CITY OF LAREDO

EASTERN CHACON CREEK INTERCEPTOR AND DRAINAGE IMPROVEMENTS

PROJECT SPECIFICATIONS

Honorable Pete Saenz, Esq.
Mayor

Alberto Torres, Jr.
Mayor Pro-Tempore

Vidal Rodriguez
Cm. District II

Nelly Vielma, Esq.
Cm. District V

George Altgelt, Esq.
Cm. District VII

Robert A. Eads
City Manager

Rudy Gonzalez, Jr.
Cm. District I

Mercurio Martinez, III
Cm. District III

Dr. Marte Martinez
Cm. District VI

Roberto Balli, Esq.
Cm. District VIII

CITY OF LAREDO
Utilities Department
(956) 721-2000

Mr. Riazul Mia, P.E., CFM
Utilities Director

Environmental Department
(956) 794-1650

Mr. John Porter, REM, CFM, CPM
Environmental Director

CRANE ENGINEERING CORP.
Firm # F-3353
1310 Junction Drive, Suite B
Laredo, Texas 78041

Mr. Alfredo Martinez, P.E., CFM
Project Engineer

MAY 2020
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MAY 2020
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<tr>
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<td>TRAFFIC MANAGEMENT</td>
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</tr>
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<tr>
<td>812</td>
<td>Definitions</td>
</tr>
</tbody>
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Division A

Instructions to Bidders & Contract Documents
Sealed bids will be received at City Secretary’s Office, 1110 Houston Street, 3rd floor, City Hall Building, Laredo, Texas, until Wednesday, July 15, 2020 at 4:00 P.M. and publicly opened, read, and taken under advisement on Thursday, July 16, 2020 at 10:00 A.M. for the furnishing of all necessary materials, machinery, equipment, labor, superintendence, and all other services and appurtenances required for the Eastern Chacon Creek Interceptor and Drainage Improvements, and shall include acknowledgement of any addenda submitted, and all other documents included in said bid call. Said bid shall be marked, “Eastern Chacon Creek Interceptor and Drainage Improvements”

The project consists of:
The Eastern Chacon Creek Interceptor and Drainage Improvements project proposes the installation of a new 30” to 36” diameter, fusible PVC interceptor along the bank of Chacon Creek Tributary 2 from the existing Vaquillas Lift Station to an existing siphon near N India Avenue, tie-ins to existing sewer mains varying in diameter from 8” to 12”, the demolition of, and reconstruction of the existing Century Blvd. drainage culvert crossing. The project also includes proposed channel improvements along the tributary. The project will consist of 2,575 LF of 36” Fusible PVC, 2,910 LF of 30” Fusible PVC, 210 LF of 12” PVC, 140 LF jack and dry bore across TxDOT ROW with 36” Fusible PVC in 42” steel casing, 85 LF of 36” steel casing, demolition and reconstruction of 120 LF of existing collector at drainage crossing, 76 LF of 100yr culvert crossing, all-weather access road, 32,000 CY of channel grading, 38,000 SF of channel rip-rap, SW3P and revegetation.

Construction contract time for the project is 330 working days.

Each bid and a bid guaranty must be originals and must be submitted in a sealed envelope plainly marked with the name of the project as shown above, and the name and address of the Bidder. When submitted by mail, this envelope shall be placed in another envelope addressed as indicated in this Notice to Bidders and shall be marked as a bid for the project above referred.

Only the bids and bid guaranties actually in the hands of the designated official at the time set in this Notice to Bidders shall be considered. Bids submitted by telephone, telegraph, or fax, will not be considered.

Bidders are expressly advised to review Section C-3.10 of the General Conditions of the proposed Contract as to the causes which may lead to the disqualification of a bidder and/or the rejection of a bid proposal. Unless all bids are rejected, the Owner agrees to give Notice of Award of Contract to the successful bidder within ninety (90) days of the bid opening.

Bidders are expected to inspect the site of the work and inform themselves regarding all local conditions.
Bidders are advised to review the **Key Points of Public Right-of-Way Ordinance** on Legal Relations and Responsibilities to the Public Division C-7.15. The entire ordinance may be viewed at the following website under Building Services Department.


**A pre-bid conference with prospective bidders will be held on Wednesday, June 17, 2020 at 10:00 A.M. at City of Laredo Utilities Department conference room located at 5816 Daugherty Avenue, Laredo, Texas 78041.** Contractors electing to call into the meeting shall notify the City of Laredo Utilities Department at (956) 721-2000 by Monday, June 15, 2020 at 10:00 A.M. and provide sign in information. Contractors that have not signed by this time will not be allowed to call in.

Plans and specifications may be obtained free of charge from the City of Laredo’s website.


_________________________
Jose A. Valdez, Jr.
City Secretary

**Publication Dates:**
Sunday, June 7, 2020
Sunday, June 14, 2020
SECTION A-2
INFORMATION TO BIDDERS

Sealed bids will be received at City Secretary's Office, 1110 Houston Street, 3rd floor, City Hall Building, Laredo, Texas, until Wednesday, July 15, 2020 at 4:00 P.M, for the furnishing of all necessary materials, machinery, equipment, labor, superintendence, and all other services and appurtenances required for construction of the Eastern Chacon Creek Interceptor and Drainage Improvements Project and shall include acknowledgment of addenda submitted, and all other documents included in said bid call. Said bids shall be marked, “Eastern Chacon Creek Interceptor and Drainage Improvements Project”

Bids shall be based on a per unit of work basis and shall include dollar amounts for each specific unit in improvements listed including those items listed as alternatives as per the proposal sheet included in the specifications of this project.

Each proposal and a proposal guaranty must be originals and must be sealed in an envelope plainly marked with the name of the project as shown above, and the name and address of the Bidder. When submitted by mail, this envelope shall be placed in another envelope addressed as indicated in this Notice to Bidders and shall be marked as a bid for the project above referred.

Only the bids and bid guaranties actually in the hands of the designated official at the time set in this Notice to Bidders shall be considered. Bids submitted by telephone, telegraph, or fax, will not be considered.

The City reserves the right to award the contract on the basis of the alternative which appears most advantageous to the City, to reject any or all bids, to waive objections based on failure to comply with formalities, and to allow the correction of obvious or patent errors. Bidders are expressly advised to review Section C-3 of the General Conditions of the proposed contract as to the causes which may lead to the disqualification of a bidder and/or the rejection of a bid proposal. Unless all bids are rejected, Owner agrees to give Notice of Award of contract to the successful bidder within ninety (90) days from the date of the bid opening.

Bidders for the construction work must submit a satisfactory cashier’s or certified check, or bidder’s bond having a minimum Best’s Rating A according to Best's Key Rating Guide Latest Edition from a surety duly authorized and licensed in the State of Texas, payable without recourse to the order of the City of Laredo, Texas, in an amount not less than five percent (5%) of the total bid based on the bid which check or bond shall be submitted as a guarantee that the bidder will enter into a contract, and execute performance and payment bonds within ten (10) days after Notice of Award of contract is given to him for contracts in excess of $25,000.00. Bids without the required check or bond will NOT be considered.

The successful bidder for the construction of the improvements must furnish a Certificate of Insurance, and a satisfactory Performance Bond in the amount of 100% of the total contract price, and a satisfactory Payment Bond in such amount, duly executed by such bidder as principal and by a corporate surety duly authorized so to act under the laws of the State of Texas. The successful bidder will be required to provide Performance and Payment Bonds issued by an insurance company which meets the minimum State requirements and is licensed in the State of Texas, and has a Best’s Key according to Best’s Key Rating Guide Latest Edition as follows:
All lump sum and unit prices must be stated in both script and figures.

Bidders are expected to inspect the site of the work and to inform themselves regarding all local conditions.

The Instructions to Bidders, Forms of Bid, Form of Contract, Plans, Specifications, Form of Bid Bond, Performance and Payment Bonds and other contractual documents may be examined free of charge at the City of Laredo Engineering Department, 1110 Houston Street, Laredo, Texas 78040.

Plans and specifications may be obtained free of charge from the City of Laredo’s website. https://www.cityoflaredo.com/bids-and-rfps.html

Bid proposals over $25,000.00 shall comply with all conditions of the bid documents.

In the event the base bid amount is $25,000.00 or LESS than $25,000.00, a Payment Bond and Performance Bond will NOT BE REQUIRED. A Bid Guarantee in the form of a Cashier’s or Certified Check or Bid Bond and the Certificate of Insurance however, WILL BE REQUIRED. Under the above conditions, the successful bidder for the Eastern Chacon Creek Interceptor and Drainage Improvements Project is hereby advised that the total contract price will be paid in ONE PAYMENT upon completion and acceptance of the project by the City of Laredo. Cashier’s checks are not to be released until a contract for the project has been approved by City Council and signed by the City Manager.

Any other division or section of this project’s specifications having reference to Bid Guarantee, Cashier’s or Certified Check, Bid Bond, Payment Bond, or Performance Bond, or having mention at all, to the requirements of bonds, is hereby amended to concur with the above conditions ONLY when the base bid is LESS THAN $25,000.00.

Bidders are advised to contact the City Utilities Department, 5816 Daugherty Avenue, Laredo, Texas 78041, telephone number (956) 721-2000, for visits to project site, and for any additional information required on the project.

Contractor’s attention is directed to Special Provision 000-6233, “Important Notice to Contractors” and “Statement of Materials and Other Charges” which will be included in all projects, beginning with the September 1991 letting. These establish the procedures whereby the Contractor will be permitted to obtain an exemption from the sales tax on certain materials. See Comptroller’s Rule 2.291 and Texas Tax Code Chapter 151, as amended by House Bill Number 11, Acts 1991, 72nd Legislature, First called Session. The Contractor will be required to separate the charges for materials from all other charges and will be furnished an Exemption Certificate for each contract. Also, the Contractor must issue resale certificates to suppliers. Sales tax permit applications and information regarding resale certificates may also be obtained by calling the State Comptroller’s toll free number 1-800-252-5555.

A pre-bid conference with prospective bidders will be held on Wednesday, June 17, 2020 at 10:00 A.M. at City of Laredo Utilities Department conference room located at 5816 Daugherty Avenue, Laredo, Texas 78041. Contractors electing to call into the meeting shall notify the City of Laredo Utilities Department at (956) 721-2000 by Monday, June 15, 2020 at 10:00 A.M. and provide sign in information. Contractors that have not signed by this time will not be allowed to call in.
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SECTION A-3
ADVICE TO BIDDERS

Project: Eastern Chacon Creek Interceptor and Drainage Improvements Project

The Contractor’s attention is directed to the State of Texas Comptroller of Public Accounts Limited Sales Excise and Use Tax Rules and Regulations, Paragraph 3 of Ruling No. 9. Repairmen and Contractors (amended April 3, 1972). Reference Article 20.01 (T). Upon compliance with certain conditions, this ruling provides for exemption from this tax of materials incorporated into work done for an exempt agency under a Contract. The City is an exempt agency.

Any Bidder may elect to exclude this sales tax from his bid. If the Bidder submitting the lowest acceptable bid for performing the work on this project elects to comply with the above ruling on any bid item included in this Contract by obtaining any necessary permit or permits from the State Comptroller allowing the purchase of material for incorporation into this project without having to pay the Limited Sales, Excise and Use Tax at the time of purchase, he shall upon Award of Contract submit a statement in satisfactory form in which his bid prices to the City for materials are listed separately from all other charges, either by bid item or by total as required by the comptroller. This statement shall be included in and made part of the Contract.

The City will furnish the Contractor with its exemption certificate for those materials incorporated in the project for which the above required statement is submitted.

The City will make no further allowance for and will make no price adjustment above or below the originally bid unit price on account of this tax. It shall be the Contractor’s sole responsibility, if he elects to exclude the sales tax from his bid, to comply with the aforementioned Ruling No. 9 and with any other applicable rules, regulation, or laws pertaining to the Texas Limited Sales, Excise and Use Tax which may now or at any time during the performance of this Contract be in effect, and the City shall have no responsibility for any sales or use tax which the Contractor may be required to pass as a result of his failure or the City’s failure to comply with said rules, regulations or laws, or as the result of the performance of the Contract or any part thereof by the Contractor.

Bidders are cautioned that materials which are not permanently incorporated into the work are not eligible for exemption and are not to be included in the statements as “Materials” (example: fuel, lubricants, tools, forming materials, etc.).
Project: Eastern Chacon Creek Interceptor and Drainage Improvements Project

The Contractor’s attention is directed to Special Provision 000-6233, “Important Notice to Contractors”, and “Statement of Materials and Other Charges” which will be included in all projects, beginning with the September, 1991 letting. These establish the procedures whereby the Contractor will be permitted to obtain an exemption from the sales tax on certain materials. See Comptroller’s Rule 3.291 and Texas Tax Code, Chapter 151, as amended by House Bill Number 11, acts 1991, 72nd Legislature, First Called Session. The Contractor will be required to separate the charges for materials from all other charges and will be furnished an Exemption Certificate for each contract by the Department. Also the Contractor must issue resale certificates to suppliers. Sales tax permit applications and information regarding resale certificates may be obtained by calling the State Comptrollers’ toll free number 1-800-252-5555.
IMPORTANT NOTICE TO CONTRACTORS

The Contractor’s attention is directed to Rule 3.291, paragraphs (a) (1), defining separated contracts, subsection (b) (3) discussing separated contracts, and subsection (c) discussing exempt contracts. Reference: Texas Tax Code, Chapter 151.

Contractors should note those organizations in subsection (c) that the rule shows as being exempt no longer qualify for the exemption. The rule states that contractors improving realty for organizations listed in Texas Tax Code 151.309 and 151.310 are exempt from tax. THIS IS NO LONGER TRUE EFFECTIVE WITH CONTRACTS SIGNED ON OR AFTER AUGUST 15, 1991.

Only those contracts with school districts and nonprofit hospitals qualify for the exemption discussed in subsection (c) of Rule 3.291.

The Comptroller is amending the rule to reflect this change.

If the low bidder elects to operate under a separated contract as defined by Rule 3.291, by obtaining the necessary permits from the State Comptroller’s office allowing the purchase of materials for incorporation in this project without having to pay the Limited Sales and Use Tax at the time of purchase, the low bidder shall identify separately from all other charges the total agreed contract price for materials incorporated into the project. This form shall be filled out by the low bidder in each of the two bound copies of the contract. Total materials shall only include materials physically incorporated into the realty.

If the Contractor operates under a “separated contract”, the Department will furnish the Contractor with an exemption certificate for the applicable materials.

In order to comply with the requirements of Rule 3.291, as mentioned above, it will be necessary for the Contractor to obtain a sales tax permit.

It will also be necessary that the contractor issue resale certificates to his suppliers.

Sales tax application for a sales tax permit and information regarding resale certificates may be obtained by writing to:

Comptroller of Public Accounts
Capital Station
Austin, Texas 78774

The Contractor may also receive information or request sales tax permit applications by calling the State Comptrollers’ toll free number 1-800-252-5555.

Subcontractors are eligible for sales tax exemption if the subcontract is made in such manner that the charges for materials are separated from all other charges. The procedure described above will effect a satisfactory separation. When subcontractors are handled in this manner, the Contractor must issue a resale certificate to the subcontractor and the subcontractor, in turn, must issue a resale certificate to his supplier.
STATEMENT OF MATERIALS AND OTHER CHARGES

Project: Eastern Chacon Creek Interceptor and Drainage Improvements Project

MATERIALS INCORPORATED INTO THE PROJECT: $ _______________

ALL OTHER CHARGES: $ _______________

*TOTAL $ _______________

*This total must agree with the total figure shown in the Item and Quantity Sheets in the bound contract.

For purposes of complying with the Texas Tax Code, the Contractor agrees that the charges for any material incorporated into the project in excess of the estimated quantity provided for herein will be no less than the invoice price for such material to the Contractor.

NOTE: ONLY THE COPY OF THIS FORM IN THE BOUND CONTRACTS IS TO BE FILLED OUT.
To: The City of Laredo, Texas

Honorable Pete Saenz, Mayor

From: ______________________________
Contractor

Address: _______________________________

Phone: _______________________________

Fax: _______________________________

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

Pursuant to Notice to Bidders, the undersigned bidder hereby proposes to furnish the labor, materials, and equipment in accordance with the plans and specifications, general conditions of the agreement, special provisions of the Agreement, and Addenda, if any. The bidder binds himself upon acceptance of his proposal to execute a contract and bonds accompanying form of performing and completing the said work within the time stated as required by the detailed specifications at the following unit prices. The quantities shown below are based on the Engineer’s estimate of quantities and it is agreed that the quantities may be increased or decreased, and may be considered necessary in the opinion of the City of Laredo, Texas to complete the work fully as planned and contemplated, and that all quantities of work, either increased or decreased, are to be performed at the unit prices set forth below (except as provided in the General Conditions of the Agreement or the specifications, the contract documents).

Acknowledgment of Addenda: (Please initial and date)
Addendum #1: ______________________________
Addendum #2: ______________________________
Addendum #3: ______________________________
Addendum #4: ______________________________
Addendum #5: ______________________________

Acknowledgment of other documents: (Please initial and date)
Wage Determination: ______________________________
Labor Provisions: ______________________________
Affirmative Action Program: ______________________________
FORM OF NON-COLLUSIVE AFFIDAVIT

STATE OF TEXAS  {   }
COUNTY OF WEBB   {   }

___________________________________________________ being first duly sworn,
deposes and says that he is _____________________________ (a Partner or Officer of the
firm of, etc.)

the party making the foregoing proposal or bid, that such proposal or bid is genuine and not
collusive or sham; that said Bidder has not colluded, conspired, connived or agreed, directly or
indirectly, with any Bidder or Person, to put in a sham bid or to refrain from bidding, and has
not in any manner, directly or indirectly, sought by agreement or collusion, or communication
or conference, with any person, to fix the bid price or affiant or of any other Bidder or to fix any
overhead, profit or cost element of said bid price, or of that of any other Bidder, or to secure
any advantage against the City of Laredo or any person interested in the proposed Contract;
and that all statements in said proposal or bid are true.

__________________________________________
Signature of

Bidder, if the Bidder is an individual
Partner, if the Bidder is a Partnership
Officer, if the Bidder is a Corporation

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

__________________________________________
Notary Public

My Commission Expires:

__________________________________________
INFORMATION FROM BIDDERS
MUST BE COMPLETED AND SUBMITTED WITH BID PROPOSAL

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

I. Are you registered to do business with the City of Laredo? _____ Yes _____ No

II. If you are registered to do business with the City of Laredo, have you completed the Traffic Management Safety Course offered through the City of Laredo?

_____ Yes Date of Completion _____/_____/_____

_____ No

III. Statement of Qualifications: (Similar Projects Completed by Bidder)

1) Name of Project: ________________________________
   Value of Contract: ________________________________
   Date Completed: ________________________________
   Owner Contact Info: ________________________________

2) Name of Project: ________________________________
   Value of Contract: ________________________________
   Date Completed: ________________________________
   Owner Contact Info: ________________________________

3) Name of Project: ________________________________
   Value of Contract: ________________________________
   Date Completed: ________________________________
   Owner Contact Info: ________________________________

Experience Data: (Include name and experience record of the Superintendent)

Financial Status: A confidential financial statement will be submitted by the apparent successful low Bidder only if the Owner deems it necessary.

NOTE: TO BE SUBMITTED UPON REQUEST

IS NOT AN ACCEPTABLE ANSWER
Project: Eastern Chacon Creek Interceptor and Drainage Improvements

Proposed Progress Schedules:

Data on Equipment to be used on the Work:
(Include the number of machines, the type, capacity, age and conditions and location)

Subcontractors:
(Submit a list of proposed Subcontractors. List sources, types and manufacturers of proposed materials)

NOTE: TO BE SUBMITTED UPON REQUEST

IS NOT AN ACCEPTABLE ANSWER
BID SCHEDULE NOTES

1) Refer to Section 402 for Clearing and Grubbing description. Contractor to advise Engineer which trees require pruning to allow for equipment operation. (i.e. excavators, backhoe, etc.) Provide allowance on bid schedule for this item. (Bid item #2)

2) Refer to Section 128 for description on disposal of waste material and salvageable material. This is not a pay item but subsidiary to project.

3) OSHA compliant trench safety plan by licensed Professional Engineer required for excavation greater than 20’ depth.

4) See Note #7 on Sheet 02 “Basis of Estimate and Construction Notes” stating contractor is responsible for dewatering of work area should ground water be encountered. Additionally, refer to Sheet 19 “Site Improvement Details” for trench backfill detail specific to areas groundwater is encountered.

5) Right of Entry forms must be secured if using private property to access site or for temporary yard.

6) Subsurface bores do not indicate rock but should rock be encountered, measurement and payment to be discussed and agreed upon with City of Laredo.

7) Bid Alternate #1 pertains to sewer interceptor Sta: 27+12.40 to 56+22.75. See Sheets 11-13 “Proposed Wastewater Collection Plan and Profiles”.

8) Bid Alternates #2 & #3 pertain to entire sewer interceptor Sta: 0+00 to 56.22.75 including the jack and bore (Sta: 25+01.38 to 26.66.85). See Sheets 08-15 “Proposed Wastewater Collection Plan and Profiles”.

9) Bid Alternates #4, #5, and #6 pertain to sewer interceptor proposed along an existing steep embankment Sta: 0+67.82 to 8+00.75. See Sheet 08 “Proposed Wastewater Collection Plan and Profiles”.

10) For Item II-5, pattern and color specified are base bid. Contractor may provide alternative pattern and color samples for review and approval by City.

11) For Item I-7 & I-8 see Sheet 26 “Phase 1 – Box Culvert Details”
## CITY OF LAREDO EASTERN CHACON CREEK INTERCEPTOR
## AND DRAINAGE IMPROVEMENTS PROJECT
## BID SCHEDULE

### I. Sewer Interceptor (Fusible PVC DR21-200psi rated Option 1)

<table>
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<tr>
<th>Item #</th>
<th>Description</th>
<th>Estimated Quantity</th>
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<th>Unit Price</th>
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<td>$</td>
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<td>Clearing and Grubbing (as per section 402), complete in place at ___________</td>
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<td>$</td>
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<td>5</td>
<td>36&quot; Fusible PVC DR21, Jack and Dry Bore with 42&quot; steel casing, complete in</td>
<td>165</td>
<td>LF</td>
<td>$</td>
<td>$</td>
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<td></td>
<td>place at ___________________________</td>
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</tr>
<tr>
<td>6</td>
<td>36&quot; Fusible PVC DR21, Open Cut, complete in place at ____________________</td>
<td>2,575</td>
<td>LF</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>30&quot; Fusible PVC DR21, Open Cut, complete in place at ____________________</td>
<td>2,830</td>
<td>LF</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>30&quot; Fusible PVC DR21, Open Cut with 36&quot; steel casing, complete in place at</td>
<td>90</td>
<td>LF</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>12&quot; SDR 26 PVC, complete in place at _____________________________________</td>
<td>210</td>
<td>LF</td>
<td>$</td>
<td>$</td>
</tr>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Quantity</td>
<td>Unit</td>
<td>Rate</td>
<td>Total</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>10</td>
<td>Fiberglass Sewer Manhole (15'-25' Deep), complete in place at _______ _________ per unit.</td>
<td>22</td>
<td>EA</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>11</td>
<td>Fiberglass Sewer Drop Manhole (15'-25' Deep), complete in place at _______ _________ per unit.</td>
<td>4</td>
<td>EA</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>12</td>
<td>Tie Into Existing Manhole, complete in place at ____________________________ per unit.</td>
<td>2</td>
<td>EA</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>13</td>
<td>Remove / Dispose Existing Manholes, complete in place at __________________________ per unit.</td>
<td>4</td>
<td>EA</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>14</td>
<td>Cap and Abandon Existing Forcemain (cap at ends and ROW lines, disconnect pipeline from source, purge, and seal at ends), complete in place at __________________________ per unit.</td>
<td>1</td>
<td>LS</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>15</td>
<td>Cap and Abandon Existing 18&quot; Sewer Mains, complete in place at __________________________ per unit.</td>
<td>1</td>
<td>LS</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>16</td>
<td>Cap, Remove, and Dispose Existing 12&quot; Sewer Mains, complete in place at __________________________ per unit.</td>
<td>1</td>
<td>LS</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>17</td>
<td>Lateral Connections of Existing 8&quot; to 12&quot; Sewer to New Interceptor, complete in place at __________________________ per unit.</td>
<td>3</td>
<td>EA</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>18</td>
<td>Remove / Replace existing pavement and base, complete in place at __________ __________________________ per unit.</td>
<td>825</td>
<td>SY</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>19</td>
<td>Remove / Replace existing 7&quot; concrete complete in place at __________ __________________________ per unit.</td>
<td>6,710</td>
<td>SF</td>
<td>$</td>
<td>$</td>
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</table>
## II. Phase 1 Drainage Channel Improvements and Culvert Reconstruction

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
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<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove / Replace Pedestrian Rail, complete in place at _____________________</td>
<td>190</td>
<td>LF</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8&quot; Subgrade Preparation complete in place at _______________________________</td>
<td>455</td>
<td>SY</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10&quot; 3500 psi Concrete Pavement, complete in place at ________________________</td>
<td>3,550</td>
<td>SF</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Type A Curb &amp; Gutter, complete in place at _________________________________</td>
<td>400</td>
<td>LF</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Quantity</td>
<td>Unit</td>
<td>Cost</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------</td>
<td>----------</td>
<td>------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Stamped concrete rip-rap (running brick pattern &amp; red coral color requiring 1 bag / 1 CY, complete in place at _____________________________ _____________________________ per unit.</td>
<td>1,945</td>
<td>SY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Culvert Headwall, complete in place at _____________________________ _____________________________ per unit.</td>
<td>2</td>
<td>EA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>10’ x 8’ Box Culvert, complete in place at _____________________________ _____________________________ per unit.</td>
<td>180</td>
<td>LF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>5’ x 10’ Box Culvert complete in place at _____________________________ _____________________________ per unit.</td>
<td>360</td>
<td>LF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Channel Concrete Rip-Rap complete in place at _____________________________ _____________________________ per unit.</td>
<td>37,975</td>
<td>SF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Concrete Sidewalk, complete in place at _____________________________ _____________________________ per unit.</td>
<td>1,100</td>
<td>SF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Channel Cut, complete in place at _____________________________ _____________________________ per unit.</td>
<td>32,150</td>
<td>CY</td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>Channel Fill, complete in place at _____________________________ _____________________________ per unit.</td>
<td>120</td>
<td>CY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Erosion Control Blanket (NA Green Vmax3 SC250) w/ Hydromulch and vegetative watering, complete in place at _____________________________ _____________________________ per unit.</td>
<td>13,930</td>
<td>SY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Remove / Replace Existing 8’ Concrete Flume, complete in place at __________ _____________________________ per unit.</td>
<td>75</td>
<td>LF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>10’ Curb Opening with Slotted Inlet Top, complete in place at __________ _____________________________ per unit.</td>
<td>2</td>
<td>EA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Quantity</td>
<td>Unit</td>
<td>Amount</td>
<td>Amount</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
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<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>16</td>
<td>Remove / Dispose Existing Slotted Inlet, complete in place at ___________________________ per unit.</td>
<td>2</td>
<td>EA</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>17</td>
<td>Swinging Gate, complete in place at ________________________________________________________________________________________________ per unit.</td>
<td>1</td>
<td>EA</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>18</td>
<td>Seal Coat, complete in place at __________________________________________________________________________________________________ per unit.</td>
<td>245</td>
<td>SY</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>19</td>
<td>ADA Ramp Type 10, complete in place at _____________________________________________________________________________________________ per unit.</td>
<td>2</td>
<td>EA</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>20</td>
<td>Contingency allowance, complete in place at ________________________________________________________________________________________ per unit.</td>
<td>1</td>
<td>LS</td>
<td>$ 50,000</td>
<td>$ 50,000</td>
</tr>
</tbody>
</table>

Total Section 2 $  

Written in words

Total Section 1 $ ________________________

Total Section 2 $ ________________________

Total Base Bid $ ________________________

Written in Words

______________________________________________________

______________________________________________________

______________________________________________________

______________________________________________________
### III. Sewer Interceptor – Alternate #1

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
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<tbody>
<tr>
<td>DEDUCT</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>30&quot; Fusible PVC DR21, Open Cut, complete in place at ______________________</td>
<td>2,830</td>
<td>LF</td>
<td>$</td>
<td>&lt;$</td>
</tr>
<tr>
<td></td>
<td>complete in place at ______________  _________________________________  __________________________ per unit.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>30&quot; Fusible PVC DR21, Open Cut with 36&quot; steel casing, complete in place at</td>
<td>90</td>
<td>LF</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>______________  _________________________________  _________________________________  __________________________ per unit.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>36&quot; Fusible PVC DR21, Open Cut, complete in place at ______________________</td>
<td>2,830</td>
<td>LF</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>complete in place at ______________  _________________________________  __________________________ per unit.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6A</td>
<td>36&quot; Fusible PVC DR21, Open Cut with 42&quot; steel casing, complete in place at</td>
<td>90</td>
<td>LF</td>
<td>$</td>
<td>$</td>
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<tr>
<td></td>
<td>______________  _________________________________  _________________________________  __________________________ per unit.</td>
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<td><strong>Total Alternate #1</strong> $</td>
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</table>

Written in words ____________________________________________

________________________________________________________________

### IV. Sewer Interceptor – Alternate #2

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<th>Item #</th>
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<th>Unit Price</th>
<th>Extended</th>
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</thead>
<tbody>
<tr>
<td>DEDUCT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>36&quot; Fusible PVC DR21, Jack and Dry Bore with 42&quot; steel casing, complete in place at __________________________ per unit.</td>
<td>165</td>
<td>LF</td>
<td>$</td>
<td>&lt;$</td>
</tr>
<tr>
<td>6</td>
<td>36&quot; Fusible PVC DR21, Open Cut, complete in place at ______________________</td>
<td>2,575</td>
<td>LF</td>
<td>$</td>
<td>&lt;$</td>
</tr>
<tr>
<td></td>
<td>complete in place at ______________  _________________________________  __________________________ per unit.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>30&quot; Fusible PVC DR21, Open Cut, complete in place at ______________________</td>
<td>2,830</td>
<td>LF</td>
<td>$</td>
<td>&lt;$</td>
</tr>
<tr>
<td></td>
<td>complete in place at ______________  _________________________________  __________________________ per unit.</td>
<td></td>
<td></td>
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</tbody>
</table>
### 8. 30" Fusible PVC DR21, Open Cut with 36" steel casing, complete in place at ______________________ per unit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>30&quot; Fusible PVC DR21, Open Cut with 36&quot; steel casing, complete in place at</td>
<td>90 LF</td>
<td>$</td>
<td>$</td>
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</tr>
</tbody>
</table>

ADD

### 5A. 36" CCF RPM Pipe, Jack and Dry Bore with 48" steel casing, complete in place at ______________________ per unit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>5A</td>
<td>36&quot; CCF RPM Pipe, Jack and Dry Bore with 48&quot; steel casing, complete in place at</td>
<td>165 LF</td>
<td>$</td>
<td>$</td>
<td></td>
</tr>
</tbody>
</table>

### 6B. 36" CCF RPM Pipe, Open Cut, complete in place at ______________________ per unit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>6B</td>
<td>36&quot; CCF RPM Pipe, Open Cut, complete in place at ______________________</td>
<td>2,575 LF</td>
<td>$</td>
<td>$</td>
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</table>

### 7A. 30" CCF RPM Pipe, Open Cut, complete in place at ______________________ per unit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>7A</td>
<td>30&quot; CCF RPM Pipe, Open Cut, complete in place at ______________________</td>
<td>2,830 LF</td>
<td>$</td>
<td>$</td>
<td></td>
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</tbody>
</table>

### 8A. 30" CCF RPM, Open Cut with 42" steel casing, complete in place at ______________________ per unit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>8A</td>
<td>30&quot; CCF RPM, Open Cut with 42&quot; steel casing, complete in place at __________</td>
<td>90 LF</td>
<td>$</td>
<td>$</td>
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</tbody>
</table>

**Total Alternate #2** $ 

Written in words

**V. Sewer Interceptor – Alternate #3**

<table>
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<tr>
<th>Item #</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEDUCT</td>
<td>36&quot; Fusible PVC DR21, Jack and Dry Bore with 42&quot; steel casing, complete in place at</td>
<td>165 LF</td>
<td>$</td>
<td>&lt;$</td>
<td>&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>36&quot; Fusible PVC DR21, Open Cut, complete in place at ______________________</td>
<td>2,575 LF</td>
<td>$</td>
<td>&lt;$</td>
<td>&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>30&quot; Fusible PVC DR21, Open Cut, complete in place at ______________________</td>
<td>2,830 LF</td>
<td>$</td>
<td>&lt;$</td>
<td>&gt;</td>
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</table>
### VI. SewerInterceptor – Alternate #3

<table>
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<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>30” Fusible PVC DR21, Open Cut with 36” steel casing, complete in place at</td>
<td>90</td>
<td>LF</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>________________ per unit.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ADD**

| 5A | 36” CCF RPM Pipe, Jack and Dry Bore with 48” steel casing, complete in place at | 165 | LF | $ | $ |
|    | ________________ per unit.                                                    |    |    |   |    |

| 5B | 36” CCF RPM Pipe, Open Cut with 48” steel casing, complete in place at          | 90 | LF | $ | $ |
|    | ________________ per unit.                                                    |    |    |   |    |

| 6B | 36” CCF RPM Pipe, Open Cut, complete in place at ________________               | 5,405 | LF | $ | $ |
|    | ________________ per unit.                                                    |      |    |   |    |

**Total Alternate #3 $**

Written in words  


### VI. SewerInterceptor – Alternate #4

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEDUCT</td>
<td>36” Fusible PVC DR21, Open Cut, complete in place at ________________</td>
<td>730</td>
<td>LF</td>
<td>$</td>
<td>&lt;$</td>
</tr>
<tr>
<td></td>
<td>________________ per unit.</td>
<td></td>
<td></td>
<td></td>
<td>&gt;</td>
</tr>
</tbody>
</table>

**ADD**

| 6C | 36” Fusible PVC DR21, Horizontal Directional Drilling, complete in place at    | 730 | LF | $ | $ |
|    | ________________ per unit.                                                    |    |    |   |    |

**Total Alternate #4 $**

Written in words  


### VII. Sewer Interceptor – Alternate #5

<table>
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<tr>
<th>Item #</th>
<th>Description</th>
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<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>DEDUCT 36&quot; Fusible PVC DR21, Open Cut, complete in place at ______________</td>
<td>730</td>
<td>LF</td>
<td>&lt;$</td>
<td>&gt;</td>
</tr>
<tr>
<td>5</td>
<td>ADD 36&quot; Fusible PVC DR21, Jack and Dry Bore with 42&quot; steel casing, complete in place at ______________</td>
<td>730</td>
<td>LF</td>
<td>$</td>
<td></td>
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</tbody>
</table>

**Total Alternate #5 $**

Written in words ____________________________________________

### VIII. Sewer Interceptor – Alternate #6

<table>
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<tr>
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<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>DEDUCT 36&quot; Fusible PVC DR21, Open Cut, complete in place at ______________</td>
<td>730</td>
<td>LF</td>
<td>&lt;$</td>
<td>&gt;</td>
</tr>
<tr>
<td>6D</td>
<td>ADD 36&quot; Fusible PVC DR21, 48&quot; diameter hand tunneling with liner plate, complete in place at ______________</td>
<td>730</td>
<td>LF</td>
<td>$</td>
<td></td>
</tr>
</tbody>
</table>

**Total Alternate #6 $**

Written in words ____________________________________________
This undersigned bidder certifies that he has currently checked the bid prices contained herein and is entirely satisfied that they are correct and final.

BIDDER:  __________________________________________________________
BY:  __________________________________________________________
TITLE:  __________________________________________________________
ADDRESS:  _______________________________________________________
CITY/STATE/ZIP:  _________________________________________________
TELEPHONE:  ______________________________________________________

NOTE #1 - PAY ITEMS: All items shall consist of furnishing all materials, labor, equipment, superintendence, and all necessary work to undertake and complete the pay item without any further compensation, adjustment, or consideration.

NOTE #2 – GENERAL NOTE: All bid items will be paid for when complete, in place, tested, and accepted by the City of Laredo.
BID BOND

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned

____________________________________________________________________

____________________________________________________________________

as Principal, and ____________________________ as Surety, are hereby held and

firmly bound unto ____________________________ as Owner in the penal sum of

______________________________ for payment of which, well and truly to

be made, we hereby jointly and severally bid ourselves, our heirs, executors, administrations, successors and assigns.

Signed, this ______ day of ________________, 20__.

The condition of the above obligation is such that whereas the Principal has submitted

to ____________________________ a certain Bid, attached hereto and hereby made a part hereof to enter into a Contract in writing for the Eastern Chacon Creek Interceptor and Drainage Improvements Project.

NOW, THEREFORE,

(a) If said Bid shall be rejected, or in the alternate,
(b) If said Bid shall be accepted and the Principal shall execute and deliver a Contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, 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 he obligations of said Surety, and its bonds shall be in no way impaired or affected by any 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
herein.

______________ (L.S.)
Principal

______________________
Surety

By: __________________________
SECTION A-6
CHECKLIST FOR BIDDERS

Project: Eastern Chacon Creek Interceptor and Drainage Improvements Project

All information required by the terms of the Bid Documents must be furnished. **MISTAKES OR OMISSIONS CAN BE COSTLY AND CAN RESULT IN THE REJECTION OF YOUR BID.** Important items for you to check are included in but not limited to, those listed below. This checklist is furnished only to assist you in submitting a proper bid. Check as you read.

**DO NOT INCLUDE THIS CHECKLIST WITH YOUR BID.**

[ ] Have you acknowledged receipt of all addenda to the plans and specifications?

[ ] Is your bid properly signed? (Refer to Bid Documents)

[ ] If a bid guarantee is required, is it included in your bid? (A late bid guarantee is treated the same as a late bid)

[ ] Is your bid guarantee in the proper amount? (Usually 5% of total bid price)

[ ] Your bid guarantee must be in the form of a Bidder’s Bond, a Certified Check or Cashier’s Check.

[ ] If your bid guarantee is in the form of a Bidder’s Bond, is the bond properly signed by both the bidder and surety and are all required seals affixed?

[ ] Is the surety company qualified and licensed by the State of Texas as required by the provisions of the bid documents?

[ ] Is the name in which you submitted the bid the same on your bid proposal as on the Bidder’s Bond?

[ ] If required have you entered a unit price for each bid item?

[ ] If required have you entered the unit price or lump sum price in both words and figures? (Unit Price or Lump Sum price in words govern)

[ ] Are decimals in unit prices in the proper places? Are your figures legible?

[ ] Are the extensions of your unit prices, and your total bid price correct?

[ ] Is proposal being submitted complete together with Information from Bidders?

[ ] Are all erasures or corrections initialized by the person signing the bid or by an authorized representative of the person signing the bid.
[ ] Do not restrict your bid by altering any provisions of the Bid Document or by attaching any documents to the Proposal that takes exception to the Bid Documents.

[ ] Have you included all pages of the Proposal with your bid? Are all blanks in the Proposal properly completed (equipment brands, alternate materials, etc.)?

[ ] Is the envelope containing your bid properly identified that it is a sealed bid and does it contain the correct project name and bid opening date?

[ ] Will your bid arrive on time? Late bids will not be considered. Generally, bids must be received by the City Purchasing Agent, City Hall on the date and time specified in the Notice to Bidders. (Other times or dates will be clearly specified in the Notice).

[ ] On Federally Funded Projects, contractor must submit certified weekly payrolls with a copy to City Engineering Files.
STATE OF TEXAS  
COUNTY OF WEBB

Agenda Item: _______________

THIS AGREEMENT, made this _____ day of _______________, 2020 by and between the City of Laredo, Texas, acting by and through its duly authorized City Manager hereinafter termed the Owner, and ________________________ of the City of __________, County of __________, State of __________, his/their executors, administrators, heirs, successors, or assigns, hereinafter termed the Contractor.

WHEREAS, the Owner desired to enter into Contract for the Eastern Chacon Creek Interceptor and Drainage Improvements Project in accordance with the provisions of the Invitation for Bids, the Specifications and Plans titled as above, and published by City of Laredo, Texas, 1110 Houston Street, Laredo, Texas 78040 all of which are a part thereof; and,

WHEREAS, the Contractor has been engaged in and now does such work and represents that he is fully equipped, competent and capable to perform the above desired and outlined work, and is ready and willing to perform the work in accordance with the provisions of the Invitation for Bids, the Specifications and Plans, titled, Eastern Chacon Creek Interceptor and Drainage Improvements Project.

WITNESS:

THAT for and in consideration of the payments and agreements hereinafter mentioned to be made and performed by the Owner, the Contractor hereby agrees at the unit price set forth in his Bid, made a part thereof totaling the sum of ____________________________ ($_____________) based on the Engineer's estimate of quantities, payable in the manner set out in Division C, Section 9, General Provisions of the contractual Documents to commence and complete the construction of the Eastern Chacon Creek and Drainage Improvements Project in accordance with Instructions to Bidders, Special Provisions, General Provisions, Technical Provisions, and all other requirements of the contractual Documents, and in accordance with the Specifications and Plans (including all maps, plats, blueprints, and other drawings and printed or written explanatory matter thereof) prepared by the Owner's Engineer, a part thereof and collectively, together with this Agreement constitute the entire Contract; and the Contractor agrees to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, bonds, insurance and other accessories and services, and whatever else may be necessary to complete the said construction in accordance with said specifications, plans, and other contractual documents including such proposal.

Further, on federally funded projects, contractor must comply with the Federal Labor Standards Provision, Davis Bacon Act, Equal Opportunity Clause, Wage Determination and HUD and Urban Development Federal Requirements especially as it regards payrolls and basic records herewith attached.
Said Contractor further agrees to begin the work on or before the tenth day following the date set by the Owner in the written notice to proceed and to complete the work within 330 working days.

The Contractor further agrees to pay the sum of $__________ for each consecutive day there-in-after as herein provided in Division B, Section 1.

And the Owner in consideration of the full and true performance of the said work by said Contractor hereby agrees to and binds itself to pay the said Contractor the unit price set forth in the attached Bid, and in the manner provided in the Specifications.

IN WITNESS WHEREOF, the OWNER AND THE CONTRACTOR have hereunto set their hand this _____ day of _______________, 2020.

WITNESS:

Contractor/Firm

Name

Name

Signature

Signature

Address

Title

City/State/Zip

Address

Phone number

City/State/Zip

Phone number

APPROVED AS TO FORM: ATTESTED

Kristina Laurel Hale, Esq.
City Attorney

Jose A. Valdez, Jr.
City Secretary

CITY OF LAREDO, TEXAS

Robert A. Eads
City Manager
SECTION A-8
PERFORMANCE BOND

(As required by Chapter 2253, Texas Government Code)

THE STATE OF { }
COUNTY OF { }

KNOW ALL MEN BY THESE PRESENTS: That we (1) ________________________________________________________ a (2) __________________________ of ____________________ hereafter called Principal and (3) _____________________________________________ of ____________________, State of _______________________, hereinafter called the Surety, are held and firmly bound unto (4) _____________________________________________ hereinafter called Owner, in the penal sum of ______________________________ ($_______________) Dollars in lawful money of the United States, to be paid in (5) WEBB COUNTY, TEXAS for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain Contract with (6) ______________________________ the Owner, dated the _____ day of _________________, 20______ a copy of which is hereto attached and made a part hereof for the Construction of:

Project:  Eastern Chacon Creek Interceptor and Drainage Improvements

(hereinafter called the “Work”)

Date of Bond must not be prior to Date of Contract.

These notes refer to the numbers in body of Contract above:

(1) Correct name of Contractor.
(2) A Corporation, or Partnership or an Individual, as case may be.
(3) Correct name of Surety.
(4) Correct name of Owner.
(5) County and State.
(6) Owner.
NOW THEREFORE, if the Principals shall well, truly and faithfully perform the work in accordance with the Plans, Specifications and Contract Documents during the original term thereof, and any extensions thereof which may be granted by the Owner with or without notice to the Surety, 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 if any legal action be filed upon this Bond, venue shall lie WEBB County, State of Texas, and that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed hereunder or the Specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

IN WITNESS WHEREOF, this Instrument is executed in six counterparts, each one of which shall be deemed an original, this the _____day of ___________________, ______.

ATTEST:

______________________________  ______________________________
(Principal) Secretary         PRINCIPAL

______________________________
(SEAL)

______________________________
By

______________________________
Address

______________________________
Witness as to Principal

______________________________
City/State/Zip Code

______________________________
Address

______________________________
Phone number

______________________________
City/State/Zip Code
ATTEST:

Secretary

(SIGNATURE)

SURETY

(SEAL)

By

Address

(Surety) Secretary

City/State/Zip Code

(SEAL)

Phone number

Witness as to Surety

Address

City/State/Zip Code
PAYMENT BOND

(As required by Chapter 2253, Texas Government Code)

THE STATE OF { } 
COUNTY OF { }

KNOW ALL MEN BY THESE PRESENTS: That we (1) ____________________________
__________________________________________ a (2) ____________________________ of ________________________ hereafter called Principal and (3) ____________________________ of ________________________, State of _______________________, hereinafter called Surety, are held and firmly bound unto (4) ____________________________ of _________________________ hereinafter called Owner, and unto all Persons, Firms, and Corporations who may furnish materials for, or perform labor upon the building or improvements hereinafter referred to in the penal sum of ____________________________ ($ _______________) Dollars in lawful money of the United States, to be paid in (5) WEBB COUNTY, TEXAS for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain Contract with (6) ____________________________ the Owner, dated the _____ day of ______________, _____ a copy of which is hereto attached and made a part hereof for the construction of:

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

(hereinafter called the “Work”)

Date of Bond must not be prior to Date of Contract.

These footnotes refer to the numbers in body of contract above:

(1) Correct name of Contractor.
(2) A Corporation, or Partnership or an Individual, as case may be.
(3) Correct name of Surety.
(4) Correct name of Owner.
(5) County and State.
(6) Owner.
NOW THEREFORE, if the Principals shall well, truly and faithfully perform the work in accordance with the Plans, Specifications and Contract Documents during the original term thereof, and any extensions thereof which may be granted by the Owner with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such Contract, then this obligation shall be null and void; otherwise to remain in full force and effect.

This Bond is made and entered into solely for the protection of all claimants supplying labor and material in the prosecution of the work provided for in said Contract, and all such claimants shall have a direct right of action under the Bond as provided in Section 2253.073, Texas Government Code.

PROVIDED FURTHER, that if any legal action be filed upon this Bond, venue shall lie WEBB County, State of Texas, and that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or 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.

IN WITNESS WHEREOF, this instrument is executed in six counterparts, each one of which shall be deemed an original, this the _______ day of __________________, ______.

ATTEST:


(Principal) Secretary

PRINCIPAL

(SEAL)

By

Address

Witness as to Principal

City/State/Zip Code

Address

Phone number

City/State/Zip Code

ATTEST:
(Surety) Secretary

By

______________________________
Address

______________________________
City/State/Zip Code

______________________________
Phone number

NOTE: If Contractor is Partnership, all Partners should execute Bond.
PERFORMANCE – PAYMENT BOND FORM

M-24, 25, Attach. Sa

______________________________  ______________________________
(Seal)  Individual Principal

______________________________  ______________________________
Address  Business – Address

______________________________  ______________________________
City/State/Zip Code  City/State/Zip Code

______________________________  ______________________________
Phone number  Phone number

ATTEST:

______________________________  ______________________________
Business Address Name  Corporate Principal

______________________________  ______________________________
Address  Phone number

______________________________  ______________________________
City/State/Zip Code

(Affix corporate seal)

ATTEST:

______________________________  ______________________________
By  Address

______________________________  ______________________________
City/State/Zip Code

Corporation

Surety

______________________________  ______________________________
Business Address

______________________________  ______________________________
City/State/Zip Code

Phone number
CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _________________________, certify that I am the _________________________, Secretary of the Corporation named as Principal in the within Bond; that __________ _________________________ who signed the said Bond on behalf of the Principal was then _________________________, of said Corporation; that I know his signature thereof is genuine; and that said Bond was duly signed, sealed, an attested for and in behalf of said Corporation by authority of its governing body.

______________________________
Title

______________________________
(Affix Corporate Seal)

______________________________
Date

______________________________
Phone number

The rate of premium on this Bond is _____________ per thousand. Total of premium charge $ ______________________________

NOTE:
The above must be filled in by Corporate Surety. Power-of-Attorney of person signed for Surety company must be attached.
SECTION A-9
CONTRACTOR’S AND SUBCONTRACTOR’S INSURANCE

MINIMUM INSURANCE PROVISIONS AND LIMITS FOR CONSTRUCTION, REPAIR, INSTALLATION, AND MAINTENANCE CONTRACTS

Contractor shall provide and continuously maintain the minimum insurance coverages set forth below during the term of its agreement with the City of Laredo; and Contractor shall require its subcontractors to purchase the same types and amounts of insurance, at a minimum, as set forth below with respect to statutory workers’ compensation and liability insurance.

1. Standard ISO commercial general liability insurance at minimum combined single limits of $1,000,000 per-occurrence and $2,000,000 general aggregate for bodily injury and property damage, which coverage shall include: products/completed operations ($2,000,000 products/completed operations aggregate); XCU (explosion, collapse, underground) hazards; and contractual liability. Without limitation, the commercial general liability coverage must cover all operations required in the contract, as well as contractual liability for the indemnity obligations assumed by the Contractor in the contract. Coverage must be written on an occurrence form.

2. Workers’ compensation insurance at statutory limits, including employers liability coverage at minimum limits of $1,000,000 each-occurrence, each accident/$1,000,000 by disease each-occurrence/$1,000,000 by disease aggregate.

3. Commercial automobile liability insurance at a minimum combined single limit of $1,000,000 per-occurrence for bodily injury and property damage, including non-owned and hired car coverage and owned vehicles if any are owned.

4. Umbrella liability or following-form excess liability at minimum limits of $_________ each-occurrence/$_________ aggregate where applicable in any underlying coverage. Coverage must be at least as broad as the underlying commercial general liability, auto liability, and employer’s liability.

5. Pollution Legal Liability
   a) Project costs of $1,000,000 to $10,000,000 and over $10,000,000
   b) Contractors Pollution Liability:
      ▪ $_________ per-claim/ $_________ aggregate (applies to operations that include the use, application, or consumption of pollutants)
      ▪ Retro date shall not be later than the inception date of contract
      ▪ Contractual liability coverage to be included in contractor’s pollution liability coverage
   c) Environmental Liability (Asbestos and removal of other hazardous materials and/or repair, maintenance, installation, construction operations that are high hazard)
      ▪ $5,000,000 per-claim/$10,000,000 aggregate minimum
      ▪ Retro date shall not be later than the inception date of contract
      ▪ Contractual liability coverage to be included in contractor’s pollution liability coverage
      ▪ At a minimum, coverage must apply to on-premises and transit operations

6. Professional liability for design build contractors, engineers, and architects at minimum limits of $_________ per-claim/$_________ aggregate. The retro date shall not be later than the inception date of the contract.
7. Builders Risk
   a) “All-risk” including collapse, flood, and earthquake, to be written on completed value form.
   b) Coverage to include limits of at least $250,000 for off-premises storage and transit of construction materials. Soft costs to be included at a minimum limit of $500,000.
   c) Thirty (30)-day occupancy clause to apply.
   d) No testing exclusion should apply.

City of Laredo reserves the right to purchase the builder’s risk coverage at its sole discretion.

With reference to the foregoing insurance requirements, Contractor shall specifically endorse applicable insurance policies as follows:

1. City of Laredo shall be named as an additional insured on a primary and non-contributory basis, regardless of the application of other insurance, with respect to all liability coverages, except for the professional liability and workers’ compensation.

2. All liability policies shall contain no cross-liability exclusions or insured versus insured restrictions.

3. A waiver of subrogation in favor of City of Laredo shall be contained in all policies.

4. All insurance policies shall be endorsed to require the insurer to immediately notify City of Laredo of any material change in the insurance coverage.

5. All insurance policies shall be endorsed to the effect that City of Laredo will receive at least thirty (30) days’ notice prior to cancellation or non-renewal of the insurance.

6. The additional insured coverage in the CGL policy in favor of City of Laredo must apply to the ongoing operations of Contractor for contract costs or up to $1,000,000 and expanded to include products/completed operation for contract costs in excess of $1,000,000.

7. Required limits may be satisfied by any combination of primary and umbrella/excess liability insurances.

8. Contractor may maintain reasonable and customary deductibles, subject to approval by City of Laredo.

9. Insurance must be purchased from insurers that are financially acceptable to City of Laredo with a minimum A.M. Best financial rating of A-:VII.

10. Coverage for commercial general liability, professional liability, and pollution legal liability must be maintained for at least one (1) to two (2) years after the project is completed.

11. For projects in excess of $10,000,000 in cost, a per-project aggregate limit must be included in the commercial general liability.

All insurance must be written on standard ISO or equivalent forms. Certificates of insurance shall be prepared and executed by the insurance company, or its authorized agent, shall be furnished to City of Laredo within five (5) business days of being notified of the award of the contract, and shall contain provisions representing and warranting the following:
Shall set forth all endorsements and insurance coverages according to requirements and instructions contained herein.

Shall specifically set forth the notice-of-cancellation or termination provisions to City of Laredo.

Copies of all required endorsements must be attached to the certificate of insurance. The certificates of insurance must be updated and resubmitted to the City of Laredo to show renewal coverages, as applicable, at least thirty (30) days prior to expiration of any one or more policies.

Upon request, Contractor shall furnish City of Laredo with certified copies of all insurance policies.

**BONDS**

(APPLIES TO MAJOR CONSTRUCTION CONTRACTS)

Bonds are required for public works contracts under the following circumstance:

1. Payment and Performance Bond and Labor and Material Payment Bond, each in a personal sum equal to 100% of the contract cost.

2. A Bid Bond is also required in the amount of the bid submitted to the City of Laredo.

All of the above requirements are minimum, as referenced, and may be modified at the sole discretion of the City of Laredo.
### City of Laredo Recommended Insurance Provisions for Construction, Repair, Installation, and Maintenance Contractors

<table>
<thead>
<tr>
<th>CONTRACT COST</th>
<th>TYPE OF INSURANCE</th>
<th>LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $1,000,000</td>
<td>Umbrella Liability</td>
<td>Not Required</td>
</tr>
<tr>
<td></td>
<td>Professional Liability</td>
<td>$1,000,000 Per-Claim / $2,000,000 Aggregate</td>
</tr>
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<td>$1,000,000 to $5,000,000</td>
<td>Umbrella Liability</td>
<td>$4,000,000 Per-Occurrence</td>
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<td>Professional Liability</td>
<td>$1,500,000 Per-Claim / $3,000,000 Aggregate</td>
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<tr>
<td>$5,000,000 to $10,000,000</td>
<td>Umbrella Liability</td>
<td>$9,000,000 to $10,000,000 Per-Occurrence</td>
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<td></td>
<td>Professional Liability</td>
<td>$1,500,000 Per-Claim / $3,000,000 Aggregate to</td>
</tr>
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<td></td>
<td></td>
<td>$2,000,000 Per Claim / $4,000,000 Aggregate</td>
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<tr>
<td>Over $10,000,000</td>
<td>Umbrella Liability</td>
<td>$10,000,000 or Higher</td>
</tr>
<tr>
<td></td>
<td>Professional Liability</td>
<td>$2,000,000 Per-Claim / $4,000,000 Aggregate or Higher</td>
</tr>
<tr>
<td>$1,000,000 to $10,000,000</td>
<td>Contractor’s Pollution Liability</td>
<td>$1,000,000 Per-Claim / $2,000,000 Aggregate</td>
</tr>
<tr>
<td>Over $10,000,000</td>
<td>Contractor’s Pollution Liability</td>
<td>$2,000,000 Per-Claim / $4,000,000 Aggregate</td>
</tr>
</tbody>
</table>

### TAIL COVERAGE

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<tr>
<th>CONTRACT COST</th>
<th>TYPE OF INSURANCE</th>
<th>LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,000,000 to $5,000,000</td>
<td>CGL, PL, and PLL</td>
<td>One (1) Year</td>
</tr>
<tr>
<td>Over $5,000,000</td>
<td>CGL, PL and PLL</td>
<td>Two (2) Years</td>
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<tr>
<td>Any Contract Size</td>
<td>Hazardous Environmental Work</td>
<td>Two (2) Years</td>
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</tbody>
</table>
SECTION A-10
NOTICE OF AWARD

To: ____________________________

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

The City of Laredo has considered the bids submitted for the above described project in response to its advertisement for bids dated June 7, 2020, and June 14, 2020, and related information to Bidders.

You are hereby notified that your bid in the net amount of $____________________ has been favorable considered for the project by the City Council at its regular council meeting on ____________________, 2020. Pursuant to the information to Bidders you are asked to sign the proposed Contract (in five duplicate originals) and to return the same, along with the required Certificate of Insurance, and Payment Bond and Performance Bond within ten (10) days of your receipt of this Notice, for the approval and signature of the City Manager.

For the purpose of effective date of the required Certificate of Insurance, and the Performance Bond and the Payment Bond, the date of ____________________, 2020, may be considered the date of the contract, if the Documents are approved by the City Manager.

If you fail to submit the signed Contract Performance and Payment Bonds, and the Certificate of Insurance within ten (10) working days from your receipt of this Notice, your bid will be considered as withdrawn and your bid bond will be forfeited, unless an extension for submittals has been requested in writing and approved by the City.

The Construction Contract time of 330 working days is to be strictly adhered to per Division B Section 1 and contractor agrees to pay liquidated damages for late completion an amount of $________ for each consecutive day exceeding the contract time allotted.

You are asked to acknowledge receipt of this Notice by signing in the appropriate place below.

Dated this the _____ day of _______________ of 2020.

Receipt of this Notice is hereby acknowledged ____________________________

______________________________
Authorized Signature

______________________________
Robert A. Eads
City Manager

Title
Date: ____________________

To: ________________________________________

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

In accordance with the construction contract dated ____________________, you are hereby authorized to proceed on __________________________________________.

Contract time is 330 working days.

Completion date for the project is approximately ________________________

City of Laredo

______________________________
Robert A. Eads
City Manager

The above NOTICE TO PROCEED is hereby acknowledged by

______________________________________________________________________

on this _____ day of ______________, 2020.

______________________________
Authorized Signature

___________________________________
Name

___________________________________
Title
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SECTION A-12
CERTIFICATE OF OWNER’S ATTORNEY

Project:  Eastern Chacon Creek Interceptor and Drainage Improvements

Awarded by the City Council: ______________________________________________________

I, the undersigned, Kristina L. Hale, City Attorney the duly authorized and acting legal representative of THE CITY OF LAREDO, do hereby certify as follows:

I have examined the attached Contract(s) and Surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid Agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said Agreements on behalf of the respective parties named thereon; and that the foregoing Agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions, and provisions thereof.

________________________________
Kristina L. Hale
City Attorney

________________________________
Date
OVERVIEW

In 2015, the Texas Legislature adopted House Bill 1295, which added Section 2252.908 of the Government Code. The law states that a governmental entity or state agency may not enter into certain contracts with a business entity unless the business entity submits a disclosure of interested parties to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency. The law applies only to a contract of a governmental entity or state agency that either (1) requires an action or vote by the governing body of the entity or agency before the contract may be signed or (2) has a value of at least $1 million. The disclosure requirement applies to a contract entered into on or after January 1, 2016.

The Texas Ethics Commission was required to adopt rules necessary to implement that law, prescribe the disclosure of interested parties form, and post a copy of the form on the Commission’s website. (See attached Rules.) The Commission adopted the Certificate of Interested Parties form (Form 1295) on October 5, 2015. The Commission also adopted new rules (Chapter 46) on November 30, 2015, to implement the law.

Filing Process:

By January 1, 2016, the commission will make available on its website a new filing application that must be used to file Form 1295. A business entity must use the application to enter the required information on Form 1295 and print a copy of the completed form, which will include a certification of filing that will contain a unique certification number. An authorized agent of the business entity must sign the printed copy of the form and have the form notarized. The completed Form 1295 with the certification of filing must be filed with the governmental body or state agency with which the business entity is entering into the contract.

The governmental entity or state agency must notify the commission, using the commission’s filing application, of the receipt of the filed Form 1295 with the certification of filing not later than the 30th day after the date the contract binds all parties to the contract. The commission will post the completed Form 1295 to its website within seven business days after receiving notice from the governmental entity or state agency.

Information regarding how to use the filing application will be available on this site by January 1, 2016.

FREQUENTLY ASKED QUESTIONS FOR DISCLOSURE OF INTERESTED PARTIES (FORM 1295)

1. WHO IS REQUIRED TO FILE FORM 1295?
   In 2015, the Texas Legislature adopted House Bill 1295, which added section 2252.908 of the Government Code. The law states that a governmental entity or state agency may not enter into certain contracts with a business entity unless the business entity submits a disclosure of interested parties (Form 1295) to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency. The Texas Ethics Commission has adopted rules requiring the business entity to file Form 1295 electronically with the Commission.
2. **WHAT CONTRACTS DOES FORM 1295 APPLY TO?**
The law applies only to a contract of a governmental entity or state agency that either:

- (1) requires an action or vote by the governing body of the entity or agency before the contract may be signed; or
- (2) has a value of at least $1 million.

Gov't Code § 2252.908. The disclosure requirement applies to a contract entered into on or after January 1, 2016.

A contract does not require an action or vote by the governing body of a governmental entity or state agency if:

- (1) the governing body has legal authority to delegate to its staff the authority to execute the contract;
- (2) the governing body has delegated to its staff the authority to execute the contract; and
- (3) the governing body does not participate in the selection of the business entity with which the contract is entered into.

1 T.A.C. § 46.1(c).

3. **CAN I FILE FORM 1295 ON PAPER?**
No. A business entity must file Form 1295 electronically with the Texas Ethics Commission using the online filing application. See Question #4 for information about logging in to the online filing application.

4. **HOW DO I LOGIN TO THE FILING APPLICATION?**
If this is your first time logging in, you will need to create an account in order to register and receive a password. Once you have registered, you will receive an email containing a password setup link. Click on the link to set your password. After you have established an account, you will use your email address, password, and user type (either “Business Entity” or “Govermental Entity/State Agency”) to log in to the filing application. Watch our short videos on "Logging In The First Time" on the Form 1295 File Reports Electronically web page.

5. **IS THERE A MOBILE VERSION?**
The mobile version is not complete at this time, but will be available soon.

6. **HELP! I FORGOT MY PASSWORD.**
If you forgot your password, you can reset your password by clicking the “Forgot Password?” link on the filing application login screen. Once you enter your email address and filer type and successfully answer the security questions, you will receive an email containing a password reset link. If you cannot successfully answer your security questions, you will need to call the Texas Ethics Commission at (512)463-5800.

7. **CAN I HAVE MULTIPLE ACCOUNTS?**
You can have a separate account associated with each unique email address. However, once an account is established, there is no way to combine it with another account. You can only view those certificates created under your own unique email address. If you want to view all your certificates together in one account, we highly encourage you to setup a specific email address to register your account and use that email address each time you login to the filing application.
8. **HOW MUCH TIME DO I HAVE TO ACKNOWLEDGE A FORM 1295?**
   A state agency or other governmental entity must acknowledge the receipt of the filed Form 1295 not later than the 30th day after the date the contract binds all parties to the contract. Once a Form 1295 is acknowledged, it will be posted to the Texas Ethics Commission’s website within seven business days.

9. **DO I SEND A COPY OF THE NOTARIZED FORM 1295 TO THE TEXAS ETHICS COMMISSION?**
   No. Do not send a paper copy of the notarized Form 1295 to the Texas Ethics Commission. If you are with a state agency or other governmental entity, you will login to the filing application and acknowledge receipt of Form 1295 electronically. See Question #4 for more information about logging into the filing application.

10. **WHAT IF I ACCIDENTALLY ACKNOWLEDGE THE WRONG FORM 1295?**
    Before you acknowledge a Form 1295, you should double check that you are acknowledging the correct one. If you acknowledge a Form 1295 in error, you cannot undo the certification. Contact the Texas Ethics Commission at 512-463-5800 and ask to speak with Technical Support.

11. **THE FILING APPLICATION SAYS THIS FORM 1295 HAS ALREADY BEEN ACKNOWLEDGED. WHAT DO I DO NOW?**
    First, you should double check that you are entering the correct certification number. If you still receive an error, contact the Texas Ethics Commission at 512-463-5800 and ask to speak to technical support.

12. **I SUBMITTED A FORM 1295 AND REALIZED THERE IS AN ERROR. CAN I STILL EDIT IT?**
    No. Once a Form 1295 has been submitted by the business entity, it can no longer be edited. If you found an error, you will need to start a new certificate and re-enter all the required information.

13. **WHAT IF THE CONTRACT ASSOCIATED WITH THE FORM 1295 IS NEVER FULFILLED?**
    All certificates that are filed with the Texas Ethics Commission and acknowledged by a governmental entity will be posted to the Commission’s website regardless of the eventual outcome of the contract associated with the certificate.

14. **WHY AM I NOT RECEIVING EMAIL MESSAGES FROM THE TEXAS ETHICS COMMISSION?**
    All password reset links will be sent to the email address you provided when you registered. This should be an email address that is current and that you check often. You can verify and update your email address right after you log in. Also, be sure to “whitelist” or mark as “safe” emails that come from “do- not-reply@ethics.state.tx.us” and be sure to check your Spam or Junk folder for any missing messages.
SECTION B-1
CONTRACT TIME & LIQUIDATED DAMAGES

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

The Contract Performance for this project shall be **330 working days** defined in the Specifications under General Provisions, Division C, Section 1.

The time set forth in the proposal for the completion of the work is an essential element of the Contract. For each day under the conditions described in the preceding Paragraph that any work shall remain uncompleted after the expiration of the days specified in the Contract, together with any additional days allowed, the amount per day given in the following schedule will be deducted from the money due or to become due to the Contractor, as liquidated damages for late completion of the specified work.

<table>
<thead>
<tr>
<th>From More Than</th>
<th>To and Including</th>
<th>Amount of Penalty Per Day over Contract Time</th>
</tr>
</thead>
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<tr>
<td>$0</td>
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<td>$200</td>
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<td>15,000,000</td>
<td>20,000,000</td>
<td>1,700</td>
</tr>
<tr>
<td>20,000,000</td>
<td>Over 20,000,000</td>
<td>2,500</td>
</tr>
</tbody>
</table>
SECTION B-2
EQUAL OPPORTUNITY CLAUSE

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

1) The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or natural origin. The Contractor will take Affirmative action to insure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color or national origin. Such action shall include, but not limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection of training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause.

2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or natural origin.

3) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or worker’s representative of the Contractor’s commitments under Section 202 of Executive Order No. 11246, as amended (3CFR 169 (1974) and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4) The Contractor will comply with all provisions of Executive Order No. 11246, as amended, and of the rules, regulations and relevant orders of the Secretary of Labor.

5) The Contractor will furnish all information and reports required by Executive Order No. 11246, as amended, and by the rules, regulations and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders.

6) In the event of the Contractor’s noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246, as amended, and such other sanctions may be imposed and remedies invoke as provided in Executive Order No. 11246, as amended or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.
7) The Contractor will include the Provisions of Paragraph 1 through 7 in every Subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246, as amended, so that such provisions will be binding upon each Subcontractor or Vendor. The Contractor will take such action with respect to any Subcontract or Purchase Order, as the contracting may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or Vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interest of the United States.
General Decision Number: TX20190003 01/04/2019

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

<table>
<thead>
<tr>
<th>Classification</th>
<th>Rates</th>
<th>Fringes</th>
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<tbody>
<tr>
<td>CEMENT MASON/CONCRETE FINISHER (Paving &amp; Structures)</td>
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<td></td>
</tr>
<tr>
<td>FORM BUILDER/FORM SETTER (Structures)</td>
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<td></td>
</tr>
<tr>
<td>FORM SETTER (Paving &amp; Curb)</td>
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</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Asphalt Raker</td>
<td>$ 10.61</td>
<td></td>
</tr>
<tr>
<td>Flagger</td>
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<td></td>
</tr>
<tr>
<td>Laborer, Common</td>
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<td>Laborer, Utility</td>
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<td>Pipelayer</td>
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</tr>
<tr>
<td>Work Zone Barricade Servicer</td>
<td>$ 12.88</td>
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</tr>
</tbody>
</table>
POWER EQUIPMENT OPERATOR:

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

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

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.

==============================================

END OF GENERAL DECISION
SECTION B-4
INSPECTION BY CITY

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

The work covered by these Specifications shall at all times be subject to inspection by the City of Laredo (City) authorized inspectors.

The Contractor shall furnish the City Inspector with every reasonable facility for ascertaining whether the work performed is substandard and deviates from the requirements of the plans and specifications. The City Authorized Inspector shall have the authority to halt the construction of any portion of the work not meeting requirements until such time as said work has been corrected to the satisfaction of the Inspector and the Engineer.

City’s normal working hours are Monday through Friday, not including Saturdays, Sundays, or legal holidays observed by the City from 8:00 A.M. to 5:00 P.M. The contractor shall notify the City at least twenty-four (24) hours in advance for any work that is to be scheduled beyond the limits of the City’s working hours, and the Contractor shall not begin any such work scheduled unless proper inspection and/or testing has been pre-arranged with the City, with the cost for such inspection beyond the City’s working hours borne by the Contractor.
SECTION B-5
PROJECT SIGN

The general contractor shall erect two (2) signs, unless otherwise noted by the City Engineer, at the project site identifying the project and indicating that the City of Laredo is participating in the development of the project.

The project sign shall be substantially in accordance with the drawing printed on the following page and shall be made from ¾ inch plywood, placed in a prominent location and maintained in good condition until completion of project.

THE CONTRACTOR SHALL REMOVE AND DISPOSE OF THE PROJECT CONSTRUCTION SIGNS WHEN THE WORK HAS BEEN COMPLETED.
SECTION B-5
PROJECT SIGN

10"

3"

CITY OF LAREDO, TEXAS

Eastern Chacon Creek Interceptor
and Drainage Improvements

Honorable Pete Saenz, Esq.
Mayor

Alberto Torres, Jr.
Mayor Pro-Tem

Rudy Gonzalez, Jr.
Councilmember

Vidal Rodriguez
Councilmember

Mercurio Martinez, III
Councilmember

Riazul Mia, P.E., CFM
Utilities Director

Robert A. Eads
City Manager
(956) 791-7300

Nelly Vielma, Esq.
Councilmember

Dr. Marte A. Martinez
Councilmember

George J. Altgelt, Esq.
Councilmember

Roberto Balli, Esq.
Councilmember

John Porter, REM, CFM, CPM
Environmental Director
(956) 794-1650

CRANE ENGINEERING CORP.
1310 Junction Dr., Ste. B
Laredo, Texas 78041
Phone: (956) 712-1996
Fax: (956) 712-2378

Contractor’s Name
Address
City, State, Zip
Phone Number
Fax Number

NOTE: Signs are to be installed in ground on 4’ x 4’ posts
Blue borders
White background
Red letter
Two (2) project signs are required - 4’ x 8’

CONTRACTOR TO REMOVE SIGNS UPON COMPLETION OF PROJECT
Project: Eastern Chacon Creek Interceptor and Drainage Improvements

The Contractor shall submit to the City for review five (5) working days prior to the Preconstruction conference an initial work plan or Construction Progress Schedule based only on working days for the Eastern Chacon Creek Interceptor and Drainage Improvements Project.

This plan shall show complete sequence of construction activity, identifying work of separate phases and other logically grouped activities. The schedule shall identify the first work day of each week.

The Schedule shall meet the following condition(s), if applicable:

All submittal for products to be used in the construction shall also be submitted with this schedule.

If required by the City, or its representative, the Construction Progress Schedule shall be revised and resubmitted.

The Construction Progress Schedule shall be submitted periodically to show actual progress of each stage by percentage against the initial revised schedule.
SECTION B-7
ILLEGAL DUMPING

The general contractor shall not dispose of any material whatsoever taken from the project site, onto any areas not considered to be legal dump sites. Materials such as broken concrete, asphalt, rebar, trash, etc. are to be disposed of properly, i.e. at the City Landfill or as directed by the City Engineer. Unless otherwise noted, no material, including dirt, is to be dumped or placed into an existing creek or channel.

The general contractor is hereby instructed to contact John Porter at the City Environmental Department at (956) 794-1650 for additional information on illegal dumping city ordinances.

*Building construction debris should be hauled to the Landfill only by a franchised hauler.
Division C

General Provisions
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SECTION C-1
DEFINITION OF TERMS

C-1.01 DEFINITION OF TERMS
Whenever the terms defined herein occur on the Plans, in any other documents or instrument herein contemplated or to which the Specifications apply, the intent and meaning shall be as follows:

C-1.02 OWNER: (OR PARTY OF THE FIRST PARTY)
The individual, firm corporation or the political subdivision for whom the facilities covered by these Plans and Specifications are to be constructed.

C-1.03 CONTRACTOR: (OR PARTY OF THE SECOND PART)
The individual, firm or corporation with whom the Contract is made by the Owner.

C-1.04 ENGINEER
City Engineer employed by the Owner, or such other Engineer, or Supervisor authorized by the City Engineer or the Owner to act on their behalf.

C-1.05 CONSULTANT
Licensed Engineer or Architect employed by the Owner, and authorized by the City Engineer or the Owner to act on their behalf. The decisions by the City Engineer are final.

C-1.06 BIDDER
An individual, firm or corporation submitting a proposal.

C-1.07 SUPERINTENDENT
An authorized representative of the Contractor.

C-1.08 INSPECTOR
An authorized representative of the Owner and Engineer

C-1.09 LABORATORY
A testing laboratory approved by the Owner and Engineer.

C-1.10 CONTRACT
The Agreement between the Owner and the Contractor covering the furnishing of all materials and labor necessary to complete the work and consisting of the Plans and Specifications, together with such supplemental agreements as may be made from time to time.

C-1.11 WORKING DAY
A “Working Day” is defined as any day not including Saturdays, Sundays, or any legal holidays, observed by the City of Laredo, in which weather or other conditions, not under the control of the Contractor, will permit construction of the principal units of work for a continuous period of not less than seven (7) hours. If the contractor opts to work on Saturday, Sunday, or legal holiday requiring construction inspection, said days are considered working days and charged to the contract time, and the cost for such inspection borne by the contractor.
C-1.12 WORK
All structures, services, machinery, equipment, or other facilities that are described in the Plans and Specifications together with such additions or modifications as may be ordered by the Owner from time to time.

C-1.13 WORK ORDER OR NOTICE TO PROCEED
A document authorized by the Owner and issued by the Engineer directing the Contractor to proceed on all or part of the work and a specified date.

C-1.14 CHANGE ORDER
A supplemental agreement adding to or modifying the Contract, including such additional Plans and Specifications as necessary to properly describe the required change.

C-1.15 SURETY
The corporate body which is bound with the Contractor for the faithful performance of the work covered by the Contract.

C-1.16 PLANS
The drawings published by the Engineer showing the locations, character, dimensions and details of the work which are part of the Contract.

C-1.17 SPECIFICATIONS
The directions, provisions and requirements contained herein pertaining to the method and manner of performing the work, or to the quantities, or to the qualities of materials to be furnished under the Contract. The term “Specifications” shall be deemed to include the Contract Documents, the Special Provisions, the General Provision, and the Technical Provisions as contained herein, together with all supplemental agreements and change orders. Specifications are part of the Contract. Plans take precedence over Specifications if in conflict.

C-1.18 CALENDAR DAYS
A “Calendar Day” is defined as any day of the week inclusive of Saturdays, Sundays, and legal holidays.

C-1.19 INSPECTION
The periodic on site review of the progress of project construction, may be referred to as progress, pre-final, or final inspection, but in each case of inspection a “punch-list” of items requiring varying degrees of further work is prepared.

C-1.20 PROJECT ACCEPTANCE
Condition resulting when all items of construction are complete, inspected for completion by inspector and engineering staff and approved by City Council.

Note: Items of construction may be approved by inspector and engineering staff as constructed in place for contractor progress payment purposes, but final acceptance of project is by City Council action.
### SECTION C-2
### DEFINITION OF ABBREVIATIONS

Whenever the abbreviations defined herein occur on the Plans, in the Specifications, Contract, Bond, advertisement, Proposal, or in any other Instrument herein contemplated or to which the Specifications apply or may apply, the intent and meaning shall be as follows:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.S.H.O</td>
<td>American Association of State Highways Official</td>
</tr>
<tr>
<td>HP</td>
<td>Horsepower</td>
</tr>
<tr>
<td>K.W.</td>
<td>Kilowatt</td>
</tr>
<tr>
<td>Am. or Amp.</td>
<td>Ampere</td>
</tr>
<tr>
<td>KVA</td>
<td>Kilovolt</td>
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<tr>
<td>A.S.T.M</td>
<td>American Society for Testing Materials</td>
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<td>In. or &quot;</td>
<td>Inch or Inches</td>
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<td>Lin.</td>
<td>Linear</td>
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<td>Asph.</td>
<td>Asphalt</td>
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<td>Lb. or #</td>
<td>Pound</td>
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<td>Ave.</td>
<td>Avenue</td>
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<td>A.W.W.A.</td>
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<td>Max.</td>
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<td>Min.</td>
<td>Minimum</td>
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<td>MH</td>
<td>Manhole</td>
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<td>I.P.</td>
<td>Iron Pin</td>
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<tr>
<td>B &amp; S.</td>
<td>Bell and Spigot</td>
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<td>Mono.</td>
<td>Monolithic</td>
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<td>Blvd.</td>
<td>Boulevard</td>
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<td>No.</td>
<td>Number</td>
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<tr>
<td>B.T.U.</td>
<td>British Thermal Unit</td>
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<td>%</td>
<td>Percent</td>
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<tr>
<td>B.M.</td>
<td>Bench Mark</td>
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<td>PL</td>
<td>Property Line</td>
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<td>C.I.</td>
<td>Cast Iron</td>
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<td>R.</td>
<td>Radius</td>
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<td>C.C.C.</td>
<td>Center to Center</td>
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<tr>
<td>Rein.</td>
<td>Reinforced or reinforcing</td>
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<tr>
<td>C/G</td>
<td>Curb &amp; Gutter</td>
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<tr>
<td>C.L.</td>
<td>Center Line</td>
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<td>V.G.</td>
<td>Valley Gutter</td>
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<td>Concrete</td>
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<tr>
<td>Rem.</td>
<td>Remove</td>
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<tr>
<td>C.S.P.</td>
<td>Concrete Sewer Pipe</td>
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<tr>
<td>Rep.</td>
<td>Replace</td>
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<tr>
<td>C.M.</td>
<td>Circular Mil</td>
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<tr>
<td>R.C.S.D.P.</td>
<td>Reinforced Concrete Storm Drain Pipe</td>
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<tr>
<td>C.F.M.</td>
<td>Cubic Feet per Minute</td>
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<td>C.O.</td>
<td>Cleanout</td>
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<tr>
<td>R.P.M.</td>
<td>Revolutions per minute</td>
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<tr>
<td>Cond.</td>
<td>Conduit Minute</td>
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<td>Corr.</td>
<td>Corrugated</td>
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<td>Right of Way</td>
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<td>Cu.</td>
<td>Cubic</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<td>Vol.</td>
<td>Volume</td>
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<td>Culv.</td>
<td>Culvert</td>
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<td>S.S.</td>
<td>Sanitary Sewer</td>
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<td>Dia.</td>
<td>Diameter</td>
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<td>S.D.</td>
<td>Storm Drain</td>
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<td>D.S.</td>
<td>Double Strength</td>
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<td>Sq.</td>
<td>Square</td>
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<td>Dr.</td>
<td>Driveway</td>
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<td>Std.</td>
<td>Standard</td>
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<td>Elev. or El.</td>
<td>Elevation</td>
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<td>T.H.D.</td>
<td>Texas Highway Department</td>
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<td>F.</td>
<td>Fahrenheit</td>
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<tr>
<td>V.C.P.</td>
<td>Vitrified Clay Pipe</td>
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<td>Ft. or ’</td>
<td>Foot or Feet</td>
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<td>V</td>
<td>Volt</td>
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<td>Gal.</td>
<td>Gallon</td>
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<td>Yd.</td>
<td>Yard</td>
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<td>S.O.P.</td>
<td>Secretaria de Obras Publicas</td>
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<td></td>
<td>(Mexican Secretaries of Public Works)</td>
</tr>
<tr>
<td>Tex. D.O.T., or TxDOT</td>
<td>Texas Department of Transportation</td>
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</tbody>
</table>
C-3.01 EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS, AND SITE OF WORK
Submission of a Proposal shall constitute prima facie evidence that the Bidder has carefully examined the site of the proposed work, the Proposal, Contract Forms, Plans and Specifications, and has satisfied himself as to the character, quality, and quantity of work to be performed, materials to be furnished, and as to the requirements of these Specifications, Special Provisions, and Contract.

Any information on the Plans or in the Specifications as to the soil, or material borings, or tests of existing materials, or location of existing utilities is for the convenience of the Bidder. The accuracy of the information is not guaranteed, and no claims for extra work or damages will be considered if it is found during construction that the actual conditions or locations vary from those indicated on the Plans or in the Specifications.

C-3.02 INTERPRETATION OF ESTIMATES
Any estimate of quantities of work to be done and materials to be furnished in the proposal or on the Plans is given only as a basis of comparison of Proposals and the Award of the Contract. Such estimate is the result of careful calculation and is believed to be correct, but the Owner does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith, nor shall the Bidder plead misunderstanding or deception because of such estimate of quantities, or of the character, location or other conditions pertaining to the work. Payment to the Contractor under unit price contracts will be made only for the actual quantities of work performed or materials furnished in accordance with the Plans and Specifications, and it is understood that the quantities may be increased or diminished as hereinafter provided without in any way invalidating the unit bid prices.

C-3.03 PREPARATION OF PROPOSAL
The Bidder shall submit his proposal on the forms furnished by the Owner. All blank space in the proposal form shall be filled in for each and every item for which quantity is given, and the Bidder shall state the price (typed, or written in ink, both in words and numerals for which he proposed to do each item of work. In case of conflict between words and numerals, the words will govern.

The Proposal shall be signed in ink by the person or persons making, or authorized to make the bid. If the Proposal is offered by an individual, his name and post office address shall be given. If the proposal is offered by a firm or partnership, the name and post office address of each member of the firm or partnership shall be given. If the Proposal is offered by a corporation, the name and title of the person signing the Proposal, and the post office address of the corporation shall be given.

Any person signing a Proposal as agent must file with the Owner legal evidence that he has the authority to do so, and that the signature is binding upon the firm or corporation.

C-3.04 REJECTION OF PROPOSAL
A Proposal showing any alterations or of words or figures, erasures, additions not called for, alternate bids not called for, incomplete bids, lack of sufficient prior work experience, condition bids, or proposals not accompanied by proposal guaranty as required, will be considered as an irregular bid and may be rejected. The Owner reserves the right to waive technicalities as to changes, alterations, or reservations, and to make the award to the best interest of the Owner.
C-3.05 PROPOSAL GUARANTY
Each Proposal shall be accompanied a certified check, cashier’s check or bid bond in the amount of five (5%) percent of the total amount bid. Checks shall be made payable unconditionally to the Owner.

C-3.06 DELIVERY OF PROPOSAL
Each Proposal must be an original and must be sealed, together with the proposal guaranty, in an envelope plainly marked with the name of the project as shown on the Notice to Bidders, and the name and address of the Bidder. When submitted by mail, this envelope shall be placed in another envelope addressed as indicated in the Notice to Bidders.

Only those proposals actually in the hands of the designated official at the time set in the Notice to Bidders shall be considered. Proposals submitted by telephone, telegraph or fax, will NOT be considered.

C-3.07 WITHDRAWAL OF PROPOSAL
A Bidder may withdraw his proposal provided he submits to the official designated to receive bids his request in writing to do so prior to the time set for opening of proposals.

C-3.08 PUBLIC OPENING OF PROPOSALS
Proposals will be publicly opened and read aloud at the time and place set in the Notice to Bidders.

C-3.09 COMPETENCY OF BIDDERS
Before any Contract is awarded, the Owner may require the Bidder to furnish a complete statement of his financial resources. His experience in similar work, his equipment available for the work proposed, resumes of key employees or any other information necessary to establish his competency and reliability as a Contractor.

C-3.10 DISQUALIFICATION OF BIDDER
Any of the following causes may be considered as sufficient for the disqualification of the Bidder and the rejection of his Proposal:
− More than one proposal for the same work from an individual or corporation under the same or different name.
− Evidence of collusion among Bidders.
− An unbalanced Proposal.
− Failure to submit a unit price for each item of work shown on the Proposal.
− Lack of competency as revealed by the financial statement, experience record, or plant and equipment statement furnished.
− Lack of responsibility as shown by past work judged from the standpoint of workmanship and progress.
− Uncompleted work which, in the judgment of the Owner, might hinder or prevent the prompt completion of additional work if awarded.
− Being in arrears on existing Contracts.
− Having defaulted on a previous Contract or assessed liquidated damages.

C-3.11 MATERIALS GUARANTY
Before any Contract is awarded, the Owner may require the Bidder to furnish a complete statement of the origin, composition or manufacturer of any and all materials proposed to be used in the work, together with samples, which may be subjected to tests to determined their quality and fitness for the work.
SECTION C-4
AWARD AND EXECUTION OF CONTRACT

C-4.01 CONSIDERATION OF PROPOSALS
For the purpose of award, after the proposals are opened and read, the bids considered the most advantageous to the Owner will be carefully studied. The bids will then be compared and the results made public. Until the award of the Contract is made, the Owner reserves the right to reject any or all proposals, to waive technicalities, to advertise for new proposals, or to proceed to do the work otherwise when the best interests of the Owner will be thereby promoted.

C-4.02 AWARD OF CONTRACT
Contract will not be awarded until the necessary investigations as to the competency of the low bidder are made. Award of Contract will be made by the Owner, upon recommendation by the Engineer, to the lowest responsible bidder meeting the requirements of the Owner. Award of Contract will be made within sixty (60) days after the opening of proposals, unless stated otherwise in the Notice to Bidders.

C-4.03 RETURN OF PROPOSAL GUARANTIES
As soon as the proposal price has been compared the Engineer may, at his discretion, return the proposal guaranties accompanying in those proposals which, in his judgment, will not be considered in making the award. When award is made, the successful bidder’s proposal guaranty only will be retained until after Contract and Bond have been executed.

C-4.04 PERFORMANCE AND PAYMENT BOND
Within ten (10) days after Notification of Award of Contract, the successful bidder shall execute and file with the Owner a separate surety and payment bond as required by Chapter 93 of the Acts of the Regular Session of the 56th Legislature of Texas, in the full amount of the contract price as a guarantee of the faithful performance of the Contract and payment of all obligations which may be incurred for material and labor used in the work. Bonds shall be executed by a surety company authorized to do business in the State of Texas on the bond forms provided in these Documents. Any surety shall be subject to the approval of the Owner.

C-4.05 EXECUTION OF CONTRACT
Within ten (10) days after Notification of Award of contract, the successful bidder shall sign and place in the hands of the Owner the necessary agreement entering into a Contract with the Owner.

C-4.06 NOTICE TO PROCEED
The Notice to Proceed shall be issued within ten (10) days of the execution of the Agreement by the City provided that the Contractor has properly executed and submitted all Documents required by the City of Laredo within the same period of time. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the City and Contractor. If the Contractor has submitted all Documents required and the Notice to Proceed has not been issued within the ten (10) day period or within the time extension, the Contractor may terminate the Agreement without further liability on the part of either party. Furthermore, should the Contractor fail to execute all the requirements within this same ten (10) days period or within the time extension, the City may terminate the Agreement.
C-4.07 INVESTIGATIONS
The City of Laredo may make such investigations as he deems necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the City all such information and data for this purpose as the City may request.

C-4.08 APPROVAL OF CONTRACT
No Contract shall be binding upon the Owner until it has been signed by the Owner and returned to the Contractor.

C-4.09 FAILURE TO EXECUTE CONTRACT
Failure to comply with any of the requirements of these Specifications, to execute Contract within ten (10) days after notification of work, or to furnish surety as required, shall be just cause for the annulment of the award. In case of annulment of award, the proposal guaranty shall become the property of the Owner, not as penalty, but as a liquidated damage.

C-4.10 DISTRIBUTION OF PLANS
After the Notice to Proceed is issued, the Owner shall provide the Contractor with three (3) complete sets of Plans and Specifications for Contractor’s use during construction. In the case that additional sets are required, the Contractor shall make arrangements to obtain the extra sets at his own expense.

C-4.11 RESPONSE TIME DURING THE PROSECUTION OF THE PROJECT
The contractor shall furnish the owner with three (3) local telephone numbers where contractor or a responsible representative of contractor can be reached at any and all time during the prosecution of this project, and especially during weekends or holidays. Failure of contractor to respond to any such emergency which causes city personnel, equipment and materials to be used in such emergency will result in the contractor being charged an amount which shall be twice the cost incurred by the City in using personnel, equipment and materials to handle such emergency due to failure of the contractor to do so, and, in addition, the contractor will be charged a penalty of $500.00 for each emergency to which it does not respond. In this connection, “failure to respond” means the failure of the contractor to respond to telephone calls from the relevant staff or owner.
SECTION C-5
SCOPE OF WORK

C-5.01 INTENT OF PLANS AND SPECIFICATIONS
It is the intent of the Plans and Specifications to describe the complete work to be performed under the Contract. Except as provided on the Plans or in the Specifications, it is also the intent that the Contractor shall furnish all materials, supplies, tools, equipment, labor and incidentals necessary to complete the work.

C-5.02 CHANGES AND INCREASED OR DECREASED QUANTITIES OF WORK
The Owner has the right to make such changes and alterations in the Plans or in the quantities of work as he may consider necessary or desirable, and such changes and alterations shall not be considered as a waiver of any condition of the Contract, nor shall they invalidate any provision thereof. The Contractor shall perform the work as increased or decreased, and no allowance will be made for anticipated profits.

Payment to the contractor will be made for the actual quantities of work done and materials furnished at the unit prices as set forth in the Contract, except as follows:

− When the total cost of work to be done, or of materials to be furnished, is more than one hundred and twenty-five 125 percent of the total contract price for the item stated in the Proposal, then either party to the Contract, upon demand, shall be entitled to a revised consideration on that portion of the work above one hundred and twenty-five (125%) percent of the total contract price stated in the Proposal.

− When the total cost of work to be done, or of materials to be furnished, is less than seventy-five (75%) percent on the total contract price for the item stated in the Proposal, then either party to the Contract, upon demand, shall be entitled to a revised consideration on the work actually done.

− Revised consideration shall be determined by supplemental agreement between the parties, which supplemental agreement shall be included with, and shall become a party of, the Contract.

C-5.03 OMITTED ITEMS
The Owner may, in writing, order the omission from the work of any item found unnecessary to the project. Such omission shall be subject to all provisions of Par. C-5.02.

C-5.04 EXTRA WORK
When the proper completion of the project requires work for which no quantities or prices were shown in the Proposal, such work shall be called “EXTRA WORK” and shall be performed by the Contractor when so directed in writing by the Owner. “EXTRA WORK” shall be performed in accordance with these Specifications and as may be directed by the Engineer.

Prices for extra work shall be itemized and covered by a supplement agreement submitted by the Contractor and approved by the Owner prior to the starting of such work.

Claims for extra work not authorized in writing by the Owner prior to the performance thereof will be rejected.
C-5.05 MAINTENANCE OF TRAFFIC
When the work requires partial or complete closing of any driveway, alley, street, or roadway, the Contractor shall so schedule and prosecute his work that traffic will be hindered to a minimum.

C-5.06 REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS
All structures and/or obstructions on the site of the work, which are not to remain in place or which are not to be used in the new construction shall be removed as directed by the Engineer. Such items of removal are not listed in the Proposal will not be paid for as separate items; the cost of doing such work shall be included in the unit price bid for other items.

C-5.07 TOOLS AND ACCESSORIES:
When special wrenches, gauges, or other special tools or accessories are required to properly maintain and operate any machine or equipment furnished under this Contract, the furnishing of such tools and accessories shall be deemed to have been included in the Contract and they shall be furnished by the Contractor without extra cost to the Owner.

C-5.08 GUARANTEES
All structural, mechanical and electrical equipment or instrument shall be guaranteed against mechanical and physical defects, leakage, breakage, or other damage occurring during normal operation for a period of one (1) year after such equipment or instruments have been accepted by the Owner. The Contractor shall promptly repair or make good, at his own expense, any defect in such equipment or instruments.

C-5.09 GENERAL GUARANTEE
All work included in the Contract shall be guaranteed against faulty material or workmanship for a period of one (1) year after the work has been accepted by the Owner.

Neither final acceptance of the work, nor final payment thereof, nor occupancy and use of the work by the Owner shall constitute a waiver of the Owner’s right to require the Contractor to repair or make good any such faulty materials or workmanship.

C-5.10 FINAL CLEAN UP
Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, tools, and materials and shall dispose of all rubbish, temporary structures, and surplus backfill. The site shall be left in a neat and presentable condition throughout. Any land area, driveway, sidewalk, alley, street or road (concrete or asphalt) which has been cut or disturbed during the prosecution of the work shall be repaired at the Contractor’s expense to a condition at least as good or better as originally existed.

C-5.11 EXISTING STRUCTURES
The Plans show the locations of all known surfaces and subsurface structures. However, the exact location of gas mains, water mains, conduits, sewer etc., is unknown and the Owner assumes no responsibility for failure to show any of these structures on the Plans or to show them in their exact location. It is mutually agreed such failure will not be considered sufficient basis for claims for additional compensation for extra work or for increasing the pay quantities in any manner whatsoever, unless the obstruction encountered is such as necessitates, or requires the building of special work, provision for which is not made in the Plans and Proposal, in which case the provisions in these Specifications for extra work shall apply.
SECTION C-6
CONTROL OF WORK AND MATERIALS

C-6.01 AUTHORITY OF ENGINEER
The work will be observed, tested and inspected by the Engineer, and performed to his satisfaction, in accordance with the Contract, Plans and Specifications. The Engineer will decide all questions which may arise as to the quality and acceptability of materials furnished and work performed, as to the manner of performance and rate of progress of said work, as to the interpretation of the Plans or Specifications relating to the work, as to the fulfillment of the Contract on the part of the Contractor and to the rights of different Contractors on the project.

The decisions of the City Engineer will be final.

C-6.02 CITY ENGINEER AS REFEREE
The City Engineer will act as referee in all questions, arising under the terms of the Contract between the parties thereto, and his decisions shall be final and binding.

C-6.03 ADEQUACY OF DESIGN
It is understood that the Owner selected the Engineer named herein to prepare the Plans and Specifications, and all supplements thereto, and it is agreed that the Owner will be responsible for the adequacy of the design, sufficiency of the Plans and Specifications, and safety of structures, provided the Contractor has complied with said Plans and Specifications, all modifications thereof, and additions and alterations thereto approved by the Engineer. The burden of proof shall be upon the contractor to show that he has fully complied with the Plans and Specifications, all modifications thereof, and all additions and alterations thereof.

C-6.04 PLANS
Plans will show the lines, grades, cross sections, details and general features of the work. Where shop drawings or working drawings are required, they shall be furnished by the Contractor and approved by the Engineer. Authorized alterations to the Plans will be endorsed on approved copies of the Plans or shown on supplementary sheets.

The approval by the Engineer of the Contractor’s shop drawings or working drawings will not relieve the Contractor of any responsibility under the Contract.

The Contractor shall furnish the Engineer with such blue print copies of shop drawings or working drawings as may be required for approval and for the purposes of supervision.

The contract price shall include the cost of furnishing all such prints.

C-6.05 CONFORMITY WITH PLANS
The finished work shall conform with the lines, grades, cross sections, details and dimensions shown on the Plans. Such deviations from the Plans as may be required will, in all cases, be determined by the Engineer and authorized in wiring.

C-6.06 COORDINATION OF PLANS AND SPECIFICATIONS AND SUPPLEMENTAL AGREEMENTS
The Plans, Specifications, and supplemental agreements are essential parts of the Contract, and a requirement occurring in one is as binding as though occurring in all. In case of disagreement, Plans shall govern over “Technical Provisions,” and “Special Provisions” shall govern over “Technical Provisions.” The Contractor shall not take advantage of any apparent error or omission on the Plans or Specifications. In the event the Contractor discovers any
apparent error or discrepancy, he shall immediately call upon the Engineer for his interpretation and decision, and such decision shall be final.

C-6.07 COOPERATION OF CONTRACTOR
The Contractor shall give the work the constant attention necessary to facilitate the progress thereof and shall cooperate with the Engineer and with other Contractors in every way possible.

The Contractor shall have on the work at all times, a satisfactory and competent English-speaking Superintendent, authorized to receive order, and act for him as his agent. The Contractor shall designate to the Engineer in writing the name of such Superintendent, and the designated Superintendent may not be removed from the work without the written permission of the Engineer.

C-6.08 CONSTRUCTION STAKES
The Contractor shall furnish and set at his own expense any and all construction stakes and blue tops as seems necessary for the satisfactory prosecution of the work.

Any missing construction stakes which have been destroyed by the different utility companies, vandals and/or the contractor at the time of construction will be replaced by the contractor at this own expense.

The Engineer may, at his option, make spot or complete checks on all construction alignment and grades to determine the accuracy of the contractor’s survey work. These checks, however, will not relieve the Contractor of his responsibility of constructing the work to the lines and grades as shown on the plans or approved change orders. Computations, sketches, and other drawings used in the design and layout of this project will be made available to the Contractor, however these items will not relieve the contractor of his responsibility.

C-6.09 QUANTITIES OF MATERIALS
It shall be the responsibility of the Contractor to verify all quantities of materials shown on the Plans before ordering such materials. Payment is provided for acceptable materials, and materials rejected due to improper fabrication or excess quantity or other reasons within the control of the Contractor will not be paid for regardless of the quantities or dimension shown on the Plans.

C-6.10 APPROVAL OF MATERIALS
The sources of supply of materials shall be subject to the approval of the Engineer. Representative samples of materials proposed for use shall be submitted, if required, for examination and testing by an independent testing laboratory selected by the City.

Results obtained from testing such samples may be used for preliminary approval, but will not be used as final acceptance of materials. All materials proposed for use may be inspected or tested at any time during their preparation or use.

If at any time, it is found that sources of supply which have been approved do not furnish a product of uniform quality, or if the product becomes unacceptable at any time, the Contractor shall furnish approved material from another source.

Any material, which after approval has for any reason become unfit for use, shall not be incorporated into the work.
C-6.11 SAMPLES AND TESTS
Samples and testing procedures shall conform to the requirements of appropriate designations of the American Association of State Highway Officials or the American Society for Testing Materials.

Test for determining the fitness of materials; tests for the purpose of obtaining preliminary approval of materials; tests for determining concrete mixes will be at the expense of the Contractor. Tests for the actual control of the work, such as soil compacting tests and concrete compressive strength test, will be at the expense of the Owner. Any and all retesting because of failure in soil compaction or concrete compressive strength tests shall be done at the expense of the Contractor. Tested and accepted subgrade shall be covered and protected with the flexible base within a maximum of seven (7) days. Tested and accepted flexible base shall be primed and cured a minimum of seventy two (72) hours and shall be cured with asphalt within seven (7) days. Failure to comply with the seven (7) days limitations may result in the need for re-testing at the Contractors expense depending on weather conditions and at the discretion of the Engineer. The Contractor shall provide such facilities as the Engineer may require for conducting field tests and collecting and forwarding samples. All sampling and testing shall be under the control of the Engineer and shall be done in laboratories approved by him.

C-6.12 STORAGE
Materials shall be stored as to insure the preservation of the quality and fitness for the work. Material which is not, in the opinion of the Engineer, properly stored and protected will not be included as material in hand in the estimates.

C-6.13 AUTHORITY AND DUTIES OF INSPECTORS
Inspectors employed by the Owner shall be authorized to inspect all work done in any part of the project and all preparation, fabrication, or manufacturer of the materials to be used.

The Inspector shall be authorized to call to the attention of the Contractor any failure of the work or materials to conform to the Specifications or the Plans. He will in no case act as foreman or perform other duties for the Contractor, nor shall he interfere with the management of the work. In the event the Contractor does not comply with the requirements of the Owner and the Engineer, he may stop all work until the non-compliance is corrected.

If the progress of the work becomes unduly delayed because of negligence on the part of the Contractor, the Inspector shall notify the Owner and the Engineer, who may require the Contractor to give reasons for the delay. If it is found that the Contractor is at fault, then it is the prerogative of the Owner to demand correction.

Inspection as provided herein shall not relieve the Contractor from any obligation to perform the work in conformity with the requirements of the Plan and Specifications. No Inspector shall be authorized to revoke, alter, enlarge or release any requirements of the Plans and Specifications, or to issue instructions contrary to the Plans and Specifications, or to approve or accept any portion of the work.

The Contractor shall furnish every reasonable facility for ascertaining whether or not the work is performed in accordance with the Plans and Specifications.

No backfill shall be made unless inspected by the Engineer or the City’s representative designated in writing and verbal approval of field Engineer is given to such work; if the Contractor should backfill any work without such inspection and approval, the Contractor shall
remove or uncover such portions of the finished work as may be directed. After examinations, the Contractor shall restore said portion of the work to the standard required by the Plans and Specifications. Should the work thus exposed and examined prove acceptable or unacceptable, the uncovering or removing and the replacing of the covering or making good of the parts removed shall be done at the Contractor’s expense.

C-6.14 SUSPENSION OF WORK
In case of any dispute arising between the Contractor and the Inspector as to materials furnished or the manner of performing the work, the Inspector shall have authority to reject materials or suspend work until the question at issue can be referred to and decided by the Engineer.

If the Contractor refuses to suspend work on verbal order, the Inspector shall issue a written order to suspend work giving the reason for such suspension. After placing the order in the hands of the Contractor’s man in charge, the Inspector shall immediately leave the job. Work done during the absence of the Inspector shall not be paid for.

C-6.15 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK
All work which has been rejected or condemned shall be repaired or removed and replaced as the Engineer may direct, at the expense of the Contractor. Materials not conforming to the requirements of the Plans and Specifications shall be removed immediately from the site of the work and replaced with satisfactory material at the expense of the Contractor.

Work done without lines and grades, work done beyond the lines and grade shown on the Plans, work done without inspection, or any extra or unclassified work done without written authority and prior agreement in writing as to the prices will be done at the Contractor’s risk and will be considered unauthorized. At the option of the Engineer, such work may not be measured and paid for, or may be ordered removed and replaced at the expense of the Contractor.

Upon the failure of the Contractor to repair satisfactorily or to remove and replace rejected, unauthorized, or condemned work or materials immediately after receiving formal notice from the Engineer, the Owner may at his own option:

a. Recover for such defective work or materials on the Contractor’s bond, or;
b. Recover from such defective work or materials by action in a court having proper jurisdiction in such matter, or;
c. Employ labor and equipment and satisfactorily repair, or remove and replace, such defective work or materials and charge the cost of same to the Contractor, which cost will be deducted from any money due him.

C-6.16 DISPUTED CLAIMS FOR EXTRA WORK
In case the Contractor deems extra compensation is due him for work or materials not clearly covered in the Contract, or not ordered by the Engineer as “EXTRA WORK”, the Contractor shall notify the Engineer in writing of his intention to make claim for such extra compensation before he begins the work on which he bases the claim and shall afford the Engineer every facility for keeping actual cost of the work.

Failure on the part of the Contractor to give such notice or to afford the Engineer every facility for keeping account of actual cost of the work shall constitute waiver of the claim for extra compensation. The filing of such notice by the Contractor and the keeping of cost by the Engineer shall not in any way be construed to prove the validity of the claim. Extra work of any kind should only be performed by Contractor upon receipt of an approved Change Order issued
by Owner. When the work has been completed, the Contractor shall within ten (10) day file
claim for extra compensation with the Engineer, who will present it to the Owner for
consideration.

C-6.17 Final Inspection
Whenever the work provided for under the Contract has been satisfactorily completed and the
final cleaning up performed, the Contractor shall notify the Engineer to make the “Final
Inspection”. Such inspection will be made within ten (10) days of such notification. After such
final inspection, if the work is found to be satisfactory, the Contractor will be notified in writing of
the acceptance of same. No time charge will be made against the Contractor between the date
of notification of the Engineer and the date of the final inspection.
SECTION C-7
LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

C-7.01 LAWS TO BE OBSERVED
The Contractor shall make himself familiar with and shall observe and comply with, all Federal, State, and local laws, ordinances and regulations which in any manner affect the conduct of the work, and shall indemnify and save harmless the Owner and the Owner's representative against any claim arising from the violation of any such law, ordinance, or regulation whether by himself or by his employees.

C-7.02 PERMITS AND LICENSES
The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary to the due and lawful prosecution of the work.

C-7.03 PATENTED DEVICES, MATERIALS, AND PROCESSES
If the Contractor is required or desires to use any design, device, material or process covered by letters, patent, or copyright, he shall provide for such use by suitable legal agreement with the patentee or Owner of such patent. The Contractor and his surety shall indemnify and save harmless the Owner from any and all claims for infringement by reason of the use of any such patented design, device, material, or process, or any trademark or copyright in connection with the work agreed to be performed under this Contract, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay for reasons of any such infringement at any time during the prosecution, or after the completion of the work.

C-7.04 PUBLIC, SAFETY, AND CONVENIENCE
The safety of the public and the convenience of traffic shall be regarded as of prime importance during construction and provisions thereof, made necessary by the work, shall be the direct responsibility of the Contractor, and shall be performed at his own expense.

Where the Contractor is required to construct temporary crossings for streams, culverts, ditches or trenches, his responsibility for accidents shall include the approaches as well as the structures of such crossing.

C-7.05 SANITARY PROVISIONS
The Contractor shall, at his own expense, provide and maintain in a neat, sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements or the State Department of Health and of other authorities having jurisdiction.

C-7.06 BARRICADES AND WARNING SIGNS
The Contractor shall furnish and maintain adequate barricades, warning and directing signs, red flags, lights and other traffic control devices as are necessary to comply with the latest edition of the TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREET AND HIGHWAYS.

All provisions of barricades and warning signs shall be considered an incidental and necessary part of the work and no direct payment will be made therefore. All costs of providing such safe guards shall be included in the prices bid for other parts of the work.
C-7.07 USE OF EXPLOSIVES:
When the use of explosives is necessary in the prosecution of the work, the Contractor shall use the utmost care not to endanger life or property. All explosives shall be stored in a secured manner and all storage places shall be marked clearly with the words “DANGEROUS EXPLOSIVES”. The method of storing and handling explosives and highly inflammable materials shall conform to the requirements of Federal and State laws and regulations. The Contractor shall not use explosives until he has taken the legal precautions necessary to save harmless the Owner from any claims arising from such use of explosives.

C-7.08 PROTECTION AND RESTORATION OF PROPERTY
The Contractor shall take all measures necessary to protect public or private property which might be injured by any process of construction, and in case of any injury or damage to said property, he shall restore at his own expense the damaged property to a condition similar or equal to the existing before such injury damage was done, or he shall make good such injury or damage in an acceptable manner.

Where the work involves excavation any public or private driveway, alley street or roadway, the Contractor shall do any work necessary to restore such driveway, alley, street or roadway to a condition similar or equal to that existing before such work was done. The Contractor shall be responsible for any subsidence of backfill or pavement failure due to such excavation, and shall promptly repair any such subsidence or failure.

C-7.09 PROTECTION OF EXISTING UTILITIES
The Contractor shall contact the utility company for exact location prior to doing any work that might interfere with or damage present utilities.

The Contractor shall take all measures necessary to protect existing surface drains, seers, underdrains, conduits, utilities, or similar underground structures, and to provide temporary service when service in any of these is interrupted.

When such facilities are encountered, the Contractor shall notify the Engineer who will arrange for their removal, if necessary. Any utility lines cut or damaged shall be repaired and restored to working conditions as determined by the Engineer.

C-7.10 RESPONSIBILITY FOR DAMAGE CLAIMS
The Contractor shall save harmless the Owner from all suits, action in or claims brought on account of any injuries or damages sustained by any person or property in consequence of any neglect in safeguarding the work by the Contractor; or on account of any claim or amount recovered for any infringement of patent or reward under the “Workmen’s Compensation Laws” or any other laws. He shall be held responsible for all damage or injury to property of any character occurring during the prosecution of the work resulting from any omission, neglect, or misconduct on his part in the manner or method executing the work, or from defective work or materials.

C-7.11 RESPONSIBILITY FOR THE WORK
Until acceptance of the work by the Engineer, in writing, it shall be under the charges and care of the Contractor. The Contractor shall rebuild and make good at his own expense all injuries and damage to the work occurring before its completion and acceptance. In case of suspension of work for any cause, the Contractor shall be responsible for all the preservation of all materials.
C-7.12 USE OF COMPLETED WORK
Whenever, in the opinion of the Engineer, any portion of the work is in acceptable conditions, it may be entered upon and used by the Owner upon the written order of the Engineer. Such use shall be held an acceptance of that portion of the work, but not into be considered as a waiver of any of the provisions of these Specifications. Pending final completion and acceptance of the entire work, all necessary repairs and renewal of any part of the work so used, due to defective material or work, to natural causes other than wear and tear, or to the operations of the Contractor, shall be performed by the Contractor at his own expense.

C-7.13 NO WAIVER OF LEGAL RIGHT
Inspection by the Engineer or by any of his duly representatives, any order, measurement, or certificate by the Engineer; any order by the Owner for the payment of money, any payment for or acceptance of any of work, or extension of time; or any possession taken by the Owner shall not operate as a waiver of any provision of the Contract, or any power therein preserved to the Owner, or of any right to damages therein provided. A waiver of any breach of the Contract shall not be held to be a waiver of any other or subsequent breach.

The Owner reserves the right to correct any error that may be discovered in any estimate that may have been paid, and to adjust that or any subsequent estimate to meet the requirements of the Contract. The Owner reserves the right to claim and recover sums as may be sufficient to correct any error or make good any deficit in the work resulting from error, dishonesty, or collusion in the work after the final payment has been made.

C-7.14 RESPONSIBILITIES OF PARTIES AS TO UTILITY WORK
It shall be the responsibility of the Contractor to check and coordinate his work with the public and private utility companies which have authority from the City of Laredo to own and operate lines, pipes, conduits, or other means of conveyance within the streets Right-of-Way. The Contractor shall contact the Engineer concerning any and all utility relocation work needed, and it shall be the responsibility of the Contractor to advise the Engineer of any lines or utility poles to be relocated. The Engineer shall assist in coordinating the various utility relocation activities but shall not be responsible for any delays occasioned by this work, although appropriate allowance for additional contract time will be made by the Engineer if warranted. The Owner shall not be responsible for any acts of the Contractor or any damages resulting from work done by the Contractor relating to the removal, alteration, or other activity concerning utilities.

C-7.15 KEY POINTS OF PUBLIC RIGHT-OF-WAY ORDINANCE
1) All projects in public R.O.W. must go through Utility Coordination Committee.

2) All Contractors must be registered at the Building Development Service Department to be able to work in public R.O.W. Registration Fee $50/year.

3) All work done in Public R.O.W. requires a permit from the Building Development Services Department. Permit cost is $50.00 plus inspection fee of $200.00. Any additional inspections requested after normal working hours of 8 am to 5 pm are charged at $40.00 per hour Monday to Friday. Saturday, Sunday, and holidays inspection rates are $70.00 per hour. Permits must be secured prior to pre-construction meeting.

4) All Work done in Public R.O.W. that impedes the flow of traffic or pedestrian path requires a traffic control plan or pedestrian accessibility.

5) Contractor must provide certificate of insurance. Insurance must be liability, workman compensation and performance bond.
SECTION C-8
PROSECUTION AND PROGRESS

C-8.01 RIGHT-OF-WAY
The Owner will furnish all and or right-of-way necessary for the performance of the contract and will use due diligence in acquiring land or right-of-way. Should all necessary land or right-of-way not be acquired prior to the beginning of construction, the Contractor shall begin with work upon such land or right-of-way as the Owner may have acquired.

C-8.02 DELAYS DUE TO OWNER
Should the Owner be prevented or enjoined from proceeding with the work or authorizing its prosecution, either before or after its commencement, by reason of any litigation or by reason of the Owner’s inability to acquire necessary land or right-of-way, the Contractor shall not entitled to make or assert any claim for damage by reason of such delay, or to withdraw from the contract except by consent of Owner.

The time for completion of the work will be extended by such time as determined by the Engineer as will compensate for the time lost by reason of said delay.

C-8.03 SUBLETTING OR ASSIGNING OF CONTRACT
The City of Laredo does not allow, permit, negotiate, authorize, nor approve any assignment of contract proceeds between the “City,” the “Contractor”, and/or with a bank, lending institution or any type of financial institution either before, during or after a contract award. The “City” agrees to pay the “Contractor” for specified services as stated in the agreed contract. The “City” does not agree to pay any additional party either jointly or separately for the contract under discussion.

C-8.04 SUBCONTRACTING
The Owner will not recognize any subcontractor on the work. The Contractor shall be fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them.

C-8.05 PROSECUTION OF WORK
Prior to beginning of the work, the Contractor shall submit to the Engineer such schedules, charts, or briefs as may be required, outlining the manner of prosecution of the work. The contractor shall begin the work within ten (10) calendar days after the date set in the “Work Order” or notice to proceed and shall continuously prosecute same with such diligence as will enable him to complete the work within the time specified. Upon completion of work submit forms of Affidavit of Payment of Debts and Claims and Release of Liens and Letter for Certificate of Warranty.

The contractor shall notify the Engineer at least twenty-four (24) hours prior to the beginning at any point. He shall not begin new portions of the work to the detriment of portions already begun.

Owner’s normal working hours are Monday through Friday from 8:00 AM to 5:00 PM. The Contractor shall notify the owner in writing at least forty-eight (48) hours in advance for any work that is to be scheduled beyond the limits of the Owner’s working hours, and he shall not begin any such work schedule unless proper inspection by the Contractor has been pre-arranged with the Owner, with the cost for such work beyond the Owner’s
working hours borne by the Contractor. For clarification, see Division B – Section 4 “Inspection by City”.

If at any time the methods, equipment, or sequence of operations pursued by the Contractor are found to be inadequate to secure the quality of the work or rate of progress required by the contract, the Engineer may in writing order such modifications in the Contractor’s methods, equipment, or sequence of operations as he may deem necessary and the contractor shall comply with such order.

C-8.06 WORKMEN AND EQUIPMENT

All workmen employed by the Contractor shall be skilled and competent. Any person employed by the Contractor who in the opinion of the Engineer does not perform his work in a proper and skillful manner or who is disrespectful, intemperate, disorderly, or otherwise objectionable shall at the written order of the Engineer be immediately removed from the work and shall not be employed again on any part of the work without written consent from the Engineer.

The Contractor shall furnish and use such suitable machinery and equipment as may be required in the opinion of the Engineer to properly prosecute the work. The Contractor shall at the written order of the Engineer remove from the work any equipment found unsuited to properly perform the work.

Upon failure of the Contractor remove the work any person or equipment as ordered by the Engineer, the Engineer may withhold all estimates which have or may become due, or may suspend the work until such orders are complied with.

C-8.07 TEMPORARY SUSPENSION OF WORK

The Engineer shall have the authority to suspend the work wholly or in part for such period or periods as he may deem necessary due to unsuitable weather, or such other conditions as are considered unfavorable for the prosecution of the work or for such time as is necessary due to failure on the part of the Contractor to comply with orders given or to perform any or all provisions of the contract.

If work is stopped for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way, and he shall take every precaution to prevent damage or deterioration of the work performed.

The Contractor shall not suspend the work without written authority from the Engineer and shall proceed with the work promptly when notified by the Engineer to resume operations.

C-8.08 COMPUTATION OF CONTRACT TIME

The Contractor shall complete the work within the number of days stated in the contract. The number of days used shall be the number of days from the first day of actual commencement of operations or the 10th day after the date set in the Work Order or Notice to Proceed whichever comes first, and counting that day as the first elapsed day of contract time.

If the completion of the contract requires unforeseen work, or work and materials in greater quantities than those set forth in the proposal, then additional days or suspension of time charge will be allowed the Contractor equal to the time which in the opinion of the Engineers the work as a whole is delayed.
C-8.09 FAILURE TO COMPLETE THE WORK ON TIME

The time set forth in the proposal for the completion of the work is an essential element of the contract. If the contractor fails to complete the work in the number of working days specified, a time charge will be made for each day thereafter until the work has been satisfactorily completed.

Unless an amount per day is set forth in the “Special Provisions” to be deducted from the amount due the Contractor for each day charged in excess of the number specified, the time charge shall be based on the monetary loss suffered by the Owner as the result of such delay. Such deductions shall in no way be considered a penalty, but as compensation to the Owner for the added expense to him for engineering supervision and other costs.

C-8.10 ABANDONMENT OF WORK OR DEFAULT OF CONTRACT

The Engineer may give notice in writing to the Contractor and his surety of delay, neglect, or default stating which if the Contractor:

− Fails to begin work within the time specified, or fails to perform the work with sufficient workmen and equipment;
− Fails to provide materials of sufficient quantity to insure the completion of the work within the contract time; or
− Performs the work unsuitable; or
− Neglects or refuses to remove materials or perform new work such as may have been rejected; or
− Discontinues the work without authority; or
− Refuses to suspend or resume operations when so directed by the Engineer; or
− Becomes insolvent or is declared bankrupt; or
− Commits any act of bankruptcy insolvency; or
− Makes an authorized assignment for the benefit of any creditor; or
− Fails from any other cause whatsoever to carry out the work in an acceptable manner.

The ten (10) days after such notice if given, if a satisfactory effort has not been made by the Contractor or his surety to correct such delay, neglect, or default, the Owner may declare the work abandoned and so notify the Contractor and his surety.

After receiving such notification of abandonment, the Contractor shall not remove from the work any machinery, equipment, tools, materials or supplies then on the site. The Owner shall have the power and authority without violating the contract to take prosecution of the work out of the hands of the contractor and to appropriate or use any or all materials and equipment on the site as may be suitable and acceptable and enter into an agreement for the completion of the contract according to the terms and provisions thereof, or use such other methods as he may elect for the completion of the contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under the contract shall be deducted from any money due or which may become due to the contractor. In the case the cost to the Owner is less than the amount which would have been payable under the contract if it had been completed by the Contractor, then the Contractor shall be entitled to receive the difference. In case the cost to the Owner exceeds the amount which would have been payable under the contract, if it had been completed by the Contractor, the Contractor and his surety shall be liable and shall pay the Owner the amount of such excess.
SECTION C-9
MEASUREMENT AND PAYMENT

C-9.01 MEASUREMENT OF QUANTITIES
All work completed under the Contract will be measured in United States standard measures. Linear and surface measurements will be taken horizontally unless otherwise shown on the Plans. Structures will be measured to the neat lines shown on the Plans.

When any material is cubic yards in the vehicle, such measurement will be made at the point of delivery. The capacity of each vehicle shall be plainly marked on said vehicle and the capacity of marking shall not be changed without written permission of the Engineer. The Engineer shall have authority to require all vehicles to have uniform capacity.

C-9.02 SCOPE OF PAYMENT
The Contractor shall accept the payment as provided in this Contract as full compensation for furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work and for performing all work contemplated and embraced under this contract, as full compensation for loss or damage arising from the nature of the work, or from action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work; as full compensation for all expenses incurred in consequence of the suspension or discontinuance of the work; as full compensation for all expenses incurred in consequence of the suspension or discontinuance of the work herein specified; as full compensation for expenses incurred in any infringement of patent, trade-mark, or copyright; and as full compensation for completing the work in conformity with the requirements of the Plans and Specifications. Payment will be made only on items which are complete, in place, tested and accepted by the owner. Materials on hand shall be considered for payment ONLY when proper PAID invoices are submitted with Contractor’s pay estimates. Materials on hand must be placed in a secured area designed for the project under this contract and be available for inspection by City Engineers at all times. The Contractor must provide an inventory of all materials on a form acceptable to the City Engineer and which must accompany each pay request. The payment of any partial or current estimate shall in no way affect the obligation of the Contractor at his own cost to repair or renew any defective parts of the construction or to replace any defective materials used in the construction and to be responsible for all damages due to such defects. Any items to complete the work indicated on plan shall be considered subsidiary to include positions of work and no further compensation will be made.

No monies payable under this contract, except the estimate for the first month or period, shall become due and payable until the Contractor shall satisfy the Owner that he has fully settled and paid for all materials and equipment used in or upon the work and labor done in connection therewith and the Owner may if he so elects pay any or all bills wholly or in part, and deduct the amount or amounts paid from any estimate(s) except the first estimate.

In event the surety on any bond given by the Contractor becomes insolvent or is placed in the hands of a receiver or has its right to do business in the State revoked by Law, the Owner may if he so elects withhold payment of any or all estimates until the Contractor shall give a good and sufficient bond in lieu of the bond so executed by said surety.

C-9.03 PAYMENT FOR ALTERED QUANTITIES
When alterations in the Plans or quantities of work not requiring supplemental agreements are ordered and performed, the Contractor shall accept payment in full at the contract price for the actual quantities of work done. No allowance for anticipated profits will be made. Increased or
decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

C-9.04 PAYMENT FOR OMITTED ITEMS
When any item ordered omitted from the Contract, the Contractor shall accept payment in full at the contract price for any work actually performed on such item prior to the date of issuance of such order. No allowance will be made for anticipated profits on work ordered omitted. Acceptable materials ordered by the Contractor, or delivered on the work prior to the date of issuance of such order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner. The Contractor shall submit immediately certified statements covering all money expended in the preparation for any item ordered omitted and shall be entitled to reimbursement for any money expended in preparation for any items when such preparation is of no value to the remaining items of the Contract.

C-9.05 PAYMENT FOR EXTRA WORK
Extra work performed under a supplemental agreement will be paid for according to the terms of such supplemental agreement.
Extra work if performed on a force account basis will be paid for as follows:

For all labor and foreman, the Contractor will receive the wage paid on the project for each hour that said labor and foremen are actually engaged on such work to which shall be added the actual cost of premiums for public liability and workmen's compensation insurance and social security taxes for the actual amount of such payroll.

For all materials used on such work the Contractor will receive the actual cost of such materials including freight charges.

For machinery and equipment used on such work the Contractor will receive an agreed rental price for each hour that such machinery and equipment is actually used on such work. The agreed price shall include the cost of fuel, lubrication and repairs.

To the sum of the foregoing an amount equal to fifteen (15) percent thereof will be added, as compensation for the use of small tools, Superintendent's services, and timekeeper's services.

Premium on bond and all other overhead expenses incurred in the prosecution of the extra work including Contractor's profit.

The sum of such payments provided for shall be accepted by the Contractor's as full compensation as provided in C-9.02.

C-9.06 PARTIAL PAYMENTS
Once a month and within the thirty (30) days after submittal of a correct and complete estimate, the Owner shall make a progress payment to the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this Contract. To insure the proper performance of the Contract, the Owner shall retain ten (10) percent ** of the amount of each estimate until final completion and acceptance of all work covered by this Contract.

**NOTE Retainage for construction contracts over four hundred thousand ($400,000) shall be five (5) percent.

In the event that the base bid is less than twenty-five thousand ($25,000) the total contract price will be paid in one payment upon completion and acceptance of the project.
Should any defective material or work be discovered or should a reasonable doubt arise as to the integrity of any part of the work completed prior to final acceptance and payment, there will be deduction from the first estimate presented after the discovery of such work, an amount equal to the value of the defective or questionable work. Such defective work will be made from all subsequent estimates until the defects have been remedied or the cause for doubt removed.

C-9.07 TERMINATION OF THE CONTRACT BY THE CONTRACTOR
If the work is stopped for a period of thirty (30) days under an order of any court of other public authority having jurisdiction, or as a result of an act of government, such as declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or subcontractor or their agents or employees or any other persons performing any of the work under a Contract with the Contractor, or if the work should be stopped for a period of thirty (30) days by the Contractor because the Engineer has not issued a Certificate for payment as provided in C-9.06 or because the Owner has not made payment within the ten(10) days after such stopping of work, then the Contractor may, upon seven (7) additional days written notice to the Owner and the Engineer, terminated the Contract and recover from the Owner payment for all work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including reasonable profit and damages.

C-9.08 TERMINATION OF THE CONTRACT BY THE OWNER
If the Contractor is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency, or if he persistently or repeatedly refused or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen, or proper materials, or if he fails to make prompt payment to Subcontractors or for materials or labor, or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a substantial violation of a provision of the Contracts Documents, then the Owner, upon certification by the Engineer that sufficient cause exists to justify such action, may without prejudice to any right or remedy and after giving the Contractor and his surety, if any, seven (7) days written notice, terminate the employment of the Contractor and take possession of the site and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may finish the work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the work is finished.

C-9.09 UNPAID BALANCE
If the unpaid balance of the Contract Sum exceeds the costs of finishing the work, including compensation for the Engineer’s additional services made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or to the Owner, as the case may be, shall be certified by the Engineer, upon application, and this obligation for payment shall survive the termination of the Contract.

C-9.10 ACCEPTANCE OF FINAL PAYMENT
When the work provided for in the contract has been completed and the final inspection has been made by the Engineer, and all parts of the work have been approved and accepted, the final estimate showing all sums due the Contractor shall be prepared. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. No payment on the final estimate will be made until the Contractor furnishes satisfactory evidence that all claims growing out of lawful demands of laborers, work, men, mechanics, subcontractors, material, men, furnishers of machinery and parts thereof, and suppliers of all kinds have been satisfied.
Upon final payment the Contractor shall execute a certificate and release upon the Owner on the form specified.

**C-9.11 AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS AND RELEASE OF LIENS**

Each and every pay estimate must be accompanied by an “Affidavit of Payment of Debts and Claims and Release of Liens” form (sample of which follows this Section).

**C-9.12 MATERIALS ON HAND INVENTORY**

When materials on hand payment is requested, and “Inventory of Materials on Hand” is required and must be included with Contractor’s Pay Estimate. Proof of payment for materials on hand is also to be included with the Materials Inventory. A sample form follows this section.

**C-9.13 PHOTOGRAPHS**

The Contractor shall submit with each monthly progress pay estimate four (4) each 3 ½" x 5" color photographs depicting generally the work done during that month, and each photograph properly identified and dated.
CITY OF LAREDO – CONTRACTOR’S APPLICATION FOR PAYMENT

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

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CERTIFICATE OF CONTRACTOR:
I certify that all items and amounts shown on this request for partial payment are correct and that all work has been performed and/or materials supplied in full in accordance with the requirements on the contract documents.
(CONTACTOR)

Signature ____________________________ Date ________________ Print Name ____________________________

CERTIFICATE OF FIELD REPRESENTATIVE:
I have checked this request for partial payment against the notes and reports of my inspections of the project and in my opinion the statement of work performed and/or material supplied is accurate and that the contractor is observing the requirements of the contract documents.
(INSPECTOR)

Signature ____________________________ Date ________________ Print Name ____________________________

CERTIFICATE OF ENGINEER:
I certify that I have checked and verified the above and foregoing request for partial payment and that it is a true and correct statement of work performed and/or material supplied by the contractor and that the same has been performed and/or supplied in full accordance with the requirements of the contract documents.
(ENGINEER)

Signature ____________________________ Date ________________ Print Name ____________________________

Recommended for Payment ____________________________
Verified for Payment ____________________________
Approved for Payment ____________________________

Riazul Mia, P.E., CFM
Utilities Director
Utilities Project Manager
Finance Department

John Porter, REM, CFM, CPM
Environmental Director
Environmental Project Manager

Eastern Chacon Creek Interceptor & Drainage Improvements
Measurement and Payment
Project Specifications
Page 5 of 10
AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS AND RELEASE OF LIENS

To:     City of Laredo
        Webb County, Texas

Project:      Eastern Chacon Creek Interceptor and Drainage Improvements

By this instrument the undersigned contractor engaged in the construction of the above project certifies that on this date, or anytime prior thereto, except listed below, contractor has paid in full or has otherwise satisfied all obligations for all materials and for all known indebtedness and claims against the project, its land, improvements and equipment of every kind.

The undersigned hereby certifies that he has received all payments currently due under his contract for work on the project above referred. Therefore, the undersigned does hereby waive and/or release any and all liens against the property, project and as of the _________ day of ____________, ____________.

_________________________
Company Name

STATE OF TEXAS:
COUNTY OF ____________:

Before me, the undersigned authority, on this day personally appeared ________________, known to me to be the person whose name is subscribed to the foregoing instrument, and being first duly sworn, acknowledge to me that he executed the same for the purposes and consideration therein expressed and declared to me that the statements therein are true.

SWORN AND SUBSCRIBED TO before me this _________ day of ____________, ____________.

NOTARY PUBLIC

MY COMMISSION EXPIRES: ___________
MATERIALS ON HAND INVENTORY

Project: Eastern Chacon Creek Interceptor and Drainage Improvements

Contractor: ____________________________________________________________

Estimate # _____  Dates  From: _______________  To: _________________

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<tr>
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<th>Vendor</th>
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<th>Received Current</th>
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</tbody>
</table>

FORM LETTER FOR CERTIFICATE OF WARRANTY

Date: ______________

Mr. Riazul Mia, P.E., CFM  
City of Laredo Utilities Director  
5816 Daugherty Avenue  
Laredo, Texas 78041

Mr. John Porter, REM, CFM, CPM  
City of Laredo Environmental Director  
619 Reynolds Street  
Laredo, Texas 78040

Re: Eastern Chacon Creek Interceptor and Drainage Improvements

Gentlemen:

______________________________ guarantees all materials and workmanship on the above referred project to be free of defects for a period of one (1) year from the date of acceptance by the owner. Upon notice, any defective materials or faulty workmanship developing within this period, will be replace at no cost to the owner.

Sincerely,

___________________________

Company Name

ACKNOWLEDGEMENT

STATE OF TEXAS

COUNTY OF ______________

Before me, Notary Public for and in __________ County, State of _______________ on this personally appeared _________________________ known to me to be person(s) whose name(s) subscribed to the foregoing affidavit and acknowledge to me that he executed the same for the purpose and consideration expressed therein.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, THIS _______ DAY OF _____________, ____________.

____________________________________

Notary Public in and for

_______________ County, State of ____________

My Commission Expires:
FORM LETTER FOR ENGINEERING COMPLETION REPORT

Mr. Riazul Mia, P.E., CFM  
City of Laredo Utilities Director  
5816 Daugherty Avenue  
Laredo, Texas 78041  

Mr. John Porter, REM, CFM, CPM  
City of Laredo Environmental Director  
619 Reynolds Street  
Laredo, Texas 78040  

Re: Eastern Chacon Creek Interceptor and Drainage Improvements

Gentlemen:

In accordance with the contracts between _______________________________ and The City of Laredo, Webb County, Texas, and pursuant to the specifications in the contract documents, I take this opportunity to file this Completion Report with reference to the above mentioned project as follows:

STATE OF _____________________  
COUNTY OF ___________________

This is to Certify that I, _______________________________Registered Professional Engineer, have inspected the work accomplished by __________________________ , and, under contract with The City of Laredo, Webb County, Texas, found that workmanship and materials supplied are in accordance with plans and specifications for said project, and as amended by the “AS-BUILT” drawings.

SIGNED THIS THE __________ DAY OF ____________________, 2019.

__________________________________  
__________________________, P.E.  

P.E. SEAL
**Project Information:**

Eastern Chacon Creek Interceptor and Drainage Improvements  
Location: __________________________

Cost: __________________________  
Start Date: ________________________

Contract/P.O. #: __________________  
Council Acceptance: __________________  
Completion Date: __________________

**Contractor/Sub-Contractor/Vendor Information:**

Name: __________________________  
Address: __________________________

Contact #: ________________________  
Email: ____________________________

**Warranty Information:**

Coverage Type (Detail): __________________________________________________
______________________________________________________________________
______________________________________________________________________

Required Maintenance (Detail): ____________________________________________
______________________________________________________________________
______________________________________________________________________

Manuals Received (if applicable): ______  Expiration Date: ____________________

Copies Provided To: _____________________________________________________

**Warranty Statement:**

We are the ________________________ contractor for the above indicated project. We guarantee our workmanship, equipment, and materials to be free of defects for a period of ______________________ from the completion date.

Signature: ______________________  Date: ______________________

**For Warranty Management Office Only:**

Entered into Warranty Tracker? ______  Entered by: ____________________________

Date Entered: _________________  Warrant Management Account # ____________
Division D

Technical Specifications
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D 102.01 SCOPE
This section shall govern all excavation and backfill which will be encountered during the work, and supplements those paragraphs pertaining to excavation in Sections titled "Specifications for SDR 26-Gravity Sewer Piping", "Water Line Construction", AND "PVC Pipe Water Conduits & Installation" of these specifications.

D 102.02 CLASSIFICATION
All excavation for this Project shall be considered unclassified. The Contractor is expected to determine the nature of the work and to make his bid prices reflective of the actual conditions which will be encountered. No claim for extra compensation shall be made by the Contractor due to rock, or other unfavorable excavation conditions encountered during the course of the work.

D 102.03 EXISTING UTILITIES
Before commencing excavation, the Contractor shall notify all utility companies with sufficient lead time, and confirm the location of existing underground lines and conduits in the work area by calling 811.

D 102.04 CLEARING
The Contractor shall do all clearing, grubbing, etc. necessary to complete the work.

D 102.05 DEWATERING
The Contractor shall provide and maintain adequate equipment to remove and dispose of all surface and ground-water entering excavations, trenches, or other parts of the work.

D 102.06 EXCAVATION
Unless otherwise ordered by the Engineer in writing, trench shall be as indicated in the Drawings, and trenching for water lines shall be excavated to a depth of five feet.

D 102.07 SHEETING AND SHORING
Where necessary to protect workmen, the work, or the existing structures, the Contractor shall sheet, brace, and shore the excavation to prevent caving or sliding. This item is further described in Division D, Section 802, titled "Sheeting and Bracing".

D 102.08 DISPOSAL OF EXCESS SOIL
Unless otherwise specified, the Contractor shall dispose of all unsuitable or excess excavation spoil daily. Disposal shall be made at a location and in a manner which is acceptable to the Owner.

D 102.09 PIPE ZONE
The "pipe zone" shall mean that portion of the trench which extends from 24" above the top of the pipe joints to the bottom of the excavation. "Above the pipe zone" shall mean that portion of the trench which shall extend from 24" above the top of the pipe joints to the top of the finished surface.

D 102.10 BLASTING
Shall be prohibited except where allowed in writing by the City and Engineer. The Contractor shall take all necessary precautions as specified in the General Provisions of these Specifications. The Contractor shall be solely responsible for any damage incurred due to blasting.
D 102.11 OVER EXCAVATION
In the event of over-excavation, the over-excavated depth of the trench shall be filled with the appropriate bedding material.

D 102.12 STABILIZATION
Subgrades for pipe work shall be firm, dense, and thoroughly consolidated. The subgrade shall be free of mud, muck, loose material, and debris and shall remain firm and intact under the workmen's feet.

D 102.13 PIPE EMBEDMENT & PIPE ZONE BACKFILL
The first layer of backfill shall be sufficient to provide a compacted depth of one-half the outside diameter of the barrel. This layer shall be placed by hand and tamped with hand or pneumatic tampers. The rest of the pipe zone shall be placed in a similar manner in layers not to exceed 8" loose measure to the top of the pipe zone. Unless otherwise specified, the embedment and material in the pipe zone shall be zero P.I. sand or gravel material, as specified by the engineer. Select excavation material may be acceptable; however, the contractor shall be required to submit ample sieve analysis results from a reputable independent testing laboratory to the engineer in order to use such materials for embedment. Backfill material containing rock over 3" in any dimension shall not be used in trenches under paved areas. The pipe trench shall be backfilled in a manner so as to prevent future settlement for a period of one year after date of final payment. All secondary backfill material shall be as required on section D-102.14, 2.

Before leaving the work at night or any other time, the upper ends of all pipes shall be securely closed with a tight fitting plug and provisions shall be made to keep the line from floating out of place should the trench fill with water. Any damage to the lines from failure to follow these provisions shall be repaired at Contractor's expense.

Provisions must be made at all times to keep the interior of the pipe that has been laid free from dirt, silt, gravel, and any other foreign matter and any such material that is deposited within the pipe from any cause whatsoever must be removed as the work progresses.

D 102.14 BACKFILLING
All trenches and excavations shall be backfilled within 24 hours after pipes are installed therein unless other means of protecting the pipe is directed by the Engineer. At no times, however, shall any backfilling be done until the Engineer has inspected the pipe to be covered. Backfilling requirements:

Materials:
1) Initial (primary) backfill to a point of 12 inches above the top of pipe shall be done as follows:
   a. Suitable excavated material placed in uniform lifts not more than 6 inches in depth and shall be compacted to the density specified herein. The maximum dry density and optimum moisture shall be determined as per TxDOT Tex-114-E. Test for in place density shall be in accordance with TxDOT Tex-115-E within 24 hours after compaction. Each lift shall be compacted to the required density and moisture as shown bellow, unless otherwise shown on the plans:

<table>
<thead>
<tr>
<th>Subgrade Material</th>
<th>Density</th>
<th>Moisture Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI ≤ 20</td>
<td>≥ 95% of Max Dry Density</td>
<td>± 2% of Opt. or greater</td>
</tr>
<tr>
<td>PI &gt; 20</td>
<td>≥ 95% of Max Dry Density</td>
<td>≥ Opt. Moisture</td>
</tr>
</tbody>
</table>

   b. Zero PI Sand. When shown on the plans, backfill the primary trench zone with zero PI sand. Non-plastic material meeting the specifications below will not be required to be tested for density.
OPTION ZERO P.I.
SIEVE ANALYSIS

<table>
<thead>
<tr>
<th>Sieve</th>
<th>Percentage</th>
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<tr>
<td>3/8” sieve</td>
<td>95-100%</td>
</tr>
<tr>
<td>1/4” sieve</td>
<td>85-100%</td>
</tr>
<tr>
<td>No.40 sieve</td>
<td>75-100%</td>
</tr>
<tr>
<td>No.80 sieve</td>
<td>20-90%</td>
</tr>
<tr>
<td>No.200 sieve</td>
<td>00-20%</td>
</tr>
</tbody>
</table>

The sand shall be placed in layers no to exceed 10 inches in depth and lightly tamped to consolidate the mass against pipe and earth surfaces.

There is no separate item for sand, unless shown on the plans as a separate pay item.

c. Flowable Backfill. When shown on the plans, conform with Division D Section 134. There is no separate item for sand, unless shown on the plans as a separate pay item.

d. Select Fill or Flexible Base (gravel, caliche, crushed limestone).

Clean gravel approved by the engineer may be used for backfill from the bottom of the trench to the 12 inches above the top of pipe. The gravel shall be placed in layers no to exceed 10 inches in depth and lightly tamped to consolidate the mass against pipe and earth surfaces.

Flexible base material (caliche, crushed limestone) may be used from the bottom of the trench to 12 inches above the top of the pipe or to the bottom of the street base in lifts no to exceed 8 inches. Material shall contain the required moisture to obtain the density for each layer to no less of 95% of the maximum dry density. There is no separate item for sand, unless shown on the plans as a separate pay item.

2) Secondary Backfill. After the initial backfill has been completed at a point of 12 inches above the top of pipe, the material for secondary backfill shall be placed in uniform layers no more than 10 inches in depth (loose measurement) and shall be compacted to the required density specified herein. Excavation material used for secondary backfill shall comply with the following unless shown on the plans:

### Secondary Backfill

#### Under Pavement

<table>
<thead>
<tr>
<th>SubgradeMat.</th>
<th>PI≤20</th>
<th>PI&gt;20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>≥95%MaxDryDens.</td>
<td>≥95%MaxDryDens.</td>
</tr>
<tr>
<td>MoistureCont.</td>
<td>±2%ofOpt.orgreater</td>
<td>≥Opt.Moisture</td>
</tr>
</tbody>
</table>

#### Within the R.O.W. or Easement

<table>
<thead>
<tr>
<th>SubgradeMat.</th>
<th>PI≤20</th>
<th>PI&gt;20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>≥90%MaxDryDens.</td>
<td>≥90%MaxDryDens.</td>
</tr>
<tr>
<td>MoistureCont.</td>
<td>±2%ofOpt.orgreater</td>
<td>≥Opt.Moisture</td>
</tr>
</tbody>
</table>
a. **Timing of backfill:** All trenches and excavation shall be backfilled within twenty-four (24) hours after pipes are installed, unless other means of protecting pipe is directed by the Engineer. At no time, however, shall any backfilling be done until the Engineer has inspected the pipe to be covered. In the case the trench cannot be backfilled, steel plates shall be used to protect the public.

b. **Backfill placement:** After the bedding has been prepared and the pipes installed as required by the pertinent specifications, selected materials from excavation or borrow shall be placed along both sides of the pipe equally in uniform layers not exceeding six (6) inches in depth (loose measurement) in the primary backfill zone and ten (10) inches in depth (loose measurement) in the secondary backfill zone, wetted if required, and thoroughly compacted so that on each side of the pipe there shall be a berm of thoroughly compacted material at least as wide as the external diameter of the pipe, except insofar as undisturbed material obstructs into this area.

c. **Addition to backfill:** Whenever excavation is made for installing pipe culverts or sewers across private property or beyond the limits of the embankment, the top soil removed in excavating the trench shall be kept separate and replaced, as nearly as feasible, in its original position, and the entire area involved in the construction operations shall be restored to a presentable condition.

d. **Earth trench:** In earth trench, the pipe shall be placed on the natural, undisturbed earth foundation with the trench bottom flat or nearly so. Where rock, shale, or boulders are encountered in the trench, the same shall be removed to a depth of six (6) inches below the grade line and the trench shall be refilled with good, sound earth, gravel, or granular material up to original grade and tamped into place.

e. **Inspection:** Prior to the final approval of the utility lines, the Engineer, accompanied by the Contractor's representative, shall make a thorough inspection by appropriate methods of the entire installation. Any indication of defects in material or workmanship or obstruction in the pipe due to the Contractor's negligence shall be corrected by the Contractor without additional compensation and in a manner as directed by the Engineer.

f. **Corrective Action:** The Contractor shall be responsible for correcting any deficient condition identified as a result of inspection/testing at Contractor's expense. Retesting shall be performed to verify that any deficient condition has been successfully corrected at Contractor's expense.

1. **GENERAL:** There are five (5) different conditions for backfill of proposed pipe. The plans indicate which condition shall prevail in each section or block of the "pipe route". If the plans do not indicate a backfill condition, Condition "A" shall prevail.

Please refer to the appendix for Utility Trench Backfill Methods.

**D 102.15 WATER JETTING**

Only in “Condition C” above, and for pipe diameters of 12” or less, and in trenches 8’ or less, and only when authority is obtained in writing from the City Engineer, backfill may be compacted with water by use of the jetting method. When using the jetting method, backfill above the pipe zone shall be placed in lifts not to exceed 5 feet. Water jetting shall be delivered under sufficient volume and pressure through an approved jetting hose and pipe nozzle. The jetting hose shall have a minimum inside dimension of two inches (2”). The jetting hose shall be connected to an approved minimum two inches
(2") water pump capable of delivering water at the volume and pressure as required by the Engineer. The pipe nozzle shall be of sufficient length to introduce the water at a depth of not less than one foot (1’) above the preceding lift. Points of trench jetting shall be staggered along the length of the trench and spaced at not more than three feet (3’) on centers. Each five feet (5’) lift shall be jetted initially at a depth of not more than one foot (1’) above the preceding lift. Sufficient water shall be introduced into the secondary backfill to cause complete subsidence of the backfill and develop free standing water at the surface of each lift. After the final lift has been jetted as approved, twelve (12) hours shall be allowed for the reduction of the materials moisture content. When the backfill moisture content is acceptable for mechanical or pneumatic compaction, the surface shall be compacted to the satisfaction of the Engineer. The surface of the final lift of trenches subject to traffic shall be compacted by ditch tamping equipment.

D 102.16 SITE RESTORATION
The Contractor shall remove and dispose in an acceptable manner of all excess construction material, trash, debris, excess spoil material, etc., from the construction site. All pavement, fences, drainage structures, drainage ditches, and etc., shall be replaced to a condition as good as, or better than, the original structure as existed. The site shall be graded to a smooth well drained condition.

D 102.17 EXISTING GROUND WATER CONDITIONS
Where ground water conditions exist, the following shall apply inclusive of crushed stone or gravel backfilling. No pipe shall be laid in trench containing water. There will be no separate payment for trench dewatering or the materials, equipment, or labor required to reestablish wet trenches to the conditions and specifications required herein. Non-Storm Water Discharge Permit will need to be obtained from the Environmental Services Department.

D 102.18 DISPOSAL OF EXCAVATED MATERIALS
Excavated materials, so far as needed and of a suitable and acceptable character, shall be piled adjacent to the excavations to be used as backfill as required. All excavated material that is unsuitable for backfilling purposes or which is in excess of the amount required or needed to satisfactorily complete the backfill, shall be disposed of daily. The character and suitability of all backfill material shall meet the approval of the Engineer. Desirable top soil, or sod, etc., shall be carefully piled separately from the other excavated material so that it can be placed in this original position when required. Excavated material shall be handled at all times in such manner as to cause a minimum of inconvenience to public travel and to permit safe and convenient access to private and public properties adjacent to or along the line of the work. In parkways and easements, where it is necessary to deposit excavated materials on lawns during the progress of the work, care shall be taken to prevent damage to such lawns. Where damage is done to such lawns all expense of replacing the lawn shall be borne by the Contractor.

D 102.19 REMOVAL AND REPLACEMENT OF SOD, SHRUBBERY, PLANTS, ETC.
Where it is necessary to remove the sod, shrubbery, plants, etc., in order to make any excavation for this work, such areas as are backfilled shall have the same sod, shrubbery, plants, etc. replaced in good condition or if necessary to furnish new sod, shrubbery, or plants of the same kind and in good condition, same shall be furnished by the Contractor at his expense.

The sod, where removal is deemed necessary, shall be removed in squares cut out with a sharp spade or other satisfactory tool; the square shall be of such sizes that they may be conveniently handles without breaking. Such sod shall be removed in layers of not less than four inches (4") depth and shall be stored and given proper attention to protect sod from drying out, pending the time of replacement.
If trees and plants shall be removed, this work shall be done in the approved manner as to require protection of roots, branches, etc.; when backfilling is completed the trees and plants shall be replaced in their original position or as near such position as possible.

If irrigation system has to be removed and replaced, refer to Section 806.

**D 102.20 PROTECTION OF TREES, PLANTS, SHRUBBERY, ETC.**

In developed areas where trees, plants, shrubbery, etc., are adjacent to the line of work, the Contractor shall protect such trees, plants, or shrubbery by wooden boxes, frames, or guards of sufficient strength to prevent any injury from machinery, trucks, or workmen during the prosecution of the work.

**D 102.21 PAYMENT**

No pay item will be included in the proposal nor direct payment made for excavation and backfill. The cost for placing the material shall be included in the unit price bid for the specific work function.
**SECTION 127**  
**JACKING AND / OR BORING PIPE AND CASING FOR FUSIBLE PVC INSTALLATION**

**D 127.01 DESCRIPTION**  
This item shall govern for the furnishing and installation of pipe by the methods of jacking and/or boring as shown on the plans in conformity with this specification.

**D 127.02 GENERAL**  
A geotechnical baseline report prepared by the engineer may be made available prior to bidding for the project. If geotechnical report is not available, the contractor is responsible for any additional geophysical information necessary to provide a responsible bid.

1. **Permits:** Owner/Contractor shall obtain a right of way use permit for the work from City of Laredo and any other agencies.

2. **Contractor Qualifications:**
   2.1 The contractor shall be trained by the respective manufacturer of the equipment in the use of the machinery. The contractor shall provide certification from the manufacturer that the contractor has been trained and is proficient in the use of equipment. Only the contractor's employee trained and certified by the manufacturer shall be allowed to operate the equipment during the project.

   2.2 The contractor shall submit job history and reference list of equal or greater size projects successfully completed including the owner, engineer, addresses, phone numbers, and dates that said projects were completed.

   2.3 All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety. The Supervisor must have at least two years directional drilling experience. A competent and experienced supervisor representing the Drilling Contractor shall be present at all times during the actual drilling operations. A responsible representative who is thoroughly familiar with the equipment and type work to be performed must be in direct charge and control of the operation at all times.

**D 127.03 MATERIALS**

1. **Pipe:** Pipe shall be of the types and sizes shown on the plans and shall conform to the requirements of Section 201 “Fusible Polyvinylchloride Pipe for Installation by Horizontal Directional Drill (HDD) or Jack and Bore.”

2. **Liner plate:** As shown on project plans.

3. **Grout:** Grout shall be sand cement slurry containing a minimum of seven (7) sacks of Portland Cement per cubic yard of slurry. All slurry shall be plant batched and transit mixed.

4. **Steel pipe:** casing shall be manufactured from steel conforming to ASTM Grade 2 as amended to date, with minimum yield strength of 35,000 psi before cold forming. Pipe may be straight seam or spiral welded. The diameter and wall thickness of the steel piping shall be as listed in the following:
<table>
<thead>
<tr>
<th>Pipe Size (inches)</th>
<th>Casing Size ² (inches)</th>
<th>Casing Thickness ¹ (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>8</td>
<td>0.250</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>0.250</td>
</tr>
<tr>
<td>8</td>
<td>16</td>
<td>0.375</td>
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<tr>
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</tr>
<tr>
<td>30</td>
<td>42</td>
<td>0.625</td>
</tr>
<tr>
<td>36 ³</td>
<td>42</td>
<td>0.625</td>
</tr>
</tbody>
</table>

5. Casing End Seals: Shall be used to completely close both openings on either side of the casing. These end seals shall be Pull on (seamless), Wrap around, Zipper or Molded with stainless steel straps for securing to the carrier pipe and casing. End seals shall be constructed of specially compounded synthetic rubber a minimum thickness of 1/8 inch.

D 127.04 CONSTRUCTION METHODS

Conform to the requirements of the City, Texas Department of Transportation, Railroad Company, or County having jurisdiction over the right-of-way involved, as to details of construction methods and time of construction. All work necessary to meet the requirements of the City, Texas Department of Transportation, Railroad Company, or County will be considered incidental to the installation of the pipeline in the right-of-way. The Contractor shall abide by the more stringent of these specifications, or the specifications of the regulatory agencies.

1. Jacking: Suitable pits or trenches shall be excavated for the purpose of jacking operations for placing end joints of the pipe. When trenches are cut in the sides of embankment such work shall be securely sheeted and braced. Jacking operations shall in no way interfere with the operation of railroads, streets, highways or other facilities and shall not weaken or damage such facilities and in accordance with TxDOT Utility Accommodation Policy, Jacking pipe in State right-of-way is prohibited. Jacking in City ROW will be considered with written permission by the Engineer only. Barricades and lights shall be furnished as directed by the Engineer to safeguard traffic and pedestrians.

   1.1 Location - A minimum distance from the edge of the paved shoulder or curb, to the face of any access pit, equipment, and supplies, shall be a minimum of 10 feet along arterials streets and a minimum of 5 feet along local streets. Any deviation from these distances shall require prior approval from the Engineer.

   1.2 Equipment shall not be used to replace fencing to protect access pits.

   1.3 The pipe to be jacked shall be set on guides to support the section of pipe being jacked and to direct it in the proper line and grade. Embankment material shall be excavated just ahead of the pipe and material removed through the pipe, and the pipe forced through the opening thus provided.

   1.4 The excavation for the underside of the pipe, for at least one-third of the circumference of the pipe, shall conform to the contour and grade of the pipe. A clearance of not more than two inches (2") may be provided for the upper half of the pipe.

   1.5 Generally, pipe shall be jacked from downstream end. Permissible lateral or vertical variation in the final position of the pipe from line and grade will be as show on the plans or as determined by the Engineer.

   1.6 Any pipe damaged in jacking operations shall be removed and replaced at the Contractor’s expense.
1.7 Jacking pits shall be backfilled immediately upon completion of jacking operations. The backfill shall be compacted as per Section 102.

2. Boring: Excavation for “Boring” pits and installation of shoring shall be as outlined under “Jacking”. Variation in line and grade shall apply as specified under “Jacking”.
   2.1 Dry Boring (auger bore)
      2.1.1 All bores will be accomplished by dry mechanical bore unless otherwise pre-approved by engineer.
      2.1.2 Only workmen experienced in boring operations shall perform the work.
      2.1.3 The use of water or other fluids in connection with the boring operation will NOT be permitted except for a minor required amount of bentonite solution for cutting head.
      2.1.4 The casing pipe shall be placed in the bore hole simultaneously while boring is being performed. Installing the encasement conduit immediately by pulling it in place from opposite the boring machine or by jacking the conduit through the bore is not acceptable. Take proper care to secure the joints of the conduit as subsequent sections are installed by welding joints. Provide a steel rail or timber cradle in the pit to support and guide the conduit in its installation.
      2.1.5 If after completion of the installation of the conduit, there is more than one inch (1") clearance between the outside of the barrel of the conduit and the wall of the bore, grouting of these voids will be required. If during construction of the bore, a cave-in occurs within the bore, grouting of the voids between the conduit and the walls of the bore will be required throughout the length of the bore.
   2.2 Wet Boring
      2.2.1 All bores will be accomplished by dry mechanical bore unless otherwise pre-approved by the Engineer.(see above)
      2.2.2 Only workmen experienced in boring operations shall perform the work.
      2.2.3 The use of water or other fluids in connection with the boring operation will be permitted only to lubricate cuttings. Jetting will not be permitted. In consolidated soil formations, a gel-forming colloidal drilling fluid consisting of at least ten (10%) percent of high-grade bentonite may be used to consolidate cuttings of the bit, seal the walls of the hole, and lubricate removal of cuttings and installation of the pipe immediately thereafter.
      2.2.4 While boring is being performed, install the encasement conduit immediately by pulling it in place from opposite the boring machine or by jacking the conduit through the bore. Encasement conduit may be placed after the boring operation is complete, if permission is obtained from the City. Take proper care to secure the joints of the conduit as subsequent sections are installed, by use of cables or welding joints. Provide a steel rail or timber cradle in the pit to support and guide the conduit in its installation.
      2.2.5 If after completion of the installation of the conduit, there is more than one inch (1") clearance between the outside of the barrel of the conduit and the wall of the bore, grouting of these voids will be required. If during construction of the bore, a cave-in occurs within the bore, grouting of the voids between the conduit and the walls of the bore will be required throughout the length of the bore.
      2.2.6 Grouting material and equipment shall be on the jobsite before beginning installation of the conduit, in order that the grouting around the encasement conduit is to be started immediately after pipe is in place.

3. Support of pipes across bore or tunnel pits: After completion of the bore or tunnel and installation of the carrier pipe with the bore or tunnel, remove all loose earth and debris from the pit down to undisturbed earth. Pour a continuous 2,000 psi concrete or cement stabilized sand support under the carrier pipe from the edge of the bore or tunnel to the first joint in the trench.
past the end of the pit. The concrete support shall be brought up to the horizontal centerline of
the pipe.

4. Joints: Joints for pipe for casing sections of “Jacking”, “Boring” shall be joined by full penetration
welds across the entire circumference of the casing pipe. Water tight pipe joints are required to
ensure the integrity of the roadbed. Casing pipe shall be constructed to prevent water leakage
or earth infiltration throughout its entire length.

5. Lubrication Fluids:
   5.1 Lubrication fluids are specifically required for this method regardless of the soil conditions.
       Any deviation from the use of lubrication shall require prior approval from the Engineer.
   5.2 Lubrication fluids, consisting of a mixture of water and bentonite or bentonite/polymer,
       shall be used in the annular space between the casing being installed and the native soil.
       Lubrication may also be used inside the casing pipe to facilitate spoil removal.
   5.3 Grease is not allowed for use as lubrication for this purpose.

6. Pipe Locating and tracking: One of the following tracking, locating, and guidance systems shall
   be used, unless an alternate is approved by the Engineer.
   6.1 Waterline system.
   6.2 Mechanical control head.
   6.3 Electronic (inertial) control head.
   6.4 Walkover system. Laser guided tunnel attachment.
   6.5 Laser guided pilot rod.

7. Settlement/Heaving Monitoring
   7.1 This method shall be performed in a manner that will minimize the movement of the
       ground in front of, above, and surrounding the HAB operation; and will minimize
       subsidence of the surface above and in the vicinity of the boring. The ground shall be
       supported in a manner to prevent loss of ground and keep the perimeter and face of the
       boring stable at all times, including during shutdown periods.
   7.2 Potential heave or settlement shall be monitored at each shoulder point, edge of
       pavement, the edge of each lane (or centerline for two lane roads), and otherwise at 50
       foot intervals along the pipe centerline.
   7.3 A survey shall be performed one day prior to initiating this operation at each required
       monitoring location. A similar survey shall then be performed at each location, on a daily
       basis, until the permitted activity has been completed. All survey readings shall be
       recorded to the nearest one-hundredth (0.01) of a foot. Digital photographs of the
       pavement conditions shall also be taken prior and after the pipe installation.
   7.4 All operations shall stop immediately whenever monitored points indicate a vertical change
       in elevation of 1/2 inch or more, or any surface disruption is observed. The Contractor
       shall then immediately report the amount of settlement to the Engineer/ Inspector.

8. Groundwater Control
   8.1 Dewatering shall be conducted whenever there is a high ground water table level to
       prevent flooding and facilitate the operation. The water table elevation shall be maintained
       at least 2 feet below the bottom of the casing at all times. When needed, dewatering may
       be initiated prior to any excavation.
   8.2 Minor water seepage or pockets of saturated soil may be effectively controlled through
       bailing or pumping. This control shall be accomplished without removing any adjacent soil
       that could weaken or undermine any access pit, its supports, or other nearby structure.
   8.3 Larger volumes of ground water shall be controlled with one or more well points or with
       staged deep wells. Well points and staged deep well pumping systems shall be installed
and operated without damage to property or structures, and without interference with the
rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of
other contractors. Any pumping methods used for de-watering and control of ground water
and seepage shall have properly designated filters to ensure that the adjacent soil is not
pumped along with the water. Well diameter, well spacing and the pump’s pumping rate,
shall provide adequate draw down of the water level. Wells shall be located to intercept
ground water that otherwise would enter the access pit excavation and interfere with the
work. Upon removal of a well, the hole shall be filled and grouted according to the
specifications identified as flowable fill, and plug drill holes as directed by the Engineer.

8.4 Existing storm sewers shall only be used to discharge water from the dewatering operation
in accordance with a permit obtained from the appropriate storm sewer owner. Filters or
sediment control devices shall be required to ensure that the existing system is not
adversely affected by construction debris or sediment.

8.5 If grouting is used to prevent ground water from entering the area of the access pit, the
grouting shall be installed without damage to property or structures and without
interference with the rights of the public, owners of private property, pedestrians, vehicular
traffic, or the work of other contractors. The material properties of the grout shall conform
to the specifications identified as flowable fill.

9. Failure

9.1 Should anything prevent completion of this operation, the remainder of the pipe shall be
constructed and/or abandoned by methods approved by the Engineer.

9.2 Abandonment of any component of the installation shall only be allowed as approved by
the Engineer.

10. Grouting of Bores: Space between pipe and liner, pipe and limits of excavation, and liner and
limits of excavation shall be pressure grouted, unless otherwise specified on the plans.

11. Spoils: Spoil locations shall be pre-approved by the engineering inspector. When no suitable
location for spoil can be found on site, the contractor shall be required to haul and dispose of
this material at no extra cost. Where spoils are to be placed on parking areas (asphalt or
concrete), sidewalks, or other paved surfaces, the spoils shall be placed on a barrier to prevent
the soil from embedding into the paved surface.

D 127.05 CONTAMINATION
When an area of contaminated ground is encountered, all operations shall stop immediately, and shall
not proceed until approved by the Engineer/Inspector.

Any slurry shall be tested for contamination and disposed of in a manner, which meets Local, State
and/or Federal requirements.

D 127.06 WORKSITE RESTORATION
1. Access pits and excavations shall be backfilled with suitable material, and in a method
approved by the Engineer/Inspector as per section 102. Any embedded supports shall be
removed to 10 feet below the original ground surface. The disturbed work site area shall be
restored to existing grades and original material condition.

2. The disturbed grass-surface area shall be topsoiled, seeded, fertilized, mulched, and anchored.

3. Upon completion of the work, the contractor shall remove and properly dispose of all excess
materials and equipment from the work site.
**D 127.07 MEASUREMENT**
Jacking and boring shall be measured by the number of linear feet of pipe and casing in place. Measurement will be made from end to end of the liner plate and shall include the liner plate and installed pipe as shown on the plans.

**D 127.08 PAYMENT**
The work performed and material furnished as specified by this item, measured as provided above shall be paid for at the contract bid price per lineal foot for pipe jacked, or bored, which price shall be full compensation for furnishing all casing and carrier pipe of the type shown on the project plans and all materials, labor, tools, equipment, and incidentals necessary to complete the work, including excavation, grouting, backfilling, pipe restraint system, casing spacers, end seals, welding, bore pits, shoring, bracing, skid foundations, restoration to original ground conditions, and disposal of surplus material.
SECTION 128
DISPOSAL OF WASTE MATERIAL AND SALVAGEABLE MATERIAL

D 128.01 GENERAL
Section includes disposal of waste material and salvageable material.

D 128.02 SUBMITTALS
A. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances, TCEQ and/or EPA.

B. Submit a copy of written permission from a property owner, along with description of property prior to disposal of excess material adjacent to the Project. Submit a written and signed release from property owner upon completion of disposal work.

EXECUTION

D 128.03 SALVAGEABLE MATERIAL
Excavated Material: when indicated on plans, load haul, and deposit excavated material at a location or locations shown on plans outside the limits of project.

Base, Surface, and Bedding Material: Local shell, gravel, bituminous, or other base and surfacing material designated for salvage.

Pipe Culvert: Load culverts designated for salvage into designated trucks.

Other Salvageable Materials: Conform to requirements of individual specification section. Coordinate disposal of material with Environmental Services Director.

D 128.04 EXCESS MATERIAL
A. Vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage, shall become property of the Contractor and shall be removed from the job site and legally disposed of.

B. Excess soil may be deposited on private property adjacent to the project when written permission is obtained from property owner. See Paragraph 128.02B above.

C. Waste materials shall be removed from the site on a daily basis, such that the site is maintained in a neat and orderly condition.

D 128.05 MEASUREMENT AND PAYMENT
There will be no separate payment for waste material disposal; all materials, manipulation, labor, tools, equipment, and incidentals necessary to complete the work shall be included in the various bid items involved.
SECTION 201
FUSIBLE POLYVINYLCHLORIDE PIPE FOR INSTALLATION BY
HORIZONTAL DIRECTIONAL DRILL (HDD) OR JACK AND BORE

D 201.01 DESCRIPTION

A. Scope
1. This section specifies fusible polyvinylchloride pipe, including standards for dimensionality, testing, quality, acceptable fusion practice, safe handling, storage and installation of the pipe by horizontal directional drilling, directional boring, or guided boring.

B. Requirements
1. Contractor shall provide fusible polyvinylchloride pipe conforming to all standards and procedures, and meeting all testing and material properties as described in this specification for installation by horizontal directional drilling.

2. Contractor shall be responsible for all installation processes and procedures associated with the installation by horizontal directional drilling in accordance with this specification.

C. Pipe Description
1. Pipe Supplier shall furnish fusible polyvinylchloride pipe conforming to all standards and procedures, and meeting all testing and material properties as described in this specification.

2. Pipe shall conform to the following dimensionality and general characteristics table:

<table>
<thead>
<tr>
<th>Pipe Description</th>
<th>Nominal Diameter (in.)</th>
<th>DR</th>
<th>Color</th>
<th>Pressure Class (psi)</th>
<th>Required Inner Diameter (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36” DR21 FPVC</td>
<td>36”</td>
<td>21</td>
<td>Green</td>
<td>200</td>
<td>34.43”</td>
</tr>
<tr>
<td>30” DR21 FPVC</td>
<td>30”</td>
<td>21</td>
<td>Green</td>
<td>200</td>
<td>28.77”</td>
</tr>
</tbody>
</table>

D 201.02 QUALITY ASSURANCE

A. References
1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those other standards are included as references under this section as if referenced directly. In the event of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of design, bid, or construction, whichever is earliest. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

3. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.
### Reference

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI/AWWA C110/A21.10</td>
<td>American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids</td>
</tr>
<tr>
<td>AWWA C605</td>
<td>Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water</td>
</tr>
<tr>
<td>AWWA C651</td>
<td>Standard for Disinfecting Water Mains</td>
</tr>
<tr>
<td>AWWA C900</td>
<td>Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in. (100mm Through 300mm), for Water Distribution</td>
</tr>
<tr>
<td>AWWA C905</td>
<td>Standard for Polyvinyl Chloride (PVC Pressure Pipe and Fabricated Fittings, 14 in. through 48 in. (350mm Through 1200mm), for Water Distribution and Transmission</td>
</tr>
<tr>
<td>ASTM C923</td>
<td>Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals</td>
</tr>
<tr>
<td>ASTM D1784</td>
<td>Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds</td>
</tr>
<tr>
<td>ASTM D1785</td>
<td>Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120</td>
</tr>
<tr>
<td>ASTM D2152</td>
<td>Test Method for Degree of Fusion of Extruded Poly (Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion</td>
</tr>
<tr>
<td>ASTM D2241</td>
<td>Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)</td>
</tr>
<tr>
<td>ASTM D2665</td>
<td>Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings</td>
</tr>
<tr>
<td>ASTM D3034</td>
<td>Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings</td>
</tr>
<tr>
<td>ASTM F477</td>
<td>Elastomeric Seals (Gaskets) for Joining Plastic Pipe</td>
</tr>
<tr>
<td>ASTM F679</td>
<td>Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings</td>
</tr>
<tr>
<td>ASTM F1057</td>
<td>Standard Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique</td>
</tr>
<tr>
<td>ASTM F1417</td>
<td>Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air</td>
</tr>
<tr>
<td>UNI-B-6</td>
<td>Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe</td>
</tr>
<tr>
<td>UNI-PUB-08</td>
<td>Tapping Guide for PVC Pressure Pipe</td>
</tr>
<tr>
<td>NSF-14</td>
<td>Plastics Piping System Components and Related Materials</td>
</tr>
<tr>
<td>NSF-61</td>
<td>Drinking Water System Components—Health Effects</td>
</tr>
<tr>
<td>PPI TR-2</td>
<td>PVC Range Composition Listing of Qualified Ingredients</td>
</tr>
</tbody>
</table>

### B. Manufacturer Requirements

A. All piping shall be made from PVC compound conforming to cell classification 12454 per ASTM D1784

### C. Fusion Technician Requirements

1. Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.
D. Specified Pipe Suppliers
   1. Fusible polyvinylchloride pipe shall be used as manufactured under the trade names Fusible C-900®, Fusible C-905®, and FPVC®, for Underground Solutions, Inc., Poway, CA, (858) 679-9551. Fusion process shall be as patented by Underground Solutions, Inc., Poway, CA, Patent No. 6,982,051. Owner and engineer are aware of no other supplier of fusible polyvinylchloride pipe that is an equal to this specified pipe supplier and products.

E. Warranty
   1. The pipe shall be warranted for one year per the pipe supplier's standard terms.
   2. In addition to the standard pipe warranty, the fusion services shall be warranted for one year per the fusion service provider's standard terms.

F. Pre-Construction Submittals
   1. The following PRODUCT DATA is required from the pipe supplier and/or fusion provider:
      1.1 Pipe Size
      1.2 Dimensionality
      1.3 Pressure Class per applicable standard
      1.4 Color
      1.5 Recommended Minimum Bending Radius
      1.6 Recommended Maximum Safe Pull Force
      1.7 Fusion technician qualification indicating conformance with this specification
   2. The following WORK PLAN AND INFORMATION is required from the contractor and/or horizontal directional drilling Contractor. This WORK PLAN AND INFORMATION shall also be supplied to the pipe supplier, should it be requested:
      2.1 Work plan shall include for each HDD installation any excavation locations and dimensions, interfering utilities, bore dimensions and locations including bend radii used, and traffic control schematics.
      2.2 A project safety and contingency plan which shall include but shall not be limited to drilling fluid containment and cleanup procedures, equipment and plan for compromised utility installations including electrical and power lines, water, wastewater and any other subsurface utility in the area.
      2.3 An HDD schedule identifying daily work hours and working dates for each installation.

G. Post-Construction Submittals
   1. The following AS-RECORDED DATA is required from the contractor and/or fusion provider to the owner or pipe supplier upon request:
      1.1 Approved datalogger device reports
      1.2 Fusion joint documentation containing the following information:
         1.2.1 Pipe Size and Thickness
         1.2.2 Machine Size
         1.2.3 Fusion Technician Identification
         1.2.4 Job Identification
         1.2.5 Fusion Joint Number
         1.2.6 Fusion, Heating, and Drag Pressure Settings
         1.2.7 Heat Plate Temperature
         1.2.8 Time Stamp
         1.2.9 Heating and Cool Down Time of Fusion
         1.2.10 Ambient Temperature
1.3 As-recorded Information
1.3.1 The as-recorded plan and profile will reflect the actual installed alignment, and reflect the horizontal offset from the baseline and depth of cover.
1.3.2 All fittings, valves, or other appurtenances will also be referenced and shown.
1.3.3 A daily project log, along with tracking log sheets, should they be used, shall be provided. Tracking log sheet data, should it be employed, shall include any and all that apply, including inclination, depth, azimuth, and hydraulic pull-back and rotational force measured.

**D 201.03 PRODUCTS**

A. Fusible Polyvinylchloride Pressure Pipe for Wastewater Conforming to AWWA C905 Dimensionality
1. Fusible polyvinylchloride pipe shall conform to AWWA C905 standard.

2. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

3. Fusible polyvinylchloride pipe shall be manufactured in a standard 40’ nominal length, or custom lengths as specified.

4. Fusible polyvinylchloride pipe shall be green in color for wastewater use.

5. Pipe shall be marked as follows:
   5.1 Nominal pipe size
   5.2 PVC
   5.3 Dimension Ratio, Standard Dimension Ratio, or Schedule
   5.4 AWWA pressure class
   5.5 AWWA standard designation number
   5.6 Extrusion production-record code
   5.7 Trademark or trade name
   5.8 Cell Classification 12454 and/or PVC material code 1120 may also be included

6. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

B. Fusible Polyvinylchloride Non-Pressure Pipe for Wastewater or Surface Water
1. Fusible polyvinylchloride pipe shall conform to ASTM D3034 or ASTM F679.

2. Fusible polyvinylchloride pipe may instead conform to AWWA C900 or AWWA C905, ASTM D2241 or ASTM D1785 for standard dimensionality, as applicable.

3. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

4. Fusible polyvinylchloride pipe shall be manufactured in a standard 40’ nominal length, or custom lengths as specified.

5. Fusible polyvinylchloride pipe shall be green in color for wastewater use. Fusible
polyvinylchloride pipe shall be white in color for surface or storm water use.

6. Pipe shall be marked as follows:
   6.1 Nominal pipe size
   6.2 PVC
   6.3 Dimension Ratio, Standard Dimension Ratio, or Schedule
   6.4 Pressure class or standard pressure rating
   6.5 Standard designation number or pipe type
   6.6 Extrusion production-record code
   6.7 Trademark or trade name
   6.8 Cell Classification 12454 and/or PVC material code 1120 may also be included

7. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

C. Fusion Joints
   1. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier’s written guidelines for this procedure. All fusion joints shall be completed as described in this specification.

D. Connections and Fittings for Pressure Applications
   1. Connections shall be defined in conjunction with the coupling of project piping, as well as the tie-ins to other piping systems.

2. Ductile Iron Mechanical and Flanged Fittings
   2.1 Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard ductile iron fittings conforming to AWWA/ANSI C110/A21.10, or AWWA/ANSI C153/A21.53 and AWWA/ANSI C111/A21.11.
   2.2 Connections to fusible polyvinylchloride pipe may be made using a restrained or non-restrained retainer gland product for PVC pipe, as well as for MJ or flanged fittings.
   2.3 Bends, tees and other ductile iron fittings shall be restrained with the use of thrust blocking or other means as indicated in the construction documents.
   2.4 Ductile iron fittings and glands must be installed per the manufacturer’s guidelines.

3. PVC Gasketed, Push-On Fittings
   3.1 Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard PVC pressure fittings conforming to AWWA C900 or AWWA C905.
   3.2 Acceptable fittings for use joining fusible polyvinylchloride pipe other sections of fusible polyvinylchloride pipe or other sections of PVC pipe shall include gasketed PVC, push-on type couplings and fittings, including bends, tees, and couplings as shown in the drawings.
   3.3 Bends, tees and other PVC fittings shall be restrained with the use of thrust blocking or other restraint products as indicated in the construction documents.
   3.4 PVC gasketed, push-on fittings and mechanical restraints, if used, must be installed per the manufacturer’s guidelines.

4. Fusible Polyvinyl Chloride Sweeps or Bends
   4.1 Fusible polyvinyl chloride sweeps or bends shall conform to the same sizing convention, diameter, dimensional tolerances and pressure class of the pipe being joined using the sweep or bend.
   4.2 Fusible polyvinyl chloride sweeps or bends shall be manufactured from the same fusible polyvinyl chloride pipe being used for the installation, and shall have at least 2 feet of straight section on either end of the sweep or bend to allow for fusion of the
sweep to the pipe installation. There shall be no gasketed connections utilized with a fusible polyvinyl chloride sweep.

4.3 Standard fusible polyvinyl chloride sweep or bend angles shall not be greater than 22.5 degrees, and shall be used in nominal diameters ranging from 4 inch through 16 inch.

5. Sleeve-Type Couplings
5.1 Sleeve-type mechanical couplings shall be manufactured for use with PVC pressure pipe, and may be restrained or unrestrained as indicated in the construction documents.
5.2 Sleeve-type couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.

6. Expansion and Flexible Couplings
6.1 Expansion-type mechanical couplings shall be manufactured for use with PVC pipe, and may be restrained or unrestrained as indicated in the construction documents.
6.2 Expansion-type mechanical couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.

7. Connection Hardware
7.1 Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.

E. Connections for Gravity Sanitary Sewer and Non-Pressure Applications
The following connections are to be used in conjunction with tie-ins to other non-pressure, gravity sewer piping and/or structures, and shall be as indicated in the construction documents.
1. PVC Gasketed, Push-On Couplings
   1.1 Acceptable couplings for joining fusible polyvinylchloride pipe to other sections of fusible polyvinylchloride pipe or other sections of PVC pipe shall include gasketed PVC, push-on type couplings as indicated in the construction documents.
   1.2 PVC gasketed, push-on fittings and/or restraint hardware must be installed per the manufacturer’s guidelines.

2. Fusible Polyvinyl Chloride Sweeps or Bends
   2.1 Fusible polyvinyl chloride sweeps or bends shall conform to the same sizing convention, diameter, dimensional tolerances and pressure class of the pipe being joined using the sweep or bend.
   2.2 Fusible polyvinyl chloride sweeps or bends shall be manufactured from the same fusible polyvinyl chloride pipe being used for the installation, and shall have at least 2 feet of straight section on either end of the sweep or bend to allow for fusion of the sweep to the pipe installation. There shall be no gasketed connections utilized with a fusible polyvinyl chloride sweep.
   2.3 Standard fusible polyvinyl chloride sweep or bend angles shall not be greater than 22.5 degrees, and shall be used in nominal diameters ranging from 4 inch through 16 inch.

3. Sleeve-Type Couplings
   3.1 Sleeve-type mechanical couplings shall be manufactured for use with PVC pipe, and may be restrained or unrestrained as indicated in the construction documents.

4. Expansion and Flexible Couplings
4.1 Expansion-type mechanical couplings shall be manufactured for use with PVC pipe, and may be restrained or unrestrained as indicated in the construction documents.

5. Connection Hardware
5.1 Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.

6. Connection to Sanitary Sewer Manholes and Structures
6.1 Fusible polyvinylchloride pipe shall be connected to manholes and other structures to provide a leak-free, properly graded flow into or out of the manhole or structure.

6.2 Connections to existing manholes and structures shall be as indicated in the construction documents.

6.2.1 For a cored or drilled opening provide a flexible, watertight connection that meets and/or exceeds ASTM C923.

6.2.2 For a knock out opening, provide a watertight connection (waterstop or other method) meeting the material requirements of ASTM C923 that is securely attached to the pipe with stainless steel bands or other means.

6.2.3 Grout opening in manhole wall with non-shrink grout. Pour concrete collar around pipe and outside manhole opening. Provide flexible pipe joint or flexible connector within 2 feet of the collar.

6.3 Connections to a new manhole or structure shall be as indicated in the construction documents.

6.3.1 A flexible, watertight gasket per ASTM C 923 shall be cast integrally with riser section(s) for all precast manhole and structures.

6.3.2 Drop connections shall be required where shown on drawings.

6.3.3 Grout internal joint space with non-shrink grout.

F. Drilling System Equipment
1. General
1.1 The directional drilling equipment, as a minimum, shall consist of a directional drilling rig of sufficient capacity to perform the bore(s) and pull-back of the pipe(s), a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations, and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project. All required equipment shall be included in the emergency and contingency plan as submitted per these specifications.

2. Drilling Rig
2.1 The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull drill pipe while delivering a pressurized fluid mixture to a drill head. The machine shall be anchored to withstand the pulling, pushing and rotating forces required to complete the project.

2.2 The drilling rig hydraulic system shall be of sufficient pressure and volume to power drilling operations. The hydraulic system shall be free from leaks.

2.3 The drilling rig shall have a system to monitor pull-back hydraulic pressure during pull-back operations.

3. Drill Head
3.1 The horizontal directional drilling equipment shall produce a stable fluid lined tunnel with
the use of a steer-able drill head and any subsequent pre-reaming heads.
3.2 The system must be able to control the depth and direction of the drilling operation.
3.3 Drill head shall contain all necessary cutters and fluid jets for the operation, and shall be of the appropriate design for the ground medium being drilled.

4. Drilling Fluid System
4.1 Drilling Fluid (Drilling Mud)
   4.1.1 Drilling fluid shall be composed of clean water and the appropriate additive(s) for the fluid to be used. Water shall be from a clean source and shall meet the mixing requirements of the mixture manufacturer(s).
   4.1.2 The water and additives shall be mixed thoroughly to assure the absence of any clumps or clods. No hazardous additives may be used.
   4.1.3 Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall(s).
   4.1.4 Drilling fluid shall be disposed of off-site in accordance with local, state and federal requirements and/or permit conditions.
   4.1.5 No additional chemicals or polymer surfactants shall be allowed to be added to the drilling fluid unless they have been submitted per this specification.

4.2 Mixing System
   4.2.1 A drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid for the project.
   4.2.2 The mixing system shall be able to ensure thorough mixing of the drilling fluid. The drilling fluid reservoir tank shall be sized for adequate storage of the fluid.
   4.2.3 The mixing system shall continually agitate the drilling fluid during drilling operations.

4.3 Drilling Fluid Delivery and Recovery System
   4.3.1 The drilling fluid pumping system shall have a minimum capacity to supply drilling fluid in accordance with the drilling equipment pull-back rating at a constant required pressure.
   4.3.2 The delivery system shall have filters or other appropriate in-line equipment to prevent solids from being pumped into the drill pipe.
   4.3.3 Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. The use of spill containment measures shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps, vacuum truck(s), and/or storage of sufficient size shall be in place to contain excess drilling fluid.
   4.3.4 A closed-loop drilling fluid system and a drilling fluid cleaning system should be used to whatever extent practical, depending upon project size and conditions. Under no circumstances shall drilling fluid that has escaped containment be reused in the drilling system.

5. Drilling Control System
   5.1 Calibration of the electronic detection and control system shall be verified prior to the start of the bore.
   5.2 The drilling head shall be remotely steer-able by means of an electronic or magnetic detection system. The drilling head location shall be monitored in three dimensions:
      5.2.1 Offset from the baseline,
      5.2.2 Distance along the baseline, and
      5.2.3 Depth of cover.
5.3 Point of rotation of the head shall also be monitored.
5.4 For gravity application and on-grade drilling, sonde/beacon or approved equipment applicable for grade increments of 1/10th of one percent shall be used.

G. Pipe Pull Heads
1. Pipe pull heads shall be utilized that employ a positive through-bolt design assuring a smooth wall against the pipe cross-section at all times.
2. Pipe pull heads shall be specifically designed for use with fusible polyvinylchloride pipe, and shall be as recommended by the pipe supplier.

H. Pipe Rollers
1. Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe during handling and pullback operations.
2. A sufficient quantity of rollers and spacing, per the pipe supplier’s guidelines shall be used to assure adequate support and excessive sagging of the product pipe.

D 201.04 EXECUTION
A. Delivery and Off-Loading
1. All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the owner or engineer.
2. Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify owner or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.
3. Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all of the pipe supplier’s guidelines shall be followed.
4. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
5. During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
6. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to insure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

B. Handling and Storage
1. Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.
2. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.
3. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to
avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

4. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.

5. If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.

6. Pipe shall be stored and stacked per the pipe supplier’s guidelines.

C. Fusion Process
   1. General
      1.1 Fusible polyvinylchloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier’s guidelines.
      1.2 Fusible polyvinylchloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier.
      1.3 Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.
      1.4 Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following elements:
         1.4.1 HEAT PLATE - Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly; cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier’s guidelines.
         1.4.2 CARRIAGE – Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.
         1.4.3 GENERAL MACHINE - Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.
         1.4.4 DATA LOGGING DEVICE – An approved datalogging device with the current version of the pipe supplier’s recommended and compatible software shall be used. Datalogging device operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.
      1.5 Other equipment specifically required for the fusion process shall include the following:
         1.5.1 Pipe rollers shall be used for support of pipe to either side of the machine
         1.5.2 A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement, extreme temperatures, and/or windy weather, per the pipe supplier’s recommendations.
         1.5.3 An infrared (IR) pyrometer for checking pipe and heat plate temperatures.
         1.5.4 Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
         1.5.5 Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall
2. Joint Recording
   2.1 Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of fusible polyvinyl chloride pipe. The software shall register and/or record the parameters required by the pipe supplier and these specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

D. Drilling Operations
   1. General
      1.1 Bore path and alignment are as indicated in the contract documents. The path of the bore may be modified based on field and equipment conditions. Entry and exit locations and control-point elevations shall be maintained as indicated in the contract documents.
      1.2 Bend radii shown in the contract documents are minimum allowable radii and shall not be reduced.

   2. Location and Protection of Underground Utilities
      2.1 Correct location of all underground utilities that may impact the HDD installation is the responsibility of the Contractor, regardless of any locations shown on the drawings or previous surveys completed.
      2.2 Utility location and notification services shall be contacted by the Contractor prior to the start of construction.
      2.3 All existing lines and underground utilities shall be positively identified, including exposing those facilities that are located within an envelope of possible impact of HDD installation as determined for the project specific site conditions. It is the Contractor and HDD system operator's responsibility to determine this envelope of safe offset from existing utilities. This will include, but is not limited to, soil conditions and layering, utility proximity and material, HDD system and equipment, and foreign subsurface material.

   3. Site Location Preparation
      3.1 Work site as indicated on drawings shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made
      3.2 Contractor shall confine all activities to designated work areas.

   4. Drilling Layout and Tolerances
      4.1 The drill path shall be accurately surveyed with entry and exit areas placed in the appropriate locations within the areas indicated on drawings. If using a magnetic guidance system, drill path will be surveyed for any surface geomagnetic variations or anomalies.
      4.2 Instrumentation shall be provided and maintained at all times that accurately locates the pilot hole, measures drill-string axial and torsional loads and measures drilling fluid discharge rate and pressure.
      4.3 Entry and exit areas shall be drilled so as not to exceed the bending limitations of the pipe as recommended by the pipe supplier.

   5. Pilot Hole Bore
      5.1 Pilot hole shall be drilled along bore path. In the event that the pilot bore does deviate from the bore path, it may require contractor to pull-back and re-drill from the location along bore path before the deviation.
      5.2 The Contractor shall limit curvature in any direction to reduce force on the pipe during
pull-back. The minimum radius of curvature shall be no less than that specified by the pipe supplier and as indicated on the drawings.

6. Reaming
   6.1 After successfully completing the pilot hole, the bore hole shall be reamed to a diameter which meets the requirements of the pipe being installed. The following table is offered as an estimated guide:

<table>
<thead>
<tr>
<th>Nominal Pipe Diameter</th>
<th>Bore Hole Diameter</th>
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</thead>
<tbody>
<tr>
<td>&lt; 8 inches</td>
<td>Pipe Dia. + 4 inches</td>
</tr>
<tr>
<td>8 inches to 24 inches</td>
<td>Pipe Dia. X 1.5</td>
</tr>
<tr>
<td>&gt; 24 inches</td>
<td>Pipe Dia. + 12 inches</td>
</tr>
</tbody>
</table>

6.2 Multiple reaming passes shall be used at the discretion of the Contractor and shall conform to this specification.

6.3 In the event of a drilling fluid fracture, returns loss or other loss of drilling fluid, the Contractor shall be responsible for restoring any damaged property to original condition and cleaning up the area in the vicinity of the damage or loss.

E. Pipe Pull-Back and Insertion
   1. Pipe shall be fused prior to insertion, if the site and conditions allow, into one continuous length.

   2. Contractor shall handle the pipe in a manner that will not over-stress the pipe prior to insertion. Vertical and horizontal curves shall be limited so that the pipe does not bend past the pipe supplier’s minimum allowable bend radius, buckle, or otherwise become damaged. Damaged portions of the pipe shall be removed and replaced.

   3. The pipe entry area shall be graded as needed to provide support for the pipe and to allow free movement into the bore hole.
      3.1 The pipe shall be guided into the bore hole to avoid deformation of, or damage to, the pipe.
      3.2 The fusible polyvinylchloride pipe may be continuously or partially supported on rollers or other Owner and Engineer approved friction decreasing implement during joining and insertion, as long as the pipe is not over-stressed or critically abraded prior to, or during installation.
      3.3 A swivel shall be used between the reaming head and the fusible polyvinylchloride pipe to minimize torsion stress on the pipe assembly.

   4. Buoyancy modification shall be at the sole discretion of the Contractor, and shall not exceed the pipe supplier’s guidelines in regards to maximum pull force or minimum bend radius of the pipe. Damage caused by buoyancy modifications shall be the responsibility of the Contractor.

   5. Once pull-back operations have commenced, the operation shall continue without interruption until the pipe is completely pulled through the bore hole.

   6. The pipe shall be installed in a manner that does not cause upheaval, settlement, cracking, or movement and distortion of surface features. Any damages caused by the Contractor’s operations shall be corrected by the Contractor.
F. Installation Cleanup  
1. Following the installation, the project site shall be returned to a condition equal to or better than the pre-construction condition of the site. All excavations will be backfilled and compacted per the construction documents and jurisdictional standards. All pavement and hardscape shall be repaired per applicable jurisdictional standards, excess materials shall be removed from the site, and disturbed areas shall be re-landscaped. All drilling fluid shall be properly disposed of per these specifications and all applicable jurisdictional laws.

2. Contractor shall verify that all utilities, structures, and surface features in the project area are sound.

G. Preparation Prior to Making Connections into Existing Piping Systems  
1. Approximate locations for existing piping systems are shown in the construction documents. Prior to making connections into existing piping systems, the contractor shall:
   1.1 Field verify location, size, piping material, and piping system of the existing pipe.
   1.2 Obtain all required fittings, which may include saddles, sleeve type couplings, flanges, tees, or others as shown in the construction documents.
   1.3 Have installed all temporary pumps and/or pipes in accordance with established connection plans.

2. Unless otherwise approved, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.

H. Pipe System Connections  
1. Pipe connections shall be installed per applicable standards and regulations, as well as per the connection manufacturer’s guidelines and as indicated in the construction documents. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer’s guidelines.

2. If possible, pipe installed via HDD shall be filled with water prior to making any connections to the existing system or other portions of the project.

I. Tapping for Potable and Non-Potable Water Applications  
1. Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605. Tapping shall be performed only with use of tap saddles or sleeves. NO DIRECT TAPPING WILL BE PERMITTED. Tapping shall be performed in accordance with the applicable sections for Saddle Tapping per Uni-Pub-8.

2. All connections requiring a larger diameter than that recommended by the pipe supplier, shall be made with a pipe connection as specified and indicated on the drawings.

3. Equipment used for tapping shall be made specifically for tapping PVC pipe:
   3.1 Tapping bits shall be slotted "shell" style cutters, specifically made for PVC pipe. ‘Hole saws’ made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.
   3.2 Manually operated or power operated drilling machines may be used.

4. Taps may be performed while the pipeline is filled with water and under pressure (‘wet’ tap,) or when the pipeline is not filled with water and not under pressure (‘dry’ tap).

J. Testing  
1. Testing shall comply with all applicable jurisdictional building codes, statutes, standards,
2. Hydrostatic Testing and Leakage Testing for Pressure Piping
   2.1 Hydrostatic and leakage testing for piping systems that contain mechanical jointing as well as fused PVC jointing shall comply with AWWA C605.
   2.2 Unless agreed to or otherwise designated by the owner or engineer, for a simultaneous hydrostatic and leakage test following installation, a pressure equal to 150% of working pressure at point of test, but not less than 125% of normal working pressure at highest elevation shall be applied. The duration of the pressure test shall be for two (2) hours.
   2.3 If hydrostatic testing and leakage testing are performed at separate times, follow procedures as outlined in AWWA C605.
   2.4 In preparation for pressure testing the following parameters must be followed:
      2.4.1 All air must be vented from the pipeline prior to pressurization. This may be accomplished with the use of the air relief valves or corporation stop valves, vent piping in the testing hardware or end caps, or any other method which adequately allows air to escape the pipeline at all high points. Venting may also be accomplished by ‘flushing’ the pipeline in accordance with the parameters and procedures as described in AWWA C605.
      2.4.2 The pipeline must be fully restrained prior to pressurization. This includes complete installation of all mechanical restraints per the restraint manufacturer's guidelines, whether permanent or temporary to the final installation. This also includes the installation and curing of any and all required thrust blocking. All appurtenances included in the pressure test, including valves, blow-offs, and air-relief valves shall be checked for proper installation and restraint prior to beginning the test.
      2.4.3 Temporary pipeline alignments that are being tested, such as those that are partially installed in their permanent location shall be configured to minimize the amount of potentially trapped air in the pipeline.

3. Leakage Testing for Non-Pressure Piping
   3.1 Gravity sanitary sewers that contain mechanical jointing in addition to fused PVC joints may need to be tested for excessive leakage.
   3.2 Gravity sanitary sewer leakage testing may include appropriate water or low pressure air testing. The leakage outward or inward (exfiltration or infiltration) shall not exceed 25 gallons per inch of pipe diameter per mile per day for any section of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of two feet. The air test, if used, shall be conducted in accordance with one of the following Standards:
      3.2.1 ASTM F1417
      3.2.2 UNI-B-6
   3.3 The testing method selected shall properly consider the existing groundwater elevations during the test.

4. Deflection Testing for Non-Pressure Piping
   4.1 After completion of the backfill, the engineer or owner may require that a deflection test be performed.
   4.2 Deflection tests should be conducted using a go/no-go mandrel. The mandrel’s outside dimension shall be sized to permit no more than 7.5 percent deflection. The percent deflection shall be established from the base inside diameter of the pipe. If the internal beading of the fused joints for the pipe is not required to be removed, the mandrel shall account for this clearance as well. The mandrel shall be approved by the owner or engineer prior to use. Lines that permit safe entry may allow other deflection test
options, such as direct measurements.

5. Disinfection of the Pipeline for Potable Water Piping
   5.1 After installation, the pipeline, having passed all required testing, shall be disinfected prior to being put into service. Unless otherwise directed by the owner or engineer, the pipeline will be disinfected per AWWA C651.

6. Partial Testing
   6.1 Segments of the pipe may be tested separately in accordance with standard testing procedure, as approved by the owner and engineer. Testing of each HDD installation prior to connection to the system or other piping is preferred.

D 201.04 MEASUREMENT
Fusible PVC will be measured for payment in linear feet for the various sizes and types shown on plans along the horizontal centerline of the pipe. No deduction will be made for manholes.

D 201.04 PAYMENT
Fusible PVC pipe will be paid for at the unit price per linear foot, complete in place, as provided in the proposal and contract. The contract price per linear foot shall be the total compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete work, including fusion, excavation, granular embedment material, backfill, and disposal of surplus materials, in accordance with plans and specifications.
D 202.01 SUBMITTALS
   A. Test Results: Include results of tests with shipment of materials. Furnish 2 additional copies of test results to Engineer.
   B. Submit in accordance with the Standard General Conditions and Supplementary Conditions.
   C. Contractor shall submit all final testing reports for deflection testing and for low pressure air testing of sewer pipe in accordance with Section B- Testing Sewer Systems.
   D. Any deviations from the standards shall be approved by the Director of Utilities in writing.

D 202.02 PRODUCTS
   1. Polyvinyl Chloride (PVC) Sewer Pipe
      A. All 4”- 15” PVC Sewer Pipe and Fittings used in this contract shall be made of plastic, meeting the requirements of: ASTM D3034. All 4”- 15” PVC sewer pipe, service saddles and fittings shall be SDR- 26. All 18”- 27” PVC Sewer Pipe and Fittings used in this contract shall be made of plastic, meeting the requirements of: F679, PS-115.

      B. Fittings
         1. Fittings such as saddles, elbows, tees, and wyes shall be of material and construction corresponding to and have joint design compatible with adjacent pipe.
         2. Provide submittals for approval of adapters for transitions to other types of pipe.

      C. Pipe Joints
         1. Rubber Gasket: Bell and spigot joint, sealed by a rubber gasket so assembly will remain watertight under conditions of service including movements resulting from expansion, contraction, settlement, and deformation of pipe. Gaskets shall conform to ASTM C361.

      D. Pipe Markings: Mark at intervals of 5 feet or less with following:
         1. Manufacturer’s name or trademark
         2. Nominal pipe size
         3. PDV cell classification; for example 12454-B
         4. Legend, “Type PSM SDR-26 PVC Sewer Pipe”
         5. ASTM D3034
         6. Extrusion date, period of manufactured or lot number

      E. Fitting Markings
         1. Manufacturer’s name or trademark
         2. Nominal size
         3. Material designation “PVC”
         4. PSM type
         5. ASTM D3034

      F. Dimensions
         1. Dimensions of pipe shall be in accordance with Table 1, except wall thickness may not be less than 97% of specified minimum.
         2. Average wall thickness shall meet minimum wall thickness requirements of Table 1.
Table 1 PVC Sewer Pipe Dimensions

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<td>32.261</td>
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</tr>
</tbody>
</table>

* 30 or greater, subject to approval

2. Source Quality Control
   A. Testing
      1. Tests conducted by approved testing agency shall be performed to determine the following:
         a. Pipe dimensions:
            1) Average outside diameter
            2) Average inside diameter
            3) Minimum and average wall thickness
         b. Pipe stiffness at 5% deflection
         c. Pipe flattening for PVC sewer pipe: Deflect pipe to 60% deflection. Remove load and examine specimen for evidence of splitting, cracking, or breaking.
      2. Conduct tests on random sampling basis covering representative extrusion dates making up project of each individual pipe size.
      3. Test reports shall show results of these tests and conformance to ASTM requirements.

D 202.03 EXECUTION

1. Installation
   A. Trench, backfill, and compaction shall be done in accordance with Section 102 “Excavation and Backfilling for Utilities”
   B. Rubber Gasket Joint
      1. Immediately before making joint, lubricate outside of gasket and inside of bell of groove of last pipe with approved manufacturer lubricant.
      2. Assure gasket and ends of pipe are clean and free of sand and gravel.
      3. Introduce spigot or tongue of pipe being laid, with gasket in place, into bell or groove end of previously laid pipe.
      4. Carefully set pipe to line and grade, and join pipes per manufacturer recommendations.
      5. Use jack or "come-along" to ensure joints are tight.

2. Field Quality Control
   A. Pipe shall be subject to rejection for failure to conform to requirements of specifications or any of the following:
      1. Any fractures or cracks.
      2. Chips or imperfections.
      3. Defects indicating improper proportioning, mixing, and molding.
      4. Variations of more than 1/8in / 1in.ft in alignment of pipe intended to be straight.
5. Damaged ends, where such damage prevents making satisfactory joint.
7. Manufactured date exceeding one year.

B. Specially fabricated fittings, stubs, or pipe sections, shall be submitted for approval by Engineer prior to manufacture.

D 202.04 MEASUREMENT AND PAYMENT
This item will be measured for payment in linear feet for the various sizes and types shown on the plans along the horizontal centerline of the pipe. Not deduction will be made for manholes or fittings. Plastic sewer pipe will be paid for at the unit price per linear foot, complete in place, as provided in the proposal and contract. The contract price per linear foot shall be the total compensation for furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the work, including excavation, granular embedment material, backfill, and disposal of surplus materials, in accordance with plans and specifications.
SECTION 203
CENTRIFUGALLY CAST FIBERGLASS REINFORCED POLYMER MORTAR (CCFRPM) PIPE

D 203.01 GENERAL
The specifications contained herein govern, unless otherwise agreed upon between purchaser and supplier.

References

D 203.02 PRODUCTS
1. Materials
   A. Resin Systems: The manufacturer shall use only polyester resin systems with a proven history of performance in this particular application. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.
   B. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.
   C. Silica Sand: Sand shall be minimum 98% silica with a maximum moisture content of 0.2%.
   D. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally affect the performance of the product.
   E. Elastomeric Gaskets: Gaskets shall meet ASTM F477 and be supplied by qualified gasket manufacturers and be suitable for the service intended.

2. Manufacture and Construction
   A. Pipes: Manufacture pipe by the centrifugal casting process to result in a dense, nonporous, corrosion-resistant, consistent composite structure. The interior surface of the pipes exposed to sewer flow shall provide crack resistance and abrasion resistance. The exterior surface of the pipes shall be comprised of a sand and resin layer which provides UV protection to the exterior. Pipes shall be Type 1, Liner 2, Grade 3 per ASTM D3262.
   B. Joints: Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint watertightness. The joints must meet the performance requirements of ASTM D4161. Joints at tie-ins, when needed, may utilize gasket-sealed closure couplings.
   C. Fittings: Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. Properly
protected standard ductile iron, fusion-bonded epoxy-coated steel and stainless steel fittings may also be used.

D. **Acceptable Manufacturer: HOBAS Pipe USA.**

3. **Dimensions**
   A. **Diameters:** The actual outside diameter (18” to 48”) of the pipes shall be in accordance with ASTM D3262. For other diameters, OD’s shall be per manufacturer's literature.
   
   B. **Lengths:** Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be nominal +1, -4 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.
   
   C. **Wall Thickness:** The minimum wall thickness shall be the stated design thickness.
   
   D. **End Squareness:** Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/8”.

4. **Testing**
   A. **Pipes:** Pipes shall be manufactured and tested in accordance with ASTM D3262.
   
   B. **Joints:** Coupling joints shall meet the requirements of ASTM D4161.
   
   C. **Stiffness:** Minimum pipe stiffness when tested in accordance with ASTM D2412 shall normally be 36 psi.

5. **Customer Inspection**
   A. The Owner or other designated representative shall be entitled to inspect pipes or witness the pipe manufacturing.
   
   B. **Manufacturer’s Notification to Customer:** Should the Owner request to see specific pipes during any phase of the manufacturing process, the manufacturer must provide the Owner with adequate advance notice of when and where the production of those pipes will take place.

6. **Packaging, Handling, Shipping** shall be done in accordance with the manufacturer’s instructions.

**D 203.03 INSTALLATION**

1. **Burial:** The bedding and burial of pipe and fittings shall be in accordance with the project plans and specifications and the manufacturer’s requirements (Section 14 A of the product brochure).

2. **Pipe Handling:** Use textile slings, other suitable materials or a forklift. Use of chains or cables is not recommended.

3. **Jointing:**
   A. Clean ends of pipe and coupling components.
   
   B. Apply joint lubricant to pipe ends and elastomeric seals of coupling. Use only lubricants approved by the pipe manufacturer.
   
   C. Use suitable equipment and end protection to push or pull the pipes together.
   
   D. Do not exceed forces recommended by the manufacturer for coupling pipe.
E. Join pipes in straight alignment then deflect to required angle. Do not allow the deflection angle to exceed the deflection permitted by the manufacturer.

4. **Field Tests:**
   A. **Infiltration / Exfiltration Test:** Maximum allowable leakage shall be per local specification requirements.

   B. **Low Pressure Air Test:** Each reach may be tested with air pressure (max 5 psi). The system passes the test if the pressure drop due to leakage through the pipe or pipe joints is less than or equal to the specified amount over the prescribed time period.

   C. **Individual Joint Testing:** For pipes large enough to enter, individual joints may be pressure tested with a portable tester to 5 psi max. with air or water in lieu of line infiltration, exfiltration or air testing.

   D. **Deflection:** Maximum allowable long-term deflection is normally 5% of the initial diameter.

**D 203.04 MEASUREMENT AND PAYMENT**

CCFRPM pipe will be measured for payment in linear feet for the various sizes and types shown on plans along the horizontal centerline of the pipe. No deduction will be made for manholes.

CCFRMP pipe will be paid for at the unit price per linear foot, complete in place, as provided in the proposal and contract. The contract price per linear foot shall be the total compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete work, including fusion, excavation, granular embedment material, backfill, and disposal of surplus materials, in accordance with plans and specifications.

10/2017
SECTION 206
SERVICE CONNECTION

D 206.01 DESCRIPTION
This Specification shall govern for the furnishing, excavating, laying, or placing, and backfilling, shoring, and other operations necessary to the installing of all sanitary sewer services.

D 206.02 MATERIALS
1) Polyvinyl Chloride (PVC)
PVC pipe and fittings 6 inch (6") through 12 inch (12") diameter shall be in accordance with Section 102.

2) Flexible Tap Saddles
Flexible 6" tap saddles shall be made of PVC meeting the requirements of ASTM D 5926 and shall be used on existing clay sewer pipe only.

D 206.03 EXECUTION
Sewer connections shall be provided for each dwelling and lot to be served and shall be a minimum of 6 inch (6") diameter. The location of each sewer connection shall be clearly in the construction drawings by indicating northing and easting. The as built plans shall include the location of each sewer connection by clearly indicating northing, easting and elevation.

All new sewer construction shall include pre-manufactured wyes for sewer connections according to Detail No. 206-1 thru 206-3. Saddles will only be allowed for connection to existing sewer lines. Saddles shall be installed by cutting the pipe with a tapping machine. Connection shall be either with a saddle tap or a slip-line taps according to Detail No. 206-4.

Service connection branches shall be plugged with a pipe stopper manufactured for such service. The stopper shall be capable of sustaining without failure or leakage.

The lowest floor elevation of any structure to be served by gravity shall be a minimum of four feet (4’) above the invert elevation of its sewer connection at the sewer main.

For existing structures, connection to the public sewer with plumbing fixtures located on a floor of the structure that is not four feet (4’) or more above the sewer main as specified above shall not be allowed unless a written waiver is obtained from the Utilities Department Director or a pumping operation is utilized.

Sewer connections shall not be tied directly into an interceptor sewer (18" or greater) unless specifically approved by the Utilities Director.

The minimum and maximum slope for a 6" sewer lateral shall be 0.50% and 12.35% respectively. The following are not permitted:
1) Attaching sewer service connections to the vertical portion of the cleanout constructed at the property line or easement line.
2) Drop connections on the portion of the lateral in the right of way or in a sanitary sewer easement.

For projects involving the construction of new sewer mains, the sewer lateral to the property line or easement line shall be constructed and tested with the sewer mains.
After acceptance by the City, the plumbing contractor shall construct the sewer lateral from the building to the tested sewer lateral, then construct a cleanout at the property or easement line and connect it to the tested portion of the lateral.

When specifically approved by the Director, a portion of the cleanout at the property line or easement line to within three feet (3’) of the ground surface and a portion of the sewer lateral on the private property past any utility easements may be constructed and tested with the sewer mains, provided that a means of protecting the cleanout and/or extended sewer lateral is provided.

A sanitary sewer lateral table shall be included in the construction plans. The table will include stationing, the inverts of the lateral at the main and elbow, invert at the property or easement line, and depth at the property or easement line as well as Northing and Easting.

**D 206.04 CLEANOUTS**

A six-inch (6") cleanout shall be provided at one foot (1’) from the property line within the R.O.W or easement line for each service connection.

Lateral backwater valves shall be installed on sewer laterals serving buildings with basements or floors located below the top of the wet well elevation of the nearest wastewater pumping station.

Connection of roof downspouts, exterior foundation drains, areaway drains, basement drains and other sources of surface runoff and groundwater directly or indirectly to a sanitary sewer is prohibited.

**D 206.05 BACKFILL**

All trenches and excavations in this section shall be in accordance with Section 102.

**D 206.06 CONCRETE CUSHION, CRADLE, OR PROTECTION**

Concrete cradle, cushion, or protection where required, shall be constructed as shown on the plans. Where a condition arises which requires the installing of such concrete cushions or cradle or protection, not shown on the plans, such installation shall be made only on the written instructions of the Engineer; such instruction shall designate the location, shape, type, and manner of construction.

Where concrete cradle or cushion is constructed beneath the sewer pipe, the sub-grade shall be prepared to the dimensions and form as shown on the plans. Concrete cradle, cushion, or protection shall be placed in a dry trench unless, in the opinion of the Engineer, such a method is not practicable. Where the concrete is placed in a wet trench the work shall be done strictly as directed or approved by the Engineer.

**D 206.07 MEASUREMENT**

All sewer laterals, and stubs, shall be measured in accordance with the above specifications per each complete in place, of the size, type, depth constructed, and accepted by the Engineer. Concrete cradle or concrete encasement protection will be measured by the linear foot along the center of the pipe where it has been installed in accordance with the details shown on the plans.

**D 206.08 PAYMENT**

All sewer laterals, and stubs, shall be paid for at the unit price bid per each complete in place, of the size, type, and depth constructed, which price shall be full compensation for furnishing all labor, material, and equipment, for all hauling, excavation, shaping of trench bottom, bracing, sheeting, for all installation, backfilling, tamping of backfill, and for all clean-up and incidentals necessary to furnish sewer services complete in place.
**SECTION 208**  
**FIBERGLASS REINFORCED PLASTIC MANHOLES**

**D 208.01 MATERIALS**
Fiberglass reinforced plastic manholes shall be in accordance with ASTM D3753 “Glass Fiber-Reinforced Polyester Manholes” and the requirements of this specification. The inside diameter of the manhole barrel shall be either 48” or as indicated in the plans. A concentric reducer over the barrel shall have an inside diameter of 30 inches. The minimum wall thickness for all manholes regardless of depth shall be ½” (.480”).

**D 208.02 GOVERNING STANDARDS**
1) ASTM D3753 - Standard specifications for glass fiber reinforced polyester manholes.  
2) ASTM D2412 - Test method for external loading properties plastic pipe by parallel-plate loading.  
3) ASTM C581 - Practice for determining chemical resistance of thermosetting resins.  
4) ASTM D2584 - Test method for ignition loss of cured reinforced resins.  
5) ASTM D695 - Test method for compressive properties of rigid plastics.  
6) ASTM C790 - Test methods for flexural properties of unreinforced and reinforced plastics and electrical insulating materials.  
7) ASTM D2583 - Test methods for indentation hardness of rigid plastics by means of barcol impressor.

The contractor shall furnish the manufacturer’s certificate that the material meets the standards set forth herein. All fiberglass manhole sections shall be identified with the manufacturer’s name, identification number, and manhole length.

Fiberglass – Reinforced Polyester Manholes shall include a 6’ X 6’ reinforced concrete collar in accordance to Detail 208-4.

**D 208.03 MANHOLE RINGS AND COVERS**
All manhole rings and covers for streets shall have a clear opening of no less than 30” labeled SANITARY SEWER and CITY OF LAREDO with emblem (EJIW 41430043A01 or approved equal) and shall have the seating surface of ring machined to secure a snug fit.

The castings for manhole rings and covers shall be as detailed on drawings. They shall be grey iron castings boldly filleted at angles and the rises shall be sharp and perfect. The casting shall be true to pattern, form, and dimensions, free from cracks, sponginess, blow holes, or other pouring faults affecting their strength and value for the service intended. Surfaces of the castings shall be free from burnt on sand and shall be reasonable smooth. Runners, risers, fins, and other cast-on places shall be removed from the surface.

**D 208.04 EXCAVATION**
The contractor shall be all necessary excavation for the various manholes. Such excavation shall be of sufficient size as to permit the proper installation of the base and wall forms, and allow room for striping of such forms. All such excavation shall conform to the size and dimensions as shown on the drawings, plus a maximum of four (4) feet to permit working room. Care shall be taken to insure that the excavation is not carried to a greater depth that required. If it becomes necessary to shore the walls and also permit the construction of the manhole itself without necessitating the removal of any shoring until such time as the entire manhole is completed. No shoring shall be left or back filled around, unless authorized by the Engineer. Shoring shall remain in place for at least twenty-four (24) hours after the masonry or concrete work has been completed.
D 208.05 GENERAL CONSTRUCTION METHODS
All manhole work shall be completed and finished in a careful and workmanlike manner, special care being given to sealing the joints around all pipe that extend through the wall of the manhole. Joints for sewer pipe for line and drop connections in sizes 8”-15” shall be made by means of Insert a Tee watertight compression connection or approved equal as shown in the plans and details. Install in accordance with the manufacturer's written instructions. Connections for pipe larger than 15” shall be made using a pre-approved connection. Install in accordance with the manufacturer’s written instructions after finishing of wall has additional concrete to shape or form on the drawing.

Where old manholes are to be adjusted to meet new lines and grades, all old masonry or concrete shall be thoroughly cleaned and wetted before joining any new masonry or concrete to it. All work on manholes shall be done in a workmanlike manner and in conformity with the usual practice used for such work. All materials for adjusting old manholes shall conform to the requirements set out in these specifications for manhole work.

D 208.06 BACKFILLING
The backfilling around the outside of manholes shall commence as soon as the concrete or masonry has been allowed to cure the required time and the forms and shoring have been removed. Such backfill shall be placed in layers of not more than six inches and shall be thoroughly tamped before the next layer is installed. It is anticipated that the backfilling shall be either hand or mechanically tamped. Whichever method is used, care must be exercised to insure that the backfill is thoroughly compacted to the density shown on the drawings. When a density is not shown on the drawings, compaction shall be 90% standard proctor density (ASTM D-690). Unless shown otherwise on the drawings suitable material selected from the excavation shall be used for backfill. Material must be subject to approval by the Engineer.

D 208.07 DROP MANHOLES
Drop manholes shall consist of construction of a standard sanitary sewer manhole with one standard drop connection on one side only when 24 inches above the manhole invert, as shown in the detail drawings. All material used in the drop connection shall conform to the requirements of the pertinent specifications.

D 208.08 MEASUREMENT
This item will be measured by each individual structure completed. The depth will measure from the flow line to the top of the rim. The size shall be the nominal inside diameter. This item includes but, is not limited to the following:
- Structural Excavation;
- Loading, hauling, and disposing of all excess material;
- Furnishing all labor and materials;
- Placing and compacting all backfill;
- Final Grading.

D 208.09 PAYMENT
This item will be paid for at the Contract unit price bid per each structure for the various sizes, types and various depths of manholes complete and in place as shown in the drawings and specified herein.
SECTION 214
SANITARY SEWER CLEANOUTS

D 214.01 DESCRIPTION
This Specification shall govern for the furnishing, excavating, laying, or placing, and backfilling, shoring, and other operations necessary to the installing of all sanitary sewer cleanouts. Cleanout connections shall be provided at the end of the sanitary sewer main and shall be a minimum of 8 inch (8") diameter. The location shall be clearly indicated on the construction drawings.

D 214.02 MATERIALS
Cast iron boot and cover shall be in accordance to ASTM A48 Class 30B.

PVC pipe and fittings 6 inch (6") through 12 inch (12") diameter shall conform to Section 202.

D 214.03 EXECUTION
An eight-inch (8") cleanout shall be provided outside of the pavement or as approved by the Utilities Director at one foot (1') from the property line within the R.O.W., easement line or as indicated on the plans. A cast iron cleanout cover shall be placed over every cleanout for the main line as per Detail No.

D 214.04 BACKFILL
All trenches and excavations in this section shall be in accordance with Section 102.

D 214.05 CONCRETE CUSHION, CRADLE, OR PROTECTION
Concrete cradle, cushion, or collar, shall be constructed as shown on the plans. Where concrete cradle or cushion is constructed beneath the sewer pipe, the sub-grade shall be prepared to the dimensions and form as shown on the plans. Concrete cradle, cushion, or collar shall be placed in a dry trench unless, in the opinion of the Engineer, such a method is not practicable. Where the concrete is placed in a wet trench, the work shall be done strictly as directed or approved by the Engineer.

D 214.06 MEASUREMENT
All sewer cleanouts shall be measured in accordance with the above specifications per each complete in place, of the size, type, depth constructed, and accepted by the Engineer.

D 214.07 PAYMENT
All sewer cleanouts, shall be paid for at the unit price bid per each complete in place, of the size, and type constructed, which price shall be full compensation for furnishing all labor, material, and equipment, for all hauling, excavation, shaping of trench bottom, bracing, sheeting, for all installation, backfilling, tamping of backfill, and for all clean-up and incidentals necessary to furnish sewer services complete in place.
SECTION 218
TESTING SEWER SYSTEMS

D 218.01 GENERAL
1. Summary
   A. Section Includes:
      1. Deflection testing of sanitary sewer lines.
      2. Leakage testing of sanitary sewer lines.
      3. Leakage testing of sanitary sewer manholes.
   B. Measurement and Payment:
      1. Include costs for testing in appropriate unit prices bid for sewer line construction.

2. Submittals
   A. Submit in accordance with Standard General Conditions and Supplementary Conditions.
   B. Copies of all test results shall be submitted to the Engineer prior to acceptance of sewer system.

D 218.02 PRODUCTS N/A

D 218.03 EXECUTION
1. General
   A. Commence test procedures when following condition are met.
      1. Pipe section to be tested is clean and free of dirt, sand, water or other foreign material. Pipe system shall be isolated from the existing waste water system.
      2. Pipe section to be tested has backfill placed and compacted
   B. Repair visible leaks in manholes and sewers regardless of results of leakage tests.
   C. Notify Engineer and City of Laredo Utilities Department in writing 48 hours before beginning tests.
   D. Contractor shall furnish and pay for all water required for testing.

2. Deflection Testing of Sanitary Sewer Lines
   A. Perform tests on sewer pipe in presence of Engineer and City of Laredo Utilities Inspector.
   B. Provide necessary test mandrel, cable, reeling equipment, and other materials and equipment required to perform tests. Provide cable at each end of test mandrel to allow withdrawal if mandrel becomes stuck.
   C. Deflection Tests shall be performed on all flexible pipes. For pipelines with inside diameters less than 27 inches, a rigid mandrel shall be used to measure deflection.
      1. Mandrel sizing. The rigid mandrel shall have an outside diameter (OD) equal to 95% of the inside diameter (ID) of the pipe. The inside diameter of the pipe, for the purposes of determining the outside diameter of the mandrel, shall be the average outside diameter minus two minimum wall thicknesses for OD controlled pipe and the average inside diameter for ID controlled pipe, all dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.
      2. Mandrel design. The rigid mandrel shall be constructed of a metal or a rigid plastic material that can withstand 200 psi without being deformed. The mandrel shall have nine or more "runners" or "legs" as long as the total number of legs is an odd number. The barrel section of the length at least 75% of the inside diameter of the pipe. A proving ring shall be provided and used for each size mandrel in use.
3. **Method options.** Adjustable or flexible mandrels are prohibited. A television inspection is not a substitute of the deflection test. Mandrels with removable legs or runners may be accepted on a case-by-case basis.

D. The test shall be performed without mechanical pulling devices. Sewer is considered to have passed deflection test if mandrel can be drawn through sewer system being tested without aid of mechanical assistance.

E. If excessive force is required or mandrel fails to pass through, sewer shall have failed deflection test.

F. The test shall be conducted after the final backfill has been in place at least 30 days. No pipe shall exceed a deflection of 5.0%. If a pipe should fail to pass deflection test, the problem shall be corrected and a second test shall be conducted after the final backfill has been in place and additional 30 days. Correct failed sewers by excavating sewer a point of failure and for distance of 10 ft on either side, allowing sewer to return to its original round cross-section and backfill according to Specifications. Remove and replace sewers failing to return to original round cross-section or failing second deflection test at not cost to Owner. Do not use devices to generate internal pressures or vibrations to correct failed sewers.

3. **Leakage Testing of Sanitary Sewer Lines**

   A. Tests:
      1. Pressure test sanitary sewer pipe 24 inches or smaller in diameter using low pressure air test.

   B. General:
      1. Conduct tests in presence of Engineer and City of Laredo Utilities Inspector.
      2. Provide piping connections between section of line being tested and air supply, test pressure equipment, weirs, meters, certified pressure gauge, and other equipment, materials, and facilities necessary to make specified test.
      3. Provide bulkheads, blocking, bracing or other temporary sectionalizing devices that may be required.
      4. Remove temporary sectionalizing devices after test complete.

   C. Low Pressure Air Test
      1. General:
         a. Conduct required low pressure air test as specified herein.
         b. Plug pipe outlets with test plugs. Brace each plug securely to prevent blowouts during air test.
         c. Add air slowly.
         d. Pressurizing equipment shall include regulator set to avoid over-pressuring and damaging line.
         e. Safety pressure test in accordance with OSHA requirements.
      2. Air Test Procedures:
         a. The procedure for the low pressure air test shall conform to the procedures described in ASTM C-828, ASTM C-924, ASTM F-1417, or other appropriate procedures, except for testing times.
         b. The test times shall be as outlined in this section. For sections of pipe less than 36 inch average inside diameter, the pipe shall be pressurized to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Once the pressure is stabilized, the minimum time allowable for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge shall be computed from the following equation:

\[
T = \frac{0.085 \times D \times K}{Q}
\]
T = time for pressure to drop 1.0 pound per square inch gauge in seconds;  
K = 0.0049 x D x L, but not less than 1.0;  
D = average inside pipe diameter in inches;  
L = length of line of same pipe size being tested, in feet;  
Q = rate of loss, 0.0015 cubic feet per minute per square feet internal surface shall be used.

Since a K value of less than 1.0 shall not be used, there are minimum testing times for each pipe diameter as follows:

<table>
<thead>
<tr>
<th>Pipe Diameter (inches)</th>
<th>Minimum Time (seconds)</th>
<th>Length for Minimum Time (feet)</th>
<th>Time for Longer Length (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>340</td>
<td>398</td>
<td>0.855 (L)</td>
</tr>
<tr>
<td>8</td>
<td>454</td>
<td>298</td>
<td>1.520 (L)</td>
</tr>
<tr>
<td>10</td>
<td>567</td>
<td>239</td>
<td>2.374 (L)</td>
</tr>
<tr>
<td>12</td>
<td>680</td>
<td>199</td>
<td>3.419 (L)</td>
</tr>
<tr>
<td>15</td>
<td>850</td>
<td>159</td>
<td>5.342 (L)</td>
</tr>
<tr>
<td>18</td>
<td>1,020</td>
<td>133</td>
<td>7.693 (L)</td>
</tr>
<tr>
<td>21</td>
<td>1,190</td>
<td>114</td>
<td>10.471 (L)</td>
</tr>
<tr>
<td>24</td>
<td>1,360</td>
<td>100</td>
<td>13.676 (L)</td>
</tr>
<tr>
<td>27</td>
<td>1,530</td>
<td>88</td>
<td>17.309 (L)</td>
</tr>
<tr>
<td>30</td>
<td>1,700</td>
<td>80</td>
<td>21.369 (L)</td>
</tr>
<tr>
<td>33</td>
<td>1,870</td>
<td>72</td>
<td>25.856 (L)</td>
</tr>
</tbody>
</table>

The test may be stopped if no pressure loss has occurred during the first 25% of the calculated testing time. If any pressure loss or leakage has occurred during the first 25% of the test period, then the test shall continue for the entire test duration as outlined in this subparagraph or until failure.

c. Provide calibrated and certified test gauge at remote test plug.  
   1. Gauge air pressure within test section and attach to test plug by sufficient length of hose to place gauge at ground surface. In case of test frames for individual joint testing, gauge to be remote from air supply.

d. Proceed with test after sewer and lateral installation, including backfilling, is complete and lines cleaned. Proceed as follows:  
   1. Flush and clean prior to conducting low pressure air test.  
   2. Isolate section of sewer line to be tested by means of inflatable stoppers of other suitable test plugs. One plug shall have inlet tap, or other provision, for connecting hose to portable air control source.  
   3. If test section is below groundwater level, determine height of groundwater above spring line of pipe at each end of test section and compute average. For every foot of groundwater above pipe spring line, increase gauge test pressure by 0.43 lb/sq. in.  
   4. Connect air hose to inlet tap and portable air control source. Air equipment shall consist of necessary valves and pressure gauges to control rate at which air flows into test section and to enable monitoring of air pressure within test section. Testing apparatus shall also be equipped with pressure relief device to prevent possibility of loading test section with full capacity of compressor.
5. Add air slowly to test section until pressure inside pipe is raised to 4.0 psig greater than average back pressure that may be over pipe.

6. After pressure of 4.0 psig obtained, regulate air supply so pressure is maintained between 3.5 and 4.0 psig (above average groundwater back pressure) for period of 2 min. This allows air temperature to stabilize in equilibrium with temperature of pipe walls. Pressure will normally drop slightly until temperature equilibrium is obtained. During this period, check plugs with soap solution to detect plug leakage.

7. Determine rate of air loss by time pressure drop method. After 2-min air stabilization period, air supply is disconnected and the test pressure is allowed to decrease to 3.5 psig. Time required for test pressure to drop from 3.5 to 2.5 psig is determined if rate of air loss is within allowable time limit. If time is equal to or greater than times indicated in tables, pipe line shall be deemed acceptable.

8. Upon completion of test, open bleeder valve and allow air to escape. Plugs shall not be removed until air pressure in test section is released. During this time, no one shall be allowed in trench or manhole while pipe is being decompressed.

e. Repair sewers failing air test by removing and replacing defective pipe sections or by other approved methods at Contractor's cost.

1. Retest until acceptable test results obtained to be paid by contractor.

D 218.04 LEAKAGE TESTING OF SANITARY SEWER MANHOLES

A. After completion of manhole construction, all sealing or rehabilitation, all manholes shall be tested for water tightness and leakage separately and independently of wastewater lines by hydrostatic exfiltration testing.

B. Plug influent and effluent lines, including services lines, with suitability-sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test. Follow manufacturer's safety and installation recommendations. Place plugs a minimum of 6 inches outside of manhole walls. Brace inverts to prevent lines from being dislodged if lines entering manhole have not been backfilled.

C. Hydrostatic Exfiltration Testing:

1. Hydrostatic exfiltration testing shall be performed as follows: all wastewater lines coming into any manhole shall be sealed with an internal pipe plug, and then the manhole shall be filled with water and maintained full for at least one hour
   a. The maximum leakage for hydrostatic testing shall be 0.025 gallons per foot diameter per foot of manhole depth per hour.

2. If water loss exceeds amount tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

3. For concrete manholes, a wetting period of 24 hours may be used prior to testing in order to allow saturation of the concrete.

D. Repair sewers failing air test by removing and replacing defective pipe sections or by other approved methods at contractor's cost.
SECTION 220
MICROTUNNELING

D 220.01 DESCRIPTION
The trenchless installation of pipes below ground, by jacking the pipe behind a remotely-controlled, steerable, guided, articulated microtunnel boring machine (MTBM) which is connected to and shoved forward by the pipe being installed, generally precluding man entry. A geotechnical baseline report prepared by the engineer shall be made available prior to bidding for the project. If geotechnical report is not available, the contractor is responsible for contracting a geotechnical laboratory to do a subsurface exploration.

1. Permits
   1.1 Contractor shall obtain a right of way use permit for the work from City of Laredo and any other agency.

2. Contractor Qualifications
   2.1 The contractor shall be trained by the respective manufacturer of the microtunneling equipment in the use of the machinery. The contractor shall provide certification from the manufacturer that the contractor has been trained and is proficient in the use of equipment. Only the contractor's employee trained and certified by the manufacturer shall be allowed to operate the equipment during the project.
   2.2 The contractor shall submit job history and reference list of equal or greater size projects successfully completed including the owner, engineer, addresses, phone numbers, and dates that said projects were completed.
   2.3 All personnel shall be fully trained in their respective duties as part of the microtunneling crew and in safety. The Supervisor must have at least two years of microtunneling experience. A competent and experienced supervisor representing the Drilling Contractor shall be present at all times during the actual drilling operations. A responsible representative who is thoroughly familiar with the equipment and type work to be performed must be in direct charge and control of the operation at all times.

D 220.02 MATERIALS
1. Pipe
   a) Pipe shall be specifically designed and certified for microtunneling by the pipe manufacturer and shall comply with ASTM and ASCE (ASCE Standard Construction Guidelines for Microtunneling) Specifications for use in Microtunneling.
   b) All joints shall consist of an elastomeric sealing element, sleeve, and a compression cushion ring as required by applicable ASTM and ASCE standards.
   c) Allowable forces: The allowable jacking strength capacity of pipe shall be capable of withstanding the maximum jacking forces imposed by the operation.

2. Pipe Characteristics
   a) Steel pipe shall have a minimum wall thickness of ¼” or as specified in Section 126, whichever is larger. Likewise, concrete pipe shall have a minimum wall thickness as specified in Section 304.
   b) Pipe shall be round. Steel pipe shall have a roundness tolerance, so that the difference between the major and minor outside diameters shall not exceed 1% of the specified nominal outside diameter, or 0.25 inch, whichever is less. Likewise, concrete and other types of pipes shall have similar roundness tolerances.
   c) Pipe shall have square and machine beveled ends. The pipe end maximum out-of-square tolerance shall be 0.04 inch, (measured across the diameter).
d) Pipe shall be straight. The maximum allowable straightness deviation over any 10 foot length of steel pipe is 1/8 inch.
e) Pipe shall be without any significant dimensional or surface deformities. All pipes shall be free of visible cracks, holes, foreign material, foreign inclusions, blisters, or other deleterious or injurious faults or defects. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used.

3. Protective Coatings (Steel Pipe)
   a) A coating to provide a corrosion barrier as well as an abrasion barrier is required. The coating shall be bonded well to the pipe and have a hard smooth surface to resist soil stresses and reduce friction. A mill-applied fusion bonded epoxy coating is required for steel pipes (ASTM 972/972M).

4. Submittals
   a) Prior to beginning work, the Contractor shall submit to the Engineer a work plan detailing the procedure and schedule to be used to execute the project. The work plan shall include a description of all equipment to be used, down-hole tools, a list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable), list of subcontractors, a schedule of work activity, a safety plan (including MSDS of any potentially hazardous substances to be used), traffic control plan (if applicable), an environmental protection plan and contingency plans for possible problems. Work plan shall be comprehensive, realistic and based on actual working conditions for the particular project. Plan shall document the thoughtful planning required to successfully complete the project.
   b) Specifications on material to be used shall be submitted to Engineer and material shall include the pipe, fittings, drilling mud, drilling additives and any other item, which is to be an installed component of the project or used during construction.

D 220.03 CONSTRUCTION
   o For street crossings, the crossing shall be as close to 90 degrees as practical.

1. Minimum Allowable Depths
   a) Minimum allowable depth of cover shall be as specified in the approved plans.

2. Method
   a) At completion of the MT operation, the installed pipe shall be inspected by means of a Closed Circuit Television (CCTV) camera and/or a pressure test. Damaged pipe shall be jacked through to the receiving shaft and be removed. Other methods of repairing the damaged conduit may be used, as recommended by the manufacturer and approved by the Engineer/Inspector.
   b) Perform shaft and tunnel excavation in a manner that will minimize the movement of the ground in front of and surrounding the excavation and minimize subsidence of the surface, structures, and utilities above and in the vicinity of the excavation. Support the ground in a manner to prevent loss of ground and keep shafts stable. Support pit excavation by positive means and as necessary during all shutdown periods.
   c) The contractor shall continuously monitor and compare the actual volume of spoil recovered to the theoretical volume.
   d) If any damage is observed to any property, the work shall cease immediately until a plan of action to minimize further damage and restore the damaged property is submitted and approved by the Engineer/Inspector.
e) Pipe ends shall be temporarily sealed until the drive and receiving shafts are made permanent, or other manholes are installed, to prevent water or earth infiltration.

f) The control equipment shall integrate the method of excavation, removal of soil, and simultaneous placement of pipe. Line and grade shall be controlled by a guidance system that relates the actual position of the MTBM to a design reference (e.g. by a laser beam transmitted from the drive shaft along the center line of the pipe to a target mounted in the shield). As each pipe section is jacked forward, the control system shall synchronize spoils removal, excavation, and jacking speeds. The MTBM display equipment shall continuously show and automatically record the position of the shield with respect to the project design line and grade.

3. Equipment

a) The Microtunneling Boring Machine (MTBM) shall be mechanically articulated to enable steering of the shield and shall be capable of incremental adjustments to maintain face stability for the soil conditions encountered. A remotely controlled steering mechanism shall be provided that allows for the operation of the system without the need for personnel to enter the tunnel.

b) The measuring and balancing of earth and groundwater pressure shall be achieved by use of a slurry system. The MTBM cutter face shall at all times be capable of supporting the full excavated area without the use of ground stabilization and have the capability of measuring the earth pressure at the face and setting a calculated earth balancing pressure.

c) The MTBM shall be advanced by jacks mounted in a jacking frame and located in the drive shaft. The MTBM shall be moved forward by the jacks advancing a successive string of connected pipes toward a receiving shaft.

d) The MTBM shall meet the following minimum performance requirements:
   - Capable of providing positive face support regardless of the MTBM type.
   - Articulated to enable controlled steering in both the vertical and horizontal direction to a tolerance of plus or minus 1 inch from design alignment.
   - All functions are controlled remotely from a surface control unit.
   - Capable of controlling rotation, using a bi-directional drive on the cutter head or by using anti-roll fins or grippers.
   - Capable of injecting lubricant around the exterior of the pipe being jacked.
   - Indication of steering direction.
   - For slurry type MTBM, the following is also required:
     - Measurement of the volume of slurry flow in both the supply and return side of the slurry loop.
     - Indications of slurry bypass valve position.
     - Indication of pressure of the slurry in the slurry chamber.

4. Drive and Receiving Shafts

a) Location - A minimum distance, from the edge of the paved shoulder or curb, to the face of any access pit, equipment, and supplies, shall be a minimum of 10 feet along arterials and a minimum of 5 feet along local streets. Any deviation from these distances shall require prior approval from the Engineer/Inspector.

b) Sheeting and Bracing -Sheeting and bracing shall be required whenever any part of the access pit excavation is located within the roadbed influence area. Steel sheet piling shall be furnished and installed as indicated. An additional earth retention structure shall be required above and below the bore hole on the drilling face of all access pits to prevent loss of material during construction.

c) Protection - Fencing barriers shall be installed adjacent to access pits, open excavations, equipment and supplies with suitable fencing and plastic drums to prohibit pedestrian access to the work site. Equipment shall not be used as fencing to protect access pits.

d) Miscellaneous Items
o Thrust blocks should be designed to distribute loads into the ground in a uniform manner such that any deflection of the thrust block is uniform and does not impart excessive loads on the shaft itself or cause the jacking frame to become misaligned.

o Entry and exit seals should be provided at shaft walls if needed to prevent inflows of groundwater and slurry.

5. Over Cut Allowance - Overcut is the annular space between the excavated bore and the outside diameter of the pipe. When using this method, the allowable overcut shall not exceed the outside pipe radius by more than one inch.

6. Water Tight joints - Water tight pipe joints are required to ensure the integrity of the roadbed. Pipe shall be constructed to prevent water leakage or earth infiltration throughout its entire length.

7. Lubrication and Slurry Fluids
   a) Lubrication shall be used to reduce necessary jacking forces in cohesive soil. The most common lubrication is bentonite.
   b) The pumping rate, pressures, viscosity and density of the slurry shall be monitored to ensure adequate removal of spoil. The excess slurry at entry and exit points in pits shall be contained until they are recycled or removed from the site. All slurry fluids shall be disposed of or recycled in a manner acceptable to the appropriate local, state or federal regulatory agencies.

8. Settlement/Heaving Monitoring
   a) This method shall be performed in a manner that will minimize the movement of the ground in front of, above, and surrounding the boring operation; and will minimize subsidence of the surface above and in the vicinity of the boring.
   b) Potential heave or settlement shall be monitored at each shoulder point, edge of pavement, the edge of each lane (or centerline for two lane roads), and otherwise at 50 foot intervals along the pipe centerline.
   c) A survey shall be performed prior to initiating this operation at each required monitoring location. A similar survey shall then be performed at each location, on a daily basis, until the permitted activity has been completed. All survey readings shall be recorded to the nearest one-hundredth (0.01) of a foot. Digital photographs of the pavement conditions shall also be taken prior and after the pipe installation.
   d) All operations shall stop immediately whenever monitored points indicate a vertical change in elevation of 1/2 inch or more, or any surface disruption is observed. The Contractor shall then immediately report the amount of settlement to the Engineer/Inspector.

9. Ground Water Control
   a) Dewatering shall be conducted whenever there is a high ground water table level to prevent flooding and facilitate the operation. The water table elevation shall be maintained at least 2 feet below the bottom of the casing at all times. When needed, dewatering may be initiated prior to any excavation.
   b) Minor water seepage or pockets of saturated soil may be effectively controlled through bailing or pumping. This control shall be accomplished without removing any adjacent soil that could weaken or undermine any access pit, its supports, or other nearby structure.
   c) Larger volumes of ground water shall be controlled with one or more well points or with staged deep wells. Well points and staged deep well pumping systems shall be installed and operated without damage to property or structures, and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors. Any pumping methods used for de-wathering and control of ground water and seepage shall have properly designated filters to ensure that the adjacent soil is not pumped along with the water. Well diameter, well spacing and the pump’s pumping rate, shall provide adequate draw down.
of the water level. Wells shall be located to intercept ground water that otherwise would enter the access pit excavation and interfere with the work. Upon removal of a well, the hole shall be filled and grouted according to the specifications identified in as flowable fill, and Plugging Drill Holes as directed by the Engineer.

d) Existing storm sewers shall only be used to discharge water from the dewatering operation in accordance with a permit obtained from the appropriate storm sewer owner. Filters or sediment control devices shall be required to ensure that the existing system is not adversely affected by construction debris or sediment.

e) If grouting is used to prevent ground water from entering the area of the access pit, the grouting shall be installed without damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors. The material properties of the grout shall conform to the specifications identified in as flowable fill.

10. Failure
   a) Should anything prevent completion of this operation, the remainder of the pipe shall be constructed and/or abandoned by methods approved by the Engineer/Inspector and accepted by the city.
   b) Abandonment of any component of the installation shall only be allowed as approved by the Engineer/Inspector and accepted by the city.

D 220.04 Contamination
When an area of contaminated ground is encountered, all operations shall stop immediately, and shall not proceed until approved by the Engineer/Inspector. Any slurry shall be tested for contamination and disposed of in a manner, which meets Local, State and/or Federal requirements.

D 220.05 Work Site Restoration
1. Access pits and excavations shall be backfilled with suitable material, and in a method approved by the Engineer/Inspector.
2. The disturbed grass-surface area shall be top soiled, seeded, fertilized, mulched, and anchored.
3. Upon completion of the work, the contractor shall remove and properly dispose of all excess materials and equipment from the work site.

D 220.06 Televising Pipe
In accordance to Section 226

D 220.07 Measurement
This Item will be measured by the linear foot. Such measurements will be made between the ends of the barrel along its flow line.

D 220.08 Payment
Payment for the work in this section will be as per linear foot or as stipulated in the contract documents. The price for installing the pipe lines shall be full compensation for all materials, labor, equipment, cost of insertions and retrieval, pavement removal and replacement, testing, and incidentals required to complete the replacement process.
SECTION 221
HAND TUNNELING

D 221.01 SUMMARY
This Section includes the minimum requirements for Hand Tunneling and installation of tunnel linter plate or wood box at the locations shown on the drawings.

OWNER reserves the right to delay any tunneling across an intersection based on weather conditions.

D 221.02 REFERENCES
Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.

1. American Association of State Highway and Transportation Officials (AASHTO)
   a. HB-17, Standard Specifications for Highway Bridges.
   b. M190, Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches.

2. Occupational Safety and Health Administration (OSHA)

D 221.03 ADMINISTRATIVE REQUIREMENTS
The Contractor shall provide written notice to the OWNER at least 72 hours in advance of the planned launch of tunneling operations.

D 221.04 SUBMITTALS
Submit the following when required by the Contract Documents

A. Shop Drawings
   1. Detailed description of the methods and equipment to be used in completing each reach of tunnel
   2. Description of the survey methods that will be used to ensure that the tunnel is advanced as shown on the Drawings and within the line and grade tolerances specified
   3. Shaft layout drawings
      a. Detailing dimensions and locations of all equipment, including overall work area boundaries, crane, front-end loader, forklift, spoil stockpiles, spoil hauling equipment, pumps, generator, pipe storage area, tool trailer or containers, fences, and staging area
      b. Shaft layout drawings will be required for all shaft locations and shall be to scale or show correct dimensions.
      c. Layout such that all equipment and operations shall be completely contained within the allowable construction areas shown on the Drawings

B. Schedule
   1. Mobilization
   2. Shaft excavation and support
   3. Water control at shafts
   4. Working slab construction
   5. Thrust wall construction
   6. Tunneling
   7. Shaft backfills
   8. Site restoration
   9. Cleanup
10. Demobilization

C. Contact Grouting (outside of casing) Work Plan and Methods (required for all projects)
   1. Grouting methods
   2. Details of equipment
   3. Grouting procedures and sequences including:
      a. Injection methods
      b. Injection pressures
      c. Monitoring and recording equipment
      d. Pressure gauge calibration data
      e. Materials
   4. Grout mix details including:
      a. Proportions
      b. Admixtures including:
         (1) Manufacturer’s literature
         (2) Laboratory test data verifying the strength of the proposed grout mix
         (3) Proposed grout densities
         (4) Viscosity
         (5) Initial set time of grout
            i. Data for these requirements shall be derived from trial batches from an approved testing laboratory
   5. Submit a minimum of three (3) other similar projects where the proposed grout mix design was used
   6. Submit anticipated volumes of grout to be pumped for each application and reach grouted

D. Daily Records
   1. Submit samples of the tunneling logs or records to be used at least seven (7) days prior to beginning hand tunneling
   2. Submit daily records to the OWNER by noon on the day following the shift for which the data or records were taken
   3. Daily records shall include:
      a. Date
      b. Time
      c. Name of operator
      d. Tunnel drive identification
      e. Installed liner ring and corresponding tunnel length
      f. Time required to tunnel each ring
      g. Time required to set subsequent ring
      h. Spoil volumes (muck carts per liner ring and estimated volume of spoil in each muck cart)
   4. Grout volumes and pressures
   5. Soil conditions including occurrences of unstable soils and estimated groundwater inflow rates, if any
   6. Line and grate offsets
   7. Any movement of the guidance system
   8. Problems encountered during tunneling
   9. Durations and reasons for delays
   10. Manually recorded observations made:
        a. At intervals of not less than 2 every 5 feet
        b. As conditions change
        c. As directed by the OWNER and / or Engineer
D 221.05 QUALIFICATIONS
Failure to meet the qualification requirements is failure to fulfill the Contract and the Contractor will be required to obtain a Subcontractor that meets the qualification requirements

1. All tunneling work shall be performed by an experienced contractor or subcontractor who has at least 5 years of experience in performing tunneling work and has completed at least 5 projects of similar diameter in similar ground conditions.
2. All Work by the Contractor shall be done in the presence of the OWNER unless the OWNER grants prior written approval to perform such work in OWNER’s absence.
3. The Contractor shall allow access to the OWNER and/or Engineer and shall furnish necessary assistance and cooperation to aid in the observations, measurements, data and sample collection including, but not limited to, the following:
   a. The OWNER and/or Engineer shall have access to the tunneling system prior to, during and following all tunneling operations.
   b. The OWNER and/or Engineer shall have access to the tunneling shafts prior to, during and following all tunneling operations.
      (1) This shall include, but not be limited to, visual inspection of installed pipe and verification of line and grade.
      (2) The Contractor shall provide safe access in accordance with all safety regulations.
   c. The OWNER and/or Engineer shall have access to spoils removed from the tunnel excavation prior to, during and following all tunneling operations.
      (1) The OWNER shall be allowed to collect soil samples from the muck buckets or spoil piles a minimum of once every 10 feet and at any time when changes in soil conditions or obstructions are apparent or suspected.

D 221.06 MATERIALS
Tunnel liner plate shall be in accordance with Section 225

D 221.07 DESIGN CRITERIA
1. Design excavation methods and spoil conveyance system for the full range of ground conditions described in the Geotechnical Reports
2. Tolerance
   a. Accurately maintain the face of the excavation inside the tunnel so as to allow the absolute minimum of void space outside the casing/liner plate.
   b. Maintain a maximum of ½ inch tolerance between the outside of the casing/liner plate and the excavation wherever possible.
   c. The tunnel diameter shall not be greater than 2 inches larger than the casing/liner outer diameter (O.D.).
3. Use methods and equipment that control surface settlement and heave above the pipeline to prevent damage to existing utilities, facilities and improvements.
   a. Limit any ground movements (settlement/heave) to values that shall not cause damage to adjacent utilities and facilities.
   b. Repair any damage caused by ground movements at no cost to the OWNER.

D 221.08 PREPARATION
Tunneling shall not being until the following have been completed:
1. All required submittals have been made and the OWNER and/or Engineer has reviewed and accepted all submittals.
2. Review of available utility drawings and location of conduits and underground utilities in all areas where excavation is to be performed.
   a. Notify the applicable one-call system prior to any excavation to avoid interference with the existing conduits and utilities.
(1) Repair damage to existing utilities resulting from excavation at no additional cost to the OWNER.

3. Shaft excavations and support systems for each drive completed in accordance with the requirements of the Specifications.

4. Site safety representative has prepared a code of safe practices in accordance with OSHA requirements.
   a. Provide the Engineer and Owner with a copy of each prior to starting shaft construction or tunneling.
   b. Hold safety meetings and provide safety instruction for new employees as required by OSHA.

5. All specified settlement monitoring points have been installed, approved and baselined in accordance with the Contract Documents.

6. Verification of Stability
   a. Confirm that the ground will remain stable without movement of soil or water while the entry/exit location shoring is removed and while the tunnel is launched or received into a shaft.
   b. Demonstrate that all soils have been stabilized at all tunnel portal locations to:
      (1) Prevent the inflow of weak, running or flowing soils.
      (2) Prevent the inflow of loose rock.
      (3) Prevent and control groundwater inflows.

D 221.09 INSTALLATION

1. Tunnel Methods
   a. Tunnel liner plate shall not be used where bore or jack methods are used, or where not allowed on the Drawings or permits.
   b. The Contractor shall be fully responsible to:
      (1) Ensure the methods used are adequate for the protection of workers, pipe, property and the public
      (2) Provide a finished product as required.

2. General
   a. The Contractor shall immediately notify the OWNER, in writing, if and when any problems are encountered with equipment or materials, or if the Contractor believes the conditions encountered are materially and significantly different than those represented within the Contract Documents.
   b. Properly manage and dispose of groundwater inflows to the shafts in accordance with requirements of Specifications and all permit conditions.
      (1) Discharge of groundwater inflow into sanitary sewers is not allowed without proper approval and permits.
   c. Furnish all necessary equipment, power, water and utilities for tunneling, spoil removal and disposal, grouting and other associated work required for the methods of construction.
   d. Promptly clean up. Remove and dispose of any spoil or slurry spillage.
   e. Whenever there is a condition that is likely to endanger the stability of the excavation or adjacent structures, operate with a full crew 24 hours a day, including weekends and holidays, without interruption, until those conditions no longer jeopardize the stability of the Work.

3. Installation with Tunnel Liner Plate
   a. Install the tunnel liner plates to the limits indicated on the Drawings and as specified in AASHTO HB-17, Section II-26, Construction of Tunnels Using Steel Tunnel Liner Plates.
      (1) Assemble liner plates into circumferential rings.
(2) Liner plates shall be of the type to permit segments to be installed completely from inside the tunnel.

b. Accurately maintain the face of the excavation inside the tunnel so as to allow the absolute minimum of void space outside the liner plate.
   (1) Maintain a maximum of ½ inch tolerance between the outside of the liner plate and the excavation wherever possible.
   (2) The tunnel diameter shall not be greater than 2 inches larger than the liner O.D.

c. Liner plate installation shall proceed as closely as possible behind the excavation.
   (1) Excavation shall at no time be more than 6 inches ahead of the required space to install an individual tunnel liner plate.
   (2) Use breast plates, poling boards or other suitable devices to maintain accurate excavation with the minimum of unsupported excavation at any time.
   (3) Tunnel liner plate shall not be allowed to deflect vertically during installation.

d. Tunneling operations shall control surface settlement and heave above the pipeline to prevent damage to existing utilities, facilities and improvements.
   (1) In no case shall ground movements cause damage to adjacent structures, roadways, or utilities.
   (2) The Contractor shall repair any damage resulting from construction activities, at no additional cost to the OWNER and without extensions of schedule for completion.

4. Contact Grouting
a. Pressure grout any voids caused by or encountered during the tunneling.
   (1) Modify equipment and procedures as required to avoid recurrence of excessive settlements or damage.
b. Install contact grout in the void space between the outside of the casing/tunnel liner and the excavation.
   (1) For tunnel liner plate, install pressure grout mix at the end of each work day or more often, as conditions warrant.
c. Install pressure grouting through grout fittings for the casing/tunnel liner plate 48- inches in diameter or larger.
   (1) Grout fittings shall be fabricated into tunnel liner plate at a maximum spacing of 6 feet.
   (2) Remove and plug grout fittings after pressure grouting.
d. Install pressure grout from the low end for all crossings where grout fittings are not used.
   (1) Seal the low end and pressure grout until grout is extruded from the opposite end.

5. Control of Line and Grade
a. Confirm that all established benchmarks and control points provided for the Contractor’s use are accurate.
   (1) Use these benchmarks to furnish and maintain all reference lines and grades for tunneling.
   (2) Use lines and grades to establish the location of the pipe using a laser or theodolite guidance system.
   (3) Submit to the OWNER copies of field notes used to establish all lines and grades and allow the Engineer to check guidance system setup prior to beginning each tunneling drive.
   (4) Provide access for the OWNER to perform survey checks of the guidance system and the line and grade of the carrier pipe on a daily basis during tunneling operations.
   (5) The Contractor remains fully responsible for the accuracy of the work and the correction of it, as required.
b. The casing/tunnel liner shall be installed in accordance with the following tolerances:
   (1) Variations from design line or grade: ± 2 inches maximum
i. If the installation is off line or grade, make the necessary corrections and return to the design alignment and grade at a rate of not more than 1 inch per 25 feet.

   c. Monitor line and grade continuously during tunneling operations.
      (1) Record deviation with respect to design line and grade once at each pipe joint and submit records to Engineer daily.

   d. If the pipe installation does not meet the specified tolerances, correct the installation, including any necessary redesign of the pipeline or structures and acquisition of necessary easements.

6. Obstructions
   a. If the tunneling operations should encounter an object or condition that impedes the forward progress of the shield, notify the OWNER immediately.

   b. Correct the condition and remove, clear or otherwise make it possible for the shield to advance past any objects or obstructions that impede forward progress.

   c. Proceed with removal of the object or obstruction by methods submitted by the Contractor and accepted by the OWNER and/or Engineer

7. Cleanup and Restoration
   a. After completion of the tunneling, all construction debris, spoils, oil, grease and other materials shall be removed from the tunneling pipe, shafts and all work areas.
      (1) Cleaning shall be incidental to the construction.

   b. Restoration shall follow construction as the Work progresses and shall be completed as soon as reasonably possible.
      (1) Restore and repair any damage resulting from surface settlement caused by shaft excavation or tunneling.
      (2) Any property damaged or destroyed, shall be restored to a condition equal to or better than that to which it existed prior to construction.
      (3) Restoration shall be completed no later than 30 days after tunneling is complete, or earlier if required as part of a permit or easement agreement.
      (4) This provision for restoration shall include all property affected by the construction operations.

8. Site Quality Control / Safety
   a. No gasoline powered equipment shall be permitted in receiving shafts/pits.
      (1) Diesel, electrical, hydraulic and air powered equipment are acceptable, subject to applicable local, State, and Federal regulations.

   b. Furnish and operate a temporary ventilation system in accordance with applicable safety requirements when personnel are underground.
      (1) Perform all required air and gas monitoring.
      (2) Ventilation system shall provide a sufficient supply of fresh air and maintain an atmosphere free of toxic or flammable gasses in all underground work areas.

   c. Perform all Work in accordance with all current applicable regulations and safety requirements of the Federal, State, and Local agencies. Comply with all applicable provisions of OSHA 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavations.
      (1) In the event of conflict, comply with the more stringent requirements.

   d. If personnel will enter the pipe during construction, the Contractor shall develop an emergency response plan for rescuing personnel trapped underground in a shaft excavation or pipe.
      (1) Keep on-site all equipment required for emergency response in accordance with the agency having jurisdiction.
D 221.10 MEASUREMENT
Hand tunneling will be measured in linear feet for 48” diameter along the horizontal centerline of pipe. No deduction will be made for manholes.

D 221.11 PAYMENT
Hand tunneling will be paid for at the unit price per linear foot, complete in place, as provided in the proposal and contract. The price per linear foot shall be the total compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete work including: FPVC fusion, FPVC installation in linear plate, excavation, backfill, and disposal of surplus materials in accordance with plans and specifications.
SECTION 223
INSTALLATION OF CARRIER PIPE IN TUNNEL LINER PLATE

D 223.01 SUMMARY
This Section includes the requirements for the installation of carrier pipe into steel casings or tunnel liner plate at locations shown on the Drawings. Pipe fabrication, placement of backfill around the pipe, and grouting are specified elsewhere.

The following sections apply to the work of this section. Other sections not referenced below shall also apply to the extent required for proper performance of this work.

- Section 221 Hand Tunneling
- Section 225 Tunnel Liner Plate

D 223.02 DEFINITIONS
1. Carrier Pipe: Permanent pipe for operational use that is used to convey flows.
2. Casing: A steel pipe or tunnel liner installed by trenchless methods that supports the ground and provides a stable underground excavation for installation of the carrier pipe.

D 223.03 REFERENCES
Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.

1. American Society of Testing and Materials (ASTM)
2. International Organization for Standardization (ISO)
   a. 9001, Quality Management Systems - Requirements.
3. Occupational Safety and Health Administration (OSHA)

D 223.04 SUBMITTALS
Submit the following when required by the Contract Documents
A. Product Data
   1. Casing Isolators / Spacers
      a. Material data
   2. Grout Mix
      a. Material Data

B. Shop Drawings
   1. Required for 24 inch and larger pipe installations
   2. Submit work plan describing the carrier pipe installation equipment, materials, and construction methods to be employed.
   3. Casing Spacers / Isolators
      a. Detail drawings and manufacturer’s information for the casing isolators/spacers that will be used.
         (1) Include dimension and component materials and documentation of manufacturer’s ISO 9001:2000 certification.
b. Alternatives to casing spacers/isolators may be allowed by the OWNER on a case-by-case basis.
c. For consideration of alternate method, submit a detailed description of method including details.

4. End seal or bulkhead designs and locations for casing/liners.

5. Annular Space (between casing pipe and tunnel liner plate) Grouting Work Plan and Methods including:
   a. Grouting methods
   b. Details of equipment
   c. Grouting procedures and sequences including:
      (1) Injection methods
      (2) Injection pressures
      (3) Monitoring and recording equipment
      (4) Pressure gauge calibration data
      (5) Materials
   d. Grout mix details including:
      (1) Proportions
      (2) Admixtures including:
      (3) Manufacturer’s literature
      (4) Laboratory test data verifying the strength of the proposed grout mix
      (5) Proposed grout densities
      (6) Viscosity
      (7) Initial set time of grout
      (8) Data for these requirements shall be derived from trial batches from an approved testing laboratory.
   e. Submit a minimum of 3 other similar projects where the proposed grout mix design was used.
   f. Submit anticipated volumes of grout to be pumped for each application and reach grouted.
   g. For pipe installations greater than 36-inches, without hold down jacks or a restrained spacer, provide buoyant force calculations during grouting and measures to prevent flotation.
      (1) Calculations sealed by a licensed Engineer in the State of Texas.
   h. Description of methods and devices to prevent buckling of carrier pipe during grouting of annular space, if required

C. General
1. Letter of Certification. Certification that proposed pipe transportation, internal and external pipe supports, blocking details to prevent flotation, and backfilling procedures are in accordance with manufacturer’s recommendations and will not damage pipe. Provide calculations demonstrating that pipe will not be damaged during backfilling operations due to flotation. Calculations shall be prepared by and sealed by a Professional Engineer registered in the State of Texas.
2. Quality Control Plans. Methods for achieving minimum specified tolerances for line and grade, pipe ovalization to specified limits, and providing the minimum annular clearance.

D. Daily Records
1. Daily records submitted no later than the beginning of the following working day.
2. Daily records shall include:
   a. Number and classification of men and equipment.
   b. Beginning and ending stations or elevations of pipe lining, and station or elevation where joint work has been completed.
c. Testing, including time, location, and results of tests.
   d. Notation of any downtime or interruption to production, including length of time and reason.

D 223.05 TOLERANCE
1. Pipe Circularity
   \[
   \frac{(D_h - D_v)}{D_v} \leq 0.005
   \]
   Where,
   D_v is the pipe diameter measured vertically and
   D_h is the pipe diameter measured horizontally, immediately before encasement in grout.

2. Pipe Alignment in Tunnel
   a. Line: Within 0.3 foot of theoretical alignment.
   b. Grade: Within 0.33 foot of theoretical grade.
   c. Corrections to line and grade: No greater than 1 inch in 10 feet, or sufficient to prevent ponding, whichever is less.

D 223.06 DOCUMENTATION
Documents for the installation of pipe in tunnels shall be prepared and sealed by a Professional Engineer licensed in the State of Texas and include:

1. Working Drawings and Methods Statements: Detail means and methods for transporting, handling, storing, protecting, installing, supporting and blocking the pipe in place at its final location.

2. Include the following:
   a. Preparations for installing pipe sections, including details of mock-up pipe section assembly.
   b. Methods for cleaning areas where pipe is to be placed and grade control.
   c. Details of pipe carriers, prefabricated runners, cradles, internal supports, tie-downs, bracing, backfill concrete lift height, and other methods for preventing flotation while placing annular backfill.
   d. Sequence and methods for installing pipe sections in the tunnel and fit up of joints.
   e. Sequence and methods for encasing pipe sections in backfill.
   f. Details for effecting tie-ins (if any) to buried pipeline reaches.

D 223.07 QUALIFICATIONS
Failure to meet the qualification requirements is failure to fulfill the Contract and the Contractor will be required to obtain a Subcontractor that meets the qualification requirements

2. The Contractor or its installer shall demonstrate experience installing similar pipe on at least three tunnels using similar methods and procedures proposed for this project. Submit project name and details, contract, and phone number for the three projects, completed within the last 5 years.

D 223.08 DELIVERY, STORAGE, AND HANDLING
1. Handle, transport, and store pipe sections in accordance with manufacturer’s recommendations.
2. Do not use cables or chains to load or unload pipes.
3. Support stored pipe at a minimum on the quarter points along the pipe length.
4. Do not drag or skid pipe. Prefabricated runners are permitted provided coatings are not damaged.
5. Align pipe sections using jacks or other suitable devices without damaging the pipe.
D 223.09 MATERIALS
1. See Section 225
2. The casing spacers/isolators shall be new, and the product of a manufacturer regularly engaged in the manufacturing of casing spacers/isolators.

D 223.10 DESIGN CRITERIA
1. Carrier pipe shall be installed within the horizontal and vertical tolerances as indicated in section 11 of this Specification, incorporating all support/insulator dimensions required.

2. Grout of annular space
   a. For sewer pipe installation
      (1) Fill all voids between the carrier pipe and the casing or liner with grout
      (2) All exterior carrier pipe surfaces and all interior casing or liner surfaces shall be in contact with the grout
   b. For water line installation
      (1) No annular space fill will be used

3. Grout Mixes
   a. Low Density Cellular Grout (LDCC)
      (1) Annular space (between sewer carrier pipe and casing/liner) grout shall be LDCC.
      (2) The LDCC shall be portland cement-based grout mix with the addition of a foaming agent designed for this application.
      (3) Develop 1 or more grout mixes designed to completely fill the annular space based on the following requirements:
         i. Provide adequate retardation to completely fill the annular space in 1 monolithic pour.
         ii. Provide less than 1 percent shrinkage by volume.
         iii. Compressive Strength
            ▪ Minimum strength of 10 psi in 24 hours, 300 psi in 28 days
         iv. Design grout mix with the proper density and use proper methods to prevent floating of the carrier pipe.
         v. Proportion grout to flow and to completely fill all voids between the carrier pipe and the casing or liner.

4. End Seals
   a. Provide end seals at each end of the casing or liner to contain the grout backfill or to close the casing/liner ends to prevent the inflow of water or soil.
      (1) For water piping less than 24-inch diameter, use hard rubber seals, Model PL Link Seal as manufactured by the Thunderline Corporation or approved equal.
      (2) For water piping 24-inch diameter and greater, use pull-on, 1/8-inch-thick, synthetic rubber end seals, Model C, as manufactured by Pipeline Seal and Insulator, Inc. or approved equal.
      (3) For sewer piping, no end seals are required since the annular space between the carrier pipe and the casing will be grouted.
   b. Design end seals to withstand the anticipated soil or grouting pressure and be watertight to prevent groundwater from entering the casing.

5. Casing Spacers/Insulators
   a. Provide casing spacers/insulators to support the carrier pipe during installation and grouting (where grout is used).
      (1) For concrete pressure pipe, mortar bands may be allowed in lieu of casing spacers/insulators.
b. Casing Spacers/Isolators material and properties:
   (1) Shall be minimum 14 gage
   (2) For water pipe, utilize Stainless Steel.
   (3) For sewer pipe, utilize Coated Steel.
   (4) Suitable for supporting weight of carrier pipe without deformation or collapse during installation

c. Provide restrained-style casing spacers to hold all pipes stable during grouting operations and prevent floating or movement.

d. Provide dielectric strength sufficient to electrically isolate each component from one another and from the casing.

6. Design risers for appropriate loads, and, as a minimum:
   a. Provide 10 gage steel risers
      (1) Provide stainless steel bands and risers for water installations.

7. Band Material and Criteria
   a. Provide polyvinyl chloride inner liner with:
      (1) Minimum thickness of 0.09 inches
      (2) Durometer “A” of 85-90 hardness
      (3) Minimum dielectric strength of 58,000 volts

8. Runner Material and Criteria
   a. Provide pressure-molded glass reinforced polymer or UHMW with:
      (1) Minimum of 2 inches in width and a minimum of 11 inches in length.
   b. Attach to the band or riser with 3/8-inch minimum welded steel or stainless-steel studs.
   c. Runner studs and nuts shall be recessed well below the wearing surface of the runner
      (1) Fill recess with a corrosion inhibiting filler.

9. Riser Height
   a. Provide sufficient height with attached runner allow a minimum clearance of 2 inches between the outside of carrier pipe bells or couplings and the inside of the casing liner surface.

**D 223.11 INSTALLATION**

1. General
   a. Carrier pipe installation shall not begin until the following tasks have been completed:
      (1) All required submittals have been provided, reviewed and accepted.
      (2) All casing/liner joints are watertight, and no water is entering casing or liner from any sources.
      (3) All contact grouting is complete.
      (4) Liner alignment record drawings have been submitted and accepted by OWNER to document deviations due to casing/liner installation.
      (5) Site safety representative has prepared a code of safe practices and an emergency plan in accordance with applicable requirements.
   b. The carrier pipe shall be installed within the casings or liners between the limits indicated on the Drawings, to the specified lines and grades and utilizing methods which include due regard for safety of workers, adjacent structures and improvements, utilities and the public.
   c. In areas of groundwater intrusion and sloughing potential, contractor is required to fill the annular space between the shaft and excavated area with grout or install shoring to prevent slough.
2. Control of Line and Grade
   a. Install carrier pipe inside the steel casing within the following tolerances:
      (1) Horizontal ± 2 inches from design line
      (2) Vertical ±1 inch from design grade
   b. Check line and grade set up prior to beginning carrier pipe installation.
   c. Perform survey checks of line-and-grade of carrier pipe during installation operations.

3. The Contractor is fully responsible for the accuracy of the installation and the correction of it, as required.
   a. Where the carrier pipe installation does not satisfy the specified tolerances, correct the installation, including if necessary, redesign of the pipe or structures at no additional cost to OWNER.

4. Pipe Installation
   a. Remove all loose soil from casing or liner.
   b. Grind smooth all rough welds at casing joints.

5. Installation of Casing Spacers
   a. Provide casing spacers, insulators or other approved devices to prevent flotation, movement or damage to the pipe during installation and grout backfill placement.
   b. Assemble and securely fasten casing spacers to the pipeline to be installed in casings or tunnels.
   c. Correctly assemble, evenly tighten and prevent damage during tightening of the insulators and pipe insertion.
   d. Install spacers in accordance with manufacturer’s recommendations.
   e. Install carrier pipe so that there is no metallic contact between the carrier pipe and the casing.
   f. Carrier pipe shall be installed without sliding or dragging it on the ground or in the casing/liner in a manner that could damage the pipe or coatings.
      (1) If guide rails are allowed, place cement mortar on both sides of the rails
   g. Coat the casing spacer runners with a non-corrosive/environmentally safe lubricant to minimize friction when installing the carrier pipe.
   h. The carrier pipe shall be electrically isolated from the carrier pipe and from the casing.
   i. Grade the bottom of the trench adjacent to each end of the casing to provide a firm, uniform and continuous support for the pipe. If the trench requires some backfill to establish the final trench bottom grade, place the backfill material in 6-inch lifts and compact each layer.
   j. After the casing or tunnel liner has been placed, pump dry and maintain dry until the casing spacers and end seals are installed.

6. Insulator Spacing
   a. Maximum distance between spacers is to be 6 feet.
   b. For 18 and 20-foot-long joints, install a minimum of 4 spacers.
      (1) Install 2 spacers within 1 foot on each side of the bell or flange.
      (2) Remaining 2 spacers shall be spaced equally.
   c. If the casing or pipe is angled or bent, reduce the spacing.
   d. The end spacer must be within 6 inches of the end of the casing pipe, regardless of size of casing and pipe or type of spacer used.
   e. Install spacers on PVC pipe at the insertion line to prevent over-insertion of the spigot into the bell.

7. After installation of the carrier pipe
   a. Mortar inside and outside of the joints, as applicable
b. Verify electrical discontinuity between the water carrier pipe and tunnel liner.
   (1) If continuity exists, remedy the short, by all means necessary including removing and
   reinstalling the carrier pipe, prior to applying cellular grout.

c. If hold down jacks or casing spacers are used, seal or plug the ends of the casing.
d. If steel pipe is used and not welded prior to installation in casing/liner, welding of pipe will
   only be allowed after grouting of annular space is complete.

8. Installation of End Seals
a. For water pipes
   (1) Grout end of casing/liner a minimum of 6 inches and a maximum of 12 inches.
   (2) Place pull-on synthetic rubber end seals on the pipe and pull over the end of the
   casing. Securely fasten with stainless steel bands.

b. For Sewer pipes
   (1) Grout annular space between carrier pipe and casing as indicated in this Specification.

9. Annular Space Grouting (For Sewer Only)
a. Prepare pipe as necessary to prevent the pipe from floating during grouting operation as
   necessary. Methods that create a point load on the pipe will not be acceptable.
b. Mixing of Grout
   (1) Mix material in equipment of sufficient size to provide the desired amount of grout
   material for each stage in a single operation.
      i. The equipment shall be capable of mixing the grout at the required densities for
         the approved procedure and shall be capable of changing the densities as
         required by field conditions.
c. Backfill Annular Space with Grout
   (1) Prior to filling of the annular space, test the carrier pipe
   (2) Verify the maximum allowable pressure with the carrier pipe manufacturer and do not
       exceed this pressure.
   (3) After the installation of the carrier pipe, the remaining space (all voids) between the
       casing/liner and the carrier shall be filled with LDCC grout.
      i. All surfaces of the exterior carrier pipe wall and casing/liner interior shall be in
         contact with the grout.
      ii. Grout shall be pumped through a pipe or hose.
      iii. Use grout pipes, or other appropriate materials, to avoid damage to carrier pipe
           during grouting.
d. Injection of LDCC Grout
   (1) Grout injection pressure shall not exceed the carrier pipe manufacturer’s approved
       recommendations or 5 psi (whichever is lower).
   (2) Pumping equipment shall be of a size sufficient to inject grout at a volume, velocity
       and pressure compatible with the size/volume of the annular space.
   (3) Once grouting operations begin, grouting shall proceed uninterrupted, unless grouting
       procedures require multiple stages.
   (4) Grout placements shall not be terminated until the estimated annular volume of grout
       has been injected.
e. Block the carrier pipe during grouting to prevent flotation during grout installation.
f. Protect and preserve the interior surfaces of the casing from damage.

D 223.12 QUALITY CONTROL
A. Reports and Records required for pipe installations greater than 48-inches and longer than 350
   feet
   1. Maintain and submit daily logs of grouting operations. Include:
      a. Grouting locations
b. Pressures
c. Volumes
d. Grout mix pumped
e. Time of pumping

2. Note any problems or unusual observations on logs.

B. Grout Strength Tests
1. OWNER may perform testing for 24-hour and 28-day compressive strength tests for the
cylinder molds or grout cubes obtained during grouting operations.
2. OWNER may perform field sampling during annular space grouting.
   a. OWNER may collect at least 1 set of 4-cylinder molds or grout cubes for each 100
cubic yards of grout injected but not less than 1 set for each grouting shift.
   b. OWNER may perform 24-hour and 28-day compressive strength tests per ASTM C39
      (cylindrical specimens) or ASTM C109 (cube specimens).
   c. Remaining samples shall be tested as directed by OWNER.

C. Safety
1. The Contractor is responsible for safety on the job site.
   a. Perform all Work in accordance with the current applicable regulations of the Federal,
      State and local agencies.
   b. In the event of conflict, comply with the more restrictive applicable requirement.
2. No gasoline powered equipment shall be permitted in jacking shafts and receiving
   shafts/pits.
   a. Diesel, electrical, hydraulic and air powered equipment is acceptable, subject to
      applicable local, State and Federal regulations.
3. Methods of construction shall be such as to ensure the safety of the Work, Contractor's and
   other employees on site and the public.
4. Furnish and operate a temporary ventilation system in accordance with applicable safety
   requirements when personnel are underground.
   a. Perform all required air and gas monitoring.
   b. Ventilation system shall provide a sufficient supply of fresh air and maintain an
      atmosphere free of toxic or flammable gasses in all underground work areas.
5. Perform all Work in accordance with all current applicable regulations and safety
   requirements of the federal, state and local agencies.
   a. Comply with all applicable provisions of OSHA 29 CFR Part 1926, Subpart S,
      Underground Construction and Subpart P, Excavations.
   b. In the event of conflict, comply with the more stringent requirements.
6. If personnel will enter the pipe during construction, the Contractor shall develop an
   emergency response plan for rescuing personnel trapped underground in a shaft excavation
   or pipe.
   a. Keep on-site all equipment required for emergency response in accordance with the
      agency having jurisdiction

D 223.13 PAYMENT
No pay item will be included in the proposal or direct payment for installation of pipe in liner plate. The
cost for these materials and labor shall be included in the bid unit price for 36" FPVC, 48" diameter hand
 tunneling with liner plate.
SECTION 225
TUNNEL LINER PLATE

D 225.01 SUMMARY
This Section includes the minimum requirements for manufacturing, furnishing and transporting Tunnel Liner Plate to be used for excavation support as installed by hand tunneling at the locations shown on the Drawings.

D 225.02 REFERENCES
Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.

1. American Association of State Highway and Transportation Officials (AASHTO)
   a. LRFD, Bridge Design Manual, Section 12.13
   b. M190, Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches.

D 225.03 SUBMITTALS
A. Product Data
   1. Tunnel Liner Plate and fasteners
      a. Material data
   2. Exterior Coating
      a. Material data
      b. Field touch-up procedures
   3. Grout Mix
      a. Material data

B. Shop Drawings
   1. Submit calculations for the design of the Tunnel Liner Plate sealed by a Licensed Engineer in the State of Texas.
   2. Detailed plan for grouting the void space on the exterior of the Tunnel Liner Plate
   3. Grout coupling location and spacing

D 225.04 DELIVERY, STORAGE, AND HANDLING
Deliver, handle and store Tunnel Liner Plate in accordance with the Manufacturer's recommendations to protect coating systems.

D 225.05 MANUFACTURERS
Manufactured by Contech Construction Products, Inc., DSI Underground, or approved equal.

D 225.06 DESIGN CRITERIA
1. Manufacturer to design Tunnel Liner Plate in accordance with the methods and criteria as specified in AASHTO LRFD, Bridge Design Manual, Section 12.13.
2. Soil parameters shall be determined by the Tunnel Liner Plate Manufacturer.
3. Allow a maximum deflection of 3 percent.
4. Thickness of the Tunnel Liner Plate specified herein is the minimum acceptable and shall be increased as necessary to obtain adequate joint strength, stiffness, buckling strength and resistance to deflection.

D 225.07 MATERIALS

1. Provide new, corrugated metal Tunnel Liner Plates made from steel sheets conforming to the requirements of ASTM A1011.

A. Potable and Reclaimed Water carrier pipe
   1) Galvanized
      a) Plate to be galvanized with zinc coating in accordance with ASTM A123 with the following exception:
         (1) Zinc shall be applied at a rate of 2.0 ounces per square foot on each side.
   2) Coated
      a) Plate to be coated with a bituminous coating meeting the performance requirements of AASHTO M190
      b) Uniformly coat pipe inside and out to minimum thickness of 0.05 inches, measured on crests of corrugations.

B. Sanitary Sewer carrier pipe
   1) Galvanized
      a) Plate to be galvanized with zinc coating in accordance with ASTM A123 with the following exception:
         (1) Zinc shall be applied at a rate of 2.0 ounces per square foot on each side.

2. Tunnel Liner Plates and fasteners shall comply with the requirements of AASHTO LRFD, Bridge Design Manual, Section 12.13.
   (1) Liner plates shall be punched for bolting on both longitudinal and circumferential seams and fabricated to permit complete erection from the inside of the tunnel.
   (2) Bolts and nuts shall be galvanized to conform to ASTM A153.
   (3) Where groundwater is encountered gasketed liner plates shall be used.

3. Plates shall be of uniform fabrication and those intended for 1 size tunnel shall be interchangeable.

4. Field welding of Tunnel Liner Plate, including grout couplings shall not be allowed.

5. The material used for the construction of these plates shall be new, unused and suitable for the purpose intended.

6. Minimum thickness of Tunnel Liner Plate shall be as shown on drawings. General minimum thickness guidelines are as follows*:

<table>
<thead>
<tr>
<th>Tunnel Diameter (inches)</th>
<th>2-Flanged Liner Plate Thickness (gauge)</th>
<th>4-Flanged Liner Plate Thickness (gauge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bury Depth: 8 feet – 16 feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>48</td>
<td>12</td>
<td>12</td>
</tr>
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</tr>
<tr>
<td>72</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Greater than 72</td>
<td>Project Specific Design</td>
<td>Project Specific Design</td>
</tr>
</tbody>
</table>
The information in the above table is based on the following assumptions: AASHTO Section 16: “Steel Tunnel Liner Plates”, H20 loading angle of 0 and bury depth of 8 feet to 16 feet. For projects not meeting these assumptions, a specific design should be performed to determine the appropriate thickness for the liner plate.

**D 225.08 INSTALLATION**
Tunnel Liner Plate shall be installed in accordance with appropriate portions of Section 221 Hand Tunneling.

Carrier pipe shall be installed inside Tunnel Liner Plate in accordance with Section 223 Installation of Carrier Pipe in Casing or Tunnel Liner Plate.

Contact grouting of the annulus outside the Tunnel Liner Plate shall be performed in accordance with Section 221 Hand Tunneling.

**D 225.09 PAYMENT**
No pay item will be included in the proposal or direct payment for tunnel liner plate. The cost for placing this material shall be included in the unit bid price for 36” FPVC, 48” diameter hand tunneling with liner plate.
SECTION 226
PIPE CLEANING AND CCTV INSPECTION

D-226.01 DESCRIPTION: This Item shall govern the cleaning and Closed Circuit Television (CCTV) inspection of sanitary and storm sewer mains before assessment, rehabilitation and final acceptance of a system. The Contractor shall do the televising. The City reserves the right to re-televise any new sanitary sewer/storm drain work after the placement of pavement or permanent trench resurfacing, but before acceptance by the Engineer, to determine the existence and extent of any foreign material or obstructions such as, but not necessarily limited to, cement grout, wood, rocks, sand, concrete, or pieces of pipe, and any structural deficiencies or sags precipitated by the permanent resurfacing operations or other Contract Work.

The Contractor shall notify the Engineer and Utility Inspector five (5) working days in advance of the anticipated date of the televising. Five (5) working days shall be allowed for the Engineer to review each individual video recording of each and every storm drain documented on that particular recording. In the event that any deficiencies or sags are discovered by the Engineer, either by the Contractor’s televising or the City’s re-televising, Five (5) working days shall be allowed for the Engineer to determine whether the deficiencies or sags are repairable in place. If the Engineer determines that the deficiencies or sags are not repairable in place, the affected portion(s) shall be reconstructed in accordance with these Specifications. The Contractor shall not be entitled to any additional working days due to delays resulting from the correction of any deficiencies or sags, repairable or non-repairable in place, as determined by televised inspections and the Engineer.

D-226.02 GENERAL: The CCTV inspection work must be completed by a certified National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) trained operator(s) using established PACP coding and observations.

1. General Requirements:

   a. The video operator must have at least one (1) year of experience with a project of a similar nature.
   b. Video shall be submitted to the Municipality on DVDs with high quality color in a format reviewable by the Municipality.
   C. Video recordings that are out of focus shall be cause for rejection of the recordings and Contractor shall re-televising at no additional cost to the Owner.
   d. The Contractor shall notify the Engineer five (5) Municipal working days prior to televising.
   e. The Contractor shall turn over the original video recordings to the Engineer immediately after recording.
   f. Televising shall be done in one direction for the entire length between manholes; each section shall be isolated from the remainder of the pipe as required. Sufficient water shall be supplied to cause drainage within the isolated section prior to televising.
   g. Pipe must be clean and free of dirt, rock, gravel, debris, or any other material or obstruction that will hinder the CCTV inspection.
h. For underground storm drain conduit installations, the maximum operation tolerance for a sag shall be one-hundredth foot (0.01’) per inch of pipe diameter. No sag shall be longer than sixty feet (60’). When CCTV inspection is used to check for sag, a calibrated readable device acceptable to the Engineer shall be used to measure the depth of sag.

i. The Contractor shall not be entitled to any additional working days due to delays in securing the CCTV services of a private vendor.

**D-226.03 EQUIPMENT:**

1. CCTV inspection equipment shall consist of a monitoring unit and self-contained camera with pan, tilt and zoom capability. This equipment shall be specifically designed and constructed for such inspection purposes. The camera shall be mounted on a crawler or adjustable skids and have a height adjust to facilitate the inspection of different sizes of pipe and to allow for visual judgment of ovality by centering the camera within the pipe. The camera shall be self-operative in one hundred percent (100%) humidity conditions. Focal distance shall be adjustable through a range of from one inch (1”) to infinity. The camera shall be waterproof and shall have a remote controlled self-contained lighting system capable of producing effective illumination for all sizes of pipe. The lighting system shall be capable of lighting the entire periphery of the pipe. The remote reading footage counter shall be accurate to within one-half percent (0.5%) over measured distance of the particular section being inspected and shall be displayed on the television monitor. The equipment shall be capable of providing a clear digital recording of the interior of the pipes. An inclinometer which gives a profile of the pipeline must be used for all new pipe inspections or on existing pipe at the discretion of the Engineer. The camera, television monitor and other components of the video system shall be capable of producing a minimum three hundred and fifty (350) line resolution color video picture. The equipment shall be capable of televising the entire length in one direction. When televising storm drains the camera shall be capable of scanning the joints for three hundred and sixty degrees (360°).

2. High velocity pipe cleaning equipment shall be constructed for ease and safety of operation. The equipment shall have a selection of nozzles capable of scouring the interior of the size range of pipe indicated on the plans.

3. Debris removal equipment shall consist of a vacuum tanker unit capable of removing typical sewage debris accumulated by the pipe cleaner at the manholes.

4. Solid debris cutting equipment shall be hydraulically driven by the sewer cleaner. The equipment must have circular saw-tooth blades in sizes consistent with the pipe being cleaned.

**D-226.04 CCTV INSPECTION REPORTS:**

1. Audio and written documentation shall accompany all DVD(s) submitted to the Engineer.
DVD(s) shall have printed labels with location information, date format information, and other descriptive information. The voice recording of the DVD(s) shall make brief but informative comments on data of significance, including, but not limited to, the locations of unusual conditions, type and size of connection, collapsed section, the presence of scale and corrosion, and other discernible features.

The DVD(s) shall include the following:

<table>
<thead>
<tr>
<th>Data View</th>
<th>Audio</th>
<th>Written</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report No. (including DVD number(s))</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Date of CCTV inspection</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Current weather conditions</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>MQA Storm Drain Grid page number</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Upstream and downstream manhole structure numbers, storm drain access point or station numbers.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>GPS coordinate locations for- upstream and downstream manholes and/or any other storm drain access points. GPS receivers shall provide sub-meter accuracy</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Location, size, type, and length of pipe.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Direction of flow and measurement (“From” manhole/storm drain access point/station number “To” manhole/storm drain access point/station number</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Tape Counter Footage (current distance along reach)</td>
<td>X</td>
<td>Beginning &amp; End</td>
</tr>
<tr>
<td>Sketch showing the street and cross streets where the TV inspection was made</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Description and location of each defect</td>
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<td>X</td>
</tr>
<tr>
<td>Description and location of each connection</td>
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<td>X</td>
</tr>
</tbody>
</table>
2. A digital video shall be provided accompanied by an inspection report. This report shall be in accordance with the NASSCO defect codes. A sample inspection report and corresponding digital data file shall be submitted for review prior to starting the project. The report shall be a record of the exact location of each leak or fault discovered by the inspection - e.g. open joints, broken, cracked, deformed or collapsed pipe, and presence of grease, roots, debris, accumulation, obstruction, infiltration, water depth variations and other points of significance. The reference location for distance measurements shall be the centerline of the launch manhole (Station 0+000). If the inspection includes an intermediate manhole, station shall be reset to 0+000 in the center of the intermediate manhole.

3. All videos shall be in digital MPEG format that is compatible with the City of Laredo inspection software. Recorded picture quality and definition shall be to the satisfaction of the City.

4. The report shall include the location of all service connections together with a statement of opinion as to whether or not the service connections are subject to joint infiltration. Intrusions of service connections into the main line shall be noted with reference to the degree of intrusion.

5. Photographs of sewer defects and service connections shall be taken. The photographs shall be coordinated with the written report by reference numbers. A minimum of one photograph per line or manhole-to-manhole segment shall be taken to show a representative view of the workmanship.

5. Each manhole-to-manhole section of pipe shall be located on the report form in such a way as to be readily identifiable. Identify such items as name of subdivision, street names, manhole numbers, type of pipe, joint length, direction of flows, pipe diameter, manhole depth, inspection date, names of the inspection technician, persons viewing, and video identification numbers. Lot and block numbers for all services shall be provided.

6. Two copies of the final CCTV report with corresponding video shall be provided to the City within two weeks after the completion of the inspection. Media submitted shall become the property of the City.

7. All digital media shall be numbered and cross-indexed to the written report. Video footage shall indicate the size of the sewer, the manhole-to-manhole segment being inspected, plus the street address or location.

8. To insure photographic quality in reports, color printers shall be used.

**D-226.05 EXECUTION:**

1. **Pipe Cleaning**
   1.1. Acceptance of pipe and manhole cleaning shall be made upon review of the corresponding video inspection.
   1.2. Block debris at downstream manhole to prevent contamination of the downstream mains. Sludge, dirt, sand and other debris resulting from the cleaning operations shall be removed from the downstream manhole of the section being cleaned. Passing material from the section being cleaned to the downstream pipe section shall not be permitted.
1.3. The liquid portion of material removed at the manholes shall be decanted back into the pipe. The solid and semi-solid material removed at the manholes shall be disposed of at a designated site as approved by the City of Laredo.

2. Traffic Control
2.1. Interference to the normal flow of traffic shall be kept to a minimum.
2.2. Traffic control equipment shall conform to the TMUTCD Manual for Temporary Traffic Control.

3. Closed Circuit Television Inspection Procedures
3.1. The CCTV inspection shall provide a fill record of the condition of the pipes, manholes and appurtenances along the designated section of sewer. This shall include all installation and material defects. The CCTV inspection shall use inclinometer testing that is compatible to the City’s software.
3.2. For new construction, completely wet the pipe with clean water to fill any sags prior to inspection.
3.3. The Contractor shall not attempt a CCTV inspection if water levels in the pipe obstruct the cameras view unless instructed by the City.
3.4. Traveling speed of the camera in the pipeline to be as follows:
   3.4.1. 0.33 ft/s for pipelines less than 8” diameter
   3.4.2. 0.5 ft/s for 8” to 12” diameter
   3.4.3. 0.66 ft/s for over 12” diameter or
   3.4.4. Will not exceed a traverse rate of 30 ft/min.
3.5. Position camera lens centrally in the pipeline with a positioning tolerance of plus or minus 10% off the vertical centerline axis of the pipeline.
3.6. During the inspection, the camera operator shall pan the camera to focus on observable deficiencies in the pipe that may be located off-center to the direction of camera travel. This shall include but not be limited to all services, joints to the top, left or right, cracks and fractures or surface deterioration of the pipe walls. Pan and tilt into each service connection.
3.7. Upon completion the Contractor shall provide inspection reports and digital media as detailed in Section 3.0 above.
3.8. Manual winches, power winches, TV cable and powered rewinds or other devices that do not obstruct the camera view or interface with proper documentation of the pipe conditions shall be used to move the camera through the pipe. If, during the televising operations, the television camera will not pass through an entire manhole section or access point section, the Contractor shall reset the equipment in a manner so that the inspection can continue opposite the obstruction. If the television camera encounters an obstruction within a section not accessible to a manhole or access point, the Contractor shall remove the obstruction by excavation or other appropriate means, replace whatever pipe is necessary, and re-televise the entire section.
3.9. Whenever non-remote powered and controlled winches are used to pull the television camera through the line, telephones, radios, or other suitable means of communication shall be set up between the two manholes or access points of the section being inspected to ensure that adequate communications exist between members of the crew.
3.10. The importance of accurate distance measurements is emphasized. Measurement for
location of defects shall be above ground by means of a meter device Marking on the cable, or the like, which would require interpolation for depth of manhole or storm access points, is not acceptable. The accuracy of the measurement shall be checked daily by use of a walking meter, roll-a-tape, or other suitable device. Measurements shall be from center to center of each manhole or access point. Unless permission is given by the Engineer to do otherwise. Distance shall be shown on the video data view at all times.

3.11. The City, or a City approved contractor, can excavate a pipe in order to free lodged camera equipment at the expense of the Contractor

D-226.06 MEASUREMENT:

Measurement for all sizes of pipe shall be based on the horizontal distances and shall be from center to center of manholes, from the center of manholes to center of catch basins, from center of manholes to center of cleanout “wye”, and from center of manhole to end of pipe including flared end sections. Televising pipe is considered incidental to the pay item and no separate payment shall be made.
SECTION 302
STRUCTURAL EXCAVATION AND BACKFILL

D 302.01 DESCRIPTION
This item shall consist of doing the excavation for the placing of structures; for the disposal of all material obtained from such excavation; for the backfilling around completed structures to the finished grade as called for on the plans. Work to be done shall include all the necessary pumping or bailing, sheeting, drainage, and the construction and removal of any required cofferdams. Unless otherwise provided, the work included herein shall provide for the removal of old structures or portions thereof, trees, and other obstructions necessary to the proposed construction.

D 302.02 DEFINITIONS
"Common Structural Excavation" shall include the removal of all materials regardless of its nature.

D 302.03 USE OF EXPLOSIVES
When the use of explosives is necessary for the prosecution of the work, the Contractor shall use the utmost care not to endanger life or property. All explosives shall be stored in a secure manner, and all storage places shall be marked clearly "DANGEROUS EXPLOSIVES". The method of storing and handling explosives and highly flammable materials shall conform to Federal and State laws and regulations. The Contractor shall not use explosives until he has taken the necessary legal precautions to save the Owner against any claims arising from such use of explosives.

CONSTRUCTION METHODS

D 302.04 EQUIPMENT
All equipment necessary and required for the proper construction of structures and appurtenances shall be on project site in first class working condition and shall be approved by the Engineer before construction is permitted to start.

The Contractor shall provide hand tamping devices and pneumatic tampers as may be necessary to obtain the proper compaction for the bed and backfill as specified.

D 302.05 COMMON EXCAVATION
Common excavation shall be done in accordance with the lines and depths indicated on the plans or as established by the Engineer. Unless written permission to the contrary is given by the Engineer, no excavation shall be made outside a vertical plan three feet from the footing lines and parallel thereto.

In order that the Engineer may judge the adequacy of a proposed foundation, the Contractor, if requested, shall make soundings to determine the character of the subgrade materials. The maximum depth of such soundings will not be required to exceed five (5) feet below the proposed footing grade; it is the intent of this provision that soundings shall be made at the time the excavation in each foundation is approximately complete.

The final elevation to which a foundation is to be constructed shall be as shown on the plans or as raised or lowered by written order of the Engineer when such alterations are judged proper to satisfactorily comply with the design requirements for the structure. Should it be found necessary in the judgment of the plans, the necessary alterations in the details of the structure shall be accomplished in a manner as directed by the Engineer.
When a structure is to rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation and the final removal of the foundation material to grade shall not be performed until just before the footing is placed.

**D 302.06 ROCK EXCAVATION**

All material encountered, regardless of its nature, shall be included as common structural excavation.

Unless written permission to the contrary is given by the Engineer, no excavation shall be made outside a vertical plane 3 (three) feet from the footing lines and parallel thereto.

Rock foundation material shall be freed from all loose material, cleaned and cut to a firm surface either level, stepped, or serrated as directed by the Engineer. All seams shall be cleaned out and filled out with concrete at the time the footing is placed.

**D 302.07 EXCAVATED MATERIAL**

Excavated material required to be used for backfill may be deposited by the Contractor in storage piles at points convenient for rehandling. The location of storage piles shall be subjected to the approval of the Engineer who may require that survey points or lines be kept free from any obstruction.

Excavated material not required for backfill shall be disposed of by the Contractor as directed by the Engineer or as specified herein. If, in the opinion of the Engineer, the bottom of the ditch consists of unstable soil, this soil shall be removed from the full width of the trench and replaced with a pit run gravel. Pit run gravel shall vary in size from 3/4" to 3 1/2". The material shall be free from large amounts of organic material such as grass, roots, etc. The Engineer shall determine the depth of removal or unstable soil and the amount of backfill necessary. The cost of removing this unstable soil and replacing it with approved material shall be covered by a supplemental agreement. The sides of the trench shall be vertical unless otherwise approved by the Engineer. The Contractor shall install such trench bracing and sheeting as is necessary to protect the excavation also as required for the safety and to conform with governing laws.

Unless otherwise provided, the bracing and sheeting shall be removed by the Contractor after the backfilling has been replaced to a point at least 12 (twelve) inches above the top of the structure. In no case shall any sheeting or bracing be removed until the backfilling conditions have been met. The cost of bracing andsheeting shall be included in the unit price per linear foot for the structures.

The Contractor shall take adequate precautions to prevent damage to all existing utilities. Any utility lines cut or damaged shall be repaired or restored to their former condition.

**D 302.08 DEWATERING TRENCH**

Removal of water may be accomplished by bailing, pumping, or by a well point installation as conditions warrant. Pumping or bailing from any excavation shall be done through or alongside any concrete being placed. No pumping or bailing will be permitted during the placing of concrete or for a period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a watertight wall.

1) Minor water seepage or pockets of saturated soil may be effectively controlled through bailing or pumping. This control shall be accomplished without removing any adjacent soil that could weaken or undermine any access pit, its supports, or other nearby structure.

2) Larger volumes of ground water shall be controlled with one or more well points or with staged deep wells. Well points and staged deep well pumping systems shall be installed and operated without damage to property or structures and without interference with the rights of the public,
owners of private property, pedestrians, vehicular traffic, or the work of other contractors. Any pumping methods used for de-watering and control of ground water and seepage shall have properly designated filters to ensure that the adjacent soil is not pumped along with the water. Well diameter, well spacing and the pump’s pumping rate, shall provide adequate draw down of the water level. Wells shall be located to intercept ground water that otherwise would enter the access pit excavation and interfere with the work. Upon removal of a well, the hole shall be filled and grouted according to the specifications identified as flowable fill, and plug drill holes as directed by the Engineer.

3) Existing storm sewers shall only be used to discharge water from the dewatering operation in accordance with a permit obtained from the appropriate storm sewer owner. Filters or sediment control devices shall be required to ensure that the existing system is not adversely affected by construction debris or sediment.

4) If grouting is used to prevent ground water from entering the area of the access pit, the grouting shall be installed without damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors. The material properties of the grout shall conform to the specifications identified as flowable fill.

**D 302.09 BEDDING**

The structure shall be bedded as shown on plans on fine granular materials over an earth foundation accurately shaped to fit the lower part of the structure exterior for at least 15% of its overall height. Selected material from excavation or borrow shall then be placed along both sides of the structure equally in layers not more than six (6) inches thick and compacted by mechanical tampers or rammers for the remainder of the lower 30% of the overall height of the structure.

**D 302.10 BACKFILLING**

As soon as practicable, all portions of excavation not occupied by the permanent structure shall be backfilled. Backfill material shall be free from large or frozen lumps, wood or other extraneous material, placed in successive layers of not more than 6” in depth (loose measurement) for the full width of the cross section. The material and the layers shall have the proper moisture content before tamping or rolling. Wetting or drying of the material and manipulations to secure uniform moisture content throughout the layer will be required. Should the material be too wet to permit proper compaction or rolling, all work on all positions of the fill thus affected shall be corrected. Unless otherwise provided by the plans or special provisions, hand tamping will not be accepted as an alternate for mechanical compaction.

As a general rule, material used in filling or backfilling the portions described in this paragraph shall be an earth free of any appreciable amount of gravel or stone particles more than 4 (four) inches in greatest dimension and of a graduation that permits thorough compaction. When, in the opinion of the Engineer, such material is not readily available, the use of rock or gravel mixed with earth will be permitted provided no particles larger than 12 (twelve) inches in the greatest and 6 (six) inches in the least dimensions may be used. The percentage of fines shall be sufficient to fill all voids and insure a uniform and thoroughly compacted mass of proper density. No backfill shall be placed adjacent to or over single and multiple boxes until the top slab has attained 500 psi flexural strength.

All backfill as specified above shall be compacted to not less than 95% of the maximum density at optimum moisture content as determined by procedures set out under TEX 113 E. This compaction shall extend to the entire depth of each layer and the backfill, when completed, shall be a homogenous and uniformly compacted mass. Water jetting in backfill operations will not be permitted.
D 302.11 CLEANING AND RESTORATION OF SITE
After the backfill is completed, the Contractor shall notify the Environmental Services Department before the disposal of all surplus material, dirt, and rubbish from the site and shall restore all disturbed areas to their original condition. After all work is completed, the Contractor shall remove all tools and other equipment used by him, leaving the entire site free, clear, and in good condition.

D 302.12 MEASUREMENT AND PAYMENT
No separate measurement or payment will be made under this item, but all such work done shall be deemed a subsidiary obligation of the Contractor, and as having been taken into account and included by him in the price bid for the complete job.
SECTION 310
CONCRETE BOX CULVERT

D 310.01 DESCRIPTION
This Item shall govern for the materials furnished, and for constructing, furnishing, and placing concrete box culverts, at the locations shown, and in accordance with the details on the plans of this Item. Unless otherwise shown on the plans, The Contractor shall have the option of furnishing cast-in-place, pre-cast (formed) or precast (machine made) box culverts.

D 310.02 MATERIALS
All materials shall conform to the pertinent requirement of the following items:
- Section D-406, "Concrete Structures"
- Section D-504, "Concrete"
- Section D-410, "Reinforcing Steel"
- Section D-304, "Reinforced Concrete Storm Drain Pipe"

Concrete for precast (machine-made) concrete boxes shall conform to ASTM C1433

When precast (machine-made) boxes are furnished and portland cement is partially replaced, blended, or otherwise modified by pozzolan, the pozzolan shall be fly ash conforming to the Departmental Materials Specification D-9-8900, "Fly Ash". Copies of Departmental Materials Specifications are available from the Texas Department of Transportation, Division of Materials and Tests, 125 East 11th Street, Austin, Texas 78701-2483.

For culverts with overlay or 1 to 2 course surface treatment or if the top slab is the final riding surface, use class “S” concrete for top slabs of “cast-in-place” concrete culverts unless otherwise shown on the plans. Use class “C” for the rest of the culvert and for other cast-in-place boxes.

D 310.03 TYPES
Cast-in-place concrete boxes shall conform to the details shown on the plans and to the requirements of Section 504 "Concrete" and Section 406 "Concrete Structures".

Precast (formed) concrete boxes shall conform to the details shown of the plans and the requirement of (TxDOT Standard Specification 2004 or latest Edition) Item 424, "Precast Concrete Structures (Fabrication)".

Precast (machine-made) concrete boxes shall conform to the requirements of ASTM C1433.

D 310.04 FABRICATION
1) General: All fabrication of concrete boxes including forming, casting, and curing shall conform to the following requirements.
   A. Cast-in-place concrete boxes shall be produced in accordance with Section 406, Concrete Structures".
   B. Precast (formed) concrete boxes shall be produced in accordance with Item 424, "Precast Concrete Structure (Fabrication)". (TxDOT Standard Specification 2004 Edition) Contractor shall provide shop drawings signed and sealed by a Registered Professional Engineer in Texas.
   C. Precast (machine-made) concrete boxes shall be produced by a process which will provide for uniform placement of the concrete in the forms and compaction by mechanical devices which will assure dense concrete. Concrete shall be mixed in a central batch plant or other approved batching facility form which the quality and uniformity of the concrete can be
assured. Ready-mix concrete will not be acceptable for use in precast (machine-made) concrete boxes. Testing and Curing shall be in accordance with TxDot Test Procedures Tex-704-I.

2) Testing: Test specimens for testing of cast-in-place concrete boxes sections shall be in accordance with Section 504, "Concrete". Test specimens for precast (formed) concrete box sections shall be in accordance with TxDot Test Procedures Tex-704-I. Test specimens for precast (machine made) shall be test cylinders made at the same time and in the same manner as the box sections they represent.

For precast concrete boxes (machine-made), a minimum of four (4) test cylinders shall be made for each day’s production run of each size and class of box section. Test cylinders for machine-made concrete boxes shall be cured in the same manner and for the same time as the boxes they represent.

Equipment required for testing concrete boxes produced in a precasting plant shall be furnished by the producer.

3) Marking: Precast concrete boxes produced in a precasting plant shall bear the following markings:
   a. The name or trademark of the producer.
   b. The date of manufacture.
   c. The box size and height of fill.
   d. When lifting holes are not provided, one end of each box section shall be clearly marked on the inside and outside walls to indicate the top or bottom as it will be installed.
   e. When required under "Fabricating Tolerances", matchmarks shall be use for proper installation.

Markings shall be indented into the box section or may be painted thereon with waterproof paint.

4) Fabricating Tolerances: Tolerances for precast sections of either type shall conform to the following.

The inside vertical and horizontal dimensions shall not vary from plan requirement by more than 1/2 inch.

The horizontal or vertical plane at each end of the box section shall not vary from perpendicular by more than 1/2 inch, measured on the inside faces of the section.

The sides of a section at each end shall not vary from being perpendicular to the top and bottom by more than 1/2 inch, measured on the inside faces of the section.

The thickness of walls and slabs shall not be less than that shown on the plans, except than an occasional deficiency not greater than 1/4 inch will be acceptable. If proper jointing is not affected, thicknesses in excess of plan requirements are acceptable.

The straightness of the tongue and groove, at the mating surface shall not vary by more than 1/4 inch.

Deviations from the above tolerances will be acceptable if the sections can be fitted at the plant or job site and it is demonstrated that an acceptable joint can be made. For this condition an acceptable joint is:
When two sections are fitted together on a flat surface, in proper alignment and in the position the sections will be installed, the joint opening at any point shall not exceed one (1) inch. Sections fitted together at the plant and accepted in this manner shall be matchmarked for installation.

5) Defects and Repair. Fine cracks on the surface of the member which do not extend to the plane of the nearest reinforcement will not be cause for rejection unless the cracks are numerous and extensive. Cracks which extend into the plane of the reinforcing steel shall be repaired in an approved manner.

Small damaged or honeycombed areas which are purely surface in nature shall be repaired to the satisfaction of the Engineer. Excessive damage, honeycomb or cracking will be subject to structural review. When fine cracks on the surface indicate poor curing practices, further production of precast sections shall be discontinued until corrections are made and proper curing provided.

6) Storage and Shipment. Precast sections shall be stored on level blocking in a manner acceptable to the Engineer. No load shall be placed upon the section until design strength is reached and curing completed. Shipment of sections may be made when the design strength is reached and curing requirements have been met.

**D 310.05 CONSTRUCTION METHODS**

Exavation, bedding and backfill shall be in accordance with the requirements of Division D, 302 “Structural Excavation and Backfill” except where tunneling or jacking methods are required or permitted by the plans.

Coarse aggregate material ganging for 2” to 6” (inches) and capped with 5/8” material may be use for bedding.

Unless otherwise shown on the plans, the Contractor may use any of the jointing material in accordance with the jointing requirements specified in Section 312, "Laying Procedure-Storm Sewer".

When precast box culverts are used to form multiple barrel structures, the box sections shall be placed in conformance with the details shown on the plans.

Connections of precast sections to cast-in-place culverts or to any required headwalls, wingwall, riprap, or other structure shall conform to the details on the plans. Lifting holes shall be filled with mortar or concrete and cured to the satisfaction of the Engineer. Precast concrete or mortar plugs may be used when approved by the Engineer.

Cover between the top of a sanitary sewer pipe and the culvert box bottom shall be at least 2 feet unless otherwise shown on the plans.

**D 310.06 MEASUREMENT**

This Item will be measured by the linear foot. Such measurement will be made between the ends of the culvert or sewer along the flow line. Where spurs or branches, or connections to existing structures are involved, measurement of the intersection of the flow line with the outside surface of the structure into which it connects. Where inlets, headwalls, catch basins, manholes, junction chambers, or other structures are included in lines of culverts or sewers that length of box section tying into the structure wall will be included for measurement but no other portion of the structure length or width will be so included.
For multiple barrel structures, the measured length will be the sum of the lengths of the barrels measured as prescribed above.

This is a plans quantity measurement Item and the quantity to be paid for will be that quantity shown in the proposal and on the "Basis of Estimate" sheet of the contract plans, except as may be modified by the Engineer. If no adjustment of quantities is required, additional measurements or calculations will not be required.

**D 310.07 PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Concrete Box Culvert" of the size and type specified. This price shall be full compensation for constructing, furnishing, and transporting sections; for cutting of section of skew or slope; for connections to existing structures; for concrete, reinforcing steel and mall material, labor and equipment, tools, backfill and incidentals necessary to complete the work.
SECTION 312
MANHOLES AND INLETS

D 312.01 DESCRIPTION
This item shall consist of manholes and inlets, complete in place constructed of required materials in accordance with these specifications and at the locations and on conformity with the lines, grades, and dimensions shown on the plans or as required by the Engineer. Drainage junction boxes are classified as manholes.

MATERIALS

D 312.02 PRECAST RINGS, THROAT SECTIONS, AND THROAT RINGS
Precast manhole rings shall be a minimum of four feet in diameter and five inches thick and a maximum of six feet in diameter. Throat sections shall be five inches thick and 2.5 feet in length. Throat rings shall be two feet in diameter and five inches thick. Alternate designs other than precast are to be designed and sealed by a Texas licensed professional engineer.

D 312.03 MORTAR
The mortar for precast rings shall be composed of one part of Portland Cement and two parts mortar sand by volume. Portland cement shall conform to the requirements of ASTM Designation C-150, Type I. Sand shall conform to the requirements of AASHTO Specification M-45. The water shall be clean and free from injurious amounts of sewage, oil, acid, strong alkalies and other vegetable matter.

D 312.04 CONCRETE
Reinforced concrete used in manholes shall conform to the requirements of Class "A" Concrete, under the specification contained herein Division D Section 504 for "Concrete". Manholes may be either precast or cast-in-place depending on the design, same requiring the approval of the City Engineer prior to installation.

D 312.05 CAST IRON FRAMES AND COVERS
All castings shall be true to form and dimensions and shall be free from inclusions of foreign matter, casting faults, injurious blow holes, cracks, sponginess, and other defects rendering them unsuitable.

Finished frames and covers shall have the bearing surfaces machined or ground so that there will be no variation that will permit rocking or rattling and the diameter of the cover will be such as to fit the frame without wedging. The machined sets of frames and covers shall be marked in such a way that they can be properly matched for assembly in the field.

Castings shall conform to AASHTO Designation M 306-89 (2000). Castings shall include labeling of manhole type on manhole covers, such as “STORM DRAIN”. Manhole covers shall bear the “CITY OF LAREDO” name for all storm drain for proper identification. Casting covers and rings shall be as manufactured by East Jordan Iron Works or approved equal.

D 312.06 INLET UNITS
Inlet units shall be installed in conjunction with the construction or concrete curb and gutter. Prior to placing concrete for curb and gutter, the inlet units shall be set securely in position. Openings for the inlets and recesses in curb and gutter, as indicated on the plans, shall be formed in conjunction with the curb and gutter forms. Concrete for curb and gutter adjacent to the inlet shall be placed using care to secure thoroughly compacted concrete around the inlet and formed openings and recesses without displacement of the inlet units in the forms.
CONSTRUCTION METHODS

D 312.07 GENERAL
Construct manholes and inlets as soon as is practicable after pipe lines into or through the manhole or inlet locations are completed. All concrete work shall be performed in accordance with the requirements of the item, "Concrete Structures", unless otherwise specified. Forms will be required for all concrete walls except where the nature of the surrounding material may be trimmed to a smooth, vertical face (the outside form for concrete bases supporting brick walls may be omitted with the approval of the Engineer).

Care shall be taken when connecting to the manhole several pipes with an angle less than 90 degrees between them. Minimum clear distance between two wall penetrations shall be 12 in. or half diameter of the smaller penetration, whichever is greater. See Detail No.

D 312.08 EXCAVATION
Excavation shall conform to Division D, Section 302. The Contractor shall do all excavation for structures to the lines, grades, and elevations shown on the plans or staked by the Engineer. The excavation shall be sufficient size to permit the placing of a full width and length of the structure shown, plus such additional sizes to allow for forms.

The Contractor shall do all bracing, sheeting, or shoring necessary to perform and protect the excavation in the structure or as required for safety to conform with governing laws. The cost of bracing, sheeting, and shoring shall be included in the unit price bid for this structure.

Unless otherwise provided, bracing, sheeting, or shoring involved in the construction of this item shall be removed by the Contractor after completion of the structure. The removal shall be performed in such a manner as not to disturb or mar finish or masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the Engineer to that effect, and concrete and reinforcing steel shall be placed after the Engineer has approved the depth of excavation and the character of the foundation material.

D 312.09 CONCRETE STRUCTURES
Shall be in accordance with Division D Section 406

All invert channels shall be constructed and shaped accurately so as to be smooth, uniform, and cause minimum resistance to flow. The interior floor shall be sloped downward toward the outlet.

D 312.10 INLET AND OUTLET PIPES
Inlet and outlet pipes shall extend through the walls of the structures for sufficient distance beyond the outside of the surface to allow for connections, but shall be cut off flush with the wall on the inside surfaces unless otherwise directed. A concrete collar shall be placed around the pipe so as to prevent leakage and to form a neat connection. Detail No.

Care shall be taken when connecting a pipe in skew to an inlet box to avoid braking the corners and top & bottom beams of the box.

D 312.11 INVERTS
The inverts passing out or through the manhole or inlet shall be shaped and routed across the floor of the manhole or inlet as shown on the plans. This may be accomplished by adding and shaping mortar or concrete after the base is cast or by placing the required additional material with the base.
D 312.12 THE PLACEMENT AND TREATMENT OF CASTING, FRAMES, AND FITTINGS
All castings, frames, and fittings shall be placed in positions indicated on plans, or as directed by the Engineer and shall be set in true to line and elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or anchor bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until all the mortar or concrete is set.

When frames or fittings are to be placed upon previously constructed masonry, the bearing surfaces of the masonry shall be brought true to line and grade and present an even bearing surface in order that the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds or anchored to the masonry as indicated on the plans or as directed and approved by the Engineer. All units shall be set firm and secure.

When concrete structures are so located as to be within the paved areas of the street, the finish top of these structures shall match existing grades.

D 312.13 BACKFILLING
After a structure has been completed, the area around it shall be filled with approved material in accordance with the Division D, Section 302, "Structural Excavation and Backfill". Fill shall be made to the elevations shown on the plans or as directed by the Engineer.

No backfill material shall be placed against any structure until permission is given by the Engineer. In the case of the concrete, such permission preferably shall not be given until the concrete has been in place for 14 days and tested in a laboratory conforming to the requirements of ASTM Designation C-42. All water must be removed from excavation before backfilling is done unless otherwise directed by the Engineer.

Fill in place shall be deposited on all sides of the structure at the same time and to approximately the same elevation. Special care shall be taken to prevent any wedging action against the structure and all slopes, bounding or within the area to be backfilled, will be stepped or serrated to prevent wedge action.

All backfill shall be compacted as per Division D, Section 302.

Backfill shall not be measured for direct payment. Performance of this work is not payable directly but shall be considered a subsidiary obligation of the Contractor covered under the contract unit price for the structure involved.

D 312.14 CLEANING AND RESTORATION OF SITE
After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt shall be disposed of as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.

After all work is completed, the Contractor shall remove all tools and other equipment used by him, leaving the entire area free, clear, and in good condition. The performance of the work described in this section is not payable directly, but shall be considered as a subsidiary obligation of the Contractor, covered under the contract unit price for each manhole and inlet.

D 312.15 MEASUREMENT
The number, types and nominal sizes of manholes and inlets shown on the plans shall be measured per each unit complete in place and accepted by the Engineer.
D 312.16 PAYMENT
The number of units of manholes and inlets determined as provided in above paragraph shall be paid at the contract unit price for each of the various types and nominal sizes of manholes and inlets as called for on the Bid Schedule, which price and payment shall constitute full compensation for furnishing all materials, for placing and finishing, for all excavation and hauling, for all backfill, for setting and anchoring any frame, cover, for all labor, equipment, tools, and incidentals necessary to complete the unit, as shown on the plans and as described in the specifications.
SECTION 314
LAYING PROCEDURES – STORM SEWER

D 314.01 LAYING PROCEDURES
1) Classification: All excavation for this Project shall be considered unclassified. The Contractor is expected to determine the nature of the work and to make his/her bid prices reflective of the actual conditions which will be encountered. No claims for extra compensation shall be made by the Contractor due to rock or other unfavorable excavation conditions encountered during the course of the work.

2) Existing Utilities: Before commencing excavation, the Contractor shall notify all utility companies with sufficient lead time and confirm the location of existing underground lines and conduits in the work area.

3) Dewatering: The Contractor shall provide and maintain adequate equipment to remove and dispose of all surface and ground-water entering excavations, trenches, or other parts of the work.

4) Water-jetting: See Section 102

D 314.02 PREPARATION OF TRENCH
Except in water-bearing earth, mechanical excavation of trenches shall be limited to an elevation four inches (4") above the elevation of the invert of the pipe after placement in its final position. All additional excavation necessary for preparation of the trench bottom shall be made manually. Excess excavation below required level shall be backfilled with gravel which shall be thoroughly tamped. Engineer will determine the depth of removal, and replacement of unstable soil shall be at Contractor's expense. Contractor shall furnish pumps to keep excavation free of water.

Wherever the presence of incipient slides are noted during excavation, the trench walls shall be restrained with adequate sheeting and shoring.

When excavations are made adjacent to existing building or other structure, existing utility lines, or in paved streets, particular care shall be taken to adequately sheet, shore, and brace the sides of the excavation to prevent undermining of or settlement beneath the structures, utility lines, or pavement. Underpinning of adjacent structures or pavement shall be done by the Contractor at his/her own cost and expense, and in a manner satisfactory to the Engineer. When required by the Engineer, the pavement shall be removed, the void satisfactorily refilled, and the pavement replaced by the Contractor. The entire expense of such removal and subsequent replacement thereof shall be borne by the Contractor.

Should trenches be dry when the trench bottom is prepared, a continuous trough shall be prepared or excavated to receive the bottom quadrant of the pipe barrel. In addition, bell holes shall be excavated so that after placement, only the barrel of the pipe receives bearing pressure from the trench bottom.

Preparation of the trench bottom and placement of the pipe shall be carefully made so that, when in final position, the pipe is true to line and grade.

When sand, broken stone, or gravel is used to support the pipe, such material shall be placed in the trench bottom in sufficient quantity so that a trough shall be formed to support the bottom quadrant of the pipe barrel.
Trenches in which concrete cradles, cushions, or encasements for pipe are to be placed, may be excavated completely with mechanical equipment. Concrete cradles, cushions, and encasements, where required, shall be constructed as shown on the plans, or, where not shown on the plans, as directed by the Engineer. Where concrete cradles or cushions are constructed beneath the pipe, the subgrade shall be prepared to dimensions and form as shown on the plans. Concrete cushions, cradles, or encasements shall be placed in a dry trench unless, in the opinion of the Engineer, such a method is not practical. Where concrete is placed in wet trench, the work shall be done strictly as directed or approved by the Engineer. The pipe shall be firmly bedded in concrete to the proper grade. Concrete encasements placed over or on the pipe shall be so placed as not to damage or injure joints or displace the pipe. For pipe encasements, sufficient concrete shall be used so that the encasement is at least four inches (4") thick at all points. The concrete shall be wet enough during placement to permit its flow, without excessive prodding, to all required points around the pipe surface. The width of cradle shall be such as to completely fill the trench width. In the case of extremely wide trenches, the concrete cradle may be confined to a narrower width, but in no case shall it be less than twelve inches (12") greater than the diameter of the pipe at the outside of the socket.

**D 314.03 PIPE LAYING**

Pipe shall be protected during handling against impact shocks and free fall. Pipe shall be kept clean at all times, and no pipe shall be used in the work which does not conform to the appropriate ASTM Standard.

The laying of pipe in finished trenches shall be commenced at the lowest point, with the spigot ends pointing in the direction of the flow.

All pipe shall be laid with ends abutting and true to line and grade. They shall be carefully centered so that they will form a sewer with a uniform invert.

Pipe shall be set firmly according to line and grade, and preparatory to making pipe joints, all surfaces of the portion of the pipe to be joined shall be cleaned.

**D 314.04 BACKFILLING TRENCHES**

Refer to Section 102.

**D 314.05 SHEETING AND SHORING**

Whenever timber or other sheeting is driven to a depth below the elevation of the top of the pipe, that portion of the sheeting below the elevation of the top of the pipe shall not be disturbed or removed. Whenever timber or other sheeting is driven for the protection of trench walls in water bearing soil, no portion of such sheeting below a level four feet (4') over the top of pipe shall be removed.
D 316.01 DESCRIPTION
This Item shall govern for placing concrete encasement, cradles, saddles, and collars, when called for the Project plans or as directed by the Engineer.

D 316.02 MATERIALS
Concrete: All concrete shall be class “A" and conform to the provisions of Division D, Section 504 or shall be of the class noted on the plans.

D 316.03 CONSTRUCTION METHODS
1) Concrete Encasement: When concrete encasement is show on the plans or when directed by the Engineer, the trench shall be excavated and fine graded to a depth conforming with details and sections shown on the plans. The pipe shall be supported by precast concrete blocks of the same strength as the concrete for encasement and securely tied down to prevent floatation. Encasement shall then be placed to a depth and width conforming with details and sections shown on the plans.

2) Concrete Cradles: When concrete cradles are shown on the plans or when called for by the Engineer, the trench shall be prepared and the pipe supported in the same manner as described in this specification and shall be constructed in accordance with details and sections shown on the plans.

3) Concrete Saddles: When shown on the plans or when directed by the Engineer, pipe to receive concrete saddle shall be backfilled in accordance with Division D Section 302, "Structural Excavation, and Backfill" to the spring line and concrete placed for a depth and width conforming with details and sections shown on the plans.

4) Concrete Collars: When shown on the plans or when directed by the Engineer, concrete collars shall be constructed in accordance with details and sections shown on the plans. See details No.

D 316.04 MEASUREMENT
Will be measured by the cubic yard of accepted work calculated based on the lines and dimensions shown on the plans, complete in place. Reinforcing, if required, shall not be measured for payment.

D 316.05 PAYMENT
Will be paid for at the unit price bid per cubic yard, which price shall be full compensation for furnishing and placing all materials, manipulation, labor, tools, equipment, and incidentals necessary to complete the work.
SECTION 318
CHANNEL EXCAVATION AND EMBANKMENT

D 318.01 DESCRIPTION
Shall consist of required excavation for all channels proposed in the plans; the removal and proper utilization or disposal of all excavated materials; and constructing, shaping and finishing all earthwork involved in conformity with the required lines, grades and typical cross sections and in accordance with specifications requirements herein outlined.

D 318.02 METHODS
All suitable materials removed from the excavation shall be used, insofar as practicable, in the formation of embankments as required by the Item, “Embankment”, or shall be otherwise utilized or satisfactorily disposed of as indicated on plans, or as directed, and completed work shall conform to the established alignment, grades and cross sections. During construction, the channel shall be kept and drained, insofar practicable, and the work shall be prosecuted in a neat workmanlike manner.

Unsuitable channel excavation in excess of that needed for construction shall be as known as “WASTE” and shall become property of the Contractor to be disposed of by him outside the limits of the right of way.

Payment will not be allowed for excavation of any material which is used for purposes other than those designated, except as provided in the governing specifications under the item “Scope of Work.”

D 318.03 MEASUREMENT
All channel excavation will be measured in its original position and the volume computed in cubic yards by the method of average in end areas.

D 318.04 PAYMENT
All work performed as required herein and in the Item, “Embankment” and measured as provided under “Measurement” will be paid for at the unit price bid under the following method:

Ordinary Compaction (for channel embankment) each layer shall not exceed one (1) foot of loose depth, and shall be compacted as per specifications. Each layer shall be brought to the moisture content ordered by the Engineer, and shall be kept leveled with suitable equipment to insure uniform compaction over the entire layer.

The prices bid for channel excavation or embankment shall each be full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to complete the work. Payment for unauthorized work will not be made.

All work required for disposing of waste, including haul, will not be paid for directly, but shall be considered subsidiary work pertaining to the various contract items, and such cost shall be included in the unit prices for these items.

When specified on the plans, and hauling of materials will not be paid directly, but shall be considered as subsidiary work pertaining to the various contract items, and such cost shall be included in the unit prices bid.
SECTION 402
CLEARING AND GRUBBING

D 402.01 DESCRIPTION
"Clearing and Grubbing" shall consist of the removal and disposal of trees, stumps, brush roots, vegetation, logs, rubbish, and other objectionable matter. Full compliance with NPDES (National Pollution Discharge Elimination System) permitting & Drainage Standard shall be maintained.

D 402.02 CONSTRUCTION METHODS
The right-of-way shall be cleared of stumps, brush, logs, rubbish, trees, and shrubs, except such trees and shrubs and certain areas designated by the Engineer for preservation. Those trees, shrubs, and other landscape features specifically designed by the Engineer for preservation shall be carefully protected from abuse, marring, or damage during construction operations. Continual parking and/or servicing of equipment under the branches of trees designated for preservation will not be permitted. Trees and shrubs designated for preservation that must be pruned shall be trimmed as directed and all exposed cuts over two (2) inches in diameter shall be treated with an approved material.

Areas required for embankment construction, for roadway, channel and structural excavation, and for borrow sites and material sources shall be cleared and grubbed. On areas required for roadway, channel, or structural excavation, all stumps, roots, etc., (except for designated trees and brush) shall be removed to a depth of at least two (2) feet below the existing ground surface. All holes remaining after clearing and grubbing shall be backfilled and tamped as directed by the Engineer and the entire area bladed to prevent ponding of water and to provide drainage, except, in areas to be immediately excavated, the Engineer may direct that the holes not be backfilled. When permitted by the plans, trees and stumps may be cut off as close to natural ground as practicable on areas which are to be covered by at least three (3) feet of embankment. On areas required for borrow sites and material sources, stumps, roots, etc., (except for designated trees and brush) shall be removed to the complete extent necessary to prevent such objectionable matter becoming mixed with the material to be used in construction.

All cleared and grubbed material shall be disposed of in a manner satisfactory to the Engineer. Unless otherwise provided, all merchantable timber removed as required above shall become the property of the Contractor.

D 402.03 MEASUREMENT
Payment will be made for this item as clearing and grubbing and the Contractor shall investigate the conditions as they exist in the field.

D 402.4 PAYMENT
Price shall be full compensation for placing removing, loading and disposing all materials, manipulation, labor, tools, equipment, dumping fees and details necessary to complete the work.
SECTION 404
GENERAL CONSTRUCTION AND PREPARATION OF SITE SPECIFICATIONS

D 404.01 INTENT OF PLANS AND SPECIFICATIONS
The intent of the plans and specifications is to prescribe a complete work or improvement which the Contractor undertakes to do so, in full compliance with the plans, specifications, special provisions, proposal, and contract. The Contractor shall do all work as provided in the plans, specifications, special provisions, proposal, and contract, and shall do such additional work as may be considered necessary to complete the work in a satisfactory and acceptable manner. The Contractor shall furnish all labor, tools, materials, machinery, equipment, and incidentals necessary to the prosecution of the work.

D 404.02 DESCRIPTION OF SITE
This item shall consist of the preparation of site for construction operations by the removal and disposal of all obstructions which are not otherwise provided for in the plans and specifications.

Such obstructions shall be considered to include removal of sections of existing utility lines (water, sewer, & force main), existing fences/gates, and other such materials as shown on the plans including concrete slabs.

This item shall include the removal of obstructions in accordance with the item "Clearing and Grubbing", Section 402. It is the intent of this item to provide for the disposal of all objectionable materials not specifically provided for elsewhere in the plans/specifications. All materials to be salvaged by the Owner shall be properly disposed of by the contractor as directed.

D 404.03 FINAL CLEAN-UP
Upon the completion of the work and before acceptance and final payment will be made, the Contractor shall clean and remove from the site of the work, surplus and discarded materials, temporary structures, and debris of every kind. Contractor shall leave the site of the work in a neat and orderly condition. Surplus and waste materials removed from the site of the work shall be disposed of at locations satisfactory to the Engineer. Grounds around any structures shall be dressed to final grade as shown on plans.

D 404.04 COORDINATION OF PROJECT
The plans, these specifications, the proposal, special provisions, and all supplementary documents are intended to describe a complete work and are essential parts of the contract. A requirement occurring in any of them is binding. In case of discrepancies, figured dimensions shall govern over specifications; and plans and quantities shown on the plans shall govern over those shown in the proposal. The Contractor shall not take advantage of any apparent error or omission in the plans and specifications, and the Engineer shall be permitted to make such corrections or interpretations as may be deemed necessary for the fulfillment of the intent of the plans and specifications. In the event the Contractor discovers an apparent error or discrepancy, Contractor shall immediately call this to the attention of the Engineer.

D 404.05 COOPERATION OF CONTRACTOR
The Contractor shall give to the work the consistent attention necessary to facilitate the progress thereof, and he shall cooperate with the Engineer, his inspectors, and with other contractors in every way possible.
D 404.06 MATERIALS – GENERAL
The materials shall be the best procurable, as required by the plans, specifications, and special provisions. The Contractor shall not start delivery of materials until the Engineer has approved the source of supply. Only materials conforming to these specifications shall be used in the work, and such materials shall be used only after approval has been given by the Engineer and only so long as the quality of said materials remains equal to the requirements of the specifications. The Contractor shall furnish approved materials from other sources, if for any reason the product from any source at any time before commencement or during the prosecution of the work proves unacceptable. After approval, any material which has become mixed with or coated with dirt or any other foreign substances during its delivery and handling will not be permitted to be used in the work.

D 404.07 MATERIALS – STORAGE
Any and all materials, such as cement, lime, mill work, or other materials or equipment subject to deterioration by exposure to weather or other factors, shall be stored in such a manner to protect them from deterioration or damage preceding the time they become a permanent part of final structure.

D 404.08 MEASUREMENT AND PAYMENT
All work performed will NOT be paid directly but shall be included in the unit price bid for other items of construction. Price shall be full compensation for furnishing and placing all materials, manipulation, labor, tools, equipment, and incidentals necessary to complete the work.
SECTION 406
CONCRETE STRUCTURES

D 406.01 GENERAL
This item shall consist of reinforced concrete structures built in accordance with the design requirements and details shown on the plans and in conformity with the requirements herein.

MATERIALS

D 406.02 CONCRETE
Concrete shall conform to the requirements of Section D-504. Unless otherwise specified on the plans or in the proposal.

D 406.03 REINFORCING STEEL
Reinforcing steel shall conform to the requirements of Section D-410. Wire mesh reinforcement shall conform to the requirements of ASTM Designation A185.

D 406.04 STRUCTURAL STEEL
Structural steel shall conform to the requirements of ASTM Designation A-36.

D 406.05 EXPANSION JOINT MATERIAL
(a) Pre-molded expansion joint material shall conform to the requirements of Division D, Section 416, titled, EXPANSION JOINT MATERIALS.

(b) Poured joint material shall conform to requirements of Federal Specifications SS-S-156, SS-S-159, or SS-S-164.

D 406.06 FORM MATERIAL
(a) Form lumber for all exposed concrete surfaces shall be CM concrete form lumber, Southern Yellow Pine or approved equal, S4S, grade marked in accordance with the latest grading rules of the Southern Pine Association. Form lumber not otherwise specified shall be No. 2 Common Southern Yellow Pine, S4S.

(b) Plywood form shall be of Douglas Fir Plywood, 5 ply, and at least 3/4" thick, conforming to the grading rules as required under State Department of Highways and Public Transportation Specifications.

CONSTRUCTION METHODS

D 406.07 REINFORCEMENT
(a) Reinforcing shall be detailed, fabricated, and erected in accordance with Manual of Standard Practice for Detailing Reinforced Concrete Structures (ACT 315-57). Shop drawings shall be submitted in triplicate for engineering approval prior to fabrication. All reinforcement shall be entirely free from rust, scale, grease, or other coating which might destroy or reduce its bond with concrete.

(b) Spacing: Unless otherwise indicated, the clear distance between parallel bars shall be not less than one and one-half times the diameter of round bars. In no case shall the distance between bars be smaller than the maximum size of the aggregates.
(c) **Protective Covering:** Reinforcement shall be protected by the thickness of concrete indicated on the plans. Unless otherwise specified, the protective coverings over reinforcement shall not be less than the maximum size of aggregates.

(d) **Splicing and Lapping:** As per section D-410

(e) **Supports:** All reinforcement shall be secured in place true to the lines and grades, indicated by the use of metal supports, spacers, or ties approved by the Engineer. Such supports shall be of sufficient number and strength to maintain the reinforcement in place throughout the concreting operations. The use of pebbles, pieces of broken stones or brick, metal pipe and wooden blocks shall not be permitted.

### D 406.08 FORMS

(a) **General:** Forms shall conform to the shape, lines, and dimensions of the members of structures, as called for on the plans and shall be substantial and sufficiently tight to prevent leakage of mortar. All details of form construction shall be subject to the approval of the Engineer and permission to place concrete will not be given until all such work is complete to his satisfaction.

(b) **Braces and Ties:** Forms shall be properly braced and tied together so as to maintain position and shape. Metal form of an approved type shall be used to hold forms in place. Such ties shall be of a type especially designed for use in connection with concrete work and shall have provision to permit easy removal of the metal to a depth of at least one-half inch from the surface of the concrete. The use of wire from ties will not be permitted except for minor or special form areas where the use of rigid type metal ties would be impracticable. Where wire ties are used, all wires upon removal of the forms shall be cut back at least one-half inch from the face of the concrete.

(c) **Curved Surface:** In the case of exterior exposed curved surfaces, the Contractor shall use such forming as may be necessary to provide smooth forms of uniform curvature.

(d) **Coating:** Plywood forms and plywood form lining shall be mill-oiled according to standard practice recommended by the Douglas Fir Plywood Association. Form lumber for all other exposed surfaces shall be coated with approved non-staining mineral oil which shall be applied shortly before the concrete is deposited. In general, all forms shall be thoroughly wetted before the concrete is placed.

(e) **Cleanouts:** At the time of placing concrete, the forms shall be clean and entirely free from all chips, dirt, sawdust, and other extraneous matter. For narrow walls and other locations where access to the bottom of the forms is not readily obtainable otherwise, adequate cleanout openings shall be provided.

(f) **Chamfers:** Unless otherwise shown on the plans, fill forms at all sharp corners and edges with triangular chamfer strips measuring $\frac{3}{4}$" on the sides. Dress wood molding on all faces. Make molding for chamfers strips of materials of a grade that will not split when nailed and that can be maintain to true line without warping.

### D 406.09 PLACING CONCRETE – GENERAL

(a) **Supervision:** The Contractor shall give the Engineer sufficient notice before starting to place concrete in any unit of the structure to permit the inspection of forms, reinforcing steel, and preparation for placing. Concrete shall not be placed in footings until the character of the foundation has been approved by the Engineer and permission has been given to proceed. When footings can be placed in dry foundation pits, forms may be omitted, if desired by the Contractor and approved by the Engineer, and the entire excavation filled with concrete to the top of the footing.
Where this procedure is followed, no measurement for payment will be made for concrete placed outside of the footing dimensions shown on the plans.

(b) Placing: Place concrete according to TxDOT item 420. All concrete shall be placed before its initial set has occurred. The operation of depositing and compacting the concrete shall be conducted so as to form a compact, dense, impervious mass of uniform texture which shall show smooth faces on all surfaces. Each part of the forms shall be filled by depositing the concrete directly as near its final position as possible. The coarse aggregate shall be worked back from the face and the concrete forced under and around the reinforcement bars without displacing them. Depositing large quantities at one point in the forms and running or working it along the forms will not be permitted. Concrete in columns shall be placed monolithically unless otherwise provided. An interval of not less than 4 hours shall elapse between the placing of concrete above the tops of the columns or walls to allow shrinkage. Concrete in walls, columns, and deep foundations shall be placed in a manner that will avoid separation of the aggregates or displacement of the reinforcement. Suitable chutes or vertical pipes shall be provided.

(c) Vibrating: All concrete shall be placed with the aid of mechanical vibrating equipment unless otherwise directed. Vibration shall be transmitted directly to the concrete, and in no case shall it be transmitted through the forms of reinforcing steel. The duration of vibration shall at any location be held to the minimum necessary to produce thorough compaction. Vibration shall be supplemented by hand spading to insure the flushing of mortar to the surface of all forms.

(d) Construction Joints: Construction joints shall be formed as shown on the plans. In all cases where they are not shown on the plans, they shall be formed as directed by the Engineer. Where indicated or required dowel rods shall be used. Before placing is resumed, all water and laitance shall be removed and the concrete shall be cut away, if necessary, to insure a strong dense concrete at the joint. In order to secure adequate bond, the surface of all concrete already in place shall be cleaned and roughened and shall then be spread with a 1/2 inch layer of mortar of the same sand-cement ratio as is used in the concrete immediately before the new concrete is deposited.

D 406.10 FINISHING EXPOSED SURFACES
An ordinary surface finish shall be applied to all concrete surfaces either as a final finish or preparatory to a higher grade or class of finish. Higher grades and classes of finish shall be in accordance with TxDOT Item 427, "Surface Finishes for Concrete". Where neither a grade nor class of finish is specified, an ordinary surface finish shall be provided as follows:

After form removal, all porous or honeycombed areas and spalled areas shall be corrected by chipping away all loose or broken material to sound concrete. Holes and spalls caused by removal of metal ties, etc., as required by TxDOT Item 420, shall be cleaned and filled with adhesive grout or epoxy grout. Exposed parts of metal chairs on surfaces to be finished by rubbing shall be chipped out to depth of one-half inch and the surface repaired.

All fins, runs, drips, or mortar shall be removed from surfaces which remain exposed. Form marks and chamfer edges shall be smoothed by grinding and/or rubbing.

Grease, oil, curing compound, etc., shall be removed from surfaces requiring a higher grade of finish. Discolorations resulting from spillage or splashing of asphalt, paint, or other similar material shall be removed. Repairs shall be dense, well bonded, and properly cured, and when made on surfaces which remain exposed and do not require a higher finish, shall be finished to blend with the surrounding concrete. Unless otherwise specified on the plans, ordinary surface finish shall be the final finish for the following exposed surfaces: Inlets, manholes, and sewer appurtenances.
D 406.11 FINISHING VERTICAL SURFACES (GENERAL)
After tie rods and bolts are removed, the holes shall be filled solid with cement mortar. Honeycomb and minor defects shall not be patched until approval has been given by the Engineer.

D 406.12 REMOVAL OF FORMS
(a) Finished Concrete: Forms for surfaces required to be finished shall be removed when the concrete has aged not less than ½ nor more than 2 curing days after the concrete has been placed.

(b) Unfinished Concrete: Forms and false work may be removed when the concrete has attained a compressive strength of not less than 65 percent of the design strength except that forms for walls, columns, and sides of beams may be removed after 48 hours.

(c) Curing Day: The term "curing day" will be interpreted as any calendar day on which the temperature is above 50 F for at least 19 hours. In continued cold weather, the Engineer will determine when sufficient time has elapsed to permit the removal of forms and false work.

D 406.13 DEFECTIVE WORK
Any defective work discovered after the forms have been removed shall be repaired immediately. If the surface of the concrete is bulging, uneven, or shows excess honeycombing or form marks, which, in the opinion of the Engineer, cannot be repaired satisfactorily, the entire section shall be removed before the repair work is started. No extra compensation will be allowed for extra work or materials involved in repairing or replacing defective concrete.

D 406.14 CURING
Concrete shall be maintained in a moist condition for at least five (5) days after placement. Curing shall be commenced as soon as possible after the concrete has been finished. This shall be either by means of approved curing compound, sprinkling, or by damp curing by means of wet mats, sand, etc. Adequate protection shall be provided to prevent damage from extreme weather conditions shall they be either hot or cold temperatures, wind, or other conditions which would cause evaporation of moisture from the fresh concrete. The ACI recommendations for hot or cold weather shall be followed.

D 406.15 ADDITIONAL CONCRETE FINISH FOR EXPOSED SURFACES
Concrete shall be finished pursuant to 2014 TxDOT Specification Item 427 or latest revision.

D 406.16 CONCRETE STRUCTURE REPAIRS
For all repairs, provide materials suitable for the appropriate horizontal, vertical or overhead application. Approval from the engineer for any proposed repair is required unless a repair material type is indicated in the plans. Remove unsound concrete, repair spalled or delaminated concrete, and replace concrete with repair materials. All concrete repairs shall be as per TxDOT Item 429, 2004 edition or latest revision.

D 406.17 MEASUREMENT AND PAYMENT
No separate measurement or payment will be made under this item, but all such work done shall be deemed a subsidiary obligation of the Contractor, having been taken into account and included in price bid for the complete job.
D 408.01 GENERAL
This item shall govern the furnishing and placing of riprap.

D 408.02 MATERIALS
1) Concrete: Unless otherwise shown in the plans, concrete shall be Class “A”. The riprap will consist of a minimum of 4 inch slab with a 6 x 6- W2.9 x W2.9 welded wire fabric or No. 3 or No. 4 reinforcing steel bars spaced at maximum 18-inch centers each way, and per requirements of specifications entitled, "CONCRETE", Division D, Section 504. Grout shall be in accordance with TxDot item 421.

2) Stone shall be as large as can be conveniently placed in a layer of the required depth. The stones, excepting small stones and spalls used to chink interstices shall weigh not less than 10 pounds and at least 50 percent of the stone shall weigh not less than 100 pounds.

3) Sacks shall be made of burlap not lighter than 10 ounce and shall be approximately 19 ½ inches by 36 inches measured inside the seams when the sack is laid flat. Sound reclaimed sacks may be used.

D 408.03 CONSTRUCTION METHODS
If the slopes and bottom of the trench for toe walls are dry and not consolidated properly, the Engineer may require the entire area to be sprinkled, or sprinkled and consolidated before the concrete is placed. All surfaces shall be moist when concrete is placed.

1) The concrete riprap shall have a toe ditch as specified on plans. Concrete slab shall be placed, finished, and cured in accordance with the item, "Concrete Structures" Division D, Section 406 of these specifications.

2) Stone: for plain and grouted riprap shall be sound and durable, free from seams and coatings, and of such characteristics that it will not disintegrate when subjected to the action of water. Stone shall be of shapes which will form a stable protection structure of the required depth. Rounded boulders or cobbles shall not be used on slopes steeper than 2 to 1 unless grouted. Angular shapes may be used on any slope. Flat or needle shapes will not be acceptable unless the thickness of the piece is more than 1/3 the length. Do not place grout when air temperature is below 35° F. Protect work for rapid drying for at least 3 days after placement. For non grouted rock riprap and when the voids are going to be filled only with spalls or small stones, use filter fabric with the length running up and down the slope with a minimum of 2 feet overlap. Non grouted rock riprap shall be constructed as per design and engineer’s recommendations. Waste concrete may be used, if the pieces are sound free from coatings, steel and meet the size requirements specified for a stone.

3) Sacks: the capacity of each sack shall be 1.25 cubic feet. Each sack shall contain 1 cubic foot of concrete loosely placed so as to leave room for folding the open end, the fold just enough to retain the concrete at the time. The filled sacks are placed immediately after filling. The sacks shall be placed and lightly trampled to cause them to conform with the ground surface and with adjacent sacks in place.

4) Riprap other than concrete shall have a perimeter toewall of reinforced concrete a minimum of 18 inches deep and 9 inches wide placed adjacent to the existing or proposed finish grade.
D 408.04 Measurement
Riprap of any type shall be measured by the square foot as measured in the plan view, there shall be no separate measurement for toewalls.

D 408.05 Payment
Riprap shall be paid for on a unit price basis as measured. The price bid shall be considered to include furnishing, hauling, and placing all materials and for labor, tools, equipment, and incidentals necessary to complete the work. There shall be no separate payment for toewalls.
SECTION 410
REINFORCING STEEL

D 410.01 DESCRIPTION
This item shall provide for the furnishing and placing of bar reinforcing steel of the size and quantity designated for use in structures and other concrete items that require reinforcing steel as shown on the plans and in accordance with these specifications.

D 410.02 MATERIALS
Reinforcing steel shall conform to the requirement of Item 440, "Reinforcing Steel" of the TxDOT latest Provisions. Reinforcing steel bars produced outside of the United States are acceptable if such bar reinforcement conforms to the requirements of the ASTM Designations.

D 410.03 PLACING REINFORCEMENT
All steel reinforcing shall be accurately placed in the position shown on the plans and firmly held during the placing and setting of concrete. All reinforcement shall be inspected and approved before placement to be free from dust, rust, mill scale, paint, oil, or foreign material. When stored, it shall not be in direct contact with the ground. Bars shall be tied at all intersections. Distances from forms shall be maintained by means of stays, precast blocks, ties, hangers, metal chairs, or other approved supports. Blocks for holding reinforcement from contact with the form shall be precast concrete blocks of approved shape and dimensions or other equally suitable devices. The use of pebbles, pieces of broken stones or brick, metal pipe and wooden blocks shall not be permitted. Reinforcement in any sections shall be placed and then inspected and approved by the Inspector before the placing of concrete begins.

D 410.04 SPLACING AND LAPPING
Unless otherwise indicated, all spliced bars shall be staggered. Laps shall be in accordance with Table No. 1.

Table 1
Minimum Lap Requirements for Bar Sizes through No. 11

<table>
<thead>
<tr>
<th>Bar Size No. (in)</th>
<th>Bar size No. (mm)</th>
<th>Uncoated Lap Length</th>
<th>Coated Lap Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>10</td>
<td>1 ft 4 in</td>
<td>2 ft 0 in</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>1 ft 9 in</td>
<td>2 ft 8 in</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>2 ft 2 in</td>
<td>3 ft 3 in</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>2 ft 7 in</td>
<td>3 ft 11 in</td>
</tr>
<tr>
<td>7</td>
<td>22</td>
<td>3 ft 5 in</td>
<td>5 ft 2 in</td>
</tr>
<tr>
<td>8</td>
<td>25</td>
<td>4 ft 6 in</td>
<td>6 ft 9 in</td>
</tr>
<tr>
<td>9</td>
<td>29</td>
<td>5 ft 8 in</td>
<td>8 ft 6 in</td>
</tr>
<tr>
<td>10</td>
<td>32</td>
<td>7 ft 3 in</td>
<td>10 ft 11 in</td>
</tr>
<tr>
<td>11</td>
<td>36</td>
<td>8 ft 11 in</td>
<td>13 ft 5 in</td>
</tr>
</tbody>
</table>

Note: bar size numbers (in.) are based on the number of eighths of an inch included in the nominal diameter of the bar. Bar size numbers (mm) approximate the number of millimeters included in the nominal diameter of the bar.

D 410.05 MEASUREMENT AND PAYMENT
No separate measurement or payment will be made under this item, but all such work done shall be deemed a subsidiary obligation of the Contractor, having been taken into account and included by him in price bid for the complete job.
D 412.01 DESCRIPTION
This item shall govern the furnishing and placing of the various sizes of welded wire fabric as indicated on the plans or as directed by the Engineer.

D 412.02 MATERIAL
All welded wire fabric used in construction shall conform to the requirements of ASTM Designation A-185. It shall be 6 x 6- W2.9 x W2.9 welded wire fabric, plain electric welded reinforcing fabric or as indicated on the plans.

D 412.03 CONSTRUCTION METHODS
All splices in the wire fabric shall overlap sufficiently to allow two (2) pairs or transverse wires to be tied together and no splices of less than six (6) inches will be permitted.

At the edge of the construction, the wire fabric shall not be less than one (1) inch nor more than three (3) inches from the edge of the concrete and shall have no wires projecting beyond the last member parallel to the edge of the concrete. The wire fabric shall be straightened to lie flat in place without bulges or excessive vertical displacement and shall be supported properly throughout to insure its proper position in the finished construction.

D 412.04 MEASUREMENT
No measurement of welded wire fabric will be made.

D 412.05 PAYMENT
No direct payment for furnishing and placing welded wire fabric will be made. All materials and labor required will be considered subsidiary to the item in which it is used and shall be included in the unit price bid for said item.
SECTION 416  
EXPANSION JOINT MATERIALS

D 416.01 DESCRIPTION
This item shall govern for furnishing and placing of all expansion joint material as herein specified in the various items of these specifications or as shown on the plans or as directed by the Engineer.

D 416.02 MATERIAL
The material used for expansion joints shall conform to either of the following:

1) Preformed Bituminous Fiber Material shall be formed from cane or other suitable fibers of a cellular nature securely bound together and uniformly impregnated with a suitable asphaltic binder and shall meet the requirements of the Standard Specifications for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction, ASTM Designation D-1751.

2) Boards for expansion joints shall be obtained from Redwood or Cypress timber and shall be sound heartwood, free from sapwood, knots, clustered birds-eye, checks, and splits. Occasional sound or hollow birds-eye when not in clusters will be permitted provided the board is free from any other defects that will impair its usefulness as a joint filler.

D 416.03 CONSTRUCTION METHODS
All materials used shall extend the full depth of the concrete and shall be perpendicular to the exposed face. All joints shall be shaped to conform to the contour of the finished section in which they are installed. All material shall be a minimum of one-half (1/2") inch thick.

D 416.04 MEASUREMENT
Expansion Joint Materials will not be measured for payment.

D 416.05 PAYMENT
No direct payment will be made for Expansion Joint Materials. All material supplied and installed as specified herein shall be considered subsidiary work to the various items of these specifications calling for Expansion Joint Materials.
SECTION 418
MEMBRANE CURING

D 418.01 DESCRIPTION
This item shall consist of curing by the impervious membrane method of all curbs, sidewalks, drive approaches, concrete riprap, concrete structures, and other concrete as specified in the various items of these specifications or as indicated on the plans.

D 418.02 MATERIALS
The membrane curing compound shall comply with the requirements as set forth under "Membrane Curing, Type 2, White Pigmented" of the TxDOT latest provisions.

Type 1-D (Resin Base Only) is required for bridge slabs and top slabs of direct traffic culverts and all other surfaces that required a higher grade of surface finish.

D 418.03 CONSTRUCTION METHODS
The membrane curing compound shall be applied after the surface finishing has been completed, and immediately after the free surface moisture has disappeared. The surface shall be completely sealed with a uniform coating of the curing compound applied at the rate of coverage recommended by the manufacturer or as directed by the Inspector.

Do not apply membrane curing compound on projections of reinforcing steel or concrete that will later form a construction joint.

Do not apply membrane curing to dry surfaces. Dampen formed surfaces and surfaces that have been given a first rub so that they are moist at the time of application of membrane.

The liquid-membrane forming compound must not disintegrate, check, peel, or crack during the required curing period. It must not peel or pick up under traffic and must disappear from the surface of the cured concrete by gradual disintegration.

D 418.04 MEASUREMENT
"Membrane Curing" will not be measured for payment.

D 418.05 PAYMENT
The work and materials prescribed herein will not be paid for directly, but shall be included in the unit price bid for the items of construction in which these materials are used.
SECTION 424
RELOCATING WIRE FENCE

D 424.01 DESCRIPTION
This item shall consist of removing and relocating the wire fence(s) at the location(s) designated on the plans, and for furnishing and installing any additional materials required as specified by this item or as indicated on the plans.

D 424.02 MATERIALS
All materials furnished shall be equal to or better than the materials of the existing fence unless specifically designated otherwise on the plans.

D 424.03 CONSTRUCTION METHODS
Construction methods shall be equal to or better than existing type of wire fencing or conform to the Division D, Technical Provisions of Section 420, “Chain Link Fence”, for the relocating of existing chain link wire fence.

D 424.04 MEASUREMENT
Accepted work as performed and prescribed by this item will be measured by the linear foot of fence relocated.

D 424.05 PAYMENT
The work performed and the materials furnished as prescribed by this Item will be paid for at the contract unit bid price per linear foot for "Relocating Wire Fence", which price shall be full compensation for removing and reinstalling the existing fence, and for furnishing all additional materials, for all labor, tools, equipment, and incidentals necessary to complete the work.
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SECTION 430
CONCRETE SIDEWALKS

D 430.01 GENERAL
Section includes reinforced concrete sidewalks and accessible ramps. Applications for sidewalk permits shall be made in writing to the Building Development Services Department to construct, reconstruct, alter, remove, or replace any sidewalk section within the R.O.W. (Right-of-Way). The application shall include the location of the proposed improvements, together with a plot plan drawn to scale (or approved site plan) fully describing the nature of the proposed improvements and the locations as well as the traffic control plan. Construction of sidewalks and accessible ramps shall be in compliance with ADA. Any existing obstructions as water meters, traffic signs, fire hydrants, water valves, street lights, etc. shall be relocated outside the proposed driveway at the owner's expense.

D 430.02 REFERENCES
A. ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the field.


C. ASTM C 42 - Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

D. ASTM C 138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.


F. ASTM C 172 - Practice for Sampling Freshly Mixed Concrete.


D 430.03 SUBMITTALS
Submit certified testing results and certificates of compliance.

D 430.04 MATERIALS
A. Concrete: Conform to material and proportion requirements for concrete Section 406.

B. Reinforcing Steel: Conform to material requirements in section 410 & 412.

C. Reinforcing Fiberglass: Conform to material and proportion requirements as per Section 414. Approval from the District Engineer is required.

D. Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 416-Expansion Joint Material.

E. Expansion Joint Filler: Conform to material requirements for expansion joint material of Section 406- Concrete Structures.

F. Forms: Use straight, unwrapped wood or metal forms with nominal depth equal to or greater than the proposed sidewalk thickness. The use of 2" by 4" lumber as forms will be allowed.
EXECUTION

D 430.05 REPLACEMENT
Replace sidewalks and accessible ramps that are removed or damaged during construction as per this specification to the next joint. Provide replaced and new sidewalks with accessible ramps if sidewalk intersects curb at street or driveway as per the latest ADA standards.

D 430.06 PREPARATION
A. Identify and protect utilities which are to remain.
B. Protect living trees, other plant growth, and features designated to remain.
C. Conduct clearing and grubbing operation in accordance with Section 402-Clearing and Grubbing.
D. Excavate subgrade to the line, grade and cross-section shown on plans. Remove soft spots and pumping soils and replace with fill material having a Plasticity Index between 7 and 20.

D 430.07 PLACEMENT
A. Setting Forms: Securely stake forms to line and grade. Maintain position during concrete placement.
B. Reinforcement: Install 6 x 6, W2.9 x W2.9 welded wire fabric or No. 3 reinforcing steel bars on 18-inch centers longitudinally and transversely. Lay longitudinal bars in walk continuously, except through expansion joints. Support reinforcement in manner to maintain reinforcement in center of slab vertically during placement.
C. Expansion Joints: Install expansion joints at 40’ to 80’ in accordance with Section 416-Expansion Joint Material.
D. Place concrete in forms to specified depth and tamp thoroughly with “jitterbug” tamp, or other acceptable method. Bring mortar to surface. Where a sidewalk crosses a driveway, ensure that the sidewalk depth and reinforcement are not less than the driveway cross-sectional details shown on the plans.
E. Strike off to smooth finish with wood strike board. Finish smoothly with wood hand float. Brush across sidewalk with fine-haired brush. Exposed material shall not be allowed as finish surface.
F. Unless otherwise indicated on plans, mark off joints ¼ inch deep, at spacing equal to 5 feet and matching C&G joints. Use joint tool equal in width to edging tool.
G. Finish edges with tool having ¼ inch radius.
H. After concrete has set sufficiently, refill space along side of sidewalk to top of walk with suitable material. Tamp until firm and solid. Dispose of excess material in accordance with Section 128-Waste Material Disposal. Repair driveways and parking lots damaged by sidewalk excavation in accordance with Section 430.

D 430.08 CURING
Conform to requirements of Section 406 - Concrete Curing.
D 430.09 FIELD QUALITY CONTROL

A. Testing will be performed under provision of Division C, General Provisions, Section 6 Control of Work and Materials.

B. Compressive Strength Test Specimens: Four test specimens for compressive strength test will be made in accordance with ASTM C 31 for each 30 cubic yards or less of sidewalk that is placed in one day. Two specimens will be tested at 7 days. The remaining two specimens will be tested at 28 days. Specimens will be tested in accordance with ASTM C 39. Minimum compressive strength shall be 3000 pounds per square inch at 28 days.

C. Yield test for cement content per cubic yard of concrete will be made in accordance with ASTM C 138. If such cement content is found to be less than that specified per cubic yard, reduce batch weights until amount of cement per cubic yard of concrete conforms to requirements.

D. If the Contractor places concrete without notifying the laboratory, the District will have the concrete tested by means of a core test as specified in ASTM C 42. The cost of the test will be deducted from payment due the Contractor.

E. Sampling of fresh concrete shall be in accordance with ASTM C 172.

F. Take slump tests when cylinders are made.

G. Concrete shall be acceptable if the average of the two 28 day compression tests is equal to or greater than the minimum 28-day strength specified.

H. If either of the two tests is less than the average of the two tests by more than 10 percent, that entire test shall be considered erratic and not indicative of the concrete strength. Core samples will be required of this concrete.

I. If any 28-day laboratory test indicates that concrete of low strength has been placed, the concrete in question shall be tested by taking cores as directed by the District Engineer may direct. At least three representative cores shall be taken and tested as specified in ASTM C 42. Cost for any additional testing required due to a failed test will be paid by the contractor.

D 430.10 NONCONFORMING

Remove and replace areas of sidewalk that fail compressive strength tests, with concrete of thickness shown on plans. Nonconforming sidewalk sections shall be replaced at no additional cost to the District.

D 430.11 PROTECTION

Maintain sidewalks in good condition until completion of work.
Replace damaged sidewalks in accordance with Paragraph D 430.06 - Replacement.

D 430.12 MEASUREMENT

Sidewalks will be measured by the square foot or by the foot of different widths. Accessible ramps will be measured by each unit. The unit will consist of the curb ramp, landing, adjacent flares or side curb, and detectable warning surface as shown on the plans.

D 430.13 PAYMENT

Will be paid by the unit price bid for concrete sidewalks for the depth specified and accessible ramps. This price is full compensation for surface preparation of base; materials; removal and disposal of excavated material; drilling and doweling into the existing concrete curb, sidewalk and pavement; repair of the adjacent street or pavement structure damaged by the operations; and equipment, labor, materials, tools and incidentals.
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SECTION 502
EXCAVATION AND EMBANKMENT OF STREETS

D 502.01 DESCRIPTION
This item shall consist of doing all required excavation within the limits of the roadway (except for excavation otherwise classified such as excavation for drainage structures, etc.): the removal and proper utilization or disposal of all excavated materials; the erection of all embankments; and the constructing, shaping, compacting, and finishing of all earthwork on the entire roadway and approaches thereto in conformity with the lines, grades, and typical sections as shown on the plans and established by the Engineer.

D 502.02 GENERAL
Soil material for street subgrade or embankment with a PI > 20 shall be stabilized as shown on the plans. The method shall be approved by the City Engineer. All material encountered of whatever nature within the limits indicated shall be removed and disposed of as directed. The Contractor shall inform and satisfy himself as to the character, quantity, and distribution of all material to be excavated. No payment will be made for any excavated material which is used for purposes other than required in the plans or proposal or as directed by the Engineer.

The rough excavation shall be carried to such depth that sufficient material will be left above the designated grade to allow for compaction. Likewise on embankments, sufficient material shall be placed above the designated grade to allow for compaction and settlement. Should the Contractor excavate below the designated lines, Contractor shall replace such material excavated with approved material in an approved manner and condition at own expense.

The Engineer shall have complete control over the excavation, moving, placing, and disposition of all material, and he shall determine the suitability of material to be placed in embankments.

Stakes set by the Engineer as provided in the "General Provisions" shall include only one set of offset alignment and grade stakes. All slope stakes, bluetops, and additional alignment stakes shall be furnished and set by the Contractor.

EQUIPMENT

D 502.03 GRADING EQUIPMENT
The Contractor may use any type of earth-moving equipment the contractor wishes to use or has available, provided such equipment is in satisfactory condition and of such capacity that the grading schedule as planned by the Contractor and approved by the Engineer can be maintained.

D 502.04 COMPACTING EQUIPMENT
(a) Tamping rollers shall consist of two metal rollers, drums, or shells or 40 " minimum diameter, each not less than 42 " in length and unit-mounted in a rigid frame in such manner that each roller may oscillate independently of the other; and each roller, drum, or shell shall be surmounted by metal studs with tamping feet projecting not less than seven (7) inches from the surface of the drum and spaced not less than six (6) inches nor more than ten (10) inches measured diagonally from center to center. The area of each tampering foot shall be not less than five (5) feet square inches nor more than eight (8) square inches. Each unit shall be provided with a suitable tamper foot cleaning device.
Where more than one rolling unit is used, the rolling units shall be pivoted on the main frame in a manner which will permit the rolling units to adapt themselves to uneven ground and to rotate individually. When empty, the weight of the roller shall be such that the unit pressure applied by the tamping foot in contact with the ground is not less than 120 pounds per square inch.

(b) Pneumatic rollers shall consist of not less than nine pneumatic tired wheels running on two axles in such manner that the rear group of tires will not follow in the tracks of the forward group and shall be mounted on a rigid frame provided with platform or body suitable for ballast loading. The front axle shall rotate around the kingpin so located that the roller may be turned within a minimum circle. The pneumatic tire roller under working conditions shall have an effective rolling width of approximately sixty (60) inches and shall give a minimum compression of three hundred and twenty-five (325) pounds per inch of width of tire trend.

(c) Smooth self-propelled rollers shall weigh at least ten tons and may be tandem or three-wheel type. The wheels of the roller shall be equipped with adjustable scrapers.

**CONSTRUCTION METHODS**

**D 502.05 EXCAVATION**

The excavation material shall be handled in such a manner as to allow the selected material to be properly placed in embankment and in the capping of the pavement subgrades as determined by the Engineer. Any suitable surplus material shall be stock-piled in approved areas for later use as directed by the Engineer.

The contractor shall make the distribution as indicated on the plans, and the widening or narrowing of the section or raising or lowering of the grade to avoid haul will not be permitted. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept and divert surface water.

In cut areas, the top of the subgrade shall be scarified and compacted to a minimum depth of six (6) inches to not less than 95% compaction as per TEX. 113-E or 114-E, or ASTM 1557 or ASTM 698, as appropriate to the extent of at least 12” inches behind the back of the curb or edge of pavement. When the required density cannot be obtained, the material shall be undercut and replaced with suitable material as directed. The material placed to refill and undercut portion shall be handled and compacted as specified for embankments.

During compacting operations, water shall be added to the subgrade material. Such watering shall be done by approved methods and using approved equipment. This moisture shall not be more than 2% above or below the optimum. Approved subgrade shall be primed, cured and after primed will be covered with base within maximum seven (7) days.

**D 502.06 BORROW**

Borrow excavation shall consist of excavation made outside the normal grading limits to obtain material for the completion of embankments and for other purposes. It shall be the Contractor's responsibility to locate and obtain the supply, and the Contractor shall notify the Engineer sufficiently in advance to permit tests and measurements to be made.

All borrow pits shall be opened up immediately to expose the vertical face of various strata of acceptable material to obtain a uniform product. Borrow pits shall be excavated to regular lines to permit accurate measurements, and shall be drained and left in a neat and presentable condition with all slopes dress uniformly.
D 502.07 PREPARATION OF EMBANKMENT AREA
Immediately prior to the placing of material, the entire area upon which the embankment is to be placed shall be stripped of all grass, weeds, brush and other organic materials, and shall be scarified and broken to a depth of six (6) inches. All roots, debris, large stones or objectionable material that would interfere with the compaction of fill will be moved and disposed of as directed. A thin layer (approximately three (3) inches) of fill material shall be spread over the scarified foundation, and the whole area compacted as required herein. When embankments are to be placed on natural slopes steeper than 3 to 1, horizontal benches shall be constructed as directed by the Engineer. Material excavated in the construction of such benches will be included in the total yardage of excavation.

D 502.08 CONSTRUCTION OF EMBANKMENTS
Embankments shall be formed of satisfactory materials placed in successive horizontal layers of not more than six inches in loose depth for the full width of the cross section. The material in the layers shall have the proper moisture content before rolling to obtain the required compaction. Wetting or drying of the material and manipulation to secure a uniform moisture throughout the layer shall be required. Should material be too wet to permit proper compaction, corrective work on all portions of the embankment thus affected shall be done with the proper equipment and methods approved by the Engineer.

Each layer placed as specified above shall be compacted to not less than the comparable density of the adjoining material. Compaction shall extend through the entire depth of each layer and the embankment, when complete, shall be homogeneous and uniformly compacted mass. The moisture shall not be more than 2% above or below the optimum.

Under all paved areas and for a depth of six inches below the surface of the subgrade, the embankment shall be compacted to not less than ninety-five percent of the maximum density as determined by procedures set out under TEX-113E or 114-E to the extent of at least 12" inches behind the back of the curb or edge of pavement. Backfill behind back of curb shall be properly compacted. However, any areas inaccessible to a roller shall be consolidated and compacted with approved mechanical tampers. Stones or rock fragments larger than four inches in their greatest dimension will not be permitted in the top six inches of the embankment.

The Contractor shall be responsible for the stability of all embankments made under this contract and shall replace any portion which is the opinion of the Engineer has become displaced due to negligence on the part of the Contractor.

D 502.09 TRUENESS TESTS
In those areas upon which a sub-base or base course is to be placed, the surface of the subgrade shall be of such smoothness that when tested with a sixteen (16) foot straightedge, it shall show no deviation in excess of five-hundredths (0.05) of a foot from true grade as established by grade pins or hubs. In areas not under sub-base or base course, the surface shall not deviate more than one tenth (0.10) of a foot from true grade as established by grade pins or hubs.

D 502.10 COMPACTION TESTS
Subgrade materials shall be compacted to the required density and moisture content as shown below, unless otherwise shown on the plans:
The maximum dry density and optimum moisture content shall be determined in accordance with TxDOT Tex-113-E or Tex-114-E.
Test for in place density shall be made in accordance with TxDOT Test-115-E and within 24 hours after compacting operations are completed. If the material fails to meet the density specified, it shall be re-worked as necessary to obtain the density and moisture required.
### MATERIALS

<table>
<thead>
<tr>
<th>PI</th>
<th>Max. Dry Density</th>
<th>Percentage of moisture</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 20</td>
<td>95%</td>
<td>- 2% of Optimum or greater</td>
</tr>
<tr>
<td>≥ 20</td>
<td>95%</td>
<td>≥ Optimum moisture</td>
</tr>
</tbody>
</table>

For materials with a PI > 20, just prior to placing any base materials or stabilization, the top 4 inches of compacted subgrade shall be tested for density and moisture content. If test show the density to be more than 2% below the specified minimum or the moisture content more than 3% above or below the specified minimum, the course shall be reworked as necessary to obtain the specified compaction and moisture content.

### MEASUREMENT

**D 502.10 ROADWAY EXCAVATION**

The number of cubic yards of street excavation to be paid for shall be computed by the method of average end areas. The width of these areas shall be the distance measured from edge of asphalt to edge of asphalt or from back of curb to back of curb plus two (2.0) feet. The depth shall be that staked in the field by the Engineer.

**D 502.11 BORROW EXCAVATION**

The number of cubic yards of "Borrow Excavation" to be paid for shall be computed by the method of average and areas. The width of these areas shall be the distance measured from back of curb to back of curb plus two (2.0) feet. The depth shall be that staked "in the field by the Engineer."

**D 502.12 EMBANKMENT**

No separate measurement for embankment will be made.

**D 502.13 HAUL**

No separate measurement of haul will be made other than that specifically approved in the plans.

### PAYMENT

**D 502.14 STREET EXCAVATION**

The cubic yards of street excavation measured as provided in these specifications will be paid for at the contract unit price per cubic yards (dense measurement) for "Street Excavation" which payment shall constitute full compensation for excavation, haul, embankment, watering and compaction; and for furnishing all materials, labor and equipment for doing the work as specified herein and to the liens and grades shown on the plans. Payment for fifty percent (50%) of street excavation will be paid at the time initial excavation (rough grading) is completed. The balance of fifty percent (50%) is to be paid when the street subgrade is tested and approved.
SECTION 504
CONCRETE

D-504.01 DESCRIPTION: These specifications shall govern for the materials used, for the storing, measuring, and handling of materials, and for the proportioning and mixing of Portland Cement Concrete.

MATERIALS

D-504.02 CEMENT: Portland Cement shall conform to the requirements of the latest revision of ASTM Designation C150, Type 1, or Type II. Only one brand or kind of cement shall be used in any one structure except as permitted in writing by the Engineer. All cement shall be delivered in bags plainly marked with the brand and name of the manufacturer.

D-504.03 COARSE AGGREGATE: The coarse aggregate shall conform to the requirements of the latest revision of ASTM Designation C-33 and ASTM Designation D-448. Coarse aggregate for the various classes of concrete shall conform to the requirements of the following table:

<table>
<thead>
<tr>
<th>Aggregate Grade No.</th>
<th>Nominal Size</th>
<th>2-1/2&quot;</th>
<th>2&quot;</th>
<th>1-1/2&quot;</th>
<th>1&quot;</th>
<th>3/4&quot;</th>
<th>1/2&quot;</th>
<th>3/8&quot;</th>
<th>No. 4</th>
<th>No. 8</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>0-</td>
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<td>0-</td>
<td>0-5</td>
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<td>30-65</td>
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<td>70-90</td>
<td>95-100</td>
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<td>95-100</td>
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<td>0-</td>
<td>0-5</td>
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<td>40-75</td>
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<td>90-100</td>
<td>95-100</td>
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<td>45-80</td>
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<td>95-100</td>
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<td>0-</td>
<td>0-5</td>
<td>35-60</td>
<td>90-100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Numbers in parenthesis indicate that these gradations conform to corresponding ASTM gradation form ASTM C-33.

The amount of deleterious substances in coarse aggregate shall not exceed the following percentages by weight:

<table>
<thead>
<tr>
<th>Material removed by decantation</th>
<th>1.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shale, slate and similar materials</td>
<td>1.0%</td>
</tr>
<tr>
<td>Clay lumps</td>
<td>0.25%</td>
</tr>
<tr>
<td>Soft fragments</td>
<td>3.0%</td>
</tr>
<tr>
<td>Other deleterious substances (Including friable, thin, elongated or laminated pieces)</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

The sum of all deleterious materials exclusive of materials removed by decantation shall not exceed 5% by weight.
D-504.04 FINE AGGREGATE: The fine aggregate shall conform to the requirements of the latest revision of ASTM Designation C-33.

<table>
<thead>
<tr>
<th>AGGREGATE</th>
<th>3/8 in.</th>
<th>No.4</th>
<th>No.8</th>
<th>No.16</th>
<th>No.30</th>
<th>No.50</th>
<th>No.100</th>
<th>No.200</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRADE #1</td>
<td>0</td>
<td>0-5</td>
<td>0-20</td>
<td>15-50</td>
<td>35-75</td>
<td>65-90</td>
<td>90-100</td>
<td>97-100</td>
</tr>
</tbody>
</table>

The amount of deleterious substances in fine aggregate shall not exceed the following percentages by weight:

| Materials removed by decantation | 3.0% |
| Clay Lumps | 0.5% |
| Other deleterious substances (Such as coal, shale, coated or soft flaky particles) | 2.5% |
| Material finer than No. 200 sieve (a) In concrete subject to surface abrasion | |
| (b) All other concrete | 3.0% |

D-504.05 WATER: Water shall be clean and free from deleterious amounts of acids, alkalies, and organic materials.

EQUIPMENT

D-504.06 GENERAL: All equipment will be inspected by the Engineer and only equipment approved by him may be used. Any equipment disapproved shall be removed from the job site within 24 hours after it has been inspected.

D-504.07 CEMENT STORAGE FACILITIES: All cement shall be stored in well ventilated, weatherproof buildings which will protect the cement from dampness. The floor supporting the cement shall clear the ground a sufficient distance to prevent the absorption of moisture by the cement. Provision for storage shall be ample, and the shipment of cement shall be segregated in such manner as to provide easy access for identification of each shipment.

The Engineer may permit small quantities of cement to be stored in the open for periods not exceeding 48 hours, if a raised platform and adequate waterproof coverings are provided.

D-504.08 AGGREGATE STORAGE FACILITIES: If the aggregates are stored on the ground, the sites for the stockpiles shall be grubbed clear of all weeds and grass, and leveled off. The bottom layer of aggregate shall not be disturbed nor used without cleaning.

When the contract requires the use of two or more sizes of aggregate, the different sizes shall be stored in a manner as to prevent intermixing.
Materials in all stockpiles shall be handled and placed in such manner that segregation of materials within the stockpile will be avoided.

**D-504.09 MEASURING EQUIPMENT:** Equipment for measuring concrete materials shall be such that the proportions can be accurately controlled and easily checked at any time during the work, preferably measurement by weight rather than by volume.

**D-504.10 MIXING EQUIPMENT:** The mixing shall be done in a batch mixer of approved type and size which will insure the uniform distribution of the material throughout the mass so that the mixture will be uniform in color and smooth in appearance. Whenever a concrete mixer is not suitable or adequate for the work, it shall be removed from the site upon written order from the Engineer. Pick-up and throw-over blades in the mixer drum which are worn down more than ten percent (10%) in depth shall be repaired or replaced.

**D-504.11 CLASSIFICATION AND MIX DESIGN:** It shall be the responsibility of the Contractor to furnish the mix design, using a Coarse Aggregate Factor acceptable to the Engineer, for the class(es) of concrete specified to conform with the requirements contained herein and in accordance with TxDOT Standards. The contractor shall perform, at his own expense, the work required to substantiate the design, except the testing of strength specimens, which will be done by the Department. Complete concrete design data shall be submitted to the Engineer for approval and shall be less than 1 year old signed and sealed by a licensed professional engineer in the State of Texas.

It shall also be the responsibility of the Contractor to determine and measure the batch quantity of each ingredient including all water, not only for batch designs, but for all concrete produced for the project, so that the mix conforms to these specifications and other requirements shown on the plans.

In lieu of the above mix design responsibility, the Contractor may accept a design furnished by the Engineer, however, this will not relieve him of the responsibility of providing concrete meeting the requirements of these specifications.

Trial batches will be made and tested using all the proposed ingredients prior to placing of concrete, and when the aggregate, and/or type, brand or source of cement, or admixture is changed. When the brand and/or source of cement only is changed, the Engineer may waive trial batches only if a prior record of satisfactory performance of the cement has been established.

Trial batches shall be made in the mixer to be used on the job. When Transit Mix concrete is to be used, the trial designs will be made in a transit mixer representative of the mixers to be used. Batch size shall not be less than fifty percent (50%) of its rated mixing capacity.

Mix designs from previous or concurrent jobs may be used without trial batches if it is shown that no substantial change in any of the proposed ingredients has been made. Mix design shall be current or less than one (1) year old.

The coarse aggregate factor shall not be more than 0.82, but when the voids in the coarse aggregate exceed 48 percent of the total dry loose volume, the coarse aggregate factor shall not exceed 0.85.
The coarse aggregate factor shall not be less than 0.68 unless authorized by the Engineer in writing.

Water reducing or retarding agents may be used with all classes of concrete at the option of the Contractor, and will be required for hot weather concreting for cased drilled shafts and for continuous slab placement.

When a retarding admixture is required for hot weather concreting, must meet the requirements of ASTM C 94. When used in continuous slab placement, the amount to be used will be established by several trial batches with varying retarder content and simulating the placing conditions to be encountered. When water reducing or retarding agents are used at the option of the Contractor, reduced dosage of the admixture will be permitted.

Entrained air materials shall comply with ASTM C 260 and will be required in accordance with Table 7 TxDOT item 421. Specimens will be tested in accordance with Tex-414-A or Tex-416-A.

D-504.12 QUALITY OF CONCRETE: The concrete shall be uniform, workable, and of a consistency acceptable to the Engineer. The cement content, maximum allowable water/cement ratio, the desired and maximum slump, the proper amount of entrained air and the strength requirements for all classes of concrete shall conform to the requirements of these specifications. It shall be the responsibility of the Contractor to provide concrete meeting these specifications.

During the progress of the work, the Engineer will cast test cylinders or beams, perform slump and entrained air tests, and will make temperature checks, as required, to insure compliance with the specifications.

A strength test shall be defined as the average of the breaking strength of two cylinders or two beams as the case may be. Specimens will be tested in accordance with Test Methods TEX-418-A or Tex-448-A.

If the required strength or consistency of the class of concrete being produced cannot be secured with the minimum cement specified or without exceeding the maximum water/cement ratio, the Contractor will be required to furnish different aggregates, use a water-reducing agent, an air-entraining agent, or increase the cement content in order to provide concrete meeting these specifications.

All test specimens, beams or cylinders, representing tests for removal of forms and/or false work shall be cured using the same methods, and under the same conditions as concrete represented.

"Design Strength" beams and cylinders shall be cured in accordance with TxDOT Bulletin C-11 and Supplement thereto.

The Contractor shall provide and maintain curing facilities as described in TxDOT Bulletin C-11 and Supplement thereto, for the purpose of curing test specimens. Provision shall be made to maintain the water in the curing tank at temperatures between 70°F and 90°F.
When control of concrete quality is by twenty-eight day compressive tests, job control will be by seven day compressive tests which are shown to provide the required twenty-eight day strength, based on results from trial batches. Thereafter, if the required seven day strength is not secured with the quantity of cement specified in Table 5, changes in the batch design will be made as specified in this article.

<table>
<thead>
<tr>
<th>Class of Concrete</th>
<th>Design Strength, Mim. 28-day $f'_c$ (psi)</th>
<th>Maximum W/C Ratio$^1$</th>
<th>Coarse Aggregate Grades$^{2,3}$</th>
<th>General Usage$^4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3,000</td>
<td>0.60</td>
<td>1—4, 8</td>
<td>Inlets, manholes, curb, gutter, curb &amp; gutter. conc. Retards, sidewalks, driveways, backup walls, anchors</td>
</tr>
<tr>
<td>B</td>
<td>2,000</td>
<td>0.60</td>
<td>2—7</td>
<td>Riprap, small roadside signs and anchors</td>
</tr>
<tr>
<td>C</td>
<td>3,600</td>
<td>0.45</td>
<td>1—6</td>
<td>Drilled shafts, bridge substructure, bridge railing, culverts except top slab of direct traffic culverts, headwalls, wing walls, approach slabs, concrete traffic barrier (cast-in-place)</td>
</tr>
<tr>
<td>D</td>
<td>1,500</td>
<td>0.60</td>
<td>2—7</td>
<td>Riprap</td>
</tr>
<tr>
<td>E</td>
<td>3,000</td>
<td>0.50</td>
<td>2—5</td>
<td>Seal concrete</td>
</tr>
<tr>
<td>F$^5$</td>
<td>Note 6</td>
<td>0.45</td>
<td>2—5</td>
<td>Railroad structures; occasionally for bridge piers, columns, or bents</td>
</tr>
<tr>
<td>H$^5$</td>
<td>Note 6</td>
<td>0.45</td>
<td>3—6</td>
<td>Prestressed concrete beams, boxes, piling, and concrete traffic barrier (precast)</td>
</tr>
<tr>
<td>S$^5$</td>
<td>4,000</td>
<td>0.45</td>
<td>2—5</td>
<td>Bridge slabs, top slabs of direct traffic culverts</td>
</tr>
<tr>
<td>P</td>
<td>See Item 360</td>
<td>0.45</td>
<td>2—3</td>
<td>Concrete pavement</td>
</tr>
<tr>
<td>DC$^5$</td>
<td>5,500</td>
<td>0.40</td>
<td>6</td>
<td>Dense conc. overlay</td>
</tr>
<tr>
<td>CO$^5$</td>
<td>4,600</td>
<td>0.40</td>
<td>6</td>
<td>Conc. overlay</td>
</tr>
</tbody>
</table>
Concrete

<table>
<thead>
<tr>
<th>LMC&lt;sup&gt;5&lt;/sup&gt;</th>
<th>4,000</th>
<th>0.40</th>
<th>6—8</th>
<th>Latex-modified concrete overlay</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS&lt;sup&gt;5&lt;/sup&gt;</td>
<td>Note 7</td>
<td>0.45</td>
<td>4—6</td>
<td>Slurry displacement shafts, underwater drilled shafts</td>
</tr>
<tr>
<td>K&lt;sup&gt;5&lt;/sup&gt;</td>
<td>Note 6</td>
<td>0.45</td>
<td>Note 6</td>
<td>Note 6</td>
</tr>
<tr>
<td>HES</td>
<td>Note 6</td>
<td>0.45</td>
<td>Note 6</td>
<td>Note 6</td>
</tr>
</tbody>
</table>

1. Maximum water-cement or water-cementitious ratio by weight.
2. Unless otherwise permitted, do not use Grade 1 coarse aggregate except in massive foundations with 4-in. minimum clear spacing between reinforcing steel bars. Do not use Grade 1 aggregate in drilled shafts.
3. Unless otherwise approved, use Grade 8 aggregate in extruded curbs.
4. For information only.
5. Structural concrete classes.
6. As shown on the plans or specified.
7. Cementitious material content shall be minimum 658 lb/cy of concrete.

**D-504.13 CONSISTENCY:** The consistency of the concrete as placed should allow the completion of the finishing operation without the addition of water to the surface. When field conditions are such that additional moisture is needed for the final concrete surface finishing operation, the required water shall be applied to the surface by fog spray only and shall be held to a minimum. The concrete shall be workable, cohesive, possessing satisfactory finishing qualities, and of the stiffest consistency that can be placed and vibrated into a homogeneous mass. Excessive bleeding shall be avoided. Slump requirements will be as specified in TxDOT item 421 Table 8.

**Table 8**

<table>
<thead>
<tr>
<th>CONCRETE DESIGNATION</th>
<th>RECOMMENDED DESIGN AND PLACEMENT SLUMP (in.)</th>
<th>MAXIMUM ACCEPTABLE PLACEMENT SLUMP (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilled Shafts</td>
<td>See item 416</td>
<td>See item 416</td>
</tr>
<tr>
<td>Thin walled section (9 in. or less)</td>
<td>4</td>
<td>6-1/2</td>
</tr>
<tr>
<td>Approach slabs, concrete overlays, caps, columns, piers, wall sections (over 9 in.)</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Bridge slabs</td>
<td>4</td>
<td>5-1/2</td>
</tr>
<tr>
<td>Prestressed Concrete Members&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
<td>6-1/2</td>
</tr>
<tr>
<td>Concrete Traffic Barrier, concrete bridge railing</td>
<td>4</td>
<td>6-1/2</td>
</tr>
<tr>
<td>Dense concrete overlay</td>
<td>3/4</td>
<td>2</td>
</tr>
<tr>
<td>CONCRETE DESIGNATION</td>
<td>RECOMMENDED DESIGN AND PLACEMENT SLUMP (in.)</td>
<td>MAXIMUM ACCEPTABLE PLACEMENT SLUMP (in.)</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>---------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Latex-modified concrete for bridge deck overlays</td>
<td>3</td>
<td>7-1/2</td>
</tr>
<tr>
<td>Concrete Placed Under Water</td>
<td>6</td>
<td>8-1/2</td>
</tr>
<tr>
<td>Concrete pavement (slip-formed)</td>
<td>1-1/2</td>
<td>3</td>
</tr>
<tr>
<td>Concrete pavement (formed)</td>
<td>4</td>
<td>6-1/2</td>
</tr>
<tr>
<td>Riprap, Curb, Gutter, and other Miscellaneous Concrete</td>
<td>As approved</td>
<td>As approved</td>
</tr>
</tbody>
</table>

1. If a high-range water reducer (HRWR) is used, maximum acceptable slump will be 9 in.

**NOTE:** No concrete will be permitted with slump in excess of the maximums shown.

(a) The mortar will cling to the coarse aggregate
(b) The concrete is not sufficiently fluid to segregate when transported to the place of deposit
(c) The concrete, when dropped directly from the discharge chute, will flatten out at the center of the pile but the edges of the pile will stand up and not flow
(d) The mortar will show no free water when removed from the mixer
(e) The concrete will settle into place when deposited in the forms, and when transported in metal chutes at an angle of 30 degrees horizontal, it will slide and not flow into place
(f) The surface of the finished concrete will be free from "laitance", or a surface film of free water

Any concrete failing to meet the requirements although meeting the slump requirements will be considered unsatisfactory; and the mix shall be changed to correct such unsatisfactory conditions.

**D-504.14 MIXING:** The first batch of materials placed in the mixer for each placement shall contain an extra quantity of sand, cement, and water sufficient to coat the inside surface of the drum without diminishing the mortar content or the mix. Upon cessation of mixing for any considerable period of time, the mixer shall be thoroughly cleaned.

The entire contents of the drum shall be discharged before any materials are placed therein for the succeeding batch. The concrete shall be mixed in quantities required for immediate use, and any concrete which is not in place within one (1) hour after water is added to the batch will not be used. Re-tempering of concrete will not be permitted.

After all the ingredients are assembled in the drum the mixing shall continue for a minimum time of one and one-half minute for 14 cubic foot mixers and smaller, and for a minimum time of one minute for 21 cubic foot mixers and larger. During the mixing time the drum shall revolve at a speed of 14 to 20 revolutions per minute. The mixer shall be equipped with a speed regulator to hold the mixer to the required speed of revolution. The absolute volume of the concrete batch shall not exceed 120 percent of the NRMCA-rated capacity of the mixer.
D-504.15 READY MIX CONCRETE: Concrete forms from a central plant of mixed-in-transit mixer trucks may be used if it complies with these specifications. The Engineer shall have free access at all times to the batching and mixing plant for sampling of all materials and inspection of work performed at this project. Concrete shall be delivered in water-tight containers which will not permit segregation of the materials. When delivered, the concrete shall be uniform throughout the mass.

The delivery ticket shall include the date, time, strength, slump, and amount of batch delivered. If an extra charge of water is required at the job site because of too low a slump, the drum shall be turned a minimum of 30 revolutions after addition of such water. Mixer shall be completely emptied before recharging. Trucks shall not be loaded greater than NRMCA-rated capacity. The maximum time interval between the addition of the cement to the batch and the placing of the concrete in the forms shall conform to the requirements set up under TxDOT specifications, Item 421. Overwet mixers shall be rejected and shall not be corrected by the addition of either aggregate or cement to the particular batch in question.

D-504.16 ADVERSE WEATHER: In threatening weather which, in the opinion of the Engineer, may result in conditions which will adversely affect the quality of the concrete to be placed, the Engineer may order postponement of the work. Where work has been started and changes in weather conditions require protective measures to be used, the Contractor shall furnish adequate shelter to protect the concrete against damage from rainfall, wind, or damage due to freezing temperature. In case it is necessary to continue mixing operation during rainfall, the Contractor shall provide protective coverings for the material stockpiles as well as the concrete being placed. The covering for aggregate stockpiles will be required only to the extent as may be necessary to control the moisture conditions in the aggregate so that adequate control of the consistency of the concrete mix may be maintained.

No concrete shall be mixed without the approval of the Engineer when the air temperature is at or below 40 degrees Fahrenheit taken in the shade away from artificial heat and falling. If authorized by the Engineer, concrete may be mixed when the air temperature is 35 degrees Fahrenheit and rising. When permission is given for mixing when the temperature is below 40 degrees Fahrenheit, the Engineer will specify the special precautions which shall be taken.

In case the air temperature is at or above 85 degrees Fahrenheit, concrete may be mixed in accordance with the requirements set up in TxDOT, Specifications.

Hand mixing of concrete will be permitted only for small placements or in the case of an emergency and then only when authorized by the Engineer. The Engineer will also specify the proportioning and methods of mixing to be used.

D-504.17 TESTING AND INSPECTION OF MATERIALS:

(a) Concrete testing of mix designs shall be made by a commercial testing laboratory approved by the Engineer. One copy of the test reports shall go to the Engineer and one copy of same shall go to the Contractor.

(b) Selection of the testing laboratory by the Engineer shall be understood as in no way relieving the
Contractor's responsibility for the satisfactory performance of the work in full conformance with the requirements of the contract. Excluding written protest by the Contractor, in advance of processing or use of materials, services of the testing laboratory shall be understood as constituting full acceptance by an approval of the Contractor.

(c) Tests of concrete and materials shall be made under the direction of the Engineer who shall have access to all places where materials are stored, proportioned, or mixed.

(d) The Contractor shall submit to the Engineer the mixes he/she intends to use which have been proven by preliminary compression test prior to commencement of work. Proving tests shall consist of at least six 6" x 12" cylinders for each mix specified. Three cylinders shall be tested at 7 days and three at 28 days.

(e) During the progress of the work one set of 3 (4) each 6" x 12" cylinders for compression tests shall be cast for each 50 c.y. or day's pour. Cylinders shall be tested for compression at seven 7 days, 14 days, and at 28 days, and one cylinder will be reserved as "stand-by" or as per engineer’s recommendation.

Samples used for testing must be representative of the batch tested and should be taken from the middle third portion of the batch. Samples shall be mixed with a shovel to insure uniformity throughout the sample and immediately molded into test specimens.

If test cylinders fail to meet specified strength at 28 days by more than 5%, core tests of the structure may be ordered by the Engineer at the Contractor's expense. These tests shall be made by an approved laboratory.

(f) Slump tests: Slump tests shall be made on each sample taken for compression tests and shall comply with Table 8 “Slump Requirements”. Additional slump tests shall be as required by the Engineer.

D-504.18 TEST METHODS:

(a) ASTM Designation C-17 "Standard Method of Sampling Fresh Concrete."

(b) ASTM Designation C-143 "Standard Method of Slump Test for Consistency of Portland Cement Concrete".

(c) ASTM Designation C-31 "Standard Method of Making and Curing Compression and Flexure Test Specimens in the Field".

(d) ASTM Designation C-39 "Standard Method of Test for Compressive Strength of Molded Concrete Cylinders".

(e) ASTM Designation C-42 "Standard Methods of Securing, Preparing, and Testing Specimens from Hardened Concrete for Compressive and Flexural Strengths".
All tests shall conform to the requirements of the latest revisions of the applicable ASTM Designations.

**D-504.19 PLACING, CURING, AND FINISHING:** The placing of concrete including construction of forms and falsework, curing and finishing, shall be in accordance with Division D, Section 406, CONCRETE STRUCTURES.

**D-504.20 MEASUREMENT AND PAYMENT:** No separate measurement or payment will be made under this item, but all such work done shall be deemed a subsidiary obligation of the Contractor, having been taken into account and included in price bid for the complete job.
SECTION 506
CONCRETE CURB AND GUTTER

D 506.01 DESCRIPTION
This item shall consist of curb and gutter composed of Portland Cement concrete, constructed as herein specified on an approved subgrade or base course, in conformity with the lines and grades established by the Engineer and the details and sections shown on the plans.

MATERIALS

D 506.02 CONCRETE
Concrete shall be Class "A" and shall conform to the requirements of Division D, Section 504, titled "CONCRETE" in the specifications.

D 506.03 EXPANSION JOINT MATERIAL
Filler for expansion joints shall be preformed bituminous fiber type and shall conform to the requirements of Division D, Section 416, titled "Expansion Joint Materials".

D 506.04 FORMS
Forms shall be of metal and of a section satisfactory to the Engineer, straight, free from warp and of a depth equal to the depth of the finished work. Forms shall be securely staked to line and grade and maintained in true position during the placing of concrete.

D 506.05 REINFORCING STEEL
Reinforcing steel shall conform to the requirements of Division D, Section 410, titled “Reinforcing Steel”.

CONSTRUCTION METHODS

D 506.06 SUBGRADE OR BASE COURSE
The subgrade and base course shall be excavated and shaped to line, grade and cross-section, compacted as specified. The subgrade and base course shall be moist at the time concrete is placed. The specified subgrade and base materials and specifications for the roadway shall extend 1 foot beyond the back of curb.

D 506.07 PLACING CONCRETE
Placement of concrete shall comply with TxDOT Item 420. Where reinforcing is required, it shall be placed and supported upon suitable chairs or concrete spacer blocks before concrete is poured.

D 506.08 FINISHING AND JOINTING
The surface of the concrete shall be struck off to the required line and grade with an appropriately shaped screed and shall be floated smooth while the concrete is still soft. The surface shall be floated with a wood float until a slight excess of sand appears. The outer edges and joints shall be rounded with approved tools to the radii shown on the plans. When the concrete has taken sufficient set, the inside form shall be carefully removed, and the surface thus exposed shall be pointed up where necessary, then wetted and rubbed with a wooden block to remove all form marks and other irregularities, producing a finish similar in appearance to the finished upper surfaces. Mortar finishing will not be permitted. Where the location of expansion joints is not indicated, joints shall be placed at spacing of not more than forty (40) feet. Expansion joint material shall be of the thickness shown on the plans and shall conform to the required section of the curb. Expansion joint material shall be placed between the curb and any abutting structures, and around all obstructions protruding through the curb.
and gutter as shown on the plans.

Dummy groove contraction joints shall be placed at intervals of approximately ten (10) feet. Joints shall be made so that the joint is perpendicular to the line of the curb.

**D 506.09 CURING**
As per Division D, Section 418, other methods of curing if approved by the Engineer may be used at the Contractor’s option.

**D 506.10 BACKFILLING**
The curb shall be backfilled to the full height of the concrete, tamped, and sloped as directed.

**D 506.11 MEASUREMENT**
The footage of concrete curb and gutter to be paid for shall be the number of linear feet, measured along the back of the curb in place, completed, and accepted. The various types and classes of curb and gutter shall be measured separately.

**D 506.12 PAYMENT**
The footage of concrete curb and gutter, measured as provided in Division D, Section 506, Paragraph D-506.11 will be paid for at the contract unit price per linear foot for concrete curb and gutter of the various types and classes.
SECTION 508
MACHINE LAID CURB AND GUTTER

D 508.01 DESCRIPTION
This item shall consist of curb and gutter composed of Portland Cement concrete, constructed as herein specified on prepared subgrade, compacted as specified or shown, with reinforcing steel and in conformity with the lines and grades established by the Engineer and the details and sections shown on the plans.

D 508.02 MATERIALS
Shall conform to TxDOT Specifications 2004, Item 529 or latest revision, as stated for extruding curb.

D 508.03 CONSTRUCTION METHODS
Shall conform to TxDOT Specifications 2004 or latest revision, Item 529, as stated for extruding curb.

D 508.04 MEASUREMENT
The footage of concrete curb and gutter to be paid for shall be the number of linear feet, measured along the back of the curb in place, completed, and accepted. The various types and classes of curb and gutter shall be measured separately.

D 508.05 PAYMENT
The footage of concrete curb and gutter, the curing, the preparation of subgrade, and the placing of flexible base where shown under the curb to dimensions shown on the plans, measured as provided in Division D, Section 508, Paragraph D-508.04 shall be paid for at the contract unit price per linear foot for concrete curb and gutter.
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SECTION 510
FLEXIBLE BASE COURSE

D 510.01 GENERAL
Flexible Base shall consist of a foundation course for surfacing, pavement, or other base courses; shall be composed of uncontaminated materials of uniform quality that meet the requirements of TxDOT Item 247, and shall be constructed as herein specified in conformity with the sections shown on the plans and to the lines and grades established by the Engineer.

D 510.02 MATERIALS
The materials shall consist of argillaceous limestone, calcareous clay particles with or without stone, conglomerate, gravel, sand, or other granular materials. The materials shall be at least Type “B” Grade II, conforming to Item No. 247 of the Texas Department of Transportation Specifications 2004 or latest edition. The source of the material shall be approved by the Engineer prior to use. The plasticity index of caliche shall have a maximum of 12 and a minimum of 5. The Contractor shall stockpile the material to be used for this particular project. Sampling and testing shall conform to TxDOT or ASTM specifications. Triaxial test will be required only when specified by the engineer. Stones greater than 3” in any direction shall be removed from street during construction.

D 510.03 CONSTRUCTION METHODS
The flexible base materials shall be placed on the approved subgrade in courses not to exceed eight (8) inches compacted depth. It shall be the responsibility of the Contractor that the required amount of materials be delivered and uniformly spread and shaped. All materials shall be moved from the place where it is dumped by cutting in windrow. After the material has been cut into windrows, it shall be sprinkled, spread, shaped, and rolled in proper sequence to prevent segregation and as necessary for required compaction.

The surface upon completion shall be smooth and in conformity with typical sections and to the established lines and grades. Any deviation in excess of 1/4 inch in cross section and in length of 16 feet measured longitudinally shall be corrected. All irregularities, depressions, or weak spots which develop shall be corrected.

Flexible base shall be compacted to an apparent dry density of not less than 98 percent (98%) of the maximum dry density as determined in accordance with TxDOT Specifications Test Method TEX 113-E. Tests for density will be made within 24 hours after compaction operations are completed. If the material fails to meet the density specified, it shall be reworked as necessary to meet the density required. Just prior to the placing of any succeeding course of flexible base or surfacing on a previously completed course, the density and moisture of the top four (4) inches of the flexible base shall be checked and if tests show the density to be more than 2 percent (2%) below the specified minimum or the moisture content to be more than 3 percent (3%) above or below the optimum, the course shall be reworked as necessary to obtain the specified compaction and moisture content.

Should the base course due to any reason or cause lose the required stability, density, or finish before the surface is completed, it shall be recompacted, refinished, and retested at the sole expense of the Contractor.

The limits of placement for F.B.C. will extend 1 foot beyond the back of curb (whenever curb is specified) in order to provide proper support for concrete curb (Detail No.).
D 510.04 MEASUREMENT
Flexible Base: The number of square yards of flexible base course to be paid for shall be measured as
the square yards in place after compaction. Thickness shall be checked by means of depth tests or
cores, but no extra yardage for thickness in excess of that shown on the plans will be paid.

D 510.05 PAYMENT
The yardage of flexible base measured as provided for in Paragraph above will be paid for at the
contract unit price for "Flexible Base". All payment made under this section shall constitute full
compensation for excavation for furnishing, loading, hauling, and placing materials; for mixing,
blending, sprinkling, shaping and compacting; for reconditioning the underlying course and shoulders,
and for furnishing all labor, tools, and equipment as specified herein.
SECTION 514
GEOGRID FOR BASE OR EMBANKMENT REINFORCEMENT

D 514.01 DESCRIPTION
Furnish and place geogrid base reinforcement in accordance with the lines and grades shown on the plans or as directed by the Engineer.

D 514.02 MATERIALS
Provide geogrid in conformance with the items and requirements stated herein.

1) Geogrid Reinforcement: Texas Department of Transportation Materials Specification DMS 6240 “Geogrid for Base / Embankment Reinforcement” of the type as shown on the plans. The sampling, testing, and rejection of criteria of that specification shall govern.
   − Approved products are Tensar TriAX TX5 and TX7.

2) Unapproved Materials: Material substitutions for geogrids not conforming to the physical requirements of TxDOT DMS 6240 must be submitted with an alternative design proposal to Engineer for consideration. Alternate design proposals must be accompanied by the test data from an approved laboratory showing all design and index properties in accordance with the test properties shown in TxDOT DMS 6240. If approved, the Engineer will provide written authorization. Allow a minimum of 14 days for the approval process.

D 514.03 CONSTRUCTION
1) Subgrade soil shall be prepared in accordance with Specifications item 502 “Street Excavation and Embankment” item prior to placement of geogrid reinforcement.

2) Geogrid reinforcement shall be rolled out parallel to the road direction at the proper elevation and alignment as shown on the construction drawings.

3) Geogrid sections shall be overlapped a minimum of one (1) foot in both directions. Placement of geogrid around corners will require cutting of geogrid product and diagonal overlapping. Unless otherwise noted by the Engineer, plastic ties shall be used at overlaps. The transverse spacing of the ties shall be 4 to 5 feet and the longitudinal tie spacing shall be 10 to 20 feet, unless otherwise approved by the Engineer.

4) The geogrid shall be pinned at the beginning of the backfilling section, but shall be left free to stretch or relieve tension throughout the remainder of the work area.

5) Contractor shall take steps to ensure that geogrid sections do not separate at overlaps during construction.

6) Base material shall be placed and compacted in accordance with Specification item 510 “Flexible Base.” This material shall be back dumped from trucks riding on top of the reinforced base material and bladed on to the grid ahead.

7) Tracked construction equipment shall not operate directly upon the geogrid. A minimum base thickness of 6 inches is required prior to operation of trucked vehicles over the geogrid.

8) Rubber tired equipment may pass over the geogrid at slow speeds, less than 5 miles per hour, if the subgrade material is capable of supporting the loads without excessive rutting or causing damage to the grid. Equipment operators shall avoid sudden braking or sharp turning.
9) If ruts are created in the base material due to construction traffic, they shall be filled with additional base material rather than blading adjacent material into the rut.

10) Sections of the geogrid, which are damaged by construction activity, shall be repaired or replaced at the Contractor’s expense. All repaired sections shall contain a minimum three (3) foot overlap in all directions.

D 514.04 MEASUREMENT
Accepted work as prescribed by this item will be measured by the square yard of base reinforcement complete in place in accordance with the plans with not allowance made for width of overlaps required.

D 514.05 PAYMENT
The work performed as prescribed by this item will be paid for at the contract unit price bid per square yard, measured as prescribed above, for “Base Reinforcement” which price shall be full compensation for furnishing all labor, materials, equipment, and other items necessary and incidental to completion of work.
SECTION 516
BITUMINOUS PRIME COAT

GENERAL

D 516.01 DESCRIPTION
This item shall consist of an application of asphaltic material on the completed base course in accordance with these specifications and as directed by the Engineer.

MATERIAL

D 516.02 CUT-BACK ASPHALT
The bituminous material shall conform to the following:

<table>
<thead>
<tr>
<th>GRADE MC-30</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinematic Vis. At 140 F, CST</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>Flash Point T.O.C. F</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

When distilled ASTM Method D-402, the distillate-off volume shall be as follows:

<table>
<thead>
<tr>
<th>Off at 437 F%</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off at 500 F%</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>Off at 600 F%</td>
<td>75</td>
<td>93</td>
</tr>
</tbody>
</table>

Residue from 680 F Distillation Volume %

The residue when poured from the flash without cooling immediately upon reaching the maximum temperature specified shall have the following characteristics:

<table>
<thead>
<tr>
<th>Penetration at 77 F, 100gms, 5 sec</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ductility at 77 F, 5 cm/min., cms.</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>Solubility in CCI 4%</td>
<td>99.5</td>
<td>--</td>
</tr>
</tbody>
</table>

The material shall be free from water.

MC-30 shall be applied uniformly at the rate of 0.25 gallons per square yard. At Contractor's option, appropriate emulsified asphalt, water mixture may be used in lieu of MC-30. Number of applications, mixture rate, and depth of penetration shall be approved by Engineer prior to use of emulsified asphalt. Furnishing and placement of prime coat shall be subsidiary to pavement and flexible base construction.

CONSTRUCTION METHODS

D 516.03 APPLICATION OF ASPHALT
Asphalt shall be applied when the air temperature is 60°F and above, and it may be applied when the air temperature is 50°F and rising; the air temperature to be taken in the shade and away from artificial heat. No asphalt shall be placed when general weather conditions in the opinion of the Engineer are not suitable.
All storage tanks, piping, retorts, booster tanks, and distributors used in storing or handling asphalt shall be kept clean and in good operating condition at all times, and they shall be operated in such a manner that there will be no contamination of the asphalt with foreign material. Asphalt shall not be heated above 400°F at any time, and when applied, shall be at a temperature of not less than 70°F, and not more than 150°F. The Engineer will select the temperature of application, and the Contractor shall apply the asphalt at a temperature within 15°F of the temperature selected. All asphalt heated above 400°F will be rejected.

Before the application of asphalt, the surface of the base shall be cleaned of dirt, dust, or other deleterious matter by sweeping or other approved methods and, if required by the Engineer, lightly sprinkled with water.

Asphalt shall be applied on the clean surface by an approved type of self-propelled pressure distributor so operated as to distribute the asphalt in the quantity specified evenly and smoothly under a pressure necessary for proper distribution. The Contractor shall provide all necessary facilities for determining the temperature of the asphalt in all the heating equipment and in the distributor for determining the rate at which it is applied and for insuring uniformity at the junction of two distributor loads. Asphalt shall be applied for the full width of the surface treatment in one application unless the width exceeds twenty-two (22) feet. No traffic or hauling will be permitted over the freshly applied asphalt for five days.

**MEASUREMENT AND PAYMENT**

**D 516.04 QUANTITY – SQUARE YARDS**
The quantity of bituminous prime coat to be paid shall be measured in square yards of the area primed, applied at a rate of 0.25 gallons per square yard.

**D 516.05 GALLONS**
The number of gallons of bituminous prime coat measured as provided in Section 514, Paragraph D-514.04 will be paid for at the contract unit price per square yard for bituminous prime coat applied.

**D 516.06 GENERAL**
All payment made under these sections shall constitute full compensation for furnishing (freight included) heating, hauling, and distributing all bituminous material; for cleaning the surface to which it is applied; and for furnishing all labor, tools, and equipment.
SECTION 520
HOT MIX ASPHALTIC CONCRETE

D 520.01 DESCRIPTION
This item shall consist of a base course, a leveling up course, a surface course, or any combination of these courses as shown on the plans, each to be composed of a compacted mixture of mineral aggregate and asphaltic material. The mixture, when designed and tested in accordance with these specifications and methods outlined in Tex 204-F shall have the following:

<table>
<thead>
<tr>
<th>In Place Density %</th>
<th>Min</th>
<th>Max</th>
<th>Optimum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>95</td>
<td>99</td>
<td>96</td>
</tr>
</tbody>
</table>

| Stability %         | Not less than 35 nor more than 60 unless otherwise shown on plans |

The pavement shall be constructed on the previously completed and approved subgrade, base, existing pavement, bituminous surface, or, in the case of a bridge, on the prepared floor slab, as herein specified and in accordance with the details shown on the plans.

D 520.02 MATERIALS
Materials used in Hot-Mix Asphaltic Concrete Pavement shall meet the requirements as set forth in TxDOT Item 340 “Dense Graded Hot-Mix Asphalt” Specifications, 2004 or latest edition.

Prior to laying any asphalt, Contractor shall submit a Hot-Mix Asphaltic Concrete mix design (less than one year old) signed and sealed by a professional engineer licensed in Texas for approval. He/She shall also submit written assurance that material stockpiles are sufficient to produce a mix consistent with the design for the duration of the project. If material source change occurs prior to completion, Contractor shall provide a revised mix design at no additional expense to Owner.

The Contractor shall provide for quality control at the plant to ensure that paving material delivered to the site conforms to requirements of these specifications and the mix design unless otherwise specified by Engineer.

D 520.03 CONSTRUCTION METHODS
Construction methods used in Hot- Mix Asphaltic Concrete Pavement shall meet the requirements as set forth in TxDOT Item 340 “Dense Graded Hot-Mix Asphalt” Specifications, 2004 or latest revision, with the following addition:

1) Place the mixture when the roadway surface temperature is 60°F or higher unless otherwise approved. Place mixture only when weather conditions and moisture conditions of the roadway surface are suitable in the opinion of the engineer.
2) Delivery temperature not to exceed 350°F
3) Minimum placement temperature shall not be less than 260°F and depending on the Hot Mix Binder grade.
4) Ensure pavement is fully compacted before allowing rollers to stand on the pavement.
5) Use only water or an approved release agent on rollers, tamps, and other compaction equipment. Keep diesel, gasoline, oil, grease, and other foreign matter off of the mixture.
6) Allow the compacted pavement to cool to 160°F or lower before opening to traffic.
D 520.04 EQUIPMENT
Mixing plants that will not continuously produce a mixture meeting all of requirements of TxDOT Item 340.4 Specifications, 2004, shall not be allowed.

D 520.05 TESTING
The assigned Laboratory shall test a job site sample to compare with the approved Hot-Mix design and also test for in-place air void determination as per TxDot Item 340. Reports of Core test, made by the assigned laboratory, to assure the required compacted lift thickness shall be provided prior to acceptance.

D 520.06 MEASUREMENT
The asphaltic mixture shall be measured by square yards of various types and thickness as actually used in the completed and accepted work in accordance with the plans and specifications for the project. No separate measurement will be made for fluxing oil.

D 520.07 PAYMENT
The number of square yards of asphaltic mixture placed will be paid for at the contract unit price per square yard of various types and thickness. The unit price will be full compensation for surface preparation, hot mix material, placement, equipment, labor, tools and incidentals.
SECTION 522
CUTTING AND REPLACING PAVEMENT

D 522.01 DESCRIPTION
This item shall govern for the cutting of pavements, the removal and bases and the replacement of bases and pavements, as herein specified and in conformity with the typical sections shown on the plans and to the lines established by the Engineer.

D 522.02 MATERIALS
1) **Prime Coat**: All prime coat shall conform to the provisions of Division D, Section 516, "Bituminous Prime Coat".

2) **Tack Coat**: All tack coat shall conform to the provisions of Division D, Section 518, "Bituminous Tack Coat".

3) **Flexible Base Course**: All flexible base shall conform to the provisions of Division D, Section 510, "Flexible Base Course".

4) **Hot-Mix Asphaltic Concrete Pavement**: All hot-mix asphaltic concrete pavement shall conform to the provision of Division D, Section 520, "Hot Mix Asphaltic Concrete Pavement - Type D".

5) **Excavation and Backfilling**: All excavation and backfilling shall conform to the provision of Division D, Section 102, "Excavation and Backfill for Utilities" Backfill under existing pavement.

D 522.03 CONSTRUCTION METHODS
1) **Cutting of Pavements**
   A. **Concrete and asphaltic concrete pavements**: All concrete and asphaltic concrete pavements shall be cut with a concrete saw. The depth of the cut shall be such that upon removal of concrete and/or asphaltic concrete the sides of the cut shall be straight and square. Care shall be taken when cutting concrete pavement, not to cut transverse reinforcing steel.

   B. **Base Material**: Base material shall be removed by normal trenching operations.

2) **Replacement of Bases**:
   A. **Base Material**: Base replacement shall be of the type shown on the plans and in the bid proposals.

3) **Replacement of Pavements**:
Pavements shall be replaced with hot-mix asphaltic concrete pavement or reinforced concrete pavement. Replacement will be of the type shown on the plans and in the bid proposals.

   A. **Hot-mix asphalt pavement**: Shall be furnished and placed in accordance with Division D, Section 520, "Hot-Mix Asphaltic Concrete Pavement. Flexible base shall be primed in accordance with the provisions of Division D, Section 516, "Bituminous Prime Coat", prior to the placement of hot-mix asphaltic concrete.

   B. All concrete bases shall be tack coated with RC-250 in accordance with the provisions of Division D, Section 518, "Bituminous Tack Coat", prior to the placement of hot-mix asphaltic concrete.
C. Replacement of pavement shall be with straight lines parallel and perpendicular to the flow of traffic. Do not replace pavement areas with angled sides or irregular shapes. All replacements shall be full lane width see details 534-1 to 534-5 for special conditions.

D 522.04 MEASUREMENT
This item will be measured by the square yard of finished pavement surface area repaired. No measurement will be made for areas outside the limits shown in the plans or other damaged because of Contractor negligence without written authorization by the engineer.

D 522.05 PAYMENT
The work performed and the materials furnished in accordance with this specification shall be paid for the unit price bid per square yard of the various pavement types and depths when specified. The price shall be considered full compensation for saw cutting, removal, stockpiling, and/or disposal of existing pavement, base, and waste material and for all equipment, materials, labor, tools, and incidentals to reconstruct the pavement base, prime, tack and surface course shown in the plans. Curb replacement, where incidentally repaired will not be paid for directly but will be considered subsidiary to this item.
SECTION 538
PEDESTRIAN RAILING

D 538.01 DESCRIPTION
This Item shall govern for the construction of steel pipe pedestrian railing, on bridges, culverts, walls, or incidental structures as shown on the plans.

D 538.02 GENERAL
In general, railing shall include that portion of the structure erected on and above the roadway or along the edges of walks, walls, curbs and/or slabs for the protection of pedestrians and shall include any tie-in anchorage to approach railing or guard fence. Railing, including the necessary anchorage, shall be in accordance with these specifications and the details shown on drawings 543-1 to 543-6 as well as with ADA.

D 538.03 MATERIALS
All materials shall conform to the requirements of the TxDot items “Concrete Structures”, “Reinforcing Steel”, “Metal for Structures”, “Steel Structures” and “Concrete”.

D 538.04 QUALITY ASSURANCE
Bridge railings shall meet the requirements of the Texas Department of Transportation’s, “Standard Specifications for Construction of Highways Streets and Bridges” 2004 edition and as hereinafter amended.

D 538.05 SUBMITTALS
Contractor shall submit fabrication drawings for metal railing, showing construction and materials.

D 538.06 FABRICATION
Fabrication and erection of railing shall conform to the pertinent provisions of the Item “Steel Structures” and to the requirements of these specifications.

Splicing of members will be permitted only as provided by the plans. All splice locations and details shall be shown on the shop or erection drawings. For metal railings, shop or erection drawings shall be prepared and forwarded for approval in accordance with the requirements of the Item “Steel Structures”.

Shop welding shall be in accordance with the Item “Steel Structures” while field welding, when required, shall be in accordance with the Item “Structural Welding”.

Pipe rail and posts, shop fabricated into panels shall be mounted in a jig clamped in their true relative position, accurately spaced with respect to each other and while assembled shall be completely welded or bolted, as the case may be. When required by the plans, as each rail section is completely assembled and connection, the adjacent section shall be set in its proper relative position with the ends engaged and remain in this position until completely connected. Each pair of sections shall be matchmarked so they may be erected in the same order in which they were fabricated.

The fabricated elements for deep beam railing shall conform to the dimensions and cross-section shown on the plans. The rail shall be straight and free from warp. The maximum deviation for straightness of either edge of a full length section shall be one-half of an inch. Rail elements shall be jointed and connected to the rail posts as shown on the plans. Lapped elements shall have the lap in the direction of traffic in the adjacent lane.
D 538.07 PROTECTIVE COATING
Unless otherwise noted on the plans, all portions of steel railing shall be galvanized.

Galvanized railing shall be hot dipped galvanized after fabrication, in accordance with ASTM Designation A123 and A153.

After erection, any damaged galvanizing on steel posts and rail elements shall be thoroughly cleaned and painted with two coats of zinc dust-zinc oxide paint conforming to the requirements of Federal Specification TTP-641b or repaired by the application of repair compounds meeting Federal Specification O-G-93.

When fabrication is done after galvanizing and when specifically required by the plans, the cut edges and bolt holes shall be cleaned by brushing and the cleaned area shall be treated as specified above.

D 538.08 MEASUREMENT
Measurement Railing, of the type designated, shall be measured by the linear foot, in accordance with the dimensions and details shown on the plans. Measurement will be made upon the face of the rail in place.

D 538.09 PAYMENT
Payment will be made at the contract unit price bid per linear foot for railing of the type indicated on the plans, complete in place, measured as provided herein, which price shall be full compensation for furnishing, preparing and placing of all concrete, expansion joint material, reinforcing steel, structural steel, pipe, anchor bolts, anchorage devices and all other materials required in the finished railing and for all labor, tools, hardware, equipment, galvanizing and all other incidentals necessary to complete the work in the manner and in accordance with the plans and these specifications.
SECTION 602
SILT FENCE

D 602.01 DESCRIPTION
This item shall govern for the material of silt fence fabric and related fencing materials used for control of sediment in surface runoff waters.

D 602.02 MATERIAL REQUIREMENTS
A. Fabric: Fabric may be manufactured from polyester, polypropylene, or polyamide and shall be resistant to ultraviolet degradation, mildew and rot and shall be suitable for use in a wet soil and stagnant water environment. The edges of woven fabric shall be sealed or salvaged to prevent raveling. Fabric shall be at least 36 inches wide with 6 to 8 inches of the width buried in a trench to prevent undercutting, unless specified otherwise on the plans. The fabric shall exhibit the following physical properties when sampled and tested using the specified methods.

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Test Method</th>
<th>Silt Fence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Tensile Strength, lb</td>
<td>ASTM D 4632</td>
<td>90 Min</td>
</tr>
<tr>
<td>2) Elongation @ Yield, %</td>
<td>ASTM D 4632</td>
<td>100 Min</td>
</tr>
<tr>
<td>3) Trapezoidal Tear, lb</td>
<td>ASTM D 4533</td>
<td>35 Min</td>
</tr>
<tr>
<td>4) Apparent Opening Size</td>
<td>ASTM D 4751</td>
<td>50-80 Min</td>
</tr>
<tr>
<td>5) Permittivity, sec-1</td>
<td>ASTM D 4491</td>
<td>1 Min</td>
</tr>
<tr>
<td>6) Ultraviolet Stability original tensile strength retained after 500 hours exposure, %</td>
<td>ASTM D 4355</td>
<td>80 Min</td>
</tr>
</tbody>
</table>

B. Silt Fence: This system consists of fence posts, spaced no more than 8.5 feet apart, and fabric with and attached reinforcing net. Fence posts shall be a minimum of 42 inches long, embedded at least 1 foot, and constructed of either wood or steel. Soft wood posts shall be at least 3 inches in diameter or nominal 2 in. x 4 in. and essentially straight. Hardwood posts shall be a minimum of 1.5 in. x 1.5 in. Net reinforcement shall be a galvanized welded wire mesh of at least 12.5 gauge wire with maximum opening size of 4 in². The fabric shall be attached to the top of the net by crimping or cord at least every 2 feet, or as otherwise specified.

D 602.03 CERTIFICATION AND IDENTIFICATION
Each lot or shipment shall be accompanied by a certification of conformance to this specification. The shipment must be identified by a ticket or labels securely affixed to the fabric rolls. This ticket or label must list the following information:

a. Name of manufacturer or supplier
b. Brand name and style
c. Manufacturer's lot number or control number
d. Roll width in inches
e. Roll length in yards

D 602.04 MEASUREMENT AND PAYMENT
A. Unless indicated in the PROPOSAL FORMS as a pay item, no separate payment for work performed under this Item. Include cost of work performed under this Item in Contract prices bid for items of which this work is a component. When indicated in PROPOSAL FORMS as pay item measure and pay for the filter fabric fence by the linear feet of completed and accepted filter fabric fence between the limits of the beginning and ending of wooden stakes. Filter fabric
fence, measured as stated will be paid for at the unit price bid for "FILTER FABRIC FENCE, COMPLETE IN PLACE".

B. Payment for filter fabric fence will include and be full compensation for all labor, equipment, materials, supervision, and all incidental expenses for construction of these items, complete in place, including, but not limited to, protection of trees, maintenance requirements, repair and replacement of damaged sections, removal of sediment deposits, and removal of erosion and sedimentation control systems at the end of construction.
SECTION 604
EROSION CONTROL BLANKET

D 604.01 APPLICATION
To protect the side slope of a natural channel and to reduce erosion. The following specification should be met for the erosion control blankets.

The mats should be made of 100% biodegradable agricultural straw/woods netting on top and bottom sides with a minimum thickness of 0.25 inch. Material should not contain any chemical additives. The blanket should be durable and flexible to work with the following information:

- Flow velocity: greater than 5 fps
- Permissible shear strength: greater than 1.5 lbs. sq. ft.
- Weight: greater than 0.5 lbs. sq. yd.
- Tensile strength/elongation: greater than 30%
- Should be capable to control side slope of 3:1 to 2:1
- Netting shall be light photodegradable polypropylene (greater than 1.5 lbs./1000 sq. ft.)

Approved Material Suppliers (to date):

<table>
<thead>
<tr>
<th>Company Name</th>
<th>City, State</th>
<th>Model #</th>
<th>Phone #</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American Green</td>
<td>Evansville, Indiana</td>
<td>S150</td>
<td>812-867-6632</td>
</tr>
<tr>
<td>BonTerra America</td>
<td>Genesse, Idaho</td>
<td>S1</td>
<td>800-882-9489</td>
</tr>
<tr>
<td>American Excelsior Co.</td>
<td>Dallas, Texas</td>
<td>Curlex I</td>
<td>817-640-2161, 800-777-2691</td>
</tr>
</tbody>
</table>

CONSTRUCTION SPECIFICATIONS

D 604.02 SITE PREPARATION
A. Proper site preparation is essential to ensure complete contact of the protection matting with the soil.

B. Grade and shape area of installation.

C. Remove all rocks, clods, vegetative or other obstructions so that the installed blankets, or mats will have direct contact with the soil.
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SECTION 606
NPDES REQUIREMENTS

D 606.01 GENERAL
This section describes the required documentation to be prepared and signed by the Contractor before conducting construction operations, in accordance with the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) Permit, as stated in the Federal Register Vol. 57 No. 175, issued by the Environmental Protection Agency on September 2, 1992.

The Contractor shall be responsible for implementation, maintenance, and inspection of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other practices shown on the drawings or specified elsewhere in this or other specifications.

The Contractor shall review implementation of the Storm Water Pollution Prevention Plan (SWPPP) in a meeting with the City Engineer prior to start construction.

D 606.02 UNIT PRICES
Unless indicated in the Unit Price schedule as a pay item, no separate payment will be made for work performed under this section. Include cost of work performed under this section in pay items of which this work is a component.

D 606.03 REFERENCES

ASTM D4632- Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

EXECUTION

D 606.04 NOTICE OF INTENT
The Contractor shall fill out, sign, and date the Contractor’s Notice of Intent (NOI). The signed copy of the Contractor’s NOI shall be returned to the City. The City will complete the Owner’s Notice of Intent and will submit both notices to the EPA. Submission of the NOI is required by both the City and the Contractor before construction operations start.

D 606.05 CERTIFICATION REQUIREMENTS
Submit name, address, and telephone number of persons or firms responsible for maintenance and inspection of erosion and sediment control measures and all Subcontractors.

D 606.06 RETENTION OF RECORDS
(a) The Contractor shall keep a copy of the Storm Water Pollution Prevention plan at the construction site or at the Contractor’s office from the date it became effective to the date of project completion.

(b) At the project closeout, the Contractor shall submit to the City all NPDES forms and certifications, as well as a copy of the SWPPP. Storm water pollution prevention records and data will be retained by City for a period of three (3) years from the date of project completion.
D 606.07 REQUIRED NOTICES
The following notices shall be posted from the date that this SWPPP goes into effect until the date of final site stabilization:

1) Copies of the Notices of Intent submitted by the City and Contractor and a brief project description shall be posted at the construction site or at Contractor’s office in a prominent place for the public viewing.

2) Notice to drivers of equipment and vehicles, instruction them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post such notices at every stabilized construction exit area.

3) In an easily visible location on site, post a notice of waste disposal procedures.

4) Notice of hazardous material handling and emergency procedures shall be posted with the NOI on site. Keep copies of Material Safety Data Sheets at a location on site that is known to all personnel.

5) Keep a copy of each signed certification at the construction site or at Contractor’s office.
D 608.01 GENERAL

A. Summary
This Section includes the preparation, application and protection of operations consisting of hydro-mulch seeding within the lines and limits as shown on PLANS and as further directed by the ENGINEER.

B. References
The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

TEXAS DEPARTMENT OF AGRICULTURE (TDA)
TDA Chapter 61 1994 Texas Seed Law-Rules and Regulations (March Issue)

TEXAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS AND BRIDGES (TxDOT)
TxDOT Item 164 2004 Seeding for Erosion Control
TxDOT Item 166 2004 Fertilizer
TxDOT Item 168 2004 Vegetative Watering

C. Quality Assurance
A sample of each variety of seed to be furnished for analysis and testing when directed by the ENGINEER.

D. Delivery, Storage, and Handling
Each variety of seed to be furnished and delivered in separate bags or containers and protected from moisture until placed.

D 608.02 PRODUCTS

A. Manufacturers
The following cellulose fiber mulch manufacturers are approved for providing hydraulic mulches with the exact trade name of mulches accepted. No variation will be accepted unless approved by the ENGINEER.

<table>
<thead>
<tr>
<th>Trade Name of Approved Product</th>
<th>Name of Manufacturer</th>
<th>Manufacturer Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Fiber Mulch</td>
<td>American Fiber Manufacturing, Inc.</td>
<td>1701 Bench Mark Dr. Austin, TX 78728</td>
</tr>
<tr>
<td>Conwed Fibers Hydro Mulch</td>
<td>Conwed Fibers</td>
<td>1st Plaza, Suite 350, 1985 Tate Blvd., SE, Hickory, NC 28601</td>
</tr>
<tr>
<td>Second Nature Regenerated Wood Fiber</td>
<td>Central Fiber Corporation</td>
<td>4814 Fiber Lane Rd. Wellsville, KS 66092</td>
</tr>
<tr>
<td>Pro Mat</td>
<td>Tascon, Inc.</td>
<td>7607 Fairview Houston, TX 77041</td>
</tr>
</tbody>
</table>
B. Materials and/or Equipment

1) Seed
All seed must meet the requirements of the Texas Seed Law FDA Chapter 61 including the labeling requirements for showing pure live seed (PLS = purity x germination), name and type of seed. Seed furnished to be of the previous season’s crop and the date of analysis shown on each bag to be within nine months of the time of use on the project. Buffalograss to be treated with a dormancy method approved by the ENGINEER. The species and varieties of seed to be from among the types specified in Tables 1A and 1B of Item 164 of the Texas Department of Transportation Specifications.

2) Planting Season and Seed Mixes to conform to the requirements of Item 164 of the Texas Department of Transportation Specifications and/or as modified hereinafter.

3) Cellulose Fiber Mulch to be of the type and manufacturer as provided in paragraph 2.01.

   The mulch to be designed for use in conventional mechanical planting, hydraulic planting of seed or hydraulic mulching of grass seed, either alone or with fertilizers and other additives. The mulch to be such that, when applied, the material is to form a strong, moisture-retaining mat without the need of an asphalt binder. It shall be kept in a dry condition until applied and shall not be molded or rotted.

4) Fertilizer to be in accordance with TxDOT Specification Item 166.

5) Water to be in accordance with TxDOT Specification Section 168.

D 608.03 EXECUTION

A. Erection/Installation/Application and/or Construction

1) Construction Methods
After the designated areas have been completed to the lines, grades and cross sections shown on the PLANS, seeding to be performed in accordance with the requirements hereinafter described. Unless otherwise approved by the ENGINEER, all areas to be seeded to be cultivated to a depth of at least four (4) inches, except where seeding is to be done using a seed drill suitable for seeding into untilled soil. The seedbeds to be cultivated sufficiently to reduce the soil to a state of good tilth when the soil particles on the surface are small enough and lie closely enough together to prevent the seed from being covered too deeply for optimum germination. Cultivation of the seedbed will not be required in loose sand where depth of sand is four (4) inches or more.

2) Planting Season and Seed Mixes
Planting season and the required seed mixes to be in accordance with the required table for location of operation as specified in TxDOT Specification Item 164 as modified hereinafter.

<table>
<thead>
<tr>
<th>Seed Type</th>
<th>Application Rate per lbs/acre</th>
<th>Planting Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hullled Common Bermuda Grass 98/88</td>
<td>40</td>
<td>Jan 1 to Mar 31</td>
</tr>
<tr>
<td>Unhulled Common Bermuda Grass 98/88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hullled Common Bermuda Grass 98/88</td>
<td>40</td>
<td>Apr 1 to Sep 30</td>
</tr>
<tr>
<td>Hullled Common Bermuda Grass 98/88</td>
<td>40</td>
<td>Oct 1 to Dec 31</td>
</tr>
<tr>
<td>Unhulled Common Bermuda Grass 98/88</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Annual Rye Grass (Gulf)</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

3) Water Application to be in accordance with TxDOT Item 168.
D 608.04 PROTECTION
   A. Maintenance
      The hydro-mulch seeding to be adequately watered until established. Any areas damaged by
      erosion or areas that do not have an acceptable turfing to be reseeded.

   B. Final Acceptance
      Final acceptance and payment will be dependent upon hydromulch seeded areas
      demonstrating a healthy well established growth.

D 608.05 MEASUREMENT AND PAYMENT
Measurement to be by lump sum or acre, as indicated in the Contract Bid Documents. Payment for
work under this Section will be made at contract price for “Hydro-Mulch Seeding,” which price to be full
compensation for all fertilizer, seed, equipment, materials, and labor necessary for fertilizing and
seeding.
SECTION 712
TRAFFIC CONTROL AND REGULATION

D 712.01 GENERAL DESCRIPTION
Section includes requirements for signs, signals, control devices, flares, lights, and traffic signals, as well as construction parking control, designated haul routes and bridging of trenches and excavation. Temporary Traffic Control plans shall be in strict accordance with the latest revision of TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

D 712.02 INSPECTIONS
(a) Yard Inspection: Before the Traffic control Plan (TCP) is implemented and devices or hardware are installed in the field the devices must be inspected to insure that they are accepted devices in acceptable condition. There must also be sufficient devices to meet the needs of the approved traffic control plan.

(b) Drive-Through Inspection: To decrease hazards to motorists and workers, traffic control shall be inspected and evaluated immediately after the traffic control plan is implemented. This kind of inspection shall be done in all lanes, in both directions or crossroads, during the day and the night, and from all entry or exist points within the zone. Any other routes such as detours that have work zone traffic on them shall be inspected also. Unacceptable devices or situations that are found on the jobsite shall be replaced or the situation corrected. Imminent danger situation require immediate correction.

D 712.03 MATERIALS
All materials shall comply with the latest version of the Texas State Manual on Uniform Traffic Control Devices

D 712.04 PUBLIC ROADS
(a) Abide by laws and regulations of governing authorities when using public roads. If the Contractor’s work requires that public roads be temporarily impeded or closed, approvals shall be obtained from governing authorities and permits paid for before starting any work.

(b) Contractor shall maintain at all times a 10-foot-wide all-weather lane adjacent to work areas which shall be kept free of construction equipment and debris and shall be for the use of emergency vehicles, or as otherwise provided in traffic control plan.

(c) Contractor shall not obstruct the normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by the City Engineer.

(d) Contractor shall maintain local driveway access to residential and commercial properties adjacent to work areas at all times.

(e) Surrounding streets used for entering or leaving the job area must be keep free of excavated material, debris, and any foreign material resulting from construction operations.

D 712.05 CONSTRUCTION PARKING CONTROL
(a) Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles and City’s Operations.
(b) Monitor parking of construction personnel’s vehicles in existing facilities. Maintain vehicular access to and through parking areas.

(c) Prevent parking on or adjacent to access roads or in non-designated areas.

D 712.06 FLARES AND LIGHTS
Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

D 712.07 HAUL ROUTES
(a) Utilize haul routes designed by authorities or shown on the drawings for construction traffic.

(b) Confine construction traffic to designated haul routes.

(c) Provide traffic control at critical areas of haul routes to regulate traffic minimize interference with public traffic.

D 712.08 TRAFFIC SIGNS AND SIGNALS
(a) Install traffic control devices at approaches to the site and on site, at cross roads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

(b) Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.
   a. Relocate traffic signs and signals as work progresses to maintain effective traffic control.

D 712.09 BRIDGING TRENCHES AND EXCAVATIONS
(a) Whenever necessary, bridge trenches and excavation to permit an unobstructed flow of traffic.

(b) Secure bridging against displacement by using adjustable cleats, angles, bolts or other devices whenever bridge is installed:
   a. On a existing bus route;
   b. When more than five percent of daily traffic is comprised of commercial or truck traffic;
   c. When more than two separate plates are used for the bridge; or
   d. When bridge is to be used for more than five consecutive days.

(c) Install bridging to operate with minimum noise.

(d) Adequately shore the trench or excavation to support bridge and traffic.

(e) Extend steel plates used for bridging a minimum one foot beyond edges of trench or excavation. Use temporary paving materials (premix) to featheredges of plates to minimize wheel impact on secured bridging.

(f) Use steel plates (refer to SECTION 808) of sufficient thickness to support H-20 loading, truck or lane that produces maximum stress.

D 712.10 REMOVAL
(a) Remove equipment and devices when no longer required.

(b) Repair damage caused by installation
(c) Remove post settings to a depth of 2 feet.

D 712.11 MEASUREMENT
Measurement is a lump sum basis for traffic control and regulation, including submittal of a traffic control plan if different from the plan shown on the Drawings, provision of traffic control devices and provision of equipment and personnel as necessary to protect the work and the public.

D 712.12 PAYMENT
The amount invoiced shall be paid by percent completed or as approved by the Engineer based on the schedule of values submitted for traffic control and regulation. Refer to Division C, General Provisions, Section 9 - Measurement and Payment for unit prices procedures.
SECTION 802
SHEETING AND BRACING

D 802.01 DESCRIPTION
Unstable soil encountered in trench or foundation excavation which tends to cave in or otherwise, shall be properly sheeted and braced as per OSHA requirements. Sufficient bracing material shall be left in place to guarantee safety to workmen and material where removal of such sheeting and bracing after it has served its purpose would be dangerous to workmen during backfilling or harmful to materials in place.

D 802.02 MATERIALS
The sheeting material to be placed in contact with the dirt shall be either rough lumber with a minimum thickness of 2" appropriately designed steel sheet piling. Braces shall consist of lumber with a minimum thickness of 4" or metal screw jacks or other mechanical devices approved by the Engineer. All lumber shall be No. 3 common or better.

D 802.03 WHEN TO INSTALL SHEETING AND BRACING
Whenever, in the opinion of the Engineer or the Contractor, the soil at the edge of any excavation is sufficiently unstable as to endanger the safety of life, limb, or property, sheeting and bracing material shall be installed. Such material shall also be installed in all trenches whose sides are steeper than the natural angle of repose of the soil material if it were in loose uncompacted condition and the trenches are in excess of 8 feet deep, but only such portions of the total height of the trench shall be sheeted as appears necessary. Should a layer or pocket of material be encountered anywhere in the trench or other excavation which is of such type as to make possible the failure of adjacent soils, such layer or pocket shall be sheeted and braced in such a manner as to insure its permanency. Whenever a doubt exists as to the necessity of the installation of sheeting and bracing, it shall be installed.

D 802.04 CONSTRUCTION METHODS
Upon discovery of unstable material in any excavation, such sheeting and bracing as may be deemed adequate by the Engineer shall be installed. Stay bracing, piling boards, and box or vertical sheeting methods shall be used depending on the nature of the unstable material encountered. Metal sheeting and steel sheet piling may be used at the option of the Engineer.

D 802.05 MEASUREMENT
This item will be measured by the foot along the long axis of the trench.

D 802.06 PAYMENT
Contractor shall investigate the conditions as they exist in the field and include in the unit price bid per linear foot. This price is full compensation for the excavation and backfill required for excavation protection; furnishing, placing and removing shoring, sheeting, or bracing; dewatering or diversion of water; jacking and jack removal; and equipment, labor, materials, tools and incidentals.
SECTION 804
WORK PERFORMED AND NON-WORKING DAYS

D 804.01 WORKING DAY
A working day is Monday thru Friday, 8:00 a.m. to 5:00 p.m. excluding holidays.

D 804.02 WORK PERFORMED ON A NON-WORKING DAY
Any work which is to be performed on a non-working day must be inspected. The Engineer will decide which work will be requiring the presence of an inspector.

D 804.03 COST OF INSPECTION
The cost for having an inspector present shall be incurred by the Contractor performing the work. Such arrangements will be made in writing and submitted to the Engineer for his approval. Any testing requested by the contractor out of service hours or any overtime charged by the testing laboratory for delaying, shall be paid by the contractor.

D 804.04 STOP WORK
Any work stoppage by the contractor must be reported in writing to the Engineer and owner 24 hours prior to work stoppage.
SECTION 812
DEFINITIONS

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

**Addenda** - Written or graphic instruments issued by ENGINEER prior to the receipt of bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.

**Agreement** - The written contract between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

**Application for Payment** - A request from CONTRACTOR for a progress or final payment on the form accepted by ENGINEER and which is accompanied by such supporting documentation as is required by the Contract Documents.

**Asbestos** - Any material that contains more than one percent (1%) asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

**Bid** - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the required information, including prices for the Work to be performed.

**Bidder** - An individual, partnership, limited liability company, corporation, or joint venture submitting a bid for a proposed Contract.

**Bidding Documents** - The advertisement or Invitation to Bid, Instructions to Bidders, the Bid form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

**Bidding Requirements** - The information requested by and conditions for bidding set forth in the advertisement or Invitation to Bid, Instructions to Bidders, and the Bid form.

**Bonds** - Performance and Payment bonds and other instruments of security.

**Change Order** - A document prepared by ENGINEER, which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work, or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

**Contract Documents** - The Agreement, Addenda (which pertain to the Contract Documents), Contractor’s Bid (including documentation accompanying the BID and any post-bid 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 Notice to Proceed, the Bonds, these GENERAL CONDITIONS, the Supplementary Conditions, the Specifications, and the PLANS, as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEERS’s written interpretations and clarifications, issued pursuant to Paragraph 3.3, on or after the Effective Date of the Agreement. Shop Drawing submittals approved pursuant to Paragraphs 6.17.4 and 6.17.5 and the reports and drawings referred to in Paragraphs 4.2.1 and 4.2.2 are not Contract Documents.
**Contract Price**- The amount agreed to by OWNER and CONTRACTOR for completion of the Work, in accordance with the Contract Documents, as stated in Article 4 of the Agreement (subject to the provisions of Paragraph 11.3.1 in the case of Unit Price Work), and as adjusted by any Change Orders.

**Contract Times**- The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with Paragraph 14.9.1.

**Contractor**- The person, firm, or corporation with whom OWNER has entered into the Agreement.

**Defective**- An adjective which, when modifying the word Work, refers to Work that is unsatisfactory, faulty, or deficient, in that it does not conform to, or has not been performed in accordance with, the Contract Documents, or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with Paragraph 14.5.1 or 14.6).

**Effective Date of the Agreement**- The date indicated in the Agreement on which it becomes effective; but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

**Engineer**- The licensed person, firm, or corporation authorized by the City or the owner to act on their behalf.

**Engineer's Subconsultant**- A licensed person, firm, or corporation having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

**Field Order**- A written order issued by ENGINEER which orders minor changes in the Work in accordance with Paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Times.

**General Requirements**- Sections of Division A, B, and C of the Specifications.

**Hazardous Waste**- The term Hazardous Waste shall mean (i) any hazardous materials, hazardous wastes, hazardous substances, and toxic substances as those or similar terms are defined under any Environmental Laws; (ii) any Asbestos or any material which contains any hydrated mineral silicate, including chrysotile, amosite, crocidolite, tremolite, anthophylite, and/or actinolite, whether friable or non-friable;(iii) any PCBs or PCB-containing materials, or fluids; (iv) radon; (v) any other hazardous, radioactive, toxic, or noxious substance, material, pollutant, or solid, liquid, or gaseous waste; (vi) any pollutant or contaminant (including petroleum, petroleum hydrocarbon, petroleum products, crude oil, and any fractions thereof; any oil or gas exploration or production waste, and natural gas, synthetic gas, and any mixtures thereof) that in its condition, concentration, or area of release could have a significant effect on human health, the environment, or natural resources; (vii) any substance that, whether by its nature or its use, is subject to regulation under any Environmental Law or, with respect to which any Environmental Law or Governmental Authority, requires environmental investigation, monitoring, or remediation; (viii) any Radioactive Material; and (ix) any underground storage tanks, as defined in 42 U.S.C. Section 699(1)(A)(l) (including those defined by Section 9001[1] of the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation Act, 42 U.S.C. Section 6901 et seq.; the Texas Water Code Annotated Section 26.344; and Title 30 of the Texas Administrative Code Sections 334.3 and 334.4), whether empty, filled, or partially filled with any substance.
**Laws and Regulations; Laws or Regulations**- Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction over the Work, the Project, and/or the CONTRACTOR’s performance of the Work.

**Liens**- Liens, charges, security interests, or encumbrances upon real property or personal property.

**Milestone**- A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

**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 (with a copy to ENGINEER) fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR’s obligation under the Contract Documents.

**Or Equal Clause**- Whenever a material or article required is specified or shown on the plans by using the name of the proprietary product, or of a particular manufacturer or vendor, any material or article which will perform adequately the duties imposed by the general design will be considered equal and satisfactory, provided the material or article so proposed is of equal substance and function, and only after written approval by the City Engineer.

**Owner**- The public body or authority, corporation, association, firm, or person which is a party to the Agreement and for whom the Work is to be provided.

**Partial Utilization**- Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work in accordance with Paragraph 14.6.

**PCBs**- Polychlorinated biphenyls.

**Petroleum**- Petroleum, including crude oil or any fraction thereof, which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Wastes and crude oils.

**Plans**- The PLANS which show the scope, extent, and character of the Work to be furnished and performed by CONTRACTOR and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents. Shop drawings are not Drawings as so defined.

**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.

**Radioactive Material**- Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

**Resident Project Representative**- The authorized representative of the OWNER who may be assigned to the site or any part thereof.

**Right of Way**- A general term denoting land or property devoted to transportation purposes.
Samples- Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

Shop Drawings- All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

Specifications- Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor- An individual, firm, or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site. Excluding a material supplier, truck owner-operator, wholly owned subsidiary, specialty-type businesses such as security companies and rental companies.

Subsidiary- Materials, labor, or other elements that because of their nature or quantity have not been identified as a separate item and are included within the items on which they necessarily depend.

Substantial Completion- The Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER as evidenced by ENGINEER’s definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended or, if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by ENGINEER’s written recommendation of final payment in accordance with Paragraph 14.9. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to 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 vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated into the Work by CONTRACTOR or any Subcontractor.

Traffic Lane- The strip of roadway intended to accommodate the forward movement of a single line of vehicles.

Underground Facilities- All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities which have been installed underground.

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

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

Work Change Directive- A written directive to CONTRACTOR, issued on or after the Effective date of the Agreement and signed by OWNER and prepared by ENGINEER, 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 6.15. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change directed or documented by a Work Change Directive 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 Times as provided in Paragraph 10.1.2.

**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 nonengineering or nontechnical, rather than strictly construction-related aspects of the Contract Documents.