

BROWNSVILLE PUBLIC UTILITIES BOARD

Request for Bid

AIRPORT SUBSTATION CONSTRUCTION

Bid #020-25

Proposal Due: January 15, 2025 by 5:00 PM

Proposal Acknowledgement: January 16, 2025 at 11:00 AM

TABLE OF CONTENTS

Part I - Contract Specifications

DESCRIPTION	PAGE No
LEGAL NOTICE AND INVITATION TO BID	1
INSTRUCTIONS TO BIDDERS	3
SPECIAL INSTRUCTIONS	4

BIDDING DOCUMENTS

BID SCHEDULE	19
BID BOND	35
CONTRACTOR'S PRE-BID DISCLOSURE STATEMENT	37
SUB-CONTRACTOR'S PRE-BID DISCLOSURE STATEMENT	40
REQUIRED FORMS	44

CONTRACT / SAMPLE FORMS

NOTICE OF AWARD	60
ACCEPTANCE OF NOTICE	61
NOTICE TO PROCEED	62
AGREEMENT	63
PERFORMANCE BOND	64
PAYMENT BOND	67
CERTIFICATE OF INSURANCE	70

GENERAL CONDITIONS

GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT	71
SUPPLEMENTARY GENERAL CONDITIONS	131

PART II – TECHNICAL SPECIFICATIONS

SPECIFICATIONS	147
ADDITIONAL INFORMATION	259

**LEGAL NOTICE
AND
INVITATION TO BID
B #020-25**

Sealed bids will be received by the PUBLIC UTILITIES BOARD of the City of Brownsville, Texas ("BPUB"), at the BPUB Purchasing Department office; 1155 FM 511, Olmito, Texas 78575 **until 5:00 PM, January 15, 2025** for the Project described in the Contract Documents and Specifications entitled:

AIRPORT SUBSTATION CONSTRUCTION

Bids received after this time will not be considered.

Bids will be publicly opened and read aloud on January 16, 2025 at 11:00 AM. Bidders can request a copy of the bid tabulation by emailing hlopez@brownsville-pub.com. Vendors can call in at 11:00 AM, January 16, 2025 to (956) 214-6020 to listen to the bid opening.

Copies of the Contract Documents and Specifications may be obtained at following website: https://www.brownsville-pub.com/rfp_status/open/. **A mandatory pre-bid conference will be held via conference call. Vendors can call (956) 214-6020 to attend the pre-bid conference on December 20, 2024 at 11:00 AM.**

Each bid, in duplicate, shall be enclosed in a sealed envelope and shall be plainly marked on the outside of the envelope: **"B020-25 AIRPORT SUBSTATION CONSTRUCTION, JANUARY 15, 2025 AT 5:00 PM"**. This envelope shall be addressed to Diane Solitaire; Brownsville Public Utilities Board; Purchasing Department; 1155 FM 511, Olmito, Texas 78575.

Each bid shall constitute an offer to the Board, as outlined therein, and shall be irrevocable for at least ninety (90) days after the time announced for the opening thereof.

Each bid shall be accompanied by a Certified or Cashier's check payable to the order of the Brownsville Public Utilities Board, City of Brownsville, Texas for a sum not less than five (5%) percent of the total amount bid. In lieu of a check, a Bid Bond may be submitted in an amount not less than five (5%) percent of the total amount bid with a Corporate Surety licensed to do business in the State of Texas, conditioned that the BIDDER will pay the BPUB, as mutually agreed to liquidated damages, and not as a penalty, the amount specified in the Bond unless he enters into a contract in accordance with his bid. BIDDER is required to execute a contract and furnish a Performance Bond, Payment Bond and a Certificate of Insurance. If the BIDDER fails to execute the contract and to furnish satisfactory Performance and Payment Bonds and Insurance Certificates within ten (10) days from the date on which he is notified that his bid has been accepted, the amount of his check or bid bond shall be forfeited to the BPUB as mutually agreed to liquidated damages, and not as a penalty. **No bid will be considered if the Bid Security is not submitted.**

The BPUB will not be responsible in the event that the U.S. Postal Service or any other courier system fails to deliver the sealed bids to the Brownsville Public Utilities Board, Purchasing

Office by the given deadline above. **No bids will be accepted via facsimile or electronic transmission.**

The BPUB specifically reserves the right to reject any or all bids, to waive irregularities or informalities in any or all bids and to accept any bid which is deemed to be in the best interest of the Board.

Diane Solitaire
Purchasing Department
(956) 983-6366

INSTRUCTIONS TO BIDDERS
Please submit this page upon receipt
Acknowledgment Form
AIRPORT SUBSTATION CONSTRUCTION
B020-25

For any clarifications, please contact Hugo Lopez at the Brownsville Public Utilities Board, Purchasing Department at (956) 983-6375 or e-mail: hlopez@brownsville-pub.com

Please e-mail this page upon receipt of the bid package or legal notice. If you only received the legal notice and you want the bid package mailed, please provide a method of shipment with account number in the space designated below.

Check one:

() Yes, I will be able to send a bid; obtained bid package from website.

() Yes, I will be able to send a bid; please email the bid package.

Email: _____

() Yes, I will be able to send a bid; please mail the bid package using the carrier & account number listed below:

Carrier: _____

Account: _____

() No, I will not be able to send a bid for the following reason:

If you are unable to send your bid, kindly indicate your reason for "No bid" above and return this form **via email to: hlopez@brownsville-pub.com**. This will ensure you remain active on our vendor list.

Upon return of this acknowledgement form, access to the Specifications & Drawings will be provided to the email address listed below. The company listed below agrees that the information to be provided is confidential and is to only be used by company in connection with preparing a bid. The company also agrees not to release this information and to comply with Federal and State laws and regulations and notify BPUB in writing within five (5) days if they receive a request for such information.

Date _____

Company: _____

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone: _____ E-mail: _____

IF SPECIFICATIONS ARE DOWNLOADED FROM WEBSITE PLEASE E-MAIL THIS PAGE TO THE ADDRESS LISTED ABOVE

Special Instructions

Contract Information

- **Interpretation**

Questions concerning terms, conditions, and technical specifications should be directed to:

Hugo E. Lopez, Purchasing Administrator (956) 983-6375	or	Diane Solitaire, Purchasing & Materials Manager (956) 983-6366
---	----	--

- **Tentative Time Line**

1. December 16, 2024 through January 15, 2025 – Vendor bid preparation.
2. January 15, 2025 at 5:00 PM - **Vendor must submit bid, in duplicate, sealed in an envelope to:**

Diane Solitaire, Purchasing & Materials Manager
1155 FM 511
Olmito, TX 78575

Bid #020-25 – AIRPORT SUBSTATION CONSTRUCTION

Due: January 15, 2024 at 5:00 PM

*The above noted information must be included on bid envelope and on any carrier's envelope/package. The Brownsville Public Utilities Board **will not be held responsible for missing, lost or late mail.** Brownsville Public Utilities Board will not accept electronic transmissions or facsimiles of sealed bids.*

1. December 20, 2024 – **Mandatory** Pre-Bid Meeting (via conference call) at 11:00 AM
2. January 10, 2025 – Last day for Questions at 5:00 PM
3. January 16, 2025 - Open bids at 11:00 AM
4. January 17 – 27, 2025 - Evaluate bids
5. January 30, 2025 - Deadline to provide final recommendations for Board approval.
6. February 13, 2025 - Send to Utilities Board for formal and possible Contract award approval

- **“Or Equal”**

Brand name and/or manufacturer's references used in this Request are descriptive – not restrictive – they are intended to generally indicate type and quality desired. Brands of like nature and quality will generally be considered. If bidding on other than referenced Specifications, please provide complete descriptive information of said material/equipment article. BPUB also reserves the legal right to specify a “sole source” component if such component is critical for integration to

a larger assembly and alternative manufactured items will not meet the design and/or performance needs of the BPUB, in BPUB's sole discretion.

- **Pricing**

Bid unit prices on BPUB estimated quantities specified, extend and show total. In case of errors in extension, unit prices expressed in written words and not numerals, shall govern. Prices shall remain firm throughout the Contract.

All fields (UNIT PRICE & TOTAL PRICE) in the Bid Schedule must be filled in. The data must be complete to identify any bidding brand called for specifically.

Failure to submit any of the above information with the sealed bid may disqualify bid as non-responsive.

- **Contractor Representative**

The successful contractor agrees to send a personal representative with binding authority for the company to the Brownsville Public Utilities Board, upon request, to make any minor clarifications or adjustments and/or assist with the coordination of all transactions as needed to allow Contract entry.

- **Quality of Products**

All material and equipment items specified must be new, and first-class condition, including containers suitable for shipment and storage. No substitutions in standard grades or lesser quality will be accepted.

- **Determining Factors for Award**

1. Price
2. Responsibility of the contractor to perform the intended work and responsiveness to the bid request.
3. Compliance with requirements of the technical specifications
4. Quality of performance on previous work on similar contracts
5. Recent successful completion of similar projects
6. BPUB financial and legal responsibility evaluations of any identified teaming arrangements involving significant joint ventures, subcontractors, and suppliers.
7. Safety record will be considered when determining the responsibility of the bidder

- **Contract with Vendor/Entity Indebted to BPUB**

It is a policy of the BPUB to refuse to enter into a contract or other transaction with an individual, sole proprietorship, joint venture, Limited Liability Company or other entity indebted to BPUB.

- **Vendor ACH (Direct Deposit) Services**

The BPUB has implemented a payment service for vendors/contractors by depositing the contract payment directly to the contractor's/vendor's bank account. Successful vendor(s)/contractors will be required to receive payments directly through Automated Clearing House (ACH) in lieu of a paper check. **The awarded vendor must agree to receive payments via ACH (Direct Deposit).**

- **Tax Identification Number (TIN)**

In accordance with IRS Publication 1220, aW9 form, or a W8 form in cases of a foreign vendor, will be required of all vendors doing business with the Brownsville PUB. If a W9 or W8 form is not made available to Brownsville PUB, the first payment will be subject to income tax withholding at a rate of 28% or 30% depending on the U.S. status and the source of income as per IRS Publication 1220. **The W9 or W8 form must be included with bid response.** Attached are sample forms.

- **Taxes**

The City of Brownsville and its Brownsville Public Utilities Board are exempt from Federal Excise Tax, State Tax and local sales Taxes. Do not include any taxes in the bid proposal. If it is later determined that tax was included in the bid it will not be included in the tabulation or any awards. Tax exemption certificates will be furnished by BPUB upon request.

- **Signing of Bid**

Failure to sign bid will disqualify it. Person signing bid should show title or authority to bind their firm to a contract.

- **EEOC Guidelines**

During the performance of this contract, the contractor agrees not to discriminate against any employee or applicant for employment because of race, national origin, age, religion, gender, sexual preference, marital or veteran status, or physically challenging condition.

- **Contract and Purchase Order**

The services shall be completed in a timely manner as specified in specifications. A contract for the services will be placed into effect by means of a purchase order issued by the Brownsville Public Utilities Board after tabulation and final Contract approval by the Board.

- **Brownsville Public Utilities Board Rights**

1. If only one or no bid is received by "submission date", the BPUB has the right to reject, re-bid, accept and/or extend the bid by up to an additional two (2) weeks from original submission date.

2. The right to reject any/or all bids and to make award as it may appear to be advantageous to the Brownsville Public Utilities Board.
3. The right to hold bid for 90 days from submission date without action, and to waive all informalities in any bid.
4. The right to extend the total bid beyond the original 90-day period prior to an award, if agreed upon in writing by all parties (BPUB and vendor/contractor) and if bidder/vendor holds original bid prices firm.
5. The right to terminate for cause or convenience all or any part of the unfinished portion of the Project resulting from this solicitation within thirty (30) calendar days written notice; for cause: upon default by the vendor/contractor, for delay or non-performance by the vendor/contractor; or if it is deemed in the best interest of the BPUB for BPUB's convenience.

- **Corrections**

Any interpretation, correction, or change of the Invitation to Bid will be made by written ADDENDUM. Changes or corrections will be issued by the Brownsville PUB Purchasing Department. **Addenda will be e-mailed to all who have returned the bid acknowledgment form.** Addenda will be issued as expeditiously as possible. It is the responsibility of the vendors/contractors to determine whether all Addenda have been received. It will be the responsibility of all respondents to contact the Brownsville PUB prior to submitting a response to the Invitation to Bid to ascertain if any/all Addenda have been issued, and to obtain any all Addenda, execute them, and return Addenda with the response to the Invitation to Bid. Addenda may also be posted on BPUB's website.

1. RECEIPT AND OPENING OF BIDS:

The Brownsville Public Utilities Board, City of Brownsville, Texas (hereinafter called OWNER), invites bids on the form attached hereto, all blanks of which must be appropriately filled in, in ink, for Project entitled **"AIRPORT SUBSTATION CONSTRUCTION"**.

The OWNER may consider informal and non-responsive, any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn by vendor/contractor prior to the above scheduled time for the opening of bids or OWNER authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No BIDDER may withdraw a bid within at least ninety (90) days after the actual date of the opening thereof.

2. INSPECTION OF SITE:

Each BIDDER shall visit the Project site of the proposed work and fully acquaint himself with the existing conditions there relating to construction and labor, and shall fully inform himself as to the facility involved, the difficulties and restrictions attending the performance of the Contract. The BIDDER shall thoroughly examine and familiarize himself with the Drawings, Technical Specifications, and all other Contract Documents. The Contractor, by the execution of the Contract, shall in no way be relieved of any obligation under it due to his failure to receive or

examine any form or legal instrument, or to visit the Project site and acquaint himself with the conditions there existing and the OWNER will be justified in rejecting any claim for extra time, or compensation, or both, based on facts regarding which Contractor should have been on notice as a result of such a diligent Project site visitation. Visits to the Project site shall be arranged by calling Eli Alvarez, Director of Electric Operations at telephone no. 956-983-6234.

3. PREPARATION OF BID AND USE OF SEPARATE BID FORMS:

These Contract Documents include a complete set of bidding documents. The BIDDER shall copy all Documents listed in the table of contents under the heading BIDDING DOCUMENTS and shall submit two sets (original signed and one signed photocopy) of his bid on these forms. A bid shall be comprised of the BIDDING DOCUMENTS completed by the BIDDER plus supplemental information required by the Specifications and Contract Documents.

If any of the information submitted as part of the bid is considered to be proprietary by the BIDDER, he shall conspicuously identify such intended confidential information in his bid. BPUB is subject to the provisions of the Texas Public Information Act and cannot legally guarantee the confidentiality of submittals and may need to consult with its legal counsel and the Texas Attorney General in rendering decisions on any requested disclosures.

- a) Preparation. Each bid shall be carefully prepared using the bid and bid data forms included as a part of the bidding documents. Entries on the bid and bid data forms shall be typed, using dark black ribbon, or legibly written in black ink. All prices shall be stated in written words and numeric figures, except where the forms provide for figures only. In case of discrepancy, especially in any sum total extensions, the amount shown in written words will generally prevail over numeric unit prices.

The BIDDER shall acknowledge, in the space provided in the bid form, receipt of each Addendum issued for the Specifications and Documents during the bidding period.

The BIDDER shall assemble all drawings, catalog data, and other supplementary information necessary to thoroughly describe work, materials and equipment covered by the bid, and shall attach such supplemental information to the copies of the specifications and documents submitted.

- b) Signatures. Each BIDDER shall sign the bid with his usual signature and shall give his full business address. The BIDDER's name stated on the bid shall be the exact legal name of the firm. The names of all persons signing should also be typed or printed below the signature.

Bids by partnerships shall be signed with the partnership name followed by the signature and designation of one of the partners or other authorized representative. A complete list of the partners shall be included with the bid.

Bids by a corporation shall be signed in the official corporate name of the corporation, followed by the signature and designation of the "president," "secretary," or other appropriate person authorized to bind the corporation.

A bid by a person who affixes to his signature the word "president," "secretary," "agent," or other designation, without disclosing his principal, will be rejected. Satisfactory evidence of the authority of the officer signing on behalf of the corporation shall be furnished. Bidding corporations shall designate the state in which they are incorporated and the address of their principal office.

- c) Submittal. The original signed bid (and its accompanying photocopy) shall be transmitted to arrive at the designated BPUB address not later than the date and time stipulated in the Legal Notice and Invitation to Bid.

Submit the original signed bid (and its accompanying photocopy) to:

Brownsville Public Utilities Board
1155 FM 511
Olmito, Texas 78575
Attention: Ms. Diane Solitaire
Purchasing Department

Each bid must be submitted in duplicate as stated above (original signature and photocopy), in a sealed envelope bearing on the outside the name of the BIDDER, his address, and the name of the Project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid itself must be enclosed in another mailing envelope addressed as specified in the bid form.

4. METHOD OF BIDDING:

Prices shall be firm, not subject to qualification, condition or adjustment. Prices shall be in United States dollars. Prices shall be lump sum, except where unit prices are requested by the bid forms. When unit price items are required by the bid, the unit prices for each of the several items in the bid of each BIDDER shall include its pro-rata share of overhead, so that the sum of the products obtained by multiplying the quantity shown for each item, by the unit price bid, represents the total bid. Any bid not conforming to that requirement may be rejected as informal and non-responsive. The special attention of all BIDDERS is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed, provided the net monetary value of all such additive and subtractive changes in quantities of such items of work pursuant to public competitive bidding statutes (i.e., difference in cost) shall not cumulatively increase or decrease the original Contract price by more than twenty-five (25%) percent. A proposed decrease only that exceeds twenty-five (25%) percent of the original Contract price must be agreed to in advance by the Contractor.

5. DISCLOSURE BY BIDDER:

Each BIDDER shall submit with the bid documents, on the form furnished for that purpose, his

Pre-Bid Disclosure Statement showing his experience record in performing the type of work embraced in the contract, his organization and equipment available for the work contemplated, and, when specifically requested by the OWNER, a detailed financial statement. The OWNER shall have the right to take such steps as it deems necessary, including telephonic contact to other owner references, to determine the ability and responsibility of the BIDDER to perform his obligations under the Contract and the BIDDER shall be responsive in furnishing the OWNER all such information and data for this purpose as it may request. OWNER reserves the right to reject any bid where an investigation of the available evidence or information does not satisfy the OWNER that the BIDDER is responsible to properly carry out the terms of the Contract. This shall also apply to any proposed subcontractor(s).

6. SUBCONTRACTS:

The BIDDER is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract under this contract must be acceptable to the OWNER, and that a Pre-Bid Disclosure Statement for each proposed subcontractor must also be submitted with the bid documents.

7. BID SECURITY:

Each bid must be accompanied by a certified or cashier's check, or a bid bond prepared on the form of the bid bond attached hereto, duly executed by the BIDDER as principal, and having as surety therein a surety company approved by the OWNER, and authorized to do business in the State of Texas, in the amount of not less than five (5%) percent of the total bid amount, but not less than \$2,500.00. Such checks, or bid bonds will be returned to all except the three lowest BIDDERS within fifteen (15) days after the opening of bids, and the remaining checks, or bid bonds will be returned promptly after the OWNER and the accepted successful BIDDER have executed the Contract or if no award has been made, within **Ninety (90) calendar** days after the date of the opening of bids. The bid security will be returned upon demand of the BIDDER at any time thereafter, so long as he has not been notified of the acceptance of his bid.

8. ADDENDA AND INTERPRETATIONS:

No oral interpretations by OWNER and its representatives shall be binding upon OWNER as to the meaning of the Plans, Specifications, Contract Documents, or other pre-bid documents.

Any interpretation, correction, or change of the bid documents will be made by ADDENDUM only. Changes or corrections will only be issued by the Brownsville PUB Purchasing Department. Addenda will be emailed to all who have returned the bid acknowledgment form. Addenda will be issued as expeditiously as possible. It is the responsibility of the vendors/contractors to determine whether all Addenda have been received. It will be the responsibility of all respondents to contact the Brownsville PUB Purchasing Department prior to submitting a response to the bid to ascertain if any Addenda have been issued, and to obtain any all Addenda, execute them, and return Addenda with the response to the bid. All Addenda so issued shall become part of the Contract Documents. Addenda may be posted on BPUB's webpage.

9. FACSIMILE MODIFICATION:

Any BIDDER may modify (not originally submit) his bid by facsimile communication at any time prior to the scheduled bid closing time for receipt of bids, provided such communication is received by the OWNER, in the BPUB Purchasing Department, prior to the bid closing time, and provided further, the OWNER is satisfied that a written confirmation of the facsimile modification, over the original signature of the BIDDER, was also mailed prior to the bid closing time. The facsimile communication should not reveal the total bid price, but only should provide the clarification, addition or subtraction, or other modification, so that the final bid prices or terms intended will not be known by the OWNER, until the original sealed bid is opened and the modification computed by OWNER.

Revised bids submitted before the opening of bids, whether forwarded by mail or facsimile, if representing an increase in excess of two percent (2%) of the original bid submittal, must have the bid security (bid bond or check) adjusted accordingly; otherwise the bid will not be considered responsive.

If the written and originally signed confirmation of a bid revision is not received within three (3) calendar days after the bid closing time, no consideration will be given to any proposed adjustment contained in the facsimile modification.

10. TIME FOR RECEIVING BIDS:

Bids received prior to the advertised hour of opening will be securely kept sealed by BPUB. The officer whose duty it is to open them will decide when the specified time has arrived, and no bid received thereafter will be considered; except that when a bid arrives by mail after the time fixed for opening, but before the public reading of all other bids is completed, and it is shown to the satisfaction of the OWNER that the non-arrival on time was due solely to delay in the mails for which the BIDDER was not responsible, such bid will be received and considered.

BIDDERS are cautioned that, while facsimile modifications of bids may be received as provided above, such modifications, if not explicit and if in any sense subject to misinterpretation, shall make the bid so modified or amended, subject to rejection for non-responsiveness.

11. OPENING OF BIDS:

At the time and place fixed for the public opening of bids, the OWNER will cause to be opened and publicly read aloud every bid received within the time set for receiving bids, irrespective of any irregularities therein. BIDDERS and other persons properly interested may be present, in person or by representative.

12. WITHDRAWAL OF BIDS:

Bids may be withdrawn on written, facsimile or electronic transmission request dispatched by the BIDDER in time for delivery in the normal course of business prior to the time fixed for bid opening; provided, that written confirmation of any facsimile withdrawal over the signature of the

BIDDER is placed in the mail and postmarked prior to the time set for bid opening. The bid security of any BIDDER withdrawing the bid in accordance with the foregoing conditions will be returned promptly.

13. AWARD OF CONTRACT: REJECTION OF BIDS:

The Contract will be awarded to the responsive and responsible BIDDER submitting the lowest bid complying with the conditions of the Legal Notice and Invitation for Bids. The BIDDER to whom the award is made will be notified at the earliest possible date. The OWNER, however, reserves the right to reject any and all bids and to waive any informality in bids received, whenever such rejection or waiver is in BPUB's interest.

The OWNER reserves the right to consider as not responsible, any BIDDER who does not habitually perform with his own forces the major portions of the work involved in construction of the improvements embraced in this proposed Contract. This provision is meant to prevent wholesale assignment and "brokering" of awarded contracts.

14. EXECUTION OF AGREEMENT: PERFORMANCE AND PAYMENT BOND:

Subsequent to the Notice of Award and within ten (10) calendar days after the prescribed forms are presented for signature, the successful BIDDER shall execute and deliver to the OWNER an Agreement in the form included in the Contract Documents in such number of copies as the OWNER may require.

Having satisfied all conditions of award as set forth elsewhere in these Documents, the successful BIDDER shall, within the period specified in the preceding paragraph, furnish a Performance Bond and Payment Bond, in accordance with the following parameters:

- a.) For a Contract in excess of \$100,000.00, a Performance Bond shall be executed in the full amount of the Contract, conditioned upon the faithful and timely performance of the Work in accordance with the Plans, Specifications, and Contract Documents. Said Bond shall be solely for the protection of the OWNER.
- b.) For a Contract in excess of \$50,000.00, a Payment Bond shall be executed in the full amount of the Contract, solely for the protection of all proper claimants supplying labor and material in the prosecution of the Work provided for in the Contract, for the use of each such claimant perfecting a proper claim. Payment Bonds are required under Texas law, since no mechanics' liens are allowed against BPUB's public property assets.

When bonds are required, they shall serve as security for the faithful performance of the Contract, and for the payment of all persons, firms or corporations to whom the Contractor may become legally indebted to for labor, materials, tools, equipment, or services of any nature, including utility and transportation services employed or used by him in performing the work. Such bonds shall be in the same form as that included in the Contract Documents and shall bear the same date as, or a date subsequent to that of the Agreement. The current power of attorney for the person who signs

for any surety company shall be attached to such bonds. These bonds shall be signed by a guaranty or surety company legally authorized to do business in the State of Texas.

The failure of the successful BIDDER to execute such Agreement and to supply the required bonds and insurance certificates within ten (10) calendar days after the prescribed forms are presented for signature, or within such extended period as the OWNER may grant in writing, based upon reasons determined sufficient by the OWNER, shall constitute a default, and the OWNER may either award the contract to the next lowest responsive and responsible BIDDER, or re-advertise for bids, and may charge against the defaulting BIDDER the difference between the amount of the defaulted bid and the amount for which a final contract for the work is subsequently executed, irrespective of whether the amount thus due exceeds the amount of the bid bond. If a more favorable bid is received by re-advertising, the defaulting BIDDER shall have no claim against the OWNER for a bid bond refund.

15. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT:

The successful BIDDER, upon his failure or refusal to execute and deliver the Contract, Bonds and insurance certificates required within ten (10) calendar days after he has received notice of the acceptance of his bid, shall forfeit to the OWNER, as mutually agreed to liquidated damages (and not as a penalty) for such failure or refusal, the security provided in the bid bond or otherwise deposited with his bid.

16. TIME OF COMPLETION AND LIQUIDATED DAMAGES:

BIDDER agrees by submission of his bid to commence Work on the date to be specified in a written "Notice to Proceed" issued by the OWNER and to Substantially Complete the Project as provided in Article 2 of the Construction Agreement.

BIDDER agrees by submission of his bid to pay as mutually agreed to liquidated damages, and not as a penalty, the sum as provided in said Construction Agreement, Article 2.

17. NOTICE OF SPECIAL CONDITIONS:

Attention is particularly called to those parts of the Contract Documents and Specifications which address the following:

- A. Inspection and testing of materials.
- B. Insurance requirements.
- C. Wage and Hour Provisions.
- D. State Sales and Use Tax Exemption Provisions

18. LAWS AND REGULATIONS:

The BIDDER's attention is directed to the fact that all applicable federal, State and local laws, statutes, ordinances, codes and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and they will be mutually

deemed to be included in the Contract, the same as though herein written out in full.

19. EQUAL EMPLOYMENT OPPORTUNITY:

Attention of BIDDERS is particularly called to the requirement for ensuring that employees and applicants for employment are not discriminated against because of their race, religion, gender, sexual preference, physically challenging condition or national origin.

20. PRE-BID CONFERENCE:

A pre-bid meeting between the OWNER, prospective bidders, suppliers, etc., will be held to answer any questions concerning the Work. No Addenda will be issued at this meeting. Subsequent thereto, if necessary to clear up any written questions, a written Addendum will be issued by the OWNER to all pre-bid conference attendees. The pre-bid meeting will be held at the place, time and date indicated in the Legal Notice. Interested parties are invited to attend via conference call. Attendance at the Pre-Bid Conference is **MANDATORY**, for all contractors and suppliers interested in bidding the Work for the Project.

21. SUBMITTAL OF TRENCH SAFETY DESIGN: (RESERVED)

The apparent low BIDDER shall provide the OWNER with a Trench Safety System Plan and a certificate signed and sealed by a Registered Professional Engineer licensed by the State of Texas, within 21 calendar days after the date of the opening of Bids prior to award of the Contract. Failure to timely comply may disqualify BIDDER.

22. INFORMATION TO BE SUBMITTED WITH BID:

Each BIDDER shall submit with his bid pertinent information concerning proposed equipment and materials and proposed construction organization.

a) Equipment and Materials. In addition to the information submitted on the bid and bid data forms, each BIDDER shall submit all specifications, preliminary drawings, and similar descriptive information necessary to describe completely the equipment and materials he proposes to furnish.

The bid shall be based on using new equipment and materials which comply with the Specifications and Documents in every respect, unless existing equipment is specifically noted by OWNER for reuse. If alternate or "equal" equipment and materials are indicated in the bid, it shall be understood that the OWNER will have the option of selecting any one of the alternates so indicated and such selection shall not be a cause for extra contractor compensation or extension of time. OWNER specifically reserves the legal right to specify "sole source" equipment or materials in the Specifications when unique circumstances warrant.

b) Contractor's Field Organization and Safety Record.

(i) An organization chart showing the names of field management, supervisory, technical personnel, and number of employees/workforce available and the details of the management, supervisory, and technical organization which he

proposes to use for this project. The successful BIDDER's organizational concept will be subject to the review and acceptance of the OWNER.

- (ii) The experience record of the Contractor's field superintendent(s) shall be submitted with the bid.
- (iii) The Contractor's job-safety record summary for the previous five (5) years
- (iv) The two most recent year's Financial Statements
- (v) List of three (3) projects completed by CONTRACTOR of both similar size and scope over the past five (5) years

23. PREFERENCE LAW:

Bid evaluations will take into consideration any Preference Laws of the State of Texas, and any reciprocity laws of other states as they may be addressed by current Texas law.

24. SUBSURFACE GEOLOGIC CONDITIONS: (RESERVED)

Each BIDDER shall be responsible for determining prior to bidding, the types of subsurface materials which will be found in the event that any new footings and upright structural supports for the Project are required. If test borings have been made on the Project site by the BPUB or its consultants, the locations and logs of the test borings are bound as an appendix to these Specifications and Documents.

It is to be expressly understood and acknowledged by the BIDDER, that any information on subsurface geology made available by OWNER for BIDDER'S convenience shall not be a part of the Contract Documents and there is no expressed or implied guarantee of the data given, nor of the interpretation thereof.

All excavation for this Project will be unclassified and the BIDDER shall be responsible for investigating and satisfying himself of subsurface geologic conditions (including the presence or likelihood of encountering soils requiring dewatering, rock or rock-like materials) prior to submitting his bid, which shall include any and all costs BIDDER associates with avoiding, managing or removing said subsurface geologic conditions without claim for extra compensation against OWNER.

25. DISPOSAL OF EXCESS MATERIALS:

After completion of this Project there may be in some instances an excess of spoil material or waste material left over. In such cases where there is an excess of material, BIDDER shall load and haul it away from the job site and dispose of it in a legal manner so as not to: trespass; adversely impact any protected wetlands; adversely impact the 100 year flood plain; adversely impact any endangered species; or otherwise create drainage diversions or impoundments. No extra remuneration for this Work will be allowed.

26. EROSION AND SEDIMENT CONTROL MEASURES:

The BIDDER is expected to conduct his Work in such a manner as to minimize any soil erosion

or sediment runoff from the construction site. Earth cuts and fills shall have smooth, flat side slopes, as generally indicated on the PLANS, to preclude erosion of the soil. Such operations should be timed consistent with the actual need for doing the Work and only to leave raw, unprotected surfaces for a minimum of time.

Existing lawns are to remain intact as far as practical. Such areas as are disturbed shall be duly restored by the BIDDER to as good as or better than original condition using the same type of grass, shrubs, or cover as the original. The BIDDER shall be responsible for correcting any erosion that occurs at his sole cost without claim for extra compensation.

As construction progresses, and in accordance with State and federal laws regulating storm water runoff and management from construction sites greater than five acres in size, if applicable, (See: Section 405 of the Water Quality Act of 1987, Section 402(P) as amended), and at locations where erosion with sediment runoff occurs or is likely to occur, the BIDDER shall construct temporary ditches, perimeter siltation screens, retainage levees, drains, inlets, or other works to manage, prevent, or correct the possible conditions. Upon completion of the Work, such facilities shall be removed.

During construction, the BIDDER shall take the necessary precautions to see that erosion is controlled and sediment runoff is prevented so as to protect the quality of any neighboring water bodies.

27. SAFETY PROVISIONS:

BIDDER shall provide barricades, flares, warning signs, and/or flagmen so that danger and inconvenience to the OWNER, public, and any job site working personnel, will be mitigated. In addition to any other requirements of the Contract Documents, the BIDDER shall be responsible for familiarity and compliance with all Federal (OSHA), State, railroad and local safety rules, laws and requirements.

28. PROTECTION OF PROPERTY AND EXISTING UTILITIES:

Within developed areas, all public and private property along and adjacent to the BIDDER'S operations, including roads, driveways, lawns, yards, shrubs, drainage gradients, and trees, shall be adequately protected, and when damages occur, they shall be repaired, replaced, or renewed or otherwise put in a condition equal to, or better than, that which existed before the BIDDER caused the damage or removal.

An attempt has been made by BPUB to show all known existing utilities on the PLANS, but the possibility remains strong that some underground utilities may exist that have not been shown. The BIDDER, through mandatory contact with local utility owners, shall keep himself informed and take such precautions as necessary to avoid utility damage and unsafe working conditions for employees.

29. WAGES AND HOURS:

The most recent wage rate determination from the U.S. Department of Labor for Cameron County, Texas as amended within the previous three (3) years and as locally adopted by the BPUB, is a part of these Specifications and controls minimum wage, hour and any fringe benefits, with the exception that no wage shall be paid below \$8.00 as established locally by the BPUB.

A copy of the appropriate (building and/or heavy/highway) wage rate schedule(s) must be posted at the job site in both English and Spanish and kept posted in a conspicuous place on the site of the Project at all times during construction. The BIDDER shall familiarize himself with the included General Conditions Section entitled "Wage and Labor Standard Provisions - 100% Non-Federally Funded Construction." Copies of the wage rate schedule(s) are included herein, but the responsibility for initial posting and keeping same posted, rests upon the BIDDER.

30. GUARANTEE:

The BIDDER shall warranty and guarantee the Work, equipment and materials for a period of at least one (1) year after date of final acceptance in writing by the OWNER. During this period, the BIDDER shall make any repairs and/or replacements of defective equipment and materials and corrections of Work due to poor workmanship, all as may be required for full compliance with the General Conditions, Plans and Specifications. This combined workmanship quality guarantee, and minimal equipment and materials warranty, shall apply to all matters reported by the OWNER in writing within said one (1) year period and this post-construction guarantee/warranty period shall be included in the coverage period set forth in the Performance Bond.

31. STATE SALES AND USE TAX EXEMPTION:

Pursuant to 34 Texas Administrative Code 3.291, in order for the Brownsville PUB to continue to benefit from its status as a State Sales and Use Tax Exempt Organization, after August 14, 1991, construction contracts must be awarded on a "separated contract" basis. A "separated contract" is one that distinguishes the value of the tangible personal property (materials such as pipe, bricks, lumber, concrete, paint, etc.) to be physically incorporated into the Project realty, from the total Contract price. Under the "separated contract" format, the Contractor in effect becomes a "seller" to the Brownsville PUB of materials that are to be physically incorporated into the Project realty. As a "seller", the Contractor will issue a "Texas Certificate of Resale" to the supplier in lieu of paying the sales tax on materials at the time of purchase. The contractor will also issue a "Certificate of Exemption" to the supplier demonstrating that the personal property is being purchased for resale and that the resale is to the Brownsville PUB, which is a sales tax exempt entity under UTCA Tax Code Section 151.309(5). Contractors should be careful to consult the most recent guidelines of the State Comptroller of Public Accounts regarding the sales tax status of supplies and equipment that are used and/or consumed during project work (gas, oil, rental equipment), but that are not physically incorporated into the project realty. Such items are generally not tax exempt. Contractors that have questions about the implementation of this statute are asked to inquire directly with the State Comptroller of Public Accounts, Tax Administration Division, State of Texas, Austin, Texas 78774. Bidders will not include any federal taxes in bid

prices since the City of Brownsville and Brownsville PUB are exempt from payment of such federal taxes. "Texas Certificates of Exemption", "Texas Certificates of Resale" and "Texas Sales Tax Permits" are forms available to the Contractor through the regional offices of the State Comptroller of Public Accounts.

BID
B020-25
AIRPORT SUBSTATION CONSTRUCTION

Place: BPUB Purchasing Department
1155 FM 511, Olmito, TX 78575

Due Date: - January 15, 2025 at 5:00 PM

Bid of _____ hereinafter called "BIDDER," a _____ (insert type of legal entity e.g. corporation, partnership, individual with d/b/a, etc.) organized and existing under the laws of the State of _____.

To: the Public Utilities Board of the City of Brownsville, Texas, hereinafter called "OWNER."

Gentlemen:

The undersigned BIDDER, in compliance with your Invitation to Bid for the **AIRPORT SUBSTATION CONSTRUCTION**, having read and examined the Plans and Specifications with related Documents and visited the site of the proposed Work, and being familiar with all of the federal, state and local conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, equipment and supplies, and to construct the project in accordance with the contract documents, within the time set forth herein, and at the Total Base Bid Amount prior to OWNER options on additive/deductive alternates of: (in words and numeric figures)

_____. These price(s) are to cover all expenses incurred in performing the Work required under the Contract Documents, of which this bid is a part. These price(s) are firm and shall not be subject to adjustment, provided this Bid is accepted by OWNER within ninety (90) calendar days after the time set for receipt of bids.

BIDDER hereby agrees to commence Work under this Contract on or before a date to be specified in a written "Notice to Proceed" to be issued by the OWNER.

BIDDER agrees to perform all Work for which he contracts as described in the Plans and Specifications for the unit prices and/or lump sums shown on the attached Bid Schedule.

BID SCHEDULE
BASE BID – B020-25
BROWNSVILLE PUBLIC UTILITIES BOARD

The Bidder, in compliance with the Invitation for Bids for the AIRPORT SUBSTATION CONSTRUCTION, having examined the scope of work and written Specifications, hereby proposes to furnish construction services for the following Unit prices.

AIRPORT SUBSTATION CONSTRUCTION BID UNITS

GROUP A - STRUCTURES AND BUS

Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price	
				Labor Price Per Unit	Extended Price	Material Price	Extended Price
AP-S100	AFDE - 138kV A-Frame Deadend Structure (Approx Wt.ea. 26,911 lbs.)	Y	3				
AP-S150	SM - Static Mast (60 foot, Approx Wt.ea. 5.369 lbs.)	Y	1				
AP-S220	HNB3 - 138kV Three-Phase High Bus Structure (Approx Wt.ea. 1,835 lbs.)	Y	4				
AP-S230	HLB3 - 138kV Three-Phase Low Bus Structure (Approx Wt.ea. 1,222 lbs.)	Y	4				
AP-S240	HNB1 - 138kV Single-Phase High Bus Structure (Approx Wt.ea. 663 lbs.)	Y	2				
AP-S250	HLB1 - 138kV Single-Phase Low Bus Structure (Approx Wt.ea. 366 lbs.)	Y	10				
AP-S270	HCCVT - 138kV Single-Phase CCVT Structure (Approx Wt.ea. 423 lbs.)	Y	2				
AP-S280	HHS3 - 138kV Three-Phase High Switch Structure (Approx Wt.ea. 2,096 lbs.)	Y	2				
AP-S290	HLS3 - 138kV Three-Phase Low Switch Structure (Approx Wt.ea. 1,517 lbs.)	Y	4				
AP-S390	RS - Riser Structure (Approx Wt.ea. 879 lbs.)	Y	2				
AP-S403	OP - Operator Platform (Approx Wt.ea. 270 lbs.)	Y	11				
AP-S450	WSB - Walkway Support Beam (Approx Wt.ea. 743 lbs.)	Y	2				
DA	138kV Large Angle Dead-end	Y	3				

AP-A20	12.47kV Bus Work Associated with Transformer #1 & #2, conductors, jumpers, bus supports, insulators, bus clamps, connectors, fittings, connector bolts, and miscellaneous hardware. This unit shall include all labor and material required to install dampening wire, and drill weep holes.	Y	1 lot				
AP-A22	15kV Metal Clad Switch Gear Equipment Installation, including pulling conductors, setting Switch Gear Cabinets, and installing owner provided fuse and pothead brackets , and miscellaneous hardware. This unit shall include all labor and material required to install owner furnished material.	Y	2				
AP-A23	15kV Capacitor Bank Equipment Installation, including pulling conductors, setting Capacitor Bank, and installing owner-provided fuse and pothead brackets, and miscellaneous hardware. This unit shall include all labor and material required to install owner-furnished material.	Y	2				
AP-E600B & AP-E561	138kV HIGH SIDE BUS MATERIAL MATERIAL	N	LOT				
AP-600C	LOW VOLTAGE (12.5kV) MATERIAL	N	LOT				
AP-600D	MISCELLANEOUS EQUIPMENT	N	LOT				
	Notes: 1. Unit weights are estimated. Unit prices to remain firm regardless of actual weights. 2. The contractor is responsible for providing all equipment mounting bolts. 3. Contractor is responsible for providing all field drilling of steel to make a complete steel installation.						
TOTAL, GROUP A							

GROUP B - THREE-POLE GROUP OPERATED AIR BREAK SWITCHES							
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price	
AP-E200- AP-E204	138kV Three-Pole group operated air break switch, "V" switch, 1200 amp rated, mounted on "HLS3" and "AFDE" structures. This unit includes the necessary drilling of steel members to correctly install switch.	Y	9				
TOTAL, GROUP B							
GROUP C - LIGHTNING ARRESTERS							
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price	
AP-E200- AP-E204	Surge Arrestor for AFDE. The only OFM to be supplied for this unit is the surge arrestor. Installation of surge arresters to include surge arrester mounting bolt, nuts, washers, connectors, and grounding wire necessary to make a complete surge arrestor assembly.	Y	9				
AP-E200- AP-E204	Surge Arrestor for HV T1 & T2. The only OFM to be supplied for this unit is the surge arrestor. Installation of surge arresters to include surge arrester mounting bolt, nuts, washers, connectors, and grounding wire necessary to make a complete surge arrestor assembly.	Y	6				
AP-E200- AP-E204	Surge Arrestor for LV T1 & T2. The only OFM to be supplied for this unit is the surge arrestor. Installation of surge arresters to include surge arrester mounting bolt, nuts, washers, connectors, and grounding wire necessary to make a complete surge arrestor assembly.	Y	6				
TOTAL, GROUP C							

GROUP D - CIRCUIT BREAKERS / CIRCUIT SWITCHERS						
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price
AP-E100	145kV, 2000 Amp, Power Circuit Breaker, 40kA interrupter rating (Item H31). This unit includes the necessary grounding material and misc. hardware to correctly install circuit breakers.	Y	3			
AP-E100	Install Re-used 138kV, 2000 Amp, Circuit Switcher, 40kA interrupter rating . This unit includes the necessary grounding material and misc. hardware to correctly install circuit switcher.	Y	1			
AP-E100	138kV, 2000 Amp, Circuit Switcher, 40kA interrupter rating. This unit includes the necessary grounding material and misc. hardware to correctly install circuit switcher.	Y	1			
TOTAL, GROUP D						
GROUP E - METERS, RELAYS, INSTRUMENT TRANSFORMERS, AND CONTROL PANELS						
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price
AP-W201A	Panel 101 138kV Filter Plant Line and High Side Bus Diff, meter, and relay panel (intra-wiring completed by others). Unit to include the labor and material to install the control panel in the control building and perform all external cable inter-wiring.	Y	1			
AP-W202A	Panel 102 XFMR T1 and 12.5kV Switchgear Unit 1 Main Breaker and Low Side Bus Diff, meter, and relay panel (intra-wiring completed by others). Unit to include the labor and material to install the control panel in the control building and perform all external cable inter-wiring.	Y	1			

AP-W203A	Panel 103 12.5kV Switchgear Unit 1 Feeder Breakers , meter, and relay panel (intra-wiring completed by others). Unit to include the labor and material to install the control panel in the control building and perform all external cable inter-wiring.	Y	1			
AP-W204A	Panel 104 138kV South Plant and Southmost (STEC) Lines , meter, and relay panel (intra-wiring completed by others). Unit to include the labor and material to install the control panel in the control building and perform all external cable inter-wiring.	Y	1			
AP-W205A	Panel 105 XFMR T2 and 12.5kV Switchgear Unit 2 Main Breaker and Low Side Bus Diff , meter, and relay panel (intra-wiring completed by others). Unit to include the labor and material to install the control panel in the control building and perform all external cable inter-wiring.	Y	1			
AP-W206A	Panel 106 12.5kV Switchgear Unit 2 Feeder Breakers , meter, and relay panel (intra-wiring completed by others). Unit to include the labor and material to install the control panel in the control building and perform all external cable inter-wiring.	Y	1			
AP-W207A	Panel 107 Communications and SCADA , panel (intra-wiring completed by others). Unit to include the labor and material to install the control panel in the control building and perform all external cable inter-wiring.	Y	1			
TOTAL, GROUP E						
GROUP F - TRANSFORMERS						
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price
AP-H2	Power Transformer, T1, 138kV - 12.47/7.2kV, 15/20/25/28 MVA. This unit includes the labor and materials required to move transformer T1, and install it on a new concrete foundation pad. The location of this transformer will be coordinated with BPUB, and is located just north of the substation site.	Y	1			

AP-H2	Power Transformer, T2, 138kV - 12.47/7.2kV, 15/20/25/28 MVA. This unit includes the labor and materials necessary to transport and install on a new concrete foundation pad. Transformer will be moved by Contractor. This transformer is located at the BPUB Facilities approximately < 5 miles from the substation site.	Y	1					
AP-C300	Oil Containment	N	2					
TOTAL, GROUP F								
GROUP G – CONDUIT AND CABLE								
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price		
AP-E400- AP- E420E	600 Volt Class Conduit System. Conduit system shall include the labor & materials required to install any size PVC (schedule 40 or 80) or GRC conduit, conduit fittings, junction boxes, cement, trenching, backfill, etc. in any type of soil conditions to make a complete installation. All above grade conduit shall be GRC and all below grade conduit shall be PVC.	N	1 lot					
AP-E400- AP- E420E	600 Volt Class Conduit Duct Bank System. This unit includes the materials and labor required to install a conduit duct bank from control building to new pull box. Duct bank to include the number of conduits as called out on the drawings.	N	1 lot					
AP-E400- AP- E420E	15kV Class Conduit System. Conduit system shall include the labor & materials required to install any size PVC (schedule 40 or 80) or GRC conduit, conduit fittings, junction boxes, trenching, backfill, etc. in any type of soil conditions to make a complete installation. Power cable conduits shall be encased in red concrete to warn of buried cable. All above grade conduit shall be GRC and all below grade conduit shall be PVC. Owner supplied 4/0 cable included in bid unit.	N	1 lot					

AP- E420A- APE- E420E	Cable, 1C, 4/0 SHIELED , including pulling terminating, and landing cable.	N	1 lot				
AP- E420A- APE- E420E	Cable, 1C, 1/0 XHHW-2 , including pulling, terminating, and landing cable.	N	1 lot				
AP- E420A- APE- E420E	Cable, 1C, 2/0 XHHW-2 , including pulling, terminating, and landing cable.	N	1 lot				
AP- E420A- APE- E420E	Cable, 1/C, #2 XHHW-2 , including pulling, terminating, and landing cable.	N	1 lot				
AP- E420A- APE- E420E	Cable, 2/C, #4 XHHW-2 , including pulling, terminating, and landing cable.	N	1 lot				
AP- E420A- APE- E420E	Cable, 1C, #8 XHHW-2 , including pulling, terminating, and landing cable.	N	1 lot				
AP- E420A- APE- E420E	Cable, 4C, #10 XHHW-2 SHIELED , including pulling, terminating, and landing cable.	N	1 lot				
AP- E420A- APE- E420E	Cable, 9C, #18 TFFN SHIELED , including pulling, terminating, and landing cable.	N	1 lot				
AP- E420A- APE- E420E	Cable, 12C, #10 XHHW-2 SHIELED , including pulling, terminating, and landing cable.	N	1 lot				

AP-E420A-APE-E420E	Cable, 4 Pair #18 , including pulling, terminating, and landing cable.	N	1 lot				
AP-E420A-APE-E420E	Cable, 6C MOD TEL CAB , including pulling, terminating, and landing cable.	N	1 lot				
AP-E420A-APE-E420E	Install SEL Cable between protection relays and communication module.	Y	1 lot				
AP-E420A-APE-E420E	Install New Trenwa. This unit to include all labor (layout and excavation) and material to properly install Trenwa as indicated on the drawings.	N	1 lot				
	NOTE: 1) Cable and conduit length estimates are provided in the drawings. Measurement of cable and conduit length shall be horizontal distances along route shown on drawings from point A to point B. Prices are to remain firm regardless of actual quantities used. 2) Group K line items are for the labor and material necessary for wiring circuits shown in AP-W100A to AP-W341						
TOTAL, GROUP G							
GROUP H - FOUNDATIONS							
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price	
AP-C220	Reinforced concrete foundation for structure "AFDE"	N	12				
AP-C220	Reinforced concrete foundation for structure "CS"	N	4				
AP-C220	Reinforced concrete foundation for structure "HHB3"	N	8				
AP-C220	Reinforced concrete foundation for structure "HLB3"	N	8				
AP-C220	Reinforced concrete foundation for structure "HHB1"	N	2				
AP-C220	Reinforced concrete foundation for structure "HLB1"	N	10				
AP-C220	Reinforced concrete foundation for structure "HCCVT"	N	2				
AP-C220	Reinforced concrete foundation for structure "HHS3"	N	4				
AP-C220	Reinforced concrete foundation for structure "HLS3"	N	8				
AP-C220	Reinforced concrete foundation for structure "RS"	N	2				
AP-C220	Reinforced concrete foundation for structure "SM"	N	1				
AP-C210	Reinforced concrete slab for Item "XFMR T1"	N	1				
AP-C210	Reinforced concrete slab for Item "XFMR T2"	N	1				

AP-C230	Reinforced concrete slab for Item "BKR"	N	3				
AP-C230	Reinforced concrete slab for Item "CB"	N	2				
AP-C250	Reinforced concrete slab for Item "SG1"	N	1				
AP-C251	Reinforced concrete slab for Item "SG2"	N	1				
TF-DxL	Steel Pole Foundation	N	3				
AP-L22	Cost adder to case or slurry a caisson foundation in the event a high water table is found. Should the contractor encounter the need to use a foundation casing or slurry system to place the concrete for a foundation, the total price for that foundation shall determined by adding the labor and material cost of this unit to the above price for the conventional placed concrete placement (Cost/lf). EXAMPLE - "SM" FND: Conventional Placement (AP-L19): Qty=1, Labor=\$100, Material=\$120, Cost=\$220 Casing/Slurry Adder (AP-L22): Qty=1, Labor=\$80, Material=\$60, Cost=\$140 In this example the Contractor will receive payment of \$360 to slurry/case one SM foundation.	N	594				
	Note: 1) Estimated concrete volumes are provided in the drawing. Prices are to remain firm regardless of actual quantities used. 2) Foundation items include all hardware, and materials required as noted in the respective drawings.						
TOTAL GROUP H							
GROUP I - STATION FENCE AND IDENTIFICATION SIGNS							
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price	
AP-C400 & AP-C410	Chain link fence , in place, including posts, top rail, fabric, aluminum barb wire, metal fabric snake guard, concrete and fence accessories for new fence.	N	1 lot				
AP-C400 & AP-C410	Installation of new 30' access gate	N	1 lot				
AP-C400 & AP-C410	Installation of new 20' access gate	N	1 lot				

AP-C400 & AP- C420	Installation of All Substation Warning, Notice, and Danger Signs as noted on the drawings.	N	1 lot				
	NOTE: Quantities of materials are shown on the drawings. Prices are to remain firm regardless of actual quantities used.						
TOTAL, GROUP I							
GROUP J - GROUNDING							
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price	
AP-E300- E312 & AP- E600A	Install Groundgrid according to specifications.	N	1 lot				
AP-E300- E312 & AP- E600A	Fence Line Post and Corner Post Grounding	N	1 lot				
AP-E300- E312 & AP- E600A	Large Gate Grounding	N	1 lot				
AP-E300- E312 & AP- E600A	138kV Switch Support Structure and Operating Platform	N	1 lot				
AP-E300- E312 & AP-E600A	138kV Deadend A-Frame Grounding	N	1 lot				
AP-E300- E312 & AP-E600A	Circuit Switcher Grounding	N	1 lot				
AP-E300- E312 & AP-E600A	138kV Circuit Breaker Grounding	N	1 lot				
AP-E300- E312 & AP-E600A	Junction and Control Box Grounding	N	1 lot				

AP-E300-E312 & AP-E600A	Capacitor Bank Grounding	N	1 lot				
AP-E300-E312 & AP-E600A	Switchgear Grounding	N	1 lot				
AP-E300-E312 & AP-E600A	Building Grounding	N	1 lot				
AP-E300-E312 & AP-E600A	Transformer Grounding	N	1 lot				
AP-E600A	Material Cost for Miscellaneous Grounding Materials (i.e. exothermic molds, ground rods, connectors, conductors, etc.) as specified on drawing AP-E600A.	N	1 lot				
TOTAL, GROUP J							
GROUP K - MISCELLANEOUS							
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price	
AP-E400	Yard Lights - This unit includes the labor, equipment, and materials required to install all of the flood lights in the substation.	Y	1 lot				
AP-Q3	138kV Porcelain Insulator Painting - Contractor is responsible for supplying labor, material, and equipment to apply 570 High Voltage Insulator Coating ("Seal Guard," Midsun Group, 1-800-4-MIDSUN) to prevent excess leakage current, tracking and flashover to new insulators. Seal Guard shall not be applied to anything made of polymer. The contractor is responsible to be fully trained or have a Midsun supervisor present during application so there is a full warranty in effect following application. The Midsun Insulator Coating is contractor furnished and WHITE in color. The porcelain insulators shall be painted in a dust-free environment (i.e. paint booth or other environment protected area.) INSULATOR COATING SHALL BE ADDED TO ALL NEW 650kV BIL BUSHINGS AND STATION POST INSULATORS, INCLUDING INSULATORS MOUNTED ON NEW SWITCHES.	N	1 lot				

AP-Q4	25kV Porcelain Insulator Painting- Contractor is responsible for supplying labor, material, and equipment to apply 570 High Voltage Insulator Coating ("Seal Guard," Midsun Group, 1-800-4-MIDSUN) to prevent excess leakage current, tracking and flashover to new insulators. Seal Guard shall not be applied to anything made of polymer. The contractor is responsible to be fully trained or have a Midsun supervisor present during application so there is a full warranty in effect following application. The Midsun Insulator Coating is contractor furnished and WHITE in color. The porcelain insulators shall be painted in a dust-free environment (i.e. paint booth or other environment protected area.) INSULATOR COATING SHALL BE ADDED TO ALL NEW STATION POST INSULATORS, INCLUDING INSULATORS MOUNTED ON NEW SWITCHES.	N	1 lot				
TOTAL, GROUP K							
GROUP L - TESTING							
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price	
AP-T1	Field Testing , check-out and acceptable testing of the substation facilities as described in the Division FT of the "Contract Documents". The substation testing, check-out and acceptance will be performed by:	NA	1 lot				
TOTAL, GROUP L							
TOTAL SUBSTATION BID AMOUNT							
GROUP X - OPTIONS							
Drawing Ref.	NAME AND DESCRIPTION OF CONSTRUCTION UNIT	Owner Furnished	NO. OF UNITS	LABOR PRICE		Material Price	
N/A	TOP ROCK/INSULATION ROCK (INSIDE THE STATION)	N	1 LOT				
N/A	T-LINE WORK WITHIN THE SUBSTATION – OPTIONAL	Y	1 LOT				
TOTAL, GROUP X							
TOTAL, GROUP X (OPTIONS)							
TOTAL SUBSTATION BID AMOUNT & OPTIONS							

TOTAL AMOUNT OF BID (ITEMS GROUP A - L, X): \$ _____

(written in words)

NOTE: Quantities are estimated. The Brownsville PUB reserves the right to increase or decrease quantities as allowed by Texas law (plus or minus 25%) and as deemed necessary by OWNER, without impacting the quoted unit prices. Prospective bidders are encouraged to visit and assess the existing Project site and structures prior to submitting a bid.

BIDDER Acknowledges receipt of the following Addenda:

SUBCONTRACTORS. The undersigned BIDDER proposes that he will be responsible to perform major portions of the Work at the Project site with his own forces and that specific portions of the Work not performed by the undersigned will be subcontracted and performed by the following subcontractors.

Work Subcontracted	Name of Subcontractor
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Bid amounts are to be legibly shown in both words and figures. In case of discrepancy, the unit price shown in words will govern.

The above unit prices shall include all labor, materials, excavation, bailing, shoring, removal, backfill, overhead, profit, insurance, etc., to cover the finished Work of the several kinds called for.

BIDDER understands that the OWNER reserves the right to reject any or all bids and to waive any informalities in the bidding.

BIDDER agrees that this bid shall be good and may not be withdrawn for a period of ninety (90) calendar days after the scheduled bid opening.

The undersigned hereby declares that only the persons or firms interested in the bid as principal or principals are named herein, and that no other persons or firms than are herein mentioned have any interest in this Bid or in the Contract to be entered into; that this Bid is made without connection with any other person, company, or parties likewise submitting a bid or bid; and that it is in all respects for and in good faith, without collusion or fraud.

Upon receipt of written notice of the acceptance of this bid, BIDDER will execute the formal Contract attached within ten (10) days and deliver the Bonds and Insurance Certificates as required under the GENERAL CONDITIONS. The Bid security attached in the sum of _____ (\$_____) is to become the property of the OWNER in the event the Contract, Bonds, and insurance certificates are not executed or delivered within the time above set forth, as mutually agreed to liquidated damages and not as a penalty for the delay and additional administrative expense to the OWNER caused thereby; otherwise the Bid security will be returned upon the signing of the Contract and delivering the approved Bonds and insurance certificates.

Seal affixed here if BID is by a Corporation:
Respectfully submitted,

By: _____
Signature **(failure to sign disqualifies bid)**

Title

Address

Attest: _____

BID BOND

STATE OF TEXAS §

KNOW ALL MEN BY THESE PRESENTS:

COUNTY OF CAMERON §

THAT WE, the undersigned, _____ as Principal, and _____ as Surety, are hereby held and firmly bound unto the PUBLIC UTILITIES BOARD OF THE CITY OF BROWNSVILLE, TEXAS as OWNER in liquidated damages (not as a penalty) of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 20__.

The Condition of the above obligation is such that whereas the Principal has submitted to the OWNER a certain BID attached hereto and hereby made a part hereof to enter into a contract in writing, for **AIRPORT SUBSTATION CONSTRUCTION**.

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the form of Agreement attached hereto (properly completed in accordance with said BID) and shall furnish payment and performance bonds for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall furnish insurance certificates, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void. Otherwise the same shall remain in force and effect, it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by an extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Signed, this ____ day of _____, 20__.

Principal

Surety

By:_____

IMPORTANT - Surety companies executing BONDS must be legally authorized by the State Board of Insurance to transact business in the State of Texas, and be listed as approved federal sureties in the most recently issued (as of the date of legal notice) edition of the U. S. Treasury Circular 570.

CONTRACTOR'S

PRE-BID DISCLOSURE STATEMENT

All questions must be answered or your bid will be deemed non-responsive and subject to rejection. 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 he desires, so long as that information does not constitute a condition, qualification or exception to the Bid Submittal.

1. This Pre-Bid Disclosure Statement is submitted to the Brownsville Public Utilities Board by: _____
 ___ a Corporation, ___ a Partnership, ___ a Texas Joint Venture, or ___ an Individual.
 Address: _____ Contractor's #: _____
 City _____ State _____ Zip Code _____

2. Years in business under present business name: _____

3. Years of experience in construction work of the type called for in this contract as: A General Contractor _____, A Subcontractor _____.

4. What projects has your organization completed within the last five (5) years? List most recent FIRST.

Contract	Type of Work	Date Completed	Owners Name and Address	Amount

5. What projects does your organization have under way as of this date?

Contract	Type of Work	Date Completed	Owners Name and Address	Amount

6. Have you ever failed to complete any work awarded to you?

___ Yes ___ No. If "Yes", state where and why. _____

7. Are you at present in any binding arbitrations and/or lawsuits involving construction work of any type?

___ Yes ___ No. If "Yes", explain: _____

8. Explain in detail the manner in which you have inspected the work and jobsite proposed in this contract:_____

9. Explain in detail your plan or layout for performing the work proposed in this contract:

10. If this contract is awarded to you, your company's office administrative manager for the work will be Mr. (Ms.) _____, and your resident construction superintendent will be Mr. (Ms.) _____.

11. What experience in this type of work does the individual designated as resident superintendent above have? _____

12. What portions of the work do you intend to subcontract?_____

13. What equipment do you own that is available for the proposed work?

Quantity	Description, Size Capacity, Etc.	Condition	Years in Service	Present Location

14. Have you received firm offers from suppliers or manufacturers for all major items of material and/or equipment within the price totals used in preparing your bid?__ Yes __ No

15. Attach resumes for the principal members of your organization, including the officers as well as the proposed superintendent for the project.

Credit available: \$_____ Bank Reference:_____

Bonding Capacity available: \$_____

The undersigned hereby authorizes and requests any person, firm or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Pre-Bid Disclosure Statement.

The signatory of this questionnaire guarantees the truth and accuracy of all statements herein made and all answers herein expressed.

Dated this ____ day of _____, 20____.

By:_____

Title:_____

STATE OF _____

COUNTY OF _____

Subscribed and sworn to before me this ____ day of _____20____.

Notary Public

My commission expires: _____

**SUBCONTRACTOR'S
PRE-BID DISCLOSURE STATEMENT**

All questions must be answered or the general contractor's bid will be deemed non-responsive and subject to rejection. The data given must be clear and comprehensive. **This statement must be notarized.** If necessary, questions may be answered on separate attached sheets. The subcontractor may submit any additional information he desires.

1. This Pre-Bid Disclosure Statement is submitted to the Brownsville Public Utilities Board by: _____

___ a Corporation, ___ a Partnership, ___ a Texas Joint Venture, or ___ an Individual.

Address: _____ Contractor's #: _____

City _____ State _____ Zip Code _____

2. Years in business under present business name: _____

3. Years of experience in construction work of the type called for in this contract as: A General Contractor _____, A Subcontractor _____.

4. Have you ever previously worked as a subcontractor for this general contractor?
___Yes___No; If yes, list the three most recent projects in which your company has served as a subcontractor to this general contractor.

.
.
.

5. What projects has your organization completed within the last five (5) years? List most recent FIRST.

Contract	Type of Work	Date Completed	Owners Name and Address	Amount

6. What projects does your organization have under way as of this date?

Contract	Type of Work	Date Completed	Owners Name and Address	Amount

7. Have you ever failed to complete any work awarded to you?

___ Yes ___ No. If "Yes", state where and why. _____

8. Are you at present in any finding arbitrations and/or lawsuits involving construction work of any type?

___ Yes ___ No. If "Yes", explain: _____

9. Explain in detail the manner in which you have inspected the work and jobsite proposed in this contract: _____

10. Explain in detail your plan or layout for performing the work proposed in this contract: _____

11. If this subcontract is awarded to you by the general contractor, your company's office administrative manager for the work will be Mr. (Ms.) _____,

and your resident construction superintendent will be Mr. (Ms.) _____.

12. What experience in this type of work does the individual designated as resident superintendent above have? _____

13. What portions of the work do you intend to subtier subcontract? _____

14. What equipment do you own that is available for the proposed work?

Quantity	Description, Size Capacity, Etc.	Condition	Years in Service	Present Location

15. Have you received firm offers from suppliers or manufacturers for all major items of material and/or equipment within the prices totals used in preparing your subcontractor bid?
 ___ Yes ___ No

16. Attach resumes for the principal members of your organization, including the officers as well as the proposed superintendent for the project.

Credit available: \$_____ Bank Reference:_____

Bonding Capacity available: \$_____

The undersigned hereby authorizes and requests any person, firm or corporation to furnish any information requested by the Engineer and Owner in verification of the recitals comprising this Pre-Bid Disclosure Statement.

The signatory of this questionnaire guarantees the truth and accuracy of all statements herein made and all answers herein expressed.

Dated this ____ day of _____ 20____.

By:_____

Title:_____

STATE OF _____

COUNTY OF _____

Subscribed and sworn to before me this ____ day of _____ 20____.

Notary Public

My commission expires: _____

REQUIRED FORMS CHECKLIST

The following forms are be submitted as a part of the Bid/RFP/RFQ document

NAME	FORM DESCRIPTION	SUBMITTED WITH BID	
		YES	NO
Legal Notice	Acknowledgement Form	☐	☐
	Debarment Certification	☐	☐
	Ethics Statement	☐	☐
	Conflict of Interest Questionnaire	☐	☐
	Certification of Interested Party Form 1295	☐	☐
	Residence Certification	☐	☐
	State Law Verification	☐	☐
	House Bill 89 Verification	☐	☐
	W9 or W8 Form	☐	☐
Special Instructions	Bid Schedule/Cost sheet completed and signed	☐	☐
	Cashier Check or Bid Bond of 5% of Total Amount of Bid (if applicable)	☐	☐
	OSHA 300 Log (if applicable)	☐	☐
	Contractor Pre-Bid Disclosure completed, signed and notarized (if applicable)	☐	☐
	Sub-Contractor Pre-Bid Disclosure completed, signed, and notarized (if applicable)	☐	☐
		☐	☐
References	Complete the Previous Customer Reference Worksheet for each reference provided	☐	☐
Addenda			

Prospective Bidders are respectfully reminded to completely read and thoroughly respond to the BPUB Instructions for Bidders and Pre-Bid Disclosure Statement. When BPUB evaluates the Bids, it reviews indices regarding the prospective contractors' responsibility to perform the project based upon prior job performances for BPUB and other public owners. Additionally, BPUB carefully reviews the prospective contractors' responsiveness to the BPUB Bid Advertisement. Bidders should thoroughly check their submittal for completeness prior to responding to BPUB. Do not imbalance your Bid line items to overload portions of the work. Remember to answer all written questions in the Pre-Bid Disclosure Statement and then notarize it when signing. Bidders are often required to submit OSHA 300 Logs from prior job performance records as well. BPUB can, has, and will reject Bids that fail the responsibility and/or responsiveness standards so as to protect the integrity of the bidding process for all participants. The Bidding community's compliance with these guideline standards will be appreciated by the BPUB.

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER
RESPONSIBILITY MATTERS
(THIS FORM MUST BE COMPLETED IN ITS ENTIRETY AND SUBMITTED WITH BID RESPONSE)**

Name of Entity:_____

The prospective participant certifies to the best of their knowledge and belief that they and their principals:

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

I understand that a false statement on this certification may be grounds for rejection of this bid or termination of the award. In addition, under 18 USC Section 1001, a false statement may result in a fine up to a \$10,000.00 or imprisonment for up to five (5) years, or both.

Name and Title of Authorized Representative (Typed)

Signature of Authorized Representative

Date

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

ETHICS STATEMENT (THIS FORM MUST BE COMPLETED IN ITS ENTIRETY AND SUBMITTED WITH BID RESPONSE)

The undersigned bidder, by signing and executing this bid, certifies and represents to the Brownsville Public Utilities Board that bidder has not offered, conferred or agreed to confer any pecuniary benefit, as defined by (1.07 (a) (6) of the Texas Penal Code, or any other thing of value as consideration for the receipt of information or any special treatment of advantage relating to this bid; the bidder also certifies and represents that the bidder has not offered, conferred or agreed to confer any pecuniary benefit or other thing of value as consideration for the recipient's decision, opinion, recommendation, vote or other exercise of discretion concerning this bid, the bidder certifies and represents that bidder has neither coerced nor attempted to influence the exercise of discretion by any officer, trustee, agent or employee of the Brownsville Public Utilities Board concerning this bid on the basis of any consideration not authorized by law; the bidder also certifies and represents that bidder has not received any information not available to other bidders so as to give the undersigned a preferential advantage with respect to this bid; the bidder further certifies and represents that bidder has not violated any state, federal, or local law, regulation or ordinance relating to bribery, improper influence, collusion or the like and that bidder will not in the future offer, confer, or agree to confer any pecuniary benefit or other thing of value of any officer, trustee, agent or employee of the Brownsville Public Utilities Board in return for the person having exercised their person's official discretion, power or duty with respect to this bid; the bidder certifies and represents that it has not now and will not in the future offer, confer, or agree to confer a pecuniary benefit or other thing of value to any officer, trustee, agent, or employee of the Brownsville Public Utilities Board in connection with information regarding this bid, the submission of this bid, the award of this bid or the performance, delivery or sale pursuant to this bid.

THE VENDOR SHALL DEFEND, INDEMNIFY, AND HOLD HARMLESS THE BROWNSVILLE PUBLIC UTILITIES BOARD, ALL OF ITS OFFICERS, AGENTS AND EMPLOYEES FROM AND AGAINST ALL CLAIMS, ACTIONS, SUITS, DEMANDS, PROCEEDING, COSTS, DAMAGES, AND LIABILITIES, ARISING OUT OF, CONNECTED WITH, OR RESULTING FROM ANY ACTS OR OMISSIONS OF CONTRACTOR OR ANY AGENT, EMPLOYEE, SUBCONTRACTOR, OR SUPPLIER OF CONTRACTOR IN THE EXECUTION OR PERFORMANCE OF THIS BID.

I have read all of the specifications and general bid requirements and do hereby certify that all items submitted meet specifications.

COMPANY: _____

AGENT NAME: _____

AGENT SIGNATURE: _____

ADDRESS: _____

CITY: _____

STATE: _____ ZIP CODE: _____

TELEPHONE: _____ TELEFAX: _____

FEDERAL ID#: _____ AND/OR SOCIAL SECURITY #: _____

DEVIATIONS FROM SPECIFICATIONS IF ANY:

NOTE: QUESTIONS AND CONCERNS FROM PROSPECTIVE CONTRACTORS SHOULD BE RAISED WITH OWNER AND ITS CONSULTANT (IF APPLICABLE) AND RESOLVED IF POSSIBLE, PRIOR TO THE BID SUBMITTAL DATE. ANY LISTED DEVIATIONS IN A FINALLY SUBMITTED BID MAY ALLOW THE OWNER TO REJECT A BID AS NON-RESPONSIVE.

THIS FORM MUST BE COMPLETED IN ITS ENTIRETY & SUBMITTED WITH BID RESPONSE

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 	
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.

CERTIFICATE OF INTERESTED PARTIES-FORM 1295

Special message: Please read the Special Notification regarding HB 1295 effective January 1, 2016, implemented by the Texas Ethics Commission, which requires business entities to provide a completed Form 1295 to Brownsville PUB with signed contracts in order to execute them.

In 2015, the Texas Legislature adopted House Bill 1295. The law states that a governmental entity or state agency may not enter into certain contracts with a business entity unless the business entity submits a disclosure of interested parties to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency. The law applies to a contract of a governmental entity or state agency that either (1) requires an action or vote by the governing body of the entity or agency before the contract may be signed or (2) has a value of at least \$1 million. The disclosure requirement applies to a contract entered into on or after January 1, 2016.

To implement the law, the Texas Ethics Commission (TEC) adopted new rules necessary to prescribe the disclosure of interested parties form, and post a copy of the form on the commission's website. The commission adopted the Certificate of Interested Parties form, Form 1295, on October 5, 2015. The commission also adopted new rules as part of Chapter 46 of the Texas Administrative Code on November 30, 2015.

On January 1, 2016, TEC made a new filing application available on their website for business entities to use to both create and file Form 1295. Business entities will enter the required information on Form 1295 within the application and print a copy of the completed form, which will include a certification of filing with a unique certification number. An authorized agent of the business entity will need to sign the printed copy of the form and have the form notarized. The completed Form 1295 with the certification of filing must be included with the signed contract to the governmental body or state agency in order for the governmental body to execute the contract.

Brownsville PUB will then notify the commission, using TEC's filing application, of the receipt of the filed Form 1295 with the certification of filing not later than the 30th day after the date the contract binds all parties to the contract.

TEC will then post the business entity's completed Form 1295 to its website within seven (7) business days after receiving notice from Brownsville PUB acknowledging that it was received.

To obtain additional information on HB 1295, to learn more about TEC's process to create a new account or to complete an electronic version of Form 1295 for submission with a signed contract, please go to the following link: https://ethics.state.tx.us/whatsnew/elf_info_form1295.htm

NOTE: IF AWARDED THIS CONTRACT, FORM 1295 WILL BE SUBMITTED AT THE TIME THE SIGNED CONTRACT IS SUBMITTED TO BPUB. ☐ YES ☐ NO

CERTIFICATE OF INTERESTED PARTIES**FORM 1295**

Complete Nos. 1 - 4 and 6 if there are interested parties.
Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

OFFICE USE ONLY

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the goods or services to be provided under the contract.

4 Name of Interested Party	City, State, Country (place of business)	Nature of Interest (check applicable)	
		Controlling	Intermediary

5 Check only if there is NO Interested Party. ☐

6 UNSWORN DECLARATION

My name is _____, and my date of birth is _____.

My address is _____,
(street) (city) (state) (zip code) (country)

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

Executed in _____ County, State of _____, on the _____ day of _____, 20____.
(month) (year)

Signature of authorized agent of contracting business entity
(Declarant)

ADD ADDITIONAL PAGES AS NECESSARY

Organization Name
State Law Verifications

I, _____ (Person's name), the undersigned
representative of (Company or Business name) _____
_____ (hereafter referred to as the
"Company") being an adult over the age of eighteen (18) years of age, after being duly sworn by
the undersigned notary, do hereby depose and verify under oath as follows:

- **IRAN, SUDAN AND FOREIGN TERRORIST ORGANIZATIONS:** By submission of a response to City of Brownsville Public Utilities Board ("BPUB") Request for Bid B020-25 (the "RFB"), the responding Company represents that, to the extent this proposal submission or any contracts executed in response to this proposal constitutes a governmental contract within the meaning of Section 2252.151 of the Texas Government Code, as amended, solely for purposes of compliance with Section 2252.152 of the Texas Government Code, and except to the extent otherwise required by applicable federal law, neither the responding Company, nor any wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of the Company 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.
- **ANTI-BOYCOTT ISRAEL VERIFICATION:** By submission of a response to the BPUB RFQ, the responding Company represents that, to the extent this proposal submission, or any contracts executed in response to this proposal, constitutes a contract for goods or services within the meaning of Section 2271.002 of the Texas Government Code, as amended, solely for purposes of compliance with Chapter 2271 of the Texas Government Code, and subject to applicable federal law, including without limitation, 50 U.S.C. Section 4607, the responding Company, as well as any wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of the Company, (1) does not boycott Israel and (2) will not boycott Israel through the term of any such contract. The term "boycott Israel" as used in this paragraph has the meaning assigned to such term in Section 808.001 of the Texas Government Code, as amended.
- **VERIFICATION REGARDING NO DISCRIMINATION AGAINST FIREARMS:** By submission of a response to the BPUB RFQ, the responding Company represents that, to the extent this proposal submission, or any contracts executed in response to this proposal, constitutes a contract for goods or services for which a written verification is required under Section 2274.002, Texas Government Code (as added by Senate Bill 19, 87th Texas Legislature, Regular Session), as amended, the responding Company hereby verifies that it, as well as any wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of the Firm, (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 any such contract against a firearm entity or firearm trade association. The foregoing verification is made solely to comply with Section 2274.002, Texas Government Code (as added by Senate Bill 19, 87th Texas Legislature, Regular Session), as amended, to the extent such section does not contravene applicable Texas or federal law. As used in the foregoing verification, "discriminate against a firearm entity or

firearm trade association” shall have the meaning assigned to such term in Section 2274.001, Texas Government Code (as added by Senate Bill 19, 87th Texas Legislature, Regular Session).

- **VERIFICATION REGARDING NO ENERGY COMPANY BOYCOTTS:** By submission of a response to the BPUB RFQ, the responding Company represents that, to the extent this proposal submission, or any contracts executed in response to this proposal, constitutes a contract for goods or services for which a written verification is required under Section 2274.002, Texas Government Code (as added by Senate Bill 13, 87th Texas Legislature, Regular Session), as amended, the responding Company hereby verifies that the responding Company, as well as any wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of the Firm, (1) does not boycott energy companies and (2) will not boycott energy companies during the term of any such contract. The foregoing verification is made solely to comply with Section 2274.002, Texas Government Code (as added by Senate Bill 13, 87th Texas Legislature, Regular Session), as amended, to the extent such section does not contravene applicable Texas or federal law. As used in the foregoing verification, “boycott energy companies” shall have the meaning assigned to such term in Section 809.001(1), Texas Government Code.

DATE

SIGNATURE OF COMPANY REPRESENTATIVE

On this the ____ day of _____, 20____, personally appeared

_____, the above-named person, who after by me being duly sworn, did swear and confirm that the above is true and correct.

NOTARY SEAL _____

NOTARY SIGNATURE _____

Date

BROWNSVILLE PUBLIC UTILITIES BOARD

RESIDENCE CERTIFICATION

In accordance with Art. 601g, as passed by the 1985 Texas Legislature, the following will apply. The pertinent portion of the Act has been extracted and is as follows:

Section 1. (a)

(1) "Nonresident bidder" means a bidder whose principal place of business is not in this state, but excludes a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

(2) "Texas resident bidder " means a bidder whose principal place of business is in this state, and includes a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

Section 1. (b)

The state or governmental agency of the state may not award a contract for general construction, improvements, services, or public works projects or purchases of supplies, materials or equipment to a nonresident bidder unless the nonresident's bid is lower than the lowest bid submitted by a responsible Texas resident bidder by the same amount that a Texas resident bidder would be required to underbid a nonresident bidder to obtain a comparable contract in the state in which the nonresident's principal place of business is located.

I certify that
(Company Name) is a **resident Texas bidder** as defined in Art. 601g.

Signature: _____

Print Name: _____

I certify that _____ (Company
Name) is a **nonresident bidder** as defined in Art. 601g. and our principal place of business is:

(City and State)

Signature: _____

Print Name: _____

Organization Name
House Bill 89 Verification

I, _____ (Person name), the undersigned representative of
(Company or Business name) _____
_____ (hereafter referred to as company)
being an adult over the age of eighteen (18) years of age, after being duly sworn by the undersigned
notary, do hereby depose and verify under oath that the company named- above, under
the provisions of Subtitle F, Title 10, Government Code Chapter 2270:

1. Does not boycott Israel currently; and
2. Will not boycott Israel during the term of the contract providing that:
 - (1) "company" does not include a sole proprietorship; and
 - (2) the law applies only to a contract that:
 - (a) is between a governmental entity and a company with 10 or more full-time employees; and
 - (b) has a value of \$100,000 or more that is to be paid wholly or partly from public funds or the governmental entity

Pursuant to Section 2270.001, Texas Government Code:

1. "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; and
2. "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.

DATE SIGNATURE OF COMPANY REPRESENTATIVE

On this the ____ day of _____, 20____, personally appeared

_____, the above-named person, who after by me being
duly sworn, did swear and confirm that the above is true and correct.

NOTARY SEAL _____

NOTARY SIGNATURE _____
Date

A Job Safety Analysis (JSA) form is to be completed, executed, and submitted by the vendor prior to entering into a contractual agreement with the OWNER. The JSA form will be valid for a period of 1 month after which an updated JSA form is to be completed, executed and submitted by the vendor. The completed JSA form must be included along with other Contract Documents included herein. Assistance in completing this form is available from Adolfo Vasquez, BPUB Safety Department, at (956) 983-6254.

B R O W N S V I L L E
P U B L I C U T I L I T I E S B O A R D

Contractor JSA Form



B R O W N S V I L L E
P U B L I C U T I L I T I E S B O A R D

JOB SAFETY ANALYSIS FORM

PROJECT NAME: 		DATE:
PROJECT CONTRACTOR: 	POINT OF CONTACT & TEL #: 	ANALYSIS BY:
BPUB DEPARTMENT: 	SECTION: 	REVIEWED BY:
REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT: 		APPROVED BY:
SEQUENCE OF BASIC JOB STEPS <i>Beware of being too detailed; record only the information needed to describe each job action. Rule of thumb, not more than 10 steps/task being evaluated.</i>	POTENTIAL ACCIDENTS OR HAZARDS <i>HAZARD CLASSIFICATION CATEGORIES: Struck By/Against, Caught In/Between, Slip, Trip, or Fall, Overexertion, Ergonomic (Awkward Postures, Excessive Force, Vibration, Repetitive Motion)</i>	RECOMMENDED SAFE JOB PROCEDURE <i>HAZARD CONTROL CATEGORIES: Engineer Out (New Way to Do, Change Physical Conditions or Work Procedures, Adjust/Modify/Replace Work Station Components/Tools, Decrease Performance Frequency), Personal Protective Equipment (PPE), Training, Improve Housekeeping.</i>
•	•	•
•	•	•
•	•	•
•	•	•
•	•	•

C:\Documents and Settings\agonzalez\Local Settings\Temporary Internet Files\VOLK69\CONTRACTOR JOB SAFETY ANALYSIS FORM - TEMPLATE (4).doc
Page 1 of 2

• [REDACTED]	• [REDACTED]	• [REDACTED]
• [REDACTED]	• [REDACTED]	• [REDACTED]
• [REDACTED]	• [REDACTED]	• [REDACTED]

JOB SAFETY ANALYSIS WORKSHEET

Comments:

[REDACTED]

Contractor Representative & Title	Signature	Date
[REDACTED]		[REDACTED]
[REDACTED]		[REDACTED]
[REDACTED]		[REDACTED]

Previous Customer Reference Worksheet

Name of Customer:		Customer Contact:
Customer Address:		Customer Phone Number:
		Customer Email:

Name of Company Performing Referenced Work:

What was the Period of Performance?		What was the Final Acceptance Date?
From:		
To:		
Dollar Value of Contract?		What Type of Contract?
\$_____		☐ Firm Fixed Price ☐ Time and Material ☐ Not to Exceed ☐ Cost Plus Fixed Fee ☐ Other, Specify:_____

[illegible]

**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)	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.)	
	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 ☐		
	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

Form W-8BEN-E

(Rev. October 2021)

Department of the Treasury
Internal Revenue Service**Certificate of Status of Beneficial Owner for
United States Tax Withholding and Reporting (Entities)**

► For use by entities. Individuals must use Form W-8BEN. ► Section references are to the Internal Revenue Code.
► Go to www.irs.gov/FormW8BENE for instructions and the latest information.
► Give this form to the withholding agent or payer. Do not send to the IRS.

OMB No. 1545-1621

Do NOT use this form for:

- U.S. entity or U.S. citizen or resident W-9
- A foreign individual W-8BEN (Individual) or Form 8233
- A foreign individual or entity claiming that income is effectively connected with the conduct of trade or business within the United States (unless claiming treaty benefits) W-8ECI
- A foreign partnership, a foreign simple trust, or a foreign grantor trust (unless claiming treaty benefits) (see instructions for exceptions) . . . W-8IMY
- A foreign government, international organization, foreign central bank of issue, foreign tax-exempt organization, foreign private foundation, or government of a U.S. possession claiming that income is effectively connected U.S. income or that is claiming the applicability of section(s) 115(2), 501(c), 892, 895, or 1443(b) (unless claiming treaty benefits) (see instructions for other exceptions) W-8ECI or W-8EXP
- Any person acting as an intermediary (including a qualified intermediary acting as a qualified derivatives dealer) W-8IMY

Instead use Form:**Part I Identification of Beneficial Owner****1** Name of organization that is the beneficial owner**2** Country of incorporation or organization**3** Name of disregarded entity receiving the payment (if applicable, see instructions)**4** Chapter 3 Status (entity type) (Must check one box only):

- ☐ Simple trust ☐ Tax-exempt organization
☐ Central Bank of Issue ☐ Private foundation
☐ Grantor trust ☐ Disregarded entity

☐ Corporation☐ Complex trust☐ Estate☐ International organization☐ Partnership☐ Foreign Government - Controlled Entity☐ Foreign Government - Integral PartIf you entered disregarded entity, partnership, simple trust, or grantor trust above, is the entity a hybrid making a treaty claim? If "Yes," complete Part III. ☐ Yes ☐ No**5** Chapter 4 Status (FATCA status) (See instructions for details and complete the certification below for the entity's applicable status.)☐ Nonparticipating FFI (including an FFI related to a Reporting IGA FFI other than a deemed-compliant FFI, participating FFI, or exempt beneficial owner).☐ Participating FFI.☐ Reporting Model 1 FFI.☐ Reporting Model 2 FFI.☐ Registered deemed-compliant FFI (other than a reporting Model 1 FFI, sponsored FFI, or nonreporting IGA FFI covered in Part XII). See instructions.☐ Sponsored FFI. Complete Part IV.☐ Certified deemed-compliant nonregistering local bank. Complete Part V.☐ Certified deemed-compliant FFI with only low-value accounts. Complete Part VI.☐ Certified deemed-compliant sponsored, closely held investment vehicle. Complete Part VII.☐ Certified deemed-compliant limited life debt investment entity. Complete Part VIII.☐ Certain investment entities that do not maintain financial accounts. Complete Part IX.☐ Owner-documented FFI. Complete Part X.☐ Restricted distributor. Complete Part XI.☐ Nonreporting IGA FFI. Complete Part XII.☐ Foreign government, government of a U.S. possession, or foreign central bank of issue. Complete Part XIII.☐ International organization. Complete Part XIV.☐ Exempt retirement plans. Complete Part XV.☐ Entity wholly owned by exempt beneficial owners. Complete Part XVI.☐ Territory financial institution. Complete Part XVII.☐ Excepted nonfinancial group entity. Complete Part XVIII.☐ Excepted nonfinancial start-up company. Complete Part XIX.☐ Excepted nonfinancial entity in liquidation or bankruptcy. Complete Part XX.☐ 501(c) organization. Complete Part XXI.☐ Nonprofit organization. Complete Part XXII.☐ Publicly traded NFFE or NFFE affiliate of a publicly traded corporation. Complete Part XXIII.☐ Excepted territory NFFE. Complete Part XXIV.☐ Active NFFE. Complete Part XXV.☐ Passive NFFE. Complete Part XXVI.☐ Excepted inter-affiliate FFI. Complete Part XXVII.☐ Direct reporting NFFE.☐ Sponsored direct reporting NFFE. Complete Part XXVIII.☐ Account that is not a financial account.**6** Permanent residence address (street, apt. or suite no., or rural route). **Do not use a P.O. box or in-care-of address** (other than a registered address).

City or town, state or province. Include postal code where appropriate.

Country

7 Mailing address (if different from above)

City or town, state or province. Include postal code where appropriate.

Country

For Paperwork Reduction Act Notice, see separate instructions.

Cat. No. 59689N

Form **W-8BEN-E** (Rev. 10-2021)

NOTICE OF AWARD

TO: _____

Project Description: **AIRPORT SUBSTATION CONSTRUCTION (B020-25)**

Dear Sir/Madam:

The Owner has considered the BID submitted by you for the above-described Work in response to its Legal Notice and Invitation to Bid dated **January 15, 2025** and Instruction to Bidders.

You are hereby notified that after any Owner adjustments to the Base Bid Amount to account for Owner options regarding additive and deductive alternates, your BID has been accepted in the final Contract Price amount of \$_____.

You are required by the Instructions to Bidders to execute the Construction Agreement and furnish any required Contractor's Performance Bond, Payment Bond and Certificates of Insurance within ten (10) calendar days from the date of this Notice to you.

In addition with the Bonds and Insurance Certificates, you must complete, execute, and submit a Contractor Job Safety Analysis (JSA) form. The JSA form is required prior to entering into a contractual agreement with the OWNER, and will be valid for a period of 30 days after which you must complete, execute and submit an updated JSA form. The completed JSA form is included as a part of the Contract Documents.

If you fail to execute this Agreement and furnish any required Bonds, Insurance Certificates, or other certifications within ten (10) days from the date of this Notice, Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your BID as abandoned, and as a forfeiture of your BID BOND.

The Owner will be entitled to such other rights as may be granted by law and equity.

You are required to promptly sign and return an acknowledged copy of this NOTICE OF AWARD to the Owner.

Dated this ____ day of _____ 20__.

BROWNSVILLE PUBLIC UTILITIES BOARD OF THE
CITY OF BROWNSVILLE, TEXAS

By: _____
Name: Marilyn D. Gilbert, MBA
Title: General Manager / CEO

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by:

_____ this ____ day
of _____ 2024.

By: _____

Name: _____

Title: _____

NOTICE TO PROCEED

TO:

ADDRESS:

Contract For: **AIRPORT SUBSTATION CONSTRUCTION (B020-25)**

You are notified that the Contract Time under the above Contract will commence to run on _____20____. By that date, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement, the date of Substantial Completion prior to final payment is _____20____.

Before you may start any Work at the site, material submittals must be submitted and approved by the BPUB before a Purchase Order is issued and prior to the purchase and shipment of materials.

Brownsville Public Utilities Board:
(Owner)

BY: _____
(Authorized Signature)

DATE: _____

NAME: Marilyn D. Gilbert, MBA

TITLE: General Manager/CEO

FOR: Brownsville Public Utilities Board

SAMPLE CONSTRUCTION AGREEMENT PENDING

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT _____
(Name of Contractor)

(Address of Contractor)

a _____
(corporation, partnership, or individual)

hereinafter called Principal, and

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto the PUBLIC UTILITIES BOARD of the City of Brownsville, Texas, hereinafter called OWNER, in liquidated damages (not as a penalty) of _____ Dollars (\$_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain Contract with the OWNER, dated the ____ day of _____ 20____, a copy of which is hereto attached and made a part hereof, for the construction of the: **AIRPORT SUBSTATION CONSTRUCTION.**

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one (1) year post-construction workmanship guaranty and materials/equipment warranty period, and if he shall satisfy all claims and demands incurred under such Contract, and **SHALL FULLY INDEMNIFY AND SAVE HARMLESS THE OWNER FROM ALL COSTS AND DAMAGES WHICH IT MAY SUFFER BY REASON OF FAILURE TO DO SO**, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received, hereby stipulates and agrees that no written change, extension of time, alteration or addition to the terms of the Contract or to WORK to be performed thereunder, or the SPECIFICATIONS accompanying the same, shall in any ways affect its obligation on this BOND, and it does hereby waive notice of any such written change, extension of time, alteration or addition to the terms of the Contract, or to the WORK, or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR

shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

This bond is subject to and governed by Section 2253.02 of the Texas Government Code (Vernon's Texas Codes Annotated) and Article 7.19-1 of Vernon's Texas Insurance Code and all amendments thereto.

IN WITNESS WHEREOF, this instrument is executed in triplicate, each counterpart of which shall be deemed an original, this the ____ day of _____ 20__.

ATTEST:

(Principal)

(Principal) Secretary By: _____ (s)
(Signature)

(SEAL)

(Witness as to Principal)

(Address)

(Address)

ATTEST:

(Surety)

(Surety) Secretary By: _____
(Attorney-in-Fact)

(SEAL)

(Witness as to Surety)

(Address)

(Address)

NOTE: Date of BOND must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must be legally authorized by the State Board of Insurance to transact business in the State of Texas.

ATTACH POWER OF ATTORNEY

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT _____
(Name of Contractor)

(Address of Contractor)

a _____
(corporation, partnership, or individual)

hereinafter called Principal, and

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto the PUBLIC UTILITIES BOARD of the City of Brownsville, Texas, hereinafter called OWNER, in liquidated damages (not as a penalty) of _____ Dollars (\$_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain Contract with the OWNER, dated the ____ day of _____ 20____, a copy of which is hereto attached and made a part hereof, for the construction of the: **AIRPORT SUBSTATION CONSTRUCTION.**

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials, for or performing labor in, the prosecution of the WORK provided for in such Contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no written change, extension of time, alteration or addition to the terms of the Contract or to WORK to be performed there under, or the SPECIFICATIONS accompanying the same, shall in any ways affect its obligation on this BOND, and it does hereby waive notice of any such written change, extension of time, alteration or addition to the terms of the Contract, or to the WORK, or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge any remaining legal right of any beneficiary hereunder, whose timely filed and legally perfected claim may be unsatisfied.

This bond is subject to and governed by Section 2253.02 of the Texas Government Code (Vernon's Texas Codes Annotated) and Article 7.19-1 of Vernon's Texas Insurance Code and all amendments thereto.

IN WITNESS WHEREOF, this instrument is executed in triplicate, each counterpart of which shall be deemed an original, this the ____ day of _____ 20__.

ATTEST:

(Principal)

(Principal) Secretary

By: _____(s)
(Signature)

(SEAL)

(Witness as to Principal)

(Address)

(Address)

ATTEST:

(Surety)

(Surety) Secretary

By: _____
(Attorney-in-Fact)

(SEAL)

(Witness as to Surety)

(Address)

(Address)

NOTE: Date of BOND must not be prior to date of Contract. If Contractor Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must be legally authorized by the State Board of Insurance to transact business in the State of Texas.

ATTACH POWER OF ATTORNEY

INSERT CERTIFICATE OF INSURANCE

**“SAMPLE”
GENERAL CONDITIONS**

**OF THE
CONTRACT**

Prepared by
The Public Utilities Board of the City of Brownsville, Texas
as an Adaptation From the 1983 Base Document Prepared by

Engineers' Joint Contract Documents Committee

and originally

Issued and Published Jointly By:

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN CONSULTING ENGINEERS COUNCIL

AMERICAN SOCIETY OF CIVIL ENGINEERS

CONSTRUCTION SPECIFICATION INSTITUTE

The base document from which this adaptation was prepared
(1983 edition) was approved and endorsed by:

The Associated General Contractors of America

TABLE OF CONTENTS OF STANDARD GENERAL CONDITIONS

Article Number	Title
1	DEFINITIONS
2	PRELIMINARY MATTERS
3	CONTRACT DOCUMENTS: INTENT, AMENDING AND REUSE
4	AVAILABILITY OF LANDS: PHYSICAL CONDITIONS: REFERENCE POINTS
5	BONDS AND INSURANCE
6	CONTRACTOR'S RESPONSIBILITIES
7	OTHER WORK
8	OWNER'S RESPONSIBILITIES
9	ENGINEER'S STATUS DURING CONSTRUCTION
10	CHANGES IN THE WORK
11	CHANGE OF CONTRACT PRICE
12	CHANGE OF CONTRACT TIME
13	WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK
14	PAYMENTS TO CONTRACTOR AND COMPLETION
15	SUSPENSION OF WORK AND TERMINATION
16	TIME FOR SUBSTANTIAL COMPLETION AND LIQUIDATED DAMAGES
17	MISCELLANEOUS

GENERAL CONDITIONS

SCOPE. The Standard General Conditions of the Construction Contract prepared by the National Society of Professional Engineers (NSPE-1910-8, 1983 Edition) as amended and adapted by the OWNER to meet local requirements, shall form a part of this Contract, together with the following Supplementary General Conditions. A copy of the locally amended Standard General Conditions (based upon NSPE-1910-8) is bound herewith. The following supplements modify, change, delete, or add to the General Conditions. Where any part of the General Conditions is modified or voided by these Articles, the unaltered provisions of that part shall remain in effect.

ARTICLE 1. DEFINITIONS

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

Addenda - Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding documents or the Contract Documents. These Addenda are a part of the Contract Documents and modify the Drawings, Specifications or other bid documents as indicated. No verbal changes in the Work not depicted or described in writing shall be binding.

Supplements to, changes in, or corrections to the Drawings and/or Specifications issued in writing by OWNER during the period of bidding. These Addenda are a part of the Contract and modify the drawings and/or specifications as indicated. No verbal changes in the work as shown or described shall become binding.

Agreement - The written and signed short-form Agreement (Contract) between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents including these General Conditions are attached to the Agreement and made a part thereof as provided therein.

Alternates. Additions; deletions from; or changes to requirements for the Project, each of which shall be bid separately and shall be included in or deleted/deducted from the Contract at the discretion of OWNER.

Application for Payment - The form developed by OWNER which is to be used by CONTRACTOR in requesting interim progress or final Contract payments and which is to include such supporting documentation as is required by the Contract Documents.

Bid - The written offer or bid of the bidder submitted on the OWNER prescribed form setting forth in figures and in script, the prices for the Work to be performed.

Bonds - Bid, Performance and Payment Bonds and any other instruments of security.

Calendar Day - A calendar day of twenty-four hours is measured from midnight, to the next midnight, and shall constitute a single calendar day. Calendar days include Saturdays and Sundays. This is a Calendar Day Contract.

Change Order - A document developed by OWNER, which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Agreement. Approved Change Orders are part of the Contract Documents.

Contract Documents - The Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post-Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all amendments, modifications, later approved Change Orders and supplements issued pursuant to paragraphs 3.4 and 3.5 on or after the Effective Date of the Agreement.

Contract Price - The moneys payable by OWNER to CONTRACTOR under the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.9.1 in the case of Unit Price Work).

Contract Time - The number of days ("calendar" or "working" days computed as provided in paragraph 17.2) or the date specifically stated in the Agreement for the Substantial Completion of the Work.

CONTRACTOR - The person, firm or corporation with whom OWNER has entered into the Agreement to construct the Work.

Defective - An adjective which when modifying the word "Work" refers to "Work" that is unsatisfactory, faulty or deficient, or does not conform to, or comply with the Contract Documents, or does not meet the requirements of any inspection, referenced standard, test or approval referred to in the Contract Documents, or has been damaged prior to the time OWNER makes the final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.8 or 14.10).

Drawings - The drawings (plans) which depict the character, design, and scope of the Work to be performed and which have been prepared and/or approved by OWNER and are referred to in the Contract Documents.

Effective Date of the Agreement - The date indicated in the Agreement document upon which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed by OWNER.

Engineer- The OWNER - designated Brownsville P.U.B. in-house staff registered professional person, named as the OWNER's engineering representative for the Project. There is no outside independent engineering consultant anticipated to be retained by OWNER for this Project.

Field Order - A written order issued by OWNER which orders minor changes or interpretations in the Work in accordance with paragraph 9.5, but which does not involve a change

in the Contract Price or the Contract Time.

Furnish. To supply at the jobsite the material, equipment, etc., referred to. Installation is not required of the supplier by the specifications, but shall be arranged for by the General CONTRACTOR.

General Requirements - Sections _____ of the Specifications.

Laws and Regulations; Laws or Regulations - Federal and/or State Laws, rules, administrative agency regulations, local ordinances, local codes and/or court orders.

Notice of Award - The written notice by OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.

Notice to Proceed - A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Time will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.

OWNER - The City of Brownsville, acting through its Public Utilities Board of the City of Brownsville, Texas and its authorized representatives.

Partial Utilization - Placing a portion of the Work in service for the benefit of the OWNER and for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion for all the Work.

Project - The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

Provide. To furnish and install the material, equipment, etc. referred to, at the location shown or otherwise approved at the Project job-site.

Resident Project Representative - The authorized representative of OWNER who is assigned to periodically observe the site of the Project, or any part thereof, on behalf of OWNER.

Shop Drawings - All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by, or for CONTRACTOR, to illustrate some portion of the Work, and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by CONTRACTOR, to illustrate material or equipment for some portion of the Work.

Specifications - Those portions of the Contract Documents consisting of written technical descriptions for the design configuration and/or performance standard of materials, equipment, any specified construction systems, standards and workmanship, as applied to the Work and certain administrative details applicable thereto.

Standard Abbreviations. Wherever reference is made to standard specifications,

standards of quality or performance, as established by a recognized national authority, the reference may be by initials and acronyms as generally recognized throughout the industry.

Subcontractor - An individual, firm or corporation having a direct contract with CONTRACTOR, or with any other Subcontractor (subtier), for the performance of a part of the Work at the Project site.

Substantial Completion - (See generally paragraph 14.8) The Work (or a specified part thereof) has progressed to the point where, in the opinion of OWNER as evidenced by its definitive written and signed certificate of Substantial Completion, it is apparently sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the OWNER's purposes for which it is intended; or if there is no such certificate issued, when final payment is due in accordance with paragraph 14.13. The terms "Substantially Complete" and "Substantially Completed" as applied to any Work refer to the Substantial Completion thereof.

Supplementary Conditions - The part of the Contract Documents which amends or supplements these General Conditions.

Supplier - A manufacturer, fabricator, supplier, distributor, materialman or third-party vendor.

Underground Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any outer encasements containing such facilities (vaults) which have been installed underground to furnish/transport any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other related data communications, cable television, sewage, storm drainage, traffic or other electronic control systems or potable water.

Unit Price Work - Work to be paid for on the basis of unit prices for OWNER estimated quantities.

Work - The entire completed construction or the various separately identifiable parts thereof, required to be furnished by the CONTRACTOR under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

Work Directive Change - A written directive to CONTRACTOR, issued on or after the Effective Date of the Agreement and signed by OWNER, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.22. A Work Directive Change may not change the Contract Price or the Contract Time, but is evidence that the parties expect that the change directed or documented by a Work Directive Change will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Time as provided in paragraph 10.2.

Working Day. A week day (Monday through Friday only, inclusive) in which weather conditions are such that Work can be performed in a normal manner. Weekends (Saturday,

Sunday) and holidays shall not be considered working days. This Contract is not a Working Day Contract.

Written Amendment - A written amendment of the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the non-engineering or non-technical (commercial terms, legal provisions, etc.), rather than strictly Work-related, aspects of the Contract Documents. Written Amendments are normally embodied in a Change Order once construction commences.

ARTICLE 2. PRELIMINARY MATTERS

Delivery of Bonds:

2.1 When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish in accordance with paragraph 5.1.

Copies of Documents:

2.2 OWNER shall furnish to CONTRACTOR up to five (5) copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished to CONTRACTOR, upon request, at the cost of reproduction reimbursable to OWNER.

Commencement of Contract Time; Notice to Proceed:

2.3 The Contract Time will commence to run on the date indicated in the Notice to Proceed. A Notice to Proceed may be given by Owner at any time after the Effective Date of the Agreement. The CONTRACTOR might not yet be actually performing Work after Contract Time commences.

Starting the Project:

2.4 CONTRACTOR is obligated to perform the Work on the date when the Contract Time commences to run, but no Work shall be done at the Project site prior to the date on which the Contract Time commences to run per the Notice to Proceed.

Before Starting Construction:

2.5 Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to OWNER any conflict, error or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from OWNER's Engineer before proceeding with any Work affected thereby, however CONTRACTOR shall not be liable to OWNER for failure to report any conflict, error or discrepancy in the Contract Documents, unless CONTRACTOR had actual knowledge thereof or should reasonably have known thereof pursuant to customary construction industry

standards.

2.6 Within ten (10) calendar days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to OWNER for review:

2.6.1 an estimated Work Progress Schedule indicating the starting and completion dates of the various critical stages of the Work; and

a preliminary schedule of Shop Drawing submissions; and

2.6.2 a preliminary Schedule of Values for all of the Work, which will include quantities and prices of items aggregating the total Contract Price and will subdivide the Work into logical component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work which will be automatically confirmed in writing by CONTRACTOR at the time of submission to OWNER.

2.7 By the tenth (10th) calendar day after award of the Contract by OWNER, CONTRACTOR shall deliver to OWNER original certificates (and any other evidence of insurance requested by OWNER) which CONTRACTOR is required to purchase and maintain in accordance with Article 5.

Preconstruction Conference:

2.8 After the Effective Date of the Agreement, but before CONTRACTOR starts the Work at the Project site, a mandatory conference attended by CONTRACTOR, OWNER and others as appropriate, will be held to discuss the Schedules referred to in paragraph 2.6, to discuss procedures for handling Shop Drawings and other submittals and for processing Applications for Payment; and to establish a working and pragmatic understanding among the parties as to the general progress and administration of the Work.

Finalizing Schedules:

2.9 At least ten (10) calendar days before submission of the first Application for Payment, a mandatory conference attended by CONTRACTOR, OWNER and others as appropriate, will be held to finalize the Schedules submitted in accordance with paragraph 2.6. The finalized Progress Schedule will be made acceptable to OWNER as providing an orderly progression of the Work to completion within the Contract Time, but such OWNER acceptance will neither impose on OWNER responsibility for the progress or scheduling of the Work, nor relieve CONTRACTOR from full responsibility therefore. The finalized Schedule of Shop Drawing submissions will be acceptable to OWNER's Engineer as providing a workable arrangement for processing the submissions for review. The finalized Schedule of Values will be made acceptable to OWNER's Engineer as to form and substance.

ARTICLE 3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Intent:

3.1 The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of Cameron County, Texas.

3.2 It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents as being required of CONTRACTOR to produce the OWNER'S intended result will be supplied by CONTRACTOR, whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe Work, materials or equipment, such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, whether such reference be specific or by implication, shall mean the latest amended standard specification, manual, code or Laws or Regulations in effect at the time of opening of Bids (or, on the Effective Date of the Agreement, if there were no Bids), except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR, or any of their consultants, agents or employees from those set forth in the Contract Documents. Clarifications and interpretations of the Contract Documents shall be issued by OWNER's Engineer in writing as provided in paragraph 9.4.

3.3 If, during the performance of the Work, CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, CONTRACTOR shall so report to OWNER's Engineer in writing immediately, and before proceeding with the Work affected thereby, and CONTRACTOR shall obtain a written interpretation or clarification from OWNER's Engineer, however, CONTRACTOR shall not be liable to OWNER for failure to report any conflict, error or discrepancy in the Contract Documents unless CONTRACTOR had actual knowledge thereof, or should reasonably have known thereof pursuant to customary construction industry standards.

Amending and Supplementing Contract Documents:

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

3.4.1 a formal Written Amendment,

3.4.2 a Change Order (pursuant to paragraph 10.4), or

3.4.3 a Work Directive Change (pursuant to paragraph 10.1).

As indicated in paragraphs 11.2 and 12.1, Contract Price and Contract Time may only be changed by a Change Order or a Written Amendment.

3.5 In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

3.5.1 a Field Order (pursuant to paragraph 9.5),

3.5.2 OWNER Engineer's approval of a Shop Drawing or sample (pursuant to paragraphs 6.26 and 6.27), or

3.5.3 OWNER Engineer's written interpretation or clarification (pursuant to paragraph 9.4).

Reuse of Documents:

3.6 Neither CONTRACTOR nor any Subcontractor or Supplier, or other person or organization performing or furnishing any of the Work under a direct contract or Project involvement with OWNER, shall have or acquire any title to, or ownership rights in, any of the Drawings, Specifications or other Contract Documents (or copies of any thereof) prepared by or bearing the seal of OWNER's Engineer, and they shall not reuse any of them on extensions of the Project or any other project without written consent of OWNER and specific written verification or adaptation by OWNER's Engineer. All Drawings, Specifications or other Documents (or copies of any thereof) are upon completion of the Project to become the property of OWNER. Further use thereof without written consent of OWNER and OWNER'S Engineer is prohibited and solely at the risk of the user.

ARTICLE 4. AVAILABILITY OF LANDS: PHYSICAL CONDITIONS: REFERENCE POINTS

Availability of Lands:

4.1 OWNER shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way, licenses and easements for access thereto and such other lands which are specifically designated by OWNER for the use of CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents. If CONTRACTOR believes that any delay in OWNER's furnishing of these lands, rights-of-way, licenses or easements entitles CONTRACTOR to an extension of the Contract Time, CONTRACTOR may make a claim therefore as provided in Article 12. CONTRACTOR shall provide at his sole cost and option for any and all additional lands and access thereto not specifically provided by OWNER that CONTRACTOR may perceive are required for staging, temporary construction facilities, or storage of materials and equipment.

4.2 Physical Condition:

4.2.1 Explorations and Reports: Reference is made to the Supplementary

Conditions for any identification of any reports of geotechnical explorations and tests of subsurface conditions at the Project site that may have been utilized by OWNER's Engineer in preparation of the Contract Documents. Any of these geotechnical Explorations and Reports are expressly not part of these Contract Documents. CONTRACTOR may not rely upon the accuracy of the technical data contained in any such reports, nor upon non-technical data, interpretations or opinions contained therein or for the completeness thereof for CONTRACTOR's purposes. Except as indicated in the immediately preceding sentence and in paragraph 4.2.6, CONTRACTOR shall have full responsibility with respect to exploring, testing and encountering any subsurface conditions at the Project site.

4.2.2 Existing Structures: Reference is made to the Supplementary Conditions for any identification of those Drawings of physical conditions in or relating to existing surface or subsurface structures (except Underground Facilities referred to in paragraph 4.3) which are at or contiguous to the Project site that have been utilized by OWNER's Engineer in preparation of the Contract Documents. CONTRACTOR may rely upon the accuracy of the technical data actually contained in such drawings, but not for the current conditions or completeness thereof for CONTRACTOR's purposes. Except as indicated in the immediately preceding sentence and in paragraph 4.2.6, CONTRACTOR shall have full responsibility with respect to current locating, verification, investigation of, and encountering physical conditions in or relating to such structures.

4.2.3. Report of Differing Conditions: If CONTRACTOR believes that:

4.2.3.1 any technical data on which CONTRACTOR is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is inaccurate, or

4.2.3.2 any physical condition uncovered or revealed at the Project site differs materially from that indicated, reflected or referred to in the Contract Documents,

CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.22), notify OWNER's field representative and OWNER's Engineer in writing about the inaccuracy or difference.

4.2.4 OWNER's Review: OWNER's Engineer will promptly review the pertinent conditions, determine the necessity of either CONTRACTOR or OWNER obtaining additional physical or geotechnical explorations or tests with respect thereto, and advise CONTRACTOR in writing of the findings and conclusions.

4.2.5 Possible Document Change: If OWNER's Engineer concludes that there is a material error in the Contract Documents, or that because of newly discovered, latent physical conditions, a change in the Contract Documents is required, a Work Directive Change or a Change Order may be issued as provided in Article 10 to reflect and document the consequences of the inaccuracy or difference.

4.2.6 Possible Price and Time Adjustments: In each such case, an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, or any combination thereof, may be allowable to the extent that they are attributable to any such inaccuracy or difference. If OWNER and CONTRACTOR are unable to agree as to the amount

or length thereof, a CONTRACTOR claim may be made therefore as provided in Articles 11 and 12. All increases or decreases in the Contract Price shall be governed by all State and local statutes, codes, laws, ordinances, rules and regulations governing public competitive bidding and Change Orders.

Physical Conditions

4.3 Underground Facilities:

4.3.1 Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Project site is only based on existing available information and data furnished to OWNER by the owners of such Underground Facilities, (utilities, pipeline companies, railroads, etc.) or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

4.3.1.1 OWNER shall not be responsible for the actual current conditions, accuracy or completeness of any such third-party information or data; and,

4.3.1.2 CONTRACTOR shall have full responsibility for reviewing and checking all such current information and data; for locating all current Underground Facilities shown or indicated in the Contract Documents, for coordination of the Work with the owners of such Underground Facilities during construction; for the safety and protection thereof as provided in paragraph 6.20 and; paying for the repair of any damage thereto resulting from the Work; the cost of all of which will be mutually considered between OWNER and CONTRACTOR as having been included in the CONTRACTOR'S original Contract Price.

4.3.2 Not Shown or Indicated: If an Underground Facility is uncovered or revealed at or contiguous to the Project site which was not shown or indicated in the Contract Documents, and which CONTRACTOR could not reasonably have been expected to be aware of under customary construction industry standards, CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work affected thereby (except in an emergency as permitted by paragraph 6.22), identify the owner of such Underground Facility and give written notice thereof to that owner and to OWNER's Engineer. OWNER's Engineer will promptly review the Underground Facility to determine the extent to which the Contract Documents should be modified to reflect and document the consequences of the existence of the Underground Facility, and the Contract Documents may be amended or supplemented to the extent necessary. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.20. CONTRACTOR may be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents, and which CONTRACTOR could not reasonably have been expected to be aware of pursuant to customary construction industry standards. If the parties are unable to agree as to the amount or length thereof, CONTRACTOR may make a claim therefore as provided in Articles 11 and 12. All increases or decreases in the Contract Price shall be governed by all State and local statutes, codes, laws, ordinances, rules and regulations governing public competitive bidding and Change Orders.

Reference Points:

4.4. OWNER shall provide CONTRACTOR with any reasonably current and existing engineering surveys to assist CONTRACTOR to establish reference points for construction, which in OWNER Engineer's judgment are adequate to enable a skilled CONTRACTOR to proceed with the Work pursuant to customary construction industry standards. CONTRACTOR shall be responsible for laying out the Work (unless otherwise specifically specified by OWNER in the General Requirements), and shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to OWNER's Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and CONTRACTOR shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

ARTICLE 5. BONDS AND INSURANCE

Performance and Payment Bonds:

For a Contract in excess of \$100,000.00, a Performance Bond shall be executed in the full amount of the Contract conditioned upon the faithful performance of the Work in accordance with the Plans, Specifications and Contract Documents. Said Bond shall be solely for the protection of the OWNER.

For a Contract in excess of \$50,000.00, a Payment Bond shall be executed in the full amount of the Contract, solely for the primary protection of all proper claimants against the surety for payment in supplying labor and material in the prosecution of the Work provided for in the Contract, for the use of each such claimant timely perfecting a proper claim against surety.

5.1 CONTRACTOR shall furnish Performance and Payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance of the Work and payment of all CONTRACTOR's labor, materials and supply obligations under the Contract Documents. **These bonds shall remain in effect at least until one year after the date when final payment becomes due,** except as otherwise provided by Law or Regulation or by the Contract Documents. CONTRACTOR shall also furnish any such other Bonds as may be required by the Supplementary Conditions. All Bonds shall be in the forms prescribed by Law or Regulation or by the Contract Documents and be executed by such sureties as are authorized to do business in the State of Texas. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act on behalf of the surety.

5.2 If the surety on any Bond furnished by CONTRACTOR is declared a bankrupt or becomes insolvent, or its right to do business is terminated in Texas or it ceases to meet the requirements of paragraph 5.1, CONTRACTOR shall within five (5) calendar days thereafter substitute another Bond or surety, both of which must be acceptable to OWNER.

Contractor's Liability Insurance:

5.3 CONTRACTOR shall purchase and maintain such commercial general liability and

other insurance coverages as are appropriate for the Work being performed and furnished, and as will provide protection from claims set forth below which may arise out of, or result from, CONTRACTOR's performance and furnishing of the Work and CONTRACTOR's other obligations under the Contract Documents; whether it is to be performed or furnished by CONTRACTOR, by any Subcontractor, by anyone directly or indirectly employed by any of them to perform or furnish any of the Work; or by anyone for whose acts and/or omissions any of them may be liable:

5.3.1 Claims under workers' compensation, disability benefits and other similar employee benefit acts. This is a Texas public works Contract and rejection of the worker's compensation act, and thereby substituting a CONTRACTOR'S self-insurance reserve, is specifically disallowed.

5.3.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees traditionally covered by employer's liability insurance;

5.3.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

5.3.4 Claims for damages insured by personal injury liability coverage which are sustained (a) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR; or (b) by any other person for any other reason;

5.3.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting there from;

5.3.6 Claims arising out of operation of Laws or Regulations for damages because of bodily injury or death of any person or for damage to property; and

5.3.7 Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any owned or hired motor vehicle.

The various insurance coverages required by these paragraphs 5.3 and 5.6 shall include the specific type coverage and be written for not less than the limits of liability and coverage amounts provided herein below or in the Supplementary Conditions, or required by law, whichever is greater. The commercial general liability insurance shall include completed operations insurance. All of the policies of insurance so required to be purchased and maintained (or the certificates or other evidence thereof) shall be of an "occurrence"-type, when applicable, and shall contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least (30) thirty days prior written notice has been given to OWNER by certified mail. All such insurance shall remain in effect until final payment and at all times thereafter when CONTRACTOR may be correcting, removing or replacing defective Work in accordance with paragraph 13.12. In addition, CONTRACTOR shall maintain such completed operations insurance for at least two (2) years after final payment and furnish OWNER with evidence of continuation of such insurance at final payment and one year thereafter. All insurance coverage

furnished under the Contract Documents shall include the City of Brownsville and BPUB as OWNER, and their respective public officials, officers, board members, and employees, as named additional insureds and hereinafter known as "additional insureds."

Contractual Liability Insurance:

5.4 The Commercial general liability insurance required by paragraph 5.3 will include contractual liability insurance applicable to CONTRACTOR's INDEMNITY obligations under paragraphs 6.32 and 6.33.

5.5 Specific Coverages of Insurance Required by Owner:

5.5.1 Workmen's Compensation and Employer's Liability. This insurance shall protect the laborer, and insure the CONTRACTOR, and insulate the additional insureds, against all claims under applicable Texas workmen's compensation laws, pursuant to Section 5.3.1. The additional insureds shall also be protected under an Employer's Liability policy against claims for injury, disease, or death of employees which, for any reason, may not fall within the provisions of a workmen's compensation law. This Employer's Liability policy shall include an "all states" endorsement.

5.5.2. **Mandatory TWCC Rule 28 TAC Sect. 110.110 Language**

(A) **Definitions:**

Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the Commission, or a coverage agreement (TWCC-81, TWCC- 82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's (CONTRACTOR's) employees providing services on a Project, for the duration of the Project.

"Duration of the Project" - includes the time from the beginning of the Work on the Project until the CONTRACTOR's/person's Work on the Project has been completed and accepted by the OWNER.

"Persons providing services on the Project" ("subcontractor" in § 406.096) - includes all persons or entities performing all or part of the services the CONTRACTOR has undertaken to perform on the Project, regardless of whether that person contracted directly with the CONTRACTOR and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the Project.

"Services" - include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a Project.

- (B) The CONTRACTOR shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, § 401.011(44) for all employees of the CONTRACTOR providing services on the Project, for the duration of the Project.
- (C) The CONTRACTOR must provide a certificate of coverage to the OWNER prior to being awarded the Contract.
- (D) If the coverage period shown on the CONTRACTOR'S current certificate of coverage ends during the duration of the Project, the CONTRACTOR must, prior to the end of the coverage period, file a new certificate of coverage with the OWNER showing that coverage has been extended.
- (E) The CONTRACTOR shall obtain from each person providing services on a Project, and provide to the OWNER:
 - (1) a certificate of coverage, prior to that person beginning Work on the Project, so the OWNER will have on file certificates of coverage showing coverage for all persons providing services on the Project; and
 - (2) no later than seven (7) calendar days after receipt by the CONTRACTOR, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project.
- (F) The CONTRACTOR shall retain all required certificates of coverage for the duration of the Project and for three (3) years thereafter.
- (G) The CONTRACTOR shall notify the OWNER in writing by certified mail or personal delivery, within ten (10) calendar days after the CONTRACTOR knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project.
- (H) The CONTRACTOR shall post on each Project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the Project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.
- (I) The CONTRACTOR shall contractually require each person with whom it contracts to provide services on a Project, to:
 - (1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, § 401.011(44) for all of its employees providing services on the Project, for the duration of the Project;

- (2) provide to the CONTRACTOR, prior to that person beginning Work on the Project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the Project, for the duration of the Project;
 - (3) provide the CONTRACTOR, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;
 - (4) obtain from each other person with whom it contracts, and provide to the CONTRACTOR:
 - (a) a certificate of coverage, prior to the other person beginning Work on the Project; and
 - (b) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;
 - (5) retain all required certificates of coverage on file for the duration of the Project and for three (3) years thereafter;
 - (6) notify the OWNER in writing by certified mail or personal delivery, within ten (10) calendar days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project; and
 - (7) contractually require each person with whom it contracts, to perform as required by clauses (I)-(1-7) of this subparagraph, with the certificates of coverage to be provided to the person for whom they are providing services.
- (J) By signing this Contract or providing or causing to be provided a certificate of coverage, the CONTRACTOR is representing to the OWNER that all employees of the CONTRACTOR who will provide services on the Project will be covered by workers' compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier, or, in the case of a self-insured, with the Commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the CONTRACTOR to administrative penalties, criminal penalties, civil penalties, or other civil actions.
- (K) The CONTRACTOR's failure to comply with any of these provisions is a breach of Contract by the CONTRACTOR which entitles the OWNER to declare the

Contract void if the CONTRACTOR does not remedy the breach within ten (10) calendar days after receipt of notice of breach from the OWNER.

The liability limits shall not be less than:

Workmen's compensation	Texas Statutory Limits
Employer's liability	\$100,000.00 each occurrence

5.5.3 Comprehensive Business Automobile Liability. This insurance shall be written in comprehensive business form and shall protect the CONTRACTOR and the additional insureds against all claims described under Section 5.3.6. of the General Conditions of the Contract Documents and arising from the use of motor vehicles, and shall cover, on or off the Project site, all motor vehicles licensed for highway use, whether they are owned, non-owned, or hired.

The liability limits shall not be less than:

Bodily Injury and Property Damage	\$500,000.00 combined single limit each occurrence
--------------------------------------	---

5.5.4 Commercial General Liability. This insurance shall be an "occurrence" type policy written in commercial form and shall protect the CONTRACTOR and the additional insureds against all claims described in Sections 5.3.2., 5.3.3., 5.3.4., and 5.3.5. of the General Conditions of the Contract Documents arising out of any intentional or negligent act and/or omission of the CONTRACTOR or his agents, employees, or subcontractors. This policy shall also include protection against claims insured by usual personal injury liability coverage.

The liability limits shall not be less than:

Personal Injury and property damage	\$1,000,000.00 combined single limit each occurrence and and \$1,000,000.00 aggregate
--	---

If the CONTRACTOR'S Work, or Work under his direction, requires blasting, explosive conditions, or underground operations, the commercial general liability coverage shall contain no exclusion relative to blasting, exploding, collapse of structures, or damage to underground property.

5.5.5 Excess Umbrella Liability Policy. This insurance shall protect the CONTRACTOR and the additional insureds against all claims in excess of the limits provided under the employer's liability, comprehensive business automobile liability, and commercial general liability policies. The liability limits of the umbrella policy shall not be less than \$2,000,000.00. The policy shall be an "occurrence" type policy.

5.5.6 Transportation Insurance. This insurance shall be of the "all risks" type and shall protect the CONTRACTOR and the OWNER from all insurable risks of physical loss or damage to equipment and materials in transit to the Project jobsite and until the OWNER receives

the equipment and materials at the Project jobsite. The coverage amount shall be not less than one-half of the full amount of the total Contract.

Transportation insurance shall provide for losses to be payable to the CONTRACTOR and the OWNER as their interests may appear.

5.5.7 All policies required under Section 5.5 herein shall contain a "cross liability" or "severability of interest" clause or endorsement. Notwithstanding any other provision of these policies, the insurance afforded shall apply separately to each insured, named insured, or additional insured with respect to any claim, suit, or judgment made or brought by or for any other insured, named insured, or additional insured, as though a separate policy had been issued to each, except the insurer's liability shall not be increased beyond the amount or amounts for which the insurer would have been liable had only one insured been named.

5.5.8 CONTRACTOR shall require each of his Subcontractors to procure and maintain during the life of his subcontract, Subcontractor's Commercial General Liability and Property Damage Insurance of the type specified in subparagraph 5.5.1, 5.5.2, 5.5.3, 5.5.4 and paragraph 5.6 hereof, in amounts approved by OWNER.

5.5.9 The insurance required under subparagraphs 5.5.2, 5.5.3, 5.5.4 and paragraph 5.6 hereof shall provide adequate protection for CONTRACTOR and his Subcontractors respectively against damage claims which may arise from operations under this Contract, whether such operation is by the insured or by anyone directly or indirectly employed by him, and also, against any special hazards which may be encountered in the performance of this Contract.

5.5.10 CONTRACTOR shall not commence any Work under this Contract until he has obtained all the insurance coverage required under this Article and such insurance has been approved by OWNER; nor shall CONTRACTOR allow any Subcontractor to commence Work on this Contract until the insurance required by the Subcontractor has been so obtained and approved.

Property Insurance:

5.6 Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall purchase and maintain property insurance upon the Work at the Project site to the full insurable value thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions, established by current customary construction industry standards given the type of Work and value thereof, or as may be required by Laws and Regulations). This insurance shall include the interests of OWNER, CONTRACTOR, and Subcontractors, in the Work, all of whom shall be listed as insured or additional insured parties, which shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss and damage including theft, vandalism and malicious mischief, collapse and water damage, and such other perils as may be provided in the Supplementary Conditions; and shall include damages, losses and expenses arising out of or resulting from any insured loss or cost incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers, architects, attorneys and other professionals). If not covered under the "all risk" insurance or otherwise provided in the Supplementary Conditions, CONTRACTOR shall purchase and

maintain similar property insurance on portions of the Work stored on and off the site or in transit when such portions of the Work are to be included in an Application for Payment. The policies of insurance required to be purchased and maintained by CONTRACTOR in accordance with this paragraph shall be of an "occurrence"-type, when applicable, and contain a provision that the coverage afforded will not be canceled or materially changed until at least (30) thirty days prior written notice has been given to OWNER by certified mail.

5.6.1 Property Insurance Coverage. This insurance shall protect CONTRACTOR and the additional insureds against all claims described in Section 5.6 and shall provide the following minimum amounts:

Property Insurance Coverage: Provide Full Contract Amount or
\$100,000.00 Minimum, whichever is greater.

Waiver of Rights:

5.7 Waiver

5.7.1 CONTRACTOR waives all rights against OWNER, unless OWNER was solely negligent, for all losses and damages caused by any of the perils covered by the policies of insurance provided in response to paragraph 5.6 and any other property insurance applicable to the Work, and also waives all such rights against all other parties named as additional insureds in such policies for losses and damages so caused. As required by paragraph 6.12, each subcontract between CONTRACTOR and a Subcontractor will contain similar waiver provisions by the Subcontractor in favor of OWNER, and all other parties named as additional insureds.

5.7.2 CONTRACTOR intends that any policies provided in response to paragraph 5.6 shall protect all of the parties insured and provide primary coverage for all losses and damages caused by the perils covered thereby. Accordingly, all such policies shall contain provisions to the effect that in the event of payment of any loss or damage, the insurer will have no rights of recovery against any of the parties named as insured or additional insured, and if the insurers require separate waiver forms to be signed by any Subcontractor, CONTRACTOR will obtain the same.

Acceptance of Insurance:

5.8 If OWNER has any objection to the coverage afforded by or other provisions of the insurance required to be purchased and maintained by CONTRACTOR in accordance with paragraphs 5.3 and 5.4 on the basis of the coverages not complying with the Contract Documents, OWNER will attempt to notify CONTRACTOR in writing thereof within ten (10) calendar days of the date of delivery of such certificates to OWNER in accordance with paragraph 2.7. CONTRACTOR shall provide to the OWNER such additional information regarding the insurance provided by CONTRACTOR as the OWNER may reasonably request. Failure on the part of the OWNER or its agents to detect an insurance deficiency as compared to the insurance requirements of the Contract shall not constitute a waiver by the OWNER of the insurance requirements which CONTRACTOR and/or Subcontractor must contractually meet to be in compliance herewith.

Partial Utilization - Property Insurance:

5.9 If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10. CONTRACTOR shall have the obligation to inform the insurers of OWNER's intent to so occupy or use a portion or portions of the Work. The insurers of CONTRACTOR providing the property insurance shall consent to such use or occupancy by endorsement on the policy or policies, but the property insurance shall not be canceled or lapse on account of any such partial use or occupancy by OWNER.

ARTICLE 6. CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1 CONTRACTOR shall supervise 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 and customary construction industry standards. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, procedures, safety and quality control of construction, but CONTRACTOR shall not be responsible for any negligence of others in any design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. CONTRACTOR shall be solely responsible to guarantee that the finished Work complies accurately with the Contract Documents and CONTRACTOR shall not rely upon the OWNER's construction observation to accomplish same.

6.2 CONTRACTOR shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to OWNER and ENGINEER, except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications given to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials and Equipment:

6.3 CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out the Work, oversee quality control, and perform construction of the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the Project site. Except in connection with the safety or protection of persons or the Work or property at the Project site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the Project site shall be performed during regular daily working hours (generally eight (8) hours between 7:00 A. M. and 6:00 P.M.) as may be specifically set forth by the OWNER, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without OWNER's advanced written consent. Preference employment shall be given to resident citizens of the Cameron County, Texas area where such persons are available and fully qualified to perform the Work to which the employment relates.

6.3.1 CONTRACTOR shall acquaint himself with all matters and conditions

concerning the Project site and any existing construction. Any practical criticism or exception regarding any feature of the Work must be presented in writing to OWNER at least ten (10) calendar days prior to bidding. After a Contract agreement to perform the Work has been signed by CONTRACTOR, it shall then be his responsibility to provide satisfactory Work that will meet the full intent of the Contract Documents. CONTRACTOR shall then pursue this Work with the other trades so that all phases of the Work may be properly coordinated without delays or damage to any parts of the Work.

6.4 Unless otherwise specified in the General Requirements, CONTRACTOR shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

6.4.1 CONTRACTOR shall provide and maintain suitable weather-tight, washable, sanitary toilet facilities for all workmen for the entire construction period. CONTRACTOR shall comply with all requirements of applicable health authorities. When toilet facilities are no longer required, promptly remove from the Project site, disinfect and clean the area as required. CONTRACTOR shall keep toilet facility swept and supplied with toilet tissue at all times.

6.5 All materials and equipment shall be of good quality and new, except as otherwise specifically provided in the Contract Documents. Sometimes a project specification may require salvage and reinstallation of OWNER's recently acquired machinery and equipment pre-existing at a project site. If required by OWNER's Engineer, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment procured for the Project. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable Supplier, except as otherwise provided in the Contract Documents; but no provision of any such Supplier instructions will be effective to assign to OWNER any duty or authority to supervise or direct the furnishing or performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.15 or 9.16.

6.6 CONTRACTOR shall notify OWNER in writing of any conflict between the manufacturer's directions and the Contract Documents and shall not perform any Work on any item until such conflict has been resolved. Upon award of the Contract, CONTRACTOR will secure a certificate of exemption from the Texas State Comptroller to preserve the CITY's exemption from Limited Sales, Excise and Use Tax in an amount representing that part of the total Contract price representative of the value of tangible personal property to be physically incorporated into the Project realty. The certificate of exemption must contain a statement to the effect that such materials or property have been, or will be, utilized in the performance of the Contract to the full extent of the amount for which a certificate of exemption is requested.

6.6.1 Except where otherwise specified, CONTRACTOR shall, at all times, provide protection against weather, so as to maintain all Work, materials and fixtures free from injury or damages. All new Work likely to be damaged shall be covered or otherwise protected as required.

6.6.2 While it is appreciated that CONTRACTOR has to maintain continuous construction operations and sequences, it should be understood that the OWNER's electric distribution system must function during the Contract period with a minimum of inconvenience to the electric users and the OWNER's water distribution system must function during the Contract period with a minimum of inconvenience to the water users, and that the OWNER'S sanitary sewer collection and treatment system must function during the Contract period on a 24 hour daily basis throughout the year to meet the requirements of the Texas Commission on Environmental Quality (TCEQ). It is therefore incumbent on CONTRACTOR to plan ahead on the basis of integrating his construction sequencing program as far as possible into the normal operating sequence of the utility systems. No departure from the normal operating sequence of the systems will be allowed, except with the specific advanced written agreement of OWNER.

6.6.3 CONTRACTOR shall notify OWNER a minimum of 48 hours in advance of any Work which will be tied into the existing utility systems. Method of tie-in shall be submitted to OWNER for OWNER's approval prior to any Work being performed. At no time shall contaminated water that has not been disinfected be allowed to seep into the existing waterlines, and at no time shall sewage be allowed to flow into surrounding areas. Connections will be made during times of daily minimum sewage flows, if required by Project.

6.6.4 CONTRACTOR shall coordinate his Work with that of other contractors whose work may occur at a conflicting time and location. The coordination shall be such that CONTRACTOR's Work will be maintained at a normal rate.

6.6.5 All Work that is performed on, across or along International Boundary and Water Control Commission levees must conform to all I.B. & W.C.C. requirements. All Work performed on, across or along Brownsville Irrigation and Drainage District or the Cameron County Water Control and Improvement District No.16 canals or ditches must conform to all District requirements.

6.6.6 Satisfactory access or detour roads shall be provided where necessary due to construction.

6.6.7 If required by the Bid or Project Specifications, or by law for the type of excavation construction being performed, CONTRACTOR and his Registered Professional Engineer shall develop the Trench Safety System Plan and shall provide any necessary shoring, bracing and/or sheeting pursuant to Section 756.022 of the Texas Health and Safety Code and OSHA 29 C.F.R. 1926, Subpart P, Vol. 54 No. 209 of the Federal Register, October 31, 1989, pp. 45959-45991, and, as provided in Section 11 - "Trench Excavation and Shoring Safety Plan" of the Standard Specifications.

6.6.8 CONTRACTOR shall provide adequate barricades and warning devices in conformance with the guidelines for Traffic Control as established by the Texas Department of Transportation (TDOT) in the Texas Manual on Uniform Traffic Control Devices (TMUTCD). This provision shall be subsidiary to the rest of the Work in this Contract, and shall not constitute a separate pay item.

6.6.9 CONTRACTOR shall provide the services of a technical representative for CONTRACTOR furnished equipment, for a sufficient period of time to assist in start-up and initial adjustment of all equipment, and to train, advise and consult with OWNER's operating personnel, if appropriate for the Project.

6.6.10 All items of equipment required for this Contract shall be bid to provide as part of the initial price, any literature explaining "Operation and Maintenance" of that item of equipment, if required by Project. If a manufacturer does not print such a standard O&M manual, CONTRACTOR shall provide OWNER with a customized manual approved, in writing by the manufacturer.

Adjusting Progress Schedule:

6.7 CONTRACTOR shall submit to OWNER's Engineer for acceptance (to the extent indicated in paragraph 2.9) adjustments in the Progress Schedule to reflect the impact thereon of new developments; these will conform generally to the Progress Schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

Substitutes or "Or-Equal" Items:

6.8

6.8.1 Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item, or the name of a particular Supplier, the naming of the item is intended to establish the type, function, performance standard and quality required. In some instances, the OWNER is legally allowed to "sole source" a specific material or component of equipment when its design and/or performance is required to integrate with a larger system that will remain in place. Unless the material or equipment name is followed by words indicating that no substitution is permitted, materials or equipment of other Suppliers generally may be accepted by OWNER's Engineer, if sufficient information is submitted by CONTRACTOR to allow OWNER's Engineer to determine that the material or equipment proposed is equivalent, or equal to, that named by OWNER. The procedure for review by OWNER's Engineer will include the following as supplemented in the General Requirements. Requests for review of substitute items of material and equipment will not be accepted by OWNER's Engineer from anyone other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR shall make written application to OWNER's Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitute will not prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for any other work on the Project by other contractors) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be

identified in the application and available maintenance, repair and replacement parts and service will be indicated. The application will also contain an itemized estimate of all costs or savings that will result directly or indirectly from acceptance of such substitute, including costs of redesign and potential claims of other contractors affected by the resulting change, all of which shall be considered by OWNER's Engineer in evaluating the proposed substitute. OWNER's Engineer may require CONTRACTOR to furnish at CONTRACTOR's expense additional data about the proposed substitute.

6.8.2 If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, CONTRACTOR may generally furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to OWNER's Engineer, if CONTRACTOR submits sufficient information to allow OWNER's Engineer to determine that the substitute proposed can be legally utilized by CONTRACTOR (e.g. patented or licensed processes) and is equivalent to that indicated or required by the Contract Documents. OWNER may have similar legal rights to "sole source" as indicated above in paragraph 6.8.1. The procedure for review by OWNER's Engineer will be similar to that provided in paragraph 6.8.1 above, as applied by OWNER's Engineer and as may be supplemented in the General Requirements.

6.8.3 OWNER's Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. OWNER's Engineer will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without OWNER's Engineer prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guaranty or other form of surety with respect to any substitute. OWNER's Engineer will record time required by OWNER's Engineer and any OWNER'S Engineer outside technical consultants in evaluating substitutions proposed by CONTRACTOR and in making changes in the Contract Documents occasioned thereby. Whether or not OWNER's Engineer accepts a proposed substitute, CONTRACTOR shall reimburse OWNER for the charges of OWNER's Engineer and any consultants for evaluating each proposed substitute.

Concerning Subcontractors, Suppliers and Others:

6.9

6.9.1 CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to OWNER as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

6.9.2 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of material and equipment), to be submitted to OWNER in advance of a specified date prior to the Effective Date of the Agreement for acceptance by OWNER, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date

indicated for acceptance or objection in the bidding documents or the Contractor Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked by OWNER on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute. The Contract Price may be increased by the difference in the cost occasioned by such substitution and an appropriate Change Order may be issued or Written Amendment signed. All increases or decreases in the Contract Price shall be governed by all State and local statutes, codes, laws, ordinances, rules and regulations governing public competitive bidding and Change Orders. No acceptance by OWNER of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER to reject any defective or noncompliant Work.

6.10 CONTRACTOR shall be fully responsible to OWNER for all acts and/or omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct contract or indirect relationship with CONTRACTOR, just as CONTRACTOR is responsible to the OWNER for CONTRACTOR's own acts and/or omissions. Nothing in the Contract Documents shall create any contractual relationship between OWNER and any such Subcontractor, subtier subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of OWNER to pay or to supervise the payment of any moneys due any such Subcontractor, subtier subcontractor, Supplier or other person or organization, except as may otherwise be required by Laws and Regulations.

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

6.12 All Work performed for CONTRACTOR by a Subcontractor will be pursuant to an appropriate written agreement between CONTRACTOR and the Subcontractor, which specifically binds the Subcontractor through appropriate "flow down" provisions, to the applicable terms and conditions of the Contract Documents for the benefit of OWNER, and contains waiver provisions as required by paragraph 5.7.

Patent Fees and Royalties:

6.13 CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product or device, which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work, and if to the actual knowledge of OWNER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. **CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS OWNER AND ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY OWNER AGAINST ANY CLAIMS, DAMAGES, LOSSES AND EXPENSES (INCLUDING ATTORNEYS' FEES AND COURT COSTS) ARISING OUT OF ANY INFRINGEMENT OF PATENT RIGHTS OR COPYRIGHTS INCIDENT TO THE USE IN THE PERFORMANCE OF THE WORK OR RESULTING FROM THE INCORPORATION IN THE WORK OF ANY INVENTION, DESIGN, PROCESS, PRODUCT OR DEVICE NOT SPECIFIED IN THE**

CONTRACT DOCUMENTS, AND SHALL DEFEND ALL SUCH CLAIMS IN CONNECTION WITH ANY ALLEGED INFRINGEMENT OF SUCH RIGHTS. IT IS THE EXPRESSED INTENTION OF THE PARTIES HERETO THAT THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH IS INDEMNITY BY CONTRACTOR TO INDEMNIFY AND PROTECT OWNER FROM THE CONSEQUENCES OF OWNER'S OWN NEGLIGENCE WHERE THAT NEGLIGENCE ON THE PART OF THE OWNER IS A CONCURRING CAUSE OF THE CLAIMS, DAMAGES, LOSSES, AND EXPENSES REFERENCED ABOVE. FURTHERMORE, THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH SHALL HAVE NO APPLICATION TO ANY CLAIM, DAMAGE, LOSS AND EXPENSE REFERENCED ABOVE WHERE SUCH RESULTS FROM THE SOLE NEGLIGENCE OF THE OWNER INDEPENDENT OF THE FAULT OF ANY OTHER PERSON OR ENTITY.

Permits:

6.14 Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto such as impact fees or plant investment fees, if any.

6.14.1 Fires shall not be built on the Project premises except by the express consent of OWNER and Brownsville City Fire Marshall.

Laws and Regulations:

6.15

6.15.1 CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, OWNER shall not be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

6.15.2 If CONTRACTOR has actual knowledge that the Specifications or Drawings are at variance with any Laws or Regulations, CONTRACTOR shall give OWNER's Engineer prompt written notice thereof, and any necessary changes will be authorized by OWNER by one of the methods indicated in paragraph 3.4. If CONTRACTOR performs any Work knowing, or having reason to know, that it is contrary to such Laws or Regulations, and without such notice to OWNER's Engineer, CONTRACTOR shall bear all costs arising there from; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with such Laws and Regulations.

Taxes:

6.16 "Pursuant to 34 Texas Administrative Code 3.291, in order for the OWNER to

continue to benefit from its status as a State Sales and Use Tax Exempt Organization, after August 14, 1991 construction contracts must be awarded on a "separated contract" basis. A "separated contract" is one that distinguishes the value of the tangible personal property (materials such as pipe, bricks, lumber, concrete, paint, etc.) to be physically incorporated into the Project from the total Contract price. Under the "separated contract" format, the CONTRACTOR in effect becomes a "seller" to the OWNER of materials that are to be physically incorporated into the Project realty. As a "seller", the CONTRACTOR will issue a "Texas Certificate of Resale" to the supplier in lieu of paying the sales tax on materials at the time of purchase. The CONTRACTOR will also issue a "Certificate of Exemption" to the supplier, demonstrating that the personal property is being purchased for resale and that the resale is to a public owner, the City of Brownsville, Texas, and its BPUB, which are sales tax exempt entities under UTCA Tax Code Section 151.309(5). CONTRACTOR should be careful to consult the most recent guidelines of the State Comptroller of Public Accounts regarding the sales tax status of supplies and equipment that are used and consumed during Project Work, but that are not physically incorporated into the Project realty. If the CONTRACTOR has questions about the implementation of this policy he is asked to inquire with the State Comptroller of Public Accounts, Tax Administration Division, State of Texas, Austin, Texas 78774. The CONTRACTOR will not include any federal taxes in bid prices since the OWNER is exempt from payment of such taxes. "Texas Certificates of Exemption", "Texas Certificates of Resale" and "Texas Sales Tax Permits" are forms available to the CONTRACTOR through the regional offices of the Texas State Comptroller of Public Accounts."

Use of Premises:

6.17 CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Project site and land and areas identified in and permitted by the Contract Documents, or otherwise privately acquired by the CONTRACTOR, and other land and areas permitted by Laws and Regulations, rights-of-way, permits and easements. CONTRACTOR shall assume full responsibility for any damage to any Project land or area, or to the owner or occupant thereof, or of any land or areas contiguous thereto, resulting from the performance of the Work. Should any claim be made against OWNER by any such adjacent owner or occupant because of the performance of the Work, CONTRACTOR shall promptly attempt to settle with such other party by agreement, or otherwise resolve the claim by mediation, arbitration or at law. **CONTRACTOR SHALL, TO THE FULLEST EXTENT PERMITTED BY LAWS AND REGULATIONS, INDEMNIFY, AND HOLD HARMLESS OWNER FROM AND AGAINST ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES (INCLUDING, BUT NOT LIMITED TO, FEES OF ENGINEERS, ARCHITECTS, ATTORNEYS AND OTHER PROFESSIONALS AND COURT COSTS) ARISING DIRECTLY, INDIRECTLY OR CONSEQUENTIALLY OUT OF ANY ACTION, LEGAL OR EQUITABLE, BROUGHT BY ANY SUCH OTHER PARTY AGAINST OWNER, TO THE EXTENT BASED ON A CLAIM ARISING OUT OF CONTRACTOR'S PERFORMANCE OF THE WORK. IT IS THE EXPRESSED INTENT OF THE PARTIES HERETO THAT THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH IS INDEMNITY BY CONTRACTOR TO INDEMNIFY AND PROTECT OWNER FROM THE CONSEQUENCES OF OWNER'S OWN NEGLIGENCE, WHEN THAT NEGLIGENCE ON THE PART OF THE OWNER IS A CONCURRING CAUSE OF THE INJURY, DEATH OR DAMAGE.**

FURTHERMORE, THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH SHALL HAVE NO APPLICATION TO ANY CLAIM, LOSS, DAMAGE, CAUSE OF ACTION, SUIT, AND LIABILITY WHERE THE INJURY, DEATH OR DAMAGE RESULTS FROM THE SOLE NEGLIGENCE OF THE OWNER, INDEPENDENT OF THE FAULT OF ANY OTHER PERSON OR ENTITY.

6.18 During the progress of the Work, 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 and legally dispose of all waste materials, rubbish and debris from and about the premises, as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the Project site clean and ready for occupancy by OWNER. CONTRACTOR shall restore to original condition all property not designated for alteration by the Contract Documents.

6.19 CONTRACTOR shall be confined to all working easements provided by OWNER, unless CONTRACTOR separately and privately secures at his own cost, additional private temporary construction easements. Generally, storage of excavation material and all CONTRACTOR equipment and material shall remain within the limits of Project working easements.

6.20 CONTRACTOR shall not weight load or permit any part of any structure or utility to be loaded in any manner that will endanger the structure or utility, nor shall CONTRACTOR subject any part of the Work or adjacent property to surcharge stresses or pressures, or loss of subjacent or lateral support, that will endanger it.

Record Documents:

6.21 CONTRACTOR shall as a precondition to interim progress payments, regularly maintain and update and store in a safe place at the Project site, one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Directive Changes, Field Orders and any written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and periodically annotated to show all changes made by CONTRACTOR during construction. These periodically updated record documents, together with all approved samples and a counterpart of all approved Shop Drawings, will be at all times available to OWNER's Engineer for reference. Upon completion of the Work, these record documents, samples and Shop Drawings, will be delivered to OWNER's Engineer for OWNER record retention.

Safety and Protection:

6.22 CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of employees and the general public, and shall provide the necessary protection to prevent damage, injury or loss to:

6.22.1 all employees on the Work and other persons and organizations who may be required to properly visit the Project site and be affected thereby;

6.22.2 all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Project site; and

6.22.3 other property at the Project site or adjacent thereto, including drainage gradients, trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.

6.22.4 Driveways, culverts, storm sewer inlets and laterals, and other public or private property that is destroyed or removed during the construction shall be replaced to its original or better condition by CONTRACTOR. Temporary drainage and any subgrade dewatering is to be provided by CONTRACTOR as necessary to protect and complete the Work.

6.22.5 CONTRACTOR is responsible for locating any underground obstacles. It is not represented that the Plans show all previous or current sewers, waterlines, electric lines, gas lines, telephone lines and other underground obstacles and utilities. CONTRACTOR shall exercise caution to prevent damage to existing utility facilities during the progress of the construction Work, taking care to locate same in advance of the actual Work. OWNER will render all assistance possible to CONTRACTOR in the matter of determining the location of existing utilities by making available such existing maps, records, and other available existing information as may be accessible to OWNER, when requested to do so, but the accuracy of such information will not be guaranteed by OWNER. CONTRACTOR shall make repairs and/or replacements to all damage to existing utilities resulting from his operations. Where a pipe, duct or other structure of a utility is exposed, which, in the opinion of OWNER requires strengthening, altering or moving, CONTRACTOR shall perform such Work on same, as OWNER may order, which Work may be paid for as extra Work. Should CONTRACTOR, in the layout of his Work, encounter any pipe, underground utility or structure, the location of which has been furnished to him by OWNER, he shall bring such conditions to the attention of OWNER for OWNER and CONTRACTOR discussion to determine the CONTRACTOR'S method to be used to pin in place, remove or bypass such obstructions.

6.22.6 It is essential that in the event of any damage being caused to existing utilities that immediate attention be given to their repair. Any repair work carried out shall be at the cost of CONTRACTOR and shall be performed to the complete satisfaction of OWNER, who will acknowledge same in writing. It is therefore, the duty of CONTRACTOR, prior to the commencement of construction, to inspect and accurately record in writing to OWNER, the condition of any utility which he reasonably suspects or knows to be damaged, faulty, or defective. In addition, any such utilities so recorded, which in the opinion of CONTRACTOR may deteriorate further as a result of the proposed mode of construction operations, should be protected, and/or other remedial measures employed as agreed to with OWNER.

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. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and utility owners, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, restoration and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.20.2 or 6.20.3 caused, directly or indirectly, in

whole or in part by CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work; or anyone for whose acts any of them may be liable; shall be remedied by CONTRACTOR. CONTRACTOR's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and OWNER'S Engineer has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.13 that the Work is acceptable to OWNER (except as otherwise expressly provided in connection with Substantial Completion).

6.23 CONTRACTOR shall designate in writing to OWNER a responsible representative at the Project site whose duty shall be the management of risk and safety, and that person shall make a concerted effort to assist workers and visitors at the Project site to prevent accidents. This person shall be CONTRACTOR's superintendent, unless otherwise designated in writing by CONTRACTOR to OWNER.

Emergencies:

6.24 In emergencies affecting the safety or protection of persons, or the Work, or property at the Project site or adjacent thereto, CONTRACTOR, without special written or oral instruction or authorization from OWNER, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give OWNER's Engineer prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If OWNER's Engineer determines that a change in the Contract Documents is required because of the CONTRACTOR's prompt action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of any changes or variations.

Shop Drawings and Samples:

6.25 After checking and verifying all field measurements and after complying with applicable procedures specified in the General Requirements, CONTRACTOR shall submit to OWNER's Engineer for review and approval, in accordance with the accepted Schedule of Shop Drawing submissions (see paragraph 2.9), or for other appropriate action if so indicated in the Supplementary Conditions, five (5) copies (unless otherwise specified in the General Requirements) of all Shop Drawings, which will bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the internal review of the submission. All submissions will be identified as the OWNER's Engineer may require. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable OWNER'S Engineer to efficiently and comprehensively review the CONTRACTOR's information as required.

6.25.1 Before ordering any material or doing any Work, CONTRACTOR will verify all measurements of any existing and new Work and shall be responsible for their correctness. Any differences which may be found shall be submitted to OWNER for consideration before proceeding with the Work. No extra compensation will be allowed to CONTRACTOR because of differences between actual dimensions and measurements indicated on the final working drawings.

6.26 CONTRACTOR shall also submit to OWNER's Engineer for review and approval with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and accompanied by a specific written indication that CONTRACTOR has internally satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the review of the submission, and will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended.

6.27

6.27.1 Before submission of each Shop Drawing or sample, CONTRACTOR shall have internally determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples, and with the requirements of the Work and the Contract Documents.

6.27.2 At the time of each submission, CONTRACTOR shall give OWNER's Engineer specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract Documents, and, in addition, shall cause a specific notation to be made on each Shop Drawing submitted to OWNER's Engineer for review and approval, of each such CONTRACTOR variation.

6.28 OWNER's Engineer will review and approve with reasonable promptness, Shop Drawings and samples, but OWNER Engineer's review and approval will be only for general conformance with the design concept of the Project and for compliance with the information given in the Contract Documents, and shall not extend to CONTRACTOR's means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents), or to CONTRACTOR's safety precautions or programs incident thereto. The review and approval of a separate or component item will not indicate approval of the assembly into which the item functions integrally. CONTRACTOR shall make corrections required by OWNER's Engineer, and shall return the required number of corrected copies of Shop Drawings and submit as required, new samples for review and approval. CONTRACTOR shall direct Owner Engineer's specific attention in writing to the most current revisions, other than the corrections called for by OWNER's Engineer on previous CONTRACTOR submittals.

6.29 OWNER Engineer's review and approval of Shop Drawings or samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents, unless CONTRACTOR has in writing called OWNER Engineer's attention to each such variation at the time of submission as required by paragraph 6.25.2, and OWNER's Engineer has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawing or sample approval; nor will any approval by OWNER's Engineer relieve CONTRACTOR from responsibility for CONTRACTOR's errors or omissions in the Shop Drawings, or from responsibility for having complied with the provisions of paragraph 6.25.1.

6.30 Where a Shop Drawing or sample is required by the Specifications, any related

Work performed prior to OWNER Engineer's review and approval of the pertinent submission will be at the sole risk, expense and responsibility of CONTRACTOR.

Continuing the Work:

6.31 CONTRACTOR shall carry on the Work and adhere to the Progress Schedule during any and all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as OWNER may otherwise agree in writing.

INDEMNIFICATION:

6.32 CONTRACTOR AGREES TO AND SHALL INDEMNIFY AND HOLD HARMLESS OWNER, ITS PUBLIC OFFICIALS, OFFICERS, BOARD MEMBERS, AND EMPLOYEES, FROM AND AGAINST ANY AND ALL CLAIMS, LOSSES, DAMAGES, CAUSES OF ACTION, SUITS, AND LIABILITY OF EVERY KIND, INCLUDING ALL EXPENSES OF LITIGATION, COURT COSTS, AND ATTORNEY'S FEES, FOR INJURY TO OR DEATH OF ANY PERSON, OR FOR DAMAGE TO ANY PROPERTY, ARISING OUT OR IN CONNECTION WITH THE PERFORMANCE OF THE WORK, PROVIDED THAT SUCH CLAIM, DAMAGE, LOSS, LIABILITY OR EXPENSE (A) IS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE OR DEATH OR TO INJURY OR DESTRUCTION OF TANGIBLE PROPERTY, INCLUDING THE LOSS OF USE RESULTING THERE FROM AND (B) IS CAUSED IN WHOLE OR IN PART BY ANY CONDITION OF THE WORK OR MATERIALS, OR BY ANY NEGLIGENT ACT OR OMISSION OF CONTRACTOR, ANY SUBTIER SUBCONTRACTOR, ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY CONTRACTOR OR ANY SUBCONTRACTOR OR ANYONE FOR WHOSE ACTS CONTRACTOR OR ANY SUBCONTRACTOR MAY BE LIABLE UNDER THIS CONTRACT.

SUCH INDEMNITY SHALL APPLY WHERE THE CLAIMS, LOSSES, DAMAGES, CAUSES OF ACTION, SUITS, OR LIABILITY ARISE IN PART FROM THE CONCURRENT NEGLIGENCE OF OWNER.

IT IS THE EXPRESSED INTENTION OF THE PARTIES HERETO, BOTH CONTRACTOR AND OWNER, THAT THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH IS INDEMNITY BY THE CONTRACTOR, TO INDEMNIFY AND PROTECT OWNER FROM THE CONSEQUENCES OF OWNER'S OWN NEGLIGENCE, WHERE THAT NEGLIGENCE IS A CONCURRING CAUSE OF THE INJURY, DEATH OR DAMAGE. FURTHERMORE, HOWEVER, THE INDEMNITY PROVIDED FOR IN THIS PARAGRAPH SHALL HAVE NO APPLICATION TO ANY CLAIM, LOSS, DAMAGE, CAUSE OF ACTION, SUIT, AND LIABILITY WHERE THE INJURY OR DEATH OR DAMAGE RESULTS FROM THE SOLE NEGLIGENCE OF THE OWNER, INDEPENDENT OF THE FAULT OF ANY OTHER PERSON OR ENTITY.

6.33 IN ANY AND ALL CLAIMS AGAINST OWNER OR ANY OF ITS CONSULTANTS, AGENTS OR EMPLOYEES BY ANY EMPLOYEE OF

CONTRACTOR, ANY SUBCONTRACTOR, ANY PERSON OR ORGANIZATION DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM TO PERFORM OR FURNISH ANY OF THE WORK, OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE, THE INDEMNIFICATION OBLIGATION UNDER PARAGRAPH 6.32 SHALL NOT BE LIMITED IN ANY WAY BY ANY LIMITATION ON THE AMOUNT OR TYPE OF DAMAGES, COMPENSATION OR BENEFITS PAYABLE BY OR FOR CONTRACTOR, OR ANY SUCH SUBCONTRACTOR, OR OTHER PERSON OR ORGANIZATION UNDER WORKERS' OR WORKMEN'S COMPENSATION ACTS, DISABILITY BENEFIT ACTS OR OTHER EMPLOYEE BENEFIT ACTS.

6.34 THE OBLIGATIONS OF CONTRACTOR UNDER PARAGRAPH 6.32 SHALL NOT EXTEND TO ANY LIABILITY OF OWNER, OWNER'S ENGINEER, CONSULTANTS, AGENTS OR EMPLOYEES ARISING OUT OF THE PREPARATION OR APPROVAL OF PROJECT MAPS, DRAWINGS, PLANS, OPINIONS, REPORTS, SURVEYS, CHANGE ORDERS, DESIGNS, OR SPECIFICATIONS.

6.35 CONTRACTOR shall perform all phases of Work, other than general clean-up, thru the duration of the Contract, as defined in these General and any Supplementary General Conditions. If CONTRACTOR desires to perform Work, other than general clean-up during holidays, prior proper arrangements must be made in writing with OWNER, or any other regulatory agency regarding such Work.

6.35.1 General. This Contract shall be based upon payment by CONTRACTOR and his Subcontractors of wage rates not less than the General Prevailing Wage Rate of per diem wages for work of a similar character in Cameron County, Texas, for each type of laborer, workman or mechanic needed to implement the Contract at the Project Site, and not less than the general prevailing rate of per diem wages for legal holiday and overtime Work. The Schedule of General Prevailing Wage Rates specifically adopted by the OWNER for this Project, and other important Wage and Labor Standard Provisions are included in these Contract Documents in the Supplementary General Conditions. Pursuant to local BPUB labor policy, no Project worker shall be paid less than \$8.00 per hour, regardless of the adopted wage listings in the attached U. S. Department of Labor General Wage Decision.

CONTRACTOR shall at minimum comply with all requirements of the prevailing wage law of the State of Texas, Texas Revised Civil Statutes, Texas Government Code Section 2259.001 et seq., including the latest amendments thereto, and those special local wage provisions adopted by OWNER. When in conflict , the more stringent requirements apply to CONTRACTOR.

6.35.2 Records. CONTRACTOR and each Subcontractor shall keep an accurate record showing the names and occupations of all classifications of laborers, workmen, and mechanics employed, together with the actual wages paid to each worker. At all reasonable working hours, such records shall be open to inspection by the representatives of the OWNER. With each application for payment, CONTRACTOR shall provide a certified copy of such payroll records as necessary to substantiate compliance with this provision during the period of time for which the application for payment pertains. OWNER shall take cognizance of any and all employee complaints regarding any violations of the requirements of TGC Section 2259.001 et

seq.

6.35.3 Penalty. In case CONTRACTOR and any Subcontractor fail to comply with the prevailing wage law, by statutory authority, CONTRACTOR shall forfeit to the OWNER \$60.00 per calendar day, or portion thereof, for each laborer, workman, or mechanic who is paid less than the specified local rate for any Work done under the Contract.

6.35.4 Hours of Labor. CONTRACTOR shall comply with all requirements of the hours of work on public works in accordance with the laws of the State of Texas, Texas Revised Civil Statutes, Articles 5165.1 to 5165.3, including the latest amendments thereto.

No CONTRACTOR or Subcontractor contracting for any part of the Contract Work which may require or involve the employment of laborers, workmen or mechanics at the Project Site, shall require or permit any laborer, workman or mechanic in any work week in which he is employed on such Work, to work in excess of forty (40) hours in such work week, unless such laborer, workman or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay, for all hours in excess of forty (40) hours in such work week.

6.35.5 Equal Employment Opportunities. The CONTRACTOR shall not discriminate against any employee or applicant for employment because of race, religion, gender, sexual preference, national origin, age, physically challenged condition, or a political belief or affiliation, and will comply with all State and federal statutes applicable to CONTRACTOR which relate to employment discrimination.

ARTICLE 7. OTHER WORK

Related Work at Site:

7.1 OWNER may perform other separate work related to the Project at the site by OWNER's own forces, have other work performed by utility owners, or award other direct construction contracts therefor, which shall contain General Conditions similar to these. If the fact that such other work is to be performed was not originally noted in these Contract Documents, advance written notice thereof will be given to CONTRACTOR prior to OWNER authorizing any such other work; and, if CONTRACTOR believes that such other work performance will involve additional expense to CONTRACTOR, or requires additional time, and the parties are unable to agree as to the extent thereof, CONTRACTOR may make a claim therefore as provided in Articles 11 and 12. All increases or decreases in the Contract price shall be governed by all State and local laws, statutes, codes, ordinances, rules and regulations governing public competitive bidding and Change Orders.

7.2 CONTRACTOR shall afford each utility owner and other contractor who is a party to a direct contract with OWNER (or OWNER, if OWNER is performing the additional work with OWNER's employees) proper and safe access to the Project site and a reasonable opportunity for the introduction and storage of materials and equipment, and the execution of such work, and shall properly connect and coordinate the Work with their separate work. CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall not endanger any

work of others by cutting, excavating or otherwise altering their work, and will only cut or alter their work with the written consent of OWNER's Engineer and the consent of other contractor(s), persons whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors, to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such other utility owners and other contractors.

7.3 If any part of CONTRACTOR's Work depends for proper execution or results upon the work of any such other contractor or utility owner (or OWNER), CONTRACTOR shall inspect and promptly report to OWNER's Engineer in writing any delays, defects or deficiencies in such other work that renders it unavailable or unsuitable for such integration, proper execution and results. CONTRACTOR's failure so to report will constitute an acceptance of the other work as fit and proper for integration with CONTRACTOR's Work, except for latent or non-apparent defects and deficiencies in the other work.

Coordination:

7.4 If OWNER contracts with others for the performance of other work on the Project at the Project site, the person or organization who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified by OWNER in the Supplementary Conditions, and the specific matters to be covered by such authority and responsibility will be itemized, and the extent of such authority and responsibilities will be provided, in the Supplementary Conditions.

ARTICLE 8. OWNER'S RESPONSIBILITIES

8.1 OWNER shall issue all written and oral communications to CONTRACTOR through OWNER's Field Representative and/or OWNER's Engineer.

8.2 In case of termination of the employment of OWNER's Engineer, OWNER shall appoint a replacement Engineer whose status under the Contract Documents shall be that of the former Engineer.

8.3 OWNER shall furnish the data required of OWNER under the Contract Documents promptly, and shall make eligible payments to CONTRACTOR within the time periods allowed by the Contract Documents and State prompt pay statutes, after payments are due as provided in paragraphs 14.4 and 14.13.

8.4 OWNER's duties in respect to providing lands and easements and providing any recent existing available engineering surveys to establish CONTRACTOR construction reference points, are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to OWNER's identifying and making available to CONTRACTOR copies of any existing and available reports of explorations and tests of subsurface pre-existing conditions at the Project site which are not part of the Contract Documents, but which have been utilized by OWNER's Engineer in generally preparing the Drawings and Specifications.

8.5 (RESERVED)

8.6 OWNER is obligated to execute Change Orders as indicated in paragraph 10.4.

8.7 OWNER's responsibility in respect to certain inspections, tests and approvals is set forth in paragraph 13.4.

8.8 In connection with OWNER's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 outlines OWNER's right to terminate services of CONTRACTOR under certain circumstances.

ARTICLE 9. OWNER ENGINEER'S STATUS DURING CONSTRUCTION

Owner's Representative:

9.1 OWNER's Engineer will be OWNER's primary representative during the construction period.

Visits to Site:

9.2 OWNER's Engineer will make periodic visits to the site at intervals appropriate to the various stages of construction to observe the progress and general quality of the executed Work and to determine, in general, for the benefit of OWNER only, if the Work is proceeding in accordance with the Contract Documents. OWNER's Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work, because CONTRACTOR is solely responsible for same. OWNER Engineer's efforts will be directed toward providing for OWNER only, a greater degree of confidence that the CONTRACTOR's completed Work will conform to the Contract Documents. On the basis of such limited visits and on-site observations as an experienced and qualified design professional working for OWNER, OWNER's Engineer will keep OWNER informed of the progress of the Work and will endeavor to advise OWNER of any obvious defects and deficiencies in the Work.

On-Site Project Representation:

9.3 OWNER may furnish a Project Field Representative to assist OWNER's Engineer in observing the daily performance of the Work. This is an option available to OWNER that need not be exercised, nor may it be relied upon by the CONTRACTOR in any way to satisfy CONTRACTOR's quality control responsibility. The duties, responsibilities and limitations of authority of any such Project Field Representative and assistants will be determined by the OWNER.

Clarifications and Interpretations:

9.4 OWNER's Engineer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as OWNER's Engineer may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If CONTRACTOR believes that a written clarification or interpretation by OWNER's Engineer

justifies an increase in the Contract Price or an extension of the Contract Time, and the OWNER and CONTRACTOR are unable to agree to the basis, amount or extent thereof, CONTRACTOR may make a claim therefore as provided in Article 11 or Article 12. Any increases or decreases in the Contract Price shall be governed by all State and local laws, statutes, codes, ordinances, rules and regulations governing public competitive bidding and Change Orders.

Authorized Variations in Work:

9.5 OWNER's Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time, and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER, and also on CONTRACTOR who shall perform the Work involved promptly. If CONTRACTOR believes that a Field Order justifies an increase in the Contract Price or an extension of the Contract Time, CONTRACTOR may make a claim therefore as provided in Article 11 or 12. Any increases or decreases in the Contract Price shall be governed by all State and local laws, statutes, codes, ordinances, rules and regulations governing public competitive bidding and Change Orders.

Rejecting Defective Work:

9.6 OWNER's Engineer will have the authority to disapprove or reject Work which OWNER's Engineer believes to be defective, and will also have authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders and Payments:

9.7 In connection with OWNER Engineer's responsibility for Shop Drawings and samples, see paragraphs 6.23 through 6.28 inclusive.

9.8 In connection with OWNER Engineer's responsibilities as to Change Orders, see Articles 10, 11 and 12.

9.9 In connection with OWNER Engineer's responsibilities in respect to Applications for Payment, etc., see Article 14.

Determinations for Unit Prices:

9.10 OWNER's Engineer will determine the final actual quantities and classifications of any Unit Price Work performed by CONTRACTOR. OWNER's Engineer will review with CONTRACTOR, OWNER Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). OWNER Engineer's written decisions thereon will be final and binding upon OWNER and CONTRACTOR.

Decisions on Disputes:

9.11 OWNER's Engineer will be the interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work, and claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Time, will be referred initially to OWNER's Engineer in writing, with a request for a formal decision in accordance with this paragraph, which OWNER's Engineer will render in writing within a reasonable time. Written notice of each such claim, dispute and other matter will be delivered by the CONTRACTOR (but in no event later than thirty (30) calendar days) after the occurrence of the event giving rise thereto, and written supporting data will be submitted to OWNER's Engineer within sixty (60) calendar days after such occurrence, unless OWNER's Engineer allows an additional period of time to ascertain more accurate data in support of the claim.

9.12 When functioning as interpreter and judge under paragraphs 9.10 and 9.11, it is hereby mutually agreed between OWNER and CONTRACTOR that OWNER's Engineer will not be personally liable in connection with any non-negligent interpretation or decision rendered in good faith in such official and professional capacity. The rendering of a decision by OWNER's Engineer pursuant to paragraphs 9.10 and 9.11 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.16) will be a condition precedent to any exercise by CONTRACTOR and/or OWNER of such rights or remedies they may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter.

Limitations on OWNER Engineer's Responsibilities:

9.13 Neither OWNER Engineer's authority to act under this Article 9, or elsewhere in the Contract Documents, nor any decision made by OWNER Engineer in good faith either to exercise or not exercise such authority, shall give rise to any personal duty or personal responsibility of OWNER Engineer to CONTRACTOR, and Subcontractor, any Supplier, or any other person or organization performing any of the Work, or to any surety for any of them.

9.14 Whenever in the Contract Documents the terms: "as ordered"; "as directed"; "as required"; "as allowed"; "as approved"; or terms of like effect or import are used, or the adjectives: "reasonable"; "suitable"; "acceptable"; "proper"; or "satisfactory"; or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of OWNER's Engineer as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate the Work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to OWNER's Engineer any duty to supervise or direct the furnishing, performance, or quality control of the CONTRACTOR's Work or any duty or authority to undertake responsibility of the CONTRACTOR contrary to the provisions of paragraph 9.15 or 9.16.

9.15 OWNER's Engineer will not be responsible for CONTRACTOR's means, methods, techniques, quality control, sequences or procedures of construction, or the safety precautions and programs incident thereto, for which CONTRACTOR shall be solely responsible. OWNER's Engineer will not be responsible for CONTRACTOR's failure to perform or furnish the Work in

accordance with the Contract Documents.

9.16 OWNER's Engineer will not be responsible for the acts and/or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

ARTICLE 10. CHANGES IN THE WORK

10.1 Without invalidating the Agreement and without notice to any surety, OWNER may, at any time, or from time to time, order additions, deletions or revisions in the Work that are in compliance with State public competitive bidding statutes and laws governing Change Orders; these will be authorized by a Written Amendment, a Change Order, or a Work Directive Change. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved, which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

10.2 If OWNER and CONTRACTOR are unable to agree as to the extent, if any, of an increase or decrease in the Contract Price, or an extension or shortening of the Contract Time that should be allowed as a result of a Work Directive Change, a claim may be made therefore as provided in Article 11 or Article 12. All increases or decreases in the Contract Price shall be governed by all State and local laws, statutes, codes, ordinances, rules and regulations governing public competitive bidding and Change Orders.

10.3 CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.4 and 3.5, except in the case of an emergency as provided in paragraph 6.22, and except in the case of uncovering Work as provided in paragraph 13.9.

10.4 OWNER and CONTRACTOR may execute appropriate Change Orders (or Written Amendments) covering:

10.4.1 changes in the Work which are ordered by OWNER pursuant to paragraph 10.1; are required because of willing acceptance of defective Work by OWNER under paragraph 13.13; or correcting defective Work under paragraph 13.14; or are otherwise agreed to by the parties;

10.4.2 changes in the Contract Price or Contract Time which are agreed to by the parties; and

10.4.3 changes in the Contract Price or Contract Time which embody the substance of any written decision rendered by OWNER's Engineer pursuant to paragraph 9.11; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the Progress Schedule as provided in paragraph 6.29.

10.5 If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Time) is required by the provisions of any Bond to be given to a surety by CONTRACTOR, the giving of any such notice will be CONTRACTOR'S sole responsibility, and the amount of each applicable Bond may be adjusted accordingly.

ARTICLE 11. CHANGE OF CONTRACT PRICE

11.1 The Contract price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All original duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at his expense without change in the original Contract price.

11.2 The Contract price may only be changed by a Change Order or by a Written Amendment. Any claim for an increase or decrease in the Contract price shall be based on initial written notice delivered promptly by the CONTRACTOR or OWNER to the other party, and to OWNER'S Engineer promptly (but in no event later than thirty (30) calendar days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall follow and be delivered within sixty (60) calendar days after such occurrence (unless OWNER's Engineer allows an additional period of time to ascertain more accurate data in support of the claim), and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant believes he is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract price shall be determined by OWNER's Engineer in accordance with paragraph 9.11. No claim for an adjustment in the Contract price will be valid if not submitted in accordance with this paragraph 11.2.

11.3 The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract price shall be determined in one of the following ways:

11.3.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of paragraphs 11.9.1. through 11.9.3. inclusive).

11.3.2 By mutual acceptance of a lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 11.6.2.1).

11.3.3 On the basis of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5), plus a CONTRACTOR's Fee for overhead and profit (determined as provided in paragraphs 11.6 and 11.7).

Cost of the Work:

11.4 The term "Cost of the Work" means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the Cameron County, Texas area and shall include only the following items, and shall not include

any of the costs itemized in paragraph 11.5:

11.4.1 Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under Schedules of Job Classifications as set forth by OWNER in the Supplementary General Conditions of the Contract Documents. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of any fringe benefits, if any, which shall include social security contributions, unemployment, excise and payroll taxes, workers' or workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday, as may be applicable thereto. Such employees shall include superintendents and foremen at the Project site. The expenses of performing Work after regular daily working hours on Saturday, Sunday or on legal holidays, shall be included in the above, to the extent authorized by OWNER.

11.4.2 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR, unless OWNER deposits funds with CONTRACTOR with which to make advanced payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment, shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

11.4.3 Payments made by CONTRACTOR to the Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from Subcontractors acceptable to CONTRACTOR, and shall deliver such bids to OWNER who will then determine which bid will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a Fee, the Subcontractor's Cost of the Work shall be determined in the same manner as CONTRACTOR's Cost of the Work. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

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

11.4.5 Supplemental costs including the following:

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

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

11.4.5.3 Rentals of all construction equipment and machinery and the parts thereof, whether rented from CONTRACTOR or others, in accordance with rental agreements approved by OWNER, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof (all in accordance with terms of said rental agreements). The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

11.4.5.4 Any sales, consumer, use or similar taxes related to the Work that OWNER is not exempt from paying, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

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

11.4.5.6 Losses and damages (and related expenses), not compensated by insurance or otherwise, to the Work, or otherwise sustained by CONTRACTOR in connection with the performance and furnishing of the Work, provided they have resulted from causes other than the intentional and/or negligent acts and/or omissions of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them, or for whose acts and/or omissions any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's Fee. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for reconstruction services, a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7 The cost of utilities, fuel and sanitary facilities at the Project site.

11.4.5.8 Minor expenses such as telefaxes, long distance telephone calls, telephone service at the Project site, express mailings and similar petty cash items in connection with the Work.

11.4.5.9 Cost of premiums for additional Bonds and insurance required because of changes in the Work.

11.5 The term "Cost of the Work" shall not include any of the following:

11.5.1 Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the Project site or in CONTRACTOR's principal or a branch office for general administration of the Work and not specifically included in the agreed upon Schedule of Job Classifications referred to in paragraph 11.4.1, or specifically covered by paragraph 11.4.4, all of which are to be considered administrative costs covered by the CONTRACTOR's Fee.

11.5.2 Expenses of CONTRACTOR's principal and branch offices, other than any CONTRACTOR's office at the Project site.

11.5.3 Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent CONTRACTOR payments.

11.5.4 Cost of premiums for all Bonds and for all insurance, whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 11.4.5.9 above).

11.5.5 Costs due to the intentional and/or negligent acts and/or omissions of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them, or for whose acts and/or omissions any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

11.5.6 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

CONTRACTOR's Fee:

11.6 The CONTRACTOR's Fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

11.6.1 a mutually acceptable fixed fee; or if none can be agreed upon,

11.6.2 a fee based on the following percentages of the various portions of the Cost of the Work:

11.6.2.1 for costs incurred under paragraphs 11.4.1 and 11.4.2, the CONTRACTOR's Fee shall be fifteen (15%) percent;

11.6.2.2 for costs incurred under paragraph 11.4.3, the CONTRACTOR's Fee shall be five (5%) percent; and if a subcontract is on the basis of Cost of the Work Plus a Fee, the maximum allowable to CONTRACTOR on account of overhead and profit of all Subcontractors shall be fifteen (15%) percent;

11.6.2.3 no fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5 and 11.5;

11.6.2.4 the amount of credit to be allowed by CONTRACTOR to OWNER for any such change which results in a net decrease in cost will be the amount of the actual net decrease, plus a deduction in CONTRACTOR's Fee by an amount equal to ten (10%) percent of the net decrease; and

11.6.2.5 when both additions and credits are involved in any one change, the adjustment in CONTRACTOR'S Fee shall be computed on the basis of the net change in accordance with paragraphs 11.6.2.1 through 11.6.2.4, inclusive.

11.7 Whenever the cost of any Work is to be determined pursuant to paragraph 11.4 or 11.5, CONTRACTOR will submit in a form acceptable to OWNER's ENGINEER, an itemized cost breakdown together with supporting data.

Cash Allowances:

11.8 It is understood that CONTRACTOR has included in the Contract price all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such Subcontractors or Suppliers, and for such sums within the limit of the allowances as may be acceptable to OWNER. CONTRACTOR agrees that:

11.8.1 The allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Project site, and all applicable non-exempt taxes; and

11.8.2 CONTRACTOR's costs for unloading and handling on the Project site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances. No demand for additional payment on account of any thereof will be valid.

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

Unit Price Work:

11.9

11.9.1 Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work, times the estimated quantity of each item as indicated in the Agreement. The OWNER's estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual final quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by OWNER's Engineer in accordance with Paragraph 9.10.

11.9.2 Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

11.9.3 Where the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the OWNER's estimated quantity of

such item indicated in the Agreement (generally plus or minus 25%), and there is no corresponding and offsetting adjustment(s) with respect to any other item(s) of Work, and if CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof, CONTRACTOR may make a claim for an increase in the Contract Price in accordance with Article 11 and any applicable State law, if the parties are unable to otherwise agree as to the amount of any such increase.

ARTICLE 12 -- CHANGE OF CONTRACT TIME

12.1 The Contract Time may only be changed by a Change Order or a Written Amendment. Any claim for an extension or shortening of the Contract Time shall be based on initial written notice delivered by the CONTRACTOR or OWNER to the other party (but in no event later than thirty (30) calendar days) after the occurrence of the event giving rise to the claim, and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall follow and be delivered within sixty (60) calendar days after such occurrence (unless OWNER's Engineer allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time shall be determined by OWNER's Engineer in accordance with paragraph 9.11. No claim for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2 The Contract Time will be extended in an amount equal to time lost due to delays beyond the reasonable control of CONTRACTOR, so long as CONTRACTOR has made good faith efforts to mitigate delaying impacts and if a claim is made therefore as provided in paragraph 12.1. Such delays shall include, but not be limited to, acts or neglect by OWNER or others performing additional separate work as contemplated by Article 7, or to fires, floods exceeding the 100 year frequency, labor disputes, epidemics, extremely abnormal weather for Cameron County, Texas, as may be described further in these Contract Documents, or Acts of God.

12.3 **ALL TIME LIMITS STATED IN THE CONTRACT DOCUMENTS ARE MUTUALLY AGREED TO BE OF THE ESSENCE OF THE AGREEMENT.** The provisions of this Article 12 shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court costs) for delay by either party.

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

Warranty and Guarantee:

13.1 CONTRACTOR warrants and guarantees to OWNER that all Work will be in accordance with the Contract Documents and will not be defective. Prompt notice of any obvious patent defects discovered by OWNER shall be given to CONTRACTOR. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided in this Article 13. In

case of dispute as to the cause of improper functioning of all or any part of the Work, the burden of proof that CONTRACTOR has complied with the Contract Documents rests with CONTRACTOR for this Work. He shall submit in writing to OWNER's Engineer his opinion and basis of proof for the adequacy of his Work. OWNER may have those tests made, which OWNER deems advisable, by an independent testing laboratory of OWNER's choice. If any test so made indicates a defect in material or workmanship, or that one or more manufactured components of the Work are performing below the standard set by the manufacturer's public data and specifications, the entire cost of all such tests shall be paid for by CONTRACTOR, and he shall also pay for retesting of the corrected Work, until it functions satisfactorily. The Work shall be guaranteed to be free from defects due to faulty workmanship or material for a period of one (1) year from the date of OWNER issue of the Certificate of Acceptance. Work found to be improper or imperfect shall be replaced or redone without cost to OWNER within the one year guarantee period. Neither the Certificate of Acceptance, final payment, of any other provision of the Contract Documents shall free CONTRACTOR from his workmanship guarantee. Failure to repair or replace faulty Work entitles OWNER to repair or replace the same and recover the costs from CONTRACTOR and/or his Surety. CONTRACTOR shall be the sole guarantor of the Work installed under this Contract and no third party guarantees/warranties by Subcontractors or suppliers of various components or materials will be acceptable; nor shall agreements with Subcontractors or material or component suppliers by CONTRACTOR reduce CONTRACTOR's responsibility to OWNER under this Agreement. All equipment shall be warrantied and/or guaranteed be either CONTRACTOR or its supplier/manufacturer to OWNER for at least one (1) year from the date of OWNER acceptance of the entire Project. It is anticipated by OWNER and acknowledged by CONTRACTOR that many equipment and material warranties from manufacturers shall extend well beyond the initial one (1) year post acceptance period. The CONTRACTOR shall transfer to the OWNER any and all third party supplier and manufacturer warranties and/or guaranties that remain in effect beyond the one (1) year workmanship guarantee/warranty period.

Access to Work:

13.2. OWNER, OWNER's Engineer, OWNER's Field Representative, other representatives of OWNER, testing agencies and governmental agencies with jurisdictional interests, will have access to the Work at reasonable times for their observation, inspecting and testing. CONTRACTOR shall provide proper and safe conditions for such reasonable access.

It is agreed by CONTRACTOR that OWNER shall be and is hereby authorized to appoint from time to time, OWNER Engineer's subordinate supervisors, observers, and/or inspectors, as the said OWNER may deem proper to inspect the material furnished and observe the Work performed under this construction Agreement, and to see that the said material is furnished and said Work is generally done in accordance with the Specifications. This OWNER function, for OWNER's sole benefit, does not excuse the CONTRACTOR from quality control assurance, which is solely his responsibility. CONTRACTOR shall furnish all reasonable aid and assistance required by the OWNER's Engineer, subordinate supervisors, observers and/or inspectors for the proper observation, inspection and examination of the Work and all parts of the Work. CONTRACTOR shall regard and obey the directions and instructions of the OWNER's Engineer and any subordinate supervisors, or inspector so appointed, when such directions are consistent with the obligations of this Agreement and the accompanying Specifications, provided,

however, that should CONTRACTOR object to any order by any subordinate supervisor or inspector, CONTRACTOR may within six (6) calendar days make written notice to OWNER for his decision. Except as herein before provided, the authority of subordinate supervisors or inspectors shall be limited to the rejection of unsatisfactory Work and materials and to the suspension of the Work, until the questions of Work acceptability can be referred to OWNER's Engineer.

13.2.1. CONTRACTOR shall cooperate with any OWNER testing laboratory to the end that the function and services of the laboratory may be properly performed. CONTRACTOR shall give OWNER's representative and testing laboratory a minimum of twenty-four (24) hours notice of readiness for all testing as required by the Specifications or customary construction industry standards. OWNER shall bear the cost of density and concrete testing, for first test only. Testing of equipment, lines and valves shall be the responsibility of CONTRACTOR and he shall notify OWNER's Engineer and/or inspectors of his scheduled time for such tests, so that the test can be witnessed by an OWNER's representative. If initial tests show failure, the CONTRACTOR shall cover the costs of retesting the areas that failed after corrective action has been taken, as well as the personnel and equipment costs incurred by OWNER in said retesting, on a per diem basis. The per diem costs shall be determined based on the hourly wage plus reasonable overhead of OWNER's personnel needed and present at the Project site during retesting, and by the locally prevailing rental rate for the vehicles and equipment utilized in retesting. These retesting time costs shall be paid by CONTRACTOR prior to OWNER's acceptance of the Work improvements.

Tests and Inspections:

13.3. CONTRACTOR shall give OWNER's Engineer and /or OWNER's Field Representative timely notice of readiness of the Work for all required inspections, tests or approvals.

13.4. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) to specifically be inspected, tested or approved, CONTRACTOR shall assume full responsibility therefore, pay all costs in connection therewith, and furnish OWNER's Engineer the required final certificates of inspection, testing or approval. CONTRACTOR shall also be responsible for and shall pay all costs in connection with any special inspection or testing required in connection with OWNER Engineer's approval and acceptance of an alternative Supplier of "or equal" proposed substitutions of materials or equipment proposed by CONTRACTOR to be incorporated in the Work, or of materials or equipment submitted for approval prior to CONTRACTOR's purchase thereof, for incorporation in the Work. The cost of all routine inspections, tests and approvals, other than any of those special inspections which may be required by the Contract Documents to be paid by CONTRACTOR, shall be paid by OWNER (unless otherwise specified).

13.5 All inspections, tests or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by organizations acceptable to OWNER (or by OWNER's Engineer, if so specified).

13.6 If any Work (including the work of others) that is to be inspected, tested or approved is covered or otherwise concealed by CONTRACTOR without written concurrence of OWNER's

Engineer, it must, if requested by OWNER'S Engineer, be uncovered and revealed for OWNER observation. Such uncovering shall be at CONTRACTOR's expense, unless CONTRACTOR has given OWNER's Engineer timely notice of CONTRACTOR's intention to cover the same and OWNER's Engineer has not acted with reasonable promptness in response to such CONTRACTOR notice.

13.7 Neither observations by OWNER's Engineer nor inspections, tests or approvals by others shall relieve CONTRACTOR from CONTRACTOR's obligations to perform the Work and constantly employ quality control in accordance with the Contract Documents.

Uncovering Work:

13.8 If any Work is covered contrary to the written request of OWNER's Engineer, it must, if requested by OWNER's Engineer, be uncovered for OWNER Engineer's observation and replaced at CONTRACTOR's expense.

13.9 If OWNER's Engineer considers it necessary or advisable that covered Work be observed by OWNER's Engineer or inspected or tested by others, CONTRACTOR, at OWNER Engineer's request, shall uncover, expose or otherwise make available for observation, inspection or testing as OWNER'S Engineer may require, that portion of the Work in question, furnishing all necessary labor, material and equipment to uncover same. If it is found that such Work is defective, CONTRACTOR shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing, and of satisfactory repair, replacement and reconstruction, (including but not limited to fees and charges or engineers, architects, attorneys and other professionals), and OWNER shall be entitled to an appropriate decrease in the Contract Price, and if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefore as provided in Article 11. If, however, such Work is not found to be defective, CONTRACTOR may be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, repair, replacement and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefore as provided in Articles 11 and 12. All increases or decreases in the Contract price shall be governed by all State and local laws, statutes, codes, ordinances, rules and regulations governing public competitive bidding and Change Orders.

Owner May Stop the Work:

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

Correction or Removal of Defective Work:

13.11 If required by OWNER's Engineer, CONTRACTOR shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, if the Work has been rejected by OWNER's Engineer, and remove it from the Project site and replace it with non-defective Work. CONTRACTOR shall bear all direct, indirect and consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

One Year Workmanship Correction Period:

13.12 If within one (1) year after the date of OWNER issuance of the Certificate of Acceptance, or such longer period of time as may be prescribed by Laws or Regulations, or by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents, any Work is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions, either correct such defective Work, or, if it has been rejected by OWNER, remove it from the Project site and replace it with non-defective Work. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected, or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) will be paid by CONTRACTOR. In special circumstances, where a particular item of equipment is placed in continuous service before acceptance of all the Work, the minimum one (1) year workmanship guarantee and equipment warranty correction period for that item may start to run from an earlier date, if so provided in the Specifications or by Written Amendment.

Acceptance of Defective Work:

13.13 If instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to OWNER Engineer's recommendation of final payment), prefers to accept it as is, OWNER may do so. CONTRACTOR shall bear all direct, indirect and consequential costs attributable to OWNER's evaluation of, and determination to accept such defective Work (such costs to be approved by OWNER's Engineer as to reasonableness and to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals). If any such OWNER acceptance occurs prior to OWNER Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions to the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefore as provided in Article 11. If the acceptance occurs after such final payment, an appropriate amount as determined by OWNER will be paid by CONTRACTOR to OWNER.

OWNER May Correct Defective Work:

13.14 If CONTRACTOR fails within a reasonable time after written notice by OWNER's Engineer to proceed to correct, and to actually correct defective Work; or to remove and replace rejected Work as required by OWNER's Engineer in accordance with paragraph 13.11; or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents; or if CONTRACTOR fails to comply with any other provision of the Contract Documents; OWNER

may, after seven (7) calendar days written notice to CONTRACTOR, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph, OWNER shall proceed with reasonable expediency. To the extent necessary to complete corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the Project site; take possession of all or part of the Work; and suspend CONTRACTOR's services related thereto; take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Project site; and incorporate in the Work all materials, and CONTRACTOR shall allow OWNER, OWNER's representatives, and employees such access to the Project site as may be necessary to enable OWNER to exercise the rights and remedies under this paragraph. All direct, indirect and consequential costs of OWNER in exercising such rights and remedies will be charged against CONTRACTOR, in an amount approved as to reasonableness by ENGINEER, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefore as provided in Article 11. Such direct, indirect and consequential costs will include, but not be limited to: fees and charges of engineers; architects; attorneys; and other professionals; all court costs; and all costs of repair and replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's defective Work. CONTRACTOR shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

ARTICLE 14 -- PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1 The Schedule of Values established as provided in paragraph 2.9 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to OWNER's Engineer. Progress payments on account of Unit Price Work will be based on the number of units actually completed.

Application for Progress Payment:

14.2 At least twenty (20) calendar days before each progress payment is scheduled (but not more often than once a month), CONTRACTOR shall submit to OWNER for review, an Application for Payment filled out and signed by CONTRACTOR, covering the Work completed as of the date of the Application, and accompanied by such supporting documentation as is required by the Contract Documents. The amount of retainage with respect to progress payments (customarily 5%) will be as stipulated in the Agreement.

CONTRACTOR's Warranty of Title:

14.3 CONTRACTOR warrants and guarantees that title to any Work and materials covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment, free and clear of any and all prior claims for payment.

Review of Applications for Progress Payment:

14.4 OWNER's Engineer will, within ten (10) calendar days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and process the Application, or return the Application to CONTRACTOR indicating in writing OWNER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application. Twenty (20) calendar days after presentation of the Application for Payment with OWNER Engineer's recommendation, the amount recommended will (subject to the provisions of the last sentence of paragraph 14.7) become due, and when due will be paid by OWNER to CONTRACTOR.

14.5 OWNER Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by OWNER's Engineer, based upon ENGINEER's limited on-site observations of the Work in progress as an experienced and qualified design professional; and on OWNER Engineer's review of the Application for Payment and the accompanying data and Schedules; that the Work has progressed to the point indicated, that, to the best of OWNER Engineer's knowledge, information and belief, the status of the Work is in apparent general accordance with the Contract Documents (subject to: a later evaluation of the Work as a functioning whole; prior to or upon Substantial Completion; and subject to the results of any subsequent tests called for in the Contract Documents; and subject to a final determination of quantities and classifications for Unit Price Work under paragraph 9.10; and subject to any other qualifications stated in the OWNER Engineer's recommendation); and that CONTRACTOR is entitled to payment of the amount recommended. However, by recommending any such payment, OWNER's Engineer will not thereby be deemed to have represented that exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to OWNER's Engineer in the Contract Documents, or that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER, or OWNER to withhold payment to CONTRACTOR.

14.6 OWNER Engineer's recommendation of final payment will constitute an additional representation by OWNER that to the best of OWNER Engineer's knowledge, the conditions precedent to CONTRACTOR's being entitled to final payment, as set forth in paragraph 14.13, have been fulfilled.

14.7 OWNER's Engineer may refuse to recommend the whole or any part of any payment if, in OWNER Engineer's professional opinion, it would be incorrect to make such representations to OWNER. OWNER Engineer may also refuse to recommend any such payment, or, because of subsequently discovered evidence, or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in OWNER Engineer's opinion, to protect OWNER from loss because:

14.7.1 the Work is defective, or completed Work has been damaged requiring correction or replacement.

14.7.2 the Contract Price has been reduced by Written Amendment or Change Order.

14.7.3 OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.14, or

14.7.4 because of OWNER Engineer's actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.9 inclusive.

OWNER may for its own benefit and protection and not for the direct benefit of any third parties, refuse to make payment in whole or in part of the amount recommended by OWNER's Engineer, because claims have been made against OWNER on account of CONTRACTOR's improper performance of the Work, or payment bond claims have been filed in connection with the Work and OWNER wishes to consult with CONTRACTOR and/or CONTRACTOR's surety, or there are other items entitling OWNER to a set-off against the amount recommended, but OWNER must give CONTRACTOR written notice stating the reasons for such action.

Substantial Completion:

14.8 When CONTRACTOR considers the entire Work ready for OWNER's intended use, CONTRACTOR shall notify OWNER's Engineer in writing that the entire Work is Substantially Complete (except for items specifically listed by CONTRACTOR as incomplete) and request that OWNER issue a certificate of Substantial Completion. Within a reasonable time thereafter, OWNER and CONTRACTOR shall make an inspection of the Work to determine the status of completion. If OWNER's Engineer does not consider the Work Substantially Complete, OWNER's Engineer will notify CONTRACTOR in writing giving the reasons therefore. If OWNER's Engineer considers the Work Substantially Complete, OWNER's Engineer will prepare and process a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of pending items to be completed or corrected before final payment ("punch-list"). At the time of delivery of the tentative certificate of Substantial Completion, OWNER's Engineer will deliver to CONTRACTOR a written recommendation as to the division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties. OWNER Engineer's aforesaid recommendation will be binding on OWNER and CONTRACTOR, until final payment.

14.9 OWNER shall have the right to exclude CONTRACTOR from the Work after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the punch list.

Partial Utilization:

14.10 Use by OWNER of any finished part of the Work, which has specifically been identified in the Contract Documents, or which OWNER and CONTRACTOR agree constitutes a separately functioning and useable part of the Work that can be used by OWNER without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work, subject to the following:

14.10.1 OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for OWNER's intended use and Substantially Complete. If CONTRACTOR agrees, CONTRACTOR will certify to OWNER that said part of the Work is Substantially Complete and request OWNER

to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after such request, OWNER, and CONTRACTOR shall make an inspection of that part of the Work to determine its status of completion. If OWNER considers that part of the Work to be Substantially Complete, the provisions of paragraphs 14.8 and 14.9 will apply with respect to certification of Substantial Completion of that part of the Work, and the division of responsibility in respect thereof and access thereto.

14.10.2 OWNER may at any time request CONTRACTOR in writing to permit OWNER to take over operation of any such part of the Work, although it is not Substantially Complete. A copy of such request will be sent to OWNER's Engineer and within a reasonable time thereafter OWNER, and CONTRACTOR, shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If CONTRACTOR does not object in writing to OWNER that such part of the Work is not ready for separate operation by OWNER, OWNER's Engineer will finalize the list of items to be completed or corrected and will deliver such list to CONTRACTOR, together with a written statement as to the division of responsibilities pending final payment between OWNER and CONTRACTOR, with respect to security, operation, safety, maintenance, HVAC, utilities, insurance, warranties and guarantees for that part of the Work, which will become binding upon OWNER and CONTRACTOR at the time when OWNER takes over such operation. During such operation and prior to Substantial Completion of such part of the Work, OWNER shall allow CONTRACTOR reasonable access to complete or correct items on any punch list, and to complete other related Work.

14.10.3 No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.15 in respect of CONTRACTOR's property insurance.

Final Inspection:

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

A qualified person representing CONTRACTOR shall be present at this final inspection. Prior to this inspection, all Work shall have been completed, tested, adjusted and in final operating condition, if required by the Project Specifications.

Final Application for Payment:

14.12 After CONTRACTOR has completed all such corrections to the satisfaction of OWNER's Engineer and delivered certificates of inspection, marked-up record documents, if any, depicting as-built conditions (as provided in paragraph 6.19) and other documents--all as required by the Contract Documents; and after OWNER's Engineer has indicated that the Work is acceptable (subject to the provisions of paragraph 14.16), CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for

Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to OWNER) of all claims arising out of, or filed in connection with the Work. In lieu thereof and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full; an affidavit of CONTRACTOR that the releases and receipts include all labor, services, material and equipment for which a Payment Bond claim could be filed, and that all payrolls, material and equipment bills, and other indebtedness connected with the Work, for which OWNER or OWNER's property might in any way be encumbered, have been paid or otherwise satisfied; and consent of the surety to final payment, if any is required by surety. If any Subcontractor or Supplier fails to furnish a release or receipt in full, CONTRACTOR may furnish a special indemnity Bond, or other collateral satisfactory to OWNER, to indemnify OWNER against any potential third party claim.

Final Payment and Acceptance:

14.13 If, on the basis of OWNER Engineer's observation of the Work during construction and final inspection, and OWNER Engineer's review of the final Application for Payment, and accompanying documentation (all as required by the Contract Documents), OWNER's Engineer is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, OWNER's Engineer will, within twenty (20) calendar days after receipt of the final Application for Payment, indicate in writing, OWNER Engineer's recommendation of payment and process the Application for Payment. Thereupon OWNER's Engineer will give written notice to CONTRACTOR that the Work is acceptable, subject to the provisions of paragraph 14.16. Otherwise, OWNER's Engineer will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application. Thirty (30) calendar days after presentation to OWNER of the Application for Payment and accompanying documentation, in appropriate final form and substance, and with OWNER Engineer's recommendation and notice of acceptability, the amount recommended by OWNER's Engineer will become due and will be paid by OWNER to CONTRACTOR.

CONTRACTOR shall submit satisfactory evidence to the OWNER that all payrolls, and other indebtedness connected with the Work have been paid, before a Final Certificate of Acceptance is issued.

14.14 If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of OWNER's Engineer, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.1, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to OWNER's Engineer with the Application for such Payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a final waiver of claims by OWNER.

Contractor's Continuing Obligation:

14.15 CONTRACTOR'S obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by OWNER's Engineer; nor the issuance of a Certificate of Substantial Completion or Final Acceptance; nor any payment by OWNER to CONTRACTOR under the Contract Documents; nor any use or occupancy of the Work or any part thereof by OWNER; nor any act of acceptance by OWNER; nor any failure to do so; nor the issuance of a notice of acceptability by OWNER's Engineer pursuant to paragraph 14.13; nor any correction of defective Work by OWNER, will constitute an acceptance of Work not in accordance with the Contract Documents, or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents (except as provided in paragraph 14.16).

Waiver of Claims:

14.16 The making and acceptance of final payment will constitute:

14.16.1 a waiver of all claims by OWNER against CONTRACTOR, except third party claims arising from unsettled payment bond claims; from latently defective Work appearing after final inspection pursuant to paragraph 14.11; or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by OWNER of any rights regarding CONTRACTOR's continuing obligations under the Contract Documents; and

14.16.2 a waiver of all claims by CONTRACTOR against OWNER, other than those previously and properly made in writing and still unsettled.

ARTICLE 15 -- SUSPENSION OF WORK AND TERMINATION

Owner May Suspend Work:

15.1 OWNER may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than thirty (30) calendar days by notice in writing to CONTRACTOR, which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR may be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension, if CONTRACTOR demonstrates an approved claim therefore as provided in Articles 11 and 12. Any increase or decrease in the Contract Price shall be governed by all State and local laws, statutes, codes, ordinances, rules and regulations governing public competitive bidding and Change Orders.

Owner May Terminate:

15.2 Upon the occurrence of any one or more of the following events:

15.2.1 if CONTRACTOR commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if CONTRACTOR takes any equivalent or similar action by filing a petition or otherwise, under any other federal or State law in effect at such time, relating to the bankruptcy or insolvency;

15.2.2 if a petition is filed against CONTRACTOR under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against CONTRACTOR under any other federal or State law in effect at the time relating to bankruptcy or insolvency;

15.2.3 if CONTRACTOR makes a general assignment for the benefit of creditors;

15.2.4 if a trustee, receiver, custodian or agent of CONTRACTOR is appointed under applicable law or under contract, whose appointment or authority to take charge of the property of CONTRACTOR is for the purpose of enforcing a lien against such CONTRACTOR property, or for the purpose of general administration of such CONTRACTOR property, for the benefit of CONTRACTOR's creditors;

15.2.5 if CONTRACTOR admits in writing an inability to pay its debts generally as they become due;

15.2.6 if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents (including but not limited to, failure to supply sufficient skilled workers or equipment, or failure to adhere to the Progress Schedule established under paragraph 2.9, as revised from time to time);

15.2.7 if CONTRACTOR disregards Laws or Regulations of any public body having jurisdiction;

15.2.8 if CONTRACTOR disregards the rights of OWNER; or

15.2.9 if CONTRACTOR otherwise violates in any substantial and material way, any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR and the surety seven (7) calendar days written notice, and to the extent permitted by Laws and Regulations: terminate the services of CONTRACTOR; exclude CONTRACTOR from the site and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment and machinery at the Project site; and use the same to the full extent they could be used by CONTRACTOR (without OWNER liability to CONTRACTOR for trespass or conversion), and finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract price exceeds the OWNER's direct, indirect and consequential costs of completing the Work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court costs), such excess will be paid to CONTRACTOR or surety. If such OWNER costs exceed such unpaid balance, CONTRACTOR or surety shall pay the difference to OWNER. Such costs incurred by OWNER will be incorporated in a Change Order, but when exercising any rights or remedies under this paragraph, OWNER shall not be required to obtain the lowest price for the Work performed.

15.3 Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then

existing, or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from ongoing liability.

15.4 Upon seven (7) calendar days written notice to CONTRACTOR, OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the Work and terminate the Agreement. In such case, CONTRACTOR shall mitigate demobilization costs as best as possible and be paid for all Work executed and expenses sustained, plus reasonable termination expenses, which will include, but not be limited to, direct, indirect and consequential costs (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals and court costs).

15.5 (RESERVED)

ARTICLE 16 -- TIME FOR SUBSTANTIAL COMPLETION AND LIQUIDATED DAMAGES.

16.1. IT IS HEREBY UNDERSTOOD AND MUTUALLY AGREED, BY AND BETWEEN THE PARTIES HERETO, THAT THE DATE OF BEGINNING, RATE OF PROGRESS AND THE TIME FOR SUBSTANTIAL COMPLETION OF THE WORK TO BE DONE HEREUNDER ARE ESSENTIAL CONDITIONS OF THIS CONTRACT; and it is further mutually understood and agreed, by and between the parties hereto, that the time to perform the Work embraced in this Contract shall be commenced on a date to be specified in the Notice to Proceed.

16.2 CONTRACTOR agrees that said Work shall be prosecuted regularly, diligently, and uninterrupted at such rate of progress as will insure Substantial Completion thereof within the time specified. It is expressly understood and mutually agreed, by and between the parties hereto, that the time for the Substantial Completion of the Work described herein is a reasonable time for Substantial Completion of same, taking into consideration the average climatic range and weather conditions that the CONTRACTOR must reasonably anticipate, and usual industrial conditions prevailing in the Cameron County area.

16.3 If CONTRACTOR shall neglect, fail or refuse to Substantially Complete the Work within the time herein specified, then CONTRACTOR does hereby agree, as a part consideration for awarding of this Contract, to pay the OWNER the mutually agreed to amount specified in the Contract, not as a penalty, but as liquidated damages for such breach of Contract as hereinafter set forth, for each and every calendar day that CONTRACTOR shall be in default, after the time stipulated in the Contract for Substantially Completing the Work.

16.4 The damage to OWNER by reason of this Contract not being Substantially Completed as of that date are incapable of definite ascertainment by either party, and therefore the parties hereto have mutually fixed and limited such damages to the sum stipulated in the Agreement for each calendar day the job runs beyond such Substantial Completion date, and the joint fixing of such damages constitutes a part of the consideration for the Contract. It is further agreed that **TIME IS OF THE ESSENCE** of each and every portion of this Contract and of the Specifications, wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract, additional time is allowed for the Substantial

Completion of any Work, the new time fixed by such extension shall be **OF THE ESSENCE** of this Contract. Provided that CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in the Substantial Completion of Work is due:

16.4.1 To any preference, priority or allocation order duly issued by the Federal Government.

16.4.2 To unforeseeable causes beyond the control and without the fault or negligence of CONTRACTOR, including, but not restricted to: Acts of God; or of the public enemy; acts of the OWNER; acts of another contractor in the performance of a separate contract with the OWNER; fires; floods exceeding the 100 year frequency; epidemics; quarantine restrictions; strikes; freight embargoes and unusually severe weather not customary for the Cameron County, Texas area.

16.4.3 To any delays of Subcontractors occasioned by any of the causes specified in 16.4.1 or 16.4.2.

16.4.4 Provided further, that CONTRACTOR shall immediately attempt to mitigate the impacts of the delay, and then within seven (7) calendar days from the beginning of such delay, notify OWNER, in writing, of the causes of the delay. OWNER shall then ascertain the facts and extent of the delay and notify CONTRACTOR within a reasonable time of OWNER's decision in the matter regarding any adjustment to the Contract time and a recovery plan.

ARTICLE 17 -- MISCELLANEOUS

Giving Notice:

17.1 Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the CONTRACTOR's Project Superintendent or mailed to an officer of the corporation in the case of the CONTRACTOR; or to the General Manager and CEO of the BPUB in the case of the OWNER; or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

Computation of Calendar Day Time:

17.2 When any period of time is referred to in the Contract Documents by "days", and the OWNER'S format for scheduling the Project is by utilizing calendar days in lieu of working days, it will be computed as calendar days, to exclude the first and include the last calendar day of such period. If the last calendar day of any such period falls on a calendar day listed as a BPUB holiday by the Contract Documents, such calendar day will be omitted from the computation.

17.2.1 A calendar day of twenty-four hours is measured from midnight, to the next midnight, and shall constitute a single calendar day.

General:

17.3 Should OWNER suffer injury or damage to person or property because of any error, omission or negligent act of the CONTRACTOR, or of any of the CONTRACTOR's employees or agents, or others for whose acts and/or omissions CONTRACTOR is legally liable, OWNER's claim will be made in writing to the CONTRACTOR within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph 17.3 shall not be construed as a substitute for, or a waiver of, the legal provisions of any applicable statute of limitations or repose.

17.4 The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the conditions, warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 6.30, 13.1, 13.12, 13.14, 14.3 and 15.2, and all of the rights and remedies available to OWNER and OWNER'S Engineer thereunder; are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to OWNER which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this paragraph will be as effective as if repeated specifically in all the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply. All representations, conditions, warranties and guarantees made in the Contract Documents will survive the execution, final payment and termination or completion of the Agreement. All CONTRACTOR recitations contained in any document required by OWNER, whether delivered at the time of the execution of the Contract Documents, or at a later date, shall constitute representations, warranties and guarantees by CONTRACTOR herein.

17.5 CONTRACTOR shall comply with the "anti-kickback" provisions of the Copeland Act now codified at 18 U. S. C. A. §874, and all amendments or modifications of the original act of June 13, 1934.

SUPPLEMENTARY GENERAL CONDITIONS

SECTION 1 - WAGE AND LABOR STANDARD PROVISIONS-100% NON-FEDERALLY FUNDED CONSTRUCTION

Contents

1. GENERAL STATEMENT
2. BROWNSVILLE PUBLIC UTILITIES BOARD (BPUB) RESPONSIBILITIES
3. CLAIMS & DISPUTES PERTAINING TO WAGE RATES
4. BREACH OF WAGE & LABOR STANDARDS PROVISIONS
5. EMPLOYMENT OF LABORERS/MECHANICS NOT LISTED IN WAGE DETERMINATION DECISION
6. MINIMUM WAGE
7. OVERTIME COMPENSATION ON NON-FEDERALLY FUNDED PROJECTS
8. PAYMENT OF CASH EQUIVALENT FRINGE BENEFITS
9. WORK CONDUCTED ON HOLIDAYS-NON-FEDERALLY FUNDED PROJECTS
10. UNDERPAYMENT OF WAGES OR SALARIES
11. POSTING WAGE DETERMINATION DECISION/STATEMENT AND "NOTICE TO EMPLOYEES"
12. PAYROLLS & BASIC PAYROLL RECORDS
13. LABOR DISPUTES
14. COMPLAINTS, PROCEEDINGS, OR TESTIMONY BY EMPLOYEES
15. EMPLOYEE INTERVIEWS TO ASSURE WAGE & LABOR STANDARD COMPLIANCE
16. "ANTI-KICKBACK" PROVISION
17. "FALSE INFORMATION" PROVISION
18. EMPLOYMENT OF APPRENTICES/TRAINEES
19. JOBSITE CONDITIONS
20. EMPLOYMENT OF CERTAIN PERSONS PROHIBITED
21. PROVISIONS TO BE INCLUDED IN SUBCONTRACTS

1. GENERAL STATEMENT

This is a 100% Non-Federally funded and competitively bid Public Works Contract and Texas Government Code Section 2258.001 et seq., as amended, requires that not less than the general prevailing wage rates (minimum hourly base pay and minimum hourly fringe benefit contribution) for Work of similar character be paid to CONTRACTOR and subcontractor employees. These local prevailing and adopted wage rates are derived from the most current applicable pre-Bid federal prevailing wage rates for Cameron County, Texas, as published by the United States Department of Labor, Dallas, Texas pursuant to the original intent and authority of the Resolution passed by the Public Utilities Board of Brownsville on February 24, 1992 (hereinafter referred to as "BPUB"). Copies of the wage rates are contained immediately behind these Supplementary General Conditions, and are included instruments of this Contract and full compliance with same shall be required.

Additionally, on April 16, 2007, the BPUB Board of Directors approved a local "living wage" policy that requires all Contractors and Subcontractors performing 100% Non-Federally funded Work for the BPUB to pay a minimum wage rate of \$8.00/hour, regardless of any lower federal wage rate for Cameron County. The BPUB requires that all Contractors and Subcontractors also comply with this policy. Otherwise, the BPUB adopts the Federal Department of Labor Wage scales for Cameron County on 100% Non-Federally funded projects as specified later herein behind these Supplementary General Conditions.

Any deviation from Wage and Labor Standard Provisions compliance may be cause for OWNER's withholding either interim or final payment to the CONTRACTOR until such deviations are properly corrected.

2. WAGE & HOUR OFFICE, PUBLIC WORKS, RESPONSIBILITIES

The OWNER's Engineer or the BPUB Wage & Hour Monitor is primarily responsible for all Wage and Labor Standard Provisions investigation and enforcement and will monitor Contractor/subcontractor practices to assure the BPUB General Manager and CEO that:

- a. Appropriate weekly compliance statements and payroll records are submitted to the BPUB by the Contractor/subcontractors and that such are reviewed for compliance with Wage and Labor Standard Provisions.
- b. Any Apprentices/trainees designated by CONTRACTOR as working on the Project are properly identified by Contractor/subcontractor on payroll records and documented as being included in programs currently sanctioned by appropriate federal or state regulatory agencies.
- c. Applicable Wage Determination Decisions, including any applicable modifications and related statements are posted at the Work-site by the Contractor and that proper job classifications and commensurate minimum hourly base and any fringe wage rates are paid.

- d. Employees are periodically interviewed (at random) on the Project as required.
- e. That no person employed by Contractor/subcontractor is induced against his will, by any means, to give up any part of the compensation to which he is otherwise entitled.
- f. That any and all periodic administrative directives to the OWNER'S Engineer and/or Wage & Hour Monitor from the Board and General Manager and CEO are being implemented.

3. CLAIMS & DISPUTES PERTAINING TO WAGE RATES

Claims and disputes not promptly and routinely settled by the CONTRACTOR/subcontractor and employees pertaining to wage rates, or to job classifications of labor employed upon the Work covered by this Contract, shall be reported by the employee in writing, within sixty (60) calendar days of employee's receipt of any allegedly incorrect classification, wage or benefit report, to the OWNER's Engineer and/or Wage & Hour Monitor, BPUB for further investigation. Claims and disputes not reported by the employee to the OWNER in writing within the sixty (60) calendar day period shall be deemed waived by the employee for the purposes of the OWNER administering and enforcing the OWNER's Contract rights against the CONTRACTOR on behalf of the employee. Waiver by the employee of this OWNER intervention shall not constitute waiver by the OWNER or employee to independently pursue contractual rights it may have against the CONTRACTOR/subcontractor for breach of contract and other sanctions available to enforce the Wage and Labor Standard Provisions.

4. BREACH OF WAGE AND LABOR STANDARD PROVISIONS

The OWNER reserves the right to terminate this Contract for cause if the Contractor/subcontractors shall knowingly and continuously breach, without timely restitution or cure, any of these governing Wage and Labor Standard Provisions. A knowing and unremedied proven violation of these Wage and Labor Standard Provisions may also be grounds for debarment of the CONTRACTOR/subcontractor from future OWNER contracts for lack of responsibility, as later determined by the OWNER. Recurrent violations, whether remedied or not, will be considered by the General Manager and CEO when assessing the responsibility history of a potential contractor/subcontractor prior to competitive award of future Public Works projects. The general remedies stated in this paragraph 4. above, are not exhaustive and not cumulative, for the OWNER reserves legal and contractual rights to other specific remedies outlined herein below and in other parts of this Contract and as are allowed by applicable OWNER resolutions, State and federal statutes.

5. EMPLOYMENT OF LABORERS/MECHANICS NOT LISTED IN WAGE DETERMINATION DECISION

In the event that a CONTRACTOR/subcontractor discovers that construction of a particular Work element requires a certain employee classification and skill that is not

listed in the Wage Determination Decision contained in the original Contract Documents, CONTRACTOR/subcontractors will make prompt inquiry (before bidding, if possible) to the OWNER identifying that class of laborers/mechanics not listed in the Wage Determination Decision who are intended to be employed, or who are being employed, under the Contract. Using his best judgment and information resources available to him at the time, and any similar prior local or federal decisions, the General Manager and CEO of the OWNER, shall classify said laborers/mechanics by issuing a special local wage determination decision to the CONTRACTOR/subcontractor, which shall be enforced by the OWNER.

6. MINIMUM WAGE

All laborers/mechanics employed to construct the Work governed by this Contract shall be paid not less than weekly the full amount of wages due (minimum hourly base pay and any applicable minimum hourly fringe benefit contribution for all hours worked, including overtime) for the immediately preceding pay period, computed at wage and any fringe rates not less than those contained in the Wage Determination Decision included in this Contract. Only payroll deductions as are mandated by State or federal law, and those legal deductions previously approved in writing by the employee, or as are otherwise permitted by State or federal law, may be withheld by the CONTRACTOR/subcontractor.

Should the CONTRACTOR/subcontractor subscribe to fringe benefit programs for employees, such programs shall be fully approved by the OWNER in adopting a previous U.S. Department of Labor decision on such fringe benefit programs or by applying DOL criteria, in rendering a local decision on the adequacy of the CONTRACTOR's fringe benefit programs. The approved programs shall be in place at the time of OWNER Contract execution and provisions thereof disclosed to the OWNER's Engineer or Wage and Hour Monitor, for legal review prior to Project commencement.

Regular CONTRACTOR/subcontractor contributions made to, or costs incurred for, approved fringe benefit plans, funds or other benefit programs that cover periods of time greater than the one week payroll period (e.g. monthly or quarterly, etc.) shall be prorated by the CONTRACTOR/subcontractor on weekly payroll records to reflect the equivalent value of the hourly and weekly summary of fringe benefits per employee.

7. OVERTIME COMPENSATION ON NON-FEDERALLY FUNDED PROJECTS

No CONTRACTOR/subcontractor contracting for any part of the non-federally funded Contract Work (except for worksite related security guard services), which may require or involve the employment of laborers/mechanics, shall require or permit any laborer/mechanic in any seven (7) calendar day Work period in which he, she is employed on such Work, to Work in excess of 40 hours in such Work period, unless said laborer/mechanic receives compensation at a rate not less than one and one-half times the basic hourly rate of pay for all hours worked in excess of 40 hours in a seven (7) calendar day Work period. Any applicable fringe benefits must be paid for straight time and overtime; however, fringe benefits are not included when computing the overtime rate.

8. PAYMENT OF CASH EQUIVALENT FRINGE BENEFITS

The CONTRACTOR/subcontractor is allowed to pay a minimum hourly cash equivalent of any applicable minimum hourly fringe benefits listed in the Wage Determination Decision, in lieu of the contribution of benefits to a permissible fringe benefit plan, for all hours worked, including overtime. An employee is not allowed to receive less than the local \$8.00 pr. hour minimum living wage or the minimum hourly basic rate of pay specified in the Wage Determination Decision, whichever is greater.

9. WORK CONDUCTED ON HOLIDAYS-NON-FEDERALLY FUNDED PROJECTS

If a laborer/mechanic is employed in the normal course and scope of his or her Work on the jobsite on New Year's Day, Martin Luther King Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day, or the calendar days observed as such in any given year, along with additional OWNER-designated local holidays to be annually determined by OWNER and provided in writing to CONTRACTOR, Work shall be paid for at no less than one and one half (1 1/2) times the regular minimum hourly base pay regardless of the total number of hours the laborer/mechanic has accumulated during the pay period.

10. UNDERPAYMENT OF WAGES OR SALARIES

- a. When a "full investigation" (as called for in and as construed under Texas Government Code Section 2258.001 et seq. and as further generally described in an administrative directive to the OWNER's Engineer and BPUB's Wage & Hour Monitor from the General Manager and CEO entitled "Conducting Wage and Labor Standards Investigations on 100% Non-Federally Funded BPUB Construction Projects", as may be amended) evidences underpayment of wages by CONTRACTOR/subcontractor to laborers/mechanics employed upon the Work covered by this Contract, the OWNER, in addition to such other rights as may be afforded it under State and/or federal law and/or this Contract, shall withhold from the CONTRACTOR, out of any payments (interim progress and /or final) due the CONTRACTOR, so much thereof as the OWNER may consider necessary to secure ultimate payment by the appropriate party to such laborers/mechanics, of full wages required by this Contract, plus possible penalty (See b. below). The amount so withheld, excluding any possible penalty to be retained by the OWNER, may be disbursed at an appropriate time after "full investigation" by the OWNER, for and on behalf of the CONTRACTOR/subcontractor (as may be appropriate), to the respective laborers/mechanics to whom the same is due, or on their behalf to fringe benefit plans, funds, or programs for any type of minimum fringe benefits prescribed in the applicable wage determination decision.
- b. Texas Government Code Section 2258.001 et seq., as amended, states that the CONTRACTOR shall forfeit as a penalty to the OWNER the sum of sixty dollars (\$60.00) for each calendar day, or portion thereof, for each laborer, workman, or mechanic, who is paid less than the said stipulated rate for any Work done under this Contract, whether by the CONTRACTOR himself, or by any subcontractor

working under him. Pursuant to and supplemental to this statutory authority, the OWNER and the CONTRACTOR/subcontractor contractually acknowledge and agree that said sixty dollar (\$60.00) statutory penalty shall be construed by and between the OWNER and the CONTRACTOR/subcontractor as liquidated damages, and not as a penalty, and will apply to any violations of paragraphs 6, 7, or 9 herein, resulting from CONTRACTOR/subcontractor underpayment violations.

- c. If unpaid or underpaid workers cannot be located by the CONTRACTOR or the OWNER after diligent efforts to accomplish same, unpaid or underpaid wages shall be reserved by the OWNER in a special "unfound worker's account" established by the OWNER, for such employees. If after one (1) year from the final acceptance of the Project by the OWNER, workers still cannot be located, in order that the OWNER can make effective interim re-use of the money, such wages and any associated liquidated damages may be used to defray actual costs incurred by the OWNER in attempting to locate said workers, and any remaining monies may then revert back to the OWNER's original funding source for the Project. However, unpaid or underpaid workers for which money was originally reserved are eligible to claim recovery from the OWNER for a period of not-to-exceed three (3) years from the final acceptance of the Project by the OWNER. Recovery after expiration of the three year period is prohibited.

11. DISPLAYING WAGE DETERMINATION DECISIONS/AND NOTICE TO LABORERS/MECHANICS STATEMENT

The applicable Wage Determination Decision as described in the "General Statement" (and as specifically included in the Project Contract), outlining the various worker classifications and mandatory minimum wages and minimum hourly fringe benefit deductions, if any, of laborers/mechanics employed and to be employed upon the Work covered by this Contract, shall be displayed by the CONTRACTOR/subcontractor at the site of Work in a conspicuous and prominent public place, readily and routinely accessible to workmen for the duration of the Project. In addition, the CONTRACTOR/subcontractor agrees with the contents of the following statement, and shall display same, in English and Spanish, near the display of the wage determination decision at the site of Work:

Both the OWNER and the CONTRACTOR/subcontractor agree that you must be compensated with not less than the minimum hourly base pay of \$8.00 pr. hour or other greater minimum hourly base pay based upon job classification, and minimum hourly fringe benefit contribution in accordance with the wage rates publicly posted at this jobsite, and as are applicable to the classification of Work you perform.

Additionally, you must be paid not less than one and one-half times your basic hourly rate of pay for any hours worked over 40 in any seven (7) calendar day Work period, and for any Work conducted on New Year's Day, Martin Luther King Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day or the calendar days observed as such in any given year, along with additional OWNER-designated local holidays to be annually determined by OWNER and provided to CONTRACTOR.

Apprentice and trainee hourly wage rates and ratios apply only to apprentices and trainees recognized under approved Federal, or State, apprenticeship training programs registered with the Bureau of Apprenticeship and Training, U.S. Dept. of Labor.

If you believe that your employer is not paying the appropriate minimum wage for the type of Work you do, you must make direct inquiry to the CONTRACTOR/subcontractor and inquire in writing, within sixty (60) calendar days of your receipt of any allegedly incorrect wage or benefit check or report, to the BPUB(OWNER's) Engineer and/or BPUB Wage & Hour Monitor, 1425 Robinhood Drive, Brownsville, Texas 78520. It is mandatory that you promptly file written inquiry of any allegedly incorrect wage or benefit checks or reports with the BPUB within the sixty (60) calendar day period, so that you do not waive your potential right of recovery under the provisions of the BPUB (OWNER) construction Contract that governs this Project.

Both the OWNER and the Contractor/subcontractor agree that no laborer/mechanic who files a complaint or inquiry concerning alleged underpayment of wages or benefits, shall be discharged by the employer, or in any other manner be discriminated against by the employer, for filing such complaint or inquiry.

12. PAYROLLS & BASIC PAYROLL RECORDS

- a. The CONTRACTOR and each subcontractor shall prepare payroll reports in accordance with the "General Guideline" instructions furnished by the OWNER's Engineer or Wage & Hour Monitor of the BPUB. Such payroll submittals shall contain the name and address of each such employee, his correct labor classification, rate of pay, daily and weekly number of hours worked, any deductions made, and actual basic hourly and fringe benefits paid. The CONTRACTOR shall submit payroll records each week, and no later than seven (7) working days following completion of the workweek being processed, to the OWNER's Engineer or Wage & Hour Monitor, BPUB. These payroll records shall include certified copies of all payrolls of the CONTRACTOR and of his subcontractors, it being understood that the CONTRACTOR shall be responsible for the submission and general mathematical accuracy of payrolls from all of his subcontractors. Each such payroll submittal shall be on forms deemed satisfactory to the OWNER's Engineer or Wage & Hour Monitor, and shall contain a "Weekly Statement of Compliance", as called for by the Contract Documents. Such payrolls will be forwarded to OWNER's Engineer or Wage & Hour Monitor, 1425 Robinhood Drive, Brownsville, Texas 78520.
- b. Copies of payroll submittals and basic supporting payroll records of the CONTRACTOR/subcontractors accounting for all laborers/mechanics employed under the Work covered by this Contract, shall be maintained by CONTRACTOR/subcontractor during the course of the Work, and preserved for a period of three (3) years after completion of the Project. The CONTRACTOR/subcontractors shall maintain records which demonstrate: any CONTRACTOR/subcontractors commitment to provide fringe benefits to

employees as may be mandated by the applicable Wage Determination Decision; that the plan or program is adjudged financially responsible by the appropriate approving authority, (i.e. U.S. Department of Labor, U.S. Department of Treasury, etc.); and that the provisions, policies, certificates, and description of benefits of the plan or program as may be periodically amended, have been clearly communicated in a timely manner and in writing, to the laborers/mechanics affected prior to their performing Work on the Project.

- c. The CONTRACTOR/subcontractor shall make the above records available for inspection, copying, or transcribing by authorized OWNER's Engineer or Wage & Hour Monitor of the BPUB at reasonable times and locations for purposes of monitoring compliance with this Contract.

13. LABOR DISPUTES

The CONTRACTOR/subcontractor shall immediately notify the BPUB General Manager and CEO or his designated representative of any actual or impending CONTRACTOR/subcontractor labor dispute which may affect, or is affecting, the Schedule of the CONTRACTOR's or any other contractor's/subcontractor's Work. In addition, the CONTRACTOR/subcontractor shall consider all appropriate measures to eliminate or minimize the effect of such labor disputes on the Schedule, including but not limited to such measures as: promptly seeking injunctive relief if appropriate; seeking appropriate legal or equitable actions or remedies; taking such measures as establishing a reserved gate, as appropriate; if reasonably feasible, seeking other sources of supply or service; and any other measures that may be appropriately utilized to mitigate or eliminate the jobsite and Scheduling effects of the labor dispute.

14. COMPLAINTS, PROCEEDINGS, OR TESTIMONY BY CONTRACTOR/SUBCONTRACTOR EMPLOYEES

No laborers/mechanics to whom the wage, salary, or other labor standard provisions of this Contract are applicable shall be discharged, or in any other manner discriminated against by the CONTRACTOR/subcontractors, because such employee has filed any formal inquiry or complaint, or instituted or caused to be instituted, any legal or equitable proceeding, or has testified, or is about to testify, in any such proceeding under or relating to the wage and labor standards applicable under this Contract.

15. EMPLOYEE INTERVIEWS TO ASSURE WAGE AND LABOR STANDARD COMPLIANCE

CONTRACTOR/subcontractors shall allow expeditious jobsite entry of the OWNER's Engineer and/or Wage & Hour Monitor displaying and presenting proper BPUB identification credentials to the jobsite superintendent or his representative. While on the jobsite, the OWNER's Engineer and/or Wage & Hour Monitor shall observe all jobsite rules and regulations concerning safety, internal security and fire prevention. CONTRACTOR/subcontractors shall allow Project employees to be separately and confidentially interviewed at random for a reasonable duration by the OWNER's Engineer

and/or Wage & Hour Monitor to facilitate compliance determinations regarding adherence by the CONTRACTOR/subcontractor to these Wage and Labor Standard Provisions.

16. "ANTI-KICKBACK" PROVISION

No person employed in the construction or repair of any BPUB public works Project shall be induced, by any means, to give up to the CONTRACTOR/subcontractor or City of Brownsville or BPUB public official or employee, any part of the hourly and/or fringe benefit compensation to which he or she is otherwise entitled.

17. "FALSE OR DECEPTIVE INFORMATION" PROVISION

Any person employed by the CONTRACTOR/subcontractor in the construction or repair of any BPUB public works project, who is proven to have knowingly and willfully falsified, concealed or covered up by any deceptive trick, scheme, or device a material fact, or made any false, fictitious or fraudulent statement or representation, or made or used any false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry, shall be permanently removed from the jobsite by the CONTRACTOR/subcontractor. The OWNER reserves the right to terminate this Contract for cause as a result of serious and uncured violations of this provision.

18. EMPLOYMENT OF APPRENTICES/TRAINEES

- a. Apprentices will be permitted to work at less than the predetermined rate for the Work they perform when they are employed and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship & Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship & Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen in any craft classification shall not be greater than the ratio under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not a trainee as defined in (b) below, or is not registered or otherwise employed as stated above, shall be paid the wage rate for the classification of work he actually performs. The CONTRACTOR/subcontractor is required to furnish to the OWNER'S Engineer or Wage & Hour Monitor of the BPUB, a copy of the certification, along with the payroll record that the employee is first listed on. The wage rate paid apprentices shall be not less than the specified rate in the registered program for the apprentice's level of progress expressed as the appropriate percentage of the journeyman's rate contained in the applicable Wage Determination Decision.
- b. Trainees will be permitted to work at less than the predetermined rate for the Work performed when they are employed pursuant to an individually registered program

which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen shall not be greater than that permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress. Any employee listed on the payroll at a trainee wage rate, who is not registered and participating in a training plan approved by the Employment and Training Administration, shall be paid not less than the wage rate determined by the classification of Work he actually performs. The CONTRACTOR/subcontractor is required to furnish a copy of the trainee program certification, registration of employee-trainees, ratios and wage rates prescribed in the program, along with the payroll record that the employee is first listed on, to the OWNER's Engineer or Wage & Hour Monitor of the BPUB. In the event the Employment and Training Administration withdraws approval of a training program, the CONTRACTOR/subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the Work performed until an acceptable program is approved by the Employment and Training Administration.

- c. Paragraphs 18.a. and b. above shall not operate to exclude training programs approved by the OFCCP, United States Department of Labor and as adopted by the Associated General Contractors (AGC) of Texas, Highway, Heavy, Utilities and Industrial Branch. Guidelines for these training programs shall be the same as those established for federally funded projects. This sub-paragraph 18.c. shall not apply to those portions of a project deemed to be building construction.

d. RATIOS, APPRENTICE TO JOURNEYMAN:

The Ratio of Apprentice to Journeyman for this Project shall be the same as the Ratio permitted under the plan approved by the Employment and Training Administration, Bureau of Apprenticeship and Training, U.S. Department of Labor, by craft. A copy of the allowable Ratios is included with the applicable Wage Determination Decision in the Specifications for this Project.

When a "full investigation" (as called for in, and as construed under Texas Government Code Section 2258.001 et. seq., and as further generally described in an administrative directive to the OWNER's Engineer and BPUB's Wage & Hour Monitor from the General Manager entitled "Conducting Wage and Labor Standards Investigations on 100% Non-Federally Funded BPUB Construction Projects", as may be amended) evidences a violation of the Apprentice or Trainee to Journeyman ratios effective for CONTRACTOR/subcontractor employees working on this Contract, the POWNER, in addition to such other rights as may be afforded it under State and/or federal law and/or other sections of this Contract (especially paragraph 10, of these Supplementary General Conditions "Underpayment of Wages"), shall withhold from the CONTRACTOR, out of any payments (interim progress and/or final) due the CONTRACTOR, the liquidated

damages (not a penalty) sum of seventy-five dollars (\$75.00) for each calendar day, or portion thereof, for each certified Apprentice or Trainee employee assigned to a Journeyman that exceeds the maximum allowable Apprentice/Trainee to Journeyman ratio stipulated for any Work done under this Contract, whether by the CONTRACTOR himself, or by any subcontractor working under him.

19. JOBSITE CONDITIONS

CONTRACTOR/subcontractor will not allow any person employed for the Project to work in surroundings or under construction conditions which are unsanitary, unhealthy, hazardous, or dangerous as governed by industry standards and appropriate City of Brownsville, State and federal statutes, ordinances, and regulatory guidelines.

20. EMPLOYMENT OF CERTAIN PERSONS PROHIBITED

- a. The CONTRACTOR/subcontractor shall knowingly only employ persons of appropriate ages commensurate with the degree of required skill, strength, maturity and judgment associated with the activity to be engaged in, but not less than the age of fourteen (14) years, as governed by Chapter 51 "Employment of Children", Texas Labor Code, (Vernon's Texas Codes Annotated) (as may be amended), and Texas Department of Labor and Standards rulings and interpretations associated with that statute. It is hereby noted that in some circumstances generally governed by this section, a federal statute (see: Fair Labor Standards Act, 29 USCS Section 212; Volume 6A of the Bureau of National Affairs Wage Hour Manual at Paragraph 96:1; "Child Labor Requirements in Nonagricultural Occupations" WH Publication 1330, July 1978 as may be amended), could pre-empt the Texas Statute and therefore be the controlling law on this subject. The CONTRACTOR/subcontractor should seek clarification from State and federal agencies and CONTRACTOR's legal counsel when hiring adolescent employees for particular job classifications.
- b. Prohibited persons not to be employed are also those persons who, at the time of employment for this Contract, are serving sentence in a penal or correctional institution, except that prior approval by the BPUB General Manager is required to employ any person participating in a supervised work release or furlough program that is sanctioned by appropriate State or federal correctional agencies.
- c. The CONTRACTOR/subcontractors shall be responsible for compliance with the provisions of the "Immigration Reform and Control Act of 1986" Public Law 99-603, and any related State enabling or implementing statutes, especially as they in combination apply to the unlawful employment of aliens and unfair immigration-related employment practices affecting this Contract.

21. PROVISIONS TO BE INCLUDED IN SUBCONTRACTS

The CONTRACTOR shall cause these Wage and Labor Standard Provisions, or reasonably similar contextual adaptations hereof, and any other appropriate State and federal labor

provisions, to be inserted in all subcontracts relative to the Work to bind subcontractors to the same Wage and Labor Standards as contained in these terms of the General Conditions and other Contract Documents, insofar as applicable to the Work of subcontractors or sub-tier subcontractors, and to give the CONTRACTOR similar, if not greater, general contractual authority over the subcontractor, or sub-tier subcontractors, as the OWNER may exercise over the CONTRACTOR.

General Number: TX20240003 01/05/2024

Superseded General Decision Number: TX20230003

State: Texas

Construction Types: Heavy and Highway

Counties: Cameron, Hidalgo and Webb Counties in Texas.

HEAVY & HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022: Executive Order 14026 generally applies to the contract. The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.

If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022: Executive Order 13658 generally applies to the contract. The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number Publication Date

0 01/05/2024

SUTX2011-003 08/02/2011

	Rates	Fringes
CEMENT MASON/CONCRETE		
FINISHER (Paving & Structures)...	\$ 12.46	**
FORM BUILDER/FORM SETTER		
(Structures).....	\$ 12.30	**
FORM SETTER (Paving & Curb)..	\$ 12.16	**
LABORER		
Asphalt Raker.....	\$ 10.61	**
Flagger.....	\$ 9.10	**
Laborer, Common.....	\$ 9.86	**
Laborer, Utility.....	\$ 11.53	**
Pipelayer.....	\$ 11.87	**
Work Zone Barricade		

Servicer.....	\$ 12.88 **
POWER EQUIPMENT OPERATOR:	
Asphalt Distributor.....	\$ 13.48 **
Asphalt Paving Machine.....	\$ 12.25 **
Broom or Sweeper.....	\$ 10.33 **
Crane, Lattice Boom 80 Tons or Less.....	\$ 14.39 **
Crawler Tractor.....	\$ 16.63 **
Excavator, 50,000 lbs or less.....	\$ 12.56 **
Excavator, over 50,000 lbs.....	\$ 15.23 **
Foundation Drill, Truck Mounted.....	\$ 16.86 **
Front End Loader Operator, Over 3 CY.....	\$ 13.69 **
Front End Loader, 3 CY or less.....	\$ 13.49 **
Loader/Backhoe.....	\$ 12.77 **
Mechanic.....	\$ 15.47 **
Milling Machine.....	\$ 14.64 **
Motor Grader Operator, Rough.....	\$ 14.62 **
Motor Grader, Fine Grade....	\$ 16.52 **
Scraper.....	\$ 11.07 **
Servicer.....	\$ 12.34 **
Steel Worker (Reinforcing).....	\$ 14.07 **
TRUCK DRIVER	
Lowboy-Float.....	\$ 13.63 **
Single Axle.....	\$ 10.82 **
Single or Tandem Axle Dump..	\$ 14.53 **
Tandem Axle Tractor with Semi Trailer.....	\$ 12.12 **
WELDER.....	\$ 14.02 **

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

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.20) or 13658 (\$12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

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>.

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 classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which 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. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of 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. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

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

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write 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 the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write 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 by 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

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION"

BPUB TECHNICAL SPECIFICATIONS

(THIS PAGE INTENTIONALLY LEFT BLANK)

CONSTRUCTION OF AIRPORT SUBSTATION

OWNER: BROWNSVILLE PUBLIC UTILITIES BOARD

DESCRIPTION OF PROJECT

Brownsville Substation Construction Contract Summary

Brownsville Airport Substation consists of a 138kV bus arrangement with three-(3) 138kV line positions and two-(2) transformer positions (138/69kV & 138/12.47kV) on the 138kV bus and a 69/12.47kV transformer. The transformers supply enclosed switchgear (12.47kV) each with four (4) feeder positions. Each switchgear has one capacitor bank tied to a dedicated feeder. The 138kV lines are protected with circuit breakers and the transformers are protected with candlestick circuit switchers.

The transmission lines around the substation will be energized during construction. BPUB will coordinate with ERCOT for line outages to build T-line shoe-flies around the substation. Once the T-line work is complete, the Contractor may begin his work.

LOCATION

915 S. Central Ave. Brownsville

SCOPE OF WORK

The Contractor shall provide all labor, equipment, transportation and personnel necessary to construct the substation and control building in accordance with the attached drawings and specifications herein. The Contractor shall be responsible for hauling owner furnished material (OFM) to site when necessary. Commissioning testing of the substation is not included in the contract, however, the Contractor will be required to make the necessary changes / modifications required for successfully commissioning the substation for service.

TABLE OF CONTENTS

Technical Specifications Page No.

<u>DIVISION GR - GENERAL REQUIREMENTS</u>	152
<u>DIVISION GR - GENERAL REQUIREMENTS – APPENDIX A</u>	169
<u>DIVISION ME –MAJOR EQUIPMENT</u>	172
<u>DIVISION CN –CONCRETE FOUNDATIONS</u>	177
<u>DIVISION AW–ALUMINUM WELDING</u>	189
<u>DIVISION BW–BUS WORK</u>	192
<u>DIVISION ES–ELECTRICAL RACEWAY SYSTEMS</u>	195
<u>DIVISION UB–UNDERGROUND BUS & FEEDERS INSTALLATION</u>	202
<u>DIVISION CO–HIGH VOLTAGE CONNECTORS</u>	209
<u>DIVISION FI–FENCE & IDENTIFICATION SIGNS</u>	213
<u>DIVISION EW–SITE PREPARATION, GRADING AND EARTHWORK</u>	217
<u>DIVISION SI–STEEL STRUCTURES (INSTALLATION)</u>	225
<u>DIVISION GD–GROUNDING</u>	231
<u>DIVISION WC – WIRE AND CABLING</u>	235
<u>DIVISION FT – FIELD TESTING, CHECK-OUT, AND ACCEPTANCE</u>	241
<u>DIVISION PL – POWER, LIGHTING, CONTROL DEVICES, AND ASSOCIATED EQUIPMENT</u>	254

INDICES OF DRAWINGS

INDEX NAME	LETTER DESIGNATION	NO. OF SHEETS
BUILDING DRAWING INDEX	B	10
CIVIL DRAWING INDEX	C	22
ELECTRICAL DRAWING INDEX	E	36
STRUCTURAL DRAWING INDEX	S	36
WIRING DRAWING INDEX	W100s & W200s	53
WIRING DRAWING INDEX	W300s	35

DIVISION GR

GENERAL REQUIREMENTS

GR.1 DESCRIPTION OF THE PROJECT

This DIVISION pertains to the construction of the Airport Substation and Control Building for the Brownsville Public Utilities Board headquartered in Brownsville, TX. The intent of all Divisions in the Contract is to detail the Contractor's function, coordination of procedures, environmental protection measures, materials requirements, assembly and erection of the facilities, the Owner's acceptance criteria, and any other factors considered pertinent to the cost-effective construction of the electrical facilities in accordance with the Owner's standards.

GR.2 WORK UNDER THE CONTRACT

- A. The Contract provides for all labor, tools, materials, equipment, transportation, storage, and services required to construct the substation facilities as described by the Contract Documents, Drawings, and Specifications. Materials to be furnished by the Owner are detailed in the Contract Documents. The Contractor shall provide all other required materials, construction equipment, and labor.
- B. This Contract includes the work as described in this Division and depicted in the Design Drawings. If any conflicting information arises between the Contract and the Design Drawings, the Design Drawings shall take precedence.
- C. This Contract includes, but is not limited to, work described in the scope of work and the Drawings.
- D. The following "Schedule of Construction Activities" shall be used by the Contractor as a guide to the minimum information that will be required during the execution of this Contract.

TABLE 1 – SCHEDULE OF CONSTRUCTION ACTIVITIES				
Task		Spec Reference	Contractor to Provide by	Date Completed
1	Pre-construction conference	GR.4	At or near first day of construction	
2	Construction bond and insurance documents		Prior to start of construction	
3	Contractor's Safety Manual		Prior to start of construction	
4	Submittal of plan to establish lines and grades	GR.5	Prior to survey work	
5	Concrete and crushed rock mix designs		Prior to start of construction	
6	Submittal of the Contractor	GR.7	Two (2) weeks after	

REV 3/17

	Furnished Materials (CFM) list		Contract execution, prior to order placement	
7	Engineer's review of the CFM list	GR.7	Two (2) weeks	
8	Submittal of final PO's to the Engineer	GR.7	Two (2) weeks following approval (Item 4)	
9	Obtain all necessary permits	GR.9	Prior to start of construction	
10	Notify the Owner or Engineer of items of concern	GR.10	Upon discovery	
11	Initiate communications with the Owner	GR.10	As specified	
12	Obtain underground utility locates	GR.10	Prior to start of construction	
13	Conduct on-site safety meetings	GR.11	Once a week, minimum	
14	Provide construction schedule	GR.15	Pre-construction conference	
15	Submittal of progress reports	GR.16	Every two (2) weeks, minimum	
16	Notification of concrete pours		24 hours before concrete pour	
17	Interconnect Drawings		Two (2) weeks prior to start of cable termination work	
18	Submittal of report delays or schedule acceleration	GR.16	Immediately upon occurrence	

GR.3 ENVIRONMENTAL CONDITIONS

The Contractor is responsible for designing, manufacturing, shop testing, delivering, and installing the Equipment and associated accessories and appurtenances, all as specified in this Division to meet or exceed all of the site and environmental conditions that are expected. The Contractor shall study the information provided and perform his own research, as deemed necessary, to meet or exceed these conditions.

GR.4 PRE-CONSTRUCTION CONFERENCE

- A. A conference will be held on or near the first day of construction to review and take action on correspondence, communications, and review procedures for payment to the Contractor and to establish a working understanding between the parties as to their relationship during the Project life. The conference may be attended by:
 - 1. The Contractor.
 - 2. Representatives of principal subcontractors, suppliers, and manufacturers.
 - 3. The Engineer.
 - 4. The Owner or his representative.
 - 5. Other Utilities that may be involved.
- B. At the discretion of the Owner, a field review of the Project will be made with the above parties.
- C. The Owner shall notify the Contractor by phone or email of the date for the pre-construction conference. Notification shall be made at least five (5) days prior to the pre-construction conference. The Contractor shall notify his subcontractors, suppliers, and manufacturers. The Owner shall notify all other interested parties.
- D. The pre-construction conference will be held at the Owner's or Engineer's office at BPUB Annex Administration Building, located at 1425 Robinhood Drive.

GR.5 SURVEYING AND STAKING

- A. The location of property corners and elevation benchmarks shall be established by the Owner.
- B. The Contractor shall be responsible for establishing or extending lines and grades from the existing monuments and facilities provided by the Owner. All measurements shall be to the limits and tolerances prescribed in the Drawings and Specifications.
 - 1. All Contractor survey work shall be under the direction of a surveyor or engineer who is qualified to supervise the work required by this paragraph. The Contractor shall maintain sufficient qualified survey personnel to perform the required work.
 - 2. All survey work performed by the Contractor shall be subject to field and office review by the Owner.
 - 3. Prior to beginning any phase of the survey work, the Contractor shall submit to the Owner his proposed plan for establishing lines and grades for control of the work.
- C. The degree of accuracy for surveys shall be of an order high enough to satisfy the desired tolerances for various types of work. The accuracy of survey work for site grading shall be within the following tolerances:
 - 1. Points for cross sections shall be located to the nearest 0.01 foot horizontally and vertically.

REV 3/17

2. Final grade stakes shall be set to ± 0.01 foot.
- D. The Contractor shall furnish all equipment and materials, including instruments, stakes, spikes, steel pins, platforms, tools, and other accessories as may be required in laying out any part of the work. Instruments shall be accurate and subject to rigid inspection, and any defective instruments, as determined by the Owner or Engineer, shall be promptly replaced, repaired, or adjusted.
- E. The Contractor shall coordinate his survey work with other survey work being performed for the Owner at the substation site.
- F. Existing monuments, stakes, or markers shall not be disturbed.
- G. The Owner's Surveyor may verify all base line, elevation, and foundation locations prior to the start of foundation work.

GR.6 COPIES OF DOCUMENTS

- A. The Contractor will be provided, at no cost to him, a maximum of four (4) sets of 11" x 17" and two (2) full size Contract Drawings which will include the latest revisions and a maximum of five (5) sets of the Bid Documents in addition to those used in execution of the Contract.
- B. Additional copies of the above documents will be supplied at printing and delivery cost, upon request.

GR.7 MATERIALS PROCUREMENT

- A. The Contractor shall prepare and submit a list of all materials to be furnished by the Contractor's suppliers, manufacturers, and subcontractors, which differs from the materials called out on the Construction Drawings.
- B. The materials list shall be submitted before Purchase Order placement and no later than two (2) weeks after Contract execution as follows:
 1. One (1) copy of the submittal shall be delivered to the Engineer and shall include the following information:
 - a. Materials description.
 - b. Supplier's name and address.
 - c. Manufacturer's catalog number.
 - d. Cut-sheet Drawings.
 - e. The Contractor's Purchase Order issue date and a firm delivery date at the job site.
 2. The Engineer will review the preliminary materials submittal information for any alternate materials proposed by the Contractor and return to the Contractor one (1) set of submittals with all exceptions noted, within ten (10) working days of receipt of the Contractor's submittal. The Contractor shall make the corrections noted and finalize all Contractor Furnished Materials Purchase Orders.
 3. One (1) PDF and/or one (1) AutoCAD copy of the final submittal to the Engineer shall be made no later than two (2) weeks following approval and shall include the following information:
 - a. Materials description.
 - b. Supplier's name and address.

REV 3/17

- c. Manufacturer's catalog number.
- d. Cut-sheet Drawing.
- e. Issue date of Purchase Order and a firm delivery date at the job site.
- f. Instruction and installation books, where appropriate.

C. Owner Furnished Materials

- 1. A complete list of Owner Furnished Materials (OFM) ordered for this Project is found in the Contract under OFM/Contractor's Proposal and is listed in the Drawing set.
- 2. The Contractor shall coordinate his work in accordance with the OFM delivery schedules.
- 3. The Contractor shall inventory and then accept OFM by signing a Materials Receipt Form.
- 4. Excess OFM shall be returned to the Owner in new, unused condition. These items shall be inventoried by the Contractor and the Owner and accepted by the Owner by signing a Materials Receipt Form for any returned material. Credit to the Contractor at the stated value shall be based on the quantities shown on the Materials Receipt Form.
- 5. The Contractor shall assume risk of loss of all OFM transferred for installation. The Contractor's responsibility for loss/damage to any OFM shall continue until final acceptance is made by the Owner of the constructed facilities and until excess OFM is returned and accepted.

GR.8 APPLICABLE CODES AND STANDARDS

- A. Applicable codes and standards referred to in all Divisions shall establish minimum requirements for equipment, materials, and construction and shall be superseded by more stringent requirements of Drawings and Specifications when and where they occur.
- B. Reference to Standard Specifications of any technical society, organization, or association or to the codes of local or state authorities shall mean the latest standard, code, Specification, or tentative Specification adopted and published at the date of taking bids, unless specifically stated otherwise.
- C. All equipment furnished and installed under the Contract shall be designed, fabricated, assembled, installed, and placed into service such that equipment will conform to the applicable provision of all federal and state safety and health standards.
- D. All construction methods and tools shall conform to the applicable provisions of all federal and state safety and health standards.
- E. Any conflicts between Specifications and applicable codes and standards shall be referred to the Owner for a decision.

GR.9 CONSTRUCTION FACILITIES

- A. Neither raw water for construction nor potable water will be available at the construction site. The Contractor shall make all necessary provisions and arrangements for water service at his own expense.
- B. The Contractor shall provide his own temporary on-site field office.
- C. The Contractor shall be responsible for supplying and maintaining construction power during the entire Project and contacting the Owner to determine if power is available on-site. The Contractor must obtain the Owner's approval in writing prior to using such power. Portable generators will be allowed only with prior written approval of the Owner.
- D. The Contractor shall provide and maintain sanitary facilities at his own expense. Toilets shall be of the chemically-treated type obscured from public view and shall be maintained in a manner approved by the Owner.
- E. The Contractor shall make every effort not to disturb the normal flow of traffic.
- F. The Contractor shall be responsible for determining and obtaining all permits required for construction activities.

GR.10 COMMUNICATIONS

- A. The following people are familiar with various phases of the Project:
 - 1. Eli Alvarez, P.E.
1425 Robinhood Drive, Brownsville TX.
Phone: 956-983-6234
 - 2. David Delaney, P.E.
ESC engineering, Inc.
3540 JFK Parkway
Fort Collins, Colorado 80525
Phone: (970) 224-9100
- B. In general, the Contractor shall be required to communicate only with the Owner, the Owner's Representative, or the Engineer, who shall forward copies of written communication, as necessary, to other appropriate organizations.
- C. Communications pertaining to the Contract for such items as Payment Applications, Change Orders, accident reports, requests for switching clearances, and outages shall be directed to the Owner or Engineer.
- D. The Contractor shall provide, at the Contractor's expense, a local telephone or cell phone located at the Contractor's field office for daily communications with the Owner and Engineer.
- E. The Owner's on-site field coordinator's responsibility (if provided by the Owner) shall be to communicate routinely, as required, on the following matters:
 - 1. Safety; use of hard hats and other safety devices.
 - 2. Receive any accident reports from the Contractor and submit said accident reports properly to the Owner.
 - 3. Interpretation of the Construction Drawings.
 - 4. Assist the Contractor to locate any OFM in the Owner's warehouse.
 - 5. Coordinate field services from equipment suppliers who have been contracted to

REV 3/17

- perform field alignment, test, or provide other services on their products.
- 6. Receive any Materials Receipt Forms from the Contractor.
- 7. Receive any switching requests from the Contractor and coordinate switching or outages with the Owner's operations personnel.
- 8. Receive progress reports from the Contractor.
- 9. Coordinate schedules with other Contractors whose work must interface with this Project.
- 10. Verify that the Contractor's materials and workmanship are in strict accordance with the Specifications and Drawings.
- F. The Contractor's foreman shall be responsible for bringing items of concern to the attention of the Owner, the Owner's on-site field coordinator, or the Engineer, such as:
 - 1. Questions on the proper interpretation of the Construction Drawings and Specifications.
 - 2. Requests to access OFM in the Owner's warehouse.
 - 3. Condition of OFM delivered to the site.
 - 4. Advise the construction coordinator when to schedule factory field service personnel.
 - 5. Upon receipt of OFM, the foreman shall sign a Materials Receipt Form provided by the Owner's warehouse manager.
 - 6. Submit written requests to the field coordinator at least 48 hours in advance when switching or outages are planned.
 - 7. Advise the Owner's construction coordinator of any special coordination needed with other Contractors working for the Owner in the same vicinity.
- G. The Contractor shall be responsible for initiating the following communications to the Owner:
 - 1. Accident reports.
 - 2. Requests for the location of the Owner's utilities buried in the Contractor's zone of activities.
 - 3. Monthly Payment Applications for progress payments.
 - 4. Switching requests for the Contractor's convenience.
 - 5. Other requests which affect the Contract completion schedule or Project cost.
- H. The Contractor shall determine the need for and obtain all underground utility locates. The Contractor shall be responsible for the entire cost of repair of any such underground utilities that are damaged by the Contractor or his subcontractors and shall hold blameless the Owner and the Engineer for such damages.

GR.11 SAFETY AND HEALTH REQUIREMENTS

- A. The Contractor shall implement and administer an aggressive accident prevention program and take all precautions in the performance of the work under this Contract to protect the safety and health of employees and members of the public and prevent damage to public and private property. The Contractor shall notify the Owner in writing that he intends to conduct on-site safety meetings (at least once a week) and will either follow his own or the Associated General Contractor's safety rules. This notification shall be made at the pre-construction conference.

- B. The Contractor shall not require or knowingly allow any employee engaged in the performance of the Contract, whether directly employed or through subcontract or on-site supply contract, to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety.
- C. The Contractor shall comply with the latest effective standards promulgated by the Secretary of Labor for the Department of Labor, Occupational Safety and Health Administration, Safety and Health Standards (OSHA 29 CFR 1910) and the Construction Safety and Health regulations promulgated under Section 107 of the Contract Work Hours and Safety Standards Act (OSHA 29 CFR 1926).
- D. Blasting shall not be permitted except by approval of the Owner and Engineer.
- E. The Contractor shall indemnify and hold the Owner and Engineer (including their respective stockholders, officers, agents, and employees) harmless for any and all losses, damages, costs (including attorney's fees and costs of defense), or liability on account of personal injury, death, or property damage of any nature whatsoever and by whosoever made or arising out of the activities of the Contractor, his employees, subcontractors, or agents under the Contract. Such indemnity shall include, but shall not be limited to, the failure of the Contractor, his employees, subcontractors, or agents to comply with the safety and health provisions mandated by the applicable federal, state, and local authorities.

GR.12 ENVIRONMENTAL QUALITY PROTECTION

- A. The Contractor shall be deliberate in the maintenance of environmental protection per the provisions of the United States Department of the Interior's (USDI's) "Environmental Criteria for Electric Transmission Systems". A summary of the pertinent environmental criteria is included in "Division GR - Appendix A". The Contractor shall also comply with any other federal, state, or local environmental regulations which are applicable for this Project.
- B. The Contractor shall exercise care to preserve the natural landscape and conduct his construction operations so as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work. All trees, native shrubbery, and vegetation shall be preserved and protected from damage by the Contractor's construction operations and equipment except where clearing is required and approved for permanent works, construction roads, or excavation operations. Movement of crews and equipment within the right-of-way and over routes provided for access to the work shall be performed in a manner to prevent damage to grazing land, crops, and property.
- C. The Contractor's construction activities shall be performed by methods that will prevent the entrance or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into streams, flowing or dry water courses, lakes, and underground water sources. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sanitary waste, industrial waste, radioactive substances, all petroleum based products, aggregate processing tailings, mineral salts, and thermal pollution.
- D. During all construction activities and the operation of equipment, the Contractor shall utilize such practicable methods and devices as are available to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants, as

REV 3/17

required by state and local requirements.

- E. The Contractor shall utilize the Storm Water Pollution Prevention Plan, Construction Drawings and other documents included in the construction document to aid the Contractor in the management of storm water.

GR.13 SHIPMENT AND HANDLING OF EQUIPMENT AND MATERIALS

- A. The Contractor shall assist the Owner in the unloading, inventory, verification of damage, and compliance of Materials Specifications of all OFM deliveries received after the Contract award. OFM deliveries received by the Contractor shall be immediately transferred to the Contractor for possession and upon execution of a Materials Receipt Form. An accounting report of all OFM shall be kept current of transactions by the Contractor and available for the Owner's periodic review.
- B. The Contractor shall require manufacturers and suppliers to prepare equipment and materials for shipment in a manner which facilitates unloading and handling and protects against damage or unnecessary exposure in transit and storage. Provisions for protection shall include the following:
 - 1. Covers and other means to prevent corrosion, moisture damage, mechanical injury, and the accumulation of dirt.
 - 2. A suitable rust-preventive compound on exposed machined surfaces and unpainted iron and steel.
- C. Each item of equipment and materials shall be tagged or marked as identified in the delivery schedule or on the compliance submittals, and complete packing lists and Bill of Materials shall be included with each shipment. Each piece of every item need not be marked separately, provided that all pieces of each item are packed or bundled together and the packages or bundles are properly tagged or marked.
- D. The Contractor shall be responsible for any and all damage to or losses of Owner Furnished and Contractor Furnished Materials and equipment occurring during and following delivery.
- E. The Contractor shall assume responsibility for and protect all equipment and materials during the storage period in accordance with the manufacturer's or supplier's recommendations, including, but not limited to, the following:
 - 1. Protection of exposed machined surfaces and unpainted iron and steel, as necessary, with suitable rust-preventive compounds.
 - 2. Handling and storage of steel plate, sheet metal work, and similar items in a manner to prevent deformation.
- F. The Contractor shall receive, check, unload, inventory, accept, and store all equipment and materials in accordance with industry standard procedures, as approved by the Owner. He shall report any damage to the Owner prior to or during unloading and advise the Owner of any shortage at the time of delivery. For any OFM, the Owner will verify such reports and so notify the equipment or material supplier.
- G. For materials delivered during construction to the Project site or picked up at the Owner's warehouse, the Contractor shall inspect any such materials for damage prior to accepting delivery by signing a Materials Receipt Form. Acceptance of any damaged OFM will transfer liability to the Contractor. The Contractor shall deliver packing lists and Bill of Materials to the Owner for any materials delivered to the construction site directly from the Owner's supplier. If agreed upon by the Owner, the Contractor shall

REV 3/17

- contact the Owner when OFM are delivered directly to the Project site so that the Owner can have an opportunity to inspect the materials prior to accepting delivery.
- H. The Contractor shall familiarize himself with any materials that are located in the Owner's warehouse and items which are to be delivered to the job site by the supplier. Materials furnished by the Owner which have been delivered to the Owner's warehouse shall be transferred and handled by the Contractor as follows:
1. Advise the warehouse supervisor at least 24 hours in advance that the Contractor's crews will be picking up the materials.
 2. The Contractor shall sign a Materials Receipt Form signifying that the Contractor is accepting responsibility for the materials itemized on the form.
 3. The Contractor shall take full responsibility for loading, unloading, transportation, storage, and installation of OFM. The Contractor, not the Owner, shall load the materials at the warehouse, secure the materials for transit, transport the materials to the substation site, and off load the materials at the substation site.
- I. New OFM not used on the Project shall be returned to the Owner in new or unaltered condition. All excess post-construction OFM shall be transported by the Contractor to the Owner's warehouse located at 1425 Robinhood Drive, Brownsville, TX. The Contractor shall notify the Owner of any OFM returns 48 hours in advance to prepare for the inspection and inventory of any returned materials. The Owner's acceptance of returned OFM will be validated per a signed Materials Receipt Form.

GR.14 SALVAGED EQUIPMENT AND MATERIALS (Where Applicable)

- A. Existing equipment and materials removed as part of the work and not reused shall be disposed of as designated by the Owner.
- B. The Contractor shall carefully remove in a manner to prevent damage all equipment and materials specified as those to be salvaged and reused or to remain the property of the Owner. The Contractor shall store and protect salvaged items specified as being reused in the work. Salvaged items not reused in the work which will remain the Owner's property shall be delivered in good condition to the Owner's designated storage area.
- C. All items designated for the Owner's salvage that are damaged by the Contractor during removal, storage, handling, or transportation shall be replaced in kind with new items by the Contractor, at the Contractor's expense.
- D. The Contractor may at his option furnish and install new items, at no cost to the Owner, in lieu of those specified as being salvaged and reused.

GR.15 CONSTRUCTION SCHEDULE

- A. In general, the Contractor shall manage his own construction work activities for timely completion of the overall Project with primary regard for personnel safety and the Owner's system integrity.
- B. The Contractor shall provide detailed completion schedules for the various work classifications. Any such schedules shall be discussed in detail at the pre-construction conference, at which time the Contractor may be requested to defend the schedules and demonstrate his conformance to the completion date.
- C. Completion of the overall Project on the date specified in the Bid Documents shall be the basis for the Bidder's (Contractor's) Bid Proposal. The Contractor may offer an alternative completion schedule for consideration by the Owner, provided that:
 - 1. The Contractor submits an alternate completion schedule in his proposal.
 - 2. The Contractor submits reasons for a change in the completion schedule (i.e., travel schedules, outage schedules, materials delivery problems, cost advantages to the Owner, etc.).
 - 3. The Owner has accepted in writing the alternate completion schedule.

GR.16 WORK PROGRESS REPORTS

- A. The Contractor shall submit to the Owner a report on actual progress of the work at least every two (2) weeks. Weekly reports may be required should the work fall behind the accepted schedule or for a Contract of short duration.
- B. Work progress reports shall consist of marked prints of the accepted work progress schedule and a narrative report including, but not limited to, the following:
 - 1. A statement of the percentage completion of each Project labor and material bid unit.
 - 2. A statement of work in progress and scheduled work for the following two (2) weeks.
 - 3. A statement of any factors delaying the construction effort, including causes and solutions.
- C. In addition to the bi-weekly reports, the Contractor shall report to the Owner immediately upon becoming aware of any circumstance which might delay or accelerate the approved work schedule.
- D. A work progress report shall accompany each Payment Application for partial payment. Work reported as completed but not readily apparent to the Owner must be substantiated with supporting data.
- E. Should any work fall behind the accepted schedule to an extent that substantial completion of the work within the Contract time appears doubtful, the Contractor shall at no additional expense to the Owner take whatever action is required to be in compliance with the specified schedule, including, but not limited to:
 - 1. Add to his plant, equipment, and construction forces, or
 - 2. Increase the working hours per week, or
 - 3. Both 1 and 2 above.

GR.17 COORDINATION CONFERENCE

- A. Coordination conferences will be held, as requested by the Owner. The Contractor, Engineer, and Owner shall each be represented at every conference. The Contractor may, at his discretion, request attendance by representatives of his suppliers, manufacturers, and other subcontractors. The Contractor shall be prepared to discuss all issues related to the Contract, including quality control, schedules, and materials status. Regarding schedules, the Contractor shall be prepared to report current status, near term anticipated progress, and overall schedule conformance as it relates to the completion date. Format of all submittals for these conferences shall be subject to approval by the Owner.
- B. When the Contractor's work affects or is affected by the work of other contractors, the Owner may hold coordination conferences to be attended by those involved. The Contractor shall participate in such conferences, as requested by the Owner.

GR.18 CHANGE ORDERS

- A. All requests for changes to the Contract shall require Change Orders filled out by the Contractor. Such Change Orders shall detail the specific changes and the complete cost to the Owner for any such changes.
- B. Change Orders must be approved in writing by the Owner and Engineer before any work is to begin.

END OF DIVISION GR

This Page Intentionally Left Blank

DIVISION GR – APPENDIX A

PERTINENT ENVIRONMENTAL PROTECTION REQUIREMENTS (Summarized in Part from the USDI's "Environmental Criteria for Electric Transmission Systems")

GR.A.1. CLEARING AND GRADING

- A. The substation site shall be graded in accordance with the Construction Drawings and in a manner which will minimize erosion.
- B. Clearing and construction activities in the vicinity of stream bed shall be performed in a manner to minimize damage to the natural condition of the area.

GR.A.2. VEGETATION MANAGEMENT AND CONTROL

- A. Vegetation removal shall be held to a minimum and, if possible, preserve existing mature trees.
- B. Trees, shrubs, grass, and natural features which are not removed shall be protected from damage during construction.
- C. Revegetation and fertilization, as described in this Project's Storm Water Pollution Prevention Plan (SWPPP), shall be implemented during and following construction of the substation. A SWPPP may not be required for this project; however, the Contractor shall comply with these protection requirements.

GR.A.3. EROSION AND SEDIMENT CONTROL AND WATER QUALITY

- A. Soil disturbance during construction shall be kept to a minimum, and restoration measures shall be taken promptly.
- B. Depending upon the size of the substation and specific state requirements, a storm water discharge permit may be required for construction of the substation. A SWPPP will be required as part of the discharge permit.
- C. Specific Best Management Practices (BMP) for erosion and sediment control listed in the SWPPP shall be implemented prior to construction to reduce potential water quality impacts.
- D. Construction materials shall be protected from run-on and run-off. At the end of every work day and during precipitation events, provide cover for any materials that could leach pollutants.

GR.A.4. ARCHITECTURAL FEATURES, COLOR SELECTION, AND LANDSCAPING

Architectural features and fences may be required along the fence line to complement the surrounding landscape or other features, as shown on the Construction Drawings and in this Contract.

GR.A.5. CONSTRUCTION SITE WASTE MANAGEMENT

Building materials and other construction site wastes must be properly managed and disposed of to reduce the risk of pollution from materials such as surplus or refuse building materials or hazardous wastes. Practices such as trash disposal, recycling, proper material handling, and spill prevention and clean-up measures can reduce the potential for storm water run-off to mobilize construction site wastes and contaminate surface or ground water. Refer to specific measures listed in the General Construction Site Waste Management BMP in the SWPPP for the management of solid wastes, hazardous materials and wastes, pesticides and fertilizers, and petroleum products and detergents.

GR.A.6. OIL SPILLS AND HAZARDOUS WASTE

- A. Avoid oil spills and other types of pollution. If there are any spills, immediately implement clean-up measures described in the SWPPP or in compliance with Environmental Protection Agency (EPA) regulations.
- B. Any hazardous waste generated at the site shall be disposed of according to EPA Hazardous Waste regulations.

GR.A.7. GOVERNMENT REGULATIONS.

Contractor shall follow all applicable Federal, State, and Local environmental regulations.

END OF DIVISION GR.A

This Page Intentionally Left Blank

DIVISION ME
MAJOR EQUIPMENT

ME.1 GENERAL

- A. This DIVISION covers the installation of major equipment in the substation, including all labor and materials needed to install and make functional major substation equipment items.
- B. Handling, assembly, and installation shall be performed only by qualified personnel with proper tools, methods, and procedures to ensure that all equipment is installed strictly according to the Manufacturer's instructions.

ME.2 EQUIPMENT AND MATERIALS

- A. Major substation equipment and Owner Furnished Materials are listed elsewhere. Contractor Furnished Materials and equipment shall be as described in detailed Specifications for these items and/or as shown on the Construction Drawings.
- B. Miscellaneous materials may be required to complete the installation including, but not limited to, shims, dowels, connectors, gaskets, anchors, etc. and shall be furnished by the Contractor unless specifically listed as Owner Furnished Materials. These miscellaneous materials shall be new and suited to any installation requirements, consistent with best modern practices and in accordance with the Manufacturer's recommendations.

ME.3 INSTALLATION

- A. The Contractor shall be familiar with all Owner Furnished Materials, labor, and services for major equipment items that are to be supplied by the Owner.
 - 1. The Contractor shall coordinate his work with Owner Furnished services and equipment delivery schedules.
 - 2. The Contractor shall be completely familiar with all Owner Furnished services to ensure that no duplication of services occurs.
 - 3. Acceptance of Owner Furnished Materials by the Contractor is the point of transfer of liability from the Owner to the Contractor. The Contractor shall therefore notify the Engineer prior to accepting all deliveries to confirm that all responsibilities are executed.
- B. In general, the Contractor shall install all equipment described in these Specifications or listed/shown on the Construction Drawings and in accordance with the following:
 - 1. Install the equipment and materials as specified and required for the operation and continuous service at the locations shown on the Construction Drawings.
 - 2. Include the assembly of all shipping sections and miscellaneous items of equipment shipped unassembled as received from the Manufacturer.
 - 3. Include any disassembly and reassembly of any parts or sections of equipment made necessary by obstructions or other limitations encountered in moving equipment to the final location(s) shown on the Construction Drawings.
 - 4. Conform exactly to the Manufacturer's recommendations in all respects. Any conflict between the Construction Drawings and Specifications and the

REV 3/17

Manufacturer's written or verbal recommendation shall be referred to the Engineer for a final decision.

5. Receive, care for, and deliver to the Owner's storage area all tools, maintenance devices, and other accessories that are furnished with the equipment.
 6. The Contractor shall utilize Belleville lock washers when mounting equipment to steel. Split washers are not acceptable.
- C. Equipment shall at all times be protected from damage and stored in such a way to minimize risk to the equipment.
- D. All equipment shall be clean, both interior and exterior, of dirt, debris, or other foreign material(s). The interior of any electrical equipment, including relays and contacts, shall be thoroughly wiped and vacuumed prior to energization.
- E. Should the services of the Manufacturer's representative(s) be retained by the Owner for aid in the proper installation of the equipment, the Contractor shall assist such Manufacturer's representative(s), as required. The presence of a Manufacturer's representative shall not relieve the Contractor of the responsibility for any work under this Division.
- F. The surface finish of the equipment shall be protected and great care taken to prevent its damage during handling and installation. If the finish is damaged, it shall be restored to the original condition in every respect, including color, thickness, and texture, at no expense to the Owner and at the Owner's sole judgment of satisfactory finish.
- G. Heavy equipment hauling, when required, shall be performed as follows:
1. Provide the services of a heavy hauling subcontractor experienced in moving and handling equipment of the size, weight, and type of the heavy equipment (unless evidence can be shown that the Contractor possesses the proper equipment and skilled personnel equal to the heavy hauling subcontractor). The subcontractor shall:
 - a. Be licensed for the area in which the work is to be done, if required by the local regulatory agency.
 - b. Own his equipment or have a bona fide lease for the use of such equipment.
 - c. Issue a surety bond with a local regulatory agency that is adequate to cover all possible damage to roads, highways, bridges, etc., as determined by said agency. This bond shall be in addition to the bond required for equipment protection in this Contract.
 - d. Have insurance in the minimum amounts for Personnel Injury Liability and Property Damage Liability, as required by the local regulatory agency.
 2. Work must be performed under the supervision of an experienced rigger and approved by the Engineer.
 3. Extreme care must be used in moving equipment. Proposed methods, materials, and operations must be approved before any work is started.
 4. Roadways, bridges, and other areas over which equipment is to be moved shall be planked and braced for their protection, if necessary.
 5. The Contractor shall secure all permits and make all other necessary arrangements with local street and highway authorities and police, as required, to obtain right-of-way use, crossing rights, and traffic control for moving equipment from the points of unloading to the points of installation. All stipulations for the issuance of permits

REV 3/17

- shall be strictly followed.
6. The Contractor shall be responsible for raising or having raised all power cables, telephone cables, service drops, etc. and provide sufficient overhead clearances for equipment. All items damaged during and/or because of heavy equipment hauling shall be replaced or restored to the original condition.
 7. The Contractor shall learn the design loading of all equipment and structures, shall not overload them, and shall use all lifting lugs that are provided.
 8. The Contractor shall replace or restore to the original condition any equipment or material(s) damaged or missing while under the responsibility of this Contract.
 9. Equipment shall be moved to a permanent location as soon as possible. If temporarily stored, the equipment shall be blocked on the ground as low as possible with the approval of the Owner and Engineer. All spaces and voids in the blocking shall be covered to limit access under the equipment if stored in an area accessible by the public.
- H. Receiving medium-weight equipment shall be performed as follows:
1. Cranes or fork lifts of sufficient size shall be used to prevent overloading the lifting equipment. Rigging in excess of its recommended safe working load shall not be loaded. When forklifts are used, the forks shall be lined so that equipment finishes will not be marred.
 2. Rigging equipment shall be inspected prior to use and during use to ensure safety. If found defective, the rigging equipment shall be replaced.
 3. Lifting hooks, eyes, etc., if provided, shall be used on the equipment for lifting and lift equipment, according to the Manufacturer's requirements.
- I. Power transformer bushing, radiators, and pumps shall be assembled and installed and the transformer shall be oil-filled, according to the Manufacturer's instructions.
- J. Insulating oil samples shall be taken by the Contractor and tested for dielectric acceptance prior to the transfer into the equipment, according to ASTM D877.
- K. Circuit breakers shall be assembled, anchored to the foundations, and oil or gas-filled, according to the Manufacturer's instructions.
- L. Switches shall be installed, properly aligned and adjusted, and checked for proper operation after high-voltage connections are made and readjusted, as necessary for proper operation. Piercing set screws shall not be tightened until the switch has been accepted by the Owner or Engineer.
- M. Wave traps, inductors, current transformers, coupling capacitor voltage transformers, and voltage transformers shall be installed, as shown on the Construction Drawings and according to the Manufacturer's instructions.
- N. The installation of all equipment will be inspected by the Owner, Engineer, or their representative, in accordance with the following:
1. The inspector shall review the equipment installation to ensure correct and complete installation.
 2. The Engineer shall have final authority on determining if correct and complete installation has been made and may direct the Contractor to correct any errors at no additional expense to the Owner.

END OF DIVISION ME

This Page Intentionally Left Blank

DIVISION CN
CONCRETE FOUNDATIONS

CN.1 GENERAL

- A. This DIVISION establishes requirements for the quality, strength, workability, placing conditions, and workmanship of all concrete foundations to be supplied and installed by the Contractor.
- B. The Contractor shall use the reference points established by the Owner/Engineer and shall survey all necessary lines and levels to ensure that all finished concrete work is properly located and true to line and grade, per the Construction Drawings and this Division.
- C. An experienced concrete Foreman shall be in complete charge of the concrete work at all times.
- D. Codes and Standards

- ACI 301 American Concrete Institute – Specifications for Structural Concrete
 - ACI 318 American Concrete Institute – Building Code Requirements for Reinforced Concrete
 - ASTM American Society for Testing and Materials

E. Submittals

- 1. The concrete mix design shall be submitted to the Engineer for review two (2) weeks prior to the start of placement.
 - 2. Test reports (i.e., slump, air entrainment, compressive strength) are the responsibility of the Contractor and shall be submitted to the Owner as construction progresses.

CN.2 MATERIALS

A. Concrete

- 1. The source of materials proposed for use shall be submitted to the Engineer for review. If the materials conform to this Division and have been reviewed by the Engineer, no change in source shall be made without prior review by the Engineer.
 - 2. All cement used for structural concrete shall be Type I conforming to ASTM C150.
 - 3. Coarse and fine aggregate shall conform to ASTM C33:
 - a. Frozen aggregate shall not be used.
 - b. Limit of fineness modulus shall be 2.5 to 3.1.
 - c. The maximum size of coarse aggregate shall be 3/4-inch.
 - d. Pre-dampening shall be allowed no later than 12 hours before concrete production.
 - 4. Mixing water shall conform to ASTM C94:
 - a. Only potable water will be acceptable without testing.
 - b. Mixing water shall be clean and free from injurious amounts of oil, acids, alkalies, organic materials, or other deleterious substances.
 - 5. Admixtures:

REV 3/17

- a. Water-reducing types shall conform to ASTM C494, Type A.
 - b. Air-entraining types shall conform to ASTM C260.
 - c. Pozzolanic types shall conform to ASTM C618.
 - d. All admixtures shall be protected from freezing and extreme temperature changes and shall be stored according to manufacturer recommendations.
- B. Reinforcing Steel
 - 1. Reinforcing bars used in the fabrication of concrete structures shall conform to ASTM A615, Grade 60. Size and length of reinforcement shall be as specified on the Construction Drawings.
 - 2. Welded wire fabric for concrete reinforcement shall conform to ASTM A185 or A497.
 - 3. Accessories shall be provided in accordance with ACI 319 "Recommended Practice for the Use of Metal Supports for Reinforcement".
- C. Grout shall not be used between structural steel base plates and the top of the concrete footing. Grout, when used as approved by the Engineer, shall be mixed and used in accordance with the following:
 - 1. Patching Grout:
 - a. 1-part Portland cement to 2-parts sand by damp loose volume. Cement and sand materials same as for concrete.
 - b. Keep water to a minimum, as required, for placing by the dry packing method.
 - c. Place after the mixed grout has been sufficiently troweled (without additional water) to reach the stiffest consistency that will permit placement (maximum two (2) hours).
 - 2. Bonding Grout:
 - a. 1-part Portland cement to 1-part fine sand passing No. 30 sieve by weight. Materials same as for concrete.
 - b. Mix to a thick and creamy consistency.
 - c. Place immediately by brush-coating the surface to be repaired.
- D. The following expansion joint material or approved equals shall be used:
 - 1. Expansion joint filler: Premolded cork of thickness indicated and conforming to ASTM D1752, Type II.
 - 2. Bond Breaker: Polyethylene strip.
 - 3. Joint Sealant: Two (2) component polysulfide system as manufactured by one (1) of the following:
 - a. Sikaflex Polysulfide Sealant, Sika Chemical Corporation.
 - b. Synthacalk GC-2, Pecora, Inc.

CN.3 INSTALLATION

A. Excavation

- 1. Pier type foundations shall be excavated by suitable auger/rotary type drilling equipment, with pad and footing type foundations by suitable excavating equipment. All foundations shall be excavated to at least the minimum dimensions shown on the foundation drawings. Payment shall be for the specified foundation neat line dimensions regardless of any over-excavation and concrete overruns.
- 2. Any and all costs related to rock excavation shall be included in the respective foundation bid units and no additional compensation for rock shall be paid.
- 3. Pier foundations shall be constructed in undisturbed material with any over-

REV 3/17

excavation filled with concrete at the Contractor's expense. All loose or objectionable material shall be removed from the holes prior to concrete placement.

4. If augering through sand or other material that cannot stand open long enough to install reinforcing and concrete, sidewall stabilization may be accomplished by the use of slurry, removable casing, or an equivalent method that would be allowed by any applicable environmental regulations. If such soil conditions arise in the field, the Contractor shall notify the Owner/Engineer immediately to obtain any special instructions or possible field revisions before proceeding.
5. Deep smooth casing of a hole will be permitted, provided the Contractor can demonstrate that the casing can be pulled before the concrete has set, without disturbing the foundation reinforcing steel. Deep smooth casing will not be allowed to remain in place. If a shallow casing is required to stabilize the top few feet of soil, it may be left in place or removed.
A shallow casing shall be considered as any casing not extending 4 feet below final grade. Any other casings shall be considered as deep casings.
6. If shallow casings are to be left in place, either one of the following conditions shall be met:
The casing shall be driven tight against undisturbed soil, or the Contractor shall fill any spaces between the casing and soil with a lean concrete consisting of 1-part cement to 8-parts fine aggregate by volume.
7. Casings shall be of adequate thickness and strength to protect the works and excavation.
8. Excavations shall be kept free of collecting water and holes shall be dewatered by pumping or setting up well points. If the water cannot be removed from the excavation, the concrete shall be placed by tremie, as specified herein.
9. With prior approval from the Owner or Engineer, material(s) from the excavations may be uniformly spread and compacted over the site fill area. If a suitable fill area is not available, any waste material(s) shall be hauled off-site. Cost for this should be included in the foundation bid price.
10. The Contractor shall review field conditions so that terrain accessibility for construction equipment will be reflected in the foundation proposal. It shall be the Contractor's responsibility to recognize what soil conditions can occur in both accessible and inaccessible terrain.

B. Formwork

1. Forms shall be in accordance with the following:
 - a. Conform to the shapes, lines, and dimensions of the concrete structures shown on the Construction Drawings and shall be of adequate strength and tightness to support the fresh concrete without undue deformation or loss of material.
 - b. Be properly braced and tied together to maintain their position and shape when concrete is tamped or vibrated. Any misshaped concrete resulting from sagging or bulging forms may not be accepted.
 - c. 3/4-inch chamfer shall be provided on edges of exposed footings, equipment pads, beams, and piers.
 - d. Forms for permanently exposed surfaces shall produce a smooth, even, and level finish without fins or board marks.
 - e. No splashing of oil on forms will be allowed. In freezing weather, a uniform

REV 3/17

coating of form oil, in lieu of wetting forms with water, shall be applied with a roller, brush, or sprayer, or as directed by the manufacturer.

- f. Placement tolerances shall conform to Chapter 4 of ACI 301.
2. Removal of forms shall be done in a manner which will assure complete safety of the structure and concrete.
 - a. No bracing, supports, or other formwork shall be loosened or removed until the concrete members supported thereby have acquired sufficient strength to safely support their own weight and any other possible service loads.
 - b. The minimum time between concrete placement and form removal shall be determined either by field-cured test specimens or in accordance with the durations specified herein.
 - c. If the Contractor elects to determine the required form removal schedule by means of test specimens, all costs in connection thereof shall be his responsibility.
 - d. When required by the Engineer and shown on the Construction Drawings, test specimens to determine form removals shall be made, field-cured, and tested, as specified below. No forms or supports shall be loosened or removed until tests indicate the following strengths:

<u>Structural Member</u>	<u>Percent of</u>
<u>Compressive Strength</u>	
Slab FormsF	60%
Wall and Pier Side FormsPSF	40%

- e. If field-cured test cylinders or beams are not used to determine the period required for formwork to remain in place, the following shall apply:

<u>Structural Member</u>	<u>Minimum</u>
<u>Duration for Forms in Place</u>	
Slab FormsF	18
hours	
Wall and Pier Side FormsPSF	18 hours

The time periods above shall be accumulated solely when concrete surface temperatures are above 50°F. Durations may be cumulative and not necessarily consecutive.

- f. Remove forms in a manner to avoid damage to the structure, with particular care for corners and edges.
- g. All exposed formed surfaces shall receive a rubbed finish immediately after removal of forms.

C. Placement of Reinforcing Steel and Anchor Bolts

1. Reinforcing steel shall not be used in reactor bank footings, unless specifically directed by the Engineer.
2. At the time of concrete placement, all reinforcement shall be free of mud, mill scale,

REV 3/17

oil, or any substance that may reduce the concrete-steel bond.

3. All reinforcement shall be supported and fastened before the concrete is placed and secured against displacement within the tolerances allowed in Chapter 5 of ACI 301.
4. Reinforcing steel shall be accurately placed and secured against displacement by using not less than 16-gauge annealed wire. Tack welding of bars and anchor bolts for assembly purposes will not be allowed except for the bottom two (2) rings and the top ring of pier reinforcing.
5. Reinforcement shall be supported from the ground on precast concrete blocks not less than 3 inches and of compressive strength equal to or greater than the concrete being placed. Alternate support devices may be used with the approval of the Engineer.
6. Clearances shall be maintained by using “shaft spacers” and “bar boots” for the construction of drilled piers equal to or greater than 15’-0” in length. The Contractor will be responsible for determining the number required and locations based on the length of pier and best practice.
7. Anchor bolts shall be treated as reinforcement per the above sections for installation purposes. Templates may be furnished for placement of anchor bolts or other embedded items within the tolerances allowed herein.
8. Concrete cover over reinforcing shall be as shown on the Construction Drawings and never less than 3 inches for concrete surfaces adjacent to soil.

D. Concrete Proportioning

1. Proportioning of materials for concrete shall be established to provide:
 - a. Workability and consistency without segregation or excessive bleeding to permit concrete to be worked readily into forms and around reinforcement.
 - b. Compressive strength, as specified, and durability to resist severe weathering and atmospheric contamination after hardening.
2. Compressive strength of hardened concrete shall be as follows or greater as shown in the Construction Drawings:
 - a. Minimum compressive strength at 7 days = **2,800 psi**.
 - b. Minimum compressive strength at 28 days (f'_c) = **4,000 psi**.
3. Cement content shall be a minimum 520 pounds of cement per cubic yard, which may include max 20% Fly Ash, by weight, meeting ASTM C618, Class “F” requirements. No other class of Fly Ash will be allowed.
4. Air entrainment shall be 6.0% ($\pm 1\%$) of the total concrete volume for a maximum coarse aggregate size of 3/4-inch.
 - a. Field adjustment of concrete air content will be permitted by the Contractor with approval of the Engineer.
5. The water-cement ratio shall not exceed 0.45 by weight.

6. The slump of concrete just prior to placement shall be:
 - a. 4 inches if consolidated by vibration method.
 - b. 5 inches if consolidated by other methods and for concrete in pier foundations.

REV 3/17

A slump tolerance of ± 1 inch will be allowed. Slump measurements will be per ASTM C143.

7. Admixture quantities shall be subject to the manufacturer's instructions and not conflict with the requirements of workability and strength specified above. Calcium chloride shall not be allowed in any quantity or form in the concrete mixture.
8. Mixing water for concrete embedded with galvanized metal shall be tested to determine the content of water-soluble chloride ion. Maximum permissible chloride ion content in the mixing water shall be limited to 1% by weight of cement.
9. The proportioning requirements of this section may be waived for an alternate mix design if the Contractor provides sufficient evidence from the batch plant in the form of field test records and trial mix data to prove conformance with the strength and durability requirements specified above. Proportioning of concrete materials by this method shall meet the requirements specified in Section 3.9 of ACI 301 or Section 4.3 of ACI 318.

E. Concrete Production

1. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94. Plant facilities and equipment shall conform to the "Certification of Ready Mixed Concrete Production Facilities," as provided by the National Ready Mixed Concrete Association.
2. Concrete produced by on-site volumetric batching and continuous mixing shall be batched and mixed in accordance with ASTM C685.
3. Liquid admixtures shall be considered part of the mixing water. If two (2) or more admixture types are used, each shall be added separately to prevent any interaction which may interfere with the efficiency of each admixture or adversely affect the concrete.
4. Retarding admixtures shall be added within one (1) minute after water is introduced or prior to batching of the last three-fourths of the concrete mix, whichever occurs first.
5. Concrete shall be produced only in quantities required for immediate use. Concrete which has set before placing shall not be retempered and shall be discarded.
6. Concrete which is delivered with a slump below the project requirements and is determined to be unsuitable for placing may have water added at the site, provided that the maximum specified water-cement ratio and slump will not be exceeded as a result of the water addition and that the concrete mix duration has not exceeded the times specified herein.
7. Cold weather temperature limitations for concrete delivered at the site of placement shall be per the following:

<u>Air Temperature (F°)</u>	<u>Minimum Concrete</u>
<u>Temperature (F°)</u>	
Below 0	60
0 - 30	55
30 - 45	50

8. Cement shall not be mixed with water or aggregates having a temperature greater than 100°F. If hot weather temperatures are determined to be producing low slumps, flash setting, or cold joints, the concrete ingredients shall be cooled before mixing. Flake ice or crushed ice may substitute all or part of the mixing water, provided the ice is determined to have melted completely during the mix.
 9. The Contractor shall submit each concrete delivery ticket to the Owner's Inspector for record keeping. Concrete job tickets shall include as a minimum:
 - a. Time and date of mix water introduction.
 - b. Time and date of job site arrival.
 - c. Material proportions used.
 - d. Mix design number.
 - e. Notations of ingredient additions at job site.
- F. Concrete Placement
1. Pre-placement preparation shall include:
 - a. Cleaning all equipment for mixing and transporting concrete.
 - b. Completion of formwork, including the removal of debris and ice.
 - c. Positioning and securing of reinforcement and embedded material.
 - d. Removal of standing water, thawing, and compaction of subgrade.
 2. The concrete shall be delivered to the site and discharge shall be completed within one (1) hour after introducing the water into the mixer for placement during the months of June, July, August, and September. The time may be increased to 1-1/2 hours for placement during the remaining months of the year. These time limits may be adjusted by the Contractor, depending on actual experience with slump loss and segregation.
 3. Conveying equipment shall conform to ASTM C94. Conveyor slopes shall be limited to prevent excessive segregation or loss of concrete ingredients.
 4. Concrete shall be placed without segregation and as near as possible to its final position in the forms. Flowing or moving of concrete by means of vibrators from point of deposit to final location shall not be allowed. Concrete placed in piers shall be directed vertically so as to not affect the reinforcing cage or sidewalls. If chutes are utilized for discharging, chute slopes may not exceed 2h:1v nor be less than 3h:1v. Chutes with slopes outside of this range or exceeding 20 feet in length may be used, provided concrete is discharged into a hopper before it is deposited.
 5. Concrete shall be deposited continuously or in layers of such thickness as to disallow the formation of seams due to initial setting within the cast section. The rate of concrete placing shall allow for the integration of fresh concrete while the deposited concrete is still in its plastic stage.
 6. Concrete shall be thoroughly consolidated upon discharge by means of vibration, spading, or rodding in order to thoroughly work the fresh concrete around the reinforcement, embedded items, and corners to eliminate any potential of honeycombing. Only the upper 10 feet of piers will require vibration.
 7. Mechanical vibrators shall be the internally activated type and capable of a minimum operational speed not less than 5000 rpm. Vibrators shall be continuously inserted and withdrawn on approximately 18-inch spacing. The duration of each insertion shall not exceed 15 seconds in order to minimize segregation. A spare

vibrator shall be available at the job site during all concrete placing operations.

8. Rainwater, sleet, or snow shall not be allowed to increase the amount of mixing water nor damage the surface finish while setting or curing.
 9. Concrete temperature during placement shall not exceed 90°F nor be allowed to heat to a degree that would cause flash sets or cold joints. Hot weather measures to lower concrete temperature during placing shall be followed per ACI 305.
 10. Concrete temperature shall not decrease below 55°F during placement and for 24 hours thereafter. Cold weather measures to maintain minimum concrete temperatures shall be followed per ACI 306.
 11. Concrete shall be placed continuously without construction joints. Should events beyond the control of the Contractor cause an interruption in concrete placement, the construction joint shall be prepared as follows:
 - a. The forms shall be re-tightened before depositing new concrete on or against concrete that has hardened.
 - b. The surface of the hardened concrete shall be chipped down to solid concrete (approximately 1/4-inch), roughened as required, and thoroughly cleaned of foreign matter and laitance.
 - c. The surface may be wetted; however, absolutely no standing water shall be allowed on the joint.
 - d. All reinforcing shall be cleaned of concrete dust and splatter.
 12. Concrete for piers shall be placed in dry holes. Any water in the holes shall be pumped out immediately prior to concreting to minimum practical levels. In no event shall more than 2 inches of water be left in the holes. If water level is such that removal is impossible, concrete shall be placed by pumping or tremie from the bottom up. Should it become necessary to place concrete under water, whether by tremie or pumping, the Contractor shall submit to the Engineer for approval the mix designs appropriate for this type of work and consistent with the intent of ordinary mix designs. Concrete placed by tremie or pumping shall be done in such a manner to ensure that fresh concrete and water do not mix by maintaining sufficient concrete head at all times. Sufficient concrete shall be wasted at the top of tremie pours to ensure that clean, sound concrete remains.
 13. Pier foundations installed by casing or slurry stabilization techniques shall be subject to approval by the Engineer. If in the Engineer's judgment, the Contractor's technique or any other specific cause results in questionable foundation quality from such problems as (but not limited to) cave-ins, floating of reinforcing cage, failure to restart tremie, contamination, etc., the foundation will be rejected and replaced at the Contractor's sole expense.
 14. Concrete for pads and footings shall be placed in dry excavations.
- G. Concrete Curing and Protection
1. Immediately after placement is completed, concrete shall be protected from premature drying, excessive temperature changes during setting, and mechanical injury, heavy shock, or excessive vibration/jarring after setting. Concrete shall be maintained under a minimal rate of moisture loss and under an ambient temperature change not exceeding 5°F per hour nor 50°F in 24 hours for the period necessary for proper cement hydration and concrete hardening (generally seven (7) days).

2. Acceptable methods of curing are listed below. Contractor submittal of the proposed method shall be required for approval by the Owner/Engineer prior to work commencing:
 - a. Ponding or continuous sprinkling of the forms.
 - b. Application of moisture-retaining coverings kept continuously saturated.
 - c. Application of sand kept continuously saturated.
 - d. Continuous application of mist spray or steam at 150°F.
 - e. Application of waterproof sheet materials per ASTM C171.
 - f. Application of a curing compound per ASTM C309 and manufacturer recommendations provided the curing surface should not be required to bond with additional concrete or any other substance.
3. Curing duration shall be continued for at least seven (7) days, except for high early strength concrete which may be three (3) days. Moisture retention measures may be terminated after verification is made that the concrete has achieved 70% of its specified compressive strength (f'c) and the concrete temperature has been maintained at no lower than 50°F.
4. Cold weather curing measures shall be followed per ACI 306. Concrete curing temperature shall be maintained between 50°F and 70°F for the period specified above, whenever ambient mean daily temperatures are less than 40°F. Fresh concrete shall not be exposed to exhaust gases containing carbon dioxide during the first 24 hours after placement.
5. Hot weather curing measures shall be followed per ACI 305. Concrete curing temperature shall not exceed 85°F for the period specified above during hot weather. Provisions for shading shall be allowed, as permitted by the surrounding construction operations.
- H. Concrete surfaces showing misalignment, rock pockets, poor joints, holes from ties, voids, honeycombing, or any other defective area shall be replaced. As an alternate to removal and replacement of defective concrete, the Engineer may accept repair by approved methods as described in ACI 309 Chapter 9.
- I. All unformed concrete surfaces shall be brought to uniform, level surfaces and worked with suitable tools to an appropriate finish.
 - a. Floor slabs and tops of walls shall be brought to a smooth, steel trowel finish.
 - b. Tops of piers shall be sloped slightly to provide drainage away from anchor bolts and may be wood float, broom, or steel-trowel finished, as directed by the Foreman.
 - c. Equipment pads/slabs shall be finished with a light broom.
- J. Concrete Testing
 1. Concrete materials and operations shall be tested and inspected for compliance with these Divisions as the work progresses. The Contractor shall be responsible for replacement or repair of any concrete work or material(s) determined to be defective by appearance or upon review of test data.
 2. Contractor duties in reference to concrete testing and in order to facilitate field test/inspection procedures shall be as follows:
 - a. Provide qualification of proposed materials and mix design. The Contractor shall submit to the Owner/Engineer the concrete materials and mix design proposed with a written request for review. The submittal shall include test

results verifying conformance with the required quality of materials and overall concrete mix design. No concrete shall be placed for project work without the Contractor receiving acceptance of the concrete design proposal in writing from the Owner/Engineer.

- b. Furnish all necessary labor to assist the designated Testing Agency during field sampling and handling of concrete.
 - c. Provide the Testing Agency with current operation schedules in sufficient advance notice to allow for the efficient, non-conflicting performance of the required inspection and tests.
 - d. Provide and maintain adequate safe-storage facilities for the sole use of curing of concrete test specimens for the first 24 hours per the requirements of ASTM C31.
 - e. Submit copies of mill test reports for all steel reinforcement.
3. The following testing services shall be performed by an ACI-certified Testing Agency at the Owner's expense:
- a. Review Contractor's proposed materials and mix design for compliance with these Divisions.
 - b. Secure production samples of batch plant stockpiled materials prior to concrete work for compliance testing.
 - c. Secure concrete samples per ASTM C172. A minimum of four-cylinder specimens per 50 cubic yards or less per day shall be obtained on a random basis. Mold and cure per ASTM C31, recording any deviations from the ASTM procedure on the test report.
 - d. Test cured specimens for strength per ASTM C39. One (1) cylinder shall be tested in seven (7) days and an additional two (2) cylinders in 28 days. Should one (1) of these tests show evidence of improper sampling, molding, or testing, the fourth cylinder shall be tested for strength.
 - e. Determine and record concrete slump truck batch per ASTM C143.
 - f. Determine air content for each truck batch per ASTM C231.
 - g. Determine the concrete temperature of each truck batch.
 - h. Perform testing of concrete at the site, as required.
4. The designated Testing Agency shall report all test and inspection results to the Owner, Engineer, Contractor, and concrete supplier as the reports are completed. The Testing Agency and its representatives shall not be authorized to revoke, alter, slacken, extend, or release any requirement of the Contract Documents (i.e. this Division), nor shall they approve or accept any portion of the concrete work.
- K. Placement Tolerances
1. Foundations shall be installed to the dimensions and locations shown on the Construction Drawings and to within the following tolerances:

Vertical elevation (i.e. TOC)	$\pm 1/8''$
Horizontal plan dimension	$\pm 1/4''$

2. Anchor bolts shall be installed to within $\pm 1/16$ -inch in any specified dimension.
3. Foundations not meeting these tolerances shall be removed and replaced by the Contractor at no expense to the Owner/Engineer.

END OF DIVISION CN

This Page Intentionally Left Blank

DIVISION AW

ALUMINUM WELDING

AW.1 GENERAL

- A. This DIVISION describes the minimum requirements and conditions which shall govern all aluminum welding performed under this Contract. Any deviation proposed by the Contractor must be approved by the Engineer before any change is made.
- B. Quality Assurance
 - 1. Applicable Standards
 - a. AWS D10.7 American Welding Society – Guide for the Gas Shielded Arc Welding of Aluminum and Aluminum Alloy Pipe
 - b. AWS D1.2 American Welding Society – Structural Welding Code – Aluminum
 - c. AWS A5.3 Specification for Aluminum and Aluminum Alloy Electrodes for Shielded Metal Arc Welding
 - d. ASTM American Society for Testing and Materials
 - e. The Aluminum Association – Aluminum Design Manual
 - 2. Personnel Qualifications
 - a. The Contractor shall employ only skilled, experienced, and certified welders and maintain written welding procedure specifications. All welders and procedures shall be subject to the Owner's and the Engineer's approval prior to any welding being done.
 - b. Procedure and welder qualifications shall be in accordance with the AWS.
 - c. All costs associated with the independent certification of welders and procedures shall be paid by the Contractor.

AW.2 EQUIPMENT AND MATERIALS

- A. All welding of aluminum bus shall be done by the Tungsten-arc or MIG process.
- B. Materials
 - 1. Welding filler material shall be high-quality aluminum alloy ER4043 in accordance with AWS A5.3 and suitable for producing sound welds equivalent to the parent material. Filler metal shall be stored in a dry, warm, uniform temperature area in its own sealed container.
 - 2. Shielding gas shall be commercially prepared and certified as being of welding grade and purity.

AW.3 INSTALLATION

- A. Performance
 - 1. Surfaces to be welded shall be clean and free of all foreign materials.
 - 2. Surfaces shall be thoroughly wire brushed or rubbed with steel wool to remove oxides prior to welding.
 - 3. If required to prevent interference by air currents or wind, suitable enclosures shall be constructed to protect the inert-gas screen.
 - 4. Preheating of parts prior to welding shall not exceed 250°F.
 - 5. Any cross-sectional area of weld shall not be less than that of the smaller section

REV 5/17

- being joined.
6. Finished welds shall be smooth with evenly spaced convolutions and free of oxides and weld spatter.
- B. Welds shall be made according to the Construction Drawings and details and as directed by the Engineer.
- C. Tests and Acceptance
1. If, in the opinion of the Owner, the Engineer, or their representative, a particular weld performed by the Contractor is substandard, the Contractor shall perform ultrasonic or radiographic testing of the entire length of the complete joint penetration for shop and field welds. Tests and any necessary corrective measures shall be performed at the Contractor's expense.
 2. The Owner or the Engineer may require magnetic particle or dye penetrant testing of any weldment where the appearance or the configuration suggests a possibility of cracking. The technique and procedures for magnetic particle testing shall be in accordance with ASTM E709. The technique and procedures for dye penetrant testing shall be in accordance with ASTM E165. The standards of acceptance for both types of testing shall be in accordance with AWS D1.2. The Contractor shall perform any such testing and repair any cracks or other defects that are discovered at the Contractor's expense.
 3. In addition to the testing as required above, all welds completed by the Contractor shall be visually inspected by following the procedures, techniques, and standards of AWS D1.2.
 4. All welds that in the opinion of the Engineer are deemed to be substandard or defective shall be replaced by the Contractor at the Contractor's expense.

END OF DIVISION AW

This Page Intentionally Left Blank

DIVISION BW

BUS WORK

BW.1 GENERAL

This DIVISION describes the materials and installation of the rigid bus, cable bus, cable jumpers, fittings, static wires and assemblies, and hardware that are required to form a complete system of overhead current-carrying paths and static-wire systems, as indicated on the Construction Drawings.

BW.2 EQUIPMENT AND MATERIALS

- A. The rigid bus shall be aluminum tubular bus conductor 6063-T6 alloy of sizes indicated on the Drawings.
- B. Overhead ground wire shall be as shown on the Drawings. Galvanized steel wire shall be in accordance with ASTM A363.
- C. Cable for the jumper bus shall be as shown on the Drawings and in accordance with ASTM B232. Each individual aluminum wire used in the construction of the completed conductors shall conform to ASTM B2 30. The core wire, if any, shall be galvanized steel wire conforming to ASTM B498/B498M.
- D. All bolts and washers (flat and heavy-duty lock) shall be stainless steel. All nuts shall be made of silicon bronze. Aluminum cadmium hardware is not acceptable.

BW.3 INSTALLATION

- A. Rigid bus installation shall be in accordance with the following:
 - 1. Install the rigid bus in complete accordance with recommendations of the Manufacturer, the Drawings, and specific requirements of the Engineer.
 - 2. All tubing bus connectors shall be welded, unless otherwise noted on the Drawings.
 - 3. Corona bells shall be installed on the open ends of the bus tubing, where indicated on the Drawings, including open tubing ends in expansion bus supports without alignment guides.
 - 4. Provide damping conductor for all horizontal bus runs greater than 7 feet or as shown on the Drawings and/or as approved by the Engineer. Damping conductor size is given in the following table:

Nominal Bus Diameter (inches)	Minimum Size of dampening conductor (circular mils)
1-½ to 3	266,800
3-½	397,500
4	795,000
5	1,431,000
6	1,590,000

REV 3/17

Any damping conductor used shall be straight and free of kinks. Two (2) cables may be substituted for the single cable, provided that the weight of the two (2) cables is at least as great as the single cable and does not exceed the weight of the single cable by more than 10%. Alternately, if the Drawings indicate, the bus dampers shall be installed according to the Manufacturer's instructions.

5. The Contractor shall clean all mating surfaces prior to installing the bolted connectors. Corrosion-resistant, oxide-inhibiting paste of a type equal to Alcoa Type "EIC" shall be used in making all-aluminum and aluminum-to-copper connections. The paste shall be applied, the aluminum surface shall be wire brushed through the paste, and additional paste shall be applied, if necessary, to cover the contact area. Paste remaining after the connectors are tightened shall be retained as a seal against moisture. All bolted-type connectors shall be clamped and locked securely using torque wrenches set to the Manufacturer's recommended torque values. Bends shall be made with a hydraulic bender without kinks or surface damage.
 6. Maintain proper phasing of the bus and connections, as indicated. Install phase identification plates, as specified.
 7. To reduce corona, all high-voltage bus fittings shall be wire brushed and sanded, as required, to remove rough surfaces and sharp edges.
 8. Drain holes, 5/16-inch diameter, shall be drilled in the bottom of each section of horizontal bus at midspan near the terminal end of the cantilevered bus runs and at the bottom of each section of the vertical bus.
- B. The jumpers and overhead shield wires shall be installed in accordance with the Drawings, Manufacturer's recommendations, Engineer's requirements, and the following:
1. The jumpers and overhead-shield wires shall be smoothly formed, and adjacent runs shall be similarly and symmetrically shaped to provide a uniform appearance throughout and free of bird caging and kinks.
 2. Stranded conductor shall be installed without twists or kinks and handled to avoid abrasions or other damage. No splices shall be allowed in the jumpers or overhead shield wires.
- C. The installation of all bus work will be inspected by the Owner, Engineer, or their representative in accordance with the following:
1. Damaged conductor, tubing, or fittings shall be replaced or repaired to the satisfaction of the Owner and Engineer.
 2. All rigid bus, jumpers, and overhead-ground wires shall be cleaned of dirt, tags, tape, or other material.
 3. All errors in the installation of the bus work, as determined by the Owner or Engineer, shall be corrected by the Contractor at no additional cost to the Owner.

END OF DIVISION BW

This Page Intentionally Left Blank

DIVISION ES
ELECTRICAL RACEWAY SYSTEMS

ES.1 GENERAL

A. Description

This DIVISION covers the materials and labor for the complete installation of all-weather proof boxes, conduits, fittings, and accessories for the 120/240VAC and 125VDC auxiliary power distribution and lighting systems, as shown on the Construction Drawings.

B. Quality Assurance

1. Applicable Standards

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
FS	Federal Specifications
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
UL	Underwriters Laboratories, Inc.

ES.2 EQUIPMENT AND MATERIALS

A. Design Requirements

1. Furnish each length of conduit with coupling on one (1) end and a metal or plastic thread protector on the other end.
2. Conduit shall be UL listed and labeled on each length, fitting, and accessory.
3. Sizes of conduit, fittings, and accessories shall be as indicated, specified, or required by Electrical Codes and Standards.

B. Rigid Steel Conduit

1. Mild ductile steel shall be circular in cross section and with uniform wall thickness sufficiently accurate to cut clean threads.
2. Thread each length on both ends with the threads protected by the same process as used on each length.
3. Remove all scale, grease, dirt, burrs, and other foreign matter from the inside and outside prior to the application of coating materials.
4. Galvanize by the hot-dip process as follows:
 - a. Coat interior and exterior surfaces with a solid, unbroken layer of 99% virgin zinc by dipping.
 - b. Coating shall not show fixed deposits of copper after four (4) 1-minute immersions in a standard copper sulfate solution.
 - c. Apply one (1) coat of zinc chromate finish on inside and outside surfaces to prevent oxidation and white rust.
5. Fabricate, coat, and finish couplings and elbows by the same process as the conduit.

C. Flexible Steel Conduit

1. Conduit shall be liquid-tight with a flexible galvanized-steel core and a synthetic rubber, polyvinyl chloride or thermoplastic covering.

REV 3/17

2. Utilize spiral encased copper bonding conductors for conduit in sizes of 1-1/4 inches and smaller.
- D. Rigid Polyvinyl Chloride (PVC) Conduit
1. Fabricate conduit from self-extinguishing, high-impact polyvinyl chloride designed for aboveground and underground installations.
 2. Fabricate fittings and accessories from the same material as the conduit.
 3. Solvent cement type joints shall be as recommended by the Manufacturer.
- E. Rigid Steel Conduit and Fittings, PVC-Coated
1. Galvanized conduit prior to plastic coating shall conform to applicable Federal Specifications, American Standard Rigid Steel Conduit Specifications, and Underwriters Laboratories Specifications.
 2. Condition the zinc surface prior to plastic coating with chromic acid to provide an anchor for the plastic coating. Galvanizing and plastic coating shall be performed in the same plant.
 3. Coat the interior and exterior with a heat polymerizing lacquer not to exceed 0.0005 inches thick, such as an epoxy acrylic, prior to application of the plastic coating.
 4. Bond the plastic jacket to the metal with a thickness between 0.035 and 0.045 inches for the full length of the pipe, except the threads.
 5. A coupling shall be furnished loose with each length of conduit and have a plastic sleeve extending one (1) pipe diameter or 2 inches (whichever is less) beyond the edge of the coupling. The inside diameter of the sleeve shall be the same as the outside diameter of the I.P.S. pipe used with it. The wall thickness of the sleeve shall be the same as the plastic jacket on the pipe.
 6. The bond between the metal and plastic shall be equal to or greater than the tensile strength of the plastic coating.
 7. Utilize Robroy Type "Plasti-Bond", or approved equal, for fittings.
- F. Rigid Steel Conduit Fittings
1. Heavy-Duty Cast Malleable Iron Fittings shall utilize:
 - a. Mogul type for conduit sizes of 1-1/2 inches and larger.
 - b. LBD or roller action type LB for right angle fittings for conduit sizes 2 inches and larger.
 - c. Full-threaded hubs and rubber-gasketed covers.
 - d. Zinc, cadmium-plated, or bronze hardware bolts and screws for assembly.
 - e. Cadmium plating or galvanizing finish.
 - f. Standard and junction fittings.
 2. Conduit Expansion Fittings Design shall include:
 - a. Galvanized expansion fittings for conduit movement up to 4 inches.
 - b. Insulated metal bushing on the ends of the conduit and the bonding jumper with the expansion head sealed with a high-grade graphite packing.
 - c. Appleton Group (O-Z/Gedney) Type AX with Type AJ bonding jumper.
- G. Rigid Steel Conduit Boxes
1. Outdoor Boxes shall be designed to include:
 - a. 11-gauge minimum galvanized steel with a drip lip and galvanized-steel covers fastened with bronze or cadmium-plated screws or bolts or cast iron with a galvanized finish and flanged bolted covers.
 - b. ZRC finish for special boxes where it is not possible to provide hot-dip

- galvanizing (Engineer approval required).
- c. Threaded conduit entrances or Appleton "Uniseal" rigid conduit hubs on all boxes.
- d. Rubber or neoprene gasket for cover.
- e. Conformance to NEMA Type 3R or Type 4X enclosure in all outdoor installations, as specified on the Construction Drawings unless indicated otherwise.
- f. Oil-tight JIC boxes modified for NEMA Type 3R or Type 4X enclosure, as manufactured by Hoffman Engineering Company, or approved equal.
- 2. The box size for each particular installation shall be as required or indicated.
- 3. Provisions shall be included for mounting cable supports, where indicated, specified, or required by the NEC.
- 4. Provide for cable pulling, junctions, terminals, and the mounting of switches, outlets, and control devices, where indicated or required.
- H. Support System
 - 1. Size galvanized steel conduit clamps for the specific conduit size to support all exposed metallic conduit, where required.
 - 2. Utilize nonmagnetic clamps to support nonmetallic conduits.
 - 3. Fabricate from structural steel or manufactured framing members equal to "Unistrut" P-3000 series, as manufactured by Unistrut Corporation.
 - 4. Include all necessary rods, anchors, inserts, clamps, spacers, shims, bolts, and miscellaneous steel.
 - 5. Members shall be galvanized or cadmium-plated.
 - 6. Where exposed to weather or high humidity, use non-corrodible metal, galvanized metal, or cadmium-plated metal for nuts, bolts, washers, shims, and other small accessories.
- I. "Pulling in" rope shall be nylon with a minimum breaking strength of 1200 pounds.
- J. Prefabricated Cable Trench - Trenwa or Equal
 - 1. Provide only the Manufacturer's standard dimensional sections, as shown in the Construction Drawings. These sections shall have concrete sidewalls and floor reinforcements. Site fabricated or modified sections shall not be used unless approved in advance by the Owner. Provide standard tee's, as shown on the Construction Drawings, to facilitate future extension of the cable trench.
 - 2. For all sections (except road crossings to facilitate lid removal and handling), make each lid section of lightweight concrete reinforced with fiberglass or similar material(s). Lids shall fit flat and true with no gaps greater than 3/8-inch all around. Each lid section shall have a means for grasping by hand for removal. Lids shall be suitable as a pedestrian walkway and not be abnormally slippery when wet or snow covered.
 - 3. The trench system shall have a reinforced, open-floor design permitting random conduit entrance through the floor.
 - 4. In cable trench sections having 120/240V home runs from the station service transformer to the control building, a physical partition shall be provided to separate the power circuits from the control circuits.
 - 5. Road crossings shall be rated HS20 loading for low-speed vehicle traffic, such as utility line trucks. Road crossings shall be clearly marked with guard posts.

REV 3/17

6. Provide trench sections adjacent to control building walls for cable entrances to the building in accordance with the Construction Drawings.

ES.3 INSTALLATION

A. Conduits, Fittings, and Accessories

1. Preparation

- a. Provide suitable protection for conduit risers against damage during construction.
- b. Cap the ends of all conduits before concrete is poured and/or backfilling is done.
- c. Cap all conduits after cleaning where conduits are to be left empty per this Contract.
- d. Carefully ream the ends of all conduit lengths after cutting to eliminate sharp burrs.
- e. Clean all conduit before pulling in control wire.
- f. Clean out all conduit immediately after concrete work or backfilling is finished.

2. Performance

a. General Requirements

1) Location

- a) Install conduit as near as possible to the routing indicated.
- b) Shift locations, as required, to avoid interference with other equipment.
- c) Where routing of conduit is not indicated, the Contractor shall route in conformance with this Division.
- d) Accurate as-built location(s) of all buried conduit shall be reported by the Contractor in writing to the Owner at the end of construction.

2) Underground conduit shall not be used in sizes smaller than 1 inch in the yard area.

3) Make connections to boxes, panels, and other equipment as follows:

- a) Double locknuts; one (1) inside and one (1) outside.
- b) Bushings shall be:
 - (1) Malleable iron or steel.
 - (2) Insulated with Bakelite and molded and bonded into the bushing.
 - (3) Placed on the end of the conduit in addition to the locknuts.

4) Running threads shall not be permitted.

5) Coat all field cut threads in galvanized conduit with "Galvanox" or one (1) coat of Kolors #6820 zinc rich anodic shield and one (1) coat of aluminum paint.

6) Four (4) 90-degree bends shall not be exceeded between boxes at the start and end of the conduit run, as specified in the NEC, unless indicated otherwise by the Construction Drawings:

- a) Pull conduit runs exceeding the maximum number of 90-degree bends, as specified by the tension pull calculations, in order to avoid deformation or damage to the conductor.
- b) Use Polywater Lubricant on longer conduit runs, as indicated by the conduit plan and tension pull calculations.

7) Install an entire conduit system that is electrically continuous with provided

REV 3/17

bonding jumpers, as necessary to conform to the NEC.

b. Rigid Steel Conduit

1) Exposed

- a) Install conduit above grade outdoors, where specified or indicated.
- b) Group parallel runs in neatly aligned banks, where possible, with a minimum 1- inch clearance between conduits.
- c) A distance of 8 feet shall not be exceeded between supports on horizontal or vertical runs.

2) Concealed

- a) Conduit shall not be installed in concrete where the conduit diameter exceeds one-third of the concrete thickness.
- b) Install parallel runs using conduit spacers.
- c) Use expansion fitting with bonding jumpers at all concrete expansion joints.
- d) Tie conduit securely in place to prevent movement when the concrete is poured.
- e) Use long radius elbows where the curved portion of the elbow shall not extend above the finished foundation.
- f) Make all joints watertight after installation by coating all finished joints with Koppers Bitumastic No. 50 asphaltic coating.

c. Rigid Steel Conduit, PVC Coated

- 1) Use conduit in direct buried applications, as indicated.
- 2) Use conduit for the connection of above grade conduit to buried conduit, as indicated.
- 3) Make all joints watertight with suitable sealer.
- 4) Use a bender one (1) size larger for conduit sized 1 inch or less and a conventional bender for conduit sized above 1 inch.
- 5) Maintain a 6-inch separation from the underground piping.
- 6) Use a long radius bend at all risers, unless indicated otherwise.
- 7) Bury conduit to the depth indicated on the Construction Drawings.
- 8) Slope conduit away from conduit risers, where possible.
- 9) Lay conduit after the trench bottom has been finished to grade. The trench shall be carefully backfilled in layers of 4 inches to 8 inches of dry unfrozen sand or native soil free of rocks and other debris, as shown on the Construction Drawings. Tamp each layer with a power tamp.
- 10) Cap the ends of all conduit risers before backfilling.

d. Flexible Conduit

- 1) Use flexible conduit between the rigid conduit and motor terminal boxes and heaters.
- 2) Place between the rigid conduit or conduit box and control device cases where a direct connection is not desirable for reasons of equipment movement, vibration, or ease of maintenance.
- 3) Conform to the NEC with the installation of conductors.

- 4) Use a minimum length consistent with the Manufacturer's standard lengths,

- the acceptable bending radius, and the required movement of equipment.
- 5) Install an external bonding jumper to conform with the NEC on conduit sized 1-1/2 inches and larger.
- e. Polyvinyl Chloride (PVC) Conduit
 - 1) Use only in direct buried applications, as indicated.
 - 2) Bury conduits to the depth indicated on the Construction Drawings.
 - 3) Make all joints watertight with cement compound furnished by the conduit Manufacturer.
 - 4) Slope conduits away from conduit risers, where possible.
 - 5) Maintain a 6-inch separation from the underground piping.
 - 6) After the trench bottom has been finished to grade, lay conduit and carefully backfill the trench in layers of 4 inches to 8 inches of dry unfrozen sand or native soil free of rocks and other debris, as shown on the Construction Drawings. Tamp each layer with a power tamp.
 - f. Conduit fittings shall be installed, as required.
 - g. Boxes
 - 1) Install special boxes, as indicated, of the size required for conduits and cables entering and leaving the box.
 - 2) Where required, install for pull or junction boxes and for mounting or connecting to switches, outlets, intermediate terminal blocks, or control devices.
 - h. Supports
 - 1) Construct with sufficient rigidity to hold all mounted equipment and materials in permanent and neat alignment.
 - 2) Design to provide a 1/4-inch space between equipment housings and walls or columns upon which they are mounted.
 - 3) Do not exceed load requirements in NEC and NEMA standards.
 - 4) Paint all field cuts or welding of supports with one (1) coat of Rust-Oleum Corporation Heavy Duty Aluminum or Devcon Z or ZRC manufactured by Sealube Company, Quincy, Massachusetts.
 - 5) Use electrogalvanized steel conduit clamps and nonmagnetic conduit clamps to support electrogalvanized steel conduit and nonmagnetic conduit, respectively.
- B. Prefabricated Cable Trench
1. Trench and backfill in accordance with the Manufacturer's specifications. Slope and grade the trench to prevent low areas which collect water. Trench alignment and elevation above grade shall be visibly straight and consistent.
 2. Provide a 1-1/2-inch layer of clean bedding sand in the bottom of the cable trench along the full length of the trench.
 3. Lay cables and wires neatly in parallel runs and train each circuit exit neatly from the trench to minimize any difficulty in cable handling.

END OF DIVISION ES

This Page Intentionally Left Blank

DIVISION UB

UNDERGROUND BUS AND FEEDERS INSTALLATION

UB.1 GENERAL

- A. This DIVISION includes all underground class electrical power cable and connectors for the Substation Bus and Feeder System, as shown on the Construction Drawings.
- B. Testing and Check-Out
 - 1. The Contractor shall provide all testing equipment and supplies required to perform the tests and services.
 - 2. The Contractor shall perform all tests in accordance with the following general requirements:
 - a. Submit to the Engineer for approval a proposed plan for testing, which shall show that the Contractor either possesses qualified personnel and test equipment to satisfactorily perform the testing required or that he will employ the services of a qualified and approved testing company.
 - b. Test all wire, cable, and electrical equipment installed or connected by the Contractor to ensure proper installation, setting, connection, and function, as indicated, or to conform to the Manufacturer's instructions.
 - c. The Engineer may require that certain tests be performed in his presence or under the supervision of the Equipment Manufacturer's field representative.
 - d. The Contractor shall be responsible for all damage to equipment or materials due to improper test procedures.
 - 3. Power Cables
 - a. The Contractor shall perform high-voltage DC proof testing of the power cables prior to energization.
 - b. Cable splices, if any, shall be left exposed until high-voltage testing is complete.
 - c. Testing cable on the reel shall not be acceptable.
 - d. After installation of the cable and prior to high-voltage tests, the Contractor shall perform a continuity test with an ohmmeter.
 - e. The high potential DC test shall be performed in accordance with the Manufacturer's recommendations and NETA standards. Caution! DC charges may build up on cables and cause them to become dangerous. Before handling the cable following the high-voltage test, the Contractor shall attach the conductor to the ground grid to allow the residual voltage to completely drain to earth.
 - f. A test report shall be made for each circuit pulling length.
 - g. The Owner will not accept cable on which test reports have not been reviewed by the Engineer.
 - h. All equipment susceptible to damage from the testing shall be disconnected (such as transformers, switches, etc.).
 - i. An adequate clearance shall be established between cable test ends and the ground.
 - j. All cables shall be grounded with cable shield when not under test.
 - k. The leakage current shall be recorded.
 - 4. Phasing and Synchronizing

Correct phasing shall be verified and maintained on all circuits. Phasing tests shall be performed on all circuits which can be energized from two (2) or more sources to prevent the paralleling of sources out of phase.

UB.2 EQUIPMENT AND MATERIALS

A. Wire and Cable

1. The Contractor will be notified of the following information for Owner Furnished cable when the information is available to the Engineer. If the cable is Contractor Furnished, the Contractor shall provide the following information:
 - a. The length of cable on each reel.
 - b. The quantity, weight, and size of each reel.
2. Power cable being supplied under this Project shall be as described on the Construction Drawings.

B. Cable Supports

1. Cable supports shall be Kellem basket-type wire mesh grip, or approved equal, for the support of underground cable in the vertical conduit risers.
2. Cable racks shall support the underground primary and secondary cables in the underground vaults.

C. Cable Identification Tags and Nylon Ties

1. Tags shall be 1-inch round, hard-fiber type, white in color, and permanently marked using nylon marking ink.
2. Nylon ties shall be Thomas and Betts "Ty-Rap", Panduit "Sta-Straps", or approved equal.
3. Each cable shall be marked with the correct phase.
4. Each group of cables shall be marked with the correct destination marking.

D. Cable and Conduit Marking Tape

1. All underground cable and conduit shall be marked with a 6-inch wide marking tape.
2. The marking tape shall be red with the words "Caution: Buried Electric Line Below" printed on the tape in black.

E. Rigid Steel Conduits

1. Mild ductile steel shall be circular in cross section with a uniform wall thickness sufficiently accurate to cut clean threads.
2. All scale, grease, dirt, burrs, and other foreign matter shall be removed from inside the conduit.
3. The conduit shall be galvanized by the hot-dip process in accordance with ASTM Specifications.
4. The couplings and elbows shall be fabricated, coated, and finished by the same process as the conduit.

F. Rigid Polyvinyl Chloride (PVC) Conduit

1. The conduit shall be fabricated from self-extinguishing, high-impact polyvinyl chloride designed for aboveground and underground installations.
2. The conduit size and schedule shall be as specified in the Construction Drawings (UL Standards).
3. Fittings and accessories shall be fabricated from the same material as the conduit.

REV 6/17

4. Solvent-cement-type joints shall be as recommended by the Manufacturer for a watertight seal.
- G. Pull Vault
 1. The vault shall be pre-cast, which shall consist of a base, top, and grading ring(s).
 2. The vault shall have a minimum 8-inch cover or shall be H20 rated if installed flush with the final grade.
 3. The approximate conduit depth at the knockouts from the final grade shall be as noted on the Construction Drawings.
- H. Backfill Materials
 1. Backfill materials shall be free of all organic materials, trash, glass, broken concrete, rocks greater than 1 inch in diameter, and other unsuitable materials.
 2. If, by the judgment of the Engineer, the excavated materials cannot be used, the Contractor shall obtain from other sources a non-expansive type of granular material.
 3. The Contractor shall assume for bidding purposes that all removed trenching materials cannot be reused as backfill materials. If, by the judgment of the Engineer's representative or the Owner, the said removed trench materials may be used, the Contract Unit Price shall be reduced for every foot of usable fill installed in the backfilling process. The Contractor shall therefore provide at the Bid Opening time a Contract Unit Price for reducing backfilling costs.
- I. Crushed Gravel Base Course
 1. All pipe bedding, slabs on grade, and pavement surface shall be underlaid with select base course in accordance with the Construction Drawings.
 2. Crushed gravel base course materials shall be used to correct over-excavation in the trenches.

UB.3 INSTALLATION

- A. Primary cable terminators shall be installed in accordance with the following:
 1. All connectors shall be equal to the Manufacturer's references, as shown on the Drawings.
 2. Utmost care shall be exercised in installing clamps, connectors, and other bolted devices. The contact surface of the clamp or connectors and the bonding surface of the wire or tubing shall be clean and bright and an oxide inhibitor shall be applied. A steel brush is recommended as the principal cleaning instrument.
 3. Bolts shall be tightened firmly, but threads must not be overstressed. Bolts in the clamps over stranded conductor shall be tightened enough to flatten the lock washers, but not so tight as to deform or damage the conductor.
 4. Transition plates shall be supplied and installed in all cases of mating aluminum terminal connectors to brass, bronze, or copper terminal pads. Where transition plates are not practical, brass, bronze, or copper terminals shall be tinned.
 5. Provisions shall be made for connecting the copper ground cable to all lightning arrester grounds, structures, electrical equipment cases, and neutral connections.
 6. Cable connections shall be made clean and tight to ensure a low-resistance joint.
 7. Terminations shall not be made in the conduit.

8. Connectors, splices, and terminators shall be installed with tools, materials, and instructions recommended by the Manufacturer.
9. Modular terminations, elbow load break connections, and splices shall be installed per the Manufacturer's instructions.
10. The Contractor shall furnish and install all stainless-steel bolts, or approved equal, and mounting hardware for all connector pad assemblies.
- B. The installation of all connectors will be inspected by the Owner, Engineer, or their representative in accordance with the following:
 1. All errors in the installation of the connectors shall be corrected by the Contractor at no cost to the Owner.
 2. The Owner or Engineer shall have final approval of the connector installation.
- C. The following requirements shall be met for the installation of the primary underground distribution cable:
 1. All underground cable running through the pull vaults shall be installed on cable racks in a neat and orderly fashion. The cable shall be supported off of the floor of the vault.
 2. The cable shall not be subjected to pulling tension in excess of the Manufacturer's maximum rated pulling tension. A calibrated dynamometer shall be used to observe pulling loads, where needed.
 3. Pulling grips shall be attached over the cable sheath to prevent slipping of the insulation. The length of cable in the pulling grip plus 5 feet shall be considered as scrap and cut off of each pulling length.
 4. Once the cable pulling operation has begun, it shall be continued until the pull is completed. The maximum rate shall be 50 feet per minute.
 5. The cable shall not be subjected to a bending radius of less than 12 times the outside diameter of the cable before or during installation.
 6. Cable supports shall be installed in vertical runs of the conduit.
 7. A standard length, rotating eye, Kellem, k-type, or approved equal, pulling grip shall be used for each cable pull. A swivel shall be installed between the pulling line and the three (3) pulling grips.
 8. The Contractor shall use cable pulling compounds, as noted on the Drawings or approved by the Engineer.
 9. The cable shall be trained into the duct, vaults, and pads in such a way that cable damage caused by kinking or dragging on the duct or concrete edges will be prevented.
 10. The Contractor shall provide a clean, dry environment free of any wind-blown particles for cable terminating or splicing.
 11. Ground rods bonded to the ground grid shall be installed at every vault location. Where cable splices and terminations are made, the concentric neutral shall be tied to the ground rod.
- D. Conduits, Fittings, and Accessories General Installation
 1. Suitable protection shall be provided for conduit risers against damage during construction.
 - a. The open ends of all unused conduits shall be cleaned and conduit caps installed without cement before backfilling is performed. The Contractor shall install

REV 6/17

nylon rope or string in all "future use" conduits.

2. The ends of all conduit lengths shall be carefully reamed after cutting to eliminate sharp burrs.
 3. All conduit shall be cleaned out immediately after backfilling is finished and prior to pulling wire.
 4. All field-cut threads shall be coated in galvanized conduit with "Galvanox," or approved equal.
 5. An acceptable terminal ball shall be placed on the end of the pull rope for wire pulling.
 6. Conduit spacers shall be used when three (3) or more conduits are installed in one (1) trench.
 7. All elevation changes shall be gradual and uniform to facilitate pulling the cable through the ducts.
 8. The nearest edge of trench passing by concrete pier-type foundations shall not be less than 36 inches, unless prior approval is obtained from the Engineer.
 9. The depth of burial shall be such that the top of the PVC is a minimum of 38 inches below grade, unless noted otherwise
 10. All turns shall have a minimum radius, as defined on the Construction Drawings or approved by the Engineer.
 11. The depth of the conduit shall be increased, as is necessary, to provide 12 inches of separation between the conduit or concrete-encased conduit and any other underground utility, or as otherwise directed by the Engineer.
 12. Cable/Conduit marker tape shall be installed in the trench 12 inches above the top of the installation, unless otherwise noted on the Construction Drawings.
 13. The conduit shall be installed in accordance with the Drawings.
- E. Rigid Polyvinyl Chloride (PVC) Conduit
1. The conduit shall be used in direct buried applications.
 2. The conduit shall be buried to the depth indicated on the Drawings.
 3. All joints shall be made water-tight with cement compound furnished by the Conduit Manufacturer.
 4. The conduits shall be sloped away from the conduit risers, where possible.
 5. A 7.5-inch separation shall be maintained between each underground pipe.
 6. After the trench bottom has been finished to grade, the conduit shall be laid and the trench shall be carefully backfilled in layers, with each layer tamped with a power tamper.
- F. Metallic Conduit
1. Metallic conduit shall be adequately and properly grounded at all terminal points and wherever isolated from equipment.
 2. Where extending into the equipment from below, the conduit shall be connected to the equipment ground bus or frame.
 3. Where extending into the cable trench, the conduit shall be connected to the ground riser or cable at the structure using grounding bushings.

G. Surge Arresters

1. Where three (3) arresters are mounted together on the riser poles, the arresters shall be connected to a No. 2 ground cable which shall be connected at each end to the buried ground rod, cable concentric neutral, and system neutral.
2. The lightning arrester ground loop shall not encircle metallic items such as conduits, conductors, and mounting brackets.

H. Concrete Pull Vaults

1. The Contractor shall be responsible for installing vaults per the Manufacturer's requirements and the Construction Drawings.
2. The Contractor shall install all vaults on the top of undisturbed soil. Any over-excavation shall be corrected by adding select fill and compacting to the required grade.
3. A tar-type sealant material shall be furnished and installed by the Contractor between each grading ring and vault base to make a complete water-tight installation.
4. All conduits installed in conduit knockouts shall be grouted in place before the cable is installed.

I. Backfilling

1. Wetting or drying of backfill material shall be performed, as required, to obtain the specified density. Moisture content at the time of placement shall not be less than 2% below optimum nor more than 4% above optimum, as determined by AASHTO T-99.
2. Backfill shall be placed in the elevations indicated.
3. A 95% compaction shall be required for all backfill. Backfill shall be placed in 12-inch maximum (uncompacted depth) lifts.
4. Backfill shall not be done on frozen earth.

J. Maintenance

1. Newly graded areas shall be protected from actions of the elements.
2. Settling or erosion shall be filled, repaired, and grades re-established to the indicated elevations and slopes.

K. Correction of Settlement

1. Under provisions of this Division, the Contractor shall be responsible for correcting any settlement in excess of the amount of the specified damages created within one (1) year after acceptance of the work.
2. Any repairs shall be made within ten (10) days after due notification by the Owner of any backfill settlement and resulting damages.
3. The Contractor shall make arrangement(s) with the Owner for access to the Project site for the purpose of any repair.

END OF DIVISION UB

This Page Intentionally Left Blank

DIVISION CO

HIGH-VOLTAGE CONNECTORS

CO.1 GENERAL

This DIVISION describes the labor and materials required to complete all high-voltage connections using welded aluminum fittings, bolted aluminum-to-aluminum fittings, bolted copper/bronze fittings, clamps, strain clamps, deadend fittings, terminal devices, and couplings, as shown on the Construction Drawings.

CO.2 EQUIPMENT AND MATERIALS

- A. Suspension clamps, bus support clamps, compression-type terminals, deadend fittings, and strain clamps for use with aluminum conductor shall be aluminum alloy and equal to the reference details and Manufacturer's references, as shown on the Drawings. All clevis connections must be made with threaded hex-head bolts, nuts, and stainless steel self-locking cotter pins. Compression-type deadend fittings shall develop not less than 95 percent of the ultimate strength of the conductor and have a conductivity of not less than that of the conductor with which they are used.
- B. All connectors and height adapters, including equipment terminal connectors and corona bells, shall be of the sizes required and of the types indicated on the Drawings.
- C. Except as otherwise indicated on the Drawings, aluminum-to-aluminum connections shall be made with aluminum connectors. These aluminum connectors shall be made of Aluminum Alloy SC70A in accordance with ASTM B26 (Aluminum Association Alloy Designation No. 356) and designed and proportioned for contact with aluminum surfaces without the use of any plating or bushings. Aluminum-to-copper connections shall be avoided. Where aluminum-to-copper connections must be made, the Contractor shall obtain approval from the Engineer and use connectors and transition plates.
- D. All copper-to-copper connections shall be compression or bolted type and made with copper or bronze connectors.
- E. Terminal connector pads shall be in accordance with NEMA Publication No. CC-1.
- F. Only stainless steel bolts, split lock washers, and flat washers will be acceptable for bolted high-voltage connections, as shown on the Drawings. All nuts shall be made of silicon/bronze. Aluminum Cadmium hardware is not acceptable.
- G. For 230kV and above, EHV connectors are to be used, including 4HP hardware shields.

CO.3 INSTALLATION

- A. Connectors for the bus system, static wires, and equipment and grounding terminals shall be installed in accordance with the following:
 - 1. All connectors, suspension and strain clamps, and deadend fittings shall be equal to the Manufacturer's references, as shown on the Drawings.
 - 2. Utmost care shall be exercised in installing clamps, connectors, and other bolted devices. The contact surface of the clamp or connectors and the bonding surface

of the wire or tubing shall be clean and bright, and an oxide inhibitor shall be applied. A steel brush is recommended as the principal cleaning instrument, however, shall not be used on plated connections.

3. Bolts shall be tightened firmly; however, threads must not be overstressed. Bolts in clamps over stranded conductor shall be tightened enough to flatten the lock washers, but not so tight as to deform or damage the conductor.
4. In the absence of specific Manufacturer's recommendations, all bolts shall be tightened with calibrated torque wrenches as follows:

Bolt Diameter	Aluminum or Lubricated	Stainless Steel and Silicon Bronze (Non-Lubricated)
5/16	10 ft.-lb.	15 ft.-lb.
3/8	14 ft.-lb.	20 ft.-lb.
1/2	25 ft.-lb.	40 ft.-lb.
5/8	40 ft.-lb.	55 ft.-lb.
3/4	60 ft.-lb.	70 ft.-lb.

5. Transition plates shall be supplied and installed in all cases of mating aluminum terminal connectors to bronze or copper terminal pads. Where transition plates are not practical, bronze or copper terminal pads shall be tin plated.
6. Provisions shall be made for connecting the copper ground cable to all lightning arrester grounds, structures, electrical equipment cases, and/or neutral connections.
7. Grounding cable shall be adequately fastened to the various structural members to give a neat appearance, as approved by the Engineer.
8. On long grounding cable runs that run along structural members, clamp type connectors shall be spaced at not more than 5 feet center-to-center or as shown on the Drawings.
9. The Contractor shall install nuts and bolts such that the nuts are on the bottom of bolted connections or face out away from the equipment.
- B. The installation of all connectors will be inspected by the Owner, Engineer, or their representative in accordance with the following:
 1. All errors in the installation of connectors shall be corrected by the Contractor at no cost to the Owner.
 2. The Owner or Engineer shall have final approval of connector installation.

END OF DIVISION CO

This Page Intentionally Left Blank

DIVISION FI

FENCE AND IDENTIFICATION SIGNS

FI.1 GENERAL

- A. This DIVISION describes the materials and labor for the substation chain link perimeter fence and safety, phase, and equipment identification signs.
- B. Quality Assurance
 - 1. Fence materials and installation shall conform to RUS fence specifications found in RUS Bulletin 1724E-300.
 - 2. Acceptable Manufacturers or Approved Equals:
 - a. Chain Link Fence
 - 1) Steelock General Fence Contractor.
 - 2) Standard Fence Company.
 - 3) Elcar Fence.
 - b. Safety and Identification Signs
 - 1) Safety Sign Company.
 - 2) Seton Signs, Labels, and Safety Solutions.
 - 3) RMS Sign Company.
 - 4) Electromark.

FI.2 EQUIPMENT AND MATERIALS

- A. The chain link fence shall conform to the following:
 - 1. Unless specified otherwise, all materials shall be galvanized in accordance with ASTM A392, Class II. Tubular posts shall be galvanized in accordance with ASTM F1043. All galvanizing shall withstand six (6) 1-minute immersions in copper sulfate per ASTM A239 – “Standard Practice for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles.”
 - 2. The chain link shall be 7-foot high with three (3) strands of galvanized barbed wire to bring the total height to 8 feet.
 - 3. Chain link fabric shall be No. 9 USWG steel wire gauge, galvanized, 2-inch chain link. The sides of the mesh pattern shall be approximately 45 degrees to a vertical line.
 - 4. The personnel swing gate shall have a provision for locking closed and a provision for securing in the open position.
 - 5. As specified on the Drawings, a double swing drive-in gate shall have a provision for locking closed and a provision for securing the sections in the open position.
 - 6. Line posts shall be 2-3/8 inches O.D., standard steel pipe.
 - 7. Corner posts shall be 2-7/8 inches O.D., standard steel pipe.
 - 8. Top rails shall be 1-5/8 inches O.D., standard steel pipe.
 - 9. Gate posts for the personnel swing-gate shall be 2-7/8 inches O.D., standard steel pipe.
 - 10. Gate posts for the drive gate shall be 4-inch O.D., standard² steel pipe. Posts shall be 6 inches for gates larger than 20 feet.

11. Gate frames shall be 1-7/8 inches O.D., standard steel pipe. Clamps shall not be used in the assembly of the gates.
 12. Extension arms shall be pressed steel, SAE 1025, and suitable for three (3) strands of barbed wire; each arm shall extend at a 45-degree angle.
 13. Barbed wire shall be two (2) strands of No. 12-1/2 galvanized wire gauge, with three (3) lines, four (4) half-round barbs of No. 14 galvanized wire gauge, and 5-inch spacing.
 14. Braces located at the gate and terminal posts shall extend to the first line post midway between the top rail and the ground, with connections and fittings and a 3/8-inch diameter minimum rod for truss bracing.
 15. Fabric ties and bands shall be per ASTM specs; ties shall be spaced 14 inches to the posts.
 16. Tubular material for round shapes shall conform to ASTM A53 Grade B.
 17. All fencing shall have one No. 7 USWG tension wire along the bottom with tie clips at a maximum of 2'-0" spacing.
 18. The concrete mix shall be in accordance with foundation concrete requirements.
 19. Stretcher bars shall be galvanized steel bars not less than 1/4" x 3/4", or an equivalent cross sectional area, and 1-1/4 inches in diameter. These bars shall be approximately 1 inch less than the fabric height.
 20. Galvanized hardware cloth with 1/4-inch mesh shall be continuously applied to the outside perimeter of the fence to be used as a snake guard. The snake guard shall be placed below the fence fabric to the subgrade and buried by the rock surfacing. This guard shall extend 2 feet above the rock surfacing and curled outward a minimum of 3 inches.
- B. Safety and equipment identification signs shall conform to the following:
1. Safety signs shall be of 20-gauge steel, 20" wide x 14" high, permanently painted, and attached to the fence fabric at eye level with the lettering as noted on the Construction Drawings.
 2. Phase and equipment identification signs shall be white on black phenolic labels (Phase signs may be colors other than black; the Contractor shall coordinate with the Owner). Descriptions and locations shall be as shown on the Construction Drawings.

FI.3 INSTALLATION

- A. The chain link fence shall be installed according to the Construction Drawings and conform to the following:
1. Top rails shall be level and true with minimum variation in elevation, except where controlled by changes in grade elevations.
 2. Fence fabric shall be continuous and securely attached to all posts and rails. The bottom line of the fabric shall be approximately 1 inch below the final rock surfacing all around the perimeter, except at the gates, as specified on the Drawings.
 3. Swing gates shall move freely open and closed and latch securely in both positions and shall have no sag or deformation.
 4. Corner braces and hardware shall be tightened and in accordance with accepted Manufacturer's Specifications.

5. Spacing of the posts shall not be more than 10 feet center to center.
 6. All footings shall be 3'-6" deep. Concrete footings for fence posts shall be a minimum of 10 inches in diameter for line posts and a minimum of 12 inches in diameter for gate and terminal posts. All posts shall extend 3 feet into the concrete footings. Post foundations shall be crowned with a smooth finish to prevent water ponding.
 7. The fence post base shall be wrapped with tar paper before placement in the concrete. Tar paper shall extend at least 3 inches below and 3 inches above the top of the concrete to prevent fence post erosion.
- B. Safety sign installation shall conform to the following:
1. One (1) "DANGER" and one (1) "NOTICE" sign shall be installed on each swing gate. Any additional signs shall be installed on each side of the perimeter fence at eye level, as noted on the Drawings.
 2. Safety signs shall be installed on the fence fabric using heavy gauge galvanized steel wire neatly wound and trimmed.
 3. Phase and equipment identification signs shall be installed on the structural steel supports or equipment cabinets using screws or other attachments approved by the Engineer.

END OF DIVISION FI

This Page Intentionally Left Blank

DIVISION EW

SITE PREPARATION, GRADING, AND EARTHWORK (Where Applicable)

EW.1 GENERAL

- A. This DIVISION covers all labor, materials, equipment, and construction practices required for grading, earthwork, and site preparation, as directed by the Construction Drawings.
- B. Earthwork to be completed under this Contract:
 - 1. Construction area staking, including slope staking, as necessary.
 - 2. Removal and disposal of vegetation, tree stumps, debris, and topsoil.
 - 3. Excavation, grading, transportation, and disposal of earth materials.
 - 4. Shoring for the protection of existing construction, as necessary.
 - 5. Grading and compaction of the substation pad, slopes, and access road(s), if applicable.
 - 6. Dewatering, as necessary.
 - 7. Placement of culverts, including related ditch work, if applicable.
 - 8. Excavation, placement, and compaction of engineered structural or select fill below slab-on-grade and pad-type foundations.
 - 9. Excavation, backfill, and compaction for spread footing-type foundations.
 - 10. Excavation, backfill, and compaction for the conduit and cable trench.
 - 11. Excavation, backfill, and compaction for the buried ground grid system.
 - 12. Soil sterilization and installation of rock surfacing.
 - 13. Final site restoration, including perimeter reseeding and/or placement of rip-rap, as directed by the Construction Drawings.
 - 14. Installation of silt fence, erosion control logs, rip rap, etc., as required by the Engineer or Owner.
 - 15. The Contractor is required to call for underground locates prior to commencing construction.
 - 16. Reseeding and watering disturbed areas, as required.
- C. Earthwork to be completed by others:
 - 1. None.
- D. Applicable American Society of Testing and Materials (ASTM) standards are as follows:

C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
D1241	Standard Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses
D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
D2216	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

D4254	Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D4829	Standard Test Method for Expansion Index of Soils

- E. Gradation reports from a certified laboratory shall be submitted for the Engineer's review for crushed rock surfacing and all other imported materials.
- F. Execution of design grades and other earthwork shall consider the following:
1. Lines and grades shall be as indicated on the Construction Drawings. These Drawings will show benchmarks, base lines, and reference points, as necessary, to permit the Contractor to survey and stake the design grade(s) and structure locations. Soil boring information, if available, can be obtained from the Engineer, upon request.
 2. All benchmarks, monuments, and other reference points shall be provided upon the start of construction by the Owner's representative and shall be replaced by the Contractor, as directed, if disturbed or destroyed during grading operations.
 3. All existing facilities, structures, and property shall be adequately protected from damage during grading operations by use of commonly accepted practices most suitable for the Project site (e.g. silt fencing, erosion control logs, etc.). Inactive and abandoned utilities encountered during excavation or grading operations shall immediately be reported to the Owner and Engineer for further instructions. All work around the immediate area of the discovered utilities shall be suspended until the Contractor receives instructions from the Owner or Engineer.

EW.2 MATERIALS

- A. Fill material required to bring the substation pad to the design grade(s) shall be obtained from approved locations only. Fill material shall be clean, free of debris, and contain less than 5% by weight of organic material.

<u>Gradation</u>	<u>Percent Finer by Weight</u> <u>ASTM C136</u>
3".....	70-100
No. 4 Sieve.....	50-100
No. 200 Sieve.....	30 (max)
 <u>Soil Properties</u>	
Liquid Limit.....	30 (max)
Plasticity Index.....	10 (max)
Maximum expansive index*.....	20 (max)
*ASTM D4829	

- B. The Contractor shall identify the proposed source of fill material prior to the commencement of fill operations. A representative sample of the proposed fill material

- shall be collected by the Contractor for testing. All test reports shall be delivered to the Engineer for acceptance of the proposed fill material.
- C. The following tests shall be performed on the sample to determine the acceptability of the proposed fill material and used for quality control during compaction:
 - 1. Determination of natural moisture content per ASTM D1557.
 - 2. Determination of Atterberg Limits per ASTM D4318.
 - 3. Standard sieve analysis per ASTM C136.
 - 4. Standard Proctor test per ASTM D698.
 - D. Granular fill material used under foundations shall be crushed angular stone per ASTM D1241, in accordance with the Construction Drawings.
 - E. Corrugated metal pipe (CMP) shall be galvanized and meet all applicable ASTM Specifications.
 - F. Reinforced concrete pipe shall meet all applicable ASTM Specifications.
 - G. High-density polyethylene pipe (HDPE) shall meet all applicable ASTM Specifications.
 - H. Crushed rock used for final surfacing shall meet the following requirements for gradation:

<u>Sieve</u>	<u>% Retained Limits</u>	<u>% Retained Avg.</u>
0	1"	0
3/4"	5	3
17	5/8"	10-20
54	1/2"	30-60
92	3/8"	85-100
96	No.4	95-100
99	No.10	98-100

- 1. Fill material shall be fully fractured angular pieces of crushed limestone or crushed natural rock and free of lumps of clay, organic material, or other soft objectionable materials.
- 2. Crushed rock surfacing shall be placed according to the Construction Drawings.
- 3. A gradation report of the crushed rock surfacing material completed in accordance with ASTM C136 shall be submitted to the Engineer for review.
- 4. The Contractor may offer a different gradation of crushed rock for consideration by the Owner and Engineer.
- I. Seed mixtures for reseeding disturbed areas shall be appropriate for the local soil and climate. The right seed mix shall be determined with the aid of a local extension service or other expert help.
- J. Rip-Rap

1. Boulders or quarried rock may be used as rip-rap, if required per the Construction Drawings, with the following gradation:

<u>Weight (lbs.) Per Stone or Size</u>	<u>Percent of Total Weight Lighter than or Passing</u>
60	95
40	60 - 80
30	25 - 50
2" screen	5 - 15

2. Rock with an aspect ratio greater than 3:1 (length:width) shall not exceed 20% of the mass. The maximum aspect ratio shall not exceed 4:1.
3. Material shall be free from cracks, seams, or other defects that may lead to fracture or deterioration.
4. Not more than 10% of the stone shall show splitting, crumbing, or spalling when subjected to five (5) cycles of the soundness test, as required by AASHTO T104.
5. In lieu of conforming to aforementioned test requirements, any material with a proven history of good performance will be approved, provided certification of this history is acceptable to the Engineer.

K. Erosion Control Materials

1. Erosion control nets or mats of biodegradable materials are acceptable for slopes steeper than 3H:1V. Installation shall be in accordance with the Manufacturer's recommendations.
2. Soil-cement mixtures may be applied in embankment areas provided that the soil content of silt and clay does not exceed 35%. Mixing and lift application shall be in accordance with Portland Cement Association (PCA) Specifications.

EW.3 SITE PREPARATION, GRADING, AND EARTHWORK

- A. Site preparation shall be as shown on the Construction Drawings and in accordance with the following:
 1. Remove topsoil to a depth, as required, to eliminate all vegetation and tree stumps. Dispose of vegetation, tree stumps, debris, and topsoil, as instructed by the Owner or Engineer.
 2. After stripping topsoil, scarify the top 6 inches of exposed soil, moisture condition, and compact the entire site before placing fill. Any soft spots shall be compacted to firm the materials before beginning fill operations.
 3. Fill operations shall use only approved materials. Final grade shall be accomplished in accordance with the Construction Drawings.
 4. All fill shall be placed in 6-inch compacted lifts meeting the following requirements per ASTM D1557 and established by the preconstruction test sample:
 - a. Minimum 95% compaction.
 - b. Range of moisture content during compaction from -2% to +4% optimum.
 5. The required compaction and moisture content of each lift shall be verified by the use of a calibrated nuclear gauge and reported to the Engineer. A minimum of one (1) nuclear gauge reading and report shall be conducted for every 5,000 square feet

REV 3/17

- of compacted fill for each lift.
6. Areas with fill not meeting these compaction requirements shall be removed or scarified and recompacted at the Contractor's expense in order to meet the requirements of this Division.
- B. Excavation for the installation of ground wires, electrical conduits, foundations, and all subsurface appurtenances, per the alignment and depth indicated on the Construction Drawings, shall be as follows:
1. Remove only the minimum amount of materials required for the alignment and depth of cable and conduit installation.
 2. Excavate the area adequately to permit the erection and removal of forms, if required.
 3. Trim to neat lines where concrete is to be placed directly against soil.
 4. Excavate by hand in areas where space and access will not permit the use of machines.
 5. Notify the Engineer or authorized representative when excavation has reached the depth indicated by the Construction Drawings to allow inspection before proceeding further.
 6. Sand bedding placed beneath conduit runs in accordance with the Construction Drawings shall be compacted to a minimum 90% relative density per ASTM D4254.
 7. Fill material placed beneath foundations in accordance with the Construction Drawings shall be compacted to a minimum 85% relative density per ASTM D4254.
 8. Augering for pier type foundations shall be made to the lines shown on the Construction Drawings. Undercutting for bells, if called for, shall be made in undisturbed soil.
 9. Perimeter (i.e., bathtub) excavation around groups of foundations may be incorporated by the Contractor into his work plan to accomplish greater efficiency. At the completion of the foundation work, however, the design grade(s) of the substation shall be reestablished by following the same construction requirements outlined in this Division.
- C. Dewatering
1. Control grading around all excavations to prevent surface water from flowing into the excavations.
 2. Drain or pump, as required, to keep all excavations and trenches free of water or mud. Discharge to approved drains or channels.
 3. Use high-capacity pumps to ensure rapid drainage.
 4. Construct and use drainage channels, as required. Any temporary drainage channels shall be filled in and compacted in a manner to meet the requirements of this Division.
 5. Remove any unsuitable, excessively wet materials inside excavations or trenches and replace with approved materials conforming to this Division.
- D. Backfilling
1. For trenches and foundations:
 - a. Place backfill to the design grade indicated on the Construction Drawings.

- b. Do not place on frozen earth.
 - c. Properly compact backfill in a manner to meet the requirements of this Division.
 - 2. For foundations:
 - a. Remove all forms and debris from excavation prior to placing backfill.
 - b. Backfill only after concrete has cured for a minimum of seven (7) days or attained 70% of its design strength.
 - c. Backfill adjacent to any structure only after, in the opinion of the Engineer, a sufficient portion of the structure has been completed to resist the imposed load.
 - d. Backfill within 1 foot of the structure shall be free of gravel, rock, or shale particles larger than 2 inches.
 - e. Perform backfilling simultaneously on all sides of a structure.
 - 3. The Contractor shall furnish and place sand backfill around buried electric cables, as indicated on the Construction Drawings and meeting the compaction requirements of this Division.
- E. Excess Material
- 1. Any excess material from excavations shall be removed from the site and disposed of at approved locations.
 - 2. If an on-site disposal area is available, it will be shown on the Construction Drawings. Any excess material shall be spread and graded to a neat appearance over this area, as directed by the Owner or Engineer.
 - 3. Stumps, brush, and other unsuitable material shall be disposed of at approved locations off-site.
 - 4. If applicable, any topsoil set aside during clearing efforts shall be spread over areas designated for reseeding, as shown on the Construction Drawings.
- F. Culverts
- 1. Equipment used shall not damage the pipe in any way.
 - 2. Sand bedding a minimum of 6 inches in depth shall be placed below the culvert and compacted, per this Division.
 - 3. Backfill culverts in 6-inch lifts deposited alternately on opposite sides of the pipe to a height of 12 inches above the pipe.
 - 4. Culverts shall be installed to provide unrestricted flow without low spots and shall be cleaned of all foreign material prior to final acceptance.
 - 5. Joints, if required, shall be made in accordance with the Manufacturer's recommendations for the pipe material selected.
- G. Surface Preparation
- 1. A soil sterilant shall be applied to the final grade over an area extending a distance of 5 feet outside of the fenced area, as indicated on the Construction Drawings.
 - a. The Contractor shall furnish and apply the soil sterilant prior to the installation of rock surfacing.
 - b. The soil sterilant shall be composed of a finely ground water-soluble powder containing a minimum of 80% active ingredients (5-bromo-3-sesbutyl-6-methyluracil) commonly known as Hyvar X or an Owner-approved equivalent. The mixture shall have a minimum water solubility of 1 pound per gallon at 75°F ± 5°F.
 - c. The soil sterilant shall be applied to the ground surface in accordance with the

REV 3/17

Manufacturer's instructions.

- d. The area shall be sprinkled thoroughly with water after application of the sterilant to ensure penetration into the surface to be treated.
2. Application of the soil sterilant shall be planned by the Contractor with anticipated climatic conditions to avoid any contamination of neighboring property.
3. Immediately following application of the soil sterilant, a uniform layer of crushed rock shall be placed to immobilize the sterilant and soil.
4. Crushed rock shall be applied without segregation of the surfacing gradation. The crushed rock shall meet the gradation requirements of this Division.
5. The specified thickness of crushed rock installed shall be rolled at least four (4) times with a road-type vibrator/compactor to lock the top rock in place.
- H. Reseeding of perimeter areas disturbed during construction shall be as directed by the Owner or Engineer.
- I. Repair
 1. Protect newly graded areas from erosion using commonly accepted practices most suitable for the Project site (e.g. silt, erosion control logs, etc.).
 2. For some projects a Storm Water Pollution Prevention Plan (SWPPP) will be required and provided by the Owner or Engineer. The Contractor shall follow the plan per the SWPPP drawings and written documentation.
 3. Settling or erosion of soils shall be filled, repaired, and design grades reestablished using the same materials and procedures as those used in the original work and in accordance with this Division.

END OF DIVISION EW

This Page Intentionally Left Blank

DIVISION SI

STEEL STRUCTURES (INSTALLATION)

SI.1 GENERAL

- A. This DIVISION covers the materials and labor necessary to install all substation steel structures.
- B. Structures shall be assembled and tested in conformance with the latest revision of the following:
 - 1. American Institute of Steel Construction (AISC), Steel Construction Manual.
 - 2. American Society of Civil Engineers (ASCE)
 - a. Standard 10 - Design of Latticed Steel Transmission Structures.
 - b. Standard 48 - Design of Steel Transmission Pole Structures.
 - 3. American National Standards Institute (ANSI)
 - a. B18.2.1 Square and Hex Bolts and Screws.
 - b. B18.2.2 Square and Hex Nuts.
 - 4. American Society for Testing and Materials (ASTM)
 - a. A6 General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - b. A36 Standard Specification for Carbon Structural Steel.
 - c. A90 Standard Test Method for Weight (Mass) of Coating on Iron or Steel Articles with Zinc or Zinc-Alloy Coatings.
 - d. A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - e. A143 Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - f. A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - g. A239 Standard Practice for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles.
 - h. A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 ksi Tensile Strength.
 - i. A325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - j. A370 Standard Test Methods and Definitions for Mechanical Testing of Steel Products.
 - k. A384 Standard Practice for Safeguarding Against Warpage and Distortion

REV 3/17

- During
Hot-Dip Galvanizing of Steel Assemblies.
- l. A394 Standard Specification for Steel Transmission Tower Bolts, Zinc-Coated and Bare.
 - m. A449 Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
 - n. A490 Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
 - o. A563 Standard Specification for Carbon and Alloy Steel Nuts.
 - p. A572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - q. E376 Standard Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods.
5. American Welding Society (AWS), Structural Welding Codes D1.0 and D1.1.

SI.2 EQUIPMENT AND MATERIALS

- A. Steel structures should be furnished with the following and verified in the field by the Construction Contractor:
 1. Ground cable clamp attachment holes.
 2. Plate vangs meeting dimensional and strength requirements to support line tension loadings and accommodate mounting hardware.
 3. Mounting brackets and clips for support of switch operator mechanisms and switch operator handles.
 4. All equipment mounting plates dimensioned and sized to support equipment.
 5. Base plates which are dimensioned, drilled, and sized to accommodate anchor bolts and support the structure under design load.
 6. Protective galvanized coatings per appropriate specifications listed in SI.1 - B.4.
 7. Each member of a structure should have identifying numbers and letters (piece marks) keyed to the Fabrication and Erection Drawings, with characters a minimum of 3/8-inch high stamped into the steel prior to galvanizing. Piece marks should be circled with black indelible ink after galvanizing.
 8. Switch operator platforms complete with safety grating, mounting hardware, and grounding lugs.
 9. Erection bolts, washers, nuts, and locknuts.
 10. Anchor bolts including nuts, washers, leveling nuts, and templates, if specified.
- B. Erection Drawings will be provided by either the Fabricator or included in the Construction Drawing Set.
- C. The Construction Contractor shall provide all the equipment and tools necessary to assemble and erect the steel structures.

SI.3 INSTALLATION

A. Structures shall be installed in accordance with the following:

1. Where specified, erection of the steel structures shall include miscellaneous drilling and any necessary adjustments of mounting holes to produce a complete structural system that will accommodate all equipment, bus, materials, future equipment, and future structures.
2. The Contractor shall unload, receive, store, assemble, and install all steel structures as indicated by the Erection Drawings and as directed by the Engineer.
3. Steel structures shall be grounded to the substation ground grid immediately following erection.
4. The Contractor shall furnish and install all miscellaneous brackets, supports, and erection and mounting bolts for all electrical equipment.
5. All field welding, including welding processes and welding operators, shall conform to the following requirements:
 - a. All field welds shall be thoroughly cleaned by sandblasting or power grinding. The Contractor shall remove any foreign material(s) which may have adhered to the steel and would be detrimental to the final appearance of the completed structure.
 - b. Surfaces within 2 inches of any field weld location shall be free from any material(s) that would prevent proper welding or produce objectionable fumes while welding.
 - c. All welding and related work shall be performed in accordance with the latest edition of the AWS D1.0 Code for Welding in Building Construction. All welding terms shall be interpreted in accordance with the AWS definitions of welding terms. Welding symbols shown on the Design Drawings shall comply with AWS symbols. A shielded-arc welding process or a submerged-arc welding process shall be used. All welds shall be as shown on the Design Drawings, continuous unless otherwise noted, and made in such a manner that application stresses will be reduced to a minimum.
 - d. All welding shall be performed by a certified Welder.
6. No structure shall be erected on the foundations until at least seven (7) days after placement of the concrete foundations, unless directed otherwise by the Engineer.
7. All base plates are to be set level in exact position and shall be given full and even bearing on the anchor bolt leveling nuts. Leveling nuts shall be set as close to the top of the concrete as possible and still allow level bearing.
8. Connection bolts shall be fully seated against the head and, where practical, installed with the nuts oriented up and out relative to the member.
9. The structural nuts shall be tightened as indicated below and then locked into place with hexagon Type MF locknuts.

Type and Size	Tightening Torque (Ft-Lb)
A307, A394 1/2"	40

A325 5/8"	75	
3/4"		125
7/8"		180
1"	200	

10. After tightening, all nuts shall be marked in a fashion to easily indicate that the nuts are tight and properly torqued.
11. All equipment mounting bolts shall be provided with hexagon Type MF No. 1 locknuts. Nuts shall be on the inside face of the steel with adequate space between the locknut and adjacent steel to allow the use of socket-type wrenches.
12. Beveled washers shall be used on sloping or beveled surfaces, where required, to provide proper fit.
13. Wrenches which may deform the nut and/or cut or flake the galvanized plating will not be permitted for steel erection and equipment mounting.
14. All structural metals shall be handled with care to avoid bending or damaging. Pieces bent in handling may be used only if they are straightened to the satisfaction of the Engineer.
15. All structures shall be assembled and aligned and all bolts tightened and/or torqued as required by the AISC Code of Standard Practice. After final tightening and before any apparatus is mounted on the structures, the Engineer shall be notified and allowed time to inspect the structure. Structures must align within 1/500 of the span horizontally and 1/500 of the height from the top of the foundation to the connecting points of the supporting members of the uppermost apparatus support.
16. Any errors which prevent the proper assembly of parts by these measures or which require correction or adjustment must be immediately reported to the Engineer.
17. Miscellaneous equipment such as conduits, lights, and electrical enclosures shall be installed, where required, and may require field drilling, punching, or welding.
18. Touch-up and repair of damaged galvanizing finishes on structural steel members shall be in accordance with the following:
 - a. Galvanized finish damage incurred during shipping, off loading, or handling at the job site shall be reported to the Owner prior to erection of the structure on its foundation. The Owner shall determine if:
 - 1) The member must be returned to the Fabricator.
 - 2) The repairs can be made in the field.
 - 3) Field repairs shall be by a zinc metalizing (i.e., flame coating system), spray-on system or a brush-on galvanizing repair system.
 - b. Galvanizing repair shall be done for any field welding, drilling, or cutting.
 - c. The flame coat system shall not be used for galvanizing repairs on structures already installed.
 - d. Spray-on or brush-on galvanizing repairs may be used on structures already installed upon approval by the Owner.
 - e. Repair of Galvanizing: Material(s) on which galvanizing has been damaged shall be redipped unless in the opinion of the Inspector the damage is local and can be repaired by applying a coat of zinc dust-zinc oxide paint, galvo-weld, flame-weld, or other approved repair product. Where such repair is authorized, the damaged area shall be cleaned by wiping with clean rags saturated with

REV 3/17

mineral spirits or xylene, followed by hand wire brushing. After wire brushing, the area shall be recleaned with solvent to remove residue and repaired according to the product Manufacturer's recommendations for providing a coating equal to or greater than 5.0 mil thickness. When used, zinc dust-zinc oxide paint shall be in accordance with Federal Specification TT-P-C416, Type 11.

- f. The structural steel Fabricator should provide the galvanizing repair product(s) to be applied by the Contractor.
 - g. If the Project site is considered to be in an extremely corrosive environment (as defined by the Owner or Engineer), the Contractor shall be required to repair damaged galvanizing under strict standards.
19. Damaged paint on structures shall be repaired with touch-up paint applied in accordance with the Manufacturer's directions.
- B. The installation of steel structures will be inspected by the Owner, the Engineer, or their representative in accordance with the following:
- 1. All work shall be equal to the best modern practice in the fabrication and erection of structural steel, notwithstanding any omission(s) from this Division or the Design Drawings.
 - 2. Final inspection of the structures shall be made during which all loose bolts, locknuts, and other errors in erection are reported. Defective material(s) or work and all errors in erection, as determined by the Owner and Engineer, shall be corrected by the Contractor at no cost to the Owner.
 - 3. Final inspection shall be made to verify that all equipment is securely attached to the structure(s) with steel hardware specifically approved for the application.

END OF DIVISION SI

This Page Intentionally Left Blank

DIVISION GD

GROUNDING

GD.1 GENERAL

A. This DIVISION covers the labor and materials required to complete the station grounding system including the following:

1. Substation ground grid and ground rod system and switch operator grounding platforms.
2. Ground riser extensions to steel structures, electrical equipment, fence, and other miscellaneous equipment.

B. Applicable Standards

ASTM B8 American Society for Testing and Materials – Standard Specification for Concentric-Lay Stranded-Copper Conductors, Hard, Medium-Hard, or Soft.

NESC National Electrical Safety Code

NFPA No. 780 National Fire Protection Association – Standard for the Installation of Lightning Protection Systems

ANSI/IEEE 80 American National Standards Institute/Institute of Electrical and Electronics Engineers – Guide for Safety in AC Substation Grounding

GD.2 EQUIPMENT AND MATERIALS

A. Wire and Cable

1. Ground cables shall be annealed bare-copper or copperweld copper, concentric stranded and in accordance with ASTM B8, Class B.
2. Ground wire for station fence grounding shall be No. 2 AWG solid copper and in accordance with ASTM B3.
3. Conductor types and sizes shall be as indicated for specific connections by the Drawings and Materials Lists.

B. Ground Rods

1. Copper-clad steel or copper-alloy sectional-type rods.
2. One (1) end pointed to facilitate driving.
3. ¾-inch diameter and 10 feet long with the diameter and length stamped near the top of the rod.
4. Interconnectable rods to allow them to be stacked to obtain a deeper penetration.

C. Connection Materials

1. Cable-to-cable, cable-to-rod, and cable-to-connector connections below grade shall be exothermic-welded type with proper molds and charges, OR, in accordance with the Grounding Detail Drawings.
2. Cable-to-equipment ground connections above grade shall be bolted type.

D. Flexible braid straps shall be provided for fence enclosures per the Drawings.

E. Temporary Equipment Terminal Grounds

1. Power transformer bushing terminals, instrument transformer terminals, etc., shall

REV 3/17

be effectively grounded to the grid by #6 Cu or larger cable until such time as the equipment terminals are properly connected or prior to energization of the substation, as instructed by the Owner or Engineer.

2. Connections shall be of a bolted type to the equipment connector and of a clamp-type to the ground grid.

GD.3 INSTALLATION

A. Inspection

Ground connections shall be inspected by the Owner or Engineer prior to backfilling. Any connections backfilled prior to inspection and acceptance by the Owner, Engineer, or a representative thereof shall be exposed for inspection and then backfilled after inspection and acceptance at the Contractor's expense.

B. Performance

1. Wire and Cable

- a. Install using as few joints as possible.
- b. Suitably protect cable against damage during construction.
- c. Replace or suitably repair cable if damaged for any reason before final acceptance.
- d. In exposed installations:
 - 1) Route runs, as indicated.
 - 2) Route along the webs of columns and beams and in corners, where possible, for maximum physical protection.
 - 3) Support at intervals of approximately 5 feet or less with nonmagnetic bolt-type supports.
- e. In buried installations:
 - 1) Lay in the bottom of the trench or in other excavations at least 18 inches below finished grade or as shown on the Drawings.
 - 2) Maintain clearance of at least 12 inches from all underground metal piping or structures, except where connections are specifically indicated.
 - 3) Backfill with clean earth, free from rocks or stones. Thoroughly compact backfill, as required.
 - 4) The As-Built location of all buried ground conductor shall be accurately reported in writing to the Engineer as soon as the installation is completed.

2. Ground Rods

- a. Install the rods, as indicated, by driving; not by drilling or jetting.
- b. Drive the rods into unexcavated portions of the earth, where possible.
- c. Where the rods must be installed in excavated areas, drive the rods into earth after compaction of the backfill is completed.
- d. Drive to a depth such that the top of the rods will be approximately 14 inches below final grade or subgrade and connect the main grid ground cable thereto.
- e. The Contractor shall ground any rods that cannot be driven due to rock or extremely hard soil.

3. Connections

- a. Conform to the Manufacturer's instructions.
- b. Chemically degrease and dry completely before connections are made.

REV 3/17

- c. Make connections to equipment as follows:
 - 1) Clean and tight to ensure a low-resistance connection with voltage drop not exceeding 400 milli-volts per 1000A.
 - 2) Install so as not to be susceptible to mechanical damage during the operation or maintenance of equipment.
 - 3) Provide a direct connection to the buried ground grid system.
- 4. Metallic Conduit Grounds
 - a. Adequately and properly ground at all terminal points and points of isolation from the equipment or grounded steel.
 - b. Where the conduits extend into switchgear or other floor-mounted equipment from below, connect the conduits and the equipment ground bus or frame.
 - c. Where the conduits extend into the cable trench, connect the conduits to the ground riser or cable using grounding bushings.
- 5. Ground all metal junction boxes by direct connection to the buried ground grid system.
- 6. Ground fence fabric and posts, as indicated on the Drawings.
- 7. Install flexible braid straps across all hinge points and gates for fence enclosures.
- 8. Surge Arrester Grounds
 - a. Where arresters are mounted, provide a direct connection to the buried ground grid system.
 - b. The ground conductor shall not be enclosed in metallic conduit, and close magnetic encirclement of the conductors shall not be permitted.
- 9. Switch and Switch Platform Grounds
 - a. Provide the number and size of riser cables, as indicated by the Drawings.
 - b. Connect only in the manner indicated on the Detail Drawings.
- 10. Power Transformer Grounding

Unless other provisions are recommended and provided with the transformer by the Manufacturer, the transformer grounding shall consist of the following three (3) electrically independent grounding systems:

 - a. Tank Grounds - Provide at least two (2) continuous ground connections (i.e., one (1) from front to right and one (1) from rear left) from diametrically opposite lower corners of the transformer tank to the buried ground grid.
 - b. Neutral Bushing - Provide one (1) continuous ground connection from the neutral bushing to the buried ground grid. Multiple conductors are acceptable, if necessary, to achieve the correct current carrying capacity.
 - c. Lightning Arresters - Provide one (1) continuous loop for each set of three (3) lightning arresters (i.e., from ground grid through the ground lugs) on each set of arresters and back to a second connection on the ground grid.

END OF DIVISION GD

This Page Intentionally Left Blank

DIVISION WC
WIRE AND CABLE

WC.1. GENERAL

- A. This DIVISION includes all 600V class electrical wire, cable, and connectors for the 125VDC, 120/240VAC auxiliary power distribution and lighting systems and 600V class control and instrumentation wire and cable, as shown by the Construction Drawings.
- B. Applicable Standards
 - 1. American Society for Testing and Materials (ASTM)
 - a. B3 Standard Specification for Soft or Annealed Copper Wire
 - b. B8 Standard Specification for Concentric Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 - c. B33 Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes
 - d. B189 Standard Specification for Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes
 - e. D1047 Standard Specification for Polyvinyl Chloride Jacket for Wire and Cable
 - f. D2219 Standard Specification for Polyvinyl Chloride Insulation for Wire and Cable, 60°C Operation
 - g. D2220 Standard Specification for Polyvinyl Chloride Insulation for Wire and Cable, 75°C Operation
 - 2. National Electrical Code (NEC)
 - 3. Underwriters Laboratories (UL)
 - a. UL-44 Thermoset-Insulated Wire and Cables
 - b. UL-83 Thermoplastic-Insulated Wires and Cables
 - c. UL-486 Wire Connectors and Soldering Lugs
 - 4. Institute of Electrical and Electronic Engineers (IEEE)
 - 5. American National Standards Institute (ANSI)/National Electrical Manufacturers Association (NEMA)
 - a. WC 70 (ICEA S-95-658) Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy
- C. Wire, Cable, and Accessories
 - 1. The Contractor shall submit to the Engineer and/or the Owner for approval the Manufacturers' names and cut sheets of proposed wire, cable, and accessories of proposed products. Accessories to include but not limited to cable connectors, terminations, splice kits, tape, insulation putty, cable ties, supports, terminal blocks, and cable identification tags.
- D. Compliance Submittals
 - 1. Submittals shall include, but not be limited to, the following for each type of cable specified:
 - a. Cable Manufacturer Specification Sheet(s) shall list:
 - 1) Type, size, and stranding or current carrying conductor.

REV 10/16

- 2) Type of insulation and outer jacket.
- 3) Metallic shield concentric neutral type and size.
- 4) Outside diameter of complete cable
- 5) Current carrying capacity data
- b. Dielectric strength and tests to which the cable will be subjected at the factory.
- c. Year of manufacture (not to exceed two (2) years before the cable is to be installed).
- d. The Contractor shall submit a test report certifying that all cables have been tested and a Cable Schedule Drawing which lists the insulation strength for each cable.

WC.2. EQUIPMENT AND MATERIALS

A. Wire and Cable

1. The 600V control, instrumentation, and power cable shall be multiconductor cable in accordance with NEMA and the following:
 - a. Insulation types shall be cross-linked thermosetting polyethylene or ethylene propylene rubber.
 - b. Metallic shields, if provided, shall be corrugated longitudinal copper tape of 0.003-inch minimum thickness, with a 10% overlap, or bare copper braid, with a minimum coverage of 85% and an area equivalent to that of a No. 9 AWG conductor.
 - c. The jacket type shall be in accordance with NEMA requirements.
2. Contractor Furnished wire, cables, and connectors for power, lighting, outlets, heating and ventilation controls, and miscellaneous controls in the control building and the substation yard area shall be as indicated on the Drawings.
3. The Contractor shall determine the quantities of the various wire and cable required for the lighting, power, and related conductor systems.
4. All cable shall be suitable for operating temperatures up to 75°C in wet locations, 90°C in dry locations, and a range of -40°C to 40°C in ambient temperatures. The cable shall be suitable for substation installation with a 40-year life subjected to these conditions.
5. The Contractor Furnished wire and cable shall all be of the same specification for the entire installation, preferably all from the same source.
6. All wire and cable for current transformer circuits shall have a minimum size of No. 10.
7. The color code for the conductor shall be according to Method 1, using solid colors with spiral stripes in accordance with NEMA Table K-2.

B. Connectors

1. Power cable connectors shall be:
 - a. Designed and sized for the specific cable being connected.
 - b. Solderless, pressure-type connectors constructed of noncorrodible tin-plated copper.
 - c. Vinyl pre-insulated ring-tongue for wire sizes 12-2 AWG and uninsulated rectangular tongue for wire sizes 1-750 kcmil.

- d. Rated with a current carrying capacity equal to or greater than the cable being connected.
- 2. Control, instrument, and specialty cable connectors shall be:
 - a. Designed and sized for the specific cable being connected.
 - b. Solderless, pressure-type connectors constructed of noncorrodible tin-plated copper.
 - c. Vinyl pre-insulated ring-tongue type (spade lugs not permitted).
- C. Cable Supports shall be:
 - 1. Type "R" wedging plug for cables in vertical conduit risers.
 - 2. Kellem basket-type wire mesh grip for cables in a vertical tray or conduit risers unless noted otherwise.
- D. Terminal blocks shall be:
 - 1. Designed, sized, and rated for the cables being terminated.
 - 2. Phenolic block rated 600V if mounted in terminal boxes, or molded block rated 600V if mounted in cabinets, panels, control boards, etc.
 - 3. Contacts shall be or shall include:
 - a. Tubular-screw type contacts for power cables which do not require cable connectors.
 - b. Binding-screw type contacts for power cables, with ring-tongue cable connectors.
 - c. Strap-screw type contacts for control and instrument cables, with ring-tongue cable connectors.
 - d. Rated with a current carrying capacity equal to or greater than the cable being terminated.
 - e. A marking strip with permanent circuit identifications.
- E. Cable identification tags shall be 1 inch, round, hard, fiber-type, and white in color, with the cable number written in permanent ink. In addition, the cable identification shall be written on the control cable utilizing a silver Sharpie.

WC.3. INSTALLATION

- A. Power (600V and below), control, instrument, and specialty cable:
 - 1. The conduit, duct, wireway, cable trench, or cable tray shall be installed as indicated or specified.
 - 2. Complete installation shall be as indicated and as recommended by the Manufacturer.
 - 3. Shall be installed continuous between indicated terminal points without intermediate splices or taps, unless approved by the Engineer.
 - 4. No splices shall be permitted in the CT secondary circuits, PT secondary circuits, or communication grade circuits.
 - 5. Splices shall be made only in junction or terminal boxes. For control and instrument cables, splices shall be made on terminal blocks with a marking strip. Color coding shall be maintained on all splices. For power cable that is 6 AWG and smaller, splices shall be made on terminal blocks. For power cable larger than 6 AWG, splices shall be made using crimp-type connectors and shall be taped or heat-shrink insulation installed.

6. Cable shall not be subjected to pulling tension in excess of the Manufacturer's recommendations. A calibrated dynamo-meter shall be used to observe pulling loads.
 7. Pulling grips shall be attached over the cable sheath to prevent any slipping of the insulation.
 8. Cable shall not be subjected to a bending radius of less than 12 times (NEC 300.34) times the cable's outside diameter during or after installation.
 9. Cable supports shall be installed in vertical runs of conduit, at boxes and terminations in the equipment and as required to meet the intermediate support requirements of the NEC.
 10. All single conductor cables shall be tied together with cable ties on each individual circuit in each junction box, equipment, or manhole and in the cable tray at intervals not to exceed 6 feet.
 11. Shall be clamped, snubbed, and tied for proper support at each terminal block or connection so that any strain on the cable will not be transmitted to the terminal connections.
 12. Wires from different cables shall not be tied together.
 13. A cable identification tag shall be attached with a cable tie to each cable at termination points.
 14. Control, instrument, and specialty cable shield shall be terminated and grounded, as indicated and recommended by the Manufacturer of the equipment being connected.
 15. Cable shields shall be grounded, when provided, at one (1) end only.
 16. Ground cables shall be installed, as specified.
 17. All cables and wires for power equipment, lighting systems, outlets, wiring devices, control devices, and miscellaneous equipment items for all yard equipment shall be connected in accordance with the Drawings.
- B. Cable connection and terminations shall be made as follows:
1. Clean and tight to ensure a low-resistance joint.
 2. Terminations shall be made only in terminal boxes, equipment, or other accepted enclosures, and not in the conduit or cable tray.
 3. Connectors shall be installed with tooling manufactured by the Connector Manufacturer. The dies of all application tooling shall provide dot or wire size coding for quality control verification.
 4. All power, control, metering, relaying, and communication cables shall be connected to all terminal equipment and termination panels in the substation yard area in accordance with Wiring Termination Drawings and DC and AC Schematic Drawings furnished by the Engineer during construction to provide for a complete and working wiring system.
- C. Miscellaneous
1. All spare and unused conductors shall be left bundled together, with sufficient length to terminate at a later time.
 2. All DC circuits shall be installed with the positive and negative leads of a circuit in the same cable.
 3. AC and DC control circuits shall be run in separate cables.
 4. Power circuits shall not be run in the same cables with AC or DC control circuits.

END OF DIVISION WC

This Page Intentionally Left Blank

DIVISION FT

FIELD TESTING, CHECK-OUT, AND ACCEPTANCE

FT.1 GENERAL

A. Description

1. This DIVISION covers the field testing of substation equipment and electrical systems. It is the intent of this Division that field testing be completed, as specified, to provide assurance of correct installation and operation of equipment.
2. The testing procedure includes, but is not limited to, the following:
 - a. Test all wire, cable, electrical equipment, grounding, and systems to ensure proper installation, adjustment, connection, and operational function in accordance with the Drawings, Divisions, and the Manufacturer's recommendations.
 - b. Furnish all qualified personnel and equipment required for and incidental to testing.
 - c. Furnish all test equipment required for testing.
3. This Division includes field testing to be performed prior to the initial energization of the substation equipment and electrical systems.

B. Applicable Standards

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ICEA	Insulated Cable Engineers Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
IEEE	Institute of Electrical and Electronics Engineers
NETA	International Electrical Testing Association
OSHA	Occupational Safety and Health Administration

C. Compliance submittals include:

1. Submit to the Owner for approval a proposed plan for testing, which shall show that the Contractor either possesses qualified personnel and test equipment to satisfactorily perform the testing required or that he will employ the services of a qualified and approved testing company.
2. The Contractor shall furnish to the Owner and Engineer the qualifications and experience history of the testing personnel that will be conducting the tests. The testing company and personnel shall be subject to the Owner's approval.
3. Submit three (3) copies of the final test reports to the Engineer for approval. After final approval, these will be distributed by the Engineer.
4. Maintain a written record of all tests performed showing the date, personnel performing the test, equipment or material(s) tested, and the test results. Copies of these reports shall be submitted to the Engineer on a weekly basis.
5. Notify the Engineer two (2) weeks prior to commencement of all testing except for megger tests.

REV 10/16

6. The Contractor shall provide a list of all testing equipment required to perform required tests. All equipment shall be carefully calibrated and maintained to ensure accuracy.

FT.2 PERFORMANCE

- A. The Contractor shall perform all tests in accordance with the following general requirements:
 1. Test all wire, cable, and electrical equipment installed or connected to ensure proper installation, adjustment, connection, and operational function, as indicated, or to conform to the Drawings, these Specifications, and the Manufacturer's instructions.
 2. Include all tests recommended by the Equipment Manufacturer, unless specifically waived by the Engineer or Owner.
 3. Include all additional tests required by the Owner that are deemed necessary because of field conditions to determine that equipment, material(s), and systems meet the requirements of the Contract Documents.
 4. The Contractor is responsible for all damage to equipment or material(s) due to improper test procedures or test apparatus handling.
 5. It is anticipated there will be occasions when testing will have to be performed outside regular working hours. This testing would primarily be related to work during the initial energization and load testing of equipment and systems. Other possible work of this nature would be under critical situations where the safety of men or equipment and progress of the overall Project work is concerned.
 6. Test procedures, equipment, temporary circuits, etc., shall be designed and utilized to minimize danger to testing technicians and surrounding personnel (i.e., current transformer temporary test circuits utilizing alligator clips will not be permitted). Furnish and use safety devices such as rubber gloves and blankets, protective screens and barriers, yellow tape, and danger signs to adequately protect and warn all personnel in the vicinity of the tests.
 7. Test procedures which require the Contractor to be exposed to hazardous energy will be locked and tagged out. Lockout and tagout devices shall only be used for controlling energy and meet the following requirements:
 - a. Lockout and tagout devices shall be capable of withstanding the environments to which they are exposed for the maximum period of time that exposure is expected.
 - b. Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.
 - c. Tags shall not deteriorate when used in corrosive environments, such as areas where acid and alkali chemicals are handled and stored.
 - d. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

- e. Tagout devices, including their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal.
8. The Owner may require that certain tests be performed in his presence or under the supervision of the equipment Manufacturer's representative.
9. The Owner may at his own expense perform testing at any time before or after final acceptance of the equipment by the Owner.
10. The Owner or Engineer may assist the Contractor in checking out certain control schemes where the Owner concludes such assistance is necessary to meet the Project schedule.
11. After completing basic operational testing and checkout of the equipment, wiring, control schemes, and other items associated with individual systems and believing the system to be ready for final calibration and operation, the Contractor shall notify the Owner, who along with the Engineer, will witness the final operational test and calibration of each individual system installed by the Contractor.
12. Connections shall not be made or testing performed on existing equipment, facilities, circuits or systems without receiving proper authorization from the Owner and Engineer. The Owner reserves the right to have personnel present when connections are made or testing is performed on any piece of equipment. Scheduling for such work shall be through the Engineer and subject to the Owner's approval. Work may be rescheduled at the Owner's discretion.
13. The following colors shall be employed for documenting tests:
 - a. Schematics: Yellow for verified tripping/closing paths, control, AC current, and AC voltage.
 - b. Corrections to Drawings – Wiring diagrams and all other Drawings: Red for additions and Green for removals.
- B. The following equipment shall be visually and mechanically inspected by the Contractor. The equipment shall be electrically tested per the table below and shall meet the latest revision of Specifications published by ANSI/NETA:

Equipment	Contractor	Manufacturer	Owner	N/A
Switchgear and Switchboard Assemblies				
Power Transformer				
Control Cable				
Power Cable				
Metal-Enclosed Bus				
Air Switches				
Circuit Breakers				
Protective Relays				
Instrument Transformers				
Metering and Instrumentation				
Grounding Systems				
Ground Fault Systems				
Battery Systems				

REV 10/16

Surge Arresters				
Capacitors				
Outdoor Bus Structures				
Automatic Circuit Recloser and Line Sectionalizers				
Fiber Optic Cables				
Lighting Systems				
Thermographic Survey				

FT.3 SPECIFIC TESTING REQUIREMENTS

The following specific tests are required to be performed in addition to those required by ANSI/NETA:

A. Switchgear and Switchboard Assemblies

1. After all panel wiring has been confirmed, the Contractor shall perform operational tests of the relays, meters, and controls under the direction of the Engineer. Relay settings will be calculated by the Engineer, and the settings shall be applied and tested by the Contractor. Full operational tests of the systems and schemes will be conducted by the Contractor prior to final energization of the substation. Testing of the circuit breaker controls shall be in accordance with instruction books to verify correct operation. Auxiliary relays shall be tested for correct operation in accordance with their instruction books. Meter wiring shall be tested to confirm correct wiring of the voltage and current input circuitry.
2. The Contractor shall not energize relay, metering, and control panel circuitry without the Engineer's approval.

B. Power Transformer

1. The Contractor shall assume primary responsibility for testing of the power transformer.
2. Transformer testing deemed necessary as a result of the Contractor's construction activities shall be at the Engineer's discretion and at the Contractor's expense.
3. When changing internal taps, the following shall be required:
 - a. Follow testing procedures outlined by the Manufacturer in his instruction manual.
 - b. An oil dielectric test shall be performed prior to opening the transformer.
 - c. An oil dielectric test shall be performed after work is completed and the transformer is sealed. If dielectric tests are not within acceptable limits, the Contractor shall filter and test the oil until an acceptable limit is achieved.
 - d. A turns ratio test shall be performed on the transformer after work is complete.
4. Inspection and Test Procedures to be implemented for this Project include:
 - a. All ANSI/NETA ATS tests that are checked in the following table are required for this Project (tests can be found in the following 7.2.2. – *Transformer, Liquid-Filled* sections: 7.2.2.1. – *Visual and Mechanical Inspection* and 7.2.2.2. – *Electrical Tests*).
 - b.

VISUAL AND MECHANICAL INSPECTION TO BE PERFORMED	REQUIRED
a. Confirm nameplate data on equipment matches those in Drawings and Specifications.	
b. Inspect transformer's physical and mechanical state/condition.	
c. Prior to unloading transformer, inspect condition of impact recorder and download and examine travel data.	
d. Confirm that grounding conforms with Drawings.	
e. Confirm that all shipping bracing has been removed once the transformer has been placed.	
f. Confirm the bushings are appropriately clean.	
g. Confirm that the transformer's temperature and level indicators' alarm, control, and trip settings are as specified.	
h. If applicable, confirm the gas accumulator, fault pressure relay, temperature and level indicators, and pressure relief device have operational alarm, control, and trip circuits.	
i. Confirm the operation and overcurrent breakers for the cooling fans and pumps are functioning appropriately.	
j. Using at least two (2) of the following methods, inspect the bolted electrical connections:	
1) As shown in the ANSI/NETA ATS Section 7.2.2.2, inspect with the use of a low-resistance ohmmeter.	
2) As shown in ANSI/NETA ATS Table 100.12 or in the Manufacturer's published data, use the calibrated torque-wrench method to confirm the tightness of accessible bolted electrical connections.	
3) As shown in ANSI/NETA ATS Section 9, use a thermographic survey.	
k. Confirm that the tanks and bushings have the correct liquid level	
l. Confirm that a positive pressure is maintained on gas-blanketed transformers.	
m. Complete Manufacturer recommended inspections and mechanical tests.	
n. As instructed in ANSI/NETA ATS Section 7.12, perform load tap-changer test.	
o. Confirm the as-left position of the de-energized tap-changer.	

TESTS TO BE PERFORMED	REQUIRED
a. If applicable, using a low-resistance ohmmeter, complete the resistance measurements through bolted connections as indicated in ANSI/NETA ATS Section 7.2.2.1.	
b. Complete the winding-to-winding and each winding-to-ground insulation resistance tests and ensure that the results comply with Manufacturer's published data. If the Manufacturer's published	

REV 10/16

data is unavailable, use the ANSI/NETA ATS Table 100.5 and calculate the polarization index.	
c. At all tap positions, complete the turns-ratio tests.	
d. As specified by the test equipment Manufacturer's published data, complete the insulation power-factor or dissipation-factor tests.	
e. As specified by the test equipment Manufacturer's published data, complete the power-factor or dissipation-factor test on each power-factor/capacitance tap equipped bushing. If power-factor/capacitance tap is unavailable, use the hot-collar tests to confirm the Manufacturer's published data.	
f. As specified by the test equipment Manufacturer's published data, complete the excitation-current tests.	
g. In each de-energized tap-changer position, measure the resistance of each high voltage winding and each low voltage winding, if applicable.	
h. Remove and measure the core insulation resistance at 500VDC, if the core ground strap can be accessed.	
i. As specified by ASTM D923, remove a sample of insulating liquid and test for the following:	
1) ASTM D877 and/or ASTM D 1816 – Dielectric breakdown voltage	
2) ANSI/ASTM D 1298 – Acid neutralization number	
3) ANSI/ASTM D 1298 – Specific gravity	
4) ANSI/ASTM D 971 or ANSI/ASTM D 2285 – Interfacial tension	
5) ANSI/ASTM D 1500 – Color	
6) ASTM 1524 – Visual Condition	
7) ASTM D 1533 – Water in insulating liquids. This is required for voltages of 25kV or higher and all units that are silicone-filled.	
8) ASTM D 924 – Power factor or dissipation factor	
j. As specified in ASTM D 3613, remove a sample of insulating liquid and, as specified in ANSI/IEEE C573.104 or ASTM D 3612, complete a dissolved-gas analysis (DGA).	

5. Insulating oil shall be sampled and the following optional ANSI/NETA tests shall be performed:
 - a. Dissolved Gas Analysis.
 - b. Measure Total Combustible Gas.
 6. The winding resistance test for each winding in the final tap position as well as a determination of the percent oxygen test on the nitrogen gas blanket shall be determined.
- C. Ground Systems
1. The Engineer shall be notified at least 48 hours before ground testing. The Engineer shall witness the ground tests after the ground grid is installed.
 2. Prior to backfilling the buried ground grid system, the Contractor shall test no less

REV 10/16

- than 10% of all ground connections to determine the continuity of the connections.
3. Single-point ground tests shall be conducted at the following locations as a minimum:
 - a. Transmission line deadend structures.
 - b. Power transformer locations.
 - c. Control building ground connection to the main buried ground grid.
 - d. All switch operator platform locations.
 4. The fall-of-potential method shall be used to determine the resistance of the completed grid. The acceptable resistance for the completed ground grid is one (1) ohm or less.
- D. Instrument Transformers
1. Physically check the polarity mark orientation on all CTs, PTs, and CCVTs with the three-line diagram in the Engineer's Drawings and the Manufacturer's Drawings.
 2. Verify all transformer bushing CT polarity markings in accordance with the latest edition of ANSI/IEEE C57.13.1.
 3. Verify all PT polarity markings in accordance with the latest edition of ANSI/IEEE C57.13.1.
 4. Single point grounding shall be confirmed for each CT, PT, PD, CVT, and CCVT circuit as shown on the Engineer's Drawings.
 5. As a minimum, the following tests shall be performed on all CTs: Ratio CTs at all taps, megger tests (to ground) on all CTs, and demagnetization and excitation tests on CTs as the final tests on CTs. The excitation test data shall be verified against CT excitation curves with the Engineer being notified of any discrepancies. All CTs are to remain shorted until testing procedures indicate that the CTs are properly loaded.
 6. As a minimum, the following test shall be performed on all PT, PD, CVT, and CCVT: Verify the ratio at all taps, Doble power factor test, and adjust PDs for the voltage and burden of the secondary circuits to which they are being connected.
- E. High Voltage Bus
1. The power transformer windings and surge arresters shall be isolated for this test.
 2. Each phase of the primary and secondary bus work shall be tested separately, impressing 110% of nominal AC line to ground voltage from bus to ground for five (5) minutes each. Leakage current shall be recorded at one-minute intervals.
- F. Lighting Systems
1. Test all systems for proper operation and correct phasing prior to final acceptance.
 2. Test emergency lighting conditions prior to final acceptance.
 3. Adjust at night to provide the best light distribution of the substation area and equipment.
- G. Circuit Breaker, Automatic Circuit Reclosers, and Line Sectionalizers
1. High current tests shall be performed to simulate actual load current and fault current operation of the substation breakers.
 2. Verify that the nameplate data matches the equipment specified.
 3. Perform the following test, measurements, and verifications: Time travel analysis, SF₆ testing, Doble power factor tests, measure contact resistance, verify equipment grounding, high potential testing, relay and reclosing testing, control and

- instrument switch testing, instrument calibration motor testing, and functional and operational testing. Coordinate, as needed, the feeder exit cable testing.
- H. Test all miscellaneous equipment furnished by the equipment Manufacturer, as recommended by the Manufacturer.
 - I. Phasing and Synchronizing
 1. Maintain correct phasing on all circuits and bus. The substation bus and connections shall have phasing as shown on the Drawings. Make phasing tests on all circuits that can be energized from two (2) or more sources to prevent paralleling of sources out of phase.
 2. Phasing tests shall be made with the Engineer and Owner's representative present.
 3. Specific instructions will be issued later by the Engineer with exact details for making the final phasing and synchronizing checks prior to placing the substation in operation.
 - J. Thermographic Survey

The Contractor shall perform a Thermographic survey of the completed substation after adequate load has been supplied. Photographs and/or the thermograms of the deficient area as seen on the imaging system shall be provided to the Owner before and after corrections have been completed.
 - K. Power Panel Tests
 4. The following tests and checks shall be performed on the AC and DC power panels: Verify that the nameplate data matches the equipment specified, verify the equipment ground, check the proper current rating for the circuit connected, verify the proper operation of the ground detector on all GFCI breakers, and verify correct operation of the annunciator and alarms.
 - L. Automatic and Manual AC Power Transfer Switches

The following tests and checks shall be performed on all automatic and manual transfer switches: Verify that the nameplate data matches the equipment specified, check all interlocks and verify the correct operation of keyed interlocks (Kirk key), verify the equipment ground, and verify the correct operation of the annunciator and alarms.
 - M. Metalclad Switchgear

Upon receipt and prior to off-loading, the metalclad switchgear (MCS) and all associated equipment shall be inspected for any physical damage (both external and internal). Any damage shall be fully documented (include high quality photographs) prior to off-loading the unit.

 1. MCS Physical Inspection
 - a. The MCS shall be inspected to ensure compliance with the Division. This shall include inspecting all equipment such as, but not limited to, access doors (including hardware), lighting systems, phone systems, electrical systems, HVAC systems, personal protective equipment, auxiliary equipment, spare parts, and electrical equipment. The supplied equipment shall be compared to the Equipment Specifications and the Manufacturer's Drawings and Bill of Materials to ensure compliance with Division requirements. Any deviations from Division requirements or the Manufacturer's Bill of Materials shall be documented and reported.
 - b. All equipment or components removed for shipment shall be re-installed and/or re-connected according to the Manufacturer's requirements and

recommendations.

- c. All medium voltage connections shall be inspected to verify proper phase position and phase rotation per Division requirements.
- d. All PT and CT connections to the medium voltage bus shall be inspected to confirm proper connection to the correct phase and bus segment.
- e. The MCS shall have all protective coverings (boots and insulating covers) removed from all bolted electrical connections. This shall include all medium voltage bus and low voltage AC and DC supply and control circuits. This may require removing metal covers to allow access to the bolted connections. All bolted connections shall be inspected and all bolts or screws shall be re-torqued according to the Manufacturer's recommendations or requirements. After inspection and re-torquing the bolted connections, all protective coverings (insulating and physical) shall be re-installed according to the Manufacturer's recommendations or requirements.
- f. All compression type connectors shall be inspected for proper installation. This shall include a simple "pull" test (a firm pull on the wire to see if it comes out) on low voltage supply and control wiring connections to ensure the quality of the compression connection.
- g. All draw-out equipment shall be racked in and out of all applicable cubicles. All cubicles shall be checked for proper clearances, electrical connections, wiring, and equipment interference problems.

2. Metal-Clad Switchgear

The following tests and checks shall be performed on the metal-clad switchgear: Verify that the nameplate data matches the equipment specified, instrument transformer testing, Doble testing (arresters, roof bushings, bus work, VTs, and house power transformer), alarm sensor testing, verify equipment ground, high potential testing, relay testing, Ductor testing, control and instrument switch testing, instrument calibration, motor testing, calibration testing, bus tie cable, functional, and operational testing, and verify interlocks and safety features. The Contractor shall coordinate feeder exit cable testing which others will test.

N. Control System Tests

1. All electrical controls shall be tested by trial operation of the control equipment in the presence of the Engineer. The trial operation shall only begin after all wiring is completed. The purpose of the trial operation is to verify that each interlock and control function operates according to the connection diagrams issued by the Engineer as well as in accordance with the Manufacturer's schematics and operating instructions.
2. The Contractor shall furnish all necessary labor, supervision, testing equipment, and tools required to locate the cause of any malfunction and make the necessary corrections in wiring, equipment, or connections furnished by the Contractor as necessary to obtain the intended operation. If the cause of the malfunction is due to internal errors in the equipment or in the furnished Drawings, the Testing Contractor shall advise the Engineer prior to commencing the trouble tests and conduct such tests according to approved procedures. The Contractor will be expected to make corrections to the equipment and support the Manufacturer on warranty items.

3. All relay, control and interlock, and metering functions shown on the one-line diagrams or on the Schematic Drawings shall be tested (including all trip path tests, block close tests, and ATO tests with permissive contacts verified to block operation). Record any malfunctions noted in the operations prior to completing repairs. Repeat the tests and record on the Connection Drawing the date that the scheme functioned satisfactorily and the name of the person conducting the tests.
- O. Relay In-Case Tests
- The following functional tests shall be performed:
1. After the completion of the bench testing and the connection of all external wiring, the Contractor shall conduct an in-case test. The in-case test shall be performed by closing each relay contact manually, electrically, or from a PC to see that the proper lockout and/or breaker is tripped and/or the annunciator indication is actuated as indicated on the Drawings and as the philosophies dictate. Targets and seal-in circuits shall also be verified for proper operation.
 2. The testing of the relays shall include tests where current and voltage are applied at the test or disconnect points (PK, FT-1, etc.) to the relaying at current and voltage transformers as well as phase angle and current checks after relays are actually in-service and carrying load current. Wires are not to be lifted for testing purposes unless no other way is practical.
 3. Correct any errors in the interconnecting wiring or the internal equipment wiring, as directed by the Engineer, to obtain the correct operation of all relays.
- P. Current Circuit Tests
- The following tests and checks shall be performed on all current transformer circuits:
1. Inject currents at the source of each current transformer string and check the string at each device with a clamp-on ammeter or current probe to verify that all current transformer strings are connected in accordance with the Engineer's Drawings.
 2. Simulate the actual load current and fault current operation of the substation electrical systems by injecting appropriate currents into the CT strings to check the protective relay operation, CT circuits, meters, and instruments.
- Q. Voltage Circuit Tests
- The following tests and checks shall be performed on all voltage circuits: Pull the fuses from CVT, CCVT, PD, or PT junction boxes and apply the proper phase-to-phase and phase-to-ground voltages to the load side of the fuse blocks. Check for the proper voltages at all relays, instruments, switches, etc. to verify that the voltage circuit is connected in accordance with the Engineer's Drawings.
- R. Batteries and Chargers
- The following tests and checks shall be performed on the substation batteries and chargers:
1. Verify that the nameplate data matches the equipment specified.
 2. Visually inspect all equipment for damage, proper connection, and use of proper hardware,
 3. Verify tightness of all connections.
 4. Verify correct coordination of the charger with the vent fan operation.
 5. Test the DC voltage (float and equalize, as required).
 6. Test inter-cell connection resistance, measure the temperature, voltage, and specific gravity of each cell.

7. Verify the annunciator and alarms.
 8. Perform a battery capacity discharge test per IEEE 450 test.
 9. Verify the DC lighting system.
 10. Record the results of the battery testing in the Battery Book provided by the Owner.
 11. The Testing Contractor shall report any cells that are deficient to the Engineer.
- S. Fiber Optics
1. Testing shall be performed to certify that each of the fiber optic strands meets all Specifications.
 2. Testing shall be performed before and after installation to show fiber optics were not damaged during installation.

FT.4 INITIAL ENERGIZATION

- A. An initial energization procedure will be submitted by the Owner to the Contractor at least two (2) weeks prior to energization for approval and comments. Comments are to be returned to the Engineer within one (1) week. If deemed necessary by the Engineer, a meeting will be held on site within one (1) week of the energization date to discuss any particulars of the initial energization.
- B. Those to be present include the:
1. Owner or his authorized representative
 2. Contractor providing labor to perform switching, ground removal, and testing personnel.
 3. Engineer.
 4. Manufacturer's field representative, as required by the Owner.
 5. Responsibilities of those present are as follows:
 - a. Owner
 - 1) Witness the initial energization or operation of the equipment.
 - 2) Obtain and hold work clearances on existing facilities to allow final permanent connections to be made by the Contractor.
 - 3) Be responsible for maintaining electric service to existing facilities. The Owner may stop work from proceeding if such work in his estimation will cause the system to operate unsatisfactorily or to drop load.
 - 4) Ensure that the initial energization procedure is followed.
 - 5) Provide the test load with a backup source for load tests and checks. It is understood that the test load may be dropped during load testing.
 - b. Contractor
 - 1) Perform all labor associated with clearing new bus equipment, etc., required to allow initial energization.
 - 2) Make final connections, as required, for initial energization.
 - 3) Coordinate with the Engineer to obtain the required clearances.
 - 4) Perform all work as specified in existing facilities, as required, for initial energization. Do not proceed with work in existing facilities until clearances have been obtained from the Owner for the specific work at hand.
 - 5) Perform all testing and/or corrective work required during the initial energization.
 - 6) Be responsible for the installation of all equipment and materials installed

under this Contract.

7) Ensure that the initial energization procedure is followed.

c. Engineer

1) Witness the initial energization or operation of equipment.

2) Coordinate with the Owner to obtain required work clearances.

3) Coordinate with the Contractor to schedule the completion of testing and construction.

4) Coordinate with the Manufacturer's field representative when his presence is required.

5) Ensure that the initial energization procedure is followed.

d. Manufacturer's Field Representative

1) Perform or witness final tests on equipment.

2) State when/what equipment is ready for energization.

3) May witness initial energization.

6. The initial energization procedure may be amended, when required, by field conditions and with the consent of the Owner, Contractor, and Engineer.

END OF DIVISION FT

This Page Intentionally Left Blank

DIVISION PL

POWER, LIGHTING, CONTROL DEVICES, AND ASSOCIATED EQUIPMENT

PL.1 GENERAL

A. This DIVISION covers the materials and labor required for the installation of the following systems:

1. Yard Lighting.
2. Yard Receptacle Outlets.
3. Yard Cabinets.
4. Terminal Blocks, Fuses, Fuse Holders, and Test Switches.
5. Associated Equipment.

B. Quality Assurance

1. Applicable Standards

a. Lighting

- 1) American National Standards Institute (ANSI)
- 2) Certified Ballast Manufacturers Association (CBM)
- 3) Illuminating Engineering Society (IES)

a) LED Lighting

- (1) LM-79 Tested with CRI > 75
- (2) LM-80 Tested with an L90 > 100,000 Hours
- (3) TM-26 life MTTF > 100,000 at 50° C.

4) National Electrical Manufacturers Association (NEMA)

5) Underwriters Laboratories (UL)

b. Power Receptacle Outlets and Fuse, Terminal, and Junction Cabinets

- 1) ANSI
- 2) National Electrical Code (NEC)
- 3) NEMA
- 4) UL

2. Equipment shall be as indicated on the Drawings, including specific Manufacturers, if required.

C. Compliance Submittals

The following information shall, at a minimum, be submitted for all Contractor Furnished items:

1. Lighting Fixtures

- a. Physical size and weight.
- b. Schematic Diagrams.
- c. Ballast information.
- d. Photometric data.
- e. Catalog cut sheets.

2. Power Receptacle Outlets

- a. Physical Outline Drawings.
- b. Catalog cut sheets.
- c. Nameplate and cover engravings.

3. Fuse, Terminal, and Junction Cabinets

REV 07/17

- a. Physical Outline Drawings.
 - b. Technical information, such as overall dimensions, mounting requirements, weight, and ratings.
 - c. Catalog cut sheets.
 - d. Nameplate and cover engravings.
 - e. Internal accessories for junction cabinets.
4. Special equipment shall have a complete functional description.

PL.2 EQUIPMENT AND MATERIALS

A. Lighting Fixtures

1. General

- a. All equipment and materials shall bear the UL label, where applicable.
- b. Equipment and materials shall be designed to the environmental quality of illumination levels established by the specified luminaries.
- c. All incidental wiring, contactors, and accessories shall be included, as required, for complete installation.

B. Power receptacle outlets shall be weatherproofed and furnished as follows:

1. 240V receptacles:

- a. Surface mounted.
- b. Rated 30A at 250VAC.
- c. 3-pole, 3-wire.
- d. Raintight with an AEE unilet.
- e. The ground pin of the receptacle shall be connected to the ground system with a No. 6 AWG bare copper wire.
- f. Locate as indicated on the Construction Drawings.

2. 120V receptacles:

- a. Surface mounted.
- b. Rated 20A at 125VAC.
- c. Duplex, arc-resistant and prewired, ground fault circuit interrupting type.
- d. Stainless steel, spring-hinged, PVC-gasketed doors and stainless steel PVC-gasketed cover plate.
- e. FS or FD boxes.
- f. Locate as indicated on the Construction Drawings.

3. All 120V and 240V receptacles shall be labeled with phenolic labels.

4. Wiring devices, receptacles, switches, and device plates shall comply with UL, NEMA, and NEC Standards.

C. Yard Panel Enclosures

1. Enclosure

- a. NEMA 4, unless otherwise noted.
- b. Quantities and sizes as indicated on the Construction Drawings.
- c. Construct from formed and welded code gauge aluminum with a full-length hinge and a stainless steel hinge pin, clamps, clamp screws, and panel screws (Hoffman Engineering or approved equal).

REV 07/17

- d. Furnish with a steel or aluminum subpanel.
 - e. Furnish with a drip shield kit.
- 2. Terminal Blocks
 - a. Heavy-duty, strap-screw type, 600V, 15A.
 - b. Black bakelite base with a white masking strip.
 - c. Quantities per the terminal and fuse enclosure as indicated on the Construction Drawings.
- 3. Fuse Holders
 - a. 3-pole, 250V, 30A.
 - b. Heavy-duty phenolic base with side barriers.
 - c. Fuse clips shall be tinned.
 - d. Quantities per enclosure as indicated.
- 4. Test Switches
 - a. Configurations and quantities as indicated.
 - b. 10-pole, 600V, with a clear plastic cover and front-connected.
- 5. Fuses
 - a. Rated as indicated.
 - b. NEMA Class K5.
 - c. Quantities as required plus six (6) extra fuses.
 - d. Bussman Type FRN or approved equal.
- 6. Copper Slugs
 - a. Copper tube of a suitable size.
 - b. Coat with a corrosion prohibitive compound.
 - c. Quantities as indicated.
- 7. Nameplates
 - a. 1" x 3" minimum.
 - b. Laminated phenolic black with white letters.
 - c. Quantities and engraving as indicated on the Construction Drawings.

PL.3 INSTALLATION

A. Lighting Fixtures

- 1. Install after pipe, conduit, and other equipment above the luminaries have been installed, unless otherwise directed by the Engineer.
- 2. Place accurately as to line and level and at elevations indicated.
- 3. Clean and fully lamp with acceptable lamps.
- 4. Complete with all required accessories just prior to final acceptance.
- 5. Install as indicated by the Manufacturer's instructions.
- 6. Mount yard floodlights in the indicated locations on the Drawings.

B. Wiring Circuits for Lighting and Wiring Devices

- 1. Group in home runs with not more than one (1) conductor of each phase and suitably sized neutral wire in one (1) conduit.
- 2. Use circuit numbers as indicated.
- 3. Install in concealed and exposed conduit systems as indicated.

C. Yard receptacle outlets shall be mounted as indicated on the Drawings.

REV 07/17

D. Yard Cabinets

1. Install at the indicated locations.
2. Provide all necessary mounting hardware.
3. Mount fuse holders, terminal blocks, test switches, and wire according to the Connection Diagrams furnished by the Engineer.
4. Connect all conduit risers and mounting accessories.
5. Install the nameplates as indicated.
6. Install the cabinet ground.

END OF DIVISION PL

(THIS LEFT IN BLANK INTENTIONALLY)

ADDITIONAL INFORMATION:

Question 1: Will this project be a turnkey job?

Answer 1: Yes, it is a turnkey job. The awarded contractor will be responsible for the construction and installation of substation and control building.

Question 2: Who is going to be responsible for the site grading?

Answer 2: Brownsville PUB already has a contractor to do the site grading and preparation for the new installation of the substation and control building.

Question 3: Do you have a Geotechnical report ready and available?

Answer 3: Yes, attached is the Geotechnical report.

Question 4: Do you need any access road at this site?

Answer 4: No, it is not required.

Question 5: Will Brownsville PUB also be going out for bid on AFDE-138kV A-Frame Deadend Structure and 138kV Large Angle Dead-End? The Bid B058-24 states those structures will be furnished by owner (BPUB).

Answer 5: Brownsville PUB already purchased those units, and they will be provided at the time of the construction.

Question 6: Who is going to be responsible to tap the transmission lines to A-Frame deadend structures and to energize?

Answer 6: Brownsville PUB will be responsible.

Question 7: What are the calendar days to complete the project?

Answer 7: Brownsville PUB does not have a specific number of calendar days to complete the project. BPUB will consider it when reviewing/evaluating the bids.

Question 8: Is the contractor responsible to pick up, move, transport, and deliver the equipment to the job site? Will BPUB load our trucks with the owner furnished material or is it the responsibility of the contractor to load? What is the distance?

Answer 8: Yes, this project is a turnkey job, and the awarded contractor will be responsible to move the equipment to the job site. contractor will have to coordinate pickup with BPUB on Structural steel pickup and other equipment, and responsible to provide their own loading equipment (forklift, winch truck). The equipment is located at 1495 Robinhood Drive, Brownsville TX, and the travel distance is approximately 3 to 4 miles away. A second unit is located at the Airport Substation, 915 S. Central Avenue, Brownsville, TX about 500 ft away.

Question 9: What about if moving the equipment for the second time? Do we need to move it to the new foundation?

Answer 9: Yes, the awarded contractor will be responsible for moving the equipment the second time.

Question 10: Do you have the weight and dimensions of the equipment?

Answer 10: Yes, attached is a picture of the nameplate and manufacturer design as references.

Question 11: For the Transmission poles (Unit DA) 138kv Large Angle Dead-end - is the substation contractor just responsible for the foundation and setting of the pole or are we going to have to do the T-line work from the existing poles through the new ones and into the station?

Answer 11: The Contractor is expected to build the foundation and set the self-sustained poles. Contractors can add the cost of all the T-line work within the substation as an option.

Question 12: Unit AP-A20 - 12.47 Bus Work Associated with Transformers #1 and #2 - states that material is owner furnished, but in the drawings, it states that all the bus materials are contractor furnished. Please clarify.

Answer 12: The bus materials are contractor-furnished.

Question 13: Unit AP-600C - Low Voltage (12.5kv) Material - I am assuming this is for the bus material that we are furnishing? Please confirm.

Answer 13: Yes, this is the bus material. Attached is Drawing AP-E600C for your reference.

Question 14: Do you have any vendor drawings for the metal-clad switch gear as well as the transformers?

Answer 14: Yes, see attachment.

Question 15: Who is responsible for dressing out the Power Transformers?

Answer 15: The contractor will be responsible for dressing out the transformer.

Question 16: If the contractor is responsible for the dress out of the PWT's. Do we need to provide the oil to fill the new transformer and oil to top off the existing transformer depending on the oil level of the existing one?

For the transmission poles, are we going to provide the material needed for each pole, (i.e. insulators, clamps, etc.)?

Answer 16: Brownsville PUB will provide the additional oil for the radiators and will provide transmission materials, if necessary.

Question 17: Would it be acceptable to use seal tight (metallic flexible conduit with PVC outer jacket) above grade?

Answer 17: No, only material specified by the engineer of record should be considered.

Question 18: The new transformer will need to have the bushings, radiators, and oil placed into the radiators to complete assembly of the unit. Is it the contractor's responsibility to perform this service or will a third party be providing this service? The gear that is to be placed into your control building, do want the contractor to test the equipment before installation (it is standard procedure to test before installation)? Can you clarify if the contractor will be held responsible for any testing on the equipment installed in the new substation.?

Answer 18: The testing of the equipment before installation is not required. However, if the Contractor notices damages on the equipment that is installed/wired or if the Contractor notices mistakes on the drawings, the Owner (BPUB) will expect the Contractor brings it to the Owner's attention, so necessary corrections could be taken.



Geotechnical Engineering Report

**Airport Distribution Substation
Brownsville, Texas**

May 18, 2020

Terracon Project No. 88205026

Prepared for:

Brownsville Public Utilities Board
Brownsville, Texas

Prepared by:

Terracon Consultants, Inc.
Pharr, Texas



May 18, 2020

Brownsville Public Utilities Board (BPUB)
1425 Robinhood Street
Brownsville, Texas 78521



Attn: Emmanuel Benitez, P.E.
P: [956] 983-6216
E: ebenitez@brownsville-pub.com

Re: Geotechnical Engineering Report
Airport Distribution Substation
Billy Mitchel Blvd. and S. Central Ave.
Brownsville, Texas
Terracon Project No. 88205026

Dear Mr. Benitez:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P88205026 dated January 28, 2020. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.
(Texas Firm Registration No.: F-3272)

for:

Stephany Chacón, E.I.T.
Staff Engineer



Alfonso A. Soto, P.E., D.GE
Principal

5/18/2020

Terracon Consultants, Inc. 1506 Mid Cities Drive Pharr, TX 78577
P [956] 283 8254 F [956] 283 8279 terracon.com

Environmental

Facilities

Geotechnical

Materials

REPORT TOPICS

REPORT SUMMARY	I
INTRODUCTION	1
SITE CONDITIONS	1
PROJECT DESCRIPTION	2
GEOTECHNICAL CHARACTERIZATION	2
GEOTECHNICAL OVERVIEW	3
EARTHWORK	4
FOUNDATIONS SYSTEMS	9
SEISMIC CONSIDERATIONS	21
FLOOR SLABS	21
GENERAL COMMENTS	23

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **GeoReport** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026



REPORT SUMMARY

Topic ¹	Overview Statement ²
Project Description	The project will include the construction of substation and transmission line related equipment.
Geotechnical Characterization	■ Groundwater was encountered at depths between 7 and 34 feet below existing grade during drilling operations. ■ The subsurface soils at this site generally consist of Fat Clay (CH) and Silty Sand (SM).
Potential Vertical Rise (PVR)	The existing Potential Vertical Rise (PVR) of the soils within the proposed building area in present condition is about 1 to 2 inches.
Seismic Site Classification	The subsurface conditions within the site are consistent with the characteristics of Site Class D as defined in the International Building Code (IBC) Site Classification.
Earthwork	The subgrade should be prepared as noted in Earthwork
Foundations	A shallow or deep foundation system would be appropriate to support the structural loads of the proposed structures, provided the pads are prepared as recommended in this report.
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Geotechnical Engineering Report
Airport Distribution Substation
Billy Mitchel Blvd. and S. Central Ave.
Brownsville, Texas
Terracon Project No. 88205026
May 18, 2020

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed additions to the existing Airport Distribution Substation located at Billy Mitchel Blvd. and S. Central Ave. in Brownsville, Texas. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Excavation considerations
- Foundation design and construction
- Floor slab design and construction
- Seismic site class per IBC

The geotechnical engineering Scope of Services for this project included the advancement of 3 test borings to depths of approximately 50 feet below existing site grades.

Maps showing the site and boring locations are presented in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project site is located south of the intersection of Billy Mitchel Blvd. and S. Central Ave. in Brownsville, Texas. Latitude/Longitude: 25.906247°, -97.447431° See Site Location
Existing Improvements	Currently energized and operational substation
Current Ground Cover	Caliche
Existing Topography	Relatively flat and level.

Item	Description
Geology	Based on the Geologic Atlas of Texas, McAllen – Brownsville prepared by The University of Texas, the site is located on the Alluvium Formation of the Holocene (Recent) Period of the Quaternary Age. Floodplain deposits, lower course of Rio Grande, are divided into areas dominantly mud and areas dominantly silt and sand. All other areas are alluvium undivided, except for some areas where tidal flat areas are mapped. The soils are mostly composed of clay, silt, sand, gravel and organic matter. The silt and sand are described as calcareous and dark gray to dark brown in color. The sand is mostly quartz and the gravel along Rio Grande include sedimentary rocks from the Cretaceous and Tertiary and a wide variety of igneous and sedimentary rocks from Trans-Pecos Texas, Mexico, and New Mexico including agate. The gravel in side streams of the Rio Grande is mostly Tertiary rocks and chert derived from Uvalde Gravel which caps divide.

PROJECT DESCRIPTION

Item	Description
Information Provided	<i>Technical Specifications for the Scope of Work</i> provided by Brownsville Public Utilities Board via email on 01/24/2020.
Project Description	The project will include the construction of substation and transmission line related structures and equipment.
Construction Type	The proposed structures may be supported by a shallow (grade-supported pads and mats) and/or deep (straight-sided drilled shafts or direct embedded poles) foundation system.

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs and the GeoModel can be found in the **Exploration Results** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026



Model Layer	Layer Name	General Description
1	CLAY	Fat Clay (CH) Soft to hard
2	SAND	Silty Sand (SM) Loose to very dense

Groundwater Conditions

The boreholes were observed during and after completion of drilling for the presence and level of groundwater. The water levels observed are noted on the attached boring logs, and are summarized below.

Location	Depth to groundwater (feet)		
	During drilling	15 minutes after initial groundwater reading	After boring completion
B-1	34	34	7
B-2	16	12	7½
B-3	13	8	8

The Silty Sand (SM) soils are considered volumetrically stable and due to their granular nature may transmit water easily during rainfall seasons. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project. The boreholes were backfilled with cement-bentonite grout after completion of the groundwater level observations.

GEOTECHNICAL OVERVIEW

Our findings indicate the proposed building structure can be supported on a shallow or deep foundation system. The desired foundation system may be used at this site provided the site and foundation are designed and constructed as recommended in this report.

The suitability and performance of a soil supported foundation for a structure depends on many factors including the magnitude of soil movement expected, the type of structure, the intended use of the structure, the construction methods available to stabilize the soils, and our understanding of the owner's expectations of the completed structure's performance.

Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026



Expansive soils and soft compressible soils are present on this site. This report provides recommendations to help mitigate the effects of soil settlement, shrinkage and expansion. However, even if these procedures are followed, some movement in the structure should be anticipated. Eliminating the risk of movement may not be feasible, but it may be possible to further reduce the risk of movement if significantly more expensive measures are used during construction. We would be pleased to discuss other construction alternatives with you upon request.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of data presented herein, engineering analyses, and our current understanding of the proposed project.

The **General Comments** section provides an understanding of the report limitations.

Swell Test Results

To further evaluate the expansive characteristics of the clayey soil, one-dimensional vertical swell tests were conducted on selected specimens. The results of these tests are shown in the following table.

Swell Test Results					
Boring	Depth (feet)	Surcharge (psf)	Initial Moisture (%)	Final Moisture (%)	Percent Swell (%)
B-1	5.0	100	25.5	27.3	0.8
B-1	5.0	700 ¹	24.5	26.0	0.1

1. Swell test specimens were applied a surcharge pressure during testing that approximated the existing soil overburden.

The test results indicate that the onsite soils have a moderate swell potential in their existing condition. However, these soils, if they were allowed to dry out, could have greater potential for volumetric changes.

EARTHWORK

Earthwork will include clearing and grubbing, excavations and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria as necessary to render the site in the state considered in our geotechnical engineering evaluation for foundations and pavements.

Site Preparation

Construction areas should be stripped of all caliche, topsoil and other unsuitable material. Additional excavation as recommended in this report or as needed should be performed within the proposed building area. Once final subgrade elevation has been achieved, the exposed subgrade should be carefully proofrolled with a 15-ton pneumatic roller or a fully loaded dump truck to detect weak zones in the subgrade. Special care should be exercised when proofrolling the fill soils to detect soft/weak areas. Weak areas detected during proofrolling, as well as zones of fill containing organic matter and/or debris should be removed and replaced with select fill in the proposed building area. Proper site drainage should be maintained during construction, so that ponding of surface runoff does not occur and cause construction delays and/or inhibit site access.

Subsequent to proofrolling, and just prior to placement of fill, the exposed subgrade within the construction area should be evaluated for moisture and density. If the moisture, density, and/or the requirements do not meet the criteria described in the table below, the subgrade should be scarified to a minimum depth of 8 inches, moisture adjusted and compacted to at least 95 percent of the Standard Effort (ASTM D 698) maximum dry density. Select fill should meet the following criteria.

Fill Material Types

Engineered fill should consist of approved materials, free of organic material, debris and particles larger than about 2 inches. The maximum particle size criteria may be relaxed by the geotechnical engineer of record depending on construction techniques, material gradation, allowable lift thickness and observations during fill placement. Soils for use as engineered fill material should conform to the following specifications:

Fill Type ¹	USCS Classification	Acceptable Location for Placement
Aggregate Base Course ²	SC, GC, Caliche, Crushed Limestone, Crushed Concrete	Top 6 inches of pad areas.
Select Fill	CL and/or SC (7≤PI≤20)	Must be used to construct the pads under the structures and all grade adjustments.
On-Site Soils	CL/CH	On-site CL soils may be suitable for use as fill within the structure areas as long as they are free from organics, cohesive and have a PI between 7 and 20.

1. Prior to any filling operations, samples of the proposed borrow and on-site materials should be obtained for laboratory moisture-density testing. The tests will provide a basis for evaluation of fill compaction by in-place density testing. A qualified soil technician should perform sufficient in-place density tests during the

filling operations to evaluate that proper levels of compaction, including dry unit weight and moisture content, are being attained.

2. Crushed limestone and crushed concrete material should meet the requirements of 2014 TxDOT Item 247, Type A, or D, Grades 1-2 and 3. The select fill materials should be free of organic material and debris, and should not contain stones larger than 2 inches in the maximum dimension. The clayey gravel and caliche materials should meet the gradation requirements of Item 247, Type B, Grades 1-2 and 3 as specified in the 2014 TxDOT Standard Specifications Manual and a Plasticity Index between 7 and 20.

Fill Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Description
Fill Lift Thickness	The fill should be placed in thin; loose lifts of about 8 inches, with compacted thickness not exceeding 6 inches.
Compaction Requirements (on-site soils)	The on-site soils should be compacted to at least 95 percent of the Standard Effort (ASTM D698) maximum dry density within 4 percentage points above the optimum moisture content.
Compaction Requirements (select fill)	The select fill should be compacted to at least 95 percent of the Standard Effort (ASTM D698) maximum dry density within 2 percentage points of the optimum moisture content.

Wet Weather/Soft Subgrade Conditions

Construction operations may encounter difficulties due to the wet or soft surface soils becoming a general hindrance to equipment due to rutting and pumping of the soil surface, especially during and soon after periods of wet weather.

If the subgrade cannot be adequately compacted to minimum densities as described above, one of the following measures will be required: 1) removal and replacement with select fill, 2) chemical treatment of the soil to dry and increase the stability of the subgrade, or 3) drying by natural means if the schedule allows.

In our experience with similar soils in this area, chemical treatment is an efficient and effective method to increase the supporting value of wet and weak subgrade. Terracon should be contacted for additional recommendations if chemical treatment of the soils is needed.

Prior to placing any fill, all surface vegetation, topsoil, possible fill material and any otherwise unsuitable materials should be removed from the construction areas. Wet or dry material should either be removed or moisture conditioned and recompacted. After stripping and grubbing, the subgrade should be proof-rolled where possible to aid in locating loose or soft areas. Proof-rolling

can be performed with a 15-ton roller or fully loaded dump truck. Soft, dry and low-density soil should be removed or compacted in place prior to placing fill.

Grading and Drainage

It is important that positive drainage be established during construction such that water will not pond around the structures during or following the construction period.

All grades must be adjusted to provide positive drainage away from the structures. Where paving or flatwork abuts the structures, care should be taken that the joint is properly sealed and maintained. Roof drains should discharge away from the control building.

Earthwork Construction Considerations

Shallow excavations, for the proposed structure, are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over, or adjacent to construction area should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompact, prior to floor slab construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and top soil, proof-rolling and mitigation of areas delineated by the proof-roll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of

Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026



compacted fill in the building area and 5,000 square feet in pavement areas. One density and water content test for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. In the event unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Corrosion Considerations

The table below lists the results of laboratory soluble sulfate, soluble chloride, pH and resistivity testing. The values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Corrosivity Test Results Summary						
Boring	Sample Depth (feet)	Soil Description	Soluble Sulfate (%)	Soluble Chloride (%)	pH	Resistivity (ohm-cm)
B-3	6 - 8	Fat Clay (CH)	4,817	2,475	7.6	116

Results of soluble sulfate testing indicate samples of the on-site soils tested possess severe sulfate concentrations when classified in accordance with Table 4.3.1 of the ACI Design Manual. Concrete should be designed in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4. To improve sulfate resistance of concrete in severe sulfate exposure when Type V cement is not available, the following should be considered:

- Use of Type I-II modified cement for sulfate resistance
- Cement should have a tricalcium aluminate content of not more than 8%.
- Concrete mixture should contain at least 20% Class F fly ash.
- Provide air-entrainment of 4% to 7% by volume.
- Lower the water to cement ratio to 0.4 to 0.45.

Thermal Resistivity Testing

A laboratory thermal resistivity (TR) was performed on a remolded specimen of representative soils from the native soils. The bulk sample was recovered from the upper 5 feet of soil in the vicinity of boring B-2. The results of TR testing are included in **Exploration Results**.

Electrical Earth Resistivity Testing (EER)

Terracon performed two (2) field EER survey alignments at location selected by the client following ASTM G-57, using the Four-Electrode Wenner method. The results of EER testing are included in **Exploration Results**.

FOUNDATIONS SYSTEMS

The proposed structures, depending on the load requirements and expected performance, can be supported on a variety of foundations which include drilled piers, mats, and slabs. Near-surface foundations, such as the equipment pads and the slab foundations may be sensitive to movement. If a structure can withstand the anticipated movement presented in this report, then spread footings may be utilized.

A slab foundation would be appropriate for the proposed building-type structures. However, spread footings should not be utilized for buildings or structures sensitive to movement because of the increased risk of differential movement. Thickened and widened sections of the slab could be constructed for areas of concentrated loads.

A deep foundation system, such as drilled piers, would be appropriate to support the structural loads of dead-end structures, and those structures requiring more capacity than a shallow foundation can provide. Recommendations for these types of foundation systems are provided in the following sections, along with other geotechnical considerations for this project.

Design Parameters – Slab-on-Grade Foundation

The foundation design parameters presented below are based on our evaluation using published theoretical and empirical design methods.

These were developed based on our understanding of the proposed project, our interpretation of the information and data collected as a part of this study, our area experience and the results of our evaluation. The structural engineer should select the appropriate slab design method and code for the amount of anticipated slab movement indicated.

The slab-on-grade foundation may be designed using the following parameters provided the subgrade is prepared as outlined in the **Earthwork** and **Floor Slabs** sections of this report:

Item	Description
Select Fill Pad	Minimum 2 feet of select fill over 8 inches of moisture conditioned and compacted on-site soils.

Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026



Item	Description
Allowable Bearing Pressure ¹ ■ Compacted select fill	Net Total Load - 2,500 psf
Climatic Rating	15
Design Plasticity Index	24
Soil Support Index	0.90
Estimated PVR ²	About 1 inch
Approximate total settlement ³	About 1 inch
Estimated Differential Settlement ³	Approximately ½ of total settlement
Min. perimeter grade beam embedment ⁴	18 inches below finished grade

1. The net allowable bearing pressure provided above include a factor of safety of at least 2.
2. The slab-on-grade foundation system should be designed to tolerate the anticipated soil movement and provide satisfactory support to the proposed structure. The foundation should have adequate exterior and interior grade beams to provide sufficient rigidity to the foundation system such that the slab deflections that result are considered tolerable to the supported structure.
3. This estimated post-construction settlement is assuming proper construction practices are followed. Settlement response of a select fill supported slab is influenced more by the quality of construction than by soil-structure interaction. Therefore, it is essential that the recommendations for foundation construction be strictly followed during the construction phases of the building pad and foundation.
4. To bear within the select fill or moisture conditioned and recompacted on-site soils. The grade beams may be thickened and widened where necessary to support column loads.

Construction Considerations for Slab-on-Grade Foundation

Excavations for grade beams should be performed with equipment capable of providing a relatively clean bearing area. The bottom 6 inches of the excavations should be completed with a smooth-mouthed bucket or by hand labor. The excavations should be neatly excavated and properly formed. Debris in the bottom of the excavation should be removed prior to reinforcing steel placement. Water should not be allowed to accumulate at the bottom of the excavation. Due to the presence of dry soils, caving of grade beam excavation may occur. Therefore, the foundation contractor should be prepared to use forms.

To reduce the potential for groundwater seepage into the excavations and to minimize disturbance to the bearing area, we recommend that concrete and reinforcing steel be placed as soon as possible after the excavations are completed. Excavations should not be left open for more than 36 hours. The bearing surface of the grade beams should be evaluated after excavation is completed and immediately prior to placing concrete.

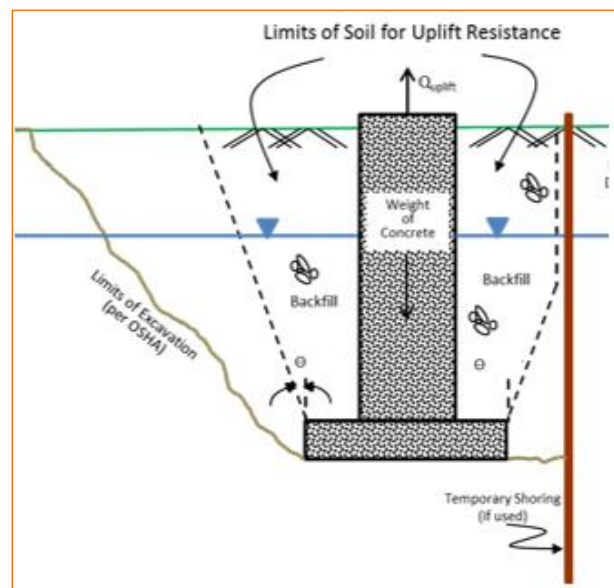
Design Recommendations – Spread Footing Foundation

A spread footing foundation system may be used to support some of the planned structures that are not sensitive to movement. On-site clay soils have a moderate to high potential for shrink/swell movements. The PVR of the soils in the general area of the substation is expected to be about 1 to 2 inches. Some industrial structures may not be affected by movements of this magnitude and shallow spread footings might be a cost-effective foundation option.

Spread footings may be considered in the design of the foundations to support the main column loads. Lateral loads transmitted to the footings should be resisted by a combination of soil-concrete friction on the base of the footing and passive pressure on the side of the footing. To resist lateral forces, a net allowable passive resistance may be utilized for portions of footings extending at least 30 inches below finished grade. If the footing is formed during construction, the open space between the footing and the in-situ soils should be backfilled with soils. Also, care should be taken to avoid disturbance of the footing bearing area since loose material could increase settlement and decrease resistance to lateral loading.

The spread footings can provide some uplift resistance for those structures subjected to wind or other induced structural loading.

Uplift resistance of spread footings can be developed from the effective weight of the footing and the overlying soils. As illustrated on the subsequent figure, the effective weight of the soil prism defined by diagonal planes extending up from the top of the perimeter of the foundation to the ground surface at an angle, θ , of 20 degrees from the vertical can be included in uplift resistance. The maximum allowable uplift capacity should be taken as a sum of the effective weight of soil plus the dead weight of the foundation, divided by an appropriate factor of safety. A soil unit weight of 120 pcf should be used for the backfill. This unit weight should be reduced to 58 pcf for portions of the backfill or natural soils below the groundwater elevation.



Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026



Design values for the footings are presented below.

Item	Description
Minimum Embedment Below Finished Grade ¹	2½ feet
Net Allowable Bearing Pressure ⁷	Total Load - 2,500 psf
Approximate total settlement ²	About 1 inch
Estimated Differential Settlement ³	Approximately ½ of total settlement
Allowable Passive Pressure ⁴	650 psf (if considered)
Coefficient of Sliding Friction ⁵	0.40
Uplift Resistance ⁶	Foundation Weight (150 pcf) & Soil Weight (120 pcf)

1. To bear within the native soils or select fill.
2. This estimated post-construction settlement of the shallow footings is without considering the effect of stress distribution from adjacent foundations and assuming proper construction practices are followed. A clear distance between the footings of one footing size should not produce overlapping stress distributions and would essentially behave as independent foundations.
3. Differential settlement may result from variances in subsurface conditions, loading conditions and construction procedures. The settlement response of the footings will be more dependent upon the quality of construction than upon the response of the subgrade to the foundation loads. We estimate that the differential settlement should be approximately one-half of the total settlement. Settlement of footings will be more sensitive to installation techniques than to soil-structure interaction.
4. The passive pressure along the exterior of the footings should be neglected unless pavement is provided up to the edge of the structure. For interior footings, the allowable passive pressure may be used for the entire depth of the footing. The passive pressure provided above includes a factor of safety of at least 3.
5. Lateral loads transmitted to the footings will be resisted by a combination of soil-concrete friction on the base of the footings and passive pressure on the side of the footings.
6. The ultimate uplift capacity of shallow footings should be reduced by an appropriate factor of safety to compute allowable uplift capacity.
7. The net allowable bearing pressure provided above include a factor of safety of at least 2.

Construction Considerations for Spread Footing Foundations

As noted in **Earthwork**, the footing excavations should be evaluated under the direction of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed. Due to the presence of dry soils, caving of excavation may occur. Therefore, the foundation contractor should be prepared to use forms.

Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026

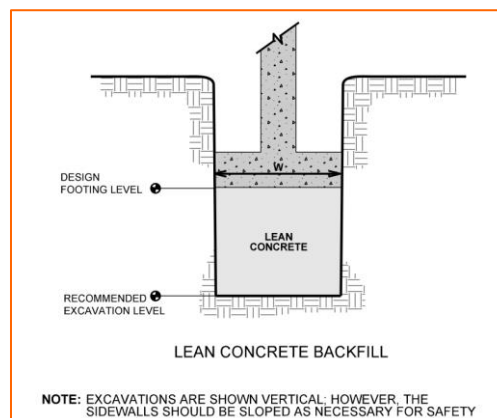


Excavation should be accomplished with a smooth-mouthed bucket. If a toothed bucket is used, excavation with this bucket should be stopped 6 inches above the final bearing surface and the excavation completed with a smooth-mouthed bucket or by hand labor.

If the footing foundations are over-excavated and formed, the backfill around the foundation sides should be achieved with compacted select fill, lean concrete, compacted cement stabilized sand (two sacks cement to one cubic yard of sand) or flowable fill. Compaction of select fill should be as described later in this section of the report.

The bearing surface should be excavated with a slight slope to create an internal sump for runoff water collection and removal. If surface runoff water in excess of 2 inches accumulates at the bottom of the excavation, it should be pumped out prior to concrete placement. Under no circumstances should water be allowed to adversely affect the quality of the bearing surface. If the spread footing is buried, backfill above the foundation may be the excavated on-site soils or select fill soils. Backfill soils should be compacted to at least 95 percent of the maximum dry density as determined by the standard moisture/density relationship test (ASTM D 698). Moisture contents for on-site soils and imported select fill soils should be within 2 percentage points of the optimum moisture content. The backfill should be placed in thin, loose lifts of about 8 inches, with compacted thickness not to exceed 6 inches.

If unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. This is illustrated on the sketch below.



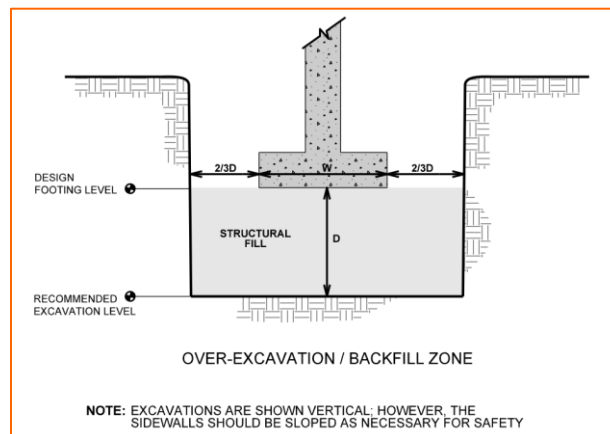
Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026



Over-excavation for structural fill placement below footings should be conducted as shown below. The over-excavation should be backfilled up to the footing base elevation, with select fill placed, as recommended in the **Earthwork** section.



Design Recommendations – Mat Foundation

A mat foundation may be utilized for some of the structures at the site. The Potential Vertical Rise (PVR) of the soils encountered at the site is about 1 to 2 inches in present condition. Based on the stiffness of a mat foundation, we anticipate that a PVR of about 1 inch, the typical design movement for these types of structures, can be tolerated.

The mat can be designed as a uniform thick concrete member extending above final grade or can be designed as a less thick member with the main mat portion buried and skids extending above final grade to support the structure.

The mat should be analyzed using a soil-structure interaction program to identify areas of high contact stresses, excessive movements and large moments. The subgrade and select fill soils should be prepared as outlined in the **Earthwork** section of this report, which contains material and placement requirements for select fill, as well as other subgrade preparation recommendations.

Item	Description
Select Fill Pad	As needed (Min. 2 feet)
Minimum Mat Embedment Depth ¹	8 inches below final grade
Maximum Contact Pressures	2,500 psf
Modulus of Subgrade Reaction	75 pounds per cubic inch (pci)
Soil Unit Weight ²	100 pounds per cubic foot (pcf)
Estimated PVR ³	About 1 inch

Item	Description
Approximate total settlement ⁴	About 1 inch
Estimated differential settlement ⁴	Approximately ½ of total settlement

1. To bear within the select fill.
2. A buried mat would provide more resistance to uplift than the uniform thick mat since the weight of the soil overlying the mat would also be included in the uplift resistance computations. In addition to the weight of foundation and structure, any soil directly overlying the foundation may also be considered. The soil unit weight provided above may be assumed for the on-site soils placed above the footing, provided the fill is properly compacted.
3. The buried mat foundation system should be designed to tolerate the anticipated soil movement and provide satisfactory support to the proposed structures.
4. This estimated post-construction settlement is assuming proper construction practices are followed.

Construction Considerations for Mat Foundations

Excavations for a mat foundation should be performed with equipment capable of providing a relatively clean bearing area. The bottom 6 inches of the excavations should be completed with a smooth-mouthed bucket or by hand labor.

The excavations should be neatly excavated and properly formed. If neat excavation is not possible then the foundation should be over-excavated and formed. All loose materials should be removed from the over-excavated areas and filled with lean concrete, compacted cement stabilized sand (two sacks cement to one cubic yard of sand) or flowable fill (ACI-229R).

Steel should be placed and the foundation poured the same day of excavation. If not, a seal slab consisting of lean concrete should be poured on the same day the contractor achieves the final bearing level in order to protect the exposed foundation soils. The bearing surface should be excavated with a slight slope to create an internal sump for runoff water collection and removal. If surface runoff water in excess of 2 inches accumulates at the bottom of the excavation, it should be pumped out prior to concrete placement. Under no circumstances should water be allowed to adversely affect the quality of the bearing surface.

The bearing surface of the foundation should be evaluated after excavation is completed and immediately prior to placing concrete.

Design Parameters - Drilled Pier Foundation

Axial compressive loads for the structures may be supported on straight-sided (non-under-reamed) piers. Due to the presence of subsurface water at relatively shallow depth, under-reamed drilled piers should not be considered for this site.

For the purposes of evaluating the subsoils for use in foundation analyses, we have developed soil parameters for axial capacity analysis for foundation design which are provided in **Exploration Results**.

Straight-sided drilled pier foundations may be designed using the following equations to evaluate the pier foundation sizes for both compressive and tensile (uplift) axial loading:

Ultimate skin friction capacity ^{1,5}	$Q_s = \pi d (f_s)(h)$
Ultimate end bearing capacity ^{1,5}	$Q_b = 0.25\pi d^2(q_{eb})$
Ultimate pier capacity in compression ⁵	$Q_c = Q_s + Q_b$
Ultimate pier capacity in tension (uplift) ^{1,5}	$Q_t = \pi d (f_s)(h)(R)+W$
Ultimate skin friction ^{2,4}	$f_s = \alpha C_u$
Ultimate skin friction ^{3,4}	$f_s = \sigma' K \tan \delta$
Ultimate end bearing pressure ^{2,4}	$q_{eb} = c_u N_c$
Ultimate end bearing pressure ^{3,4}	$q_{eb} = \sigma' N_q$
Estimated uplift pressure (kips) ¹⁰	$U_p = 5 \bullet d$
Ultimate uplift resistance (kips) ^{1,6}	$Q_r = 2.0 \bullet d(\text{ft.}) \bullet h(\text{ft.}) + W(\text{kips}) + P_{DL}(\text{kips})$
Minimum percentage of steel ⁷	As required by structural engineer
Maximum embedment depth	45 feet below existing grade
Approximate total settlement ⁸	About 1 inch
Estimated differential settlement ⁹	Approximately ½ of total settlement

1. Definitions: d = pier diameter; h = pier segment length; R = uplift reduction factor (equal to 0.7 for sands, 0.9 for clays); W = effective weight of the pier foundation; P_{DL} = dead load acting on the drilled pier
2. Ultimate value for cohesive soils only.
3. Ultimate value for cohesionless soils only.
4. Soil parameters provided in **Exploration Results**: α = skin friction adhesion factor (strength reduction factor). (equal to zero with the top 5 feet and one shaft diameter of the base of the pier); c_u = undrained shear strength of the soil; N_c = end bearing capacity factor for clay soil; σ' = effective overburden pressure; K = horizontal stress coefficient; δ = soil to pier friction angle (equal to soil angle of internal friction (φ) for concrete piers); N_q = end bearing capacity factor for granular soils
5. A factor of safety of 3 should be applied to ultimate end bearing, 2 to side shear (skin friction), and 2 to uplift (tension).
6. A factor of safety of at least 2 should be applied to the computed ultimate uplift force.
7. The piers should contain sufficient vertical reinforcing steel throughout the entire shaft length to resist uplift (tensile) forces due to post-construction heave of the clay soils. The amount of reinforcing steel required can be computed by assuming that the dead load of the structure surcharges the pier and that the above estimated tensile force acts vertically on the shaft.
8. Provided proper construction practices are followed. A clear distance between the piers of three times the pier diameter should be provided to develop the recommended bearing pressures and to control settlements. If this clearance cannot be maintained in every case, Terracon should be contacted so that we may determine the reduced capacities. Settlements provided for single, isolated piers/piles only.
9. Will result from variances in subsurface conditions, loading conditions and construction procedures, such a

cleanliness of the bearing area or flowing water in the shaft. Settlements provided for for single, isolated piers only.

10. U_p = uplift load, kips; d = shaft diameter, feet.

Drilled Pier Lateral Loading

Lateral Loading: The proposed structure(s) supported on drilled piers may be subject to lateral loading, the criteria for lateral load analysis is presented in **Exploration Results** are for use with the computer programs LPILE and FAD Tools. Several methods, including hand solutions and computer programs, are available for calculating the lateral behavior of piles and drilled piers. Most of these methods rely on “key” soil parameters such as soil elastic properties (E and k_s), strain at 50 percent of the principal stress difference (ϵ_{50}), undrained shear strength (c), and load-deflection (p - y) criteria. The p - y criteria, which are commonly used to model soil reaction, were developed from instrumented load tests and are generally considered to provide the best model of soil behavior under short-term lateral loading.

The foundations will need to be designed to resist high loads due to the structure height and the imposed forces from wind loading. Generally, four (4) load cases are applied to this type of structures; axial compressive loading, axial uplift (tensile) loading, lateral loading, and rotational. The foundations experience high lateral and rotational loading, which nearly always controls the foundation design. Axial loading of the foundation is relatively low and seldom controls the foundation design. However, the foundation should always be analyzed for the four (4) load cases to establish the controlling load case.

Factors of safety are not generally applied to the lateral load analysis. A performance criterion, or “limit state”, are usually considered. For most foundations subjected to lateral loads, the pier foundation is designed with a limit of 1 inch of deflection at the top of the pier and 1 degree of rotation as measured from the vertical axis of the pier. The analysis is generally conducted using the working loads and the limit state values. The applied loads are then doubled to evaluate the deflection and rotation at the top of the pier to determine if the foundation will topple over under extreme overload. This overload condition may indicate that the foundation would deflect or rotate such that the structure(s) will tilt, but the foundation will not experience failure. Structural limits, such as moment capacity and shear, may control the design and should be evaluated by the Structural Engineer.

Construction Considerations for Drilled Pier Foundation

Drilled excavations to a maximum depth of 45 feet below existing grade (grade at the time of our field activities) may be performed for installation of the drilled piers for the proposed structures at this site.

Groundwater was observed in the borings between 7 and 34 feet bgs during drilling operations and after drilling activities. Depending on weather conditions, groundwater levels may vary from the levels observed during our field program. Water must not be allowed to accumulate in the bottom of the pier excavations.

As previously discussed, subsurface water and sand soils were observed within the explored depths in the borings. Sloughing is likely to occur below the subsurface water table during construction. Therefore, the contractor should be prepared to remove water from the drilled piers if necessary. We recommend that slurry or casing drilling techniques be used to control sloughing of the subsurface soils during pier construction. Casing should only be used in drilled piers terminating in the Clay soils. Slurry drilling techniques are appropriate for piers terminating in all soil types encountered in the borings.

Slurry Method- Water or a weighted drilling fluid may be considered to install the pier foundations. Slurry displacement drilling can only prevent sloughing and water influx but cannot control sloughing once it has occurred. Therefore, slurry displacement drilling techniques must begin at the ground surface, not after sloughing materials are encountered.

Typical drilling fluids include those which contain polymers or bentonite. If a polymer is used with “hard” mixing water, a water softening agent may be required to achieve intimate mixing and the appropriate viscosity. The polymer manufacturer should be consulted concerning proper use of the polymer. If bentonite slurry is used, the bentonite should be mixed with water several hours before placing in the pier excavation. Prior mixing gives the bentonite sufficient time to hydrate properly. The drilling fluid should only be of sufficient viscosity to control sloughing of the excavation walls and subsurface water flow into the excavation.

Care should be exercised while extracting the auger so that suction does not develop and cause disturbance or create “necking” in the excavation walls as described above. Casing should not be employed in conjunction with the slurry drilling technique due to possible trapping of loose soils and slurry between the concrete and natural soil.

The use of weighted drilling fluid when installing drilled pier foundations requires extra effort to ensure an adequate bearing surface is obtained. A clean-out bucket should be used just prior to pier completion in order to remove any cuttings and loose soils which may have accumulated in the bottom of the excavation. Reinforcing steel and concrete should be placed in the excavation immediately after pier completion. A closed-end tremie should be used to place the concrete completely to the bottom of the excavation in a controlled manner to effectively displace the slurry during concrete placement.

When the pier excavation depth is achieved, and the bearing area has been cleaned, steel and concrete should then be placed immediately in the excavation. The concrete should be placed completely to the bottom of the excavation with a closed-end tremie in the pier excavation if more than 3 inches of water is ponded on the bearing surface or the slurry drilling technique is used. A short tremie may be used if the excavation has less than 3 inches of ponded water or if the water is pumped out prior to concrete placement. The fluid concrete should not be allowed to strike the pier reinforcement, temporary casing (if required) or excavation sidewalls during concrete placement.

Casing Method - Casing will provide stability of the excavation walls and will reduce water influx; however, casing may not completely eliminate subsurface water influx potential. In order for the casing to be effective, a “water tight” seal must be achieved between the casing and surrounding soils. The drilling subcontractor should determine casing depths and casing procedures. Water that accumulates in excess of 3 inches in the bottom of the pier excavation should be pumped out prior to reinforcing steel and concrete placement. If the water is not pumped out, a closed-end tremie should be used to place the concrete completely to the bottom of the pier excavation in a controlled manner to effectively displace the water during concrete placement. If water is not a factor, concrete should be placed with a short tremie so the concrete is directed to the bottom of the pier excavation. The concrete should not be allowed to ricochet off the walls of the pier excavation nor off the reinforcing steel. If this operation is not successful or to the satisfaction of the foundation contractor, the pier excavation should be flooded with fresh water to offset the differential water pressure caused by the unbalanced water levels inside and outside of the casing. The concrete should be tremied completely to the bottom of the excavation with a closed-end tremie.

Removal of casing should be performed with extreme care and under proper supervision to reduce mixing of the surrounding soil and water with the fresh concrete. Rapid withdrawal of casing or the auger may develop suction that could cause the soil to intrude into the excavation. An insufficient head of concrete in the casing during its withdrawal could also allow the soils to intrude into the wet concrete. Both of these conditions may induce “necking”, a section of reduced diameter, in the pier.

All aspects of concrete design and placement should comply with the American Concrete Institute (ACI) 318-08 Code Building Code Requirements for Structural Concrete; ACI 336.1-01 entitled Reference Specification for the Construction of Drilled Piers, and ACI 336.3R-93 (Reapproved 2006) entitled Design and Construction of Drilled Piers. Concrete should be designed to achieve the specified 28-day strength when placed at a 7-inch slump with a ± 1 inch tolerance. Adding

water to a mix that has been designed for a lower slump does not meet the intent of this recommendation. If a high range water reducer is used to achieve this slump, the span of slump retention for the specific admixture under consideration should be thoroughly investigated. Compatibility with other concrete admixtures should also be considered. A technical representative of the admixture supplier should be consulted on these matters.

Concrete aggregates in the area could have a history of problems associated with Alkali Silica Reactivity (ASR). If aggregates are known to have a history of ASR, then one of the following should be incorporated in the concrete used for the foundations:

- Option 1: Replace 20 to 35% of the cement with Class C or Class F fly ash. However, if sulfate resistant concrete is required, do not use a Class C fly ash and do not use Type I Portland cement.
- Option 2: Use a lithium nitrate admixture at a minimum dosage of 0.55 gallons of 30% lithium nitrate solution per pound of alkalis present in the portland cement. Coordinate with admixture supplier.
- Option 3: When using portland cement only, ensure that the total alkali contribution from the cement in the concrete does not exceed 4.00 lb. per cubic yard of concrete when calculated as follows:

$$\text{Pounds of alkali per cu yd.} = (\text{pounds of cement per cu yd}) \times (\% \text{Na}_2\text{O equivalent in cement}) / 100.$$

In the above calculation, use the maximum cement alkali content reported on the cement mill certificate.
- Option 4: Test both coarse and fine aggregate separately, in accordance with ASTM C 1260, using 440g of the proposed cementitious material in the same proportions of portland cement to supplementary cementing material to be used in the mix. Before use of the mix, provide the certified test report, signed and sealed by a licensed professional engineer, demonstrating that the ASTM C 1260 test result for each aggregate does not exceed 0.10% expansion.

Successful installation of drilled piers is a coordinated effort involving the general contractor, design consultants, subcontractors and suppliers. Each must be properly equipped and prepared to provide their services in a timely fashion. Several key items of major concern are:

- Proper drilling rig with proper equipment (including casing and augers);
- Reinforcing steel cages tied to meet project specifications;
- Proper scheduling and ordering of concrete for the piers; and

- Monitoring of installation by design professionals.

Pier construction should be carefully monitored to assure compliance of construction activities with the appropriate specifications. Particular attention to the referenced publication is warranted for pier installation. A number of items of concern for pier installation include those listed below.

- Pier locations
- Vertical alignment
- Competent bearing
- Reinforcement steel placement
- Concrete properties and placement
- Proper casing seal for groundwater control
- Slurry viscosity
- Casing removal

If the contractor has to deviate from the recommended foundations, Terracon should be notified immediately so additional engineering recommendations can be provided for an appropriate foundation type.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification is D**. Subsurface explorations at this site were extended to a maximum depth of 50 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

FLOOR SLABS

Floor Slab Design Parameters

The subsurface soils at this site generally exhibit moderate to high expansion potential. Based on the information developed from our field and laboratory programs and on method TEX-124-E in the Texas Department of Transportation (TxDOT) Manual of Testing Procedures, we estimate

that the subgrade soils at this site exhibit a Potential Vertical Rise (PVR) of about 1 to 2 inches in present condition.

The actual movements could be greater if poor drainage, ponded water, and/or other sources of moisture are allowed to infiltrate beneath the structure after construction. We have provided recommendations to reduce the site PVR to about 1 inch. In addition, positive structure perimeter drainage should be carefully observed.

After site stripping and over-excavation activities as recommended, re-used on-site soil (that meet select fill criteria) or select fill over 8 inches of moisture conditioned and compacted subgrade soils should be constructed directly below the floor slab and should also extend a minimum of 3 feet beyond the edge of the proposed building area, including any movement sensitive flatwork that abuts the structure such as sidewalks. The final exterior grade adjacent to the building should be sloped to promote positive drainage away from the structure.

The subgrade and select fill soils should be prepared as outlined in the **Earthwork** section of this report, which contains material and placement requirements for select fill, as well as other subgrade preparation recommendations. The floor slab should be designed using the following recommendations.

Item	Description
Excavation	Minimum 6 inches.
Floor Slab Support ¹	Min. 8 inches of moisture conditioned and compacted native soils plus 2 feet of select fill (plus additional if needed to achieve Finished Pad Elevation).
Estimated Modulus of Subgrade Reaction ²	100 pounds per square inch per inch (psi/in) for point loads.
Estimated Potential Vertical Rise (PVR)	About 1 inch

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation. This recommendation applies to building area and movement-sensitive flatwork that abuts the structure.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.

Floor Slab Construction Considerations

Finished subgrade within and for at least 10 feet beyond the floor slab should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed and structural fill should be added to replace the

resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location

Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026



of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet) ¹	Location
3	50	Proposed Structures

1. Below ground surface

Boring Layout and Elevations: Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ± 10 feet).

Subsurface Exploration Procedures: We advanced the soil borings with a truck-mounted drill rig using continuous flight augers (solid stem and/or hollow stem as necessary depending on soil conditions). Five samples were obtained in the upper 10 feet of the borings and at intervals of 5 feet thereafter. Soil sampling was performed using thin-wall tube and/or split-barrel sampling procedures. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, the borings were backfilled with cement-bentonite grout after their completion.

The sampling depths, penetration distances, and other sampling information were recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a geotechnical engineer. Our exploration team prepared field boring logs as part of the drilling operations. The field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field log. The final boring logs represent the geotechnical engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned various laboratory tests to better understand the engineering properties of the various soil strata as necessary for this project.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
- ASTM D2166/D2166M Standard Test Method for Unconfined Compressive Strength of Cohesive Soil

Geotechnical Engineering Report

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026



- ASTM D4546 Standard Test Methods for One-Dimensional Swell or Collapse of Soils
- ASTM D512 Standard Test Methods for Chloride Ion in Water
- ASTM C1580 Standard Test Method for Water-Soluble Sulfate in Soil
- ASTM G 51 Standard Test Method for pH of Soils

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System (USCS).

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan

Exploration Plan

SITE LOCATION

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026

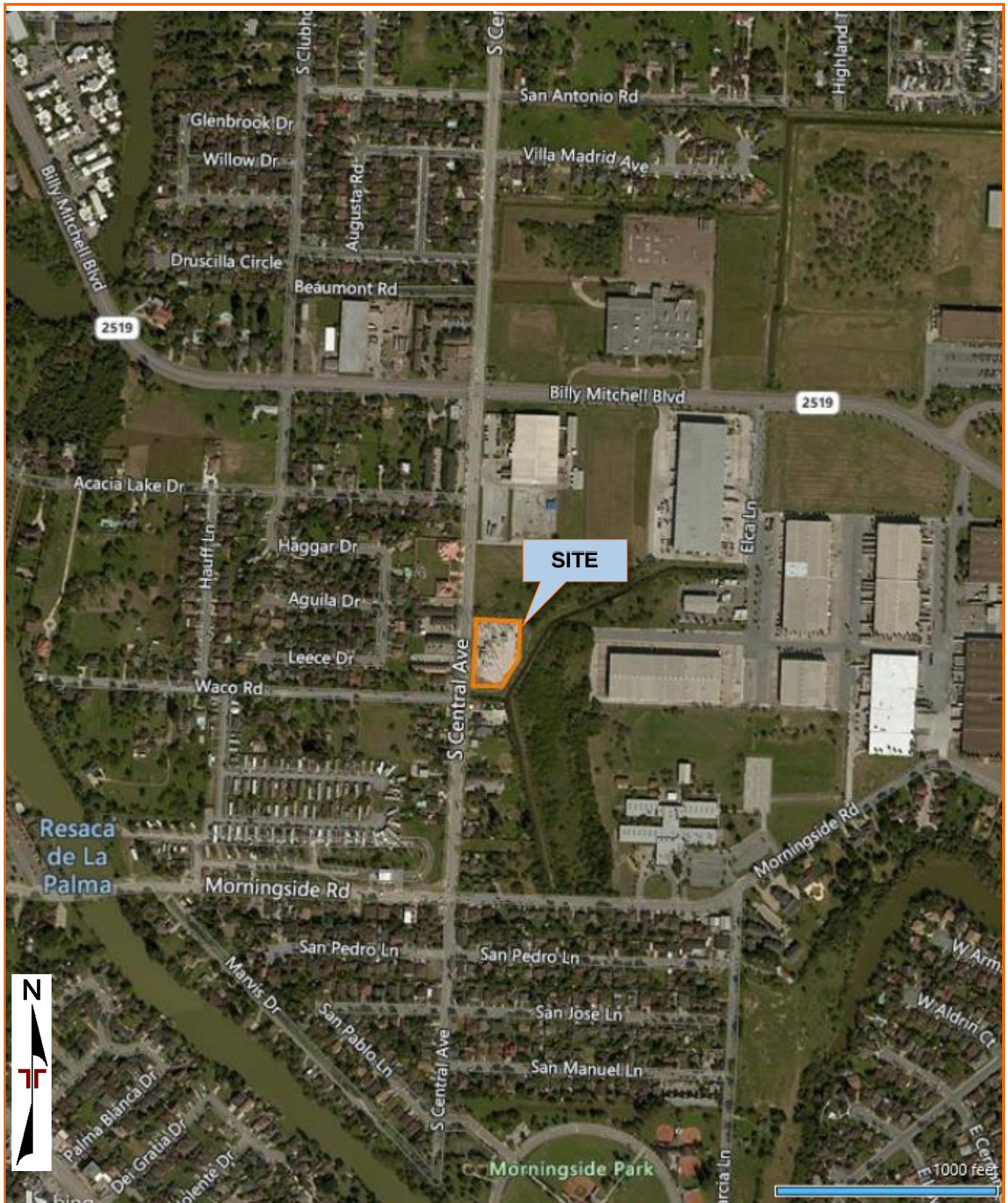


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Airport Distribution Substation ■ Brownsville, Texas

May 18, 2020 ■ Terracon Project No. 88205026

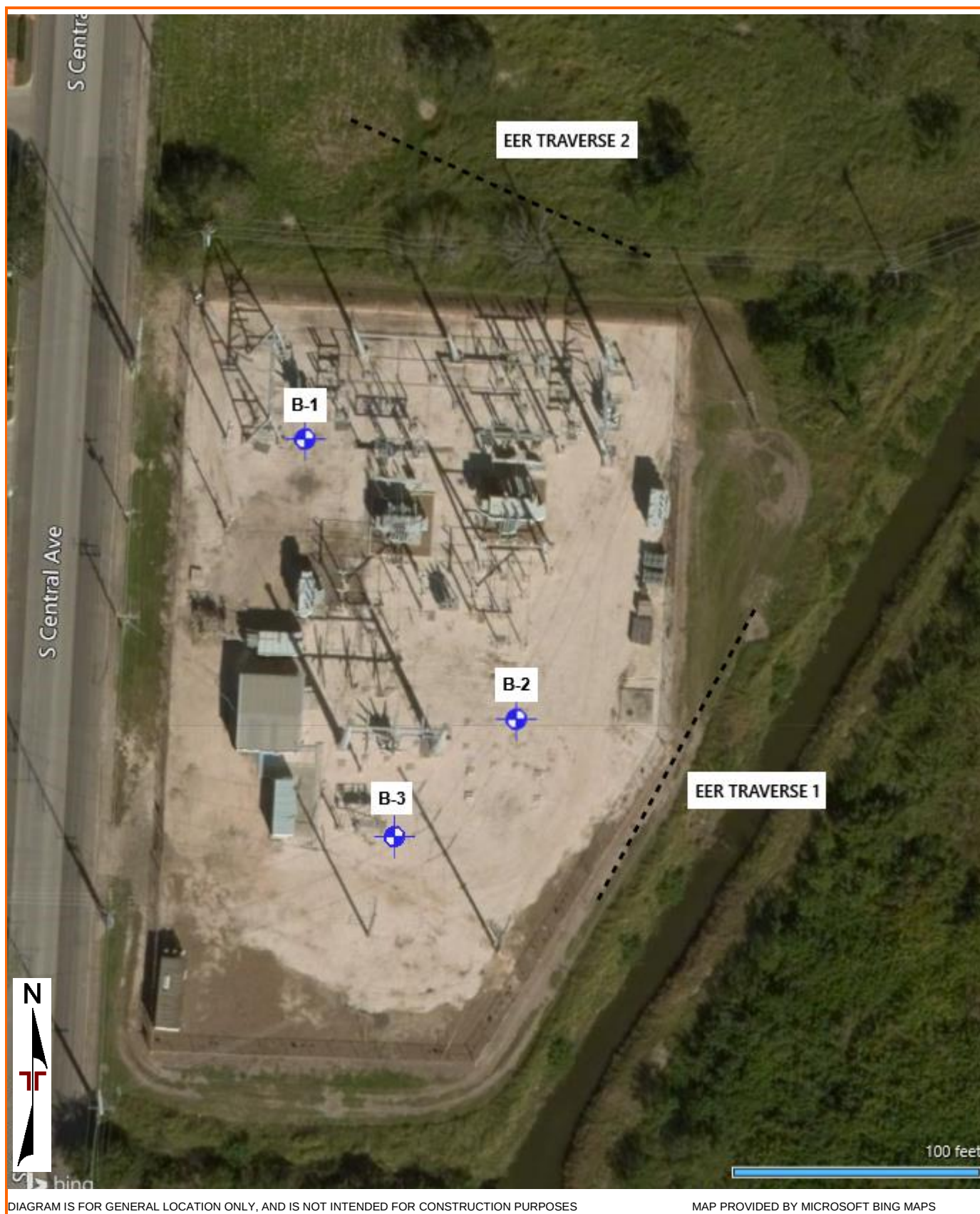


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Boring Logs

GeoModel

Thermal Resistivity Test Results

Electrical Earth Resistivity Test Results

Lateral and Axial Design Parameters for Undrained Condition

BORING LOG NO. B-1

Page 1 of 1

PROJECT: Airport Distribution Substation

CLIENT: Brownsville Public Utilities Board
Brownsville, TX

SITE: Billy Mitchel Blvd and S. Central Avenue
Brownsville, TX

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 25.9065° Longitude: -97.4476°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
1		FAT CLAY (CH) , dark grayish brown to light brown, stiff to hard - with non-plastic Sandy Silt (ML) seams at 8 feet - sandy at 13½ feet - with Silty Sand (SM) seams at 48 feet				3-5-6 N=11				21			
						4-5-6 N=11				27		58-20-38	
			5			1.5 (HP)				23			87
				▼		1.5 (HP)		0.81	10	22	105		
			10			SAMPLE DISTURBED				23		NP	
			15			2-4-6 N=10				18			67
			20			1.5 (HP)		1.90	10	20	110		
			25			4.5 (HP)				24		77-25-52	99
			30			3.5 (HP)		2.58	8	30	95		
			35			4.5+ (HP)				32			
				▽									
			40			3.75 (HP)				27		72-27-45	
			45			4.5 (HP)		2.59	4.2	28	95		
			50			SAMPLE DISTURBED				24			
		Boring Terminated at 50 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-stem augered to termination depth.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- ▽ While drilling
- ▽ After 15 minutes
- ▼ At completion of drilling

Terracon
1506 Mid Cities Dr
Pharr, TX

Boring Started: 04-16-2020

Boring Completed: 04-16-2020

Drill Rig: CME-75

Driller: EnviroCore

Project No.: 88205026

BORING LOG NO. B-2

Page 1 of 1

PROJECT: Airport Distribution Substation

CLIENT: Brownsville Public Utilities Board
Brownsville, TX

SITE: Billy Mitchel Blvd and S. Central Avenue
Brownsville, TX

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 25.9062° Longitude: -97.4473°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)				
1		FAT CLAY (CH) , dark gray, medium stiff to stiff, with Lean Clay (CL) seams to 2 feet	5			3-5-6 N=11				27		48-19-29	
						1.5 (HP)				19			90
						0.5 (HP)				34		50-22-28	
						0.5 (HP)		0.48	10	48	73		
						1.25 (HP)				40		98-33-65	99
						2.0 (HP)		1.53	9	30	92		
2		SILTY SAND (SM) , brown, medium dense to dense	20			3-5-6 N=11				33			
			25			5-7-12 N=19				28			37
			30			6-12-18 N=30				26			
			35			7-18-19 N=37				25			7
			40			7-8-11 N=19				29		66-21-45	
1		FAT CLAY (CH) , reddish brown, very stiff to hard	45			4.5+ (HP)		2.96	6.3	26	95		
			50			4.25 (HP)				23			
		Boring Terminated at 50 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-stem augered to termination depth.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- While drilling
- After 15 minutes
- At completion of drilling

Terracon
1506 Mid Cities Dr
Pharr, TX

Boring Started: 04-16-2020

Boring Completed: 04-16-2020

Drill Rig: CME-75

Driller: EnviroCore

Project No.: 88205026

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 88205026 AIRPORT DISTRIBUT. GPJ TERRACON_DATATEMPLATE.GDT 4/27/20

BORING LOG NO. B-3

Page 1 of 1

PROJECT: Airport Distribution Substation

CLIENT: Brownsville Public Utilities Board
Brownsville, TX

SITE: Billy Mitchel Blvd and S. Central Avenue
Brownsville, TX

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 25.9061° Longitude: -97.4475° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES				
							TEST TYPE	COMPRESSIVE STRENGTH (tsf)	STRAIN (%)								
1		FAT CLAY (CH) , dark gray to brown and gray, soft - with very stiff to stiff Lean Clay (CL) seams to 4 feet	5			9-9-11 N=20				22		35-16-19	89				
						4-3-5 N=8				20							
						1-1-2 N=3				40							
						0-2-1 N=3				25							
						1-1-1 N=2				38							
						10								0-0-2 N=2	25		
														15		9-16-20 N=36	28
																2-3-6 N=9	27
																8-12-38 N=50	23
						2								SILTY SAND (SM) , brown, loose to very dense	20		4-5-6 N=11
35		4-3-5 N=8	29														
		3-4-5 N=9	29														
		5-6-8 N=14	23														
		1		FAT CLAY (CH) , reddish brown, stiff	40			57-24-33	98								
45																	
										50							
with Lean Clay (CL) seams at 48½ feet																	
Boring Terminated at 50 Feet																	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-stem augered to termination depth.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

Notes:

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

WATER LEVEL OBSERVATIONS

- While drilling
- After 15 minutes
- At completion of drilling

Terracon
1506 Mid Cities Dr
Pharr, TX

Boring Started: 04-16-2020

Boring Completed: 04-16-2020

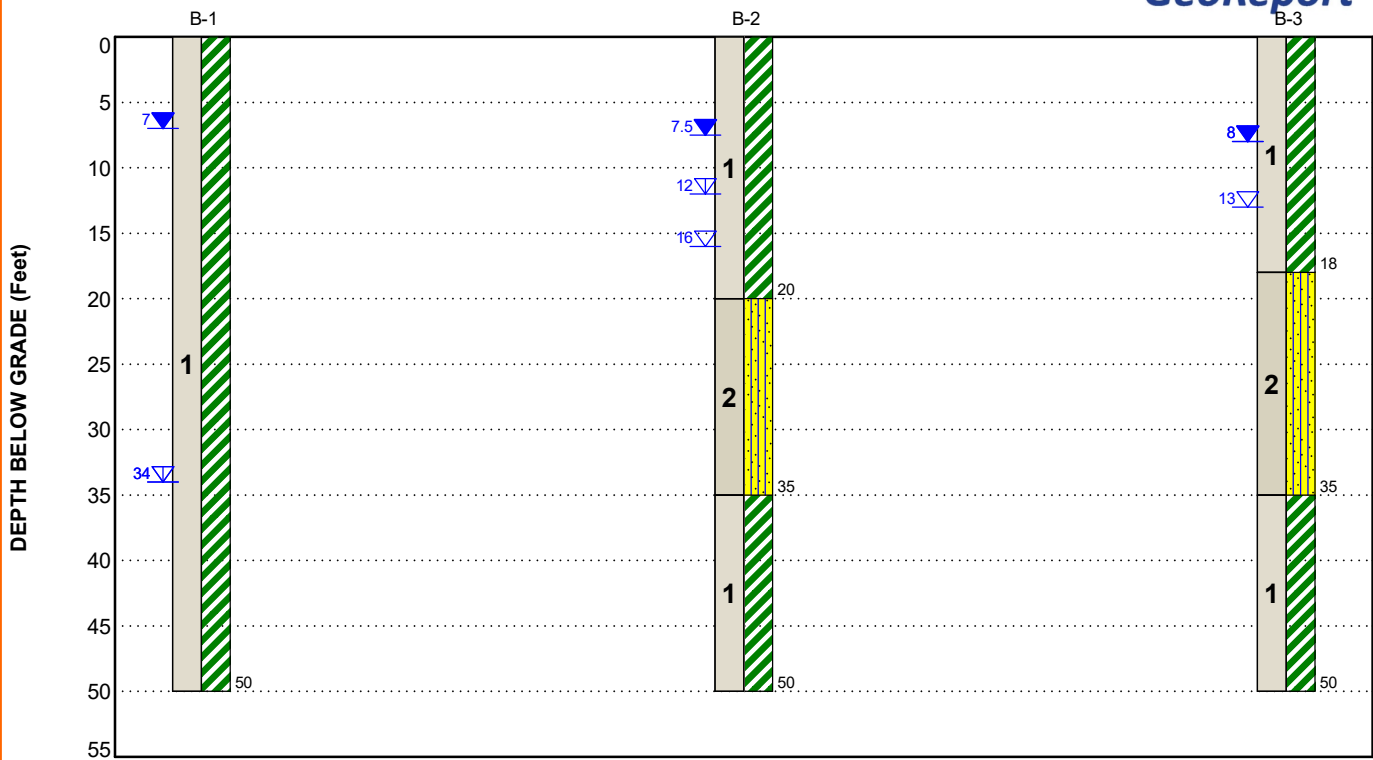
Drill Rig: CME-75

Driller: EnviroCore

Project No.: 88205026

GEOMODEL

Airport Distribution Substation ■ Brownsville, TX
Terracon Project No. 88205026



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	CLAY	Fat Clay (CH) Soft to hard
2	SAND	Silty Sand (SM) Loose to very dense

LEGEND

 Fat Clay

 Silty Sand

-  First Water Observation
-  Second Water Observation
-  Third Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.



21239 FM529 Rd., Bldg. F
Cypress, TX 77433
Tel: 281-985-9344
Fax: 832-427-1752
info@geothermusa.com
<http://www.geothermusa.com>

May 5, 2020

Terracon Consultants
1506 Mid Cities Drive
Pharr, Texas 78577
Attn: Stephany Chacon, E.I.T.

Re: Thermal Analysis of Native Soil Sample
Airport Distribution Substation – Brownsville, TX (Project No. 88205026)

The following is the report of thermal dryout characterization tests conducted on one (1) sample of native soil from the referenced project sent to our laboratory.

Thermal Resistivity Tests: The sample was compacted at its 'optimum' moisture content and at 95% of the maximum dry density ***provided by Terracon***. The tests were conducted in accordance with the IEEE standard 442-2017. The results are tabulated below and the thermal dry out curve is presented in **Figure 1**.

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID @ 0' – 5'	Description (Terracon)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft ³)
		Wet	Dry		
B-2	Lean Clay (CL) w/ Sand	106	202	17	97

Comments: The thermal characteristic depicted in the dry out curve applies for the soil at its respective test dry density.

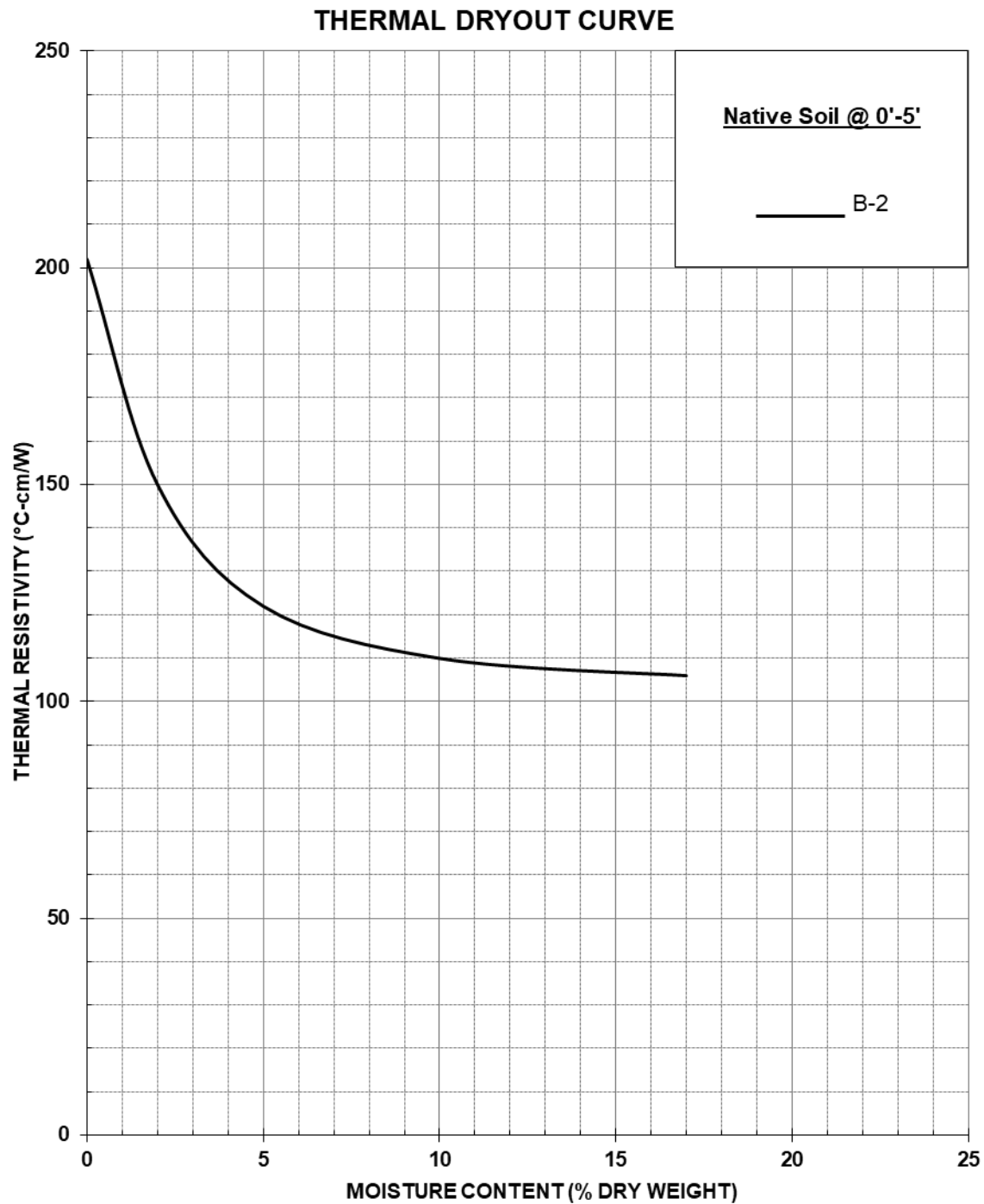
Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA

Nimesh Patel

COOL SOLUTIONS FOR UNDERGROUND POWER CABLES
THERMAL SURVEYS, CORRECTIVE BACKFILLS & INSTRUMENTATION

Serving the electric power industry since 1978



Terracon Consultants (Project No. 88205026)

Thermal Analysis of Native Soil Sample

Airport Distribution Substation – Brownsville, TX

May 2020

Figure 1

ELECTRICAL EARTH RESISTIVITY TESTING						
Project Name: Airport Distribution Substation				Manufacturer: AEMC		
Project No.: 88205026				Model No.: 4620		
Date: 4/16/2020				Calibration Date: 3/9/2020 - 3/9/2021		
Personnel: David Portillo						
TRAVERSE 1 (NORTHEAST-SOUTHWEST) Location: 25.906148, -97.477100						
Test No.	A Spacing (feet)	Meter Reading	Scale	Resistance Apparent	Multiplier	Earth Resistivity OHM-CM
1	2.5	1.28	1	1.28	479	613
2	5	0.22	1	0.22	958	211
3	10	0.08	1	0.08	1,915	153
4	20	0.03	1	0.03	3,830	115
5	40	0.01	1	0.01	7,660	77
* Significant readings beyond "a" spacing of 40 feet were not obtained.						
TRAVERSE 2 (NORTHWEST-SOUTHEAST) Location: 25.906756, -97.447289						
Test No.	A Spacing (feet)	Meter Reading	Scale Ω	Resistance Apparent	Multiplier	Earth Resistivity OHM-CM
1	2.5	4.47	1	4.47	479	2,140
2	5	0.73	1	0.73	958	699
3	10	0.12	1	0.12	1,915	230
4	20	0.04	1	0.04	3,830	153
5	40	0.01	1	0.01	7,660	77
* Significant readings beyond "a" spacing of 40 feet were not obtained.						

B-1
AXIAL CAPACITY ANALYSES
DESIGN SOIL PARAMETERS FOR
UNDRAINED CONDITIONS
Airport Distribution Substation
Brownsville, Texas

Soil Layer	Depth to Bottom of Soil Layer (feet)	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor (-)	Friction Angle (degrees)	Horizontal Stress Coefficient (-)	Bearing Capacity Factors		
							N_c^4 (-)	N_q (-)	N_g (-)
1	10	115	1,000	0.72	0	----	6	1	0
2	20	56	1,500	0.58	0	----	6	1	0
3	50	60	2,500	0.44	0	----	9	1	0

NOTES:

1. Design depth to subsurface water is about 10 feet.
2. For uplift conditions, the computed skin friction should be multiplied by 0.7 for sands and 0.9 for clay.
3. The unit allowable end bearing should not exceed 100 kips per square foot.
4. The N_c value of 9 for non-granular soils is for D/B ratios greater than 4. Otherwise, use $N_c = 6$.

B-2
AXIAL CAPACITY ANALYSES
DESIGN SOIL PARAMETERS FOR
UNDRAINED CONDITIONS
Airport Distribution Substation
Brownsville, Texas

Soil Layer	Depth to Bottom of Soil Layer (feet)	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor (-)	Friction Angle (degrees)	Horizontal Stress Coefficient (-)	Bearing Capacity Factors		
							N_c^4 (-)	N_q (-)	N_g (-)
1	4	115	1,000	----	0	----	6	1	0
2	10	107	500	1.00	0	----	6	1	0
3	20	56	1,500	0.58	0	----	6	1	0
4	28	60	0	----	33	0.75	39	26	35
5	35	66	0	----	35	0.75	46	33	48
6	50	63	3,000	0.40	0	----	9	1	0

NOTES:

1. Design depth to subsurface water is about 10 feet.
2. For uplift conditions, the computed skin friction should be multiplied by 0.7 for sands and 0.9 for clay.
3. The unit allowable end bearing should not exceed 100 kips per square foot.
4. The N_c value of 9 for non-granular soils is for D/B ratios greater than 4. Otherwise, use $N_c = 6$.

B-3
AXIAL CAPACITY ANALYSES
DESIGN SOIL PARAMETERS FOR
UNDRAINED CONDITIONS
Airport Distribution Substation
Brownsville, Texas

Soil Layer	Depth to Bottom of Soil Layer (feet)	Effective Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor (-)	Friction Angle (degrees)	Horizontal Stress Coefficient (-)	Bearing Capacity Factors		
							N_c^4 (-)	N_q (-)	N_g (-)
1	4	115	1,000	----	0	----	6	1	0
2	8	107	400	1.00	0	----	6	1	0
3	18	43	250	1.00	0	----	6	1	0
4	25	56	0	----	31	0.75	33	21	26
5	35	60	0	----	33	0.75	39	26	35
6	50	56	1,500	0.58	0	----	9	1	0

NOTES:

1. Design depth to subsurface water is about 8 feet.
2. For uplift conditions, the computed skin friction should be multiplied by 0.7 for sands and 0.9 for clay.
3. The unit allowable end bearing should not exceed 100 kips per square foot.
4. The N_c value of 9 for non-granular soils is for D/B ratios greater than 4. Otherwise, use $N_c = 6$.

B-1
LATERAL CAPACITY ANALYSES
DESIGN SOIL PARAMETERS FOR
UNDRAINED CONDITIONS
Airport Distribution Substation
Brownsville, Texas

Soil Layer	LPILE Soil Type	Depth to Soil Layer		LPILE	Effective	Undrained	Internal	LPILE	MFAD	
		Top	Bottom	Soil Modulus k (pci)	Unit Weight (pcf)	Shear Strength (psf)	Friction Angle (degrees)	Soil Strain Factor e_{50}	Strength Reduction Factor (--)	Deformation Modulus (ksi)
1	Stiff Clay without Free Water	0	10	428	115	1,000	0	0.010	0.72	0.60
2	Stiff Clay without Free Water	10	20	525	56	1,500	0	0.008	0.58	0.90
3	Stiff Clay without Free Water	20	50	718	60	2,500	0	0.006	0.44	1.50

NOTES:

1. Design depth to subsurface water is about 10 feet.
2. MFAD deformation moduli values based on *MFAD 5.1 User Guide, October 2010*

B-2
LATERAL CAPACITY ANALYSES
DESIGN SOIL PARAMETERS FOR
UNDRAINED CONDITIONS
Airport Distribution Substation
Brownsville, Texas

Soil Layer	LPILE Soil Type	Depth to Soil Layer		LPILE				LPILE		MFAD	
		Top (feet)	Bottom (feet)	Soil Modulus	Effective Unit	Undrained Shear	Internal Friction	Soil Strain	Strength Reduction	Deformation	
				k (pci)	Weight (pcf)	Strength (psf)	Angle (degrees)	Factor e ₅₀	Factor (--)	Modulus (ksi)	
1	Stiff Clay without Free Water	0	4	428	115	1,000	0	0.010	----	0.60	
2	Stiff Clay without Free Water	4	10	332	107	500	0	0.015	1.00	0.30	
3	Stiff Clay without Free Water	10	20	525	56	1,500	0	0.008	0.58	0.90	
4	Sand	20	28	91	60	0	33	----	----	1.80	
5	Sand	28	35	111	66	0	35	----	----	4.90	
6	Stiff Clay without Free Water	35	50	815	63	3,000	0	0.006	0.40	1.80	

NOTES:

1. Design depth to subsurface water is about 10 feet.
2. MFAD deformation moduli values based on *MFAD 5.1 User Guide, October 2010*

B-3
LATERAL CAPACITY ANALYSES
DESIGN SOIL PARAMETERS FOR
UNDRAINED CONDITIONS
Airport Distribution Substation
Brownsville, Texas

Soil Layer	LPILE Soil Type	Depth to Soil Layer		LPILE				LPILE		MFAD	
		Top (feet)	Bottom (feet)	Soil Modulus	Effective Unit	Undrained Shear	Internal Friction	Soil Strain	Strength Reduction	Deformation	
				k (pci)	Weight (pcf)	Strength (psf)	Angle (degrees)	Factor e ₅₀	Factor (--)	Modulus (ksi)	
1	Stiff Clay without Free Water	0	4	428	115	1,000	0	0.010	----	0.60	
2	Stiff Clay without Free Water	4	8	312	107	400	0	0.017	1.00	0.25	
3	Stiff Clay without Free Water	8	18	283	43	250	0	0.023	1.00	0.15	
4	Sand	18	25	71	56	0	31	----	----	0.85	
5	Sand	25	35	91	60	0	33	----	----	1.00	
6	Stiff Clay without Free Water	35	50	525	56	1,500	0	0.008	0.58	0.90	

NOTES:

1. Design depth to subsurface water is about 8 feet.
2. MFAD deformation moduli values based on *MFAD 5.1 User Guide, October 2010*

SUPPORTING INFORMATION

Contents:

General Notes

Unified Soil Classification System

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING	WATER LEVEL	FIELD TESTS
 Shelby Tube  Split Spoon	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION
Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.
LOCATION AND ELEVATION NOTES
Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS				
RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL		RELATIVE PROPORTIONS OF FINES	
Descriptive Term(s) of other constituents	Percent of Dry Weight	Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	<15	Trace	<5
With	15-29	With	5-12
Modifier	>30	Modifier	>12
GRAIN SIZE TERMINOLOGY		PLASTICITY DESCRIPTION	
Major Component of Sample	Particle Size	Term	Plasticity Index
Boulders	Over 12 in. (300 mm)	Non-plastic	0
Cobbles	12 in. to 3 in. (300mm to 75mm)	Low	1 - 10
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)	Medium	11 - 30
Sand	#4 to #200 sieve (4.75mm to 0.075mm)	High	> 30
Silt or Clay	Passing #200 sieve (0.075mm)		

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A					Soil Classification	
					Group Symbol	Group Name ^B
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F	
			$Cu < 4$ and/or $[Cc < 1$ or $Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}	
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I	
			$Cu < 6$ and/or $[Cc < 1$ or $Cc > 3.0]$ ^E	SP	Poorly graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}	
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above “A”	CL	Lean clay ^{K, L, M}	
			$PI < 4$ or plots below “A” line ^J	ML	Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K, L, M, N}
			Liquid limit - not dried			Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above “A” line	CH	Fat clay ^{K, L, M}	
			PI plots below “A” line	MH	Elastic Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K, L, M, P}
			Liquid limit - not dried			Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

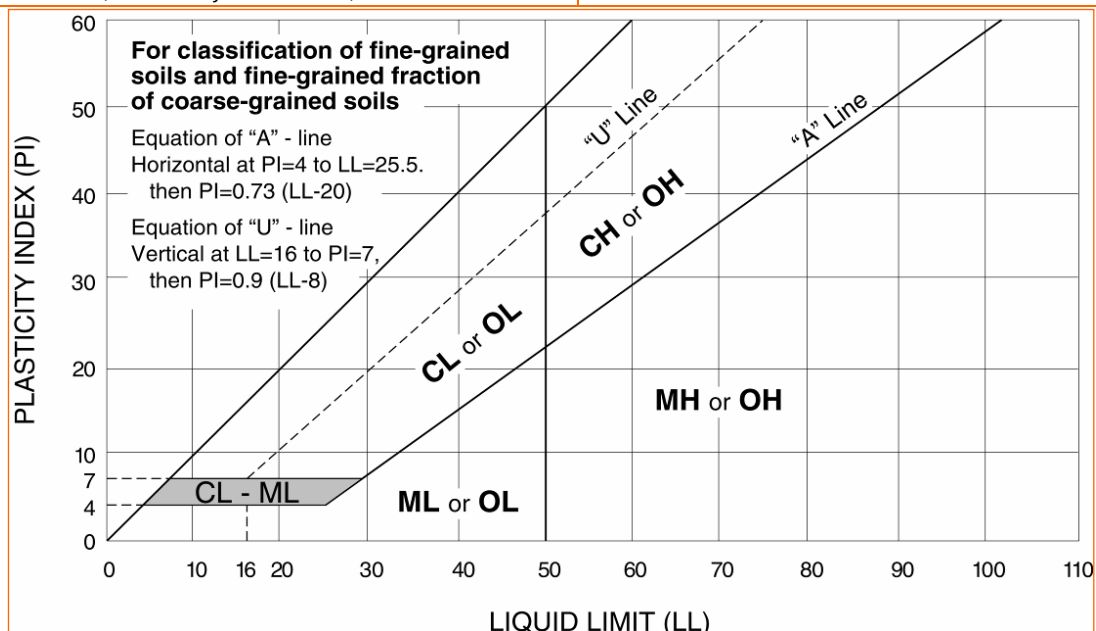
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



AUTOMATIC LOAD-TAP-CHANGING LIQUID FILLED TRANSFORMER

SERIAL NUMBER: 48015MA067--

PHASES: 3

CLASS: ONAN/ONAF/ONAF

FREQUENCY: 60 HZ

kVA: 15000/20000/25000 AT 55°C RISE

IMPEDANCE: AT 15000 KVA

kVA: 16800/22400/28000 AT 65°C RISE

LIQUID: TYPE II MINERAL OIL

HV: 138000

BIL: 550 kV COND. MATERIAL: COPPER

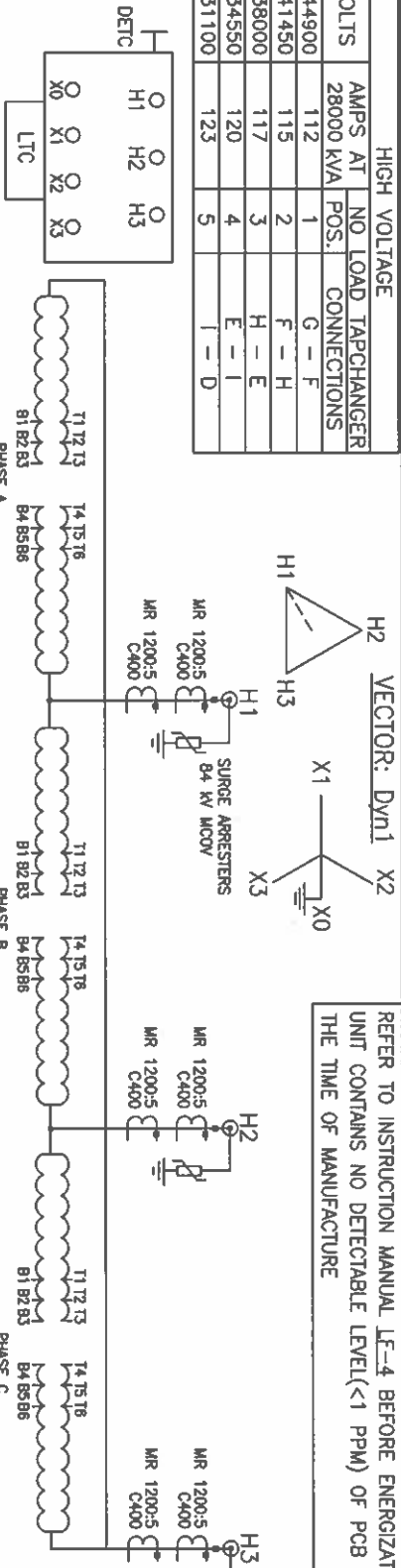
MONTH/YEAR OF MANUFACTURE:

LV: 12470 Grdy/7200

COND. MATERIAL: COPPER

LOW VOLTAGE, LTC: REINHARDSEN, RMV-II					HIGH VOLTAGE				
P4 ON	TAP ON	R ON	POS.	VOLTS	AMPS AT MAX. KVA	VOLTS	AMPS AT 28000 KVA	NO. LOAD TAPCHANGERS	G - F F - H H - E E - I I - D
11	11		16R	13767	1174	144900	112	1	G - F
11	10		15R	13717	1179	141450	115	2	F - H
10	10		14R	13667	1183	138000	117	3	H - E
10	9		13R	13567	1192	134550	120	4	E - I
						131100	123	5	I - D

HIGH VOLTAGE			
VOLTS	AMPS AT 28000 KVA	NO. POS.	LOAD TAP-CHANGERS CONNECTIONS
144900	112	1	G - F
141450	115	2	F - H
138000	117	3	H - E
134550	120	4	E - I
131100	123	5	I - D



APPROXIMATE WEIGHT IN LBS

CORE & COILS	36400
TANK & FITTINGS	33850

LIQUID:

MAIN TANK <u>3858</u> U.S. GALS.	29290
LTC TANK <u>268</u> U.S. GALS.	2040
TOTAL WEIGHT	102000
UNTANKING WEIGHT (HEAVIEST PIECE)	36820

MAX. OPERATING PRESSURES OF LIQUID PRESERVAZION SYSTEM

9 lbf/in² POSITIVE; 7 lbf/in² NEGATIVE.

TANK DESIGNED FOR 15 lbf/in² VACUUM FILLING.

25% OIL LEVEL TO TOP FLANGE OF MANHOLE, 16.38 IN.

LIQUID LEVEL CHG. 0.82 IN. PER 10°C CHG. IN LIQ. TEMP.

REFER TO INSTRUCTION MANUAL LE-4 BEFORE ENERGIZATION.

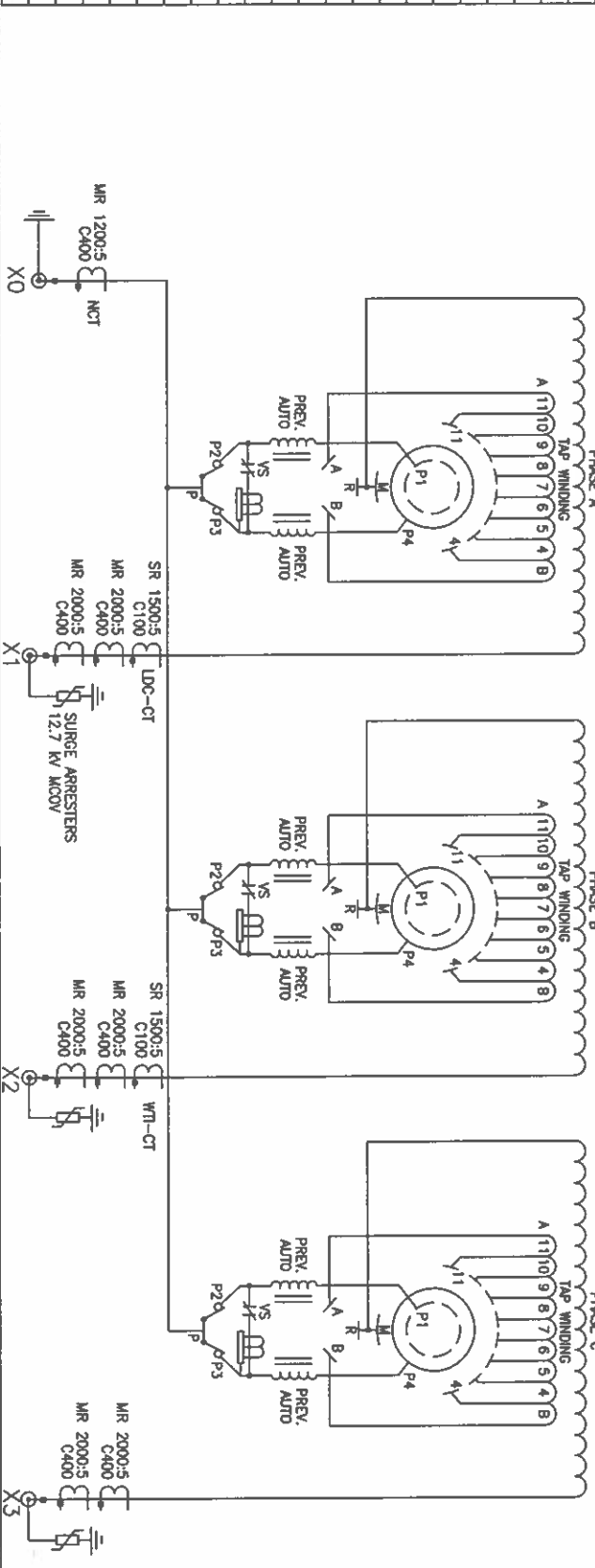
UNIT CONTAINS NO DETECTABLE LEVEL(<1 PPM) OF PCB AT THE TIME OF MANUFACTURE

MATERIAL: 0.048 STAINLESS STEEL
NON-CORROSIVE OUTDOOR BLACK
LETTER ENGRAVED PROTECTIVE
CLEAR PLASTIC FILM
0.1875 DIA. HOLES (4)

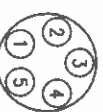
NOTES:

MONTH/YEAR OF MANUFACTURE
FINAL IMPEDANCE, WEIGHTS AND
PRESSURE VALUES WILL BE ENTERED
ON NAMEPLATE AFTER TESTING.
FOR NOMINAL DESIGN IMPEDANCE
SEE OUTLINE DRAWING.

9	8	11R	13368	1209
8	8	10R	13268	1218
8	7	9R	13218	1223
7	7	8R	13168	1228
7	6	7R	13069	1237
6	6	6R	12969	1247
6	5	5R	12869	1256
5	5	4R	12769	1266
5	4	3R	12719	1271
4	4	2R	12670	1276
4	M	1R	12570	1286
M	M	NOM.	12470	1296
M	11	1L	12370	1296
11	11	2L	12270	1296
11	10	3L	12221	1296
10	10	4L	12171	1296
10	9	5L	12071	1296
9	9	6L	11971	1296
9	8	7L	11871	1296
8	8	8L	11772	1296
8	7	9L	11722	1296
7	7	10L	11672	1296
7	6	11L	11572	1296
6	6	12L	11472	1296
6	5	13L	11373	1296
5	5	14L	11273	1296
5	4	15L	11223	1296
4	4	16L	11173	1296



VIRGINIA TRANSFORMER CORP.
ROANOKE, VA, USA



CAUTION
OPERATE MANUAL TAP CHANGER ONLY WHEN
TRANSFORMER IS DE-ENERGIZED

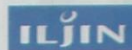
CAUTION

0.19—

$$\begin{array}{r} 1 \\ 0.1 \end{array}$$

 220 GLADE VIEW DR., N.E., ROANOKE, VA 24012 (540) 345-9892	ALL DIMENSIONS IN INCHES & IN mm IF SHOWN IN PARENTHESES	THIS DOCUMENT IS INTENDED FOR COMPANION PURPOSES ONLY OTHER USES ARE PROHIBITED EXCEPT BY WRITTEN PERMISSION OF VTC. 05723-11000	1 CT RATINGS WERE CORRECTED CAM 2/1/18		2 ADDED WEIGHTS, LEVELS AND PRESSURES GGA 03/09/18		JOB# C872AB
			TITLE: NAME PLATE (RMV-II LTC)		DWG: CAM CHK:JMD DATE: 1/2/18 DWG SCALE: 1:1 PLOT SCALE: 1:1		
C	48015MA067				SHEET 13	REV 2	

Airport New TRANS.



TRANSFORMER

PHASE	3
FREQUENCY	60Hz
COOLING METHOD	ONAN/ONAF

RATED CAPACITY (kVA)			
ITEM	ONAN	ONAF	ONAF
55°C RISE	15000	20000	25000
65°C RISE	16800	22400	28000

MATERIAL	
INSULATING OIL	MINERAL OIL
CONDUCTOR	COPPER

RATED VOLTAGE	
PRIMARY	138000 V
SECONDARY	12470 V

SOUND LEVEL	
15 MVA BASE	70.7 dB
20 MVA BASE	70.8 dB
25 MVA BASE	71.8 dB

% IMPEDANCE (at 15MVA)	
± 0.1 % (at 85°C)	
± 0.1 % (Zero-Phase-Sequence)	

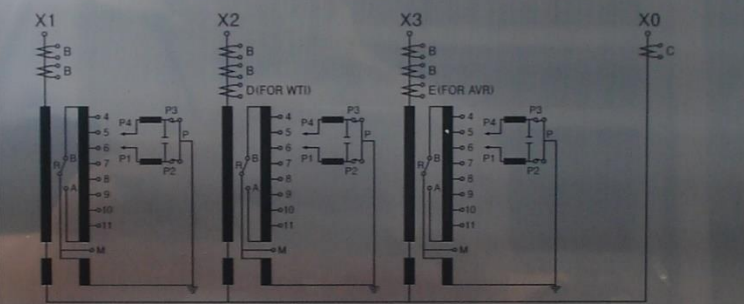
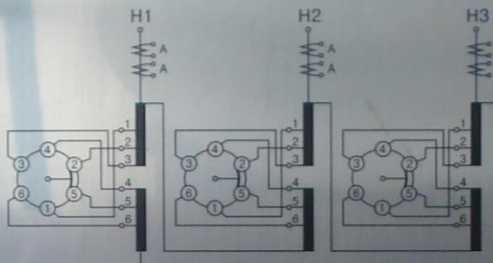
BASIC INSULATION LEVEL	
PRIMARY	550 KV
SECONDARY	110 KV

TEMPERATURE (ONAN/ONAF)	
OIL	55 / 55°C
	65 / 65°C
WINDING	55 / 55°C
	65 / 65°C

WEIGHT	
TOTAL	144,500 lbs
INSULATING OIL	42,900 lbs
SHIPPING	91,500 lbs

POLARITY	SUBTRACTIVE
STANDARD	ANSI

• NO PCBs
OUTDOOR USE, CORE TYPE



WINDING	VOLTAGE (V)	55°C RISE			65°C RISE			NO-LOAD TAP CHANGER	
		CURRENT (A)			CURRENT (A)			POSITION	CONNECTION
		15MVA	20MVA	25MVA	16.8MVA	22.4MVA	28MVA		
HV	F144900	59.8	79.7	99.6	66.9	89.3	111.6	1	3 - 4
	F141450	61.2	81.6	102.0	68.6	91.4	114.3	2	2 - 4
	R138000	62.8	83.7	104.6	70.3	93.7	117.1	3	2 - 5
	F134550	64.4	85.8	107.3	72.1	96.1	120.2	4	1 - 5
	F131100	66.1	88.1	110.1	74.0	98.7	123.3	5	1 - 6

WINDING	VOLTAGE (V)	55°C RISE			65°C RISE			ON-LOAD TAP CHANGER			
		CURRENT (A)			CURRENT (A)			POSITION	R	P1	P4
		15MVA	20MVA	25MVA	16.8MVA	22.4MVA	28MVA				
LV	13717	631	842	1052	707	943	1179	16R	33	11	11
	13639	635	847	1058	711	948	1185	15R	32	10	11
	13561	639	851	1064	715	954	1192	14R	31	10	10
	13483	642	856	1071	719	959	1199	13R	30	9	10
	13405	646	861	1077	724	965	1206	12R	29	9	9
	13327	650	866	1083	728	970	1213	11R	28	8	9
	13249	654	872	1089	732	976	1220	10R	27	8	8
	13171	658	877	1096	736	982	1227	9R	26	7	8
	13094	661	882	1102	741	988	1235	8R	25	7	7
	13016	665	887	1109	745	994	1242	7R	24	6	7
	12938	669	892	1116	750	1000	1249	6R	23	6	6
	12860	673	898	1122	754	1006	1257	5R	22	5	6
	12782	678	903	1129	759	1012	1265	4R	21	5	5
	12704	682	909	1136	763	1018	1272	3R	20	4	5
	12626	686	915	1143	768	1024	1280	2R	19	4	4
	12548	690	920	1150	773	1031	1288	1R	18	M	4
	12470	694	926	1157	778	1037	1296	N	17	M	M
	12392	699	932	1165	783	1044	1305	1L	16	11	M
	12314	703	938	1172	788	1050	1313	2L	15	11	11
	12236	708	944	1180	793	1057	1321	3L	14	10	11
	12158	712	950	1187	798	1064	1330	4L	13	10	10
	12080	717	956	1195	803	1071	1338	5L	12	9	10
	12002	722	962	1203	808	1078	1347	6L	11	9	9
	11924	726	968	1210	813	1085	1356	7L	10	8	9
	11847	731	975	1218	819	1092	1365	8L	9	8	8
	11769	736	981	1226	824	1099	1374	9L	8	7	8
	11691	741	988	1235	830	1106	1383	10L	7	7	7
	11613	746	994	1243	835	1114	1392	11L	6	6	7
	11535	751	1001	1251	841	1121	1401	12L	5	6	6
	11457	756	1008	1260	847	1129	1411	13L	4	5	6
	11379	761	1015	1268	852	1137	1421	14L	3	5	5
	11301	766	1022	1277	858	1144	1430	15L	2	4	5
	11223	772	1029	1286	864	1152	1440	16L	1	4	4

CT	B	C	T	VA	CLASS
RATIO					
A	1200/1000/900/800/600/500/400/300/200/100-5A			100	C400
B	2000/1600/1500/1200/1100/800/500/400/300-5A			100	C400
C	1200/1000/900/800/600/500/400/300/200/100-5A			100	C400
D	2000-5A			30	1.2
E	2000-5A			30	1.2

- MAXIMUM OPERATING PRESSURES OF LIQUID PRESERVATION SYSTEM 10 lb/in² (PSI) POSITIVE AND 8 lb/in² (PSI) NEGATIVE.
- TANK DESIGNED FOR 15 lb/in² (PSI) VACUUM FILLING. LIQUID LEVEL BELOW TOP SURFACE OF THE HIGHEST POINT OF THE HIGHEST MANHOLE FLANGE AT 25°C 15.75 INCH (400mm). LIQUID LEVEL CHANGES 0.83 INCH (21mm) PER 10°C CHANGE IN LIQUID TEMPERATURE.
- COOLING EQUIPMENT START TEMPERATURE (ONAF1 : 65°C, ONAF2 : 75°C)
- ALARM OPERATION OIL TEMPERATURE : 85°C

SERIAL NO. 06T10040

MANUFACTURED IN : 2008

ILJIN HEAVY INDUSTRIES CO., LTD.

NT-PTNP00522
Made in Korea
Tel: 82-32-770-2000