



RIO GRANDE SUBSTATION CONSTRUCTION

B 063-19

Due: September 25, 2019 by 5:00 PM
Open: September 26, 2019 at 10:30 AM

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**LEGAL NOTICE
AND
INVITATION TO BID
B063-19**

Sealed bids will be received by the PUBLIC UTILITIES BOARD of the City of Brownsville, Texas ("BPUB"), at the PUB Purchasing Department office; 1495 Robinhood Drive; Brownsville, Texas 78521 **until 5:00 PM, September 25, 2019** for the Project described in the Contract Documents and Specifications entitled:

RIO GRANDE SUBSTATION CONSTRUCTION

Bids received after this time will not be considered.

Bids will be publicly opened and read aloud on September 26, 2019 at 10:30 AM. Bidders are invited to attend the bid opening at the Brownsville PUB Purchasing Office.

Copies of the Contract Documents and Specifications may be obtained at the BPUB Purchasing Department; 1495 Robinhood Drive; Brownsville, Texas 78521 or at the following website <http://www.brownsville-pub.com/departments/purchasing-department/rfps-bids>. A **non-mandatory pre-bid meeting** will be held in the Brownsville PUB Purchasing Department, 1495 Robinhood Drive, Brownsville, TX at 10:00 AM, September 11, 2019. Conference call will be available at (956) 214-6020.

Each bid, in duplicate, shall be enclosed in a sealed envelope and shall be plainly marked on the outside of the envelope: **"B063-19 RIO GRANDE SUBSTATION CONSTRUCTION, September 25, 2019, 5:00 PM"**. This envelope shall be addressed to Diane Solitaire; Brownsville Public Utilities Board; Purchasing Department; 1495 Robinhood Drive; Brownsville, Texas 78521.

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.

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
(956) 983-6367-Fax

INSTRUCTIONS TO BIDDERS
Please submit this page upon receipt

Acknowledgment Form
B063-19, RIO GRANDE SUBSTATION CONSTRUCTION

For any clarifications, please contact Hugo E. Lopez at the Brownsville Public Utilities Board, Purchasing Department at (956) 983-6375 or (956) 983-6364 or e-mail: hlopez@brownsville-pub.com

Please fax, mail or 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 or fax to: (956) 983-6367. This will ensure you remain active on our vendor list.

Upon return of this acknowledgement form, access to the Plan & 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: _____ Fax: _____

Email: _____

IF SPECIFICATIONS ARE DOWNLOADED FROM WEBSITE PLEASE FAX THIS PAGE TO NUMBER LISTED ABOVE

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 CITY OF BROWNSVILLE AND THE BROWNSVILLE PUBLIC UTILITIES BOARD, ALL OF THEIR 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.

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 (b) of this certification; and
- d) Have not within a three year period preceding this 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.

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
<p>This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.</p> <p>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).</p> <p>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.</p> <p>A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.</p>	OFFICE USE ONLY <div style="border: 1px solid black; height: 100px; width: 100%;"></div>	
<div style="border: 1px solid black; padding: 2px;"> 1 Name of vendor who has a business relationship with local governmental entity. </div>		
<div style="border: 1px solid black; padding: 2px;"> 2 <input type="checkbox"/> 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.) </div>		
<div style="border: 1px solid black; padding: 2px;"> 3 Name of local government officer about whom the information is being disclosed. <div style="border-bottom: 1px solid black; width: 80%; margin: 0 auto;"></div> <div style="text-align: center; font-size: small;">Name of Officer</div> </div>		
<div style="border: 1px solid black; padding: 2px;"> 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. <div style="margin-left: 40px;"> 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? <div style="display: flex; justify-content: space-around; width: 100%;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </div> </div> <div style="margin-left: 40px; margin-top: 10px;"> 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? <div style="display: flex; justify-content: space-around; width: 100%;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </div> </div> </div>		
<div style="border: 1px solid black; padding: 2px;"> 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. </div>		
<div style="border: 1px solid black; padding: 2px;"> 6 <input type="checkbox"/> 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). </div>		
<div style="border: 1px solid black; padding: 2px;"> 7 <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 60%; border-bottom: 1px solid black;"></div> <div style="width: 35%; border-bottom: 1px solid black;"></div> </div> <div style="display: flex; justify-content: space-between; font-size: small; margin-top: 2px;"> Signature of vendor doing business with the governmental entity Date </div> </div>		

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.

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: _____

FORMS CHECKLIST

The following documents are to be submitted as a part of the bid document

NAME	FORM DESCRIPTION	SUBMITTED WITH BID	
		YES	NO
Legal Notice	Acknowledgement Form	<input type="checkbox"/>	<input type="checkbox"/>
	Debarment Certificate	<input type="checkbox"/>	<input type="checkbox"/>
	Ethic Statement	<input type="checkbox"/>	<input type="checkbox"/>
	Conflict of Interest Questionnaire	<input type="checkbox"/>	<input type="checkbox"/>
	W9 or W8 Form	<input type="checkbox"/>	<input type="checkbox"/>
	Direct Deposit Form	<input type="checkbox"/>	<input type="checkbox"/>
	Residence Certification	<input type="checkbox"/>	<input type="checkbox"/>
Special Instructions (if applicable)	Bid Schedule/Cost sheet completed and signed	<input type="checkbox"/>	<input type="checkbox"/>
	Cashier Check or Bid Bond of 5% of Total Amount of Bid	<input type="checkbox"/>	<input type="checkbox"/>
	OSHA 300 Log	<input type="checkbox"/>	<input type="checkbox"/>
	Contractor Pre-Bid Disclosure completed, signed and notarized	<input type="checkbox"/>	<input type="checkbox"/>
	Sub-Contractor Pre-Bid Disclosure completed, signed, and notarized	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
References	Complete the Previous Customer Reference Worksheet for each reference provided	<input type="checkbox"/>	<input type="checkbox"/>
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.

Special Instructions

Contract Information

- **Interpretation**

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

Hugo E. Lopez, Purchasing
(956) 983-6375
Fax (956) 983-6367

- **Tentative Time Line**

1. August 26, 2019 through September 25, 2019 – Vendor bid preparation.
2. September 25, 2019 at 5:00 PM - **Vendor must submit bid, in duplicate, sealed in an envelope to:**

Diane Solitaire
Materials/Warehouse Manager
1495 Robinhood Drive
Brownsville, TX 78521

BID No. B063-19 – RIO GRANDE SUBSTATION CONSTRUCTION
Due on **September 25, 2019 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.*

3. September 26, 2019 - Open bids at 10:30 AM
4. September 27, 2019 – October 21, 2019 - Evaluate bid
5. October 22, 2019 - Deadline to provide final recommendations for Board approval.
6. November 12, 2019 - 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 coordination of all transactions as needed to allow Contract entry.

- **Quality of Products**

All material and equipment items specified must be new, in 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 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. **Return the Direct Deposit Authorization Form with the bid response. The awarded vendor must agree to receive payments via ACH (Direct Deposit). Authorization Form with the bid response.**

- **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 manually 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.

- **Living Wage Statement**

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. The BPUB requires that all Contractors and Subcontractors 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 in the Supplementary General Conditions.

- **Contract and Purchase Order**

The Rio Grande Substation Construction shall be performed at 94 West 13th Street, Brownsville, Texas 78520. 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 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 awards as they may appear to be advantageous to the Brownsville Public Utilities Board. The bidder must indicate "all or none" in the bid if the above-stated condition is not acceptable.
3. The right to hold bid for 90 days from submission date without action, and to waive all formalities in bidding.
4. The right to extend the total bid quote beyond the original 90-day period prior to an award if agreed upon in writing by both parties and if low bid holds 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.
6. In bid, stipulate whether the increase or decrease will affect bid price. The bid prices will remain firm through the duration of the project from date of Purchase Order, unless otherwise stipulated.
7. Brownsville PUB has the right to increase or decrease services.
8. The Brownsville PUB has the right to refuse to enter into a contract or other transaction with any individual or entity indebted to the municipality as per Local Government Code 252.0436.

- **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 faxed 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 Rio Grande 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 **Cesar Cortinas, with the Electrical Engineering Department at telephone no. (956) 983-6216.**

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 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 of the
City of Brownsville, Texas
1495 Robinhood Drive
Brownsville, Texas 78521

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: UNIT PRICE AND LUMP SUM.

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 faxed 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.

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 within One Hundred Twenty (120) consecutive calendar days.

BIDDER agrees by submission of his bid to pay as mutually agreed to liquidated damages, and not as a penalty, the sum of Five Hundred Dollars (\$500.00) per calendar day for each consecutive calendar day that the Project is not Substantially Complete beyond One Hundred Twenty (120) consecutive calendar days.

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. Attendance at the Pre-Bid Conference is not mandatory, but is recommended for all contractors and suppliers interested in bidding the Work for the Project.

21. SUBMITTAL OF TRENCH SAFETY DESIGN:

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. Each BIDDER shall submit with his bid an organizational chart showing the names of field management, supervisory, and technical personnel, 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. The experience record of the Contractor's field superintendent shall be submitted with the bid.

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
B063-19
Place: BPUB Purchasing Department
1495 Robinhood Dr.
Due Date: **September 25, 2019 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 BIDDER, acting as an independent contractor and in compliance with BPUB's invitation for bids for the **RIO GRANDE SUBSTATION CONSTRUCTION**, having examined the Specifications with related Documents and being familiar with all of the conditions, including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies, within the time set forth herein, and at the Prices shown in the attached Bid Schedule. 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 within ninety (90) days after the time set for opening 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
BID - B063-19
BROWNSVILLE PUBLIC UTILITIES BOARD

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

BILL OF MATERIALS: BPUB-CS-01 138KV RIO GRANDE SUBSTATION

											Material Cost		Labor Cost	
Rev	Item	Task / Description	Specifications	Construction Contract Specs	Provided By	Installed By	Manufacturer	Part Number	Quantity	Unit	Unit Bid Price	Task Price	Unit Bid Price	Task Price
Electrical Equipment														
	A102	88kV MCOV, 84kV Duty Cycle, Arrester	BPUB-SA-01	BPUB-CS-01	BPUB	E.C.	ABB	ABB	6	EA			\$	\$
	B106	145KV, 2000A, 40KA GAS CIRCUIT BREAKER	-	BPUB-CS-01	BPUB	E.C.	ABB	145PM40-20	2	EA			\$	\$
	C100	12.47KV, 4.8MVAR OUTDOOR CAPACITOR BANK WITH SWITCHER	BPUB-CAP-01	BPUB-CS-01	BPUB	E.C.	EATON	EATON	2	EA			\$	\$
	CS100	145KV, 1200A, 40KA CIRCUIT SWITCHER	-	BPUB-CS-01	BPUB	E.C.	GE	GL312PF1	2	EA			\$	\$
	P100	138/12.47KV, 15/20/25/28MVA, THREE PHASE	BPUB-TRF-01	BPUB-TRF-01	BPUB	E.C.	VTC	VTC	2	EA			\$	\$
	S104	138KV, 1200A, GROUP OPERATED CENTER BREAK VEE DISCONNECT SWITCH W/MANUAL OPERATOR, 10' PHASE-TO-PHASE SPACING, HORIZONTALLY MOUNTED (WITH INSULATORS)	BPUB-SW-01	BPUB-CS-01	BPUB	E.C.	ROYAL SWITCHGEAR	ROYAL SWITCHGEAR	4	EA			\$	\$
	S105	138KV, 1200A, GROUP OPERATED CENTER BREAK VEE DISCONNECT SWITCH, 11' PHASE-TO-PHASE SPACING, VERTICALLY MOUNTED (WITH INSULATORS)	BPUB-SW-01	BPUB-CS-01	BPUB	E.C.	ROYAL SWITCHGEAR	ROYAL SWITCHGEAR	2	EA			\$	\$
	S106	15KV, 2000A GROUP OPERATED, VERTICAL BREAK DISCONNECT SWITCH WITH MANUAL OPERATOR, HORIZONTALLY MOUNTED (WITH INSULATORS)	BPUB-SW-01	BPUB-CS-01	BPUB	E.C.	ROYAL SWITCHGEAR	ROYAL SWITCHGEAR	2	EA			\$	\$
	T103	POTENTIAL TRANSFORMER, 138KV, 650KV BIL, 700/1200:1 RATIO, 115/67.08V, TWO WINDING	BPUB-VT-01	BPUB-CS-01	BPUB	E.C.	ABB (KUHLMAN)	UTF-145-OH	5	EA			\$	\$
	W100	15KV OUTDOOR SWITCHGEAR	BPUB-SWGR-01	BPUB-CS-01	BPUB	E.C.	POWERCON	POWERCON	1	EA			\$	\$
	-	RELAY PANELS	-	BPUB-CS-01	BPUB	E.C.	EP2	EP2	6	EA			\$	\$
	817	SUMP PUMP,0.5 HP,115VAC	-	BPUB-CS-01	E.C.	E.C.	STANCOR	SE-50	2	EA			\$	\$
Drilled Shaft and Slab Foundations														
	FD1	Concrete Slabs - Refer to DWG. RG-C SH.1-9 for details.	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.			1	LOT			\$	\$
	FD2	Drilled Shaft Foundations - Refer to DWG. RG-C SH.1-9 for details.	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.			1	LOT			\$	\$
	FD3	Anchor Bolts - Refer to DWG. RG-C SH.1-9 for details.	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.			1	LOT			\$	\$
	FD4	Transformer Oil Containment & Steel Grating - Refer to DWG. RG-C SH.1-9 for details.	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.			1	LOT			\$	\$
Steel Structures														
	14001	138KV SINGLE PHASE LOW BUS SUPPORT, 17'-0" BUS HEIGHT	BPUB-TPST-01	BPUB-CS-01	BPUB	E.C.	VALMONT	VALMONT	10	EA			\$	\$
	14002	138KV SINGLE PHASE HIGH BUS SUPPORT, 24'-0" BUS HEIGHT	BPUB-TPST-01	BPUB-CS-01	BPUB	E.C.	VALMONT	VALMONT	2	EA			\$	\$
	14010	138KV SINGLE PHASE PT SUPPORT	BPUB-TPST-01	BPUB-CS-01	BPUB	E.C.	VALMONT	VALMONT	2	EA			\$	\$
	14012	138KV CENTER-BREAK VEE SWITCH SUPPORT, 17'-0" BUS HEIGHT	BPUB-TPST-01	BPUB-CS-01	BPUB	E.C.	VALMONT	VALMONT	4	EA			\$	\$
	14014	STATIC MAST STRUCTURE	BPUB-TPST-01	BPUB-CS-01	BPUB	E.C.	VALMONT	VALMONT	2	EA			\$	\$
	14015	H-FRAME DEAD END STRUCTURE, 138KV TRANSMISSION LINE, W/MOUNTING PROVISIONS FOR 138KV VERTICAL VEE BREAK LINE SWITCH	BPUB-TPST-01	BPUB-CS-01	BPUB	E.C.	VALMONT	VALMONT	2	EA			\$	\$
	14016	138KV THREE PHASE PT SUPPORT	BPUB-TPST-01	BPUB-CS-01	BPUB	E.C.	VALMONT	VALMONT	1	EA			\$	\$
	14017	12.47KV U.G. RISER STRUCTURE	BPUB-TPST-01	BPUB-CS-01	BPUB	E.C.	VALMONT	VALMONT	4	EA			\$	\$
Electrical Equipment														
	806	Provided and Install Crushed Rock Surface Material (4" per Spec)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.			1	LOT			\$	\$
Insulators - Equivalent Substitutions Are Acceptable														
	N101	138KV, 650KV BIL, 54" STATION POST INSULATORS, PORCELAIN, HIGH STRENGTH	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	LAPP	TR289	16	EA			\$	\$
	805	SUBBASE INSULATOR, HEAVY DUTY	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	OHIO BRASS	2721453076	18	EA			\$	\$
Junction Boxes and Materials														
	T202	JUNCTION BOX, 36" x 30"x 8", NEMA 4X, LOCKABLE HINGED COVER, WITH SUBPANEL (PART # A36P30SS6), PANEL SUPPORT KIT,TERMINAL BLOCKS, FUSE BLOCKS AND FUSES (FOR 1-PH PT'S)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HOFFMAN	A36H3008SSLP	2	EA			\$	\$
	T203	JUNCTION BOX, 24" x 20" x 6", NEMA 4X, LOCKABLE HINGED COVER, WITH SUBPANEL (PART # A24P20SS6), PANEL SUPPORT KIT, TERMINAL BLOCKS, FUSE BLOCKS AND FUSES (FOR 3-PH PT'S)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HOFFMAN	A24H2006SSLP	1	EA			\$	\$
Electrical Equipment														
	800	FLOODLIGHT, LED, 120VAC, WIDE LENS, HIGH TILT, GRAY, VERTICAL MOUNT	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HOLOPHANE	MGLED-9-5K-ASW-H-V-G-US	10	EA			\$	\$
	801	POLETOP SLIP-FITTER, FITS 2" TENON	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HOLOPHANE	HOLOPHANE	10	EA			\$	\$
	802	SQUARE BULLHORN, 2U, 2" TENON, 2" SLIP FITTER, GALVANIZED	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HOLOPHANE	HOLOPHANE	10	EA			\$	\$
	803	SPLICE	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	3M	82-A1	3				\$	\$
	804	JUNCTION BOX, 16" x 12"x 6", NEMA 4X, LOCKABLE HINGED COVER (FOR LIGHTING)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HOFFMAN	16H1206	6	EA			\$	\$
Signage														
	809	Warning Signs - To be installed on fence/gates per Spec	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.			LOT	EA			\$	\$
Fittings - Equivalent Substitutions Are Acceptable														
	60335	CONNECTOR, STRAIGHT BOLT, 1-4/0 COPPER TO NEMA 2 HOLE PAD	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	FNCT-12-2B	26	EA			\$	\$
	60337	TAP, OVERHEAD HOT LINE TAP CLAMP, 954MCM ACSR TO 4/0 COPPER	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HUBBELL POWER SYSTEMS	GH103ACLBE	12	EA			\$	\$
	60340	BI-METALLIC TRANSITION PLATE, ALUMINUM TO COPPER	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HUBBELL POWER SYSTEMS	TPD	14	EA			\$	\$
	61008	END CAP, 3.5" SPS TUBE, INTERNAL, WELDED	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	WEB-63	6	EA			\$	\$
	61040	WELDMENT, 3.5" SPS TUBE RUN TO 3" SPS TUBE TAP, 15° ANGLE	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	WFTT15-6362	12	EA			\$	\$
	61047	WELDMENT, 3.5" SPS TUBE TO 2-3" SPS TUBES, 30° ANGLE	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	WFVT15-6362	6	EA			\$	\$
	61063	TEE, 3.5" SPS TUBE TO NEMA 4-HOLE PAD, WELDED	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	WTF-63-4B	3	EA			\$	\$
	61064	COUPLER, 3.5" SPS TUBE TO 3.5" SPS TUBE, STRAIGHT, WELDED	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	WSC-6363	9	EA			\$	\$
	61100	EXPANSION TERMINAL, 3.5" SPS TUBE TO NEMA 4-HOLE PAD, WELDED	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	WFXTC-V-63-4B	12	EA			\$	\$
	61174	TERMINAL, 1-2000KCMIL AAC TO NEMA 4 HOLE PAD, WELDED	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	WFC-49-4B	30	EA			\$	\$
	61175	TERMINAL, TEE, 1-2000KCMIL AAC TO NEMA 4 HOLE PAD, BOLTED	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	ACF-49-4B	6	EA			\$	\$
	61198	TERMINAL, TEE, 1-954KCMIL ASCR TO NEMA 4 HOLE PAD, BOLTED	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	ACF-39-4B	6	EA			\$	\$
	61199	TERMINAL, 1-954KCMIL ACSR TO NEMA 4 HOLE PAD, BOLTED	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	AFNC-39-4B	54	EA			\$	\$
	61400	BUS SUPPORT, 3.5" SPS TUBE, FIXED OR SLIP FIT, 5" BOLT CIRCLE	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	ASWH-63-5-SE	16	EA			\$	\$
	61401	GROUND STUD, ALUMINUM, 3"-6"	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HOMAC	AWGS-LS	LOT	EA			\$	\$
	-	STAINLESS STEEL HARDWARE	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	LOT	EA			\$	\$
Control Cable														

Rev	Item	Task / Description	Specifications	Construction Contract Specs	Provided By	Installed By	Manufacturer	Part Number	Quantity	Unit	Unit Bid Price	Task Price	Unit Bid Price	Task Price
	814	12.47KV, 750KCMIL CABLE TERMINATION KIT WITH LUGS (3 TERMINATIONS PER KIT)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	3M	7695-S-4	12	EA		\$	\$	\$
	815	12.47KV, 4/0 CU CABLE TERMINATION KIT WITH LUGS (3 TERMINATIONS PER KIT)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	3M	7622-S-2	4	EA		\$	\$	\$
	816	FIBER OPTIC INNER-DUCT, 1" ORANGE, W/ COUPLERS	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANIXTER	180524	600	FT		\$	\$	\$
	905	2/C #10, 600V CONTROL CABLES	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	OKONITE	202-31-3702	12,300	FT		\$	\$	\$
	906	4/C #10, 600V CONTROL CABLES	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	OKONITE	202-31-3704	22,000	FT		\$	\$	\$
	907	9/C #10, 600V CONTROL CABLES	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	OKONITE	202-31-3712	7,500	FT		\$	\$	\$
	908	8/C #10, 600V CONTROL CABLES	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	OKONITE	202-31-3708	2,600	FT		\$	\$	\$
	909	1/C #4, 600V CONTROL CABLES	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	OKONITE	112-31-3311	2,200	FT		\$	\$	\$
	910	1/C #2, 600V CONTROL CABLES	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	OKONITE	112-31-3371	500	FT		\$	\$	\$
	-	RELAY PANEL COMMUNICATION CABLES, SEL-C627,35 FT	EP2	BPUB-CS-01	BPUB(EP2)	E.C.	SEL	C627	19	EA			\$	\$
	-	RELAY PANEL COMMUNICATION CABLES, SEL-C273A,25 FT	EP2	BPUB-CS-01	BPUB(EP2)	E.C.	SEL	C273A	8	EA			\$	\$
	-	FIBER OPTIC CABLES, CONTROL HOUSE TO POWER TRANSFORMERS (210 FT EA.)	EP2	BPUB-CS-01	BPUB(EP2)	E.C.	SEL	C808	2	EA			\$	\$
	-	SM FIBER OPTIC CABLES, RELAY PANELS TO FIBER PATCH PANEL (100 FT EA.)	EP2	BPUB-CS-01	BPUB(EP2)	E.C.	ANY	ANY	2	EA			\$	\$
Conductors											\$	\$	\$	\$
	22004	CONDUCTOR, 3" PIPE, ALUMINUM, SCHEDULE 40, 6063-T6, 8FT	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	12	EA	\$	\$	\$	\$
	22006	CONDUCTOR, 3.5" PIPE, ALUMINUM, SCHEDULE 40, 6063-T6, 40FT	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	18	EA	\$	\$	\$	\$
	22007	1/2" x 4" COPPER BAR	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	LOT	EA	\$	\$	\$	\$
	20524	CONDUCTOR, 4/0, 7 STRAND, SOFT DRAWN COPPER	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	100	FT	\$	\$	\$	\$
	20525	CONDUCTOR, 1-2000KCMIL, "COWSLIP" AAC	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	300	FT	\$	\$	\$	\$
	20526	CONDUCTOR, 1-795MCM, "DRAKE" ACSR, (DAMPER)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	500	FT	\$	\$	\$	\$
	20258	CONDUCTOR, 954KCMIL, "RAIL" ACSR	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	700	FT	\$	\$	\$	\$
	24500	12.47KV, 750MCM CU EPR INSULATED CABLE (#115-23-3135)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	1,200	FT	\$	\$	\$	\$
	24501	12.47KV, 4/0 CU EPR INSULATED CABLE (#115-23-3121)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	500	FT	\$	\$	\$	\$
Trench											\$	\$	\$	\$
	808	Channel, Pedestrian Fibercrete 20x12x48	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CONCAST	8020LT	64	EA	\$	\$	\$	\$
	808A	Trench Covers, Pedestrian Fibercrete 20x24 (2 req. per channel)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CONCAST	8021LT	66	EA	\$	\$	\$	\$
	808B	End Plates, Pedestrian Trench 20x12	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CONCAST	8023LT	3	EA	\$	\$	\$	\$
	808C	Lifting Tool	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CONCAST	8000L	1	EA	\$	\$	\$	\$
	808D	Cable Clips, Std. Pedestrian Trench (1 req. per channel)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CONCAST	8002R	66	EA	\$	\$	\$	\$
	808E	Cable Trench, Universal Channel, 20"W x 12"D x 48", Light Traffic Rated	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CONCAST	8022LT	2	EA	\$	\$	\$	\$
	812	ALUMINUM RISER FOR CABLES IN CABLE TRENCH	-	BPUB-CS-01	OTHERS	E.C.	ANY	ANY	LOT	EA	\$	\$	\$	\$
Conduit - Equivalent Substitutions Are Acceptable											\$	\$	\$	\$
	600	CONDUIT, 2" PVC, SCH.40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	A52CA12	650	FT	\$	\$	\$	\$
	601	CONDUIT, 3" PVC, SCH.40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	A52DA12	750	FT	\$	\$	\$	\$
	602	CONDUIT, 6" PVC, SCH.40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	A52GA12	500	FT	\$	\$	\$	\$
	603	2" ELBOW, 90, PVC, SCH.40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	5133828	40	EA	\$	\$	\$	\$
	604	3" ELBOW, 90, PVC, SCH.40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	5133830	45	EA	\$	\$	\$	\$
	605	6" ELBOW, 90, PVC, SCH.40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	5133834	45	EA	\$	\$	\$	\$
	606	CONDUIT, 4" PVC, SCH.40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	A52EA12	700	FT	\$	\$	\$	\$
	609	END BELL, 2", PVC, SCH 40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	5144008	25	EA	\$	\$	\$	\$
	610	END BELL, 3", PVC, SCH 40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	5144010	30	EA	\$	\$	\$	\$
	611	END BELL, 6", PVC, SCH 40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	5144014	40	EA	\$	\$	\$	\$
	612	COUPLER, 2", PVC, SCH 40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	6141628	100	EA	\$	\$	\$	\$
	613	COUPLER, 3", PVC, SCH 40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	6141630	90	EA	\$	\$	\$	\$
	614	COUPLER, 6", PVC, SCH 40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	6141634	100	EA	\$	\$	\$	\$
	617	4" ELBOW, 45°, PVC, SCH.40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	5133832	LOT	EA	\$	\$	\$	\$
	618	CONDUIT, 1-1/2" FLEX	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	15	FT	\$	\$	\$	\$
	619	CONDUIT, 2" FLEX	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	55	FT	\$	\$	\$	\$
	620	CONDUIT, 3" FLEX	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	75	FT	\$	\$	\$	\$
	621	CONDUIT, 6" FLEX	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	30	FT	\$	\$	\$	\$
	622	CONNECTOR, 1-1/2" FLEX, STRAIGHT	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	LTB150	10	EA	\$	\$	\$	\$
	623	CONNECTOR, 2" FLEX, STRAIGHT	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	LTB200	10	EA	\$	\$	\$	\$
	624	CONNECTOR, 3" FLEX, STRAIGHT	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	LTB300	18	EA	\$	\$	\$	\$
	625	CONNECTOR, 6" FLEX, STRAIGHT	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	LTB600	12	EA	\$	\$	\$	\$
	626	REDUCER, 2" - 1-1/2" CONDUIT	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	RE65	5	EA	\$	\$	\$	\$
	627	HUB, 1-1/2"	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	HUB5	5	EA	\$	\$	\$	\$
	628	HUB, 2"	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	HUB6	25	EA	\$	\$	\$	\$
	629	HUB, 3"	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	HUB8	20	EA	\$	\$	\$	\$
	630	HUB, 6"	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	STA-12	15	EA	\$	\$	\$	\$
	642	CAMP B2000 SERIES (4" CONDUIT)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	COOPER B-LINE	B2017	LOT	EA	\$	\$	\$	\$
	646	CONDUIT, RIGID, 4", SCH.40 PVC, 45° ELBOW	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	LOT	EA	\$	\$	\$	\$
	647	COUPLER, 4", PVC, SCH.40	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	6141632	LOT	EA	\$	\$	\$	\$
	648	CONDUIT, RIGID, 4", SCH.40 PVC, 90° ELBOW	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CANTEX	5133832	LOT	EA	\$	\$	\$	\$
	660	CONDUIT BUSHING, 6" PVC	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	O-Z/GEDNEY	B-600	12	EA	\$	\$	\$	\$
	661	CONDUIT LOCKNUT, 6" GALVANIZED STEEL	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CROUSE HINDS	23	12	EA	\$	\$	\$	\$
Grounding Material - Equivalent Substitutions Are Acceptable											\$	\$	\$	\$
	500	CONDUCTOR, #2 AWG SOLID, TINNED COPPER	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	LOT	FT	\$	\$4.00	\$	\$
	501	GROUND MAT, 4' X 5', GALVANIZED STEEL W/PROVISIONS FOR NEMA 2 HOLE TERMINALS ON OPPOSITE CORNERS	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	8	EA	\$	\$	\$	\$

Rev	Item	Task / Description	Specifications	Construction Contract Specs	Provided By	Installed By	Manufacturer	Part Number	Quantity	Unit	Unit Bid Price	Task Price	Unit Bid Price	Task Price
	501A	GROUND MAT, 3' X 4', GALVANIZED STEEL W/PROVISIONS FOR NEMA 2 HOLE TERMINALS ON OPPOSITE CORNERS	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	4	EA	\$	\$	\$	\$
	502	TERMINAL, BOLTED, 2/0 OR 4/0 COPPER TO NEMA 2 HOLE PAD	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HUBBELL POWER SYSTEMS	SWL050B2	LOT	EA	\$	\$	\$	\$
	503	GROUND CLAMP, SINGLE GROOVE, BOLTED, 2/0 OR 4/0 COPPER	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HUBBELL POWER SYSTEMS	GC141AG2	LOT	EA	\$	\$	\$	\$
	504	GROUND CLAMP, PARALLEL GROOVE, BOLTED, 2/0 OR 4/0 COPPER	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	HUBBELL POWER SYSTEMS	GC143AG2	LOT	EA	\$	\$	\$	\$
	505	FENCE POST CLAMP, 2 1/2" PIPE, 2/0 CABLE	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	1-0C-27X51	LOT	EA	\$	\$	\$	\$
	505	FENCE CORNER POST CLAMP, 2 1/2" PIPE, 2/0 CABLE	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	1-0C-28X51	LOT	EA	\$	\$	\$	\$
	507	GATE POST CLAMP, 3 1/2" PIPE, #4AWG - 2/0 CABLE AND FLEXIBLE GROUND BRAID	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	GU1-4912	LOT	EA	\$	\$	\$	\$
	508	GATE POST CLAMP, 1 1/4" PIPE, #2AWG CABLE AND FLEXIBLE GROUND BRAID	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	GU1-2451	LOT	EA	\$	\$	\$	\$
	509	GATE POST CLAMP, 1 1/4" PIPE TO #2 AWG	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	SEFCOR	1-0C-2648	LOT	EA	\$	\$	\$	\$
	510	FLEXIBLE GROUND BRAID, 2/0 MIN. FLAT TINNED COPPER BRAID	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	LOT	EA	\$	\$	\$	\$
	511	SPLIT BOLT	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	BURNDY	K2C28	LOT	EA	\$	\$	\$	\$
	550	CONDUCTOR, 2/0, 7 STRAND, SOFT DRAWN COPPER	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	5,500	FT	\$	\$	\$	\$
	550A	CONDUCTOR, 4/0, 7 STRAND, SOFT DRAWN COPPER	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	1,000		\$	\$	\$	\$
	551	10', 3/4" COPPER CLAD SECTIONAL GROUND RODS	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	ANY	ANY	25	EA	\$	\$	\$	\$
	552	EXOTHERMIC MOLD, HORIZONTAL TEE, 2/0-2/0 (USES 2-#90' WELD METAL)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CADWELL	TAC-2G2G	LOT	EA	\$	\$	\$	\$
	552A	EXOTHERMIC MOLD, HORIZONTAL TEE, 4/0-4/0 (USES 2-#90' WELD METAL)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CADWELL	TAC-2Q2Q	LOT		\$	\$	\$	\$
	553	EXOTHERMIC MOLD, HORIZONTAL CROSS, 2/0 (USES 2-#150 WELD METAL)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CADWELL	XBM-2G2G	LOT	EA	\$	\$	\$	\$
	553A	EXOTHERMIC MOLD, HORIZONTAL CROSS, 4/0 (USES 2-#150 WELD METAL)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CADWELL	XBM-2Q2Q	LOT		\$	\$	\$	\$
	554	EXOTHERMIC MOLD, 3/4" GROUND ROD TO 2/0 (USES #115 WELD METAL)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CADWELL	XBM-2Q2Q	LOT	EA	\$	\$	\$	\$
	554A	EXOTHERMIC MOLD, 3/4" GROUND ROD TO 4/0 (USES #115 WELD METAL)	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CADWELL	GTC-182Q	LOT		\$	\$	\$	\$
	555	COMPRESSION TAP, 2/0 TO #2 AWG	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CAL	YGH26C2	LOT	EA	\$	\$	\$	\$
	556	WELD METAL, #S 90, 115 & 150	BPUB-CS-01	BPUB-CS-01	E.C.	E.C.	CADWELL	MISC.	LOT	EA	\$	\$	\$	\$

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
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

Bid amounts are to be legibly shown in both words and figures. In case of discrepancy, the unit price amount 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 will disqualify 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 **RIO GRANDE 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.

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: _____

NOTICE OF AWARD

TO:

Project Description: B063-19, Rio Grande Substation Construction

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 for Bids and Instruction to Bidders, dated September 25, 2019.

You are hereby notified that your BID has been accepted in the amount of \$_____.

You are required by the Instructions to Bidders to execute the attached 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.

Before Work commences, the material/equipment submittals will have to be approved by the BPUB Electrical Engineer. Signing of the Notice to Proceed and Purchase Order by BPUB are pending approval of the submittals.

If you fail to execute the attached Agreement and furnish any required Bonds and insurance certificates 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 SECURITY.

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

Dated this _____ day of _____, 20____.

PUBLIC UTILITIES BOARD OF THE CITY OF BROWNSVILLE, TEXAS

By:_____

Name: _____

Title: _____

ACCEPTANCE OF NOTICE

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

_____ this ____ day
of _____, 20__.

By: _____

Name: _____

Title: _____

NOTICE TO PROCEED

TO:

ADDRESS:

Contract For: B063-19, Rio Grande Substation Construction

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:

BY: _____
(Authorized Signature)

DATE: _____

NAME: John S. Bruciak

TITLE: General Manager/CEO

FOR: Brownsville Public Utilities Board

AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____, 20____, by and between the PUBLIC UTILITIES BOARD of the City of Brownsville, Texas (hereinafter called OWNER) and _____ of _____ an independent contractor, hereinafter called CONTRACTOR).

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

Article 1. WORK.

CONTRACTOR shall furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and Final Completion of the Work described herein and complete all the Work as specified or indicated in the Contract Documents for **RIO GRANDE SUBSTATION CONSTRUCTION**.

Article 2. CONTRACT TIME

- 2.1 The Work shall be Substantially Completed and made ready for final payment One Hundred Twenty (120) consecutive calendar days after the date when the Contract time commences to run as provided in paragraph 2.3 of the General Conditions and in the Notice to Proceed, and in accordance with paragraph 14.13 of the General Conditions.
- 2.2 **Liquidated Damages.** OWNER AND CONTRACTOR recognize that the **TIME OF PERFORMANCE IS OF THE ESSENCE** in this Agreement and that OWNER will suffer financial loss if the Work is not Substantially Complete within the time specified in paragraph 2.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. Both parties hereto also recognize the delays, expense and difficulties involved in proving in a legal proceeding the actual loss suffered by OWNER if the Work is not Substantially Complete on time. Accordingly, instead of requiring such proof, OWNER and CONTRACTOR agree that as liquidated damages, and not as a penalty, for the delay, CONTRACTOR shall pay OWNER five hundred dollars (\$500.00) for each consecutive calendar day that expires after the time specified in paragraph 2.1 for Substantial Completion.

Article 3. CONTRACT PRICE.

- 3.1 CONTRACTOR shall perform the Work described in the Contract Documents for the amounts shown in the Bid Schedule, and OWNER shall pay CONTRACTOR in current funds based on the Bid Schedule.

Article 4. PAYMENT PROCEDURES.

Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by OWNER as provided for in the General Conditions.

4.1 Progress Payments. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment on or about the Twentieth (20th) day after submittal of the Application for Payment each month as provided below. All progress payments shall be on the basis of the progress of the Work measured by the Schedule of Values provided for in paragraph 14.1 of the General Conditions.

4.1.1 Prior to Substantial Completion, progress payments shall be in an amount equal to 95% of the amount requested in the Application for Payment, with 5% remaining as retainage for the Project, to be released in accordance with paragraph 4.2.

4.1.2 Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 95% of the Contract price, less such amounts OWNER shall determine in accordance with paragraph 14.7 of the General Conditions.

4.2 **Final Payment.** Upon Final Completion and acceptance of the Work in accordance with paragraph 14.13 of the General Conditions, OWNER shall pay the remainder of the Contract price as provided in said paragraph 14.13.

Article 5. CONTRACTOR'S REPRESENTATIONS.

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

5.1 CONTRACTOR has familiarized himself with the nature and extent of the Contract Documents, Work, locality, and with all local conditions and federal, State and local laws, ordinances, rules and regulations that in any manner may affect cost, progress or performance of the Work.

5.2 CONTRACTOR has made or caused to be made examinations and investigations of information and the Project site as he deems necessary for the performance of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations or similar data are or will be required by CONTRACTOR for such purposes.

5.3 CONTRACTOR has given OWNER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by OWNER is acceptable to CONTRACTOR.

5.4 CONTRACTOR is skilled and experienced in the type of work described in the Contract Documents.

Article 6. CONTRACT DOCUMENTS.

The Contract Documents which comprise the entire Agreement between OWNER and CONTRACTOR are attached to this Agreement, made a part hereof and consist of the following:

- 6.1. Legal Notice and Invitation to Bid
- 6.2. Instructions to Bidders
- 6.3. Bid and Bid Schedule
- 6.4. Bid Bond
- 6.6 Contractor's and Subcontractor's Pre-Bid Disclosure Statements
- 6.7 Notice of Award and Acceptance of Notice
- 6.8 Notice to Proceed
- 6.9 Agreement
- 6.10 Performance Bond
- 6.11 Payment Bond
- 6.12 CONTRACTOR's Certificate(s) of Insurance
- 6.13 General Conditions
- 6.14 Supplementary General Conditions
- 6.15 Technical Specifications
- 6.16 Addendum number(s)___ (page __)
- 6.17 Construction Drawings bearing the following general title: **RIO GRANDE SUBSTATION CONSTRUCTION** (Technical Specifications)
- 6.18 Any written modification, including Change Orders, duly delivered after execution of this Agreement.

There are no Contract Documents other than those listed above in this Article 6. The Contract Documents may only be altered, amended or repealed by a written Modification (as defined in Article 1 of the General Conditions).

Article 7. MISCELLANEOUS.

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

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

7.3 OWNER and CONTRACTOR each binds himself, his partners, successors, assigns and legal representatives to the other party hereto, his partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

7.4 The invalidity or unenforceability of any provision of the Contract Documents shall not affect the validity or enforceability of any other provision of the Contract Documents.

7.5 This Agreement and the Contract Documents are subject to all applicable laws, statutes, codes, ordinances, rules and regulations.

7.6 In the event of default by CONTRACTOR under the Contract Documents, OWNER shall have all rights and remedies afforded to it at law or in equity to enforce the terms of the Contract Documents. The exercise of any one right or remedy shall be without prejudice to the enforcement of any other right or remedy allowed at law or in equity.

7.7 If any action at law or in equity is necessary by OWNER to enforce or interpret the terms of the Contract Documents, OWNER shall be entitled to reasonable attorneys' fees and costs and any necessary disbursements, in addition to any other relief to which the OWNER is entitled.

7.8 The Contract Documents constitute the entire agreement between the parties hereto and supersede all prior agreements, understandings, or oral communications between the parties. The Contract can only be modified or amended by written agreement of the parties.

7.9 These Contract Documents are governed by the laws of the State of Texas and the parties agree that venue for any lawsuits arising from these Contract Documents shall be set in Cameron County, Texas.

IN WITNESS WHEREOF, the parties hereto have signed this Agreement in duplicate originals. One counterpart each has been delivered to OWNER and CONTRACTOR. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR. This Agreement will be effective on the date signed by the OWNER below.

PUBLIC UTILITIES BOARD
OF THE CITY OF BROWNSVILLE

(Insert Contractor's Name)

By: _____ By: _____

Name: John S. Bruciak Name: _____

Title: General Manager / CEO Title: _____

Date: _____ Date: _____

Attest: _____ Attest: _____

Address for giving notices:

Address for giving notices:

Attn: Mr. Cesar Cortinas, Graduate Eng.

Attn: _____

1425 Robinhood Drive

Brownsville, TX 78520

(956) 983-6572

Email: ccortinas@brownsville-pub.com

Email: _____

Contractor hereby acknowledges and understands that this is a "separated contract" pursuant to 34 T.A.C. 3.291. The following amount of money represents that part of the total Contract price representative of the value of tangible personal property to be physically incorporated into the Project realty: \$_____._____.

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: **RIO GRANDE 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: **RIO GRANDE 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

ATTACH CERTIFICATE OF INSURANCE

**GENERAL CONDITIONS
OF THE
CONSTRUCTION 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

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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 01010-01785 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
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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 \$1,000,000.00 aggregate
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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:

5.11 Waiver

5.11.1 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 6.11, 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.

5.11.2 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:

5.14 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:

5.15 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 5.11.

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

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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 un-remedied 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:

NOTICE TO LABORERS/MECHANICS

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 Decision Number: TX190003 01/04/2019 TX3

Superseded General Decision Number: TX20180008

State: Texas

Construction Types: Heavy and Highway

Counties: Cameron, Hidalgo and Webb Counties in Texas.

HEAVY & HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.60 for calendar year 2019 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, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.60 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 calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number Publication Date
0 01/04/2019

* 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	

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

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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 www.dol.gov/whd/govcontracts.

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

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 Regional Office for the area in which the survey was conducted because those Regional Offices have 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.

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END OF GENERAL DECISION

BPUB TECHNICAL SPECIFICATIONS

CS-SUB-01 – RIO GRANDE

RIO GRANDE SUBSTATION PROJECT CONSTRUCTION CONTRACT SPECIFICATIONS

Wali Zaidi

8/16/2019

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ATTACHMENTS

Bill of Material
Project Drawings
Geotech Report

RIO GRANDE SUBSTATION

OWNER: Brownsville Public Utilities Board

DESCRIPTION OF PROJECT

This project involves the construction of a greenfield 138-kV two position substation with two incoming lines and two 138/12.47-kV transformers. The transformer secondary will feed an outdoor, free-standing 15-kV switchgear lineup with a main-tie-main bus arrangement with four 1,200 amp feeders on each bus. All relaying and control panels, batteries and other equipment necessary for the operation of the substation will be located within the control building. Station service transformers shall be incorporated into the switchgear line-up. Two 12.47kV 4.8MVAR capacitor banks will be installed in the substation yard. The 138-kV side will include installation of 145-kV circuit breakers, switches, circuit switchers and PT's. The 12.47-kV side will include installation of switches, underground cable between the transformers and switchgear and the capacitor banks and switchgear. No remote end work or transmission scope is included in this project. The scope of work assumes that a site at rough grade with no underground obstructions and no environmental contamination will be provided.

LOCATION

75 Power Plant Dr., Brownsville, TX 78250

CONNECTORS AND FITTINGS

Jumpers shall be installed so that they may be unbolted and removed for equipment maintenance, repair, or replacement.

The Contractor shall employ a highly qualified and certified welder to weld the substation bus. The Owner's Construction Manager shall approve the Contractor's personnel welding on the aluminum bus. All bus work, conductors and connectors shall be protected from discoloration, dirt, abrasion and scratches at all times, including its handling, placement and storage during construction. They shall not be placed directly on the ground or rocks.

TRANSFORMERS

A. (2) 138/12.47-kV 15/20/25/28 MVA Transformers

Two 138/12.47-kV main power transformers shall be provided by the Owner and placed on foundation pads already installed. Contractor shall be responsible to provide (2) transformer concrete oil containment pits around the existing transformer foundations.

PRE-CAST CABLE TRENCH, CONDUIT AND CABLE

A. General

The conduit and cable installation shall be in conformance with the latest edition of the NEC and construction prints. Direct buried cables are not acceptable.

B. Cable Trench

Pedestrian rated precast concrete trench shall be installed in the 138kV yard to bring underground cables into control house building.

C. Underground

Underground conduit shall be polyvinyl chloride (PVC) schedule 40 rated and labeled for use with 90 deg C rated conductors. Underground conduits shall be buried a minimum of 24-inches below subgrade, unless specified otherwise.

D. Above Ground

Above ground conduits shall be PVC schedule 40 electrical grade conduit or flexible metal conduits as detailed on construction drawings.

E. Control House

The control house shall be a cinder block building with all battery systems, cable tray and internal wiring by others. Contractor will be responsible for installation of relay panels (provided by others) and associated cables in the control house building.

FOUNDATIONS

A. Geotechnical Studies

Geotechnical Study prepared by Terracon is attached.

B. General Requirements

All concrete pours shall be notified to the Owner's Construction Manager twenty-four hours prior to pour.

C. Delivery

The time the concrete is mixed shall be placed on the ticket for each concrete truck. The Contractor shall show on this ticket the time the concrete is placed. Owner will determine in its design the maximum time allowed between the concrete mix time and the time the concrete is placed. Concrete that cannot be placed in this time shall not be used in this contract. Other information on the ticket shall be ticket number, mix number, amount of water added at jobsite by Contractor, temperature of concrete, name of batch plant, date and truck number. Copy of all delivery tickets shall be provided to the Owner's Construction Manager.

D. Test Cylinders

Prepare test cylinders (6" diameter by 12" length) conforming to ASTM C31, with not less than one set of cylinders (six cylinders) from each day's placement for each 50 cubic yards or fraction thereof. Test cylinders shall also be made for each transformer foundation and each of the substation dead-end structure foundations. Two cylinders per set to be tested at 7 days, two cylinders at 28 days, and two kept as spares. Additional cylinders shall be taken for breaks at 3 or 14 days if planned.

The test cylinders shall be clearly marked and records kept identifying the truck that the test cylinders were from and the foundations where the concrete was placed. The test cylinders shall be initially kept near the foundations where the concrete was placed. The test cylinders shall be delivered to the Contractor's Laboratory for testing. Test reports shall be provided to the Construction Manager.

E. Slump Tests

Slump test on each concrete truck shall be made in accordance with ASTM C31. Concrete with slump test greater than the concrete design value shall not be used on this project. The Contractor shall not attempt to increase the slump after it has failed the maximum slump test. Contractor shall maintain record of all slump tests and this record shall include the truck ticket number, time and date.

SWPPP

The Below Grade/Above Grade Contractor shall be responsible for monitoring SWPPP during construction.

BUILDING

Contractor shall connect building to yard cable raceway system and terminate all yard conductors to the building panel boards and AC/DC panel boards as needed.

GROUNDING

Contractor shall install all grounding conductor, grounding fittings, exothermic welding shots, molds, etc.

FENCING

Contractor shall be responsible for grounding the security fence post, security chain link fence, barbed wire above the chain link fence, and fence fabric around the entire Substation yard. The fence shall be connected to the ground grid as noted on the project drawings.

TESTING & OBSERVATION

Unless otherwise noted, all required materials laboratory testing and observation will be provided by Raba Kistner.

BURNS & MCDONNELL

CS-SUB-01

RIO GRANDE SUBSTATION PROJECT

Wali Zaidi

8/16/2019

Substation Construction package for Rio Grande Substation.

000005-0

8/16/2019

RIO GRANDE SUBSTATION PROJECT
Contract No. CS-SUB-01: Substation Construction

DOCUMENT 000005 - INDEX AND CERTIFICATION PAGE

SPECIFICATION INDEX

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-Cable Schedule	Rio Grande Substation Cable Schedule	
-Drawings	Rio Grande Substation Drawings	
-Geotech Report	Rio Grande Substation Geotech Report	

ISSUED FOR BID

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 011101 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section summarizes the Work covered in detail in the complete Contract Documents.

1.02 CONTRACT INFORMATION:

- A. Owner: Brownsville Public Utilities Board
- B. Engineer : Burns & McDonnell
- C. Supplier: Provider of equipment and materials as specified in Bill of Material for the specific substation.
- D. Contractor: Installer of equipment, materials, and structures and Supplier provided equipment and materials.
- E. Manufacturer/Subsupplier: Manufacturer or supplier of equipment and materials not manufactured by Supplier.
- F. Testing Laboratory/materials observation contractor : Raba Kistner, Inc.

1.03 PROJECT DESCRIPTION:

- A. The scope of this contract is in support of a project for the construction of a new 138/12.47-kV distribution substation.

1.04 WORK COVERED BY CONTRACT DOCUMENTS:

- A. The Work in this Specification includes supply of below and above grade conduit and grounding materials, foundation materials, and site work materials.
- B. Provide all equipment and material as specified in the Bill of Material.
- C. The Work of this Construction Contract includes the installation of substation structures, bus work, jumpers, equipment, control and power cable, control and power conduits, ground terminations, and assistance to Testing and Commissioning Contractor, etc.
 - 1. Assistance to Testing and Commissioning Contractor includes the availability of two men and one man lift for 2 weeks.
- D. Items are provided and installed by this contract in accordance with the Bill of Material.

SECTION 011101 –SUMMARY OF WORK: Continued

Contractor will:

1. Receive delivery of all materials, structures, and equipment; offload from shipping company; provide storage area; assemble as indicated on the construction contract documents; install on structure or foundations.
2. Assemble equipment (install bushings/support structures and terminate internal cables).
3. Connect all field and power cables to the cabinet, and install high voltage jumper cables.

E. Power Transformer:

1. Contractor will assemble and dressout transformers as well as fill transformer with oil. Contractor shall connect all field and power cables to the cabinet, and install high voltage jumper cables. Contractor shall install high voltage jumper cables only after testing is completed.
2. Contractor shall install oil containment as specified in Contract Drawings and per Manufacturer's instructions.

F. Contractor shall connect building to yard cable raceway system and terminate all yard conductors to the building control panels. If applicable, Contractor shall weld control building anchorage plate and provide and install building anchors.

G. Contractor to provide all anchor bolts needed for steel structures.

1.05 WORK BY OTHERS:

A. Other Contracts:

1. Providing major equipment items as indicated on Substation Bill of Material.
2. Power Transformer provided by Others and will be dressed out by Contractor.
3. 12.47kV Switchgear provided by Others.
4. Design, manufacturing and delivery of substation steel structures not specified in these Contract Documents.
5. Furnishing Control House with, Relaying Panels, DC System, and Station Service Panelboards.
6. Transmission work including connection to substation dead end poles by Others.
7. 12.47kV Capacitor Banks provided by Others.
8. Site to be prepared to rough grade.
9. Testing and Commissioning.

SECTION 011101 –SUMMARY OF WORK: Continued

1.06 WORK SEQUENCE:

- A. General: Sequence of Work shall be determined by Owner & Contractor (subject to required stages, scheduled events, or scheduled delays as specified below.)

1.07 MEASUREMENT AND PAYMENT:

- A. Proposals will be received on a Lump Sum basis as set forth in the PROPOSAL FORM.
- B. Firm Proposals are required.
- C. Change Orders and Payment Procedures: Specified in GENERAL TERMS AND CONDITIONS.

1.08 COPIES OF DOCUMENTS:

- A. Furnished Copies: After execution of Agreement, Contractor will be furnished at no cost, a maximum of one (1) set of paper documents and one (1) set of electronic files of the Contract Documents consisting of full-size Issue for Construction Drawings, specifications and bills of material, including revised Drawings (and schedules) and the Record Documents, in addition to those used in execution of the Agreement.

PART 2 - PRODUCTS - Not Applicable.

PART 3 - EXECUTION - Not Applicable.

END OF SECTION 011101

SECTION 011101 –SUMMARY OF WORK: Continued

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SECTION 012310 - ALTERNATES

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section specifies administrative and procedural requirements for Alternates.
- B. Definition: An Alternate is an amount proposed by the Supplier and stated on the Bid Form for certain Work activities defined in the Bidding Requirements that may be added to or deducted from Base Bid amount if Owner decides to accept a corresponding change in either the products, Materials, Equipment, systems, the amount of Work to be completed on the Project, or installation methods described in Contract Documents.
- C. Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the Project. Costs listed for each Alternate shall include costs of related coordination, modification, or adjustment.
- D. Notification: Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected, or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.
- E. Schedule: A "Schedule of Alternates" shall be submitted after execution of Contract. Specification Sections and/or Drawings referenced in the Schedule, if any, shall contain requirements for Equipment, Materials, and methods necessary to achieve the Work described under each Alternate.
 - 1. Each Alternate is defined by abbreviated language, recognizing that Drawings and Specifications document the requirements.
 - 2. Include as part of each Alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

PART 2 - PRODUCTS – Not Applicable.

PART 3 - EXECUTION - Not Applicable.

END OF SECTION 012310

SECTION 012310 - ALTERNATES: continued

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SECTION 013210 - PROJECT MEETINGS, SCHEDULES, AND REPORTS

PART 1 - GENERAL

1.01 SUMMARY:

- A. Project Meetings:
 - 1. Preliminary Conference.
 - 2. Coordination Meetings.
- B. Schedules and Reports:
 - 1. Initial Coordination Submittals.
 - 2. Work Progress Schedule.
 - 3. Work Progress Reports.
 - 4. Delivery Schedule.
- C. Related Work Specified Elsewhere:
 - 1. Submittals: SECTION 013301.
 - 2. Equipment and Materials: SECTION 016001.

1.02 PROJECT MEETINGS:

- A. Preliminary Conference:
 - 1. Contractor will conduct a meeting within 5 days after the Notice to Proceed, to review items stated in the agenda and to establish a working understanding between the parties as to their relationships during performance of the Work. The conference shall be attended by:
 - a. Contractor.
 - b. Representatives of principal Sub-Suppliers.
 - c. Owner.
 - d. Owner's representatives.
 - 2. Meeting Agenda:
 - a. Projected fabrication, delivery, and construction schedules.
 - b. Project coordination.
 - c. Procedures and processing of:
 - (1) Substitutions.
 - (2) Submittals.
 - (3) Change Orders.
 - (4) Request for Information (RFI).

SECTION 013210 - PROJECT MEETINGS, SCHEDULES, AND REPORTS: Continued

- (5) Applications for Payment.
 - d. Procedures for testing.
 - 3. Location of Meeting: Determined by Owner
- 1.03 SCHEDULES AND REPORTS:
- A. Initial Coordination Submittals: Within 5 days after the Notice to Proceed, Contractor shall submit to Owner electronic files for review and acceptance:
 - 1. A preliminary Work progress schedule.
 - 2. A preliminary schedule of Submittals, as stated in SECTION 013301.
 - 3. Certification of insurance or copies of policies as specified in the Contract Documents required by Owner.
 - B. Work Progress Schedule:
 - 1. After submittal of preliminary Work progress schedule, Contractor shall submit to Owner a detailed Work progress schedule within 30 days after the Notice to Proceed. Base the schedule on the preliminary Work progress schedule and incorporate review comments and other feedback.
 - 2. The schedule shall show the Work in a graphic format suitable for displaying scheduled and actual progress.
 - a. Prepare schedules as a horizontal bar chart with separate bar for each major portion of the Work or operation.
 - b. The schedule shall also show the Work broken down into major phases and key items with the dates Work is expected to begin and be completed. Sequence of listings shall be in the chronological order of the start of each item of Work.
 - 3. Provide sub-schedules to define critical portions of entire schedules.
 - 4. Coordinate Work progress schedule with Work progress reports and delivery schedule.
 - 5. Owner will review and comment on Work progress schedule. Upon agreement between Owner and Contractor on necessary changes:
 - a. Contractor shall distribute electronic copies of the accepted schedule to Owner.
 - 6. Contractor shall not change the accepted Work progress schedule without prior concurrence of Owner.
 - 7. Submit to Owner an updated schedule at least once monthly. Schedule shall show actual progress and any proposed changes in the schedule of remaining Work.
 - C. Work Progress Reports:

SECTION 013210 - PROJECT MEETINGS, SCHEDULES, AND REPORTS: Continued

1. Submit monthly a report on actual Work progress. More frequent reports may be required should the Work fall behind the accepted schedule.
 2. Work progress reports shall consist of annotated electronic files made from the accepted Work progress schedule, and a narrative report which shall include but not be limited to the following:
 - a. A description of current and anticipated delaying factors, if any.
 - b. Impact of possible delaying factors.
 - c. Proposed corrective actions.
 3. A Work progress report shall accompany each application for partial payment. Work reported complete but not readily apparent to Owner must be substantiated with supporting data.
 4. Should operations fall behind accepted schedule to an extent that completion of Work within the Contract Time appears doubtful, Supplier shall, at no change in Contract Price, take corrective action to get back on schedule.
- D. Delivery Schedule:
1. Within 30 days after the Notice to Proceed, Owner and Contractor shall agree on a delivery schedule for all Equipment and Materials to be furnished for which the delivery time is not named in the Bid or specified.
 2. Contractor shall notify Owner at least two weeks in advance of any delivery date, and shall not make any shipments without written approval of Owner.
 3. No delivery will be approved until proper Submittals pertaining to storage and installation have been received and accepted.
 4. Any items delivered without written approval may be returned to the point of origin, or unloaded and stored at a place and in a manner determined by Owner, and Contractor will be charged with any additional expense resulting therefrom.

PART 2 - PRODUCTS - Not Applicable.

PART 3 - EXECUTION - Not Applicable.

END OF SECTION 013210

SECTION 013210 - PROJECT MEETINGS, SCHEDULES, AND REPORTS: Continued

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SECTION 013301 - SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes definitions, descriptions, transmittal, and review of Submittals.
- B. Related Work Specified Elsewhere:
 - 1. Project Meetings, Schedules, and Reports: SECTION 013210.
 - 2. Contract Closeout: SECTION 017801.

1.02 GENERAL INFORMATION:

- A. Definitions:
 - 1. Shop Drawings, product data, and Samples are technical Submittals prepared and submitted by Supplier to Owner as a basis for approval of the use of Equipment and Materials proposed for incorporation in the Work or needed to describe installation, operation, maintenance, or technical properties, as specified in the Specifications.
 - a. Shop Drawings include custom-prepared data of all types including drawings, diagrams, performance curves, material schedules, templates, instructions, and similar information not in standard printed form applicable to other projects.
 - b. Product data includes standard printed information on materials, products, and systems; not custom-prepared for this Project, other than the designation of selections from available choices.
 - c. Samples include both fabricated and unfabricated physical examples of Materials, products, and Work; both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis. Mockups are a special form of Samples which are too large to be handled in the specified manner for transmittal of Sample Submittals.
 - 2. Informational Submittals are those technical reports, administrative Submittals, certificates and guarantees not defined as Shop Drawings, product data, or Samples.
 - a. Technical reports include laboratory reports, tests, technical procedures, technical records, and Supplier's design analysis.
 - b. Administrative Submittals are those nontechnical Submittals required by the Contract Documents or deemed necessary for administrative records. These Submittals include maintenance agreements, Bonds, Project photographs, physical

SECTION 013301 - SUBMITTALS: Continued

work records, statements of applicability, copies of industry standards, Project record data, schedules, security/protection/safety data, and similar type Submittals.

- c. Certificates and guarantees are those Submittals on Equipment and Materials where a written certificate or guarantee from the manufacturer or Supplier is called for in the Specifications.

- 3. Refer to ARTICLES 1.03 and 1.04 of this Part for detailed lists of Submittals and specific requirements.

B. Quality Requirements:

- 1. Submittals such as drawings and data submitted to Owner shall be of suitable quality for legibility and reproduction purposes. Every line, character, and letter shall be clearly legible. Drawings such as reproducibles shall be useable for further reproduction to yield legible hard copy.
- 2. Documents submitted to Owner that do not conform to specified requirements shall be subject to rejection by Owner, and upon request, Supplier shall resubmit conforming documents. If conforming Submittals cannot be obtained, such documents shall be retraced, redrawn, or photographically restored as may be necessary to meet such requirements. Supplier's failure to initially satisfy the legibility quality requirements shall not relieve Supplier from meeting the required schedule for Submittals.

C. Language and Dimensions:

- 1. All words and dimensional units shall be in the English language.
- 2. Metric dimensional unit equivalents shall be stated in addition to English units.

D. Submittal Completeness:

- 1. Submittals shall be complete with respect to dimensions, design criteria, materials of construction, and other information specified to enable Owner to review the information effectively.
- 2. Where standard drawings are furnished which cover a number of variations of the general class of Equipment, each drawing shall be annotated to indicate exactly which parts of the drawing apply to the Equipment being furnished. Use hatch marks to indicate variations which do not apply to the Submittal. The use of "highlighting markers" will not be an acceptable means of annotating Submittals. Such annotation shall also include proper identification of the Submittal permanently attached to the drawing.
- 3. Reproduction or copies of Contract Drawings or portions thereof will not be accepted as complete fabrication or erection drawings, but will be acceptable when used by Supplier

SECTION 013301 - SUBMITTALS: Continued

as a drawing upon which to indicate information on erection or to identify detail drawing references. Whenever the Contract Drawings are revised to show additional Supplier's information, Owner's title block shall be replaced with Supplier's title block, and Engineer's professional seal shall be removed from the drawing.

E. Form of Submittals:

1. Submittals and other Project documents shall be transmitted in electronic format as specified.
 - a. Selected Submittals may be provided in paper ("hardcopy") copies with advance approval of Owner, and using procedures specified herein.
 - b. Equipment instruction books and operating manuals shall be provided in paper copies in addition to specified electronic format.
2. Electronic Format using Owner's Document Management System:
 - a. Scanned Submittals and documents are acceptable with specific Owner approval. Transmit Submittal and Project documents in:
 - (1) Adobe *PDF files created directly from native electronic format and,
 - (2) Native electronic format, or
 - (3) Owner-approved equal.
 - (4) Electronic Submittals in .tif format are permitted only with specific Owner approval.
 - b. Each drawing shall be submitted with an electronic filename that is equivalent to the drawing number, and a date on which the submittal is made. Any resubmitted drawing shall use the same filename as the original file name and the date of resubmittal.
 - c. Supplier Submittals shall be accompanied with a completed transmittal letter. Submittals that are not accompanied with an approved transmittal letter will not be accepted and will be returned to Supplier.
 - d. All Supplier transmittal letters submitted to Owner shall be in the form supplied and shall contain as a minimum the following information:
 - (1) Supplier's Name.
 - (2) Owner's Project number.
 - (3) Owner's Contract number.
 - (4) Filename.
 - (5) Description of the information contained in the specific Submittal.

SECTION 013301 - SUBMITTALS: Continued

- (6) Revision number.
- (7) Submittal type.
- (8) Date of Submittal.
- e. Nonconforming Submittals are subject to rejection by Owner.
- 3. Owner's review comments will be provided electronically in Adobe *PDF format.
- 4. Provide "as-built" Submittals, record documents, Equipment instruction books and operating manuals, and other documents on CD-ROM in Adobe *PDF and native format or another format that is required and approved by Owner
- 5. Digital delivery media shall be Owner's and Owner's File Transfer Protocol (FTP) sites.

1.03 TECHNICAL SUBMITTALS:

- A. Items shall include but not be limited to, the following:
 - 1. Manufacturer's specifications.
 - 2. Catalogs, or parts thereof, of manufactured Equipment.
 - 3. Shop fabrication and erection drawings.
 - 4. General outline drawings of Equipment showing overall dimensions, location of major components, weights, and location of required building openings and floor plates.
 - 5. Detailed Equipment installation drawings, showing foundation details, anchor bolt sizes and locations, base plate sizes, location of Owner's connections, and all clearances required for erection, operation, and disassembly for maintenance.
 - 6. Schematic diagrams for electrical items, showing internal and external connections, and terminal block numbers.
 - 7. Internal wiring diagrams.
 - 8. One-line diagrams.
 - 9. Instruction books and operating manuals.
 - 10. Performance tests on Equipment by manufacturers.
 - 11. Samples and color charts.
 - 12. All drawings, catalogs, or parts thereof, manufacturer's specifications and data, samples, instructions, and other information specified or necessary:
 - a. For Owner to determine that Equipment and Materials conform with the design concept and comply with intent of the Contract Documents.
 - b. For proper erection, installation, operation, and maintenance of Equipment and Materials which Owner will review for general content but not for basic details.

SECTION 013301 - SUBMITTALS: Continued

- c. For Owner to determine what supports, anchorages, structural details, connections, and services are required for Equipment and Materials, and effects on contiguous or related structures, Equipment, and Materials.

B. Schedule of Submittals:

1. Prepare for Owner's concurrence a schedule for submission of all Submittals specified or necessary for Owner's approval of the use of Equipment and Materials proposed for incorporation in the Work or needed for proper installation, operation, or maintenance. Submit the schedule with the Work progress schedule. Schedule submission of all Submittals to permit review, fabrication, and delivery in time so as to not cause delay in the Work of Supplier or its SubSuppliers or any other Suppliers as described herein.
2. In establishing schedule for Submittals, allow 7 days in Owner's office for reviewing original Submittals and 5 days in Owner's office for reviewing re-submittals.
3. Submittals requiring revisions shall be resubmitted within 15 days after receipt of Owner's review notations.
4. The schedule shall indicate anticipated dates of original submission for each item and Owner's approval thereof, and shall be based upon at least one resubmission of each item.
5. Schedule all Submittals (Shop Drawings, product data, and Samples) required prior to fabrication or manufacture for submission within 20 days of the Notice to Proceed. Schedule Submittals pertaining to storage, installation, and operation at the Site for Owner's approval prior to delivery of Equipment and Materials.
6. Resubmit Submittals the number of times required for Owner's "Submittal Approved." However, any need for re-submittals in excess of the number set forth in the accepted schedule, or any other delay in obtaining approval of Submittals, will not be grounds for extension of the Contract Time provided Owner completes his reviews within the times specified.
7. Where a Submittal is required by the Specifications or the accepted Submittal Schedule, Supplier shall not commence production of any part of the Equipment and Materials affected thereby until such Submittal has been reviewed and approved by Owner.

C. Transmittal of Submittals:

SECTION 013301 - SUBMITTALS: Continued

1. All Submittals (Shop Drawings, product data, and Samples) for Equipment and Materials furnished by Supplier, Sub-Suppliers, manufacturers, and Suppliers shall be submitted to Owner by Supplier.
2. Transmit all Submittals to Owner for approval as follows:
 - a. Identify each Submittal by Project name and number, Contract title and number, and applicable Specification Section and Article numbers. Include an electronic file of the letter of transmittal the drawing number and title, sheet number (if applicable), revision number, and electronic file name (if applicable). Unidentifiable Submittals will be returned for proper identification.
 - b. Check and approve Submittals of SubSuppliers, Suppliers, and manufacturers prior to transmitting them to Owner. Supplier's submission shall constitute a representation to Owner that Supplier approves Submittals and has determined and verified all design criteria, quantities, dimensions, materials, catalog numbers, compliance with Laws and Regulations, and similar data, and Supplier assumes full responsibility for doing so; and Supplier has coordinated each Submittal with requirements of the Work and the Contract Documents.
 - c. At the time of each submission, call to the attention of Owner in the letter of transmittal any deviations from requirements of the Contract Documents.
 - d. Make all modifications noted or indicated by Owner and return the required number of revised Submittals until approved. Direct specific attention in the letter of transmittal, on revised Submittals, to changes other than the modifications called for by Owner on previous Submittals. Previously approved Submittals transmitted for final distribution will not be further reviewed and are not to be revised unless errors are discovered during manufacture or fabrication. Correct the Submittal and resubmit for review.
 - e. Following completion of the Work and prior to final payment, furnish record documents and approved Samples and Shop Drawings necessary to indicate "as-built" conditions, including field modifications, in the number of copies specified. Furnish additional copies for insertion in Equipment instruction books and operating manuals as required. All such copies shall be clearly marked "PROJECT RECORD."
 - (1) Submit a final record copy of the Master Field Drawing list which shall indicate the final revision status of each drawing on the list.

SECTION 013301 - SUBMITTALS: Continued

3. Quantity Requirements:
 - a. Except as otherwise specified, transmit all Shop Drawings in the following quantities:
 - (1) Initial Submittal:
 - (a) Electronic - One copy to Owner.
 - (2) Resubmittals:
 - (a) Electronic - One copy to Owner.
 - (3) Submittal for final distribution:
 - (a) Electronic - One copy to Owner.
 - (4) As-constructed documents:
 - (a) Electronic - One copy to Owner.
 - (b) Paper - Five copies to Owner.
 - b. Transmit Submittals of product data as follows:
 - (1) Initial Submittal:
 - (a) Electronic - One copy to Owner.
 - (2) Resubmittals:
 - (a) Electronic - One copy to Owner.
 - (3) Submittal for final distribution:
 - (a) Electronic - One copy to Owner.
 - c. Transmit Submittals of Equipment instruction books and operating manuals as follows:
 - (1) Initial Submittal:
 - (a) Electronic - One copy to Owner.
 - (2) Resubmittals:
 - (a) Electronic - One copy to Owner.
 - (3) Submittal for Final Distribution – 1 electronic copy to Owner.
 - (4) Submittal for Final Distribution - 4 paper copies and 1 electronic copy each to Owner.
 - d. When all Submittals have been updated to "as-built" conditions, transmit to Owner in electronic format.
 - e. Owner may copy and use for internal operations and staff training purposes any and all document Submittals required by this Contract and approved for final distribution, whether or not such documents are copyrighted, at no additional cost to

SECTION 013301 - SUBMITTALS: Continued

Owner. If permission to copy any such Submittal for the purposes stated is unreasonably withheld from Owner by Supplier or any SubSupplier, manufacturer, or Supplier, Supplier shall provide to Owner 2 copies plus the number of copies required by Supplier at each final distribution issue.

4. Supplier's erection drawings and other Submittals required for installation of Equipment furnished under this Contract for installation under other contracts will be transmitted by Owner to Contractor(s) in the final distribution of such Submittals.
5. Information to Manufacturer's District Office: Supplier shall arrange for manufacturers and Suppliers of Equipment or Materials to furnish copies of all agreements, drawings, specifications, operating instructions, correspondence, and other matters associated with this Contract to the manufacturer's district office servicing Owner. Insofar as practicable, all business matters relative to Equipment and Materials included in this Contract shall be conducted through such local district offices.

D. Owner's Review:

1. Owner will review and take appropriate action on Submittals in accordance with the accepted Schedule of Submittals. Owner's review and approval will be only to determine if items of Equipment and Materials covered by the Submittals are compatible with the design concept and conform to information given in the Contract Documents.
2. Such review and approval will not extend to design data reflected in Submittals which is solely within the special expertise of Supplier or Supplier's SubSuppliers or manufacturers. Review and approval of a component item as such will not indicate approval of the assembly in which the item functions.
3. Owner's review and approval of Shop Drawings, product data, or Samples will not relieve Supplier of responsibility for any deviation from requirements of the Contract Documents unless Supplier has in writing called Owner's attention to such deviation at the time of submission, and Owner has given written concurrence in and approval of the specific deviation. Approval by Owner shall not relieve Supplier from responsibility for errors or omissions in Submittals.

E. Submittal Action Stamp:

SECTION 013301 - SUBMITTALS: Continued

1. Owner's review action stamp, appropriately completed, will appear on all Submittals of Supplier when returned by Owner. Review status designations listed on Owner's action stamp are defined as follows:

A - SUBMITTAL APPROVED Signifies Equipment or Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is approved for incorporation in the Work. Supplier is to proceed with fabrication or procurement of the items and with related Work. Copies of the Submittal are to be transmitted to Owner for final distribution.

B - SUBMITTAL APPROVED AS NOTED (RESUBMIT) Signifies Equipment or Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is approved for incorporation in the Work in accordance with Owner's notations. Supplier is to proceed with fabrication or procurement of the items and with related Work in accordance with Owner's notations and is to submit a revised Submittal responsive to notations marked on the returned Submittal or written in the letter of transmittal.

C - SUBMITTAL RETURNED FOR REVISION (RESUBMIT) Signifies Equipment or Material represented by the Submittal appears to conform with the design concept and comply with the intent of the Contract Documents but information is either insufficient in detail or contains discrepancies which prevent Owner from completing his review. Supplier is to resubmit revised information responsive to Owner's annotations on the returned Submittal or written in the letter of transmittal. Fabrication or procurement of items represented by the Submittal and related Work is not to proceed until the Submittal is approved.

D - SUBMITTAL NOT APPROVED (SUBMIT ANEW) Signifies Equipment or Material represented by the Submittal does not conform with the design concept or comply with the intent of the Contract Documents and is disapproved for use in the Work. Supplier is to provide Submittals responsive to the Contract Documents.

SECTION 013301 - SUBMITTALS: Continued

E - PRELIMINARY SUBMITTAL Signifies Submittals of such preliminary nature that a determination of conformance with the design concept or compliance with the intent of the Contract Documents must be deferred until additional information is furnished. Supplier is to submit such additional information to permit layout and related activities to proceed.

F - FOR REFERENCE, NO APPROVAL REQUIRED Signifies Submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts, standard sheets, bulletins and similar data, all of which are useful to Owner in design, operation, or maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the Contract Documents. Owner reviews such Submittals for general content but not for basic details.

G - DISTRIBUTION COPY (PREVIOUSLY APPROVED) Signifies Submittals which have been previously approved and are being distributed to Owner and others for coordination and construction purposes.

F. Instruction Books and Operating Manuals:

1. Electronic and paper copies of equipment instruction books and operating manuals prepared by the Supplier shall include the following:
 - a. Index and tabs.
 - b. Instructions for installation, start-up, operation, inspection, maintenance, parts lists and recommended spare parts, and data sheets showing model numbers.
 - c. Applicable drawings.
 - d. Warranties and guarantees.
 - e. Name and address of nearest manufacturer-authorized service facility.
 - f. All additional data specified.

1.04 INFORMATIONAL SUBMITTALS:

- A. Informational Submittals are comprised of technical reports, administrative Submittals, and guarantees which relate to the Work, but do not require Owner approval prior to proceeding with the Work. Informational Submittals include:

SECTION 013301 - SUBMITTALS: Continued

1. Test reports.
 2. Certification on Materials:
 - a. Steel mill tests.
 3. Shipping and/or packing lists.
 4. Job progress schedules.
 5. Equipment and Material delivery schedules.
 6. Warranties and guarantees.
- B. Transmittal of Informational Submittals:
1. All Informational Submittals furnished by Supplier, SubSuppliers, and manufacturers shall be submitted to Owner by Supplier unless otherwise specified.
 - a. Identify each Informational Submittal by Project name and number, Contract title and number, and the Specification Section and Article numbers marked thereon or in the letter of transmittal. Unidentifiable Submittals will be returned for proper identification.
 - b. At the time of each submission, call to the attention of Owner in the letter of transmittal any deviations from the requirements of the Contract Documents.
 2. Quantity Requirements:
 - a. Technical reports and administrative Submittals except as otherwise specified:
 - (1) Electronic: One to Owner.
 - b. Written certificates and guarantees:
 - (1) Owner: 2 copies.
 3. Test Reports:
 - a. Responsibilities of Supplier, Owner regarding tests and inspections of Equipment, Materials, and completed Work are set forth elsewhere in these Contract Documents.
 - b. The party specified responsible for testing or inspection shall in each case, unless otherwise specified, arrange for the testing laboratory or reporting agency to distribute test reports as follows:
 - (1) Owner: 1 electronic copy.
 - (2) Owner: 1 electronic copy.
- C. Owner's Review:
1. Owner will review informational Submittals for indications of Work or Material deficiencies.

SECTION 013301 - SUBMITTALS: Continued

2. Owner will respond to Supplier on those informational Submittals which indicate Work or Material deficiency.

PART 2 - PRODUCTS - Not Applicable.

PART 3 - EXECUTION - Not Applicable.

END OF SECTION 013301

SECTION 013301 - SUBMITTALS: Continued

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SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY:

- A. Contractor is directly responsible for the quality of their products and services, including those of their suppliers & vendors. Acceptable quality is defined as meeting the requirements specified in the Contract Documents.
- B. Contractor shall implement a written Quality Control System that includes the following, as applicable, plus any supplemental procedures and/or instructions needed to meet the requirements of the Contract Documents.
 - 1. Organizational description including corporate and project level organizational charts showing lines of authority and reporting.
 - 2. Description of how the requirements specified in the Contract Documents are implemented through procedures, training, drawings, forms, etc.
 - 3. Procedures for scheduling, reviewing, approving, and controlling documentation, including records and submittals.
 - 4. Procedures for procuring materials and equipment.
 - 5. Procedures for material receipt, protection, control, security, and maintenance.
 - 6. Procedures for scheduling and performance of construction activities.
 - 7. Detailed procedures for control, verification, and acceptance of construction activities.
 - 8. Detailed procedures for identifying and controlling discrepancies from the project requirements.
 - 9. Procedures for system acceptance, including punch-listing and sign-off.
 - 10. Procedures for scheduling and format of project turnover documentation.
- C. Contractor must submit their written Quality Control System to the Owner for review, prior to starting work.
- D. Contractor's personnel must have sufficient experience, training, and knowledge with the product and processes for which they are responsible. Personnel must be familiar with the applicable codes of construction, project specifications / requirements, and inspection and testing operations used for verification.
- E. Contractor is responsible for the coordination and scheduling of required tests and inspections, and providing the Site Manager with sufficient prior notice to witness the required activities.

SECTION 014000 - QUALITY REQUIREMENTS: Continued

- F. Contractor is responsible for the receipt, protection, control, security, and maintenance of all Contractor furnished materials, including those of their suppliers & subvendors, and Owner furnished materials, as specified in the Contract Documents.
- G. Contractor shall prepare a report on a weekly basis, as a minimum, of quality control activities performed during the reporting period and submit to Owner with copies of the quality records generated during the period.
- H. Site Manager may audit or inspect the Contractor's products, services, and records to verify they are in accordance with the written quality control system and the Contract Documents.

1.02 QUALITY CONTROL:

- A. Contractor shall perform the necessary activities to verify the requirements specified in the Contract Documents are completed correctly and in their entirety.
- B. Contractor shall document the completion of all quality control activities.
- C. Contractor shall develop an appropriate Quality Control Checklist if one is not provided by Owner.
- D. Contractor shall utilize report forms, in conjunction with the Quality Control Checklists, to document the results and/or status of required tests and inspections. Contractor may use their form if Owner has not provided one.
- E. Contractor shall include the fully executed Quality Control Checklists and report forms with their project turnover documentation.

1.03 PROJECT TURNOVER DOCUMENTATION:

- A. Contractor shall maintain and file all quality records at the jobsite including Quality Control Checklists, test reports and records, nonconformance reports, weld logs, material certifications, etc.
- B. Contractor shall label and assemble all quality records into turnover packages as specified in the Contract Documents.
- C. Contractor shall provide the complete turnover packages to the Site Manager prior to or at the time of completing their work.

PART 2 - PRODUCTS: Not applicable.

PART 3 - EXECUTION: Not applicable.

END OF SECTION 014000

SECTION 014000 - QUALITY REQUIREMENTS: Continued

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SECTION 016001 - EQUIPMENT AND MATERIALS

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes general requirements for Supplier-furnished Equipment and Materials.
- B. Related Work Specified Elsewhere:
 - 1. Submittals: SECTION 013301.

1.02 DEFINITIONS:

- A. Definitions used in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as "systems," "structures," "finishes," "accessories," "furnishings," "special construction," and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.
 - 1. "Products": Items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the Project or taken from the previously purchased stock. The term "product" includes the terms "Material," "Equipment," "system," and other terms of similar intent.
 - 2. "Equipment": A product with operational or nonoperational parts, regardless of whether motorized, manually operated, or fixed. Equipment may require service connections such as wiring or piping.
 - 3. "Materials": Products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form parts of the Work.

1.03 QUALITY ASSURANCE:

- A. Equipment and Material Incorporated into the Work:
 - 1. Conform to applicable Specifications, codes, standards, and requirements of regulatory agencies.
 - 2. Provide Products that comply with the requirements of the Contract Documents, undamaged and, unless otherwise indicated, new and unused at the time of installation. Provide products that are complete with all accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for the intended use and effect.

SECTION 016001 - EQUIPMENT AND MATERIALS: Continued

- a. Standard Products: Where they are available and comply with Specifications, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - b. Continued Availability: Where, because of the nature of its application, Owner is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard products for which the manufacturer has published assurances that the products and its parts are likely to be available to Owner at a later date.
3. Comply with size, make, type, and quality specified, or as specifically approved in writing by Owner.
4. Manufactured and Fabricated Products:
 - a. Design, fabricate, and assemble in accordance with the applicable standard trade, engineering, and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - c. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Equipment and Material shall be suitable for intended service conditions.
 - e. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing by Owner.
5. Do not use Material or Equipment for any purpose other than that for which it is designed or is specified.
- B. Nameplates: Along with required labels and operating data, manufacturer or producer's nameplates, imprints, or trademarks may be placed on surfaces exposed to view.
 1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated Equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer including address (and telephone number).
 - b. Model and serial number.
 - c. Capacity.
 - d. Ratings.

SECTION 016001 - EQUIPMENT AND MATERIALS: Continued

C. Electronic Equipment Compliance:

1. Supplier warrants that all equipment, devices, items, systems, software, hardware, or firmware provided shall properly, appropriately, and consistently function and accurately process date and time data (including without limitation: calculating, comparing, and sequencing). This warranty supersedes anything in the Specifications or other Contract Documents which might be construed inconsistently. This warranty is applicable whether the equipment, device, item, system, software, hardware, or firmware is specified with or without reference to a manufacturer's name, make, or model number.

PART 2 - PRODUCTS - Specified in applicable Sections.

PART 3 - EXECUTION - NOT APPLICABLE.

END OF SECTION 016001

SECTION 016001 - EQUIPMENT AND MATERIALS: Continued

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SECTION 016002 - EQUIPMENT AND MATERIAL HANDLING

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes general requirements for transportation and handling, delivery, storage, and protection of Supplier-furnished Equipment and Materials.
- B. Related Work Specified Elsewhere:
 - 1. Submittals: SECTION 013301.

1.02 DEFINITIONS:

- A. Definitions used in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as "systems," "structures," "finishes," "accessories," "furnishings," "special construction," and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.
 - 1. "Products": Items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the Project or taken from the previously purchased stock. The term "product" includes the terms "Material," "Equipment," "system," and other terms of similar intent.
 - 2. "Equipment": A product with operational or nonoperational parts, regardless of whether motorized, manually operated, or fixed. Equipment may require service connections such as wiring or piping.
 - 3. "Materials": Products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form parts of the Work.

1.03 TRANSPORTATION AND HANDLING:

- A. Shipment Preparation:
 - 1. Supplier shall prepare Equipment and Materials for shipment in a manner to facilitate unloading and handling, and to protect against damage or unnecessary exposure in transit and storage. Provisions for protection shall include the following:
 - a. Crates or other suitable packaging materials.
 - b. Covers and other means to prevent corrosion, moisture damage, mechanical injury, and accumulation of dirt in motors, electrical equipment, and machinery.
 - c. Suitable rust-preventive compound on exposed machined surfaces and unpainted iron and steel.

SECTION 016002 - EQUIPMENT AND MATERIALS HANDLING: Continued

- d. Grease packing or oil lubrication in all bearings and similar items.
- B. Marking: Tag or mark each item of Equipment and Material as identified in the delivery schedule or on Submittals and include complete packing lists and bills of material 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.
- C. Bills of Material: Supplier shall mail bills of material to Owner prior to delivery of each shipment and shall include bills of material with each shipment.
- D. Delivery:
 - 1. Furnish Owner all requirements for unloading and handling of Equipment and Materials upon delivery sufficiently in advance to allow Owner and Contractor(s) sufficient preparation time. Include type and capacity of unloading equipment required as applicable.
 - 2. Deliver Equipment and Materials in an undamaged condition, in original containers or packaging, with identifying labels intact and legible.
 - 3. Mark partial deliveries of component parts to identify the Equipment or Material, to permit easy accumulation of parts, and to facilitate assembly.
- E. Receipt and Unloading:
 - 1. Deliver all Equipment and Materials to the Point of Delivery complete with packing lists and bills of material. Owner will furnish receipts to shipper upon delivery.
 - 2. Above Grade Contractor will receive, check, unload (if not specified for Supplier), inventory, accept, and store all Equipment and Materials delivered to the Point of Delivery in accordance with proper notice. Above Grade Contractor will report any damage to Owner prior to or during unloading and advise Owner of any shortage at time of delivery. Owner will verify such reports and so notify Supplier.
 - 3. Above Grade Contractor will be responsible for proper location and all demurrage charges and substantiated claims for damage to trucks resulting from unloading operations, if unloaded by them otherwise Supplier will be responsible.

1.04 STORAGE AND PROTECTION:

- A. Storage Requirements:
 - 1. Furnish Owner all requirements for storage and protection of all Equipment and Materials sufficiently in advance of delivery to allow Contractor(s) sufficient preparation time.

SECTION 016002 - EQUIPMENT AND MATERIALS HANDLING: continued

2. Above Grade Contractor will furnish all facilities needed for storage of Equipment and Materials at the Project Site.
3. Above Grade Contractor will assume responsibility for and protect all Equipment and Materials in accordance with Supplier's recommendations.

PART 2 - PRODUCTS - Specified in applicable Sections.

PART 3 - EXECUTION - Not Applicable.

END OF SECTION 016002

SECTION 016002 - EQUIPMENT AND MATERIALS HANDLING: Continued

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SECTION 017801 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY:

A. Definitions:

1. "Closeout": is defined to include general requirements near the end of Contract Time, in preparation for installation by others, performance and acceptance testing, final acceptance, final payment, normal termination of Contract, and similar actions evidencing completion of the Work. Specific requirements for individual units of Work are specified in Sections of all divisions following DIVISION 1. Time of closeout is directly related to "Substantial Completion" of the installation or erection contract, and therefore may be either a single time period for the entire Work or a series of time periods for individual units of the Work which have been certified as Substantially Complete at different dates.
2. "Substantial Completion": means the event when (i) erection or installation of the Equipment and Materials furnished by this Contract has been completed, (ii) the Equipment and Materials are operating safely for the purpose of commissioning and startup, (iii) all testing of the Work has been completed and all test data properly evaluated, (iv) the performance guarantees have been met and warranty period started, and (v) Contractor has delivered to Owner all operating instructions, maintenance manuals, and warranties.

B. Related Work Specified Elsewhere:

1. Submittals: SECTION 013301.

1.02 REQUIREMENTS FOR FINAL PAYMENT:

A. General: Unless otherwise required elsewhere by these Contract Documents, the following shall be furnished to Owner prior to application for final payment.

1. Maintenance and operating instructions.
2. Guarantees.
3. Certifications of inspection.
4. "Record Document" Submittals.
5. Other documents as required by Contract Documents.
6. Spare parts.

B. Final Payment: Specified in GENERAL TERMS AND CONDITIONS.

SECTION 017801 - CONTRACT CLOSEOUT: Continued

1.03 PROJECT RECORD DOCUMENTS:

- A. General: In addition to documentation required by the Contract Documents, maintain at the Owner's facilities (and at installation Site) one record copy of:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Approved Shop Drawings, product data, and Samples.
- B. Recording:
 - 1. Label each document "PROJECT RECORD" in neat, large, printed letters.
 - 2. Record information concurrently with fabrication or Field Services progress.
 - 3. Record Drawings: Legibly mark to record actual construction:
 - a. Where Submittals are used for mark-up, record a cross-reference at corresponding location on Drawings.
 - b. Field changes of dimension and detail.
 - c. Changes made by Change Order or other Modifications. Note related Change Order numbers where applicable.
 - d. Details not on original Contract Drawings.
 - 4. Record Specifications and Addenda: Legibly mark each Section to record:
 - a. Manufacturer, trade name, catalog number, and Supplier of each product and item of Equipment actually furnished, particularly optional and substitute items.
 - b. Changes made by Addendum, Change Order, or other modifications.
 - c. Related Submittals.
 - 5. Record Product Data: Maintain one copy of each product data Submittal, and mark-up significant variations in actual Work in comparison with submitted information.
 - a. Include both variations in product as delivered to Point of Delivery, and variations from manufacturer's instructions and recommendations for installation.
 - b. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily observed. Note related Change Orders and mark-up of record drawings and specifications.
 - 6. Miscellaneous Record Submittals: Refer to other Sections of these Specifications for requirements of miscellaneous record keeping and Submittals in connection with actual performance of the Work.

SECTION 017801 - CONTRACT CLOSEOUT: Continued

7. Instruction Books and Operating Manuals: Specified in SECTION 013301.
8. Electronic Documentation:
 - a. In addition to paper copies, provide electronic versions of record documents showing "as-constructed" conditions, master field drawing list showing final revisions, instruction books, and operating manuals on CD-ROM in native electronic format and Adobe.
- C. Delivery:
 1. Deliver Record Documents to Owner.
 2. Accompany submittal with transmittal letter in duplicate, containing:
 - a. Date.
 - b. Contract title and number.
 - c. Contractor's name, address, and telephone number.
 - d. Number and title of each Record Document.
 - e. Signature of Contractor's authorized representative.

1.04 WARRANTIES AND BONDS: Specified elsewhere in the Contract Documents.

PART 2 - PRODUCTS - Not Applicable.

PART 3 - EXECUTION - Not Applicable.

END OF SECTION 017801

END OF DIVISION 1

SECTION 017801 - CONTRACT CLOSEOUT: Continued

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DIVISION 3 - CONCRETE

SECTION 031000 - CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This Section includes formwork for concrete.
- B. Related Work Specified Elsewhere:
 - 1. Concrete Reinforcement: SECTION 032000.
 - 2. Concrete: SECTION 033000.
 - 3. Drilled Shaft Foundations: SECTION 316329.
 - 4. Anchor Bolts : SECTION 337200.

1.02 QUALITY ASSURANCE:

- A. Applicable Standards:
 - 1. American Concrete Institute (ACI):
 - a. 318 - Building Code Requirements for Reinforced Concrete.
 - b. 347 - Guide to Formwork for Concrete.

PART 2 - PRODUCTS

2.01 MATERIALS FOR FACING:

- A. Where concrete will be exposed to view after construction:
 - 1. Smooth finish exterior grade plywood at least 5/8-inch thick.
 - 2. Steel.
- B. Where concrete will not be exposed to view after construction:
 - 1. Exterior grade plywood at least 5/8-inch thick.
 - 2. Steel.
 - 3. Wood fiberboard.
 - 4. Dressed lumber free of loose knots.
- C. Treat forms with lacquer, form oil or other acceptable material to prevent bonding to concrete. Material shall not stain, cause injury to exposed concrete surfaces or affect bonding of specified surface finishes.
- D. Clean forms of sawdust, dust, dirt, and other foreign materials.

SECTION 03100 - CONCRETE FORMWORK: Continued

2.02 FORM TIES:

- A. Break-back, coil, or screw-type, except where otherwise specified.
- B. Water seal coil type in walls below grade and walls of water-bearing structures.
- C. Coil-type shall leave conical depression in concrete.
- D. Space as required against pressure of fresh concrete.

2.03 CHAMFER STRIPS:

- A. 3/4-inch chamfer except where otherwise indicated.
- B. Place in all forms to provide chamfer where concrete will have exposed projecting corners.

PART 3 - EXECUTION

3.01 FORM CONSTRUCTION:

- A. Conform to ACI 318 and ACI 347.
- B. Adequately brace, stiffen and support forms to prevent perceptible deflection or settlement, and to hold plumb or level and true to line.
- C. Construct sufficiently tight to prevent mortar leakage.
- D. Avoid offsets between adjacent forms and construct so that shores, braces and stiffening members are in line with those below.
- E. Space studs and stringers as required to support facing against concrete pressure but not more than 12 inches for 5/8-inch plywood or 16 inches for 3/4-inch plywood.
- F. Use wales, strongbacks, shores and bracing as required.
- G. Form all necessary openings or chases for piping, ductwork and similar items where indicated or as required for the Work.
- H. Construct forms to be removable in sections without marring concrete surface.
- I. Surface of forms shall provide smooth, dense, plane surface to finished concrete where exposed to view.
- J. Contractor shall be responsible for structural adequacy of formwork.

3.02 TIME IN PLACE FOR FORMS:

- A. No shores, bracing, supports or other formwork shall be loosened or removed until the concrete members supported thereby have acquired sufficient strength to support safely their own weight and any other possible loads.

SECTION 031000 - CONCRETE FORMWORK: Continued

- B. The minimum time between concrete placement and form removal shall be determined either by field-cured test specimens or in accordance with the time specified for the member involved.
- C. If Contractor elects to determine the required time by means of test specimens, all costs in connection therewith shall be his responsibility.
- D. Test specimens shall be made, field-cured and tested as specified in SECTION 033000. No forms or supports shall be loosened or removed until tests indicate strength of members as follows:

<u>Structural Member</u>	<u>Percent of design compressive or flexural strength</u>
Unshored slab and beam forms or forms which can be removed without disturbing shores	70
Slab or beam shoring	85
Wall, column and beam side forms	40

- E. If field-cured test cylinders are not used as the basis for determination of time in place for formwork, the following criteria shall apply:

<u>Structural Member</u>	<u>Time in Place for Forms*</u>
Slab or beam shoring	12 days
Slab forms or beam soffits	7 days
Wall, column and beam side forms	18 hours

*These periods are a cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the concrete surface is above 50°F.

- 3.03 REMOVAL OF FORMS: Remove forms in a manner to avoid damage to the structure, with particular care for corners and edges.

END OF SECTION 031000

SECTION 03100 - CONCRETE FORMWORK: Continued

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SECTION 032000 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This Section includes steel reinforcement bars, ties, welded wire fabric, bolsters, chairs supports and accessories.
- B. Related Work Specified Elsewhere:
 - 1. Concrete Formwork: SECTION 031000.
 - 2. Concrete: SECTION 033000.
 - 3. Drilled Shaft Foundations: SECTION 316329.

1.02 QUALITY ASSURANCE:

- A. Applicable Standards:
 - 1. American Society for Testing and Materials (ASTM):
 - a. A82 - Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185 - Welded Steel Wire, Fabric, Plain, for Concrete Reinforcement.
 - c. A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 2. American Concrete Institute (ACI):
 - a. 315 - Details and Detailing of Concrete Reinforcement.
 - b. 318 - Building Code Requirements for Reinforced Concrete.
 - 3. American Welding Society (AWS):
 - a. D1.4 - Structural Welding Code: Reinforcing Steel.
 - b. B2.1 - Welding Procedures and Performance Qualification.

1.03 DELIVERY, STORAGE AND HANDLING:

- A. Store steel reinforcement blocked up off the ground and in orderly stacks.
- B. Store only bars with the same identifying label in the same stack.

1.04 TESTING:

- A. Perform at the mill for each heat.
- B. Submit certified test results to Owner upon request.

PART 2 - PRODUCTS

2.01 REINFORCEMENT BARS, TIES AND STIRRUPS:

SECTION 03200 - CONCRETE REINFORCEMENT: Continued

A. Materials:

1. Conform to ASTM A615, Grade 60 except as otherwise specified.
2. Drilled shaft ties and stirrups of any size shall conform to ASTM A615, Grade 60 unless otherwise indicated.

B. Fabrication of Bars:

1. Fabricate with cold bends conforming to the recommended dimensions shown in ACI 318.
2. Field fabrication will be allowed only if Contractor has equipment to properly fabricate steel and must be approved by the Site Manager.
3. Attach metal or plastic tags with identifying mark corresponding to mark number on drawing.
4. Contractor may, at his option, continue steel reinforcement through openings in walls and slabs, then field-cut the opening.

2.02 WELDED WIRE FABRIC:

- A. Conform to ASTM A185 using bright basic wire conforming to ASTM A82.
- B. Wire gauges No. 11 and smaller shall be galvanized.

2.03 BOLSTERS, CHAIRS AND ACCESSORIES:

- A. Conform to ACI 315 and the Manual of Standard Practices of the Concrete Reinforcing Steel Institute.
- B. Provide all spacers, bolsters, chairs, ties, and other devices necessary to properly space, place, support and fasten steel reinforcement in place during the concrete placement.
- C. Metal accessories shall be galvanized or plastic coated where legs will be exposed in finished concrete surfaces.
- D. Do not use rocks, broken bricks, wood blocks, or concrete fragments for support of steel reinforcement.

2.04 PRECAST CONCRETE BLOCK BAR SUPPORTS:

- A. May be used only for bar supports in slabs on ground.
- B. Blocks shall be made with a minimum of nine sacks of cement per cubic yard and have a compressive strength of 6,000 psi in seven days.
- C. Each block shall have a minimum of 9 square inches of bearing area. Space as required by the particular condition of weight, bearing surface and rigidity of the steel reinforcement.

SECTION 032000 - CONCRETE REINFORCEMENT: Continued

PART 3 - EXECUTION

3.01 PLACEMENT OF STEEL REINFORCEMENT:

- A. Place in accordance with Chapters 7 and 12 of ACI 318 and the Manual of Standard Practice of the Concrete Reinforcing Steel Institute.
- B. Tie securely with 16-gauge or larger annealed iron wire.
- C. Place to maintain concrete cover to conform to Chapter 7 of ACI 318 unless otherwise indicated.
- D. Splice steel to conform to Chapter 12 of ACI 318.
 - 1. Unless otherwise indicated, the minimum length of lap for tension lap splices shall be as required for Class B splices as defined by ACI 318.
- E. Lap welded wire fabric not less than the length of one mesh plus 2 inches unless otherwise indicated.

END OF SECTION 032000

SECTION 03200 - CONCRETE REINFORCEMENT: Continued

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SECTION 033000 - CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This Section includes concrete and related items.
- B. Related Work Specified Elsewhere:
 - 1. Concrete Formwork: SECTION 031000.
 - 2. Concrete Reinforcement: SECTION 032000.
 - 3. Drilled Shaft Foundations: SECTION 316329.
 - 4. Anchor Bolts : SECTION 337200.

1.02 QUALITY ASSURANCE:

- A. Applicable Standards:
 - 1. American Society for Testing and Materials (ASTM):
 - a. A36 - Structural Steel.
 - b. A123 - Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.
 - c. A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - d. A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile.
 - e. A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - f. C31 - Making and Curing Concrete Test Specimens in the Field.
 - g. C33 - Concrete Aggregates.
 - h. C39 - Compressive Strength of Cylindrical Concrete Specimens.
 - i. C40 - Organic Impurities in Fine Aggregates for Concrete.
 - j. C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - k. C88 - Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - l. C94 - Ready-Mixed Concrete.
 - m. C143 - Slump of Hydraulic Cement Concrete.
 - n. C150 - Portland Cement.
 - o. C156 - Standard Test Method for Water Retention by Liquid Membrane-Forming Curing Compounds for Concrete
 - p. C172 - Sampling Freshly Mixed Concrete.
 - q. C192 - Making and Curing Concrete Test Specimens in the Laboratory.
 - r. C231 - Air Content of Freshly Mixed Concrete by the Pressure Method.

SECTION 033000 - CONCRETE: Continued

- s. C233 - Testing Air-Entraining Admixtures for Concrete.
 - t. C260 - Air-Entraining Admixtures for Concrete.
 - u. C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
 - v. C494 - Chemical Admixtures for Concrete.
 - w. C618 - Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - x. C1064 - Test Method for Temperature of Freshly Mixed Portland Cement concrete.
 - y. C1074 - Standard Practice for Estimating Concrete Strength by the Maturity Method
 - z. C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates.
 - aa. C1293 - Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
 - bb. C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
 - cc. D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - dd. E96 - Test Methods for Water Vapor Transmission of Materials.
2. American Concrete Institute (ACI):
- a. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
 - b. 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete.
 - c. 305 - Hot Weather Concreting.
 - d. 306.1 - Standard Specification for Cold Weather Concreting.
 - e. 309 - Guide for Consolidation of Concrete.
 - f. 315 - Details and Detailing of Reinforced Concrete
 - g. 318 - Building Code Requirements for Reinforced Concrete and Commentary.
 - h. 347 - Recommended Practice for Concrete For Work.
3. American National Standards Institute (ANSI):
- a. B18.2.1 - Square and Hex Bolts and Screws - Inch Series.
 - b. B18.2.2 - Square and Hex Nuts (Inch Series).
4. National Bureau of Standards (NBS) Specifications for Scales.
5. Truck Mixer Manufacturers' Bureau (TMMB):

SECTION 033000 - CONCRETE: Continued

- a. TMMB 100-05 - Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards
 - 6. Corps of Engineers
 - a. CRD-C 620-10 - Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials, Lithium Nitrate Admixture, and Aggregate (Accelerated Mortar- Bar Method)
- 1.03 SUBMITTALS:
- A. Submit as specified in DIVISION 1.
 - B. Include, but not limited to, the following:
 - 1. Grouts.
 - 2. Expansion joint materials.
 - 3. Sealants.
 - 4. Waterstops.
 - 5. Concrete Materials
 - a. Raba Kistner shall perform all required laboratory tests of materials proposed for use in the production of concrete.
 - b. Fine Aggregate:
 - (1) Sieve analysis per ASTM C33
 - (2) Fineness modulus per ASTM C33
 - (3) Deleterious substance content per ASTM C33, Table 1
 - (4) Soundness per ASTM C33
 - (5) Test results for Organic impurities in fine aggregates per ASTM C40
 - (6) Aggregate-cement reactivity test results
 - c. Coarse Aggregate
 - (1) Sieve analysis per ASTM C33
 - (2) Deleterious substance content per ASTM C33, Table 1
 - (3) Soundness per ASTM C33
 - (4) Maximum aggregate size (See PART 2, paragraph 2.02 A. 3.)
 - (5) Aggregate moisture - free and absorbed moisture contents.
 - (6) Aggregate-cement reactivity test results
 - d. Certification of materials:
 - (1) Cement mill tests.

SECTION 033000 - CONCRETE: Continued

- (2) Aggregate sources.
 - (3) Aggregate tests.
 - (4) Fly ash analysis.
 - (5) Reinforcing steel mill tests.
 - (6) Admixture Data Sheets
6. Concrete Mix Design Data:
- a. If suitable field strength test data is available (30 consecutive satisfactory compressive strength tests of a similar concrete mix with the proposed materials within the previous 1 year), submit field test data as listed below.
 - (1) Mix design for a dry excavation and wet excavation (See PART 2, paragraph 2.02 C.2)
 - (2) Field strength test results
 - (3) Air content.
 - (4) Admixture content.
 - (5) Water-cementitious material ratio.
 - (6) Cement content.
 - (7) Fly ash content.
 - (8) Which of the following method(s) has been used in the trial mix (and will be used in the job mix) to reduce the possibility of Alkali-Silica Reaction (ASR) occurring:
 - (a) Replacement of 20% to 35% of the cement with Class F fly ash containing less than 15% CaO.
 - (b) Use of 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.
 - b. If suitable field strength test data is not available and laboratory trial batches are used as a basis for determining mix proportions, an approved independent testing laboratory is required to test the strength of the proposed concrete trial batches.
 - (a) The Contractor shall follow the instructions given in Part 2 Paragraph 2.02 D.2.b for testing of the proposed trial mix design.
 - c. Suitable field strength test data is defined in Part 2 Paragraph 2.02 D.2.a, this Section.

SECTION 033000 - CONCRETE: Continued

- C. Test Reports: Submit as specified in DIVISION 1 and this Section.

PART 2 - PRODUCTS

2.01 CONCRETE:

A. Materials:

1. Portland Cement Type I/II: Shall conform to ASTM C150. The total alkali contribution from the cement shall not exceed 4.00 pounds of alkali per cubic yard of concrete when calculated as follows:
 - a. Pounds of alkali per cubic yard = (Pounds of cement per cubic yard) x (%Na₂O equivalent in cement)/100
 - b. In the above calculation, use the maximum cement alkali content reported (as %Na₂O equivalent) on the cement mill test report.
2. Fine Aggregate:
 - a. Conform to ASTM C33.
 - b. Maintain fine aggregate free of ice and frozen lumps.
3. Coarse Aggregate:
 - a. Conform to ASTM C33.
 - b. Blast furnace slag will not be permitted.
 - c. Maintain coarse aggregate free of ice and frozen lumps.
 - d. Grading Requirements:
 - (1) From 1-inch to No. 4 for all concrete unless otherwise specified.
4. Fly Ash:
 - a. Conform to ASTM C618
 - b. Shall be Class F with less than 15% CaO.
5. Mixing Water:
 - a. Only potable water will be acceptable without testing. Expense of testing water shall be paid by Contractor.
 - b. Nonpotable water may be used if it produces concrete with at least 95 percent of the strength of similar specimens of the same mix design made with potable water, subject to approval of qualitative analysis.
6. Admixtures:
 - a. Water Reducing Type:

SECTION 033000 - CONCRETE: Continued

- (1) Conform to ASTM C494, Type A.
 - (2) Conform to manufacturer's recommendations for use.
 - (3) Technical assistance of the manufacturer's field representative shall be furnished upon request.
 - b. Air-Entraining Type:
 - (1) Conform to ASTM C260.
 - (2) Conform to manufacturer's recommendations for use.
 - (3) Technical assistance of the manufacturer's field representative shall be furnished upon request.
 - (4) Testing of air-entraining admixtures shall conform to ASTM C233.
 - c. Other Admixtures: Used only with Owner's written concurrence.
 - (1) Water Reducing, Retarding Type: Conform to ASTM C494, Type D and shall not contain any chloride ions added during manufacture.
- B. Laboratory Testing of Materials for Use in Concrete:
1. **Raba Kistner** perform all required laboratory tests of materials proposed for use in the production of concrete. The same independent testing laboratory shall be used to determine mix proportions when laboratory trial batches are required.
 2. The laboratory shall report the results of the testing and mix designs as follows:
 - a. Owner(1 copy).
 - b. Site Manager, Field Office (1 copy).
 - c. Concrete supplier (copies as required).
 3. **Raba Kistner** shall deliver representative samples of all proposed concrete materials to the laboratory for the following testing:
 - a. Fine Aggregate:
 - (1) ASTM C33 as amended by PART 2, paragraph 2.01.A.
 - (2) ASTM C40
 - (3) ASTM C88
 - (4) ASTM C1567
 - (5) Corps of Engineers CRD-C 662-10 for Lithium Nitrate
 - b. Coarse Aggregate:
 - (1) ASTM C33 as amended by PART 2, paragraph 2.01.A.
 - (2) ASTM C88

SECTION 033000 - CONCRETE: Continued

- (3) ASTM C1567
 - (4) Corps of Engineers CRD-C 662-10 for Lithium Nitrate
 - c. Mixing water:
 - (1) Potable water shall be used.
 - (2) If the Owner has reason to suspect the acceptability of the mixing water, or if the Contractor proposes to use non-potable water, the Contractor shall have the design mix tested by the testing laboratory as directed by the Owner.
 - d. Air-entraining admixture shall be tested conforming to ASTM C233.
- C. Concrete Qualities Required:
- 1. Durability
 - a. *Sulfate resistance*— Unless otherwise specified, provide concrete meeting the requirements of Table 4.2.2.7.a (ACI 301), based on exposure class for exposure to water-soluble sulfates defined in Contract Documents. Submit documentation verifying compliance with specified requirements.
 - (1) Sulfate Exposure Class is as follows: S0
 - b. *Freezing and thawing resistance*— Unless otherwise specified, provide concrete meeting the requirements of Table 4.2.2.7.b (ACI 301) based on exposure class for freezing and thawing exposure defined in Contract Documents. Submit documentation verifying compliance with specified requirements.
 - (1) Freezing and thawing exposure class is as follows: F1
 - c. *Low permeability*—Unless otherwise specified, provide concrete meeting the requirements of Table 4.2.2.7.c (ACI 301) based on exposure class for structural members in contact with water requiring low permeability defined in Contract Documents. Submit documentation verifying compliance with specified requirements.
 - (1) Permeability exposure class is as follows: P0
 - d. *Corrosion protection of reinforcement*—Unless otherwise specified, provide concrete meeting the requirements of Table 4.2.2.7.d (ACI 301) for conditions requiring corrosion protection of reinforcement defined in Contract Documents. Submit documentation verifying compliance with specified requirements.
 - (1) Corrosion exposure class is as follows: C1

SECTION 033000 - CONCRETE: Continued

- e. Water-soluble chloride ion content contributed from constituents including water, aggregates, cementitious materials, and admixtures shall be determined for the concrete mixture by ASTM C1218/C1218M at age between 28 and 42 days.
 - 2. Compressive Strength:
 - a. Specified Minimum 28-day strength = 4500 psi for all construction unless otherwise indicated.
 - 3. Slump of concrete shall be 5 inches plus or minus 1 inch unless noted otherwise. Concrete slump for drilled shafts shall be 4 to 6 inches, unless otherwise indicated. Mix designs for each slump shall be submitted to the Owner.
 - 4. Air Content: 5 to 7 percent.
- D. Mix Proportions:
- 1. Concrete shall be homogeneous, readily placeable and uniformly workable; proportioned to conform to ACI 211.1.
 - 2. Mix proportions for all concrete unless otherwise specified shall be selected preferably on the basis of field experience; but in the case where sufficient or suitable strength test data is not available, concrete shall be proportioned on the basis of laboratory trial mix design.
 - a. Field experience using test results within the preceding 365 days with the materials and plant to be employed may be the basis of mix proportioning provided that not less than 30 consecutive satisfactory compressive strength tests on concrete using the proposed materials with a similar mix are available. A compressive strength test is defined as the average 28-day compressive strength of two companion cylinders made conforming to ASTM C172 and ASTM C31 and tested conforming to ASTM C39. The standard deviation of such tests shall be computed as a basis for design of the mix. The required average compressive strength shall exceed the specified minimum compressive strength in accordance with the following formulae:
 - (1) When standard deviation is less than 500 psi, Required Average Strength = Specified Minimum Strength + 1.343 x Standard Deviation.
 - (2) When standard deviation is greater than 500 psi, Required Average Strength = Specified Minimum Strength -500 + 2.326 x Standard Deviation.
 - (3) Submit previous test data, calculated standard deviation, and the proposed mix proportions to Owner for approval prior to placing concrete.

SECTION 033000 - CONCRETE: Continued

- b. When laboratory trial batches are used as a basis for determining mix proportions, all such work shall be performed by the laboratory as specified in this PART "Laboratory Testing of Materials for Use in Concrete."
 - (1) Laboratory trial batches shall be used to establish a water-cementitious material ratio compression strength curve with at least three points, each representing the strength of a separate trial batch. At least one point shall be above and one below the Required Average Strength. Each point on the curve shall represent the average of at least three test cylinders tested at 28 days or an earlier age when approved by Owner. The trial mix shall be composed of the materials proposed for concrete mix for the project and the slump and air content shall be at the maximum limits specified in this PART "Concrete Qualities Required."
 - (2) A point on the water-cement ratio compressive strength curve shall be selected that will provide an average strength at least 1200 psi greater than the specified minimum strength.
 - (3) Laboratory reports establishing mix proportions shall be submitted to Owner, and his approval shall be obtained prior to placing all concrete.
- 3. Mix Proportions for Concrete for Underwater Placing (special requirements) and for Placing in Drilled Shafts Requiring Casing or Slurry:
 - a. Fine aggregate - not less than 40 percent natural sand.
 - b. Coarse aggregate - 3/4-inch maximum size natural gravel.
 - c. Cement - 7 sacks minimum per cubic yard.
 - d. Water - Minimum required for slump between 6 and 9 inches.
 - e. Water reducing retarder - Conform to ASTM C494 Type D and use in sufficient amount to delay the setting time to not less than six hours.
 - f. Air entrainment - Conform to ASTM C260 and use in sufficient amount to entrain 4 percent air plus or minus 1 percent.
 - g. Specified Minimum 28-day Compressive Strength:
 - (1) Not less than 4,500 psi when tested conforming to ASTM C31 and ASTM C39, unless otherwise indicated.
- E. Measurement of Materials:
 - 1. General Requirements:
 - a. Conform to ACI 304.

SECTION 033000 - CONCRETE: Continued

- b. Measure materials within one percent by weight for aggregates and cement, and within 1-1/2 percent by volume or weight for water.
- 2. Apparatus:
 - a. Beam or springless dial-type scale conforming with NBS - "Specifications for Scales."
 - b. Volumetric measurement of water shall be performed with an approved automatic valve.
- F. Mixing and Delivery:
 - 1. Conform to ACI 304.
 - 2. Cement temperature when added to mix shall not exceed 170 degrees F.
 - 3. Batch Plant Mixer:
 - a. Charge with 5 percent to 10 percent of the mixing water both in advance and after the addition of aggregates and cement.
 - b. Charge with remaining water uniformly with the other materials.
 - c. Avoid charging in excess of manufacturer's rating.
 - d. Discharge mixed concrete completely prior to recharging.
 - e. Mixing Time:
 - (1) Start immediately when all ingredients except the last of the water are in the mixer.
 - (2) Minimum mixing time shall conform with mixer manufacturer's instructions, but not be less than the following:

<u>Capacity of Mixer Cubic Yards</u>	<u>Minimum Time of Mixing, Minutes</u>
1 or less	1 minute
2	1 minute, 15 seconds
3	1 minute, 30 seconds
4	1 minute, 45 seconds
5	2 minutes
6	2 minutes, 15 seconds

Add 15 seconds' mixing time for each additional cubic yard of concrete.

SECTION 033000 - CONCRETE: Continued

4. Mixing of Concrete at Plant Off Jobsite:
 - a. Mix concrete in central mixer or truck mixer. Transport in truck mixer turning at agitation speeds only.
 - b. Water added to concrete having a slump below the specified minimum shall be at Contractor's risk. If the water added produces a slump greater than the specified maximum, the concrete will be rejected. If water is added the concrete shall be remixed for a minimum of 25 revolutions.
 - c. Truck mixer shall conform to TMMB 100-05 of the Truck Mixer Manufacturers Bureau.
 - d. Ready-mixed concrete shall be produced and delivered conforming to ASTM C94 as applicable.
 - e. Contractor shall furnish Site Manager with a concrete delivery ticket for each load of concrete. The ticket shall have the following information recorded:
 - (1) Ticket number.
 - (2) Time batched.
 - (3) Time arrived on jobsite.
 - (4) Amount of concrete (by volume).
 - (5) Mix number.
 - (6) Amount of all water added at jobsite by Contractor.
 - (7) Number of revolutions on the truck's revolution counter before batching and after placement is completed.
 - (8) Truck number.
 - (9) Truck driver's name.
 - (10) Types and quantities of admixtures added to the batch.
 - (11) Slump of concrete.

2.02 GROUT:

A. Plain Grout:

1. 1 part portland cement to 2 parts sand by volume.
2. Keep water to a minimum as required for placing by the dry packing method.
3. Place after the mixed grout has been allowed to stand for two hours.
4. The sand and cement shall be as specified for concrete.

SECTION 033000 - CONCRETE: Continued

B. Nonshrinking Grout:

1. Required for setting sleeved anchor bolts, for setting equipment recommended by the manufacturer to be set with nonshrinking grout, and in other places indicated.
2. Grout shall be nonmetallic, as manufactured by one of the following:
 - a. Crystex, L and M Construction Chemicals, Inc.
 - b. Five Star grout, U.S. Grout Corporation.
 - c. Masterflow 713 grout, Master Builder's Company.
 - d. Sauereisen F-100, Sauereisen Cements Company.
 - e. Supreme Grout, Gifford-Hill & Company.
3. Prepare and place conforming to manufacturer's printed instructions.

C. Grout for Bonding:

1. 1 part cement to 1-1/2 parts sand by weight.
2. Keep water to a minimum.

2.03 CONCRETE ACCESSORIES:

A. Water Stops:

1. Serrated polyvinyl chloride equal to one of the following.
 - a. Servicized/Durajoint Type 13, W. R. Grace Company.
 - b. 6-inch heavy-duty Flextrip, Water Seals, Inc.
 - c. Vulco VP 8044 Heavy, Vulcan Metal Products Company.
 - d. Greenstreak Style 706 or approved equal.

B. Expansion Joints:

1. Expansion Joint Filler: Premolded cork of thickness indicated and conforming to ASTM D1752, Type II, cork or Type III, self-expanding cork.
2. Bond Breaker: Polyethylene strip.
3. Joint Sealant: Two component polysulfide system as manufactured by one of the following:
 - a. Hornflex L, A. C. Horn, Inc.
 - b. Synthacalk GC-2, Pecora, Inc.

C. Igas Joint: Single component mastic waterstop, Sika Chemical Corporation.

SECTION 033000 - CONCRETE: Continued

2.04 CURING AGENT:

- A. Liquid membrane forming compound conforming to ASTM C309, Type 1. ASTM C309 Type 2 shall be used as specified in PART 3 "Hot Weather Concreting."
- B. Curing compound used on floors to be painted, tiled or covered with resilient floor covering shall be guaranteed not to interfere with application of paint, tile mortar or tile adhesive after a 28-day curing period.

2.05 MISCELLANEOUS ITEMS:

- A. Anchor Bolts:
 - 1. Set to elevations and alignment indicated, or as required for proper anchorage, with template and other devices to align and hold bolts in place top and bottom during placement of concrete.
 - 2. Anchor bolts will be
 - a. ASTM F1554 Grade 36.
 - b. Hot-dip galvanized, per ASTM A153
- B. Moisture Barrier:
 - 1. Provide Kraft Paper - Polyethylene Sheet:
 - a. Water-resistant barrier consisting of heavy Kraft paper and asphalt, glass fiber reinforcement and polyethylene film. Layers shall be laminated under heat and pressure. Perm rating of 0.15 or less per ASTM E96, Procedure A.
 - b. Manufacturers:
 - (1) Fortifiber Corporation, Moistop I.
 - (2) Glas-Kraft Inc., Plybar Plus II.
 - 2. Provide adhesive or tape as recommended by moisture barrier manufacturer.
- C. Structural Metals:
 - 1. Steel:
 - a. Steel shall conform to ASTM A36 unless otherwise specified.
 - b. Fabricate to conform to American Institute of Steel Construction (AISC) specifications, codes and standards.
 - c. Galvanize to conform to ASTM A123 and ASTM A153 after all drilling, bending, welding or other forms of fabrication have been completed.
- D. Perimeter and Under-Slab Insulation: (Rigid Board)

SECTION 033000 - CONCRETE: Continued

1. Extruded, rigid, closed-cell, expanded polystyrene board conforming to FS HH-I 524, Type IV, with integral high-density skin, minimum thickness of 2 inches.
2. Manufacturer: Dow Chemical Co. - Styrofoam SM.
- E. Concrete Floor Hardener: Concrete floor hardener shall be Lapidolith as manufactured by Sonneborn Building Products, Minneapolis, Minnesota or Owner approved equal.

PART 3 - EXECUTION

3.01 PREPARATION FOR CONCRETE PLACEMENT:

- A. Openings Through Concrete: Provide openings through concrete as indicated and for the proper installation of all equipment, piping, wiring, ductwork and similar items, installed under this contract.
- B. Installation of Embedded Items:
 1. Provide for accurate installation of embedded items installed under this Contract.
 2. Securely fix floor drains in place to prevent floatation while placing concrete. Uniformly and accurately slope finished floor slab toward the drains.
 3. Embedded items shall be as indicated or specified, or as selected by Contractor and approved by Site Manager.
 4. Protect pipe sleeves from moisture during cold weather.
 5. Grease anchor bolt threads to protect from concrete splatter.
 6. Installation Tolerances for Anchor Bolts in Slabs:
 - a. Centerline within 1 inch of that indicated.
 - b. Elevation within 1/2-inch of that indicated.
 - c. Anchor Bolt Tolerances:
 - (1) Center to center distance between anchor bolt clusters of multi-legged structures: $\pm 1/8$ -inch.
 - (2) Top of bolt elevation: $\pm 1/4$ -inch.
 7. Installation Tolerances for Anchor Bolts in Drilled Shafts:
 - a. Refer to Drilled Shaft Foundations: SECTION 316329
- C. Installation of Joints:
 1. Construction Joints:

SECTION 033000 - CONCRETE: Continued

- a. Location:
 - (1) Locate joints, which are not indicated or specified, in conformance with ACI 318.
 - (2) Obtain Site Manager's approval of joints located by Contractor prior to preparation of reinforcing steel drawings.
 - b. Preparation and Installation:
 - (1) Clean and break laitance or other foreign material from bonding surface.
 - (2) Tighten forms remaining in place (where applicable) to prevent seepage between forms and hardened concrete.
 - (3) Provide water stops and shear keys as indicated or specified and as required in any new construction joint requested by Contractor.
 - c. Waterstops:
 - (1) Install in all construction joints where indicated.
 - (2) Install conforming to manufacturer's printed instructions.
 - (3) All joints and splices of pvc waterstop shall be 100 percent fused.
 - (4) Metal waterstops shall be welded with a continuous watertight weld or bolted with a minimum contact lap of 12 inches.
 - 2. Expansion Joints:
 - a. Install as indicated.
 - b. Completely cover the top surface of the joint filler with a polyethelene strip bond breaker prior to sealing joint.
 - c. Seal top of expansion joint with joint sealant applied conforming to manufacturer's instructions. Depth of sealant shall be 1/2 the joint width unless otherwise indicated. During cold weather protect joint from moisture prior to installation of joint sealant.
 - 3. Contraction Joints: As specified in this PART "Finishing."
- D. Cutting and Bonding to Existing Concrete:
- 1. Cutting Existing Concrete:
 - a. Use methods and equipment that will avoid damage to adjacent parts of the structure from heavy blows or vibration.
 - b. Cut existing concrete with power concrete saw where possible to prevent spalling and chipping and to form neat straight edge.

SECTION 033000 - CONCRETE: Continued

- c. Remove all loose or cracked pieces resulting from cutting existing concrete, leaving only sound, undamaged concrete adjacent to new work.
 - d. Leave access opening edges with a neat, true grout surface to the opening size indicated.
 - e. Cut reinforcing steel with sufficient length remaining (approximately 30-bar diameters) for bending and lapping into new construction.
2. Bonding to Existing Concrete:
- a. Roughen concrete by use of a pneumatic chipping hammer or other approved means.
 - b. Thoroughly clean the concrete surface and apply the bonding agent. Place the fresh concrete after the bonding agent becomes tacky.

3.02 PLACING OF CONCRETE:

A. Conventional Placing:

1. General Requirements:
- a. Conform to ACI 304.
 - b. Bonding surfaces shall be clean, free of laitance and foreign materials.
 - c. Face horizontal bonding surfaces with 1-inch-thick coat of fresh "grout for bonding." Wet all other surfaces.
 - d. Place concrete on properly prepared and unfrozen subgrade and only in dewatered excavation and forms.
 - e. Use forms for all concrete except where otherwise indicated or specified.
 - f. Do not place concrete that has partially hardened or has been contaminated by foreign materials.
 - g. Prevent mud or foreign materials from entering the concrete or forms during placement operations.
2. Conveying:
- a. Convey concrete from the mixer and deposit in place by methods which will prevent the segregation or loss of materials.
 - b. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to provide a practically continuous flow of concrete at the delivery end.

SECTION 033000 - CONCRETE: Continued

- c. Aluminum conveying equipment shall not be used.
- 3. Depositing:
 - a. Place concrete in continuous horizontal lifts not to exceed 2 feet, and place concrete against bulkheads and keyways at vertical joints.
 - b. Maximum free drop of concrete shall be 5 feet in walls 10 inches or less in thickness with 1-foot additional drop allowed for each inch of wall thickness over 10 inches, with a maximum drop of 10'-0".
 - c. When moisture barrier is used, keep lapped joints closed and take precautions to avoid puncturing the barrier.
- 4. Consolidation of Concrete:
 - a. Consolidate concrete in conformance with ACI 309. Characteristics and application of concrete vibrators shall be as set forth in Table 5.1.4.
 - b. Provide an adequate number of vibrators of sufficient capacity to keep up with the maximum rate of concrete placement. Keep on hand adequate standby equipment in good operating condition.
 - c. Vibrate concrete only until the concrete is thoroughly consolidated and the voids filled as evidenced by the leveled appearance of the concrete at the exposed surface and the embedment of the surface aggregate.
 - d. Insert internal vibrators vertically to the full depth of the layer being placed and into the previous layer. Do not drag vibrators through the concrete. Insert and withdraw vibrator slowly with the vibrator running continuously so that no hole will be left in the concrete. Do not flow concrete from one location to another by use of a vibrator.
 - e. Consolidate concrete layer to full depth when using a surface vibrator. Use thinner layers or more powerful vibrator if necessary to achieve complete consolidation.
 - f. Vibrate the top 10 feet of drilled shaft foundations.
 - g. Use form vibrators only where sections are too thin or where sections are inaccessible for internal vibrators.
- 5. Time Requirements:
 - a. Place concrete at a sufficient rate to assure that lifts below have not taken initial set before fresh concrete is deposited.
 - b. Place concrete within 45 minutes after mixing. This period may be extended to 1 hour and 30 minutes provided that the combined air temperature, relative humidity

SECTION 033000 - CONCRETE: Continued

and wind velocity are such that the plasticity of the fresh concrete is satisfactory for placement and consolidation and that the specified mixing water is not exceeded.

Concrete which has partially set shall not be retempered but shall be discarded.

6. Placing Concrete at Joints:
 - a. Bed horizontal joints with 1 inch of grout for bonding.
 - b. Take precautions to ensure tight, well-bonded construction joints with no air pockets or voids.
 - c. Take special precautions to avoid bending or displacing waterstop while placing concrete around it.
 - d. Delay construction at a joint a minimum of 16 hours where placement is continued past joint except where otherwise indicated.
- B. Underwater Placing of Concrete:
 1. General Requirements:
 - a. Do not place concrete under water except where indicated or authorized in writing by Owner.
 - b. Do not place concrete under water which has a temperature below 40 degrees F or when there is a flow of water in or out of the form or excavation. Dewatering shall be prohibited for a minimum of 24 hours after completion of concrete placement.
 - c. Use concrete mix as specified under PART 2, paragraph 2.01.D.3 "Mix Proportions for Concrete for Underwater Placing."
 - d. Design formwork for increased pressure due to the use of retarding admixture. Clean inside of forms with water jets where necessary to remove mud or debris from the bottom of sides.
 2. Depositing: As specified in Drilled Shaft Foundations - SECTION 316329.
- C. Mass Concrete:
 1. General Requirements:
 - a. Mass concrete shall comply with requirements of this specification, unless otherwise specified in this section or in Contract Documents.
 - (1) Unless otherwise specified, the following criteria shall apply for mass concrete placements:
 - (a) The maximum temperature in concrete after placement shall not exceed 155°F; and

SECTION 033000 - CONCRETE: Continued

- (b) The maximum temperature difference between center and surface of placement shall not exceed 35°F.
- b. Mass concrete is defined as follows:
 - (1) A placement of structural concrete with a minimum dimension equal to or greater than 4 ft.
 - (2) Concrete placements that contain Type III cement, accelerating admixtures, or cementitious materials in excess of 660lb/yd³ of concrete.
 - (3) Placements that trap heat.
- c. Submittals - Comply with above specification and, unless otherwise specified, submit a thermal control plan for each mass concrete placement. The adiabatic temperature rise (ATR) of concrete and temperature differences may be predicted using simple methods or specifically-designed software. Unless otherwise specified or permitted, the thermal control plan shall include following items:
 - (1) Concrete mixture proportions;
 - (2) Calculated or measured adiabatic temperature rise of concrete;
 - (3) Upper limit for concrete temperature at time of placement;
 - (4) Description of specific measures and equipment that will be used to ensure maximum temperature in placement will not exceed specified maximum temperature limit;
 - (5) Calculated maximum temperature in placement based on expected conditions at time of placement and use of proposed measures to control temperatures;
 - (6) Description of specific measures and equipment that will be used to ensure temperature difference will not exceed specified temperature difference limit;
 - (7) Calculated maximum temperature difference in placement based on expected conditions at time of placement and use of proposed measures to control temperature differences;
 - (8) Method used to predict ATR and temperature differential and to which mass concrete it applies;
 - (9) If simple methods are used to predict ATR and temperature differential provide copies of all calculations and copies of all graphs, and charts used;
 - (10) If specifically designed software is used to predict ATR and temperature differential provide all assumptions and all program inputs used;

SECTION 033000 - CONCRETE: Continued

- (11) Description of curing procedures, including materials and methods, and curing duration; and
- (12) Description of formwork removal procedures to ensure temperature difference at temporarily exposed surface will not exceed temperature difference limit, and how curing will be maintained;
- d. If concrete design mixture is changed, thermal control plan must be updated.
- 2. Execution:
 - a. Unless otherwise specified, cure and protect concrete in accordance with 3.04 for a minimum of 7 days.
 - b. Unless otherwise specified or permitted, preserve moisture by maintaining forms in place. For surfaces not in contact with forms, apply one of the procedures specified in 3.04.
 - c. *Control of concrete temperature*—Unless otherwise specified, control concrete temperature and temperature difference within concrete from time the concrete is placed until time internal temperature has cooled from its maximum so the difference between average daily ambient and internal temperatures at time of protection removal is less than specified temperature difference limit.

3.03 FINISHING:

- A. Unformed Surfaces:
 - 1. Screed Finish:
 - a. Use as first stage for all concrete finishes.
 - b. Use as final finish on surfaces that will be covered by additional concrete, grout placement, mortar setting bed except as otherwise specified, or earth backfill.
 - c. Immediately after screeding, use a wood float, darby or bullfloat to eliminate high and low spots and to embed large aggregate. This shall be done in a manner to produce even, uniform surfaces so that surface irregularities do not exceed 3/8-inch in 10 feet when used as final finish.
 - 2. Floated Finish:
 - a. Use as second stage of broomed, troweled or magnesium-troweled finish.
 - b. Float with mechanical float. Hand floating will be permitted only in areas inaccessible to mechanical float.

SECTION 033000 - CONCRETE: Continued

- c. On surfaces not to receive troweled or magnesium-troweled finish, finish with wood or cork float after mechanical floating to a true uniform surface so that surface irregularities do not exceed 1/8-inch in 10 feet, except at floor drains.
- 3. Broomed Finish:
 - a. Use as final finish on all outdoor slabs including door stoops and equipment pads.
 - b. After floated finish draw a stiff bristle broom across the surface making uniform corrugations, perpendicular to the direction of traffic, not more than 1/16-inch deep.
- 4. Troweled Finish:
 - a. Use as final finish on inside floors and on all other unformed surface not otherwise indicated or specified.
 - b. Trowel with steel trowel, mechanical or hand, to obtain a smooth, dense finish. The final troweling shall be done after the concrete has become hard enough so that no mortar adheres to the edge of trowel and a ringing sound is produced as the trowel passes over the surface.
 - c. Do not trowel before surface water has evaporated or been removed with a squeegee.
 - d. Finish to a true uniform surface so that surface irregularities do not exceed 1/8-inch in 10 feet, except at floor drains.
 - e. Do not add sand or cement to the floor surface.
- 5. Magnesium-Troweled Finish:
 - a. Perform as specified for "Troweled Finish" except use a magnesium trowel by hand instead of a steel trowel to obtain a dense, but not slick, finish.
 - b. Use where floor will receive protective coating after curing.
- 6. Concrete Floor Hardener:
 - a. Furnish and install concrete floor hardener where indicated.
 - b. Contractor shall apply in strict accordance with the manufacturer written recommendations.
 - c. Apply Lapidolith in three (3) applications. Coverage shall be 100 square feet per gallon.
 - d. Contractor shall apply the hardener as soon as possible after placement of concrete to prevent concrete damage during construction.

SECTION 033000 - CONCRETE: Continued

7. Stair-Tread Finish:
 - a. Apply to all interior and exterior concrete stair treads and landings that do not have abrasive nosings.
 - b. Spread fine abrasive aggregate uniformly on concrete before it has set, in the amount not less than 1/4-pound aggregate per square foot, and steel trowel into surface of concrete.
 - c. Expose abrasive aggregate slightly by rubbing with an abrasive brush after concrete finish has set and cured.
 - d. Aggregate and application shall conform to Specification "A" of the Norton Company.
8. Contraction Joints:
 - a. Locate as indicated.
 - b. Maintain true alignment with straightedge.
 - c. Joints shall be grooved except where sawed joints or preformed joints are indicated.
 - d. Grooved Joints:
 - (1) Perform during the finishing process.
 - (2) Width of groove shall not exceed 1/4-inch.
 - (3) Depth of groove shall be at least 1 inch.
 - e. Sawed Joints:
 - (1) Cut joints with power blade as soon as concrete surface is firm enough to resist tearing or damage by the blade and before random shrinkage cracks can occur. (Usually required 4 to 12 hours after finishing.)
 - (2) Make joints approximately 1/8-inch wide with depth as indicated.
 - (3) Seal with the same type sealant specified for expansion joint sealant.
 - f. Install preformed joints as recommended by manufacturer.
- B. Formed Surfaces:
 1. Repair surface defects as specified in this PART "Repair of Defective Surfaces," except for surfaces against which fill material or concrete is to be placed.
 2. Stoned Finish:
 - a. Use as a final finish on all formed surfaces that will be exposed to view after all work has been completed.

SECTION 033000 - CONCRETE: Continued

- b. To obtain surface finish, patch defective surfaces immediately upon removal of forms with mortar as specified in this PART "Repair of Defective Surfaces."
 - c. Immediately before starting this work, and after formwork removal, apply one of the initial curing methods cited in 3.04.B.
 - d. Rub surfaces to be finished with a medium coarse carborundum stone, using a small amount of mortar on its face. The mortar shall be composed of cement and fine sand mixed in proportions used in the concrete being finished. Continue rubbing until all form marks, projections and irregularities have been removed, all voids filled, and a uniform surface has been obtained. Leave paste produced by this rubbing in place at this time.
 - e. After all concrete above the surface being treated has been cast, obtain final finish by rubbing with a fine carborundum stone and water. Continue rubbing until the entire surface is of a smooth texture and uniform color.
 - f. After the final rubbing is completed and the surface has dried, rub with burlap to remove loose powder and unsound patches, paste, and objectionable marks.
 - g. Cure as specified in this PART "Curing."
- C. Repair of Defective Surfaces:
- 1. Defined as any concrete surface showing misalignment, rock pockets, poor joints, holes from ties, voids, honeycomb, or any other defective area.
 - 2. Repairing:
 - a. Repair as soon as forms have been removed.
 - b. Chip surface back to minimum depth of 1/2-inch, chip edges perpendicular to surface, prewet depression and brush with neat cement immediately before patching.
 - c. Patch surfaces using stiff mortar with same sand-cement ratio as original concrete and with minimum water for placing. Blend with white cement to match concrete color.
 - d. Compact mortar into depressions so that after curing, hole is filled and mortar is flush with surface. Use hammer and ramming rod for compacting the holes.
 - e. Moist-cure for three days or use curing compound.
 - f. Owner shall be notified of areas containing major defects or where reinforcing steel is exposed prior to determination of repair method.

SECTION 033000 - CONCRETE: Continued

3.04 CURING: Cure all concrete by the methods cited below:

- A. Curing of concrete during hot or cold weather shall conform to this PART "Hot Weather Concreting" and "Cold Weather Concreting."
- B. Initial Curing - deliberate action taken between placement and final finishing of concrete to reduce the loss of water from the surface of the concrete.
 - 1. Fogging
 - a. Set up fogging equipment to allow complete coverage of the area to be cured. Maintain the relative humidity above the slab at a level to prevent surface drying and the accumulation of standing water on the surface. Direct atomized water spray above the concrete surface to allow the fog to drift down to the concrete surface. Continue fogging as necessary to maintain the reflective appearance of the damp concrete. Keep concrete surfaces continuously damp, but do not allow accumulation of water until after final setting has occurred. Do not allow the surface to dry or to undergo cycles of drying and wetting.
 - 2. Sprinkling - Perform sprinkling for initial curing by using either soaker hoses or lawn sprinklers. Exercise care so the surface of the concrete is not eroded by running water.
 - a. Use soaker hoses for curing of concrete walls and columns after checking that water will not damage the surface and before form removal. Place hoses at the top of walls and columns so that water will enter between concrete and formwork.
 - b. Keep the concrete surfaces continuously wet. Do not allow alternate wetting and drying of concrete surfaces.
 - c. When absorbent wood forms are used, keep them wet until removed along with the exposed surfaces.
 - 3. Evaporation Retardant
 - a. Entrap any bleed water on the concrete surface under a uniform film of a liquid applied evaporation retardant. Apply the evaporation retardant after strike off and between the different floating operations.
- C. Final Curing - deliberate action taken between the final finishing and termination of curing to reduce the loss of water from the surface of the concrete and control the temperature of the concrete. Final curing of unformed surfaces shall occur after final finishing. Final curing of formed surfaces shall occur after form removal.

SECTION 033000 - CONCRETE: Continued

After final finishing, cure unformed concrete by 3.04.C.1, 3.04.C.2, 3.04.C.3, or 3.04.C.4 until termination of curing is allowed by 3.04.D. Do not mar or damage the concrete with any curing procedure. Cure formed concrete after form removal by one or more of these methods until termination of curing is allowed by 3.04.D. When absorbent wood forms are used, keep them wet until removed. Time in formwork and form removal shall be in accordance with 031000 Sections 3.02 and 3.03.

1. Sheet Material - Place sheet material on the concrete surface as soon as it is possible without marring the surface.
 - a. Cover all exposed concrete surfaces and beyond the edge of the concrete surface. Securely tape sheeting together or lap. Maintain the integrity of the material to minimize evaporation loss throughout the curing period.
 - b. Keep the concrete continuously wet under the sheeting. When absorbent wood forms are used, keep them wet until removed.
2. Liquid Membrane Forming Curing Compounds – Apply liquid membrane-forming curing compounds uniformly and at the rate recommended by the manufacturer, or at a rate not less than specified in ASTM C309 (AASHTO M 148) or ASTM C1315 as tested using ASTM C156 (AASHTO T 155).
 - a. Apply curing compounds immediately after final finishing and as soon as bleeding has essentially ceased, as evidenced by the disappearance of free water and no visible water sheen. Protect the membrane from damage for the duration of the curing period. Provide adequate ventilation during the application of the membrane.
 - b. Curing compounds shall be applied following manufacturer's application instructions.
 - c. Using one coat of a liquid membrane forming compound conforming to ASTM C309, Type 1. Apply immediately after removal of forms (which have been continuously wet if they are made of absorbent wood); or in case of a slab, after the concrete has been finished and is hardened sufficiently to walk on.
3. Sprinkling - Perform sprinkling for final curing by using either soaker hoses or lawn sprinklers. Exercise care so the surface of the concrete is not eroded by running water.
 - a. Use soaker hoses for curing of concrete walls and columns after checking that water will not damage the surface and before form removal. Place hoses at the top of walls and columns so that water will enter between concrete and formwork.

SECTION 033000 - CONCRETE: Continued

- b. Keep the concrete surfaces continuously wet. Do not allow alternate wetting and drying of concrete surfaces.
 - c. When absorbent wood forms are used, keep them wet until removed along with the exposed surfaces.
- 4. Fogging - Set up fogging equipment to allow complete coverage of the area to be cured. Maintain the relative humidity above the slab at a level to prevent surface drying and the accumulation of standing water on the surface. Keep concrete surfaces continuously wet. Do not allow alternate wetting and drying of concrete surfaces.
- D. Termination of Curing
 - 1. Unless otherwise specified, cure the concrete for one of the following time periods.
 - a. When testing is not specified to terminate curing procedures, cure concrete per Sections 3.04.B and 3.04.C for at least 7 cumulative days provided that the concrete surface temperature is at least 50°F. When the temperature is lower, refer to PART "Hot Weather Concreting" and "Cold Weather Concreting."
 - b. Concrete compressive strength shall meet or exceed 70 percent of design concrete compressive strength required by Section 2.01.C.2.a before termination of curing measures when curing period is based on the development of strength.
 - (1) General testing requirements—Tests to determine time of termination for curing measures shall be performed by a testing agency acceptable to the Engineer.
 - (2) Nondestructive test method—Submit the test method to the Engineer for acceptance. Provide test data correlating concrete strength determined by the proposed nondestructive test method with the compressive strength of laboratory-cured molded cylinders or drilled cores with the submittal.
 - (3) Molded cylinder method—Mold cylinders in accordance with ASTM C31/C31M or AASHTO T 23 and test in accordance with ASTM C39/C39M or AASHTO T 22 in accordance with project requirements. Maintain curing until tests of at least two cylinders, field-cured alongside the concrete they represent, have reached the compressive strength specified for termination of curing as cited in 3.04.D.1.b.

SECTION 033000 - CONCRETE: Continued

- (4) Maturity method—Maintain curing methods until concrete attains the compressive strength specified for termination of curing, as estimated in accordance with ASTM C1074.
- c. If formwork is removed after the specified termination of curing, a curing method shall be required for the newly exposed surface after final finishing activities have been performed. This curing method shall be the application of a liquid membrane-forming curing compound per section 3.04.C.2 or an Engineer approved alternate method.

3.05 HOT WEATHER CONCRETING:

- A. When the temperature is 90 degrees F or above, or is likely to rise above 90 degrees F within the 24-hour period after concrete placement; or when there is any combination of high air temperature, low relative humidity and wind velocity which would impair concrete strength or quality, follow the recommendations of ACI 305.
- B. Concrete shall have a maximum temperature of 85 degrees F during placement.
- C. Dampen subgrade and forms with cool water immediately prior to placement of concrete.
- D. Protect freshly placed concrete immediately after placement so that the rate of evaporation as determined by ACI 305 (Figure 2.1.5) does not exceed 0.2-pound per square foot per hour.
- E. Protect concrete with suitable insulation if rapidly decreasing nighttime temperatures occur, which would cause thermal shock to concrete placed during warm daytime temperatures.
- F. Protect the concrete with temporary plastic covering during any appreciable delay between placement and finishing.
- G. Begin curing unformed surfaces immediately after finishing and continue for 24 hours. Curing shall consist of application and maintenance of water saturated material to all exposed surfaces; horizontal, vertical and otherwise. After the 24-hour interval, continue curing, using one of the following methods:
 - 1. Moist curing for six days.
 - 2. Application of one coat of curing compound conforming to ASTM C309, Type 2.
 - 3. Application and maintenance of curing paper or heat-reflecting plastic sheets for six more days.
- H. Begin curing formed concrete immediately after placing. Curing shall consist of keeping forms continuously wet for 24 hours. Thereafter, continue curing using one of the following methods:

SECTION 033000 - CONCRETE: Continued

1. Loosen forms and position soaker hose so that water runs down along concrete surfaces. Continue for six days.
2. Strip forms and apply curing compound conforming to ASTM C309, Type 2. Do not allow concrete surfaces to dry prior to application of curing compound.

3.06 COLD WEATHER CONCRETING:

- A. When the temperature is 40 degrees F or is likely to fall below 40 degrees F during the 24-hour period after concrete placement, work shall conform to all requirements of ACI 306.1 to prevent loss of concrete strength or quality.
- B. Minimum temperature for concrete as mixed shall be as indicated on lines 2, 3 and 4 of Table 1.4.1 of ACI 306. Maximum temperature for concrete as mixed shall be 10 degrees F greater than the corresponding minimum temperature.
- C. Place and maintain concrete so that its temperature is never less than the temperature indicated on line 1 of Table 1.4.1 of ACI 306. Maintain the required temperature for the time duration indicated on Table 1.4.2 of ACI 306.
- D. Monitor temperature of concrete in place at corners or edges of formwork as applicable.
- E. Do not expose concrete to carbon monoxide or carbon dioxide fumes from heaters or engines. Oil or coke burning salamanders will not be permitted. Personnel shall be present at all times to maintain safe, continuous operation of heating system.
- F. Control temperature and humidity of protected concrete so that excessive drying of concrete surfaces does not occur.
- G. Calcium chloride will not be permitted as a concrete accelerator or to thaw frozen subgrade prior to concrete placement.
- H. The maximum allowable temperature drop during the first 24-hour period after protection is discontinued shall be as indicated on line 5 of Table 1.4.1 of ACI 306.

3.07 LOW STRENGTH CONCRETE:

- A. Low-Strength Concrete (Refer to ACI 318 Section 5.6.5):
 1. If either of the two following conditions are met, then the concrete will be considered low strength:
 - a. Every arithmetic average of any three consecutive strength tests (average strength of two 6 x 12 cylinders) is lower than the Specified Minimum Strength (f'_c).

SECTION 033000 - CONCRETE: Continued

- b. If any strength test (average strength of two 6 x 12 cylinders) of laboratory cured cylinders falls below the Specified Minimum Strength (f'_c) by more than 500 psi when the Specified Minimum Strength (f'_c) is 5000 psi or less, steps shall be taken to ensure that load carrying capacity of the structure is not jeopardized.
 - 2. If the likelihood of low-strength concrete is confirmed and calculations indicate that load-carrying capacity is significantly reduced, tests of cores drilled from the area in question in accordance with ASTM C42 shall be permitted. In such cases, three cores shall be taken for each strength test that falls below the values given in 3.07.A.1.
 - 3. Cores shall be obtained, moisture conditioned by storage in watertight bags or containers, transported to the laboratory, and tested in accordance with ASTM C42. Cores shall be tested no earlier than 48 hours and not later than 7 days after coring unless approved by the licensed design professional. The specifier of tests referenced in ASTM C42 shall be the licensed design professional.
 - 4. Concrete in an area represented by core tests shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of the Specified Minimum Strength (f'_c) and if no single core is less than 75 percent of the Specified Minimum Strength (f'_c). Additional testing of cores extracted from locations represented by erratic core strength results shall be permitted.
 - 5. If criteria of ACI 318 Section 5.6.5.4 are not met and if the structural adequacy remains in doubt, the responsible authority shall be permitted to order a strength evaluation in accordance with ACI 318 Chapter 20 for the questionable portion of the structure, or take other appropriate action.
- B. Remove and replace with acceptable concrete when the quality and location of the low-strength concrete is such that Owner considers the strength or durability of the structure is impaired and so orders.
- C. Construction delays caused by low-strength or potentially low-strength concrete shall not relieve Contractor from responsibility for late completion even though extensions of time may be granted.

SECTION 033000 - CONCRETE: Continued

3.08 TESTING:

A. Field Testing Concrete and Making Concrete Test Cylinders:

1. Testing Laboratory shall furnish test equipment, test cylinder molds, and trained personnel to perform all required field tests, make the required concrete test cylinders and deliver test cylinders to the testing laboratory. The prescribed tests shall be made in the presence of or with the concurrence of the Site Manager.
2. Concrete sampling for tests and cylinder making shall be done conforming to ASTM C172.
3. Perform the following tests:
 - a. Prepare test cylinders (6 inch diameter by 12 inch length) conforming to ASTM C31, with not less than one set of cylinders (six cylinders) from each day's placement for each 50 cubic yards or fraction thereof.
 - b. Slump Test conforming to ASTM C143.
 - c. Air Content Test conforming to ASTM C231.
 - d. Discard concrete used for slump and air tests.
 - e. Slump and Air Test results shall be performed by the Testing Laboratory for inclusion in the Cylinder Test Reports.

B. Laboratory Testing of Concrete During Construction:

1. **Raba Kistner** shall perform the required laboratory tests and statistical evaluations of concrete being used in the work.
2. Laboratory will lab cure and test concrete cylinders conforming to ASTM C192 and C39, testing two cylinders at seven days of age and two at 28 days of age. The remaining cylinders will be held to verify test results, if needed.
3. Contractor shall have the right to observe all phases of concrete cylinder curing and testing. Should Contractor observe any deviations from the prescribed testing procedures that he considers detrimental to concrete strength test results, he shall immediately notify Site Manager in writing.
4. Testing laboratory shall provide copies of test reports and for the concrete supplier to receive a copy of the test reports.
5. Should the statistical data indicate an unacceptable combination of average strength and standard deviation, Contractor shall take immediate corrective action.

SECTION 033000 - CONCRETE: Continued

6. Should the statistical data indicate an excessive margin of safety, the concrete mix may be modified subject to Owner's approval.

END OF SECTION 033000

END OF DIVISION 3

SECTION 033000 - CONCRETE: Continued

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DIVISION 10 – SPECIALTIES

SECTION –104100 – SIGNAGE - INSTALLATION

PART 1 - GENERAL

1.01 SUMMARY: This Section includes the specifications for signs.

1.02 REFERENCES:

- A. Acceptable Manufacturers: By Material Supplier under a separate contract.
 - 1. Premax.
 - 2. Kraftbilt.
 - 3. Ready Made Sign Company.
 - 4. Seton Name Plate Corporation.

1.03 COMPLIANCE SUBMITTALS:

- A. Submit as specified in DIVISION 1.

PART 2 - PRODUCTS – Provided under a separate contract

PART 3 - EXECUTION

3.01 Install at locations as directed by the Owner.

3.02 Install outdoor signs on fences using aluminum wire.

END OF SECTION 104100

END OF DIVISION 10

SECTION 104100 - SIGNS: continued

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DIVISION 26 - ELECTRICAL

SECTION 260001 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section applies to the complete installation of power, control, instrumentation, wiring, lighting, and other electrical systems specified in all other Sections of DIVISION 26. In general, work includes, but is not limited to, the following:
 - 1. Installation of wiring connections to Equipment specified in DIVISION 26 and all other divisions of these Specifications unless indicated otherwise.
 - 2. Installation of wiring connections to Equipment furnished by Contractor and Owner.
- B. Related Work Specified Elsewhere:
 - 1. All other Sections of DIVISION 26 and DIVISION 33.

1.02 REFERENCES:

- A. As specified in each applicable Section, DIVISION 26 and DIVISION 33.
- B. National Fire Protection Association (NFPA):
 - 1. 70 - National Electrical Code (NEC).
- C. Underwriter's Laboratories, Inc. (UL).

1.03 SUBMITTALS:

- A. As specified in each applicable Section, DIVISION 26 and DIVISION 33.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. All Equipment and Materials shall be in accordance with the National Electrical Code (NEC).
- B. All Equipment conductor termination provisions shall be UL listed for 75°C conductors, unless specified otherwise.
- C. All Equipment shall be UL listed when available.

2.02 SYSTEMS TO BE INSTALLED:

- A. Control and instrumentation systems.
- B. Underground conduit system, including pullboxes.
- C. Temporary lighting and convenience power facilities during construction.

SECTION 260001 - GENERAL REQUIREMENTS: continued

- D. Underground duct banks, including handholes, cable trench and manholes.
- E. All equipment as specified under DIVISION 1

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. As specified in each applicable Section, DIVISION 26.
- B. All work shall be in accordance with the National Electrical Code (NEC) unless specified otherwise.
- C. Where Equipment kilowatt sizes are indicated as approximate for Equipment furnished and installed by this Contract and a different sizes is installed, Contractor shall furnish and install the following at no additional cost to Contractor.
 - 1. Fuses or circuit breakers as indicated.
 - 2. Wire and conduit sized for the Equipment.

3.02 TESTING:

- A. Furnish temporary power sources of proper type for testing purposes when normal supply is not available at the time of testing.

3.03 COORDINATION AND SCHEDULING:

- A. Coordinate Electrical installation with other trades to avoid interference with exposed conduit, lighting fixtures, or other Equipment until Equipment which is located above or behind has been installed, unless release is given in specific cases by Contractor.
- B. Coordinate installation of Equipment and wiring with the established construction schedule.
- C. Provide temporary platforms and handrails as required to allow installation of electrical components and raceway systems.

END OF SECTION 260001

SECTION 260001 - GENERAL REQUIREMENTS: continued

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DIVISION 26 – ELECTRICAL

SECTION 260504 - WIRE, CABLE AND ACCESSORIES INSTALLATION

PART 1 - GENERAL

1.01 SUMMARY:

- A. Contractor shall provide and install (including terminations) all electrical wire, cable, and accessories.
 - 1. Contractor shall complete the installation of the above grade raceway and below grade raceway to form a complete substation raceway system.
 - 2. Contractor shall install all required power, control, and instrumentation cables and wires as required by the Contract Drawings.
 - 3. All field cables shall be connected to all field equipment and terminated at terminal (marshalling) cabinets inside the control building.
- B. Work by Others:
 - 1. Terminal cabinets inside the Control Building shall be provided by the Others.
- C. Definition: Burns & McDonnell type designations such as "BC2," "CEN1," and "SEN2," indicated or specified are for identification only and are not intended to correspond to any trade designation.
- D. Related Work Specified Elsewhere:
 - 1. Low Voltage Power (Yard Service) Installation: SECTION 262000
 - 2. Yard Lighting Installation: SECTION 265000
 - 3. Above Grade Conduit, Fittings & Accessories Installation: SECTION 260534
 - 4. Grounding Installation: SECTION 337900

1.02 REFERENCES:

- A. Applicable Standards (conform to all standards applicable to each item utilized) shall be latest revisions, supplements, and amendments to the following:
 - 1. American Society for Testing and Materials (ASTM):
 - a. B3 - Soft or Annealed Copper Wire.
 - b. B8 - Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - c. B33 - Tinned Soft or Annealed Copper Wire for Electrical Purposes.
 - d. B172 - Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members, for Electrical Conductors.

SECTION 260504 - WIRE, CABLE, AND ACCESSORIES INSTALLATION: Continued

2. Association of Edison Illuminating companies (AEIC):
 - a. CS5 - Specifications for Cross-Linked Polyethylene Insulated Shielded Power Cables Rated 5 Through 46 KV.
 - b. CS6 - Specifications for Ethylene Propylene Rubber Insulated Shielded Power Cables Rated 5 Through 69 KV.
 - c. G5 - Underground Extruded Power Cable Pulling Guide.
3. Institute of Electrical and Electronics Engineers (IEEE):
 - a. 48 - Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminations.
4. National Electrical Manufacturers Association (NEMA) and Insulated Cable Engineers Association (ICEA):
 - a. NEMA WC 3/ICEA S-19-81 - Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 - b. NEMA WC 5/ICEA S-61-402 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 - c. NEMA WC 7/ICEA S-66-524 - Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 - d. NEMA WC 8/ICEA S-68-516 - Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 - e. NEMA WC 55/ICEA S-82-552 - Instrumentation Cables and Thermocouple Wire.
5. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code.
6. Underwriters Laboratory (UL):
 - a. 13 - Power-Limited Circuit Cables.
 - b. 44 - Rubber-Insulated Wires and Cables.
 - c. 83 - Thermoplastic-Insulated Wires and Cables.
 - d. 854 - Service-Entrance Cables.
 - e. 1072 - Medium-Voltage Power Cables.
 - f. 1202 - Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies.
 - g. 1277 - Electric Power and Control Tray Cables with Optional Optical-Fiber Members.

SECTION 260504 - WIRE, CABLE, AND ACCESSORIES INSTALLATION: Continued

- h. 1581 - Electrical Wires, Cables, and Flexible Cords.

1.03 COMPLIANCE SUBMITTALS:

- A. Submit as specified in DIVISION 1.
- B. Include, but are not limited to, the following:

1.04 QUALITY ASSURANCE:

- A. The Contractor shall furnish equipment and materials meeting the specified ratings and performance at the altitude and ambient temperature specified.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- 1. Tape and Insulation Putty: Minnesota Mining and Manufacturing (3M).
- 2. Cable Ties:
 - a. AMP Special Industries.
 - b. Avery Dennison Manufacturing Company.
 - c. Panduit Corporation.
 - d. Thomas and Betts Company, Inc.
 - e. Minnesota Mining and Manufacturing (3M).
- 3. Cable Identification Tags:
 - a. Allen Marking Products, Kansas City, Missouri.
 - b. Floy Tag and Manufacturing, Seattle, Washington.
 - c. Panduit Corporation.
 - d. Specialty Products Company, Rock Hill, South Carolina.

2.02 WIRE AND CABLE:

- A. The Cable Schedule defines the type, size, end points and routing of each wire or cable (excluding lighting, intercom, convenience power and grounding cables).
- B. Corresponding lighting, intercom, convenience power and grounding cable requirements are indicated in associated portions of the Contract Documents.

2.03 CONNECTORS:

- A. General Requirements:
 - 1. Designed and sized for specific cable being connected.

SECTION 260504 - WIRE, CABLE, AND ACCESSORIES INSTALLATION: Continued

2. Solder-less, pressure-type connectors constructed of noncorrodible tin-plated copper.
 3. Rated current-carrying capacity equal to or greater than the cable being connected.
 4. Application tooling for connectors shall contain die or piston stops to prevent over crimping and cycling or pressure relief to prevent under crimping. Dies of all application tooling shall provide dot or wire size coding for quality control verification. All tooling shall be manufactured by the connector manufacturer.
 5. Furnish necessary hardware such as bolts, washers, nuts, etc., stainless steel for outdoor connections, and silica bronze for connections in transformer and switchgear cabinets.
- B. Power Connectors (Sizes 12-2 AWG):
1. Vinyl or nylon pre-insulated ring-tongue type.
 2. Ring tongue sized to match terminal stud size.
 3. Have insulation grip sleeve or ring to firmly hold to cable insulation.
 4. Application tooling designed to crimp the wire barrel (conductor grip) and the insulation grip sleeve or ring with a one-step crimp.
 5. Acceptable manufacturers are listed in the Acceptable Connector Manufacturers' Cross-Reference Chart at end of this Article.
- C. Power Connectors (Sizes 1 AWG - 750 MCM):
1. Uninsulated two-hole rectangular tongue.
 2. Application tooling shall be hydraulically operated.
 3. Acceptable manufacturers are listed in the Acceptable Connector Manufacturers' Cross-Reference Chart at end of this Article.
- D. Control, Instrument, and Specialty Cable Connectors:
1. Vinyl or nylon pre-insulated ring-tongue type. Spade lugs will not be permitted.
 2. Ring tongue sized to match terminal stud size.
 3. Have insulation grip sleeve to firmly hold to cable insulation.
 4. Insulation grip sleeve shall be funneled to facilitate wire insertion and prevent turned back strands.
 5. Application tooling designed to crimp the wire barrel (conductor grip) and the insulation grip sleeve with a one-step crimp.

SECTION 260504 - WIRE, CABLE, AND ACCESSORIES INSTALLATION: Continued

6. Acceptable manufacturers are listed in the Acceptable Connector Manufacturers' Cross-Reference Chart below.

Acceptable Connector Manufacturers' Cross-Reference Chart					
Type	Size (AWG or MCM)	Amp Special Industries	Thomas & Betts	Panduit Corp.	Burndy
Control	22-16	PIDG	RA18	PN18	TP16
	16-14	PIDG	RB14	PN14	TP14
	12-10	PIDG	RC10	PN10	TP10
Power	12-10	PIDG	RC10	--	TP10
	8	Amplibond	RD8	--	YAEV
	6	Amplibond	RE6	--	YAEV
	4	Amplibond	RF4	--	YAEV
	2	Amplibond	RG2	--	YAEV
	1-750	Ampower	54200 Series	--	YA-2LN YA39-2LN

2.04 TERMINATION KITS (SHIELDED MEDIUM-VOLTAGE POWER CABLE):

- A. Terminations shall be pre-engineered kits containing all components necessary to provide electric stress control for the cable insulation shield terminus, complete external leakage insulation between the high-voltage conductor(s) and ground, and a seal to prevent the entrance of the external environment.
- B. Designed and sized for the specific cable being terminated.
- C. Termination kit components shall be of heat-shrinkable polymeric construction or premolded rubber stress cone type.
- D. Designed for specific cable shielding construction being terminated (tape shield, wire shield, etc.).
- E. Provide with silicon rubber skirts for all outdoor applications.
- F. Assembled termination shall conform to the requirements of IEEE 48 for Class 1 terminations.
- G. Termination kits shall be compatible with the cable materials used in the specific cables being terminated.
- H. Termination kits shall be 3M 7600 Series, Raychem Type HVT with GCA kit, or approved equivalent

2.05 CABLE SUPPORTS: Cable supports for cables in vertical risers shall be wedging plug type or basket grip type.

SECTION 260504 - WIRE, CABLE, AND ACCESSORIES INSTALLATION: Continued

2.06 CABLE TIES:

- A. Nylon self-locking type.
- B. Have a normal service temperature range of -40 degrees C to 85 degrees C.
- C. Be weather resistant for outdoor use.
- D. Be AMP Special Industries "AMP-TY," Dennison Manufacturing Company "BAR-LOK," Panduit Corporation "PAN-TY" or Thomas & Betts "TY-RAP."

2.07 CABLE IDENTIFICATION TAGS:

- A. Designed to provide a permanent wire and cable identification system.
- B. Show complete cable number. Cable numbers are defined in the Cable Schedule and/or Contract Drawings.
- C. Cable numbers shall be legible and permanent, hand lettered, stamped or typed.
- D. Character size for cable numbers shall be a minimum of 3/16-inch if hand lettered or 1/8-inch if stamped or typed.
- E. Material shall be nonmetallic and impervious to moisture.
- F. Be securely attached to cables and accessible for inspection.
- G. Cable identification tags, marking, and attachment methods shall be subject to approval of the Owner's Representative.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS:

- A. Install wire and cable in raceway system as indicated in Contract Documents.
- B. Do not subject cable to pulling tensions or sidewall pressures in excess of manufacturer's recommendations.
- C. Attach pulling grips over the cable sheath to prevent slipping of the insulation.
- D. Do not subject cable to inside bending radius less than those recommended by the cable manufacturer or as noted below eight times the cable outside diameter for 600-Volt or lower rated cables (whichever is greater) during or after installation.
- E. If applicable, install intermediate splices only as indicated in Contract Documents or as required to avoid subjecting cable to excessive pulling tension or sidewall pressures. Cable splicing locations shall be approved by Site Manager prior to cable installation.
- F. Support cables at connections or termination points such that any strain on cable will not be transmitted to the connection or termination.

SECTION 260504 - WIRE, CABLE, AND ACCESSORIES INSTALLATION: Continued

- G. Install cable supports in vertical runs of tray or conduit, at boxes and at terminations in equipment, and as required to meet intermediate support requirements of NEC.
- H. All pulling compounds shall be approved by wire and cable manufacturer as being compatible with cable materials.
- I. Attach a cable identification tag to each cable at all terminations, splices, and end points.
- J. Foam fill cable tray openings to the building walls after cable installation.

3.02 POWER (600V AND BELOW), CONTROL, INSTRUMENT, AND SPECIALTY CABLE:

- A. As applicable, install metallic barrier in all tray, trench, and boxes to separate power, control and instrumentation from low-level signal (50 volts or less) instrumentation circuits where run in the same tray or box.
- B. Secure with cable ties in cable tray risers at intervals not to exceed three feet.
- C. Tie together with cable ties all single-conductor cable on each individual circuit in each junction box, equipment, or manhole and in cable tray or trench at intervals not to exceed 6 feet.
- D. Control and instrument cable splices shall be as follows:
 - 1. Made only in junction or terminal boxes.
 - 2. Made on terminal blocks.
 - 3. Conductor color coding shall be maintained.
 - 4. For shielded cables, shield continuity and isolation shall be maintained.
- E. Power cable (600V or below) splices and motor terminations shall be as follows:
 - 1. Made only in junction or terminal boxes.
 - 2. Splices shall be made using compression-type connectors bolted together.
 - 3. Splice to be covered with a cold-shrink connector insulator.
- F. Terminate and ground control, instrument, and specialty cable shields as indicated in Contract Documents and recommended by the manufacturer of the equipment being connected.
- G. Ground the shields on only one side of the shielded control cable used in substations and switchyards. Shields should only be grounded at the Marshalling Cabinets, which are located inside the Control Building.
- H. Ground Cable: Install as specified in SECTION 337900.

3.03 POWER CABLE (2 KV AND ABOVE):

- A. Make all splices and terminations using kit materials as specified.

SECTION 260504 - WIRE, CABLE, AND ACCESSORIES INSTALLATION: Continued

B. Properly terminate and ground cable shield:

1. Ground cable shield at both ends and at all intermediate splices.
2. Do not pass cable shield through ring-type current transformers.

C. Cover all terminal connections, lugs, bus, and all other exposed current-carrying parts to equal or exceed insulation of cables of which they are a part with high-voltage tape, insulating boots, or heat-shrink materials.

D. Isolate from all lower voltage cables in pull boxes by galvanized-steel dividers.

E. Where cables are installed in tray, group and tie together all conductors of each three-phase circuit at 2-foot intervals. Tie grouped cables to tray at 2-foot intervals and maintain at least 1-inch separation between other circuits in the tray.

F. Transformers , Capacitor Banks and Switchgear:

1. Connect transformer bushings to surge arresters and cables.
2. Completely insulate all high-voltage connections, wire, etc.

3.04 FIBER OPTIC CABLES

A. Follow manufacturer's recommendations regarding:

1. Maximum tensile load
2. Maximum static tensile.
3. Minimum bending radius.
4. Maximum crushing force.
5. Maximum impact.
6. Harmful liquids and/or gases.
7. Temperature and humidity limitations.

B. All fiber optic cable shall be fully supported throughout its entire run.

C. At no time shall more than 400 pounds of tension be placed on any fiber optic cable while it is being pulled through cable tray or conduit. It is preferred that all fiber optic cable be pulled with hand power only. If power winches or mechanical advantage devices are used to pull cable, a tensionometer must be used to insure that maximum tension is not exceeded.

Alternatively, a "mechanical fuse," rated at 400 pounds may be included in the linkage.

Torsion shall be avoided by the use of a swivel at the cable end. While under tension, a minimum bend radius of 20 times the outside cable diameter shall be maintained through the use of pulleys and sheaves where required. After pulling, no bend may have a radius, at rest, of less than 10 times the outside cable diameter.

SECTION 260504 - WIRE, CABLE, AND ACCESSORIES INSTALLATION: Continued

- D. For non-preterminated fiber cables, terminate each individual strand of fiber optic cable.
- E. For non-preterminated fiber cables, install ST connectors on each spare strand of fiber optic cable.

3.05 CABLE CONNECTIONS AND TERMINATIONS:

- A. Make up clean and tight to assure a low-resistance joint.
- B. Make only in terminal boxes, equipment, or other accepted enclosures and not in conduit or cable tray.
- C. Install all connectors with tooling manufactured by the connector manufacturer and as specified.

END OF SECTION 260504

SECTION 260504 - WIRE, CABLE, AND ACCESSORIES INSTALLATION: Continued

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POWER CONTROL & INSTRUMENT CABLE

VOLTAGE CLASS OR USE

H - 15-KV POWER
M - 15-KV POWER
P - 5-KV POWER
S - 600-V POWER
C - CONTROL
I - INSTRUMENT

SPECIFIC CONSTRUCTION

1 - BASIC CONSTRUCTION TYPE
2 - A VARIATION OF THE BASIC CONSTRUCTION TYPE
3 - ANOTHER VARIATION OF THE BASIC CONSTRUCTION TYPE
4 - ETC.

SRN1

CONDUCTOR INSULATION

E - CROSS-LINKED POLYETHYLENE
P - POLYETHYLENE
R - ETHYLENE PROPYLENE OR SILICON RUBBER
T - POLYESTER TABLE
V - POLYVINYL CHLORIDE
F - FLUOROPOLYMER OR FLUOROCARBON RESINS

CABLE OVERALL JACKET

N - NEOPRENE, HYPALON OR CHLORINATED POLYETHYLENE
P - POLYETHYLENE
V - POLYVINYL CHLORIDE
F - FLUOROPOLYMER OR FLUOROCARBON RESINS

SPECIALTY CABLE

HT1

CLASS OR USE

BC - BARE COPPER
PF - PREFABRICATED ASSEMBLY
HT - HIGH TEMPERATURE
IC - INTERCOM
ME - MINERAL INSULATED
SW - SWITCHBOARD WIRE

SPECIFIC CONSTRUCTION

1 - BASIC CONSTRUCTION TYPE
2 - A VARIATION OF THE BASIC CONSTRUCTION TYPE
3 - ANOTHER VARIATION OF THE BASIC CONSTRUCTION TYPE
4 - ETC.

TCJ

TC - THERMOCOUPLE EXTENSION WIRE

J - IRON/CONSTANTAN
K - CHROMEL/ALUMEL
T - COPPER/CONSTANTAN
E - CHROMEL/CONSTANTAN

RG8

RG - COAXIAL CABLE

NUMBER FOLLOWING RG PREFIX DESIGNATES SPECIFIC RG TYPE

FIBER OPTICS CABLE

CLASS OR USE

FIB - FIBER OPTIC

SPECIFIC CONSTRUCTION

1 - BASIC CONSTRUCTION TYPE
2 - A VARIATION OF THE BASIC CONSTRUCTION TYPE
3 - ANOTHER VARIATION OF THE BASIC CONSTRUCTION TYPE
4 - ETC.

FIB1



date 8/16/2019

designer W.Zaidi

CABLE TYPE DESIGNATIONS

project Rio Grande

client BPUB

drawn EX-61420-1 rev. 0

Burns & McDonnell Engineering Company Engineers - Architects - Consultants Kansas City, Missouri	WIRE AND CABLE SPECIFICATION SHEET	
	BC2 BMcD TYPE:	NEC TYPE:
BARE COPPER GROUND CABLE		
<u>GENERAL REQUIREMENTS:</u>		
Annealed, coated, bare copper (ASTM B33)		
<u>SPECIFIC REQUIREMENTS:</u>		
1. Solid in sizes 4 AWG and smaller.		
2. Class B stranded in sizes 2 AWG and larger (ASTM B8).		

<p align="center">Burns & McDonnell Engineering Company Engineers - Architects - Consultants Kansas City, Missouri</p>	<p align="center">WIRE AND CABLE SPECIFICATION SHEET</p>													
	<p align="center">CEN1</p> <p>BMcD TYPE:</p>	<p>NEC TYPE:</p>												
<p align="center">600 VOLT - UNSHIELDED MULTI-CONDUCTOR CONTROL CABLE</p>														
<p><u>GENERAL REQUIREMENTS:</u></p>														
CONDUCTOR:	Class B stranded annealed copper (ICEA S-73-532/NEMA WC 57 Part 2).													
INSULATION:	Cross-linked polyethylene "XLPE" (ICEA S-73-532/NEMA WC 57 Part 3). Color coding shall be Method 1 (ICEA S-73-532/NEMA WC 57 Appendix E) using color pigmented compounds with color as designated by Table E-2.													
CABLE JACKET:	Chlorinated polyethylene "CPE" or chlorosulfonated polyethylene "CPSE" (ICEA S-95-658/NEMA WC 70).													
ASSEMBLY:	For three (3) or more conductors, fillers and polyester tape covering (10% minimum overlap) shall be applied to form a round cable.													
IDENTIFICATION:	Surface printing on the cable shall show manufacturer's name, insulation type, jacket type, number and size of conductors, voltage rating, and numbered footage markers.													
<p><u>SPECIFIC REQUIREMENTS:</u></p>														
TEMP. RATING:	Cable shall be suitable for operation under the following maximum conductor temperatures: 90°C --- Continuous, wet or dry locations													
INSULATION THICKNESS:	All conductors to have 30 mils nominal insulation as per ICEA S-73-532.													
JACKET THICKNESS:	<table border="0"> <tr> <td align="center">Calculated Diameter of Cable Under Jacket (inches)</td> <td align="center">Jacket Thickness (Mils) (ICEA S-73-532)</td> </tr> <tr> <td align="center">0.425 or less</td> <td align="center">45</td> </tr> <tr> <td align="center">0.426-0.700</td> <td align="center">60</td> </tr> <tr> <td align="center">0.701-1.500</td> <td align="center">80</td> </tr> <tr> <td align="center">1.501-2.500</td> <td align="center">110</td> </tr> <tr> <td align="center">2.501 or larger</td> <td align="center">140</td> </tr> </table>		Calculated Diameter of Cable Under Jacket (inches)	Jacket Thickness (Mils) (ICEA S-73-532)	0.425 or less	45	0.426-0.700	60	0.701-1.500	80	1.501-2.500	110	2.501 or larger	140
Calculated Diameter of Cable Under Jacket (inches)	Jacket Thickness (Mils) (ICEA S-73-532)													
0.425 or less	45													
0.426-0.700	60													
0.701-1.500	80													
1.501-2.500	110													
2.501 or larger	140													
FACTORY TESTS:	<ol style="list-style-type: none"> 1. All cable shall be tested in accordance with requirements of ICEA S-73-532. 2. All cable and singles of multi-conductor cables supplied shall meet the flame test requirements of IEEE 383 using a gas burner flame source. Flame tests shall be performed on 7/C-14 AWG and certified test reports submitted shall be to the Engineer in triplicate. 													
CERTIFICATION:	Cables shall be certified to be in conformance with all applicable requirements of ICEA S-73-532.													

SECTION 260534 - CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION

PART 1 - GENERAL

1.01 SUMMARY:

- A. Contractor shall install all below and above grade conduit and associated conduit fittings.
- B. Contractor shall install prefabricated cable trench to cable ladder that interfaces with the cable entry openings on the control house wall.
- C. Contractor shall install all conduit fittings, boxes, and accessories as specified or indicated.
- D. Work by Others:
 - 1. All raceway in the control house (cable tray, conduit, cables and wires) shall be installed by Control House Supplier.
- E. The Contract Drawings define the size and type of each conduit.
- F. Related Work Specified Elsewhere:
 - 1. Wire, Cable, and Accessories Installation: SECTION 260504
 - 2. Low Voltage Power (Yard Service) Installation: SECTION 262000
 - 3. Yard Lighting Installation: SECTION 265000
 - 4. Site Work: DIVISION 31.
 - 5. Concrete: DIVISION 3.

1.02 REFERENCES:

- A. Applicable Standards (conform to all standards applicable to each item utilized) shall be latest revisions, supplements, and amendments to the following:
 - 1. American National Standards Institute (ANSI):
 - a. C80.1 - Rigid Steel Conduit, Zinc Coated.
 - b. C80.5 - Rigid Aluminum Conduit.
 - 2. American Society for Testing and Materials (ASTM):
 - a. A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - c. A307 - Carbon Steel Bolts and Studs, 60,000psi Tensile.
 - d. A611 - Steel, Sheet, Carbon, Cold-Rolled, Structural Quality.
 - e. A668 - Steel Forgings, Carbon and Alloy, for General Industrial Use.
 - f. F512 - Smooth-Wall Poly(Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

3. Federal Specifications:
 - a. W-C-1094A - Conduit and Conduit Fittings, Plastic, Rigid.
 - b. WW-C-540A - Conduit, Metal, Rigid, (Electrical, Aluminum).
 - c. WW-C-566C - Conduit, Metal, Flexible.
 - d. WW-C-581E - Conduit, Metal, Rigid, and Intermediate; and Coupling, Elbow, and Nipple, Electrical Conduit: Steel, Zinc Coated.
 4. National Electrical Manufacturers Association (NEMA):
 - a. FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - b. RN 1 - Polyvinyl-Chloride(PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - c. TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
 - d. TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
 - e. TC 6 - PVC and ABS Plastic Utilities Duct for Underground Installation.
 - f. TC 9 - Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.
 5. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code.
 6. Underwriters Laboratory (UL):
 - a. 1- Flexible Metal Conduit.
 - b. 6 - Rigid Metal Conduit.
 - c. 360 - Liquid-Tight Flexible Steel Conduit.
 - d. 467 - Grounding and Bonding Equipment.
 - e. 514A - Metallic Outlet Boxes.
 - f. 514B - Fittings for Conduit and Outlet Boxes.
 - g. 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.
 - h. 651 - Schedule 40 and 80 Rigid PVC Conduit.
 - i. 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
- 1.03 COMPLIANCE SUBMITTALS:
- A. Submit as specified in DIVISION 1.
 - B. Include, but are not limited to, catalog cuts.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Rigid Steel Conduit (Type RSC):
 - 1. Allied Tube and Conduit Corporation.
 - 2. Triangle PWC, Inc.
 - 3. Wheatland Tube Company.
- B. Electrical Metallic Tubing:
 - 1. Allied Tube and Conduit Corporation.
 - 2. Triangle Wire and Cable.
 - 3. Republic Conduit.
 - 4. Wheatland Tube Company.
 - 5. Western Tube and Conduit Corp.
- C. Rigid Polyvinyl Chloride (PVC) Conduit and Fittings:
 - 1. IPEX Inc.
 - 2. Certain-Teed Products Corporation.
 - 3. Carlon Lamson and Sessions.
 - 4. Cantex Inc.
- D. Rigid Nonmetallic Conduit (Type RNC):
 - 1. Carlon Division, Lamson & Session Company.
 - 2. CertainTeed Corp.
 - 3. Condux International, Inc.
- E. Flexible Steel Conduit (Type FSC):
 - 1. Alflex Corp.
 - 2. Anamet, Inc., Anaconda Metal Hose.
 - 3. Electri-flex Company.
- F. Conduit Fittings for Rigid Metallic Conduit:
 - 1. Heavy-Duty Fittings:
 - a. Appleton Electric Company.
 - b. Crouse-Hinds Company.
 - c. O-Z/Gedney Company.
 - 2. Conduit Expansion Fittings:
 - a. O-Z/Gedney Company.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

- G. Conduit Boxes for Rigid Metallic Conduit:
 - 1. Hoffman Engineering Company.
- H. Innerduct Conduit
 - 1. Carlon Division, Lamson & Session Company.
- I. Supports:
 - 1. B-Line Systems, Inc.
 - 2. GS Metals Corporation.
 - 3. Power-Strut Division, Allied Tube and Conduit Corporation.
 - 4. Unistrut Corporation.
- J. Conduit Identification Tags: KC Plastic Laminating Company, Kansas City, Missouri.
- K. Fireproof Coatings:
 - 1. Carboline Company - Intumastic 285.
 - 2. Flamemaster Corporation - Flamaster 77.
- L. Penetration Sealers:
 - 1. 3M Corporation - Fire Stop Foam 2001.
 - 2. Fireproof coatings listed above when applied as specified.
- M. Damming Materials:
 - 1. Boards: Thermal Ceramics - Firemaster Board.
 - 2. Fiber: Thermal Ceramics - Firemaster Blanket or Fiber.
- N. Paint and Coatings:
 - 1. Supports:
 - a. Rust-Oleum.
 - 2. Rigid Steel Conduit:
 - a. Kop-Coat, Carboline Company.

2.02 GENERAL REQUIREMENTS (TYPICAL FOR ALL TYPES):

- A. Each length of conduit furnished with coupling on one end and metal or plastic protector on other end.
- B. UL listed and labeled on each conduit length, fitting, and accessory.
- C. Sizes of conduit, fittings, and accessories as indicated by Contract Documents or required by applicable standards.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

2.03 RIGID NONMETALLIC CONDUIT (TYPE RNC):

- A. Fabricated from self-extinguishing high-impact polyvinyl chloride designed for aboveground and underground installations.
- B. Fittings and accessories fabricated from same material as conduit.
- C. Solvent-cement-type joints as recommended by manufacturer.
- D. Inside diameter no less than that of rigid steel conduit.
- E. Dielectric strength a minimum of 400 volts per mil.
- F. Rated and labeled for use with 90-degree C rated conductors.
- G. Schedule 40 PVC conduit required for direct burial applications.
- H. Type A PVC thin wall conduit may be used in concrete encased applications only. Type EB conduit will not be acceptable.
- I. Type EPC schedule 40 heavy-wall rigid conduit to conform to NEMA W-C-1094A Type II.

2.04 FLEXIBLE STEEL CONDUIT (TYPE FSC):

- A. Liquid-tight conduit with flexible galvanized-steel core and a polyvinyl chloride covering.
- B. Spiral encased copper bonding conductors for conduit in sizes 1-1/4 inches and smaller.
- C. Special grade polyvinyl chloride (PVC) jacket, suitable for use in -50 degrees F through 220 degrees F areas.
- D. Special grade polyvinyl chloride (PVC) jacket, suitable for oil-resistant applications.

2.05 CONDUIT BOXES FOR METALLIC CONDUIT (AS APPLICABLE):

- A. Steel Boxes:
 - 1. Electrogalvanized steel boxes.
 - 2. Galvanized steel covers.
 - 3. Cadmium-plated or bronze screws and bolts.
- B. Minimum gauge requirements:

<u>No Surface Area</u> <u>Exceeds</u>	<u>No Single Dimension</u> <u>Exceeds</u>	<u>Steel (MSG)</u>
360 sq in	24 in	16
1,000 sq in	40 in	14
1,500 sq in	60 in	12
over 1,500 sq in	over 60 in	10

- C. Threaded conduit entrances or waterproof hubs outdoors and in other areas subject to moisture.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

- D. Include provisions for mounting cable supports where indicated in contract documents or as required by NEC.

2.06 INNERDUCT CONDUIT:

- A. HDPE innerduct, corrugated wall, 1" nominal duct size.

2.07 SUPPORT SYSTEM:

- A. Use galvanized steel conduit clamps to support all exposed metallic conduit.
- B. Use nonmagnetic clamps to support nonmetallic conduits.
- C. Fabricated from structural steel or manufactured framing members equal to "Unistrut" P-3000 series as manufactured by Unistrut Corporation unless otherwise indicated.
- D. Provide all necessary rods, anchors, inserts, clamps, spacers, shims, bolts and miscellaneous steel.
- E. Galvanized or cadmium-plated members.
- F. Where exposed to weather or high humidity, use noncorrodible, galvanized or cadmium-plated metal for nuts, bolts, washers, shims, and other small accessories.

2.08 CONDUIT IDENTIFICATION TAGS:

- A. Gothic, 3/4-inch, black characters on white background.
- B. Made of white flame-retardant PVC, with "Perma-stik" adhesive and peel-off backing.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS:

- A. Location:
 - 1. Install conduit as near as possible to the routing indicated on Contract Drawings. Site Manager shall be notified of any deviations from indicated routing.
 - 2. Shift locations as required to avoid interference with other equipment. Coordinate relocation with other work in area.
 - 3. Where routing of conduit is not indicated, such as for lighting, home run circuits and other systems requiring small conduit runs, route conduit as specified subject to approval by Site Manager.
- B. All above grade conduits not utilized shall be sealed with conduit sealer and capped.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

- C. All above grade conduits installed for future equipment locations shall be protected from traffic using pipe bollards, which are to be located on the side facing the traffic.
- D. Furnish conduit in sizes indicated on contract drawings. Where sizes are not indicated, minimum conduit size shall be 3/4-inch.
- E. Size conduit in accordance with NEC requirements. Where larger sizes are indicated in Contract Documents, the Contract Documents shall prevail.
- F. No conduits shall be routed through cable tray or cable trench openings located in walls, floors, etc.
- G. Seal around wire and cable and empty conduits at all locations in the yard, in all equipment terminal cabinets and all conduits routed through floors, walls and ceilings of control buildings with duct and conduit sealer.
- H. Holes and Sleeves:
 - 1. Unless indicated as being provided by others, provide through floors, walls, ceilings, and roofs as necessary for conduit runs, including weatherproofing at outside walls and on roofs.
 - 2. Furnish sleeves for all holes and forms for all openings in new work.
 - 3. Seal all holes and slots in walls, floors and ceilings with penetration sealer:
 - a. Silicone Foam: Dam penetration with specified fiber and/or board and fill to a depth of six inches.
 - b. Coatings (Holes or Slots):
 - (1) Fill hole with specified fiber.
 - (2) Cut a 1/2-inch-thick piece of the specified board large enough to cover the opening and overlap the wall three to six inches.
 - (3) Attach board in at least two places.
 - (4) Apply coating 1/4-inch thick (wet) to board and the wall or floor three inches all around the board.
- I. Make connections including any required punching to boxes, panels and other equipment as follows:
 - 1. Indoors: Double locknuts, one inside and one outside.
 - 2. Outdoors: Use threaded conduit fittings or waterproof hubs.
- J. Drill and tap main and auxiliary terminal boxes as required, and make connections as follows:
 - 1. Indoors: Double locknuts, one inside and one outside.
 - 2. Outdoors: Use threaded conduit fittings or waterproof hubs.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

- K. Make connections to cable trays as follows:
 - 1. Attach to tray with cable tray conduit clamps specifically designed for this application.
 - 2. Attach to top of tray where tray covers are not required and to bottom of tray where covers are required.
 - 3. Do not cut or punch tray side rails to install conduit.
- L. Terminate all conduit runs with insulated bushings.
- M. Running threads will not be permitted.
- N. Coat all field cut threads, scars, or wrench abrasions in galvanized conduit with one coat of zinc-rich coating at 3 mils dry:
 - 1. Carboline 658.
 - 2. Keeler & Long 7575.
 - 3. Tnemec 90-94.
- O. Do not exceed the following number of bends between cable pulling points:

<u>Max. Length of Run in Feet</u>	<u>Max. No. of 90-Degree Bends</u>
0-49	4
50-99	3
100-149	2
150-199	1

- P. Place drainage fittings or weep holes (for boxes only) at low points where moisture can collect.
- Q. Metallic conduit systems shall be electrically continuous in their entirety, with bonding jumpers provided as required by NEC.
- R. Provide suitable protection for conduit risers against damage during construction.
- S. Carefully ream ends of all conduit lengths after cutting to eliminate sharp burrs.
- T. Clean inside of all conduits before pulling wire.
- U. Provide all fittings necessary for a complete installation.

3.02 CAST-IN-CONCRETE INSTALLATION:

- A. Install where specified or indicated in contract documents.
- B. Do not install conduit in concrete when conduit diameter exceeds one-third of concrete thickness.
- C. Install parallel runs with a minimum spacing of three conduit diameters between conduits.
- D. Install in floor slabs maintaining a route as straight as possible.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

- E. Use long radius elbows except on risers where curved portion of elbow would extend above the finished floor or foundation.
- F. Make all joints watertight after installation by coating all finished joints with Kop-Coat Bitumastic No. 50 or equivalent waterproof paint.
- G. Tie securely in place to prevent movement when concrete is poured.
- H. Cap ends of all conduits before concrete is poured.
- I. Slope finished floor away from conduit risers.
- J. Clean out all conduits immediately after concrete work is finished.

3.03 BURIED INSTALLATION:

- A. Install as indicated in Contract Documents.
- B. Bury conduits above ground grid, a minimum of 36 inches below subgrade unless otherwise indicated.
- C. Before burying or trenching check with Site Manager as to existing grade conditions and the possibility of future coordination problems.
- D. Slope conduits away from conduit risers where possible.
- E. Use long radius bends at all risers unless otherwise indicated.
- F. Provide wall entrance seals where conduit enters the building or subgrade walls/floors from exterior underground.
- G. Make all joints watertight after installation by coating all finished joints with Kop-Coat Bitumastic No. 50 or equivalent waterproofing paint on galvanized conduit.
- H. Cap ends of all conduits before backfilling.
- I. After conduits have been installed in trench, carefully backfill trench in layers of four to eight inches of friable sandy or silty clay containing fine material sufficient to provide a dense mass free of voids and capable of satisfactory compaction and tamp each layer with a power tamp. Backfill material shall be free of roots or other organic matter, refuse, ashes, cinder, frozen earth, or other unsuitable material.

3.04 EXPOSED INSTALLATION:

- A. Install in building interior spaces where specified or indicated. Install horizontal runs as high above floor as possible
- B. Install schedule 40 PVC for all above grade outdoor locations.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

- C. Run conduit parallel or perpendicular to walls, ceilings, beams and columns unless indicated otherwise.
- D. Route to clear all doors, windows, access wells and openings.
- E. Group parallel runs in neatly aligned banks where possible with minimum of one-inch clearance between conduits.
- F. Do not exceed a distance of eight feet between supports on horizontal or vertical runs.

3.05 RIGID NONMETALLIC CONDUIT (TYPE RNC):

- A. Schedule 40 permitted for buried applications. Bury conduits above ground grid, a minimum of 24 inches below subgrade unless otherwise indicated.
- B. Schedule 80 permitted for exposed above grade outdoor applications.
- C. Make all joints watertight with cement compound furnished by conduit manufacturer.
- D. Slope conduits away from conduit risers where possible.
- E. Maintain six-inch separation from underground piping.
- F. After trench bottom has been finished to grade, lay conduit, then carefully backfill trench in layers of four to eight inches of dry unfrozen material, and tamp each layer with a power tamp.

3.06 INNERDUCT CONDUIT:

- A. Shall be installed to protect fiber optic conductors. Innerduct conduit shall be routed through the entire cable route from splice box through conduits, cable trenches, and cable tray.

3.07 ELECTRICAL METALLIC TUBING:

- A. Install as specified or indicated.
- B. Permitted for exposed, concealed, and cast-in-concrete applications with the following restrictions:
 - 1. Use only for lighting, intercommunication, and convenience power circuits.
 - 2. For exposed applications, use indoors only and only where protected by flanges of columns, beams, or other protective structures.
 - 3. Install concealed in walls, floors, and above suspended ceilings where possible.
 - 4. Do not use where conduit passes through floors or to support light fixtures.
 - 5. Do not install in hazardous locations.

3.08 FLEXIBLE STEEL CONDUIT (TYPE FSC):

- A. Install as specified or indicated.

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

- B. Permitted for exposed and concealed applications.
- C. Install at all points of connection to equipment mounted on supports to allow for expansion and contraction.
- D. Install at locations where rigid conduit connections are impractical.
- E. Maximum length shall be six feet.
- F. Install an external bonding jumper to conform to NEC on conduit sized 1-1/2 inches and larger.
- G. Use for conduit expansion joints where practical.

3.09 CONDUIT FITTINGS: Install as specified, indicated, or necessary.

3.10 BOXES:

- A. Install boxes as specified, indicated, or as required by NEC.
- B. Provide with 1/4-inch drain holes where installed at indoor termination of duct banks or outdoor conduit run.
- C. Indoors, conform to NEMA Type 1 enclosure in all nonhazardous locations.
- D. Outdoors, conform to NEMA Type 3R except in manholes and handholes NEMA Type 4.
- E. Metallic Barriers:
 - 1. Designed not to separate phases of a power circuit.
 - 2. Provide as necessary for the isolation of power circuits from other type circuits.

3.11 SUPPORTS:

- A. Construct with sufficient rigidity to hold all mounted equipment and material in permanent and neat alignment.
- B. Design to provide 1/4-inch space between equipment housings and walls or columns upon which they are mounted.
- C. Do not exceed load requirements in NEC and NEMA standards.
- D. Paint all field cuts or welding of supports with one coat of zinc-rich coating at 3 mils dry:
 - 1. Carboline 658.
 - 2. Keeler & Long 7575.
 - 3. Tnemec 90-94.
- E. Use electrogalvanized steel conduit clamps and nonmagnetic conduit clamps to support electrogalvanized steel conduit and nonmagnetic conduit respectively.

3.12 CONDUIT IDENTIFICATION TAGS:

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

- A. Install on all scheduled conduit at time of installation.
- B. Clean the conduit surface and install a tag at each conduit termination in such a manner that the tag is readable from the floor, platform, or other vantage point.
- C. Provide temporary conduit identification until the permanent conduit identification can be installed. An acceptable method is the use of a broad-tipped permanent ink marker.

3.13 HOME RUNS:

- A. Where routing of conduit is not indicated, such as for lighting, convenience power, intercom circuits, and other systems, field route conduit as specified in this Section.

END OF SECTION 260534

SECTION 260534 – CONDUIT, FITTINGS AND ACCESSORIES INSTALLATION: Continued

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SECTION 265000 – YARD LIGHTING INSTALLATION

PART 1 - GENERAL

1.01 SUMMARY:

- A. Contractor shall install the exterior lighting system made up of luminaries, fixtures, wiring and accessories.
- B. Related Work Specified Elsewhere:
 - 1. Wire, Cable, and Accessories Installation: SECTION 260504.
 - 2. Above Grade Conduit, Fittings & Accessories Installation: SECTION 260534.

1.02 REFERENCES:

- A. Applicable Standards:
 - 1. American National Standards Institute (ANSI):
 - a. C78 Series:
 - (1) Incandescent Lamps.
 - (2) Electric Discharge Lamps (Fluorescent).
 - (3) Electric Discharge Lamps (HID).
 - b. C81 Series - Electric Lamp Bases and Holders.
 - c. C82 Series - Lamp Ballasts.
 - 2. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code (NEC).
 - b. 101 - Life Safety Code.
 - 3. National Electrical Manufacturers Association (NEMA).

PART 2 - PRODUCTS: Provided under separate contract.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Luminaries:
 - 1. Install as indicated including all necessary mounting and supporting materials.
 - 2. Maintain the lighting system throughout the construction period, including replacement of burned-out lamps, repair of unoperable fixtures and relocation of fixtures as directed by the Site Manager.

SECTION 265000 – YARD LIGHTING INSTALLATION: Continued

3. Prior to final acceptance, lighting system shall be fully checked. At this time, all defective lighting fixtures, ballasts, lamps, etc., shall be repaired or replaced.
- B. Wiring:
1. Each conduit shall contain no more than one conductor of each phase and one or more neutrals as necessary.
 2. Use circuit numbers as indicated.
 3. Do not use wire smaller than No. 12 AWG.
 4. Contractor shall size and install proper wire size, as required, such that the voltage drop from the power or lighting panel to the farthest light fixture does not exceed 3 percent. Contractor shall be required to rewire circuits which exceed 3 percent.
 5. Splice in boxes only with twist-on electrical connectors, pre-insulated closed end splices with free expanding spring to apply strong uniform holding power on all wire combinations. Acceptable manufacturers are as follows:
 - a. Minnesota Mining and Manufacturing (3M) Scotchlok.
 - b. Buchanan B Cap Connectors.
 6. Install emergency lighting circuits in a separate conduit system.
- 3.02 FIELD TESTING: By Testing and Commissioning Contractor

END OF SECTION 265000

END OF DIVISION 26

SECTION 265000 – EXTERIOR LIGHTING: continued

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SECTION 312316 - EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes all necessary excavation, filling, and backfilling for structures and all related Work, including duct banks and manholes.
- B. Related Work Specified Elsewhere:
 - 1. Site Preparation and Earthwork: SECTION 312000.
 - 2. Trenching and Backfilling for Utilities: SECTION 312333.
 - 3. Concrete: DIVISION 3.

1.02 REFERENCES:

- A. Applicable Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. T99 - The Moisture-Density Relations of Soils Using a 5.5-lb (2.5 kg) Rammer and a 12-Inch (305 mm) Drop.
 - 2. American Society for Testing and Materials (ASTM):
 - a. D4253 - Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - b. D4254 - Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - 3. Occupational Safety and Health Administration (OSHA):
 - a. Part 1926 - Safety and Health Regulations for Construction.

1.03 SUBMITTALS:

- A. Submit as specified in DIVISION 1.
- B. Where selecting an option for excavation, trenching, and shoring in compliance with local, state, or federal safety regulations such as "OSHA Part 1926" or successor regulations, which require design by a registered professional engineer, submit (for information only and not for Owner approval) the following:
 - 1. Copies of design calculations and notes for sloping, benching, support systems, shield systems, and other protective systems prepared by or under the supervision of a professional engineer legally authorized to practice in the jurisdiction where the Project is located.

SECTION 312316 - EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES: Continued

2. Documents provided with evidence of registered professional engineer's seal, signature, and date in accordance with appropriate state licensing requirements.

PART 2 - PRODUCTS

2.01 FILL AND BACKFILL MATERIAL:

- A. Earth Backfill: Use suitable material as specified in SECTION 312000, PART 2.
- B. Granular Fill: Use material as specified in SECTION 312333, PART 2 for granular pipe embedment.

2.02 CONCRETE:

- A. Includes all concrete used to restore bottom of excavation to proper elevation, and in concrete seal coats.
- B. Concrete shall be as specified in DIVISION 3.

PART 3 - EXECUTION

3.01 EXCAVATION:

- A. Excavations shall not be left open for more than 24 hours.
- B. Perform as specified in SECTION 312000 and as follows:
 1. Excavate area adequate to permit efficient erection and removal of forms.
 2. Trim to neat lines where details call for concrete to be deposited against earth.
 3. Excavate by hand in areas where space and access will not permit use of machines.
 4. Notify Owner immediately when excavation has reached the depth indicated. Do not proceed further until approved.
 5. Restore bottom of excavation to proper elevation with compacted granular fill in areas overexcavated, as approved.
 6. Top with 75-mm (3-inch) concrete seal coat if required to provide satisfactory subgrade for structural base slabs. (Payment for seal coats not indicated but required by Owner shall conform to the Unit Price for Additional Concrete stated in the Agreement.):
 - a. Seal coat shall conform to applicable requirements of DIVISION 3.
 7. Use sides of trenches to form sides of duct banks where possible and where sides of trench are vertical, stable, and excavated to the proper line.
- C. Sheet piling and Bracing:

SECTION 312316 - EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES: Continued

1. Design, furnish, place, maintain, and subsequently remove, to the extent required, a system of temporary supports for cut and cover, open cut, or trench excavations, including bracing, dewatering, and associated items to support the sides and ends of the excavations where excavation slopes might endanger in-place or proposed improvements, extend beyond construction right-of-ways, or where specified or indicated.
2. Provide on-Site prior to start of excavation in each section, and make such adjustments as are required to meet unexpected conditions.
3. Space and arrange sheeting and bracing as required to exclude adjacent material and according to the stability of excavation slopes.
4. Contractor shall make his own assessment of existing conditions including adjacent property, the possible effects of his proposed temporary works and construction methods, and shall select and design such support systems, methods, and details as will assure safety to the public, adjacent property, and the completed Work.
5. Modify or relocate Underground Facilities, at Contractor's expense, if existing Underground Facilities interfere with Contractor's proposed method of support.
6. Employ caution in the areas of Underground Facilities, which shall be exposed by hand or other excavation methods acceptable to Owner.
7. Perform sheeting, shoring, and bracing for trench excavation, for Underground Facilities, and for other purposes in accordance with the safety and protection requirements of the General Conditions.
8. Provide sheeting, shoring, and bracing for trench excavation in the subgrade of the excavation to prevent movement of the main excavation support system.
9. Provide shoring, sheeting, and bracing as indicated or specified to meet the following requirements:
 - a. Prevent undermining and damage to all structures, buildings, Underground Facilities, pavements and slabs.
 - b. Excavations shall be accomplished with vertical banks where necessary for construction activities or as indicated, and also within all limits of excavation noted on the Drawings.
 - c. Design excavation support system and components to support lateral earth pressures, unrelieved hydrostatic pressures, utility loads, traffic and construction loads, and building and other surcharge loads to allow the safe and expeditious construction of the permanent structures without movement or settlement of the

SECTION 312316 - EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES: Continued

ground, and to prevent damage to or movement of adjacent buildings, structures, Underground Facilities, and other improvements. The design shall account for staged removal of bracing to suit the sequence of concrete placement for permanent structures and backfill.

- d. Except as otherwise specified herein, shoring and sheeting materials may be extracted and reused at Contractor's option; however, Contractor shall remove and replace any existing structure or Underground Facility damaged during shoring and sheeting. Remove sheeting and bracing as backfill progresses. Fill voids left after withdrawal with sand or other approved material.
10. Where shoring and sheeting materials must be left in-place in the completed Work to prevent settlements or damage to adjacent structures or as directed by Site Manager, backfill the excavation to within 1 meter (3 feet) below the finished grade and remove the remaining exposed portion of the shoring before completing the backfill. If soldier piles and wood lagging are used for shoring, remove wood lagging to within 1 meter (3 feet) of finished grade in incremental steps of approximately 150 mm (6 inches) as the backfill is constructed, or to Contractor's design if more stringent. The location of all shoring and sheeting left in-place shall be documented on drawings and provided to Owner.
11. Contractor shall be solely responsible for proper design, installation, operation, maintenance, and any failure of any component of the system. Review by Owner of the design and data submitted by Contractor shall not relieve Contractor from full responsibility for errors therein or from the entire responsibility for complete and adequate design and performance of the sheeting and shoring system.
12. Provision for Contingencies:
 - a. The performance of the components of the support system shall be monitored for both vertical and horizontal movement daily.
 - b. A contingency plan or alternative procedure shall be provided for implementation, if the designed system does not adequately perform.
 - c. The materials and equipment necessary to implement the contingency plan shall be kept readily available.
13. Damages:
 - a. Contractor shall document all existing damage to adjacent facilities and submit the information to Owner prior to performing any excavation. Documentation shall

SECTION 312316 - EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES: Continued

include a written description, diagrams, measurements, and appropriate photographs.

- b. Repair all damage resulting from Contractor's excavation and remove and replace all undermined pavements with Site Manager-approved equal, either concrete or asphalt, at Contractor's expense.

3.02 FILLING AND BACKFILLING:

A. Granular Fill:

1. Place on prepared subgrade where indicated, prior to placing concrete in slabs on grade.
2. Lifts shall not exceed 150 mm (6 inches) in loose-layer thickness.
3. Compact to 95% relative density as referenced to ASTM D4253 and D4254.

B. Earth Backfill:

1. Backfill only after concrete has attained 70% design strength.
2. Backfill adjacent to structures only after, in the opinion of Site Manager, a sufficient portion of the structure has been built to resist the imposed load.
3. Remove all debris from excavation prior to placement of material.
4. The slope bounding the excavation, if steeper than 6 horizontal: 1 vertical, shall be stepped or serrated prior to placing the backfill material.
5. Perform backfilling simultaneously on all sides of structures.
6. Place backfill in level layers not exceeding 100 to 200 mm (4 to 8 inches) in loose-layer thickness.
7. Exercise extreme care in the use of heavy equipment in areas adjacent to structures.
8. Perform wetting or drying of embankment material as required to obtain specified density.
 - a. General load-bearing fill shall have a moisture content within 5% of the optimum as determined by ASTM D698.
 - b. Select load-bearing fill shall have a moisture content within 2% of the optimum as determined by ASTM D698
9. General load-bearing fill shall be compacted to 95% of the maximum dry density. Select load-bearing fill shall be compacted to 98% of the maximum dry density as determined by ASTM D698. Maximum dry density shall be determined per ASTM D698. Compaction shall be accomplished without inundation or flooding.

SECTION 312316 - EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES: Continued

3.03 FIELD QUALITY ASSURANCE:

A. Compaction:

1. See Section 312000, Part 3.04 for details.

END OF SECTION 312316

SECTION 312333 - TRENCHING AND BACKFILLING FOR UTILITIES

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes:
 - 1. Excavation, sheeting, bracing, and all operations necessary for the preparation of trenches for conduit and buried cable.
 - 2. Backfilling of trenches.
- B. Related Work Specified Elsewhere:
 - 1. Site Preparation and Earthwork: SECTION 312000.
 - 2. Excavation, Filling, and Backfilling for Structures: SECTION 312316.
 - 3. Concrete: DIVISION 3.

1.02 REFERENCES:

- A. Applicable Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M147 - Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
 - b. T99 - The Moisture-Density Relations of Soils Using a 5.5-Pound Rammer and a 12-Inch Drop.
 - c. T104 - Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.
 - 2. American Society for Testing and Materials (ASTM):
 - a. D4253 - Test Method for Maximum Index Density of Soils Using a Vibratory Table.
 - b. D4254 - Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - 3. Occupational Safety and Health Administration (OSHA):
 - a. Part 1926 - Safety and Health Regulations for Construction.
 - 4. State of Texas Standard Specifications for Highway Construction.

1.03 SUBMITTALS:

- A. Submit as specified in DIVISION 1.
- B. Includes, but not limited to, the following:
 - 1. Steel reinforcement for concrete encasement.

SECTION 312333 - TRENCHING AND BACKFILLING FOR UTILITIES: Continued

2. Steel reinforcement for concrete cradle.
3. Concrete Submittals as specified in DIVISION 3.
- C. Where selecting an option for excavation, trenching, and shoring in compliance with local, state, or federal safety regulations such as "OSHA Part 1926" or successor regulations, which require design by a registered professional engineer, submit (for information only and not for Owner approval) the following:
 1. Copies of design calculations and notes for sloping, benching, support systems, shield systems, and other protective systems prepared by or under the supervision of a professional engineer legally authorized to practice in the jurisdiction where the Project is located.
 2. Documents provided with evidence of registered professional engineer's seal, signature, and date in accordance with appropriate state licensing requirements.

PART 2 - PRODUCTS

2.01 GRANULAR EMBEDMENT:

- A. Material:
 1. Item 247, Type A, Grade 1 or 2 of the State of Texas Standard Specifications for Highway Construction.
 2. Gravel or crushed stone which shall not have a loss of more than 15% after five cycles when tested for soundness with sodium sulfate as described in AASHTO T104.

2.02 TRENCH STABILIZATION MATERIAL:

- A. Material shall be one of the following:
 1. As specified in this PART 2 Granular Pipe Embedment.
 2. Conform to AASHTO M147, Gradation A or B.

2.03 CONCRETE:

- A. Concrete and reinforcing steel shall conform to applicable requirements of DIVISION 3.

2.04 TRENCH BACKFILL MATERIALS:

- A. Obtain from the following:
 1. Trenches and other excavations included in Project.
 2. Borrow from location off Site.

SECTION 312333 - TRENCHING AND BACKFILLING FOR UTILITIES: Continued

- 3. Combination of above.
- B. Free from organic matter, refuse, ashes, cinders, frozen, or other unsuitable material.
- C. Gravel, rock, or shale particle size limited as follows:
 - 1. Not to exceed 2 inches in greatest dimension within 12 inches of pipe or conduit and upper 18 inches of trench.
 - 2. Gravel, rock, or shale not allowed within 12 inches of buried cable.
 - 3. Maximum dimension one-half the depth of layer to be compacted in other areas.
- D. Contain sufficient fine materials to provide a dense mass free of voids and capable of satisfactory compaction.
- E. Have moisture content enabling satisfactory placement and compaction.
 - 1. General load-bearing fill (consist/combination of GW, GP, GM, GC, SW, SP, SM, and SC materials as classified by ASTM D2487) shall have a moisture content within 2% of the optimum as determined by ASTM D698.
 - 2. Select load-bearing fill (consist/combination of GW, GP, GM, GC, SW, SP, SM, and SC materials as classified by ASTM D2487) shall have a moisture content within 2% of the optimum as determined by ASTM D698.
- F. Use granular material as specified for trench stabilization.

PART 3 - EXECUTION

3.01 EXCAVATION AND TRENCHING:

- A. General:
 - 1. Excavate all materials found within the limits for excavation.
 - 2. Perform excavation by any recognized method of good practice to complete the job in the most expeditious manner in conformance with specified requirements.
 - 3. Take precautions to ensure no damage to existing facilities or equipment, or other work.
 - 4. All materials encountered, regardless of type, character composition and condition thereof, shall be considered "unclassified" for the purpose of payment. Determine quantity of various materials to be excavated prior to submitting Proposal. Rock encountered shall be handled at no additional cost to Owner.
 - 5. Blasting will not be allowed.
 - 6. Excavations and trenches shall not be left open for more than 24 hours.
- B. Structures:

SECTION 312333 - TRENCHING AND BACKFILLING FOR UTILITIES: Continued

1. Make excavation area adequate to permit efficient erection and removal of forms and to provide minimum clearances for backfilling around structure as required to meet specified compaction.
 2. Trim to neat lines where details call for concrete to be deposited against earth.
 3. Excavate by hand in areas where space and access will not permit use of machines.
 4. Notify Site Manager immediately when excavation has reached the depth indicated.
 5. Where rock is encountered in a portion of a structural excavation and a non-rock material is encountered in an adjacent area of the same structural excavation, remove the rock to a minimum of 18 inches below the depth indicated for the structure's base and replace with embankment material as specified.
 6. Restore over-excavation as follows at no extra cost to Owner:
 - a. For mat or slab foundations, with granular fill.
 - b. For drilled shafts, with concrete.
- C. Trench Side Walls:
1. Make vertical or slope within specified trench width limitations below a horizontal plane 12 inches above top of pipe.
 2. Make vertical or sloped (stepped) as required for stability, above a horizontal plane 12 inches above top of pipe.
 3. Excavate without undercutting.
- D. Trench Depth:
1. Ground Wires and Electrical Conduits:
 - a. Remove material required for alignment and elevation, or minimum depth of installation.
 2. Drainage Pipes:
 - a. Depth shall be sufficient to match the specified invert elevation and provide the minimum bedding requirements. Minimum pipe bedding thickness shall be 3 inches (6 inches if in rock foundation).
 - b. Do not exceed that indicated where conditions of bottom are satisfactory.
 - c. Increase depth as necessary to remove unsuitable supporting materials. Unsuitable materials shall be defined as mud, frozen earth, and material that is not free of debris, roots, organic matter, refuse, ashes, and cinders.
- E. Trench Bottom:
1. Protect and maintain when suitable natural materials are encountered.

SECTION 312333 - TRENCHING AND BACKFILLING FOR UTILITIES: Continued

2. Remove rock fragments and materials disturbed during excavation or dislodged from trench walls.
- F. Trench Width:
1. Excavate trench to a width which will permit satisfactory work clearances and thorough tamping of the bedding.
 2. For single pipe installation maintain trench widths below a plane 12 inches above top of pipe as follows:
- | <u>Trench Width</u> | | |
|--------------------------|----------------|----------------|
| <u>Nominal Pipe Size</u> | <u>Minimum</u> | <u>Maximum</u> |
| Less than 24" | Pipe O.D. + 1' | Pipe O.D. +2' |
| 24" to 60" | Pipe O.D. +2' | Pipe O.D. +4' |
3. Maximum trench width limitations shall apply beginning 3 feet from structure walls.
 4. Maximum width shall be as near the minimum specified as can be controlled by construction equipment and methods utilized.
 5. Correct when over-excavated at no additional cost to Owner.
 - a. Restore over-excavation with granular fill.
 - b. Obtain approval of Site Manager before proceeding.
- G. Trenching in Embankment Areas: Perform after compacted embankment has reached an elevation of not less than one foot above the top of the pipe.
- H. Sheet piling and Bracing: Use where required by the specifications or drawings and where resulting slopes from excavation or trenching might endanger in-place or proposed structures or utilities.
- I. Dewatering:
1. Control grading around excavations to prevent surface water from flowing into excavation areas.
 2. Drain or pump as required to continually maintain, including days not normally worked, all excavations free of water or mud from any source, and discharge to approved drains or channels. Commence when water first appears and continue as required to keep excavation free of standing water during entire time excavation is open.
 3. Use pumps of adequate capacity to ensure rapid drainage of area, and construct and use drainage channels and subdrains with sumps as required by quantity of inflow.

SECTION 312333 - TRENCHING AND BACKFILLING FOR UTILITIES: Continued

4. When water is found in the excavation due to Contractor negligence, remove unsuitable excessively wet subgrade materials and replace with approved compacted embankment material as directed by Site Manager and at no additional cost to Owner.

3.02 BACKFILLING:

A. Placement:

1. Complete promptly after approval to proceed:
 - a. Only after concrete encasement has obtained 70% of design strength.
Determination of design-strength percentage obtained shall be as specified in DIVISION 3.
2. Use hand methods to a horizontal plane 12 inches above top of conduit or duct banks.
3. Use approved mechanical methods where hand backfill is not required.
4. Place in layers of thickness within compacting ability of equipment used.
5. Until compacted depth over conduit exceeds 3 feet, do not drop fill material over 5 feet. Then distance may be increased 2 feet for each additional 1 foot of cover. Backfill conduit trenches in layers of 4 to 8 inches.

B. Compaction:

1. Perform at moisture content necessary to achieve required results with equipment used.
 - a. General load bearing fill shall have a moisture content within 5% of the optimum as determined by ASTM D698.
 - b. Select load-bearing fill shall have a moisture content within 2% of the optimum as determined by ASTM D698.
2. Perform with spreading equipment supplemented by hand-operated equipment and rollers as required to obtain density specified.
3. Accomplish without inundation or flooding.
4. Achieve following densities:
 - a. General load-bearing fill shall be compacted to 95% of the maximum dry density as determined by ASTM D698.
 - b. Select load-bearing fill shall be compacted to 98% of the maximum dry density as determined by ASTM D698.
 - c. Perform wetting or drying as required to obtain specified density.
5. Backfill failing to meet required densities shall be removed or scarified and recompacted as necessary to achieve specified results.

SECTION 312333 - TRENCHING AND BACKFILLING FOR UTILITIES: Continued

3.03 CHANNEL EXCAVATION:

- A. Conform to applicable requirements of SECTION 312000.
- B. Maintain area drainage during construction.
- C. Complete channel protection expeditiously following excavation.

3.04 FIELD QUALITY CONTROL:

- A. Compaction: Contractor shall provide services of an independent laboratory to test all trench-stabilization material, granular embedment, clay cut-off walls, and trench backfill to determine conformance with specified moisture- density relationships:
 - 1. Method of test will be as specified in SECTION 312000, PART 3.04 for details.
- B. Concrete: Contractor shall test all concrete for use in encasements, cradles, and concrete cut-off walls to determine conformance with Specifications. Method of test shall be as specified in DIVISION 3.

END OF SECTION 312333

END OF DIVISOIN 31

SECTION 316329 - DRILLED SHAFT FOUNDATIONS

PART 1 - GENERAL

1.01 DESCRIPTION: This Section covers drilled shaft foundations.

- A. Perform all drilling and excavation and supply all labor, equipment and materials to construct drilled shaft foundations as indicated.
- B. Related Work Specified Elsewhere:
 - 1. Concrete Formwork: SECTION 031000.
 - 2. Concrete Reinforcement: SECTION 032000.
 - 3. Concrete: SECTION 033000

1.02 REFERENCES:

- A. Applicable Standards:
 - 1. American Concrete Institute (ACI):
 - a. 304.2R - Placing Concrete by Pumping Methods.
 - b. 309R – Guide for Consolidation of Concrete.
 - c. 336.1 - Specification for the Construction of Drilled Piers.
 - d. 336.3R - Design and Construction of Drilled Piers.
 - 2. American Petroleum Institute (API):
 - a. 13A - Oil-Well Drilling-Fluid Materials.
 - 3. American Society for Testing and Materials (ASTM):
 - a. D698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³).
 - b. D4253 - Maximum Index Density of Soils Using a Vibratory Table.
 - c. D4254 - Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

1.03 SUBMITTALS:

- A. Submit as specified in DIVISION 1.
- B. Submittals:
 - 1. Proposed drilled shaft rig name, model number, maximum continuous torque rating (ft-lb), maximum downward force ("crowd"), proposed earth and rock auger attachments and proposed special techniques and equipment.

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

2. Proposed procedures for each anticipated method of construction - dry and uncased, temporary casing, slurry, other procedure including:
 - a. Sequence of excavation, concrete placement, rebar cage placement, and placement of embedded items such as anchor bolts.
 - b. Methods to prevent caving if necessary.
 - c. Procedures for supporting rebar cage during concrete placement.
 - d. Procedures for supporting anchor bolts or other embedded items.
 - e. Procedures for tremie placement of concrete including, but not limited to, a detailed description of the proposed method and equipment; previous projects with similar subsurface conditions with description of the techniques used; names of specific personnel that will be used to supervise tremie placement and their qualifications to do so.

1.04 REPORTS:

- A. Drilled shafts: Contractor shall submit at the completion of each day, drilled shaft record reports, similar to the form shown at the end of this section. These reports shall contain the following information:
 1. Structure location.
 2. Identification number and structure name.
 3. Shaft dimensions.
 4. Ground surface elevation.
 5. Bottom of concrete elevation.
 6. Top of concrete elevation.
 7. Description of soils encountered during drilling.
 8. Bearing strata description.
 9. Nature and location of obstructions.
 10. Water conditions during drilling and concrete placement.
 11. Amount of unclassified excavation.
 12. Amount of rock excavation and length of rock socket, , if required.
 13. Method of construction – dry and uncased, temporary casing, slurry, or other.

1.05 QUALITY ASSURANCE:

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

- A. A minimum of three-years' experience in drilled shaft construction, including experience with similar subsurface material, water conditions, shaft sizes, and special techniques as required.
- B. The name of proposed Sub-Contractor, if other than Contractor, along with a written description of equipment and techniques proposed for use, and the name of three similar projects completed in the last three years, shall be submitted at time of Bid and will be considered in evaluation of Bids.

1.06 DEFINITIONS:

- A. Allowable Service Load Bearing Pressure - The vertical pressure per unit area that may be applied to the bearing stratum at the level of the shaft bottom. Allowable service load bearing pressure has been selected on the basis of samples, tests, and applied soil mechanics, with due regard for the character of the loads to be applied and the settlements that can be tolerated.
- B. Bearing Stratum or Bearing Elevation - The formation(s) or layer(s) of soil or rock that support the shaft and loads imposed on it. Bearing elevation is the proposed depth of the base of each shaft, as noted on drawings, accounting for minimum embedment and rock socket into competent rock.
- C. Slurry - Method of advancing a drilled shaft hole where bentonite, sodium montmorillonite in accordance with API 13A, or anionic polymer is mixed with clean water or water within shaft to produce a slurry mixture capable of maintaining the stability of shaft walls and bottom in potentially caving and/or water-bearing soils. Slurry is also used to increase density of fluid within shaft to offset exterior hydrostatic pressure and to facilitate removal of coarser grained soils by mixing and incorporation into the slurry mixture. Slurry shall not be used for shafts which bear upon or are socketted into rock.
- D. Casing - Protective steel casing usually of cylindrical shape, temporarily lowered into the excavated hole to protect workmen and inspectors entering the shaft from collapse or cave-in of the sidewalls and for the purpose of excluding soil and water from the excavation during drilling and concrete placement.
- E. Competent Rock - Solid rock, sound, unweathered, without visible voids, known to have or exhibited a minimum thickness of at least 5 feet and generally commencing from the elevation at which rock is first encountered, and as defined by refusal criteria. Rock generally exhibiting hard, massive, solid appearance and lacking the presence of clay seams, voids, solution cavities, broken, rubble, or weathered rock conditions. Boulders or portions of irregular rock contact along the shaft side wall shall not be considered competent rock for purposes of

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

developing a minimum embedment for rock socket. Rock socket may or may not be considered cumulative along the side wall shaft, depending upon the size, extent, location and frequency of cracks, crevices and clay seams that can be cleaned and filled by dental work. Owner's geotechnical engineer shall evaluate extent of irregularities and their effect upon detrimental settlement in defining adequate rock socket into competent rock.

- F. End Bearing Drilled Shaft - Cast-in-place foundation element with or without enlarged bearing area extending downward through weaker soils or water to a rock or soil stratum capable of supporting the loads imposed on or within it.
- G. Pumping of Concrete - "Underwater-Type Concrete" is conveyed by pressures through rigid pipe or flexible hose and discharged directly to bottom of shaft through slurry or under water. Pressure is applied by piston pumps, pneumatic compressed air, or squeeze pressure pumps in accordance with ACI 304.2R. Aluminum pipe is not allowed.
- H. Rock - Rock excavation is defined as all material encountered in excavating drilled shafts which cannot be removed with a conventional earth auger and/or underreaming tool, and requires rock auger, core barrel, boulder roter, or hand labor using air-powered tools and/or other special excavation procedures. Refusal of the earth auger shall be defined as a penetration rate equal to, or less than, 1 foot per 10-minute period using a drill rig with minimum continuous torque of 64,000 foot-pounds and minimum downward force ("crowd") of 24,000 pounds at its maximum continuous torque and maximum downward force ("crowd"). There shall be no proportioning of torque or downward pressure and advancement time to evaluate smaller equipment. All earth, clay, coal seams, rock fragments, soft fractured materials or voids encountered between rock units will not be considered rock for pay purposes.
- I. Shaft - Drilled shaft above bearing surface.
- J. Tremie - Method of placing concrete, if permitted by Owner, for "Underwater - Type Concrete" through a rigid pipe of minimum diameter of 10 to 12 inches. Aluminum pipe is not allowed. Concrete is placed by means of gravity flow or drop through the interior of the pipe, the lower end of which is kept immersed in fresh concrete. Use of a bottom sealing metal plate or a top of pipe sealing floatable plug shall be inserted prior to charging with concrete to prevent contamination of concrete by slurry or water.
- K. Unclassified Excavation - All materials encountered from the top of concrete or drilled shaft cut-off elevation to the tip-bearing elevation which can be removed with a conventional earth auger, including weathered, decomposed, broken, or highly fractured rock consisting of either

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

detached rock pieces or loose rock fragments, or thinly bedded soft fractured rock particles; exclusive of rock excavation as described above.

PART 2 - PRODUCTS

- 2.01 REINFORCEMENT: As specified in SECTION 032000
- 2.02 CONCRETE: As specified in SECTION 033000
- 2.03 SLURRY: Slurry shall consist of a mixture of bentonite (sodium montmorillonite conforming to API 13A) or anionic polymer and water to produce a slurry of sufficient density to maintain stability of the shaft walls and bottom and to facilitate removal of coarser grained soils from the excavation.
- 2.04 STEEL CASING: Steel casing shall be of sufficient diameter and wall thickness to prevent collapse or cave-in of the excavation and to prevent soil and water from entering the excavation during drilling, inspection and concrete placement.
- 2.05 EQUIPMENT:
- A. Drill rig and associated drilling equipment capable of drilling the specified shaft diameters and the specified shaft depths plus 10 feet in the subsurface conditions present.
 - B. Provide hoisting equipment and boatswain's chair for downhole entry by personnel.

PART 3 - EXECUTION

- 3.01 EXCAVATION:
- A. Drilled shaft shall be located as indicated within the following tolerances:
 - 1. Centerline: Within 2 inches or 4 percent of shaft diameter, whichever is less, of location indicated.
 - 2. Diameter: Plus 6 inches, minus 1/2-inch.
 - 3. Plumb: 1.0 percent of the length, 12.5 percent of shaft diameter, or 15 inches total, whichever is less.
 - 4. Cut-Off Elevation: Plus 1 inch or minus 1 inch from cut-off elevation indicated.
 - B. Deviations in excess of the preceding tolerances will be corrected at Contractor's expense, including additional costs for engineering, redesign and inspection.

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

- C. Install drilled shafts in accordance with ACI 336.1 and ACI 336.3R unless otherwise specified.
- D. Provide temporary casing with a minimum inside diameter equal to the nominal diameter of the drilled shaft and a sufficient wall thickness to withstand the soil pressure on site prior to start of excavation. Install:
 - 1. Prior to a man entering the excavation.
 - 2. To control seepage.
 - 3. To prevent collapse of the excavation walls.
- E. Remove all material regardless of classification within the shaft to the indicated depth. Take all precautions necessary to prevent blowouts and disturbance of the sides or bottom of the excavation. If required, maintain water or slurry in the shaft at all times at a height sufficient to produce a positive head in the shaft.
- F. During shaft excavation advancement stability of the sides and bottom of a shaft excavation shall be maintained through the use of slurry, temporary casing, or other approved method. Slurry shall not be used for shafts that bear upon or are socketted in rock.
- G. When slurry is used, maintain a positive head in the excavation at all times. Circulate the slurry and maintain sufficient consistency and velocity to remove the dislodged materials from the hole. Should materials be encountered which are too heavy to be removed by the slurry, they may be removed by other approved means.
- H. Excavation shall be carried to the indicated depth at which time the Site Manager will observe the excavation and determine whether the excavation has reached the required depth. The excavation will then be continued if required by the Site Manager.
- I. Cleanout and remove all loose material and spoil from sides and bottom of shaft prior to placing concrete. In no case should the volume of such material exceed that which would be required to cover 5 percent of the area to a depth of 2 inches.
- J. Downhole field observation by Site Manager will be performed in dry holes to inspect cleanout and examine and test bearing materials. The frequency of downhole observation may be determined and adjusted by the Site Manager. Provide all equipment and personnel to permit downhole entry for field observation. Provide reasonable notice prior to time excavation will be ready for observation. Assist Site Manager in performing field observation as required, including raising and lowering personnel from surface, using appropriate equipment.
- K. Drilled shafts which are overexcavated without approval of Site Manager shall have the overexcavation filled with unreinforced concrete at no expense to the Owner.

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

- L. Keep the ground surface for a minimum of 5 feet from the edge of the excavation clean and level.
- M. Dispose of materials removed from the excavation as directed by the Site Manager.

3.02 REINFORCING STEEL:

- A. Install as specified in SECTION 032000.
- B. Reinforcing steel fabrication shall be completed prior to completion of excavation.

3.03 CONCRETE: As specified in SECTION 033000 and as specified in this Section.

3.04 FORMWORK:

- A. As specified in SECTION 031000, PART 3.
- B. In addition, form the drilled shaft above grade and a minimum of 1 foot below existing grade with round forms with an inside diameter equal to the drilled shaft's nominal diameter and of sufficient strength to restrain the concrete without deformation or settlement.

3.05 CONCRETE PLACEMENT:

- A. Wet forms with potable water prior to placing concrete.
- B. Center reinforcing cages in the drilled shaft excavation and suspend them in an approved manner prior to placement of concrete to the cut-off elevation. Provide spacers as required to maintain minimum concrete cover at sides and bottom of drilled shafts. The reinforcing cages shall be supported to prevent excessive movement during construction.
- C. Place concrete immediately after final inspection by the Site Manager. Place concrete in the drilled shaft on the same working day that the shaft is excavated unless otherwise approved by the Site Manager.
- D. Fill entire volume of drilled shaft excavation with concrete to the cut-off elevation in one continuous operation.
- E. No construction joints shall be permitted in drilled shafts except as indicated on the Contract Drawings.
- F. Place the concrete in a manner that will not cause segregation of the mix or permit infiltration of water or any other occurrence which would tend to decrease the strength of the concrete or the capacity of the finished drilled shaft.

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

- G. Excavation, where practicable, shall be dewatered before placing concrete. The water level in the bottom of the excavation prior to concreting shall be held at a nominal depth not to exceed 2 inches.
- H. For dry excavations place concrete with an approved funneling device. Approval of the funneling device shall depend on the Contractor's demonstrated ability to direct the concrete flow so as not to fall against the sides of the temporary casing, the sides of the drilled-shaft excavation, or the reinforcing steel before reaching the bottom. For shafts with length-to-cage diameter ratio greater than 15, an extension pipe shall be used to place the concrete. Concrete shall not be allowed to free-fall more than 10-feet. Funneling devices or extension pipes shall not be aluminum.
- I. Pump concrete placed under slurry or under water shall be placed as follows:
 - 1. Place concrete using a rigid pipe or flexible hose. Start placing concrete with the lower end of the pipe sealed with a rubber-gasketed wood plug with a line attached, or similar device, lowered to the bottom with the pipe dry. Displace plug by concrete and remove from the work. The slurry or water shall be displaced as the concrete is placed and the end of the pipe or hose shall be kept embedded at least 5 feet in the concrete as the concrete is placed.
 - 2. Should the end of the pipe or hose be accidentally pulled out of the concrete during the placement, immediately discontinue the placing and withdraw the pipe or hose from the hole. Reseal the pipe or hose at the bottom and return to the hole with the sealed end inserted into the concrete. Placement may then be resumed.
 - 3. The cut-off point indicated on the drawings shall be overpoured. The excess concrete shall then be dipped out, and visual inspection made of the concrete at the top of the pour. If any contamination of the concrete is observed, it will be necessary to reinsert the pipe or hose 5 feet into the concrete and to continue placing fresh concrete until the contaminated concrete has been replaced by uncontaminated concrete.
 - 4. All slurry displaced as a result of concrete placement shall be drawn off by the Contractor during concrete placement and removed from the site.
 - 5. Use of a tremie pipe, in lieu of pumping, may be permitted by Site Manager upon review and approval of Contractor's tremie placement submittal. Continued use of a tremie pipe throughout the course of the project will be evaluated by the Site Manager, based upon the Contractor's repeated demonstration of capability to install concrete through

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

underwater placement in a satisfactory manner equivalent to the pumping method without loss of integrity to the drilled shaft structural system or soil-to-structure interaction.

- J. Keep the temporary casing plumb and pull with a smooth, vertical motion, without jerks, to ensure, in Site Manager's opinion, that no voids will occur in the shaft due to intrusion of soil or water as the casing is being removed. Coordinate the withdrawal of temporary casing with concrete placement operations to maintain a minimum depth of concrete 5 feet above the casing bottom.
- K. Should soil, rock, or water enter the excavation and contaminate the concrete, remove the contaminated concrete before completing the pour.
- L. Convey concrete as specified in SECTION 033000.
- M. Consolidate concrete as specified in SECTION 033000.

3.06 CONCRETE FINISH AND CURING: As specified in SECTION 033000.

3.07 ANCHOR BOLTS:

- A. Accurately locate anchor bolts in accordance with the manufacturer's drawings to maintain the structure's indicated grade and alignment. Secure anchor bolts against movement. For dry, noncased excavations the reinforcing cage and anchor bolts shall be in place and secured before concrete is placed.
- B. Setting dimensions shall not differ from those given by the manufacturer by more than the following:
 - 1. Anchor Bolt Clusters:
 - a. Center-to-center distance between clusters of multilegged structures - +1/4-inch.
 - b. Tangential displacement of cage - +1/8-inch.
- C. Center of anchor bolt pattern shall be located within two inches of the indicated location in drilled shaft foundations.

3.08 BACKFILLING:

- A. Backfilling is not anticipated for drilled shaft foundations.
- B. Refill any overexcavation in the lateral direction around the drilled shaft resulting from sides of drilled shaft hole collapsing or sloughing in 6-inch lifts and compact as specified below.
- C. Sufficiently compact all material replaced, with the exception of topsoil, as follows:

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

1. Cohesive Soils: Compaction shall achieve a minimum of 90 percent of maximum density with a moisture content plus or minus 3 percent at optimum moisture as determined by ASTM D698.
2. Cohesionless Soils: Compaction shall achieve a minimum of 70 percent relative density as determined by ASTM D4253 and ASTM D4254.
3. Cohesive materials include silts and clays and generally exclude sands and gravel. Cohesive materials are materials for which impact compaction will produce a well-defined moisture-density relationship curve.
4. Cohesionless materials include sands, gravels, gravel-sand mixtures and generally exclude clayey and silty materials. Cohesionless materials are materials which are free-draining and for which impact compaction will not produce a well-defined moisture-density relationship curve and for which the maximum density by impact methods will generally be less than by vibratory methods.

END OF SECTION 316329

END OF DIVISION 31

SECTION 316329 - DRILLED SHAFT FOUNDATIONS: Continued

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DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 321540 - CRUSHED STONE SURFACING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This Section includes procurement and method of depositing of crushed rock surface.
- B. Related Work Specified Elsewhere:
 - 1. Site Preparation and Earthwork: SECTION 312000.

1.02 QUALITY ASSURANCE:

- A. Applicable Standards:
 - 1. American Society for Testing and Materials (ASTM):
 - a. C88 - Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.
 - b. C117 - Test Method for Materials Finer than No. 200 Sieve in Mineral Aggregate by Washing.
 - c. C131 - Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - d. C136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - e. D3017 - Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 - f. D4318 - Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
 - g. D75 - Practice for Sampling Aggregates.
 - h. D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
 - i. D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.03 SUBMITTALS:

- A. Certification of conformance with the Specifications.

PART 2 - PRODUCTS

- 2.01 GENERAL: Crushed rock surface shall consist of aggregate specified.

SECTION 321540 - CRUSHED ROCK SURFACE: Continued

2.02 AGGREGATE:

- A. Crushed rock for substation yard surfacing shall be washed, crushed limestone conforming to the specifications of ASTM C33, # 57.
- B. Crushed rock for driveway base shall be washed, crushed aggregate conforming to Item 247, Type A, Grade 1 or 2 as specified in the Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges (2004).
- C. Crushed rock shall be free from lumps or balls of clay or other objectionable matter, and reasonably free from thin and elongated pieces of dirt. Aggregates shall consist of angular fragments, durable and sound, and shall be reasonably uniform in density and quality.
- D. Percentage of wear on that portion retained on a No. 10 sieve shall not exceed 40 after 500 revolutions as determined by ASTM C131.
- E. The aggregate shall not have a loss of weight more than 12 percent after 5 cycles when tested with sodium sulfate or magnesium sulfate solution as determined by ASTM C88.
- F. Aggregate shall contain 75 percent by weight of pieces with two or more fractured surfaces if material is crushed gravel.
- G. Portion of aggregate passing No. 40 sieve shall be as follows:
 - 1. Plastic Index: $7 \leq PI \leq 18$ as determined by ASTM D4318.
- H. Gradation as determined by ASTM C136 and ASTM C117 shall not vary from low limit on one sieve to high limit on adjacent sieve or vice versa.
- I. Have a wet resistivity of 3000 ohms.

2.03 EQUIPMENT:

- A. General Requirements:
 - 1. Maintain all equipment, tools, and machines used in the performance of the work required by this Section in a satisfactory working condition at all times.
 - 2. Equipment shall be subject to the approval of Owner.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS:

- A. Stockpiles:
 - 1. Only with approval of Owner.

SECTION 321540 - CRUSHED ROCK SURFACE: Continued

2. Clear and level storage sites prior to stockpiling.
 3. Place in a manner and at locations designated by Owner, providing separate stockpiles for materials from separate sources.
- B. Cold-Weather Limitations:
1. Crushed rock surfacing shall be prohibited when atmospheric temperature is below 35 degrees F.
 2. Do not place crushed rock surface on frozen subgrade.
 3. Protect subgrade in freezing weather and repair areas damaged by freezing by reshaping and recompacting prior to placing crushed rock.
- C. Preparation of Subgrade:
1. Clean of all foreign substances.
 2. Correct any ruts, depressions, or soft yielding spots and areas with inadequate compaction as specified for SECTION 312000.
 3. Treat all subgrade with soil sterilant as specified in SECTION 312000.
 4. Site Manager will inspect, prior to placing crushed rock surface, for adequate compaction and surface tolerances.
- D. Grade Control: Establish and maintain by means of grade stakes spaced so string lines may be stretched between stakes.

3.02 PLACING, SHAPING AND COMPACTION OF MATERIALS:

- A. Placing:
1. Deposit and spread material in a uniform layer and compact to the thickness indicated and as specified. Spread material uniformly on the prepared subgrade from moving vehicles or spreader boxes.
 2. Level material to the required contour and grades.
 3. Remove those portions of the layer which become segregated or mixed with subgrade material in spreading and replace with new material as requested by Owner.
 4. Hauling which may damage the subgrade or surfacing will be restricted by Owner.
 5. Remove and repair subgrade damaged during application of the crushed rock surface when directed by Site Manager.
- B. Shaping and Compacting Materials:
1. Compact in layers no less than three nor more than six inches thick.

SECTION 321540 - CRUSHED ROCK SURFACE: Continued

2. Roll to specified compaction requirements throughout full depth of layer with self propelled, non-vibratory steel or pneumatic roller. The roller shall have a compactive effort of 150 to 200 pounds per lineal inch of contact surface.
3. Shape and smooth by blading and rolling with self propelled, non-vibratory steel or pneumatic roller.
4. Hand tamp in places not accessible to rolling equipment.
5. Crushed rock base shall be compacted to a minimum of 95% of the ASTM D698 standard proctor density.
 - a. Determine and control compaction and moisture content in accordance with ASTM D6938 and D3017.
 - b. The minimum frequency of tests will be as follows:
 - (1) At least one test every 500 square feet in the substation yard.
 - (2) At least one test when Site Manager suspects the quality of moisture control or effectiveness of compaction.
6. Smoothness test shall be as follows:
 - a. Surface shall show no deviation in excess of 3/8-inch in any 10 feet when tested with a 10-foot straightedge applied parallel with and at right angles to the center lines of the paved area.
 - b. Correct any deviation in excess of this amount by loosening, adding or removing material, reshaping, watering, and compacting as requested by Site Manager.

3.03 MAINTENANCE:

- A. Maintain finished surface course in a condition satisfactory to Site Manager.
- B. Replace crushed rock surface deemed unsatisfactory as directed by Site Manager.

3.04 WAYBILLS AND DELIVERY TICKETS: Submit project total to Contractor upon completion of work for field verification.

END OF SECTION 321540

DIVISION 33 - UTILITIES

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Contractor shall unload (except where indicated otherwise) move, store, install, and assemble the equipment and materials furnished under all contracts including the equipment and materials listed on the Bill of Materials.

1.02 REFERENCES:

- A. Applicable Standards:
 - 1. American Institute of Steel Construction (AISC):
 - a. S323 - Quality Criteria and Inspection Standards.
 - 2. American National Standards Institute/American Welding Society (ANSI/AWS):
 - a. D1.2 – Structural Welding Code – Aluminum.
 - 3. Institute of Electrical and Electronics Engineers (IEEE):
 - a. C2 - National Electrical Safety Code.
 - 4. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code.
 - 5. Steel Structures Painting Council (SSPC)
 - a. SP 3 - Surface Preparation Specification No. 3 Power Tool Cleaning.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIALS: Provide all equipment required for the installation of equipment and materials including, but not limited to, the following:

- A. Inspection and Assembly Materials:
 - 1. Ladders and/or ropes.
 - 2. Foot covers.
 - 3. Shatterproof lights.
 - 4. Fittings, valves, couplings, etc.
- B. Aluminum heliarc welding equipment and wire.
- C. Cranes and fork lifts.
- D. Jacking equipment.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: Continued

- E. Miscellaneous hand and power tools.
- F. Any missing fastener hardware (nuts, bolts, washers, etc.).
- G. Heavy hauling equipment and materials.
 - 1. Multiwheeled lowboys (size as required).
 - 2. Hauling tractor (size as required).
 - 3. Tractor, capable of pushing, backing, or anchoring on grades, 5 percent or greater.
 - 4. Heavy cribbing, blocks, planks, or rails.
 - 5. Chains, equipment tie down and safety.
 - 6. Winch or cranes.
 - 7. Hydraulic lifting jacks with a common control for simultaneous lifting and lowering.
 - 8. Other miscellaneous materials as required.

2.02 RECEIVING AND STORAGE OF MATERIALS:

- A. General:
 - 1. Receipt of Materials:
 - a. Unload all equipment promptly when delivered and pay all demurrage charges and claims from damage to cars or vehicles resulting from Contractor's unloading operations.
 - b. Inspect all equipment and material for damage and check against shipping receipts for any missing parts. Inform the Site Manager of any shortages or damaged materials at the time of delivery. Report obvious shipping damage immediately to the Site Manager. Note the damage on the shipping company's forms before accepting shipment.
 - c. Prepare "Material Receipts" in triplicate for each shipment received, on standard forms furnished by the Site Manager. Receipts shall be distributed to the Owner as well as the Contractor's file and shall list in detail all items received noting any items damaged or missing as listed on manufacturer's shipping list. "Material Receipts" shall have attached to Owner's copy the shipping list taken from the equipment received. Material receiving reports shall be filled out, signed, dated, and delivered to the Site Manager within 24 hours of receiving the materials.
 - d. Contractor shall be responsible for any damage or missing items of stored equipment and material while in his custody.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: continued

- e. Contractor shall pay all deposits for shipping containers such as gas bottles, cable reels, etc.; be responsible for the containers while on site; and arrange for their pickup when the contents of the containers have been expended.
- 2. Inventory of Crates and Boxes:
 - a. All accessory parts received in cartons shall be inventoried item by item with any damage or shortages noted.
 - b. All materials received in crates shall be uncrated to the extent that a complete and thorough inventory may be made. Upon the completion of the inventory, the equipment shall be reboxed, packaged, and stored to the satisfaction of the Site Manager.
- B. Medium-Weight Equipment Receiving:
 - 1. Use cranes or fork lifts of sufficient size to prevent overloading of lifting equipment. Do not load rigging in excess of its recommended safe working load. When fork lifts are used, line the forks so that equipment finishes will not be marred.
 - 2. Rigging equipment shall be inspected prior to use and during its use to assure safety. If found defective, the rigging equipment shall be replaced.
 - 3. Use lifting hooks, eyes, etc., if provided on the equipment for lifting.
 - 4. Use rope or synthetic webbing for slinging steel structures.
- C. Material Storage:
 - 1. Equipment and materials shall be placed in storage areas as designated.
 - 2. Materials shall be stored such that materials being used first will not have to be lifted over materials which will be used later.
 - 3. As much as possible, all parts for a particular piece of equipment shall be stored in one location.
 - 4. Contractor shall be responsible for any damaged or missing items of stored equipment and material while in their custody.
 - 5. Deliver all spare or extra parts to the Owner's warehouse and store as directed at the end of the job.
- D. Material Inventory Control:
 - 1. Material inventory shall be started in conjunction with "Material Receipts" prepared for receiving materials.
 - 2. Materials shall be listed in accordance with the manner of storage.
 - 3. Materials which are a portion of some other item shall be listed as such.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: Continued

4. Material inventory control reports shall be made weekly or as directed by the Site Manager. This report may be compiled by numerical addition or subtraction of items received or used and include, but not be limited to, the following:
 - a. New materials received.
 - b. Materials incorporated into the project.
 - c. Materials missing.
 - d. General comments concerning the condition of materials.
 5. An inventory, item-by-item count, shall be made of all materials on hand monthly or as directed by the Site Manager.
- E. Material Protection: All equipment while under the responsibility of this Contract whether furnished and installed, or furnished by the Owner and installed under this Contract, shall be adequately protected. Provide protection as specified in DIVISION 1 and the following:
1. Equipment shall be stored outdoors unless designed for permanent indoor installation and must be stored indoors.
 2. Where stored outdoors, equipment shall be properly blocked up 6 inches off the ground on timbers.
 3. Equipment requiring indoor storage must be stored in the control house or warehouse space provided by the Contractor which shall be heated by this Contract when required by weather conditions to prevent condensation and shall be locked or supervised to prevent the entrance of unauthorized persons. Temporary buildings and trailers shall be in locations acceptable to the Site Manager and will be removed when the work is complete.
 4. Provide adequate protection during storage, installation, and up to the time of final acceptance, from the following:
 - a. Rain and all other weather conditions.
 - b. Dust, dirt, sand, and concrete splatter.
 - c. Excessive heat, freezing, and condensation.
 - d. Welding operations, falling objects, and construction work in general.
 5. Provide protection in a manner meeting the approval of the Site Manager and Manufacturer's Field Engineer by the application of the following:
 - a. Tarpaulins.
 - b. Properly controlled electric heaters, heating lamps and fans.
 - c. Temporary guards, protective awnings, barricades, etc.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: continued

6. Particular care shall be exercised in protecting equipment from moisture and damage to the finish. Equipment with damaged finish shall be touched up or completely repainted to equal the original finish as directed by the Site Manager.
7. All work, material, and equipment furnished or installed by the Contractor shall be kept in a clean condition during the construction period of the project as required by the Site Manager.
8. Store equipment and materials in accordance with instructions of the Manufacturer's Field Engineer when storage at the site is required.
9. Site Manager shall be informed of any arrangements made for storage of materials or equipment in a place other than the Project site. Evidence of insurance coverage shall be furnished.
10. 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 the following:
 - a. Protection of equipment and machinery of all kinds against corrosion, moisture deteriorations, mechanical injury, and accumulation of dirt or other foreign matter.
 - b. Protection of exposed machined surfaces and unpainted iron and steel as necessary with suitable rust-preventive compounds.
 - c. Blocking equipment and material stored outdoors at least 6 inches above the ground and arranging for natural drainage with equipment drain connections open but protected.
11. Materials and equipment shall not show any pitting, rust, decay or other deleterious effects of storage prior to final acceptance of the work.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Install equipment and materials complete as specified and as required for operation and continuous service at the locations shown on the drawings.
- B. Include assembly of all shipping sections and miscellaneous items of equipment shipped unassembled as received from the manufacturer.
- C. Install at times as required to meet the specified construction schedule and as necessary to move equipment into place without delaying erection of structures. Do not place equipment

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: Continued

onto concrete foundations until minimum concrete compressive strength requirements are met as follows:

1. Structure foundations shall be cured at least 7 days and shall have a concrete compressive strength greater than 70 percent of the specified minimum 28-day strength prior to the installation of structures.
 2. Equipment foundations shall be cured at least 14 days and shall have a concrete compressive strength greater than 85 percent of the specified minimum 28-day strength prior to the installation of equipment.
 3. Structure foundations shall be cured at least 28 days and shall have a concrete compressive strength greater than or equal to 100 percent of the specified minimum 28-day strength prior to attaching wires to structures on these foundations.
- D. 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 indicated.
- E. Conform exactly to the manufacturer's recommendation in all respects. Any conflict between the contract drawings and specifications and the manufacturer's written or verbal recommendations shall be referred to the Site Manager for final decision.
- F. Paint all nongalvanized steel supporting material with one coat of red lead chromate primer and two finish coats of fast drying enamel of color selected by the Owner.
- G. Include leveling, shimming, anchoring to floor or foundations with bolts or cinch anchors, and any necessary grouting.
- H. Include receiving, caring for, and finally delivering to Owner's warehouse, all tools, maintenance devices, and other accessories furnished with the equipment.
- I. Include removing and replacing any covers, bus and wiring connections, etc., whenever and for whatever number of times it is directed by the Site Manager for inspection or testing.
- J. Restore all equipment to a "factory clean" condition before final acceptance is made.
- K. All oil drums furnished by a manufacturer, if any, shall become the property of the Owner. Store oil drums on the site horizontally with bungs down as directed by the Site Manager.
- L. All deposits for cable reels or any other shipping containers shall be paid by this Contract.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: continued

3.02 POWER TRANSFORMERS

A. General:

1. Contractor shall install all external conduit, wire, and high/medium voltage connections to new transformers.
2. Field assembly, oil filling and testing by Contractor.

B. Unit Description:

1. 138/12.47-kV three-phase, Power Transformers furnished by Others rated 15/20/25/28 MVA delivered FOB foundation.

C. Assembly:

1. Anchor to foundations using Owner specified epoxy adhesive and anchor bolts.
2. Connect equipment grounds as specified in SECTION 337900.
3. Connect conduit risers to control cabinet housing and make all external control, CT, and auxiliary power connections.
4. Deliver spare parts to the Owner's warehouse and store as directed.

3.03 POWER CIRCUIT BREAKERS:

A. General:

1. Temporary power supply connections shall be installed to the control mechanism housing for space heaters until permanent power is available.
2. Furnish and install temporary light bulb heaters in each tank and remove just before the tanks are finally processed.
3. Do not perform any work with or on the breakers without the presence and consent of the Manufacturer's Field Engineer and Site Manager.

B. Unit Description:

1. 145 kV power circuit breaker(s) furnished by Others.
2. SF6 gas furnished by Breaker Supplier.

C. Assembly:

1. Anchor to foundations with galvanized anchor bolts and shim as required for level installation of the breaker.
2. Connect frame grounds as specified in SECTION 337900.
3. Connect conduit risers to mechanism housing and make all external control, CT, and auxiliary power connections.
4. If the storage of breakers is required, fill with gas as specified before storage.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: Continued

5. Deliver spare parts to the Owner's warehouse and store as directed.

3.04 METALCLAD SWITCHGEAR:

A. General:

1. This Contract shall receive, store, completely install and energize metalclad switchgear as directed by the manufacturer's field representative and the Owner in order to place the equipment in complete working order.
2. If storage is required, circuit breakers shall be stored indoors and switchgear heaters shall be energized.

B. Unit Description:

1. 1 assembly of outdoor 15-kV class, metalclad switchgear with four (4) 1200-A circuit breakers and three (3) 2000-A circuit breakers furnished by Others.
2. PT's CT's located in units of the switchgear will be furnished by Others and received, stored, installed, completely wired, connected, and tested by this Contract.

C. Assembly:

1. Assemble all shipping splits as indicated and directed by the manufacturer's field representative or the Owner.
2. Install all miscellaneous items removed for shipping.
3. Level, shim, and anchor to foundation with bolts or cinch anchors.
4. Connect all circuits which are disconnected because of the shipping split. Contractor to determine required number of wire terminations.
5. Check and tighten all internal and external connections.
6. Install all conduit risers complete to switchgear compartments as indicated.
7. Connect the ground bus to the ground grid as indicated. Temporarily ground external roof bushings after the switchgear is placed on its foundation until the switchgear is ready to be placed in service.
8. Connect all external and internal wiring circuits including control, power, and CT circuits. Leave all primary, secondary, and neutral bushing current transformers short circuited at the terminal blocks until such time as the testing technician directs that the short-circuit jumpers be removed.
9. Assist the manufacturer's field representative in all tests he is required to perform, as directed by the Owner. Tests will include, but not be limited to, air circuit breaker adjustment, control tests, and meggering of buses.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: continued

10. Assemble and install all bus duct as indicated and directed by the manufacturer's field representative or the Owner. Properly support all bus duct during its installation.

11. Make transition from switchgear tray riser to this Contract's cable trench.

3.05 SUBSTATION STEEL STRUCTURES:

A. General:

1. Contractor shall receive, store, assemble and install all steel structures as indicated by the manufacturer's drawings and as directed by the Site Manager in order to place the equipment in complete working order.
2. Steel structures shall not be erected on the foundations until foundation concrete tests indicate acceptability for use and approval for erection is received from the Site Manager.
3. Furnished under separate Contract.

B. Description:

1. All substation structures and equipment stands as indicated on the Bill of Material for each substation.
2. Assembly:
 - a. Erect structures in strict compliance with the manufacturer's drawings, code markings, and instructions after foundations have cured a minimum of 28 days unless otherwise approved in writing by the Owner.
 - b. Assemble sections, square, and approximately align trusses and columns in the ground.
 - c. Correction of misfits by the moderate use of drift pins and a moderate amount of reaming, punching, chipping, or cutting are considered a part of erection. Any errors which prevent the proper assembly of parts by these measures or which require correction or adjustment must be immediately reported to the Site Manager before assembly. All correction of errors by this Contract, other than those considered a normal part of erection, as directed by Manufacturer must be approved by the Site Manager before such corrections are made. All corrections shall be performed at no increase in the Contract Price.
 - d. Assemble the structures, accurately aligning each portion and finally tightening. Installation of fasteners shall be as outlined in the American Institute of Steel Construction, Inc. Manual of Steel Construction.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: Continued

- e. Clean all cuts, welds, and damaged areas in galvanized steel structures according to SSPC SP3 and 1-3 mils profile depth and apply organic zinc rich primer at 3 mils dry.
 - (1) Carboline - SP676.
 - (2) Koppers - Organic Zinc.
 - (3) Tnemec - 90-93.
- f. Level all structures, columns, and legs on finished foundations prior to erection of equipment and materials.
- g. Ground all steel structures as indicated.
- h. Install overhead shield wire between static masts as indicated.

3.06 SUBSTATION EQUIPMENT AND MATERIALS:

A. General:

- 1. Contractor shall receive, store, assemble, and install all bus fittings, bus materials connectors, equipment, etc., as indicated by the manufacturer's drawings and directed by the Site Manager in order to place the equipment in complete working order.
- 2. Transmission line dead-end spans and strain bus shall not be attached to substation dead-end structures until after these structures have been completely assembled.

B. Description:

- 1. Substation Equipment and Materials in quantities as specified in the Bill of Material.
- 2. Common Materials:
 - a. One lot of buses, bus grounding studs, bus end caps, bus expansion joints, and weldments.
 - b. One lot of conductors, shield wires, damping cable, connectors and attachments, conductor spacers, fittings, and hardware.
 - c. One lot of bus insulators, switch insulators, and suspension insulators.
 - d. One lot of compression connectors, identification tags, nameplates, clamps, power circuit breaker and shunt reactor stud to NEMA 4-hole-pad connectors, fuse and terminal cabinets.

C. Assembly:

- 1. Equipment:
 - a. Install conduit risers complete to equipment enclosures.
 - b. Switches and Circuit Switchers:

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: continued

- (1) Assemble, install, lubricate, and adjust all switches and operating mechanisms in accordance with the manufacturer's instructions.
 - (2) Install conduit and incoming cables as indicated.
 - (3) Do not set the set screws of any switch without the approval of the Site Manager.
- c. PTs, Station Service Voltage Transformers, and Surge Arresters:
 - (1) Install instrument transformers and surge arresters on stands or on the structures as indicated.
 - (2) Connect grounds to the equipment above ground with ground grid risers as indicated. Routing of the above grade grounding not specifically indicated shall be approved by the Site Manager.
 - (3) Mount instrument transformer secondary terminal and fuse cabinets on respective supporting structures or columns as indicated.
2. Buses and Conductors:
 - a. Erect and install all buses, bus supports, switches, strain insulators, conductors, and interconnections as required by manufacturer's drawings.
 - b. Welded aluminum bus erection shall include and conform to the following:
 - (1) Fabricate all buses and interconnections to correct length and shape.
 - (2) Bends shall be made with a hydraulic bender without kinks or surface damage.
 - (3) Field weld all pipe-to-pipe and pipe-to-fitting connections using inert gas arc welding.
 - (4) Furnish the services of a welder who is experienced and certified in inert gas aluminum welding. Welding personnel shall have qualified for the certification within the past 12 months for pipe-groove and fillet welds as required in ANSI/AWS D1.2. Provide portable power generators if required for the welding operation.
 - (5) All welding is to be performed, where possible, close to the ground within an enclosure to prevent air currents from disturbing the inert gas screen. Where welds must be made in final overhead position a tent or other approved temporary wind screen must be used.
 - (6) Follow exactly the welding procedure, including the use of proper filler wire or rod, as prescribed by the aluminum bus and connector manufacturer.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: Continued

Furnish all 4043 or 5356 aluminum-alloy welding wire required to complete the welding.

- (7) Clean all areas to be welded by degreasing with naphtha, acetone, or alcohol; wire brushing with a stainless steel brush; or buffing with 60X grit flapper wheel as required to produce a bright, clean surface.
 - (8) Submit to the Site Manager complete details of the proposed welding procedure, experience record, and certification data on the person proposed to do the welding, as well as samples of welds made at the jobsite in all four standard positions.
- c. Install weldment connectors and fittings for AAC conductors.
 - d. Install all connectors and fittings for ACSS or ACSR conductors with compression tools recommended by the connector manufacturer. Compression fittings shall be pressed so they are straight when installed. Slight curvatures may be corrected by hydraulic means.
 - e. Maintain proper phasing of buses and connections as indicated. Install phase identification plates as specified.
 - f. Install high-voltage connections complete to equipment including connections to terminals of switches, circuit breakers, surge arresters, and instrument transformers.
 - g. Contractor shall supply and use electrical joint compound for all aluminum connections.
 - h. Install bus tubing and interconnections without splices unless otherwise permitted by the Site Manager. Necessary splices in aluminum tubing shall be made with welded tubular aluminum splicing sleeves. Only one splice between any two rigid bus supports will be permitted.
 - i. Drill one weep hole, 1/8-inch diameter, in the bottom of each horizontal span of bus tubing at the point of lowest sag between every two bus supports and remove all burrs caused by the drilling.
 - j. Phase conductors shall be installed such that maximum tension shall not exceed those indicated on the Contract Drawings. Contractor shall install conductors as indicated in Owner provided data table to correct for temperature at which the conductors are being installed.
 - k. Install all bus and cable connectors, weldments, compression fittings, clamps, bus expansion joints, bus end caps, bus grounding studs, bus internal vibration damping

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: continued

cable, erection and mounting bolts, nuts, lockwashers, and other hardware. All bus connecting hardware shall be tightened to torques indicated by the manufacturer or specified by the Owner.

- l. Install structure shielding and grounding materials, clamps, etc., including switch operator ground pads, flexible braid, conductor, etc., for all grounding connections.
- m. Install connectors for high-voltage connections to equipment terminal pads or studs.
- n. Megger all buses, switches, and equipment, with a 1000-V megger for one minute after the installation of each major section of bus. Meggering shall be phase-to-phase and phase-to-ground.
- o. All bus work, conductors and connectors shall be protected from discoloration, dirt, abrasion and scratches at all times, including its handling, placement and storage during construction. They shall not be placed directly on the ground or rocks.

3.07 PROTECTIVE RELAYS AND AUTOMATION CONTROL EQUIPMENT:

A. General:

1. This Contract will perform all receiving, storing, and installation of all protective relay, automation control, and recorder equipment as specified, indicated, and indicated in drawings in order to place the equipment in complete working order.
2. Protective relay panels are furnished by Others. See drawings for details.
3. Automation control boards are furnished by Others. See drawings for details.

B. Assembly:

1. Provide openings in control cable trench for cable entry in locations shown on the drawings.
2. Install all equipment in the buildings as indicated, including bolting together all shipping splits, setting in place, leveling, shimming, grounding, conduit, and anchoring to floor with cinch anchors.
3. Connect all circuits which are disconnected because of the shipping split. Contractor to determine required number of wire terminations.
4. Connect the ground bus to the ground grid as indicated.
5. Connect all external and internal wiring circuits including control, power, and CT circuits. Leave all primary, secondary, and neutral bushing current transformer circuits short circuited at the terminal blocks until such time as the testing technician directs that the short-circuit jumpers be removed.
6. Check and tighten all internal and external circuits.

SECTION 337210 - MAJOR SUBSTATION EQUIPMENT INSTALLATION: Continued

7. Assist the manufacturer's field representative in all tests he is required to perform in the set-up of the protective relay panels.

END OF SECTION 337210

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SECTION 337900 - GROUNDING

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes installation of the following:
 - 1. Substation buried ground grid and ground rod system.
 - 2. Ground riser extensions to the above grade structural steel, electrical equipment, transformers, power circuit breakers, control building, raceway, and other miscellaneous equipment.

1.02 REFERENCES:

- A. Applicable Standards (conform to all standards applicable to each item utilized) shall be latest revisions, supplements, and amendments to the following:
 - 1. American Society for Testing and Materials (ASTM):
 - a. B8 - Concentric-Lay-Stranded-Copper Conductors, Hard, Medium-Hard, or Soft.
 - 2. Institute of Electrical and Electronics Engineers (IEEE):
 - a. C2 - National Electrical Safety Code.
 - b. 80 - Safety in AC Substation Grounding.
 - c. 837 - Qualifying Permanent Connections Used in Substation Grounding.
 - 3. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code.
 - b. 780 - Lightning Protection Code.

1.03 COMPLIANCE SUBMITTALS:

- A. Submit as specified in DIVISION 1.
- B. Include, but are not limited to, catalog cuts for the following:
 - 1. Exothermic Weld Materials.

1.04 QUALITY ASSURANCE:

- A. The Contractor shall furnish equipment and materials meeting the specified ratings and performance at the altitude and ambient temperatures specified, in accordance with the specified standards.

SECTION 337900 - GROUNDING: Continued

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Cable-to-Cable, Cable-to-Ground Rod, Cable-to-Steel Bar, Exothermic Weld Connections:
 - 1. Erico Products (Cadweld).
 - 2. Thermoweld.

2.02 WIRE AND CABLE:

- A. Bare copper stranded conductor per attached BC2 specification sheet shall be installed to form the below grade ground grid.
- B. Bare copper stranded conductor per attached BC2 specification sheet shall be installed to ground steel structures where the ground conductor is installed and connected inside the steel structure.
- C. Copper-Clad stranded conductor shall be installed to connect the below grade ground grid to above grade structures, and equipment.
- D. Conductor Sizes:
 - 1. As indicated on Contract Drawings for specific connections.
 - 2. For required connections not indicated, use conductor size not less than No. 2/0 AWG if buried in earth or cast in concrete, unless otherwise noted.

2.03 GROUND RODS:

- A. Copper-clad steel or copper-alloy sectional-type rods.
- B. One end pointed to facilitate driving.
- C. 3/4-inch diameter and 10 feet long with diameter and length stamped near top of rod.
- D. Interconnectable rods to allow them to be stacked to obtain a greater length.

2.04 CONNECTION MATERIALS:

- A. Cable-to-rod and cable-to-connector connections of exothermic-welding-type process with proper molds and charges only to be used when connections are made below grade.
- B. Cable-to-equipment and cable-to-cable ground connections above grade shall be bolted type only using silicon bronze bolts and lock-washers.
- C. Cable-to-cable connections made below grade shall be either of the following:
 - 1. Exothermic, Erico Products "Cadweld" or approved equivalent.

SECTION 337900 - GROUNDING: Continued

2. Compression, Burndy "Hyground" or approved equivalent.
- 2.05 MISCELLANEOUS GROUNDING EQUIPMENT AND MATERIALS:
- A. Flexible braid straps for fence enclosures.
- 2.06 TEMPORARY EQUIPMENT TERMINAL GROUNDS:
- A. Transformer bushing terminals, power circuit breaker terminals, PT terminals, etc., shall be effectively grounded to the grid by No. 6 Cu or larger cable until such time as the ground grid is properly connected or prior to energization of the substation, as instructed by the Site Manager.
 - B. Connections shall be of a bolted type to the equipment connector and of a clamp type to the ground grid.

PART 3 - EXECUTION

- 3.01 INSPECTION:
- A. Do not bury connections prior to inspection by the Site Manager.
 - B. All exothermic molds shall be made available for daily inspection by the Site Manager before ground installation begins.
- 3.02 INSTALLATION:
- A. Wire and Cable:
 1. Install using as few joints as possible.
 2. Bury wire and cable a minimum of 18" below subgrade unless otherwise indicated.
 3. Protect against abrasion by several wrappings of rubber tape at all points where cable leaves concrete in exposed areas.
 4. Suitably protect cable against damage during construction.
 5. Replace or suitably repair cable if damaged by anyone before final acceptance.
 6. In Buried Installations:
 - a. Lay ground wire above full length of all conduit runs or in other excavations at least 4 inches above conduit.
 - b. Maintain clearance of at least 12 inches from all underground metal piping or structures, except where connections thereto are specifically indicated.

SECTION 337900 - GROUNDING: Continued

- c. Backfill with clean earth, free from rocks or stones. Thoroughly compact backfill as required.
 - d. Excavation and backfill shall conform to the requirements of DIVISION 31.
- 7. In concrete: Where grounding is shown going through concrete, install PVC conduit of suitable size to enclose the ground cable.
- B. Ground Rods:
 - 1. Install rods as indicated by driving and not by drilling or jetting.
 - 2. Drive rods into unexcavated portion of the earth where possible.
 - 3. Where rods must be installed in excavated areas, drive rods into earth after compaction of backfill is completed.
 - 4. Drive to a depth such that top of rods will be approximately 27 inches below subgrade and connect main grid ground cable thereto.
 - 5. Total rod length shall be 10 feet unless ground resistivity tests performed by the Testing Contractor indicate more rods are required or indicated otherwise. Contractor shall install additional rods and/or stack sections of rods for greater depth as directed by the Owner.
- C. Connections:
 - 1. Conform to manufacturer's instructions.
 - 2. Chemically degrease and dry completely before making connection.
 - 3. For exothermic connections, clean molds thoroughly after each weld is completed. Dirty molds or excessively worn molds that will not contain the weld, shall not be used.
 - 4. For compression connectors, use a hydraulic tool by the same manufacturer as connector. Each connector shall be specifically sized for the given conductor.
 - 5. Make connections to equipment as follows:
 - a. Make up clean and tight to assure a low-resistance connection with resistance drop not exceeding 40 millivolts per 1000-A.
 - b. Install so as not to be susceptible to mechanical damage during operation or maintenance of equipment.
 - c. Provide direct copper connection to buried ground grid system.
- D. Metallic Conduit Grounds:
 - 1. Adequately and properly ground at all terminal points and wherever isolated from equipment or grounded steel.

SECTION 337900 - GROUNDING: Continued

2. Where extending into switchgear or other floor-mounted equipment from below, connect to equipment ground bus or frame.
 3. Where extending into a manhole, handhole, or cable trench, connect to the ground riser or cable at that structure using grounding bushings.
- E. Manhole and/or Handhole Grounds:
1. Ground all hardware to ground rod extensions in manholes with No. 6 AWG bare copper unless indicated otherwise.
 2. Connect manhole ground rods to the underground duct system ground conductors, cable trench system ground conductors, and substation ground grid conductors.
- F. Box Grounds: Ground all boxes by direct copper connection to the buried ground grid system.
- G. Ground fence enclosures at posts at intervals indicated.
- H. Install flexible braid straps across all hinge points and gates for fence enclosures.
- I. Ground all motors with "identified" ground conductor in addition to conduit system. Route in conduit with phase conductors unless external ground is indicated.
- J. Equipment Grounds:
1. Provide ground conductors connected to the buried ground grid for connection to the above grade equipment and structures.
 2. Provide terminations of grounding stingers to above grade equipment and structures.
 3. Provide number and size of riser cables as indicated.
 4. Take caution to connect multiple risers to separate segments of the buried ground system.
- K. Transformer Grounding:
1. The transformer shall be connected to the ground grid by a minimum of two runs of #2/0 conductor from the ground grid to the four hole pads on the transformer tank. One #2/0 conductor shall be run from the two hole pad near the base on the X0 side of the transformer to the main grounding grid. One 4/0 copper conductor shall be run from the two hole pad near the base on the high side of the transformer to the main grounding grid.
- L. Fence Grounding:
1. The 4" gate posts, 2-1/2" IPS corner posts, and 2" IPS line posts of the substation fence shall be connected to the inner rings of the grounding mat by 7#5 copperweld cable U-bolt clamps. Flexible tinned copper strands and U-bolt clamps shall be used to connect the 1-1/2" IPS gates to the 4-inch post. Copper #2 AWG, soft drawn, solid, bare, tinned

SECTION 337900 - GROUNDING: Continued

conductor and connectors shall be furnished for grounding the fence and gate fabric as shown in the approved for construction drawings.

2. One ground rod shall be installed at the fence beneath each phase of a transmission line crossing over the fence.

END OF SECTION 337900

END OF DIVISION 33

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Direct Deposit Authorization Form

Dear Vendor,

The Brownsville Public Utilities Board (BPUB) is pleased to provide our vendors with the opportunity to receive payments directly through an Automated Clearing House (ACH). The ACH is an automated process that permits funds to be directly transferred to your financial institution. ACH will alleviate lost checks in the mail, potential mail fraud, and also expedite your payments upon payment terms. Whenever you enroll in ACH, the email address you provide below is automatically setup to receive electronic notifications when BPUB processes an ACH payment for you. If you are interested in this payment option please complete the information requested in this form and fax or mail back as indicated below. All fields are required.

☐

New Application

☐

Request Change

☐

Request Cancellation

Vendor Information

Business Name: _____

Tax ID Number: _____

Remit to Address: _____

City: _____ State: _____ Zip Code: _____

Bank Information

Bank Name: _____

Bank Routing (ABA) Number (9 digit number): _____

Bank Account Number: _____

Please enclose one of the following for verification:

☐

Voided Check

☐

Specification form from bank

Check One:

☐

Checking Account

☐

Savings Account

Authorization

I, _____, as an authorized signer for _____
do hereby authorize the BPUB to deposit payments by ACH directly into the above specified bank account
and request payment notification to be sent to the recipient e-mail address below.

Authorized Signature _____

Title _____

Date _____ Telephone Number _____

Electronic Notification E-Mail Address _____

Mail or Fax to:
Brownsville Public Utilities Board Attn: Finance Department
P.O. Box 3270 Brownsville, TX 78523-3270
Fax: (956) 574-6117

**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.**

Print or type.
See Specific Instructions on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.	
2 Business name/disregarded entity name, if different from above	
3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes. <input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ► _____ <input type="checkbox"/> Other (see instructions) ► _____ <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <small>(Applies to accounts maintained outside the U.S.)</small>
5 Address (number, street, and apt. or suite no.) See instructions.	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. Also see *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:

- 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
- 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
- I am a U.S. citizen or other U.S. person (defined below); and
- 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 ► _____
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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.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding*, later.

Form W-8BEN-E

(Rev. July 2017)

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/FormW8BEN 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 U.S. (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): <table style="width: 100%;"><tr><td><input type="checkbox"/> Simple trust</td><td><input type="checkbox"/> Grantor trust</td><td><input type="checkbox"/> Corporation</td><td><input type="checkbox"/> Disregarded entity</td><td><input type="checkbox"/> Partnership</td></tr><tr><td><input type="checkbox"/> Central Bank of Issue</td><td><input type="checkbox"/> Tax-exempt organization</td><td><input type="checkbox"/> Complex trust</td><td><input type="checkbox"/> Estate</td><td><input type="checkbox"/> Government</td></tr><tr><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/> Private foundation</td><td><input type="checkbox"/> International organization</td><td></td></tr></table> If 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. <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Simple trust	<input type="checkbox"/> Grantor trust	<input type="checkbox"/> Corporation	<input type="checkbox"/> Disregarded entity	<input type="checkbox"/> Partnership	<input type="checkbox"/> Central Bank of Issue	<input type="checkbox"/> Tax-exempt organization	<input type="checkbox"/> Complex trust	<input type="checkbox"/> Estate	<input type="checkbox"/> Government	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Private foundation	<input type="checkbox"/> International organization	
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5 Chapter 4 Status (FATCA status) (See instructions for details and complete the certification below for the entity's applicable status.) <table style="width: 100%;"><tr><td style="width: 50%; vertical-align: top;"><input type="checkbox"/> Nonparticipating FFI (including an FFI related to a Reporting IGA FFI other than a deemed-compliant FFI, participating FFI, or exempt beneficial owner). <input type="checkbox"/> Participating FFI. <input type="checkbox"/> Reporting Model 1 FFI. <input type="checkbox"/> Reporting Model 2 FFI. <input type="checkbox"/> Registered deemed-compliant FFI (other than a reporting Model 1 FFI, sponsored FFI, or nonreporting IGA FFI covered in Part XIII). See instructions. <input type="checkbox"/> Sponsored FFI. Complete Part IV. <input type="checkbox"/> Certified deemed-compliant nonregistering local bank. Complete Part V. <input type="checkbox"/> Certified deemed-compliant FFI with only low-value accounts. Complete Part VI. <input type="checkbox"/> Certified deemed-compliant sponsored, closely held investment vehicle. Complete Part VII. <input type="checkbox"/> Certified deemed-compliant limited life debt investment entity. Complete Part VIII. <input type="checkbox"/> Certain investment entities that do not maintain financial accounts. Complete Part IX. <input type="checkbox"/> Owner-documented FFI. Complete Part X. <input type="checkbox"/> Restricted distributor. Complete Part XI.</td><td style="width: 50%; vertical-align: top;"><input type="checkbox"/> Nonreporting IGA FFI. Complete Part XII. <input type="checkbox"/> Foreign government, government of a U.S. possession, or foreign central bank of issue. Complete Part XIII. <input type="checkbox"/> International organization. Complete Part XIV. <input type="checkbox"/> Exempt retirement plans. Complete Part XV. <input type="checkbox"/> Entity wholly owned by exempt beneficial owners. Complete Part XVI. <input type="checkbox"/> Territory financial institution. Complete Part XVII. <input type="checkbox"/> Excepted nonfinancial group entity. Complete Part XVIII. <input type="checkbox"/> Excepted nonfinancial start-up company. Complete Part XIX. <input type="checkbox"/> Excepted nonfinancial entity in liquidation or bankruptcy. Complete Part XX. <input type="checkbox"/> 501(c) organization. Complete Part XXI. <input type="checkbox"/> Nonprofit organization. Complete Part XXII. <input type="checkbox"/> Publicly traded NFFE or NFFE affiliate of a publicly traded corporation. Complete Part XXIII. <input type="checkbox"/> Excepted territory NFFE. Complete Part XXIV. <input type="checkbox"/> Active NFFE. Complete Part XXV. <input type="checkbox"/> Passive NFFE. Complete Part XXVI. <input type="checkbox"/> Excepted inter-affiliate FFI. Complete Part XXVII. <input type="checkbox"/> Direct reporting NFFE. <input type="checkbox"/> Sponsored direct reporting NFFE. 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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). <table style="width: 100%;"><tr><td style="width: 60%;">City or town, state or province. Include postal code where appropriate.</td><td style="width: 40%;">Country</td></tr></table>		City or town, state or province. Include postal code where appropriate.	Country													
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7 Mailing address (if different from above) <table style="width: 100%;"><tr><td style="width: 60%;">City or town, state or province. Include postal code where appropriate.</td><td style="width: 40%;">Country</td></tr></table>		City or town, state or province. Include postal code where appropriate.	Country													
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8 U.S. taxpayer identification number (TIN), if required	9a GIIN	b Foreign TIN														
10 Reference number(s) (see instructions)																

Note: Please complete remainder of the form including signing the form in Part XXX.

For Paperwork Reduction Act Notice, see separate instructions.

Cat. No. 59689N


Form **W-8BEN-E** (Rev. 7-2017)

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) 983-6263.



BROWNSVILLE
PUBLIC UTILITIES BOARD

Contractor JSA Form



BROWNSVILLE
PUBLIC UTILITIES BOARD

JOB SAFETY ANALYSIS FORM

PROJECT NAME: [REDACTED]		DATE: [REDACTED]
PROJECT CONTRACTOR: [REDACTED]	POINT OF CONTACT & TEL #: [REDACTED]	ANALYSIS BY: [REDACTED]
BPUB DEPARTMENT: [REDACTED]	SECTION: [REDACTED]	REVIEWED BY: [REDACTED]
REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT: [REDACTED]		APPROVED BY: [REDACTED]
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>
• [REDACTED]	• [REDACTED]	• [REDACTED]
• [REDACTED]	• [REDACTED]	• [REDACTED]
• [REDACTED]	• [REDACTED]	• [REDACTED]
• [REDACTED]	• [REDACTED]	• [REDACTED]
• [REDACTED]	• [REDACTED]	• [REDACTED]

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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]