

**SPECIFICATIONS  
AND  
CONTRACT DOCUMENTS**  
For Construction Of

**SEQ WATER & SEWER EXTENSION  
PHASE 1A-Water  
PHASE 1A-Sewer  
PHASE 1B-Lift Station & Force Main**

To Serve The

**SE QUADRANT**  
In  
PECOS, TEXAS



DEVELOPMENT  
SERVICES LLC

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Firm No. 19453

Town of Pecos City, Texas  
July 2020

**SPECIFICATIONS AND CONTRACT DOCUMENTS  
 SEQ WATER & SEWER EXTENSION  
 PHASE 1A-Water, PHASE 1A-Sewer &  
 PHASE 1B-Lift Station & Force Main  
 To Serve The  
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Available Soils Borings

## INVITATION TO BIDDERS

Sealed Bids, in duplicate, addressed to the “Town of Pecos City, Attention Mr. Seth Sorensen, City Manager,” will be received at the office of the Pecos Economic Development Corporation, 119 South Cedar, Pecos, Texas 79772, until 1:30 p. m. local time, August 20, 2020, and then publicly opened and read for “SE Quad Water and Sewer Extension Project, Phase 1A – Water; Phase 1A – Sewer and Phase 1B – Lift Station and Force Main” to serve the SE Quadrant including services to the Pecos Regional Sport Park.

Scope of Work of the three (3) Contracts includes the following:

*Contract One*, Phase 1A – Water:

3,600 linear feet of new 8”, 12” and 16” PVC, C-900 DR 18 waterline with appurtenances and water services to the Pecos Regional Sports Park, installed along the ROW of CR 118.

*Contract Two*, Phase 1A – Sewer:

6,560 linear feet of new 8”, 10”, 12”, 15” and 18” gravity SDR 26 PVC sewer main with fiberglass reinforced manholes and a sewer service to the Pecos Regional Sport Park.

*Contract Three*, Phase 1B – Lift Station and Force Main:

665 linear feet of new 10” gravity SDR 26 PVC sewer main with fiberglass reinforced manholes; 5,500 linear feet of 10” HDPE force main and a 900 GPM automatic triplex lift station with FRP wet well, electrical and controls. Phase 1B will connect to Phase 1A(sewer) near the lift station.

Bids received after the closing time will be returned unopened. A NON-MANDATORY pre-bid conference will be held on August 13, 2020, at 1:30 p.m. local time, at the office of the Pecos Economic Development Corporation, 119 South Cedar, Pecos, Texas 79772.

Each Bid must be accompanied by a Bid Bond or a certified or cashier’s check, acceptable to the Owner, in an amount not less than five per cent (5%) of the total amount Bid as a guarantee that the successful bidder will enter into the Contract and execute the Bonds on the forms provided, and provide the required insurance certificates within seven (7) days after the date Contract Documents are received by the Contractor. Copies of the bidding documents may be obtained from [www.CivcastUSA.com](http://www.CivcastUSA.com). Bidders must register on the website in order to view and/or download specifications, plans and available soils borings for this Project. There is NO charge to view or download documents. The Owner reserves the right to reject any or all Bids and to waive all defects and irregularities in the bidding or bidding process except time of submitting a Bid. The Successful Bidder, if any, will be the responsible Bidder which in the Town of Pecos City’s judgment will be most advantageous to the City and result in the best and most economical completion of the Project.

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## INSTRUCTIONS TO BIDDERS

**1. PREPARATION OF BIDS.** Unless otherwise directed in the Invitation to Bidders, each Bid shall be submitted, in duplicate, on the bid forms provided or on photocopies of the forms, in conformity with the requirements of the Invitation to Bidders, these instructions, and the instructions printed on the bid form.

All blanks on the bid form shall be completed typed, or written in ink, and no change shall be made on the bid form or any other of the Contract Documents. Any Bid may be rejected if it contains any omission, erasure, alteration, addition, irregularity of any kind, or items not called for; if it does not submit prices for each of the items in the bid form; if any of the prices are obviously unbalanced; or if it shall, in any manner, fail to conform to the conditions of the invitation to Bidders and these instructions.

The bidder shall sign its Bid in the signature space. If the Bid is made by a partnership or corporation, the name and address of the partnership or corporation shall be shown, together with the names and addresses of the partners or officers. If the Bid is made by an individual, it must be executed by the person; if made by a partnership, it must be executed by one of the partners (and if by a limited partnership, then executed by the general partner); or if made by a corporation, it must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or assistant secretary of the corporation. The corporate address and state of incorporation must be shown below the signature.

**2. CONTRACT DOCUMENTS.** The Contract Documents are complementary and must be read together as a whole; what is called for by one is as binding as if called for by all.

Bidders desiring further information or further interpretation of any part of the Contract Documents are hereby obligated to submit a written request online to the [www.CivcastUSA.com](http://www.CivcastUSA.com) system for such information to Engineer not less than **3 calendar days** before the Bid opening. Answers to these requests will be given in writing, to all bidders as addenda to the Contract, and each addendum will be made a part of the Contract. No explanation or interpretation of the Contract other than written addenda, shall be binding. Should a bidder find discrepancies in or omissions from the Contract Documents or should the bidder be in doubt as to any meaning, the bidder is hereby obligated to notify Engineer, so a written addendum may be sent to all bidders. It is the responsibility of each bidder to determine if it has received all addenda, complete files of which will be maintained at the Engineer's office and the office designated to receive the Bids.

Each bidder shall inform itself fully of the construction and labor conditions under which the Work will be performed and shall be presumed to have inspected the Site and to have read and to be thoroughly familiar with the Contract Documents. Failure to do so will not relieve the successful bidder of its obligation to furnish all materials and labor necessary to carry out the provision of the Contract and to complete the Work for the consideration of its Bid.

**3. PRE-BID CONFERENCE.** A pre-bid conference among Owner, Engineer, prospective bidders, and others will be held to discuss the scope of the Work and to answer questions concerning the Work. No addendum will be issued at this conference, but an addendum will be issued afterwards, if necessary, to answer questions. The pre-bid conference will be held at the time and place shown in the Invitation to bidders.

**4. BID SECURITY.** Each bid shall be accompanied by a bid bond or a certified or cashier's check, acceptable to the Owner, in an amount not less than 5 per cent of the total amount bid (the "Bid Security"), as a guarantee that the successful bidder will enter into the Contract and execute the Bonds on the forms provided and provide the required insurance certificates within seven (7) days after the date Contract Documents are received by the Contractor. Bid Securities will be returned to all but the three most qualified, responsible bidders within three (3) days after opening of Bids, and the latter's Bid Securities will be returned after complete execution of the Contract. The surety company providing a bid bond must conform to the same requirements for surety companies providing the performance bonds, maintenance bonds and/or payment bonds described below.

**5. BONDS.** The successful bidder must furnish a Performance Bond, a Maintenance Bond and a Payment Bond, each in the sum of 100 per cent of the Contract Price, from a surety company holding a permit from the State of Texas to act as surety. Unless otherwise specified, the cost of proving such Bonds shall be included in the bidders' total bid amount. The surety company must have a minimum Best Key Rating of "B+" or better. The surety company, the agency and agent issuing the Bonds must be authorized to issue Bonds in Texas in an amount equal to the total Contract Price. The Bonds must be executed by a duly appointed representative of the surety company. If bidder's proposed surety company, agency or agents do not meet the aforementioned requirements, then Owner may refrain from considering the bidder for Contract award and Owner may require bidder to forfeit the Bid Security.

**6. DELIVERY OF BIDS.** It is each bidder's responsibility to deliver its Bid and Bid Security to the location names in the Invitation to Bidders before the closing time. The fact that a Bid and Bid Security were dispatched will not be considered. The Bid and Bid Security must actually be delivered to be considered.

**7. "OR EQUAL" SUBMISSIONS.** Where materials or equipment are specified by a trade or brand name, it is not the intention of the Owner to discriminate against an equal product of another manufacturer, but to set a definite standard of quality of performance. In preparing his/her proposal, each bidder is expected to include in his/her base Bid the cost of the item so specified' however, Contractor may submit a list of items to be submitted as a suggested "or equal" at time of bid submission. No additional suggested "or equal" items will be considered after bid opening.

**8. TIME FOR COMPLETION.** Contractor will not be allowed time extensions that are due to (i) inclement weather (not including Force Majeure); (ii) non-availability of equipment or material, when the principal units of Work and tasks on the critical path are not in progress or are not delayed by the event of delay, interference, disruption, or hindrance; (iii) when at least seven (7) hours of available working time remain out of the working day; (iv) while materials are drying and it is possible for the Contractor to enclose the area and use drying devices; (v) when an event of delay, interference, disruption, or hindrance occurs on a day other than a working day or other day when the Contractor had not originally planned work; (vi) when an event of delay, interference, disruption, or hindrance occurs after the expiration of the time for completion; (vii) to the extent the Contractor could have anticipated or alleviated the impact of the event of delay, interference, disruption, or hindrance through reasonable efforts; (viii) when events of concurrent delay overlap the claimed delay; and/or (ix) when an extension of time is precluded by any other provision of the Contract Documents.

**9. QUALIFICATION OF BIDDERS.** The apparent most qualified, responsible bidder shall submit to Owner, with **5 calendar days** of notification, either (i) a fully completed Contractor's Statement of Qualification or (ii) a written statement that the most recently submitted Contractor's Statement of Qualification is accurate, which statement shall be considered in the award of the Contract. Failure to accurately complete the Contractor's Statement of Qualification or to submit the Statement will, at Owner's option, disqualify the bidder from consideration in the award of the Contract.

**10. MODIFICATION AND WITHDRAWAL OF BIDS.** Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

**11. AWARD OF CONTRACT.** Owner reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, non-responsive, unbalanced or conditional Bids and to reject the Bid of any bidder if Owner believes the bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by Owner. Owner also reserves the right to waive all informalities and defects in bidding, except time of submitting a Bid.

Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of bidders, propose subcontractors, suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents, to Owner's satisfaction.

Owner reserves the right to award the Bid, at Owner's discretion, based on the amount of the Total Base Bid (without including "Substitute Items" or "alternate" bid items) or on the amount of the Total Amount Bid (including "Substitute Items" or "alternate" bid items), or based on any other combination, means or method determined appropriate by Owner.

Within seven (7) calendar days of receipt from the Owner of the Notice of Award, the successful bidder must submit to the Engineer the original Bonds and all information or other items necessary to complete the Contract Documents, including the Schedule of Completion and Contractor's safety program. The successful bidder must return the fully executed Contract Documents to Engineer within seven (7) calendar days of receipt, or Owner may at its sole discretion disqualify the bid and accept another bid and the bidder shall, at Owner's option, forfeit its bid security.

13. TAXES, LICENSES AND FEES. Certain taxes, licenses, fees and other similar items are part of the cost of the Work and it shall be Contractor's responsibility to familiarize itself with these costs and to observe and comply with the Laws and Regulations relating to the same. The prices, sums, rates and other charges set forth in the Contractor's Bid shall cover and include all such costs. Owner is exempt from Texas sales and use taxes pursuant to Texas Tax Code 151.309 as a political subdivision of the State of Texas.

14. NUMBER OF SIGNED SETS OF DOCUMENTS. The Contract Documents will be prepared in at least four original sets for signature, one for delivery to the successful bidder. Owner will furnish the successful bidder four sets of Plans and Technical Specifications free of charge, and additional sets may be obtained from Engineer at Engineer's reproduction rates. The successful bidder shall provide four signed originals of each of the Bonds to be bound with the Contract Documents.

15. WORKERS COMPENSATION INSURANCE. See section entitled "INSURANCE" in Special Conditions Part A of the Contract.

16. SOILS REPORT. The best available proximity soils borings are available for bidder's information only. The report and/or borings is not a warranty of subsurface conditions, nor is it a part of the Contract Documents. Bidders are expected to examine the Site and such reports and then decide for themselves the character of the materials to be encountered. Owner and Engineer disclaim any responsibility for the accuracy, true location and extent of the surface and subsurface investigations that have been prepared by others. Owner and Engineer further disclaim responsibility for interpretation of that data by bidder, i.e. projecting soil-bearing values, soil stability and the presence, level and extent of underground water.

## BID FORM

Date: \_\_\_\_\_

Bid of \_\_\_\_\_, a \_\_\_\_\_ organized and existing under laws of the State of Texas, for Construction of SE Quad Water and Sewer Extension Project, Phase 1 A – Water to serve the SE Quadrant in Pecos, Texas.

To: Town of Pecos City  
 c/o MBS Development Services LLC  
 Attn: Seth Sorensen, City Manager  
 Address: 119 South Cedar, Pecos, Texas 79772

Gentlemen:

The undersigned bidder has carefully examined the Instructions to Bidders, this Proposal, the General Conditions of Agreement, The Technical Specifications and the drawings for the work herein above described and referred to in the Invitation to Bid and has carefully examined the site of the work and will provide all necessary labor, superintendence, machinery, equipment, tools, materials, services and other means of construction to complete all the work upon which he bids, as called for in the Contract, the Specifications and shown on the drawings, and in the manner prescribed therein and according to the requirements of the Engineer as therein set forth for the amounts below.

Item No.	Description of Item with Unit Bid Price in Written Words	Unit	Approx. Quantity	Unit Amount	Total Price
1.	Mobilization, including performance and payment bonds for 100 per cent (100%) of the contract amount  @ _____  _____	LS	1	\$ _____	\$ _____
2.	Preparation of ROW and Easements (permanent and temporary) for the water extension facilities  @ _____  _____	AC	1.5	\$ _____	\$ _____
3.	Construction Staking using horizontal and vertical control points and coordinates provided by Engineer  @ _____  _____	LS	1	\$ _____	\$ _____

Item No.	Description of Item with Unit Bid Price in Written Words	Unit	Approx. Quantity	Unit Amount	Total Price
4.	Construction quality control testing including equipment, personnel, materials and calibration, complete as specified to demonstrate passing tests with documentation  @	LS	1	\$	\$
5.	Trench excavation safety protection, in accordance with applicable current code requirements along trench route, complete in place  @	LF	3671	\$	\$
6.	12-inch PVC waterline (C-900, DR 18), including excavation, bedding, installation of pipe and compacted backfill, complete in place @	LF	356	\$	\$
7.	16-inch PVC waterline (C-900, DR 18), including excavation, bedding, installation of pipe and compacted backfill, complete in place @	LF	3315	\$	\$
8.	Cast Iron Pipe Fittings, including excavation, bedding, anti-corrosion protection, installation of fittings, restraints and compacted backfill, complete in place @	TN	2.1	\$	\$
9.	12-inch Gate Valve, MJ, including excavation, bedding, anti-corrosion protection, installation and compacted backfill, complete in place @	EA	4	\$	\$

Item No.	Description of Item with Unit Bid Price in Written Words	Unit	Approx. Quantity	Unit Amount	Total Price
10.	12-inch Cap, MJ, complete in place @	EA	2	\$	\$
11.	16-inch Gate Valve, MJ, including excavation, bedding, anti-corrosion protection, installation and compacted backfill, complete in place @	EA	5	\$	\$
12.	16-inch Cap, MJ, complete in place @	EA	1	\$	\$
13.	Standard Fire Hydrant (4 foot bury), including gate valve, pipe spools, fittings and all required connections including excavation, bedding, anti-corrosion protection, installation and compacted backfill, in conformance with City of Pecos Fire Code specification, complete in place @	EA	4	\$	\$
14.	8-inch PVC (C-900, DR 18) service manifold with ductile iron fittings and connections for domestic, irrigation and fire services to the proposed Pecos Regional Sports Park, including excavation, bedding, anti-corrosion protection installation, restraints and compacted backfill, complete in place @	EA	1	\$	\$
<b>TOTAL BASE BID \$</b>					

The undersigned Bidder has carefully examined the instructions to Bidders, this Proposal, the General Conditions of Agreement, the Specifications, and the drawings for the work herein above described and referred to in the

invitation to Bid and has carefully examined the site of the work and will provide all necessary labor, superintendence, machinery, equipment, tools, materials, services and other means of construction to compete all of the work upon which he bids, as called for in the Contract, the Specifications and shown on the drawings, and in the manner prescribed therein and according to the requirements of the Engineer as therein set forth for the amounts above and below.

The amounts set forth above are current estimates by Contractor of the amounts that will be determined during the progress of the work. The separated progress billings from the Contractor to the Owner/Engineer shall reflect the actual amounts expended for the items enumerated above.

**ADDITIONS/DEDUCTIONS**

A1	2" Temporary Blow-Off Assembly installed on a 16" water line @	EA	1	\$	\$
<hr/>				<hr/>	<hr/>
A2	Pavement repairs for areas cut during trenching (8-inch compacted caliche base with 1 1/2-inch HMAC surface) @	SF	350	\$	\$
<hr/>				<hr/>	<hr/>

**SUBSTITUTIONS:** If necessary, attach detailed explanation to proposal.

1.

(Add) (Deduct) \_\_\_\_\_ \$ \_\_\_\_\_

2.

\_\_\_\_\_  
 (Add) (Deduct) \_\_\_\_\_ \$ \_\_\_\_\_

It is understood and agreed that the work shall be complete in full within **130 calendar days** after the date on which work is to be commenced as established by the Contract Documents. Bidder shall specify the number of calendar days for the work to be completed, if shorter than 130 calendar days.

Water Extension Phase 1A	Calendar Days to Complete	Late Completion Penalty
BIDDER		\$500.00 / calendar day
<ul style="list-style-type: none"> <li>• Estimated Mobilization Date</li> </ul>	=	

Contractor must mobilize within 10 calendar days from the date of the written Notice to Proceed. If Contractor mobilizes prior to the 10<sup>th</sup> day, then the project completion time will start based on the actual mobilization date.

It is agreed that the contract price may be increased or decreased to cover work added or deleted by order of the Engineer, in accordance with the provisions of the General Conditions of Agreement.

The award may be made on the Base Bid alone or the Base Bid, Completion Time specified and any or all of the Items listed under Alternates or Substitutions, if any.

In the event of Award of the Contract to the undersigned, the undersigned agrees to furnish Performance and Payment Bonds and Certificate of Insurance as provided in the Specifications.

Date: \_\_\_\_\_ Signed \_\_\_\_\_  
Company \_\_\_\_\_  
By \_\_\_\_\_  
(Title) \_\_\_\_\_  
\_\_\_\_\_  
(Address) \_\_\_\_\_  
\_\_\_\_\_  
(Telephone Number) \_\_\_\_\_

\_\_\_\_\_  
Witness

SEAL (if Bidder is a Corporation)

Acknowledge receipt of Addenda below:

Addendum No. \_\_\_\_\_  
Date Received \_\_\_\_\_

**BID FORM**

Date: \_\_\_\_\_

Bid of \_\_\_\_\_, a \_\_\_\_\_ organized and existing under laws of the State of Texas, for Construction of SE Quad Water and Sewer Extension Project, Phase 1 A – Sewer to serve the SE Quadrant in Pecos, Texas.

To: Town of Pecos City  
 c/o MBS Development Services LLC  
 Attn: Seth Sorensen, City Manager  
 Address: 119 South Cedar, Pecos, Texas 79772

Gentlemen:

The undersigned bidder has carefully examined the Instructions to Bidders, this Proposal, the General Conditions of Agreement, The Technical Specifications and the drawings for the work herein above described and referred to in the Invitation to Bid and has carefully examined the site of the work and will provide all necessary labor, superintendence, machinery, equipment, tools, materials, services and other means of construction to complete all the work upon which he bids, as called for in the Contract, the Specifications and shown on the drawings, and in the manner prescribed therein and according to the requirements of the Engineer as therein set forth for the amounts below.

Item No.	Description of Item with Unit Bid Price in Written Words	Unit	Approx. Quantity	Unit Amount	Total Price
1.	Mobilization, including performance and payment bonds for 100 per cent (100%) of the contract amount  @ _____ _____	LS	1	\$ _____	\$ _____
2.	Preparation of ROW and Easements for sanitary sewer easements (permanent and temporary) for the sanitary sewer extension facilities  @ _____ _____	AC	3.0	\$ _____	\$ _____
3.	Construction Staking using horizontal and vertical control points and coordinates provided by Engineer  @ _____ _____	LS	1	\$ _____	\$ _____

Item No.	Description of Item with Unit Bid Price in Written Words	Unit	Approx. Quantity	Unit Amount	Total Price
4.	Construction quality control testing including equipment, personnel, materials and calibration, complete as specified to demonstrate passing tests with documentation  @	LS	1	\$	\$
5.	Trench excavation safety protection, in accordance with applicable current code requirements along trench route, complete in place  @	LF	6560	\$	\$
6.	8-inch SDR 26 sanitary sewer pipe, (10'-14' deep), including excavation, bedding, installation, compacted backfill, complete in place  @	LF	442	\$	\$
7.	10-inch SDR 26 sanitary sewer pipe, (14' – 18' deep), including excavation, bedding, installation, compacted backfill, complete in place  @	LF	123	\$	\$
8.	12-inch SDR 26 sanitary sewer pipe, (14' – 18' deep), including excavation, bedding, installation and compacted backfill, complete in place  @	LF	5063	\$	\$
9.	12-inch SDR 26 sanitary sewer pipe, (18'-22' deep), including excavation, bedding, installation and compacted backfill, complete in place  @	LF	779	\$	\$

Item No.	Description of Item with Unit Bid Price in Written Words	Unit	Approx. Quantity	Unit Amount	Total Price
10.	15-inch SDR 26 sanitary sewer pipe (14'-18' deep), including excavation, bedding, installation and compacted backfill, complete in place @	LF	35	\$	\$
11.	18-inch SDR 26 sanitary sewer pipe, (14' – 18' deep), including excavation, bedding, installation and compacted backfill, complete in place @	LF	118	\$	\$
12.	10-inch SDR 26 sanitary sewer pipe stub-outs with plugs, (all depths), including excavation, bedding, installation and compacted backfill, complete in place @	EA	1	\$	\$
13.	12-inch SDR 26 sanitary sewer pipe stub-outs with plugs, (all depths), including excavation, bedding, installation and compacted backfill, complete in place @	EA	1	\$	\$
14.	15-inch SDR 26 sanitary sewer pipe stub-outs with plugs, (all depths), including excavation, bedding, installation and compacted backfill, complete in place @	EA	1	\$	\$
15.	Standard FRP manholes with poured concrete inverts, (0' – 15' deep) installed outside of paved areas, including excavation, bedding, concrete foundation, installation, ring encasement and compacted backfill, complete in place. @	EA	20	\$	\$

Item No.	Description of Item with Unit Bid Price in Written Words	Unit	Approx. Quantity	Unit Amount	Total Price
16.	Extra depth for Standard FRP manholes (over 15' deep) installed outside of paved areas, complete in place. @	VF	21	\$	\$

TOTAL BASE BID \$

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The undersigned Bidder has carefully examined the instructions to Bidders, this Proposal, the General Conditions of Agreement, the Specifications, and the drawings for the work herein above described and referred to in the invitation to Bid and has carefully examined the site of the work and will provide all necessary labor, superintendence, machinery, equipment, tools, materials, services and other means of construction to compete all of the work upon which he bids, as called for in the Contract, the Specifications and shown on the drawings, and in the manner prescribed therein and according to the requirements of the Engineer as therein set forth for the amounts above and below.

The amounts set forth above are current estimates by Contractor of the amounts that will be determined during the progress of the work. The separated progress billings from the Contractor to the Owner/Engineer shall reflect the actual amounts expended for the items enumerated above.

ADDITIONS/DEDUCTIONS

A1	FRP manhole vent assembly in easement areas, complete as specified @	EA	5	\$	\$
A2	Pavement repairs for areas cut during trenching (8-inch compacted caliche base with 1 1/2-inch HMA surface) @	LF	350	\$	\$

SUBSTITUTIONS: If necessary, attach detailed explanation to proposal.

1.

	\$
(Add) (Deduct)	

2.

	\$
(Add) (Deduct)	

It is understood and agreed that the work shall be complete in full within **160 calendar days** after the date on which work is to be commenced as established by the Contract Documents. Bidder shall specify the number of calendar days for the work to be completed, if shorter than 160 calendar days.

Sewer Extension Phase 1A	Calendar Days to Complete	Late Completion Penalty
BIDDER		\$500.00 / calendar day
<ul style="list-style-type: none"> <li>• Estimated Mobilization Date</li> </ul>	=	

Contractor must mobilize within 10 calendar days from the date of the written Notice to Proceed. If Contractor mobilizes prior to the 10<sup>th</sup> day, then the project completion time will start based on the actual mobilization date.

It is agreed that the contract price may be increased or decreased to cover work added or deleted by order of the Engineer, in accordance with the provisions of the General Conditions of Agreement.

The award may be made on the Base Bid alone or the Base Bid, Completion Time specified and any or all of the Items listed under Alternates or Substitutions, if any.

In the event of Award of the Contract to the undersigned, the undersigned agrees to furnish Performance and Payment Bonds and Certificate of Insurance as provided in the Specifications.

Date:

Signed

Company

By

(Title)

(Address)

(Telephone Number)

Witness

SEAL (if Bidder is a Corporation)

Acknowledge receipt of Addenda below:

Addendum No. \_\_\_\_\_

Date Received \_\_\_\_\_

## BID FORM

Date: \_\_\_\_\_

Bid of \_\_\_\_\_, a \_\_\_\_\_ organized and existing under laws of the State of Texas, for Construction of SE Quad Water and Sewer Extension Project, Phase 1 B Lift Station and Force Main to serve SE Quadrant in Pecos, Texas.

To: Town of Pecos City  
 c/o MBS Development Services LLC  
 Attn: Seth Sorenson, City Manager  
 119 South Cedar, Pecos, Texas 79772

Gentlemen:

The undersigned bidder has carefully examined the Instructions to Bidders, this Proposal, the General Conditions of Agreement, The Technical Specifications and the drawings for the work herein above described and referred to in the Invitation to Bid and has carefully examined the site of the work and will provide all necessary labor, superintendence, machinery, equipment, tools, materials, services and other means of construction to complete all the work upon which he bids, as called for in the Contract, the Specifications and shown on the drawings, and in the manner prescribed therein and according to the requirements of the Engineer as therein set forth for the amounts below.

Item No.	Description of Item with Unit Bid Price in Written Words	Unit	Approx. Quantity	Unit Amount	Total Price
1.	Mobilization, including performance and payment bonds for 100 per cent (100%) of the contract amount  @ _____  _____	LS	1	\$ _____	\$ _____
2.	Preparation of ROW and Easements for sanitary sewer work (permanent and temporary) for the sanitary sewer extension facilities and the lift station site  @ _____  _____	AC	2.8	\$ _____	\$ _____
3.	Construction Staking using horizontal and vertical control points and coordinates provided by Engineer  @ _____  _____	LS	1	\$ _____	\$ _____

Item No.	Description of Item with Unit Bid Price in Written Words	Unit	Approx. Quantity	Unit Amount	Total Price
4.	Construction quality control testing including equipment, personnel, materials and calibration, complete as specified to demonstrate passing tests with documentation  @ _____	LS	1	\$ _____	\$ _____
5.	Trench excavation safety protection, in accordance with applicable current code requirements along trench route, complete in place  @ _____	LF	6159	\$ _____	\$ _____
6.	10-inch SDR 26 sanitary sewer pipe, (6'-10' deep), including excavation, bedding, installation and compacted backfill, complete in place  @ _____	LF	664	\$ _____	\$ _____
7.	10-inch HDPE sanitary sewer force main, including excavation, bedding, installation, fittings and valves, thrust blocking and joint restraint, and compacted backfill, complete in place  @ _____	LF	5495	\$ _____	\$ _____
8.	10-inch SDR 26 sanitary sewer pipe stub-outs with plugs, (all depths), including excavation, bedding, installation and compacted backfill, complete in place  @ _____	EA	1	\$ _____	\$ _____

9.	Standard FRP manholes with poured concrete inverts, (0' – 6' deep) installed in CR 118 Paved Area, including saw-cuts, pavement repair, excavation, bedding, concrete foundation, installation and compacted backfill, complete in place @	EA	2	\$	\$
10.	Standard FRP manholes with poured concrete inverts, (0' – 6' deep) installed outside of pavement areas including excavation, bedding, concrete foundation, installation, ring encasement and compacted backfill, complete in place @.	EA	2	\$	\$
11.	Extra depth for Standard FRP manholes (over 6' deep) installed in CR 118 Paved Area or in easement areas, complete in place @	VF	4	\$	\$
12.	Receive and install a fiberglass wet well (delivered with all manufactured internals, pumps and motors), assemble all equipment and piping, make all electrical and control connections, test and calibrate the finished station, touch up paint and coatings, and include all ancillary items required for automatic operation, complete as specified @.	LS	1	\$	\$

TOTAL BASE BID \$

The undersigned Bidder has carefully examined the instructions to Bidders, this Proposal, the General Conditions of Agreement, the Specifications, and the drawings for the work herein above described and referred to in the invitation to Bid and has carefully examined the site of the work and will provide all necessary labor, superintendence, machinery, equipment, tools, materials, services and other means of construction to compete all of the work upon which he bids, as called for in the Contract, the Specifications and shown on the drawings, and in the manner prescribed therein and according to the requirements of the Engineer as therein set forth for the amounts above and below.

The amounts set forth above are current estimates by Contractor of the amounts that will be determined during the progress of the work. The separated progress billings from the Contractor to the Owner/Engineer shall reflect the actual amounts expended for the items enumerated above.

**ADDITIONS/DEDUCTIONS**

A1	FRP manhole vent assembly outside of paved areas, complete as specified @	EA	1	\$	\$
<hr/>				<hr/>	<hr/>
A2	Pavement repairs for areas cut during trenching (8-inch compacted caliche base with 1 1/2-inch HMAC surface) @	SF	350	\$	\$
<hr/>				<hr/>	<hr/>

**SUBSTITUTIONS:** If necessary, attach detailed explanation to proposal.

1.		
	(Add) (Deduct)	\$
2.		
	(Add) (Deduct)	\$

It is understood and agreed that the work shall be complete in full within **160 calendar days** after the date on which work is to be commenced as established by the Contract Documents. Bidder shall specify the number of calendar days for the work to be completed, if shorter than 160 calendar days.

Sewer Extension Phase 1A	Calendar Days to Complete	Late Completion Penalty
BIDDER		\$500.00 / calendar day
• Estimated Mobilization Date	=	

Contractor must mobilize within 10 calendar days from the date of the written Notice to Proceed. If Contractor mobilizes prior to the 10<sup>th</sup> day, then the project completion time will start based on the actual mobilization date.

It is agreed that the contract price may be increased or decreased to cover work added or deleted by order of the Engineer, in accordance with the provisions of the General Conditions of Agreement.

The award may be made on the Base Bid alone or the Base Bid, Completion Time specified and any or all of the Items listed under Alternates or Substitutions, if any.

In the event of Award of the Contract to the undersigned, the undersigned agrees to furnish Performance and Payment Bonds and Certificate of Insurance as provided in the Specifications.

Date: \_\_\_\_\_ Signed \_\_\_\_\_  
Company \_\_\_\_\_  
By \_\_\_\_\_  
(Title) \_\_\_\_\_  
\_\_\_\_\_  
(Address) \_\_\_\_\_  
\_\_\_\_\_  
(Telephone Number) \_\_\_\_\_

\_\_\_\_\_  
Witness

SEAL (if Bidder is a Corporation)

Acknowledge receipt of Addenda below:

Addendum No.	_____	_____	_____	_____	_____
Date Received	_____	_____	_____	_____	_____

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# GENERAL CONDITIONS OF AGREEMENT

## 1. DEFINITION OF TERMS

1.01 OWNER, CONTRACTOR AND ENGINEER. *The OWNER, THE CONTRACTOR and the ENGINEER are those persons or organizations identified as such in the Agreement and are referred to throughout the Contract Documents as if singular in number and masculine in gender. The term ENGINEER means the ENGINEER or his duly authorized representative. The ENGINEER shall be understood to be the ENGINEER of the OWNER, and nothing contained in the Contract Documents shall create any contractual or agency relationship between the ENGINEER and the CONTRACTOR.*

1.02 CONTRACT DOCUMENTS. *The Contract Documents shall consist of the Notice to Bidders (Advertisement), Special Conditions (Instructions to Bidders), Proposal, signed Agreement, Performance and Payment Bonds (when required), Special Bonds (when required), General Conditions of the Agreement, Technical Specifications, Construction Drawings, and all modifications thereof incorporated in any of the documents before the execution of the agreement.*

*The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. In case of conflict between any of the Contract Documents, priority of interpretation shall be in the following order: Signed Agreement, Performance and Payment Bonds, Special Bonds (if any), Proposal, Special Conditions of Agreement, Notice to Bidders, Technical Specifications, Construction Drawings, and General Conditions of Agreement.*

1.03 SUB-CONTRACTOR. *The term Sub-Contractor, as employed herein, includes only those having a direct contract with the CONTRACTOR and it includes one who furnishes material worked to a special design according to the construction drawings or specifications of this work, but does not include one who merely furnishes material not so worked.*

1.04 WRITTEN NOTICE. *Written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered mail to the last business address known to him who gives the notice.*

1.05 WORK. *The CONTRACTOR shall provide and pay for all materials, supplies, machinery, equipment, tools, superintendence, labor, services, insurance, and all water, light, power, fuel, transportation and other facilities necessary for the execution and completion of the work covered by the contract documents. Unless otherwise specified, all material shall be new and both workmanship and materials shall be of a good quality. The CONTRACTOR shall, if required, furnish satisfactory evidence as to the kind and quality of materials. Materials or work described in words which so applied have a well known technical or trade meaning shall be held to refer to such recognized standards.*

1.06 EXTRA WORK. *The term “Extra Work” as used in this contract shall be understood to mean and include all work that may be required by the ENGINEER and OWNER to be done by the CONTRACTOR to accomplish any change, alteration or addition to the work shown upon the construction drawings, or reasonably implied by the specifications, and not covered by the CONTRACTOR’S Proposal, except as provided under “Changes and Alterations,” herein.*

1.07 WORKING DAY. *A “Working Day” is defined as any day not including Saturdays, Sundays or any legal holidays, in which weather or other conditions not under the control of the CONTRACTOR, will permit construction of the principal units of the work for a period of not less than seven (7) hours between 7:00 am and 6:00 pm.*

1.08 CALENDAR DAY. *“Calendar Day” is any day of the week or month, no days being excepted.*

1.09 SUBSTANTIALLY COMPLETED. *By the term “substantially completed” is meant that the structure has been made suitable for use or occupancy or the facility is in condition to serve its intended purpose, but still may require minor miscellaneous work and adjustment.*

## 2. RESPONSIBILITIES OF THE ENGINEER AND THE CONTRACTOR

2.01 OWNER-ENGINEER RELATIONSHIP. *The ENGINEER will be the OWNER’S representative during construction. The duties, responsibilities and limitations of authority of the ENGINEER as the OWNER’S representative during construction are as set forth in the Contract Documents and shall not be extended or limited without written consent of the OWNER and ENGINEER. The ENGINEER will advise and consult with the OWNER, and all of OWNER’S instructions to the CONTRACTOR shall be issued through the ENGINEER.*

2.02 OBSERVATION OF THE WORK. *The ENGINEER shall make periodic visits to the site to familiarize himself generally with the progress of the executed work and to determine if such work generally meets the essential performance and design features and the technical and functional engineering requirements of the Contract Documents; provided and except, however, that the ENGINEER shall not be responsible for making any detailed, exhaustive, comprehensive or continuous on-site inspection of the quality or quantity of the work or be in any way responsible, directly or indirectly, for the construction means, methods, techniques, sequences, quality, procedures, programs, safety precautions or lack of same incident thereto or in connection therewith. Notwithstanding any other provision of this agreement or any other Contract Document, the ENGINEER shall not be in any way responsible or liable for any acts, errors, omissions or negligence of the CONTRACTOR, any subcontractor or any of the CONTRACTOR’S or subcontractor’s agents, servants or employees or any other person, firm or corporation performing or attempting to perform any of the work.*

2.03 PAYMENT FOR WORK. *The ENGINEER shall review CONTRACTOR’S applications for payment and supporting data, determine the amount owed to the CONTRACTOR and approve,*

*in writing, payment to the CONTRACTOR in such amounts; such approval of payment to CONTRACTOR constitutes a representation to the OWNER of ENGINEER'S professional judgement that the work has progressed to the point indicated to the best of his knowledge, information and belief, but such approval of an application for payment to CONTRACTOR shall not be deemed as a representation by ENGINEER that ENGINEER has made any examination to determine how or for what purpose CONTRACTOR has used the moneys paid on account of the Contract price.*

*2.04 INITIAL DETERMINATIONS. The ENGINEER initially shall determine all claims, disputes and other matters in question between the CONTRACTOR and the OWNER relating to the execution or progress of the work or the interpretation of the Contract Documents and the ENGINEER'S decision shall be rendered in writing within a reasonable time. Should the ENGINEER fail to make such decision within a reasonable time, appeal to arbitration may be taken as if his decision had been rendered against the party appealing.*

*2.05 OBJECTIONS. In the event the ENGINEER renders any decision which, in the opinion of the either party hereto, is not in accordance with the meaning and intent of this contract, either party may file with the ENGINEER within thirty days his written objection to the decision, and by such action may reserve the right to submit the question so raised to arbitration as hereinafter provided.*

*2.06 LINES AND GRADES. Unless otherwise specified, all lines and grades shall be furnished by the ENGINEER or his representative. Whenever necessary, construction work shall be suspended to permit performance of this work, but such suspension will be as brief as practical and the CONTRACTOR shall be allowed no extra compensation therefor. The CONTRACTOR shall give the ENGINEER ample notice of the time and place where lines and grades will be needed. All stakes, marks, etc., shall be carefully preserved by the CONTRACTOR, and in case of careless destruction or removal by him or his employees, such stakes, marks, etc., shall be replaced at the CONTRACTOR'S expense.*

*2.07 CONTRACTOR'S DUTY AND SUPERINTENDENCE. The CONTRACTOR shall give adequate attention to the faithful prosecution and completion of this contract and shall keep on the work, during its progress, a competent superintendent and any necessary assistants. The superintendent shall represent the CONTRACTOR in his absence and all directions given to him shall be as binding as if given to the CONTRACTOR.*

*The CONTRACTOR is and at all times shall remain an independent contractor, solely responsible for the manner and method of completing his work under this contract, with full power and authority to select the means, method and manner of performing such work, so long as such methods do not adversely affect the completed improvements, the OWNER and ENGINEER being interested only in the result obtained and conformity of such completed improvements to the construction drawings, specifications and contract.*

*Likewise, the CONTRACTOR shall be solely responsible for the safety of himself, his employees and other persons, as well as for the protection of the safety of the improvements being erected and the property of himself or any other person, as a result of his operations hereunder. Engineering construction drawings and specifications as well as any additional information concerning the work to be performed passing from or through the ENGINEER shall not be interpreted as requiring or allowing CONTRACTOR to deviate from the construction*

*drawings and specifications, the intent of such drawings, specifications and any other such instructions being to define with particularity the agreement of the parties as to the work the CONTRACTOR is to perform. CONTRACTOR shall be fully and completely liable, at his own expense, for design, construction, installation and use, or non-use, of all items and methods incident to performance of the contract, and for all loss, damage or injury incident thereto, either to person or property, including, without limitation, the adequacy of all temporary supports, shoring, bracing, scaffolding, machinery or equipment, safety precautions or devices, and similar items or devise used by him during construction.*

*Any review of work in process, or any visit or observation during construction, or any clarification of construction drawings and specifications, by the ENGINEER, or any agent, employee, or representative of either of them, whether through personal observation on the project site or by means of approval of shop drawings for temporary construction or construction processes, or by other means or method, is agreed by the CONTRACTOR to be for the purpose of observing the extent and nature of work completed or being performed, as measured against the drawings and specifications constituting the contract, or for the purpose of enabling CONTRACTOR to more fully understand the construction drawings and specifications so that the completed construction work will conform thereto, and shall in no way relieve the CONTRACTOR from full and complete responsibility for the proper performance of his work on the project, including but without limitation the propriety of means and methods of the CONTRACTOR in performing said contract, and the adequacy of any designs, construction drawings or other facilities for accomplishing such performance. Deviation by the CONTRACTOR from drawings and specifications that may have been in evidence during any such visitation or observation by the ENGINEER, or any of his representatives, whether called to the CONTRACTOR'S attention or not shall in no way relieve CONTRACTOR from his responsibility to complete all work in accordance with said drawings and specifications.*

**2.08 CONTRACTOR'S UNDERSTANDING.** *It is understood and agreed that the CONTRACTOR has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under this contract. No verbal agreement or conversation with any officer, agent or employee of the OWNER or ENGINEER either before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.*

**2.09 CHARACTER OF WORKMEN.** *The CONTRACTOR agrees to employ only orderly and competent men, skillful in the performance of the type of work required under this contract, to do the work; and agrees that whenever the ENGINEER shall inform him in writing that any man or men on the work are, in his opinion, incompetent, unfaithful or disorderly, such man or men shall be discharged from the work and shall not again be employed on the work without the ENGINEER'S written consent.*

**2.10 CONTRACTOR'S BUILDINGS.** *The buildings of structures for housing men, or the erection of tents or other forms of protection, will be permitted only, at such places as the ENGINEER shall direct, and the sanitary conditions of the grounds in or about such structures shall at all times be maintained in a manner satisfactory to the ENGINEER*

2.11 SANITATION. *Necessary sanitation conveniences for the use of laborers on the work, properly secluded from public observation, shall be constructed and maintained by the CONTRACTOR in such manner and at such points as shall be approved by the ENGINEER, and their use shall be strictly enforced.*

2.12 SHOP DRAWINGS. *The CONTRACTOR shall submit to the ENGINEER, with such promptness as to cause no delay in his own work or in that of any other Contractor, four checked copies, unless otherwise specified, of all shop and/or setting drawings and schedules required for the work of the various trades, and the ENGINEER shall pass upon them with reasonable promptness, making desired corrections. The CONTRACTOR shall make any corrections required by the ENGINEER, file with him two corrected copies and furnish such other copies as may be needed. The ENGINEER'S approval of such drawings or schedules shall not relieve the CONTRACTOR from responsibility for deviations from drawings or specifications, unless he has in writing called the ENGINEER'S attention to such deviations at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings or schedules. It shall be the CONTRACTOR'S responsibility to fully and completely review all shop drawings to ascertain their effect on his ability to perform the required contract work in accordance with the construction drawings and specifications and within the contract time.*

*Such review by the ENGINEER shall be for the sole purpose of determining the sufficiency of said drawings or schedules to result in finished improvements in conformity with the drawings and specifications, and shall not relieve the CONTRACTOR of his duty as an independent contractor as previously set forth, it being expressly understood and agreed that the ENGINEER does not assume any duty to pass upon the propriety or adequacy of such drawings or schedules, or any means or methods reflected thereby, in relation to the safety of either person or property during CONTRACTOR'S performance hereunder.*

2.13 PRELIMINARY APPROVAL. *The ENGINEER shall not have the power to waive the obligations of this contract for the furnishing by the CONTRACTOR of good material, and of his performing good work as herein described, and in full accordance with the drawings and specifications. No failure or omission of the ENGINEER to discover, object to or condemn any defective work or material shall release the CONTRACTOR from the obligations to fully and properly perform the contract, including without limitation, the obligation to at once tear out, remove and properly replace the same at any time prior to final acceptance upon the discovery of said defective work or material; provided, however, that the ENGINEER shall, upon request of the CONTRACTOR, inspect and accept or reject any material furnished, and in event the material has been once accepted by the ENGINEER, such acceptance shall be binding on the OWNER, unless it can be clearly shown that such material furnished does not meet the specifications for this work.*

*Any questioned work may be ordered taken up or removed for re-examination, by the ENGINEER, prior to final acceptance, and if found not in accordance with the specifications for said work, all expense of removing, re-examination and replacement shall be borne by the CONTRACTOR, otherwise the expense thus incurred shall be allowed as EXTRA WORK, and shall be paid for by the OWNER; provided that, where inspection or approval is specifically required by the specifications prior to performance of certain work, should the CONTRACTOR proceed with*

*such work without requesting prior inspection or approval he shall bear all expense of taking up, removing, and replacing this work if so directed by the ENGINEER.*

2.14 DEFECTS AND THEIR REMEDIES. *It is further agreed that if the work or any part thereof, or any material brought on the site of the work for use in the work or selected for the same, shall be deemed by the ENGINEER as unsuitable or not in conformity with the specifications, the CONTRACTOR shall, after receipt of written notice thereof from the ENGINEER, forthwith remove such material and rebuild or otherwise remedy such work so that it shall be in full accordance with this contract.*

2.15 CHANGES AND ALTERATIONS. *The CONTRACTOR further agrees that the OWNER may make such changes and alterations as the OWNER may see fit, in the line, grade, form, dimensions, construction drawings or materials for the work herein contemplated, or any part thereof, either before or after the beginning of the construction, without affecting the validity of this contract and the accompanying Performance and Payment Bonds.*

*If such changes or alterations diminish the quantity of the work to be done, they shall not constitute the basis for a claim for damages, or anticipated profits on the work that may be dispensed with, except as provided for unit price items under Section 5 "Measurement and Payment." If the amount of work is increased, and the work can fairly be classified under the specifications, such increase shall be paid for according to the quantity actually done and at the unit price, if any, established for such work under this contract, except as provided for unit price items under Section 5 "Measurement and Payment;" otherwise, such additional work shall be paid for as provided under Extra Work. In case the OWNER shall make such changes or alterations as shall make useless any work already done or material already furnished or used in said work, then the OWNER shall recompense the CONTRACTOR for any material or labor so used, and for any actual loss occasioned by such change, due to actual expenses incurred in preparation for the work as originally planned.*

### 3. GENERAL OBLIGATIONS AND RESPONSIBILITIES

3.01 KEEPING OF DRAWINGS AND SPECIFICATIONS ACCESSIBLE. *The ENGINEER shall furnish the CONTRACTOR with five (5) sets of all drawings and specifications without expense to him, and the CONTRACTOR shall keep one copy of the same constantly accessible on the work, with the latest revisions noted thereon.*

3.02 OWNERSHIP OF THE DRAWINGS. *All drawings, specifications and copies thereof furnished by the ENGINEER shall not be reused on other work, and, with the exception of the signed contract sets, are to be returned to him on request, at the completion of the work. All models are the property of the OWNER.*

3.03 ADEQUACY OF DESIGN. *It is understood that the OWNER believes it has employed competent engineers and designers. It is, therefore, agreed that the OWNER shall be responsible for the adequacy of the design, sufficiency of the Contract Documents, the safety of the structure and the practicability of the operations of the completed project; provided the CONTRACTOR has complied with the requirements of the said Contract Documents, all approved*

*modifications thereof, and additions and alterations thereto approved in writing by the OWNER. The burden of proof of such compliance shall be upon the CONTRACTOR to show that he has complied with the said requirements of the Contract Documents, approved modifications thereof and all approved additions and alterations thereof.*

**3.04 RIGHT OF ENTRY.** *The OWNER reserves the right to enter the property or location on which the works herein contracted for are to be constructed or installed, by such agent or agents as he may elect, for the purpose of inspecting the work, or for the purpose of constructing or installing such collateral work as said OWNER may desire.*

**3.05 COLLATERAL CONTACTS.** *The OWNER agrees to provide by separate contract or otherwise, all labor and material essential to the completion of the work specifically excluded from this contract, in such manner as not to delay the progress of the work, or damage said CONTRACTOR, except where such delays are specifically mentioned elsewhere in the Contract Documents.*

**3.06 DISCREPANCIES AND OMISSIONS.** *It is further agreed that it is the intent of this contract that all work must be done and all material must be furnished in accordance with the generally accepted practice, and in the event of any discrepancies between the separate contract documents, the priority of interpretation defined under "Contract Documents" shall govern. In the event that there is still any doubt as to the meaning and intent of any portion of the contract, specifications or drawings, the ENGINEER shall define which is intended to apply to the work.*

**3.07 EQUIPMENT, MATERIALS AND CONSTRUCTION PLANT.** *The CONTRACTOR shall be responsible for the care, preservation, conservation, and protection of all materials, supplies, machinery, equipment, tools, apparatus, accessories, facilities, all means of construction, and any and all parts of the work, whether the CONTRACTOR has been paid, partially paid, or not paid for such work, until the entire work is completed and accepted.*

**3.08 DAMAGES.** *In the event the CONTRACTOR is damaged in the course of the completion of the work by the act, neglect, omission, mistake or default of the OWNER, or of the ENGINEER, or of any other CONTRACTOR employed by the OWNER upon the work, thereby causing loss to the CONTRACTOR, the OWNER agrees that he will reimburse the CONTRACTOR for such loss. In the event the OWNER is damaged in the course of the work by the act, negligence, omission, mistake or default of the CONTRACTOR, or should the CONTRACTOR unreasonably delay the progress of the work being done by others on the job so as to cause loss for which the OWNER becomes liable, then the CONTRACTOR shall reimburse the OWNER for such loss.*

**3.09 PROTECTION AGAINST ACCIDENT TO EMPLOYEES AND THE PUBLIC.** *The CONTRACTOR shall at all times exercise reasonable precautions for the safety of employees and others on or near the work and shall comply with all applicable provision of Federal, State and Municipal safety laws and building and construction code. All machinery and equipment and other physical hazards shall be guarded in accordance with the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America except where incompatible with Federal, State or Municipal laws or regulations. The CONTRACTOR shall provide such machinery guard, safe walkways, ladders, bridges, gangplanks, and other safety*

*devices. The safety precautions actually taken and their adequacy shall be the sole responsibility of the CONTRACTOR, acting at his discretion as an independent contractor.*

**3.10 PERFORMANCE AND PAYMENT BONDS.** *Unless otherwise specified, it is further agreed by the parties to this contract that the CONTRACTOR will execute separate performance and payment bonds, each in the sum of one hundred (100) percent of the total contract price, in standard forms for this purpose, guaranteeing faithful performance of the work and the fulfillment of any guarantees required, and further guaranteeing payment to all persons supplying labor and materials or furnishing him any equipment in the execution of the Contract, and it is agreed that this Contract shall not be in effect until such performance and payment bonds are furnished and approved by the OWNER.*

*Unless otherwise approved in writing by the OWNER, the surety company underwriting the bonds shall be acceptable according to the latest list of companies holding certificates of authority from the Secretary of the Treasury of the United States.*

*Unless otherwise specified, the cost of the premium for the performance and payment bonds shall be included in the CONTRACTOR'S proposal.*

**3.11 LOSSES FROM NATURAL CAUSES.** *Unless otherwise specified, all loss or damage to the CONTRACTOR arising out of the nature of the work to be done, or from the action of the elements, or from any unforeseen circumstance in the prosecution of the same, or from unusual obstructions or difficulties which may be encountered in the prosecution of the work, shall be sustained and borne by the CONTRACTOR at his own cost and expense.*

**3.12 PROTECTION OF ADJOINING PROPERTY.** *The said CONTRACTOR shall take proper means to protect the adjacent or adjoining property or properties in any way encountered, which might be injured or seriously affected by any process of construction to be undertaken under this Agreement, from any damage or injury by reason of said process of construction; and he shall be liable for any and all claims for such damage on account of his failure to fully protect all adjoining property. The CONTRACTOR agrees to indemnify, save and hold harmless the OWNER and ENGINEER against any claim or claims for damages due to any injury to any adjacent or adjoining property, arising or growing out of the performance of the contract; but any such indemnity shall not apply to any claim of any kind arising out of the existence or character of the work.*

**3.13 PROTECTION AGAINST CLAIMS OF SUB-CONTRACTORS, LABORERS, MATERIAL MEN AND FURNISHERS OF MACHINERY, EQUIPMENT AND SUPPLIES.** *The CONTRACTOR agrees that he will indemnify and save the OWNER and ENGINEER harmless from all claims growing out of the lawful demands of sub-contractors, laborers, workmen, mechanics, materialmen and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this contract. When so desired by the OWNER, the CONTRACTOR shall furnish satisfactory evidence that all obligations of the nature herein above designated have been paid, discharged or waived. If the CONTRACTOR fails so to do, then the OWNER may at the option of the CONTRACTOR either pay directly any unpaid bills, to which the OWNER has written notice, or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to liquidate any and all such lawful claims until satisfactory evidence is furnished that all liabilities have*

*been fully discharged, whereupon payments to the CONTRACTOR shall be resumed in full, in accordance with the terms of this contract, but in no event shall the provision of this sentence be construed to impose any obligation upon the OWNER by either the CONTRACTOR or his Surety.*

**3.14 PROTECTION AGAINST ROYALTIES OR PATENTED INVENTION.** *The CONTRACTOR shall pay all royalties and license fees, and shall provide for the use of any design, device, material or process covered by letters patent or copyright by suitable legal agreement with the patentee or owner. The CONTRACTOR shall defend all suits or claims for infringement of any patent or copyright rights and shall indemnify and save the OWNER and ENGINEER harmless from any loss on account thereof, except that the OWNER shall defend all such suits and claims and shall be responsible for all such loss when a particular design, device, material or process or the product of a particular manufacturer or manufacturers is specified or required by the OWNER; provided, however, if choice of alternate design, device, material or process is allowed to the CONTRACTOR, then CONTRACTOR shall indemnify and save OWNER harmless from any loss on account thereof. If the material or process specified or required by the OWNER is an infringement, the CONTRACTOR shall be responsible for such loss unless he promptly gives such information to the OWNER.*

**3.15 LAWS AND ORDINANCES.** *The CONTRACTOR shall at all times observe and comply with all Federal, State and local laws, ordinances and regulations, which in any manner affect the contract or the work, and shall indemnify and save harmless the OWNER and ENGINEER against any claim arising from the violation of any such laws, ordinances, and regulations whether by the CONTRACTOR or his employees, except where such violations are called for by the provisions of the Contract Documents.*

*CONTRACTOR is responsible for obtaining all required permits required to accomplish the work. If the CONTRACTOR observes that the construction drawings and specifications are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in the contract for changes in the work. If the CONTRACTOR performs any work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the ENGINEER, he shall bear all costs arising therefrom, In case the OWNER is a body politic and corporate, the law which it derives its powers, insofar as the same regulated the objects for which, or the manner in which, or the conditions under which the OWNER may enter into contract, shall be controlling, and shall be considered as part of this contract, to the same effect as though embodied herein.*

**3.16 ASSIGNMENT AND SUBLETTING.** *The CONTRACTOR further agrees that he will retain personal control and will give his personal attention to the fulfillment of this contract and that he will not assign by Power of Attorney, or otherwise, or sublet said contract without the written consent of the ENGINEER, and that no part or feature of the work will be sublet to anyone objectionable to the ENGINEER or OWNER. The CONTRACTOR further agrees that the subletting of any portion or feature of the work, or materials required in the performance of this contract, shall not relieve the CONTRACTOR from his full obligations to the OWNER, as provided by this Agreement.*

**3.17 INDEMNIFICATION.** *The CONTRACTOR shall defend, indemnify and hold harmless the OWNER and the ENGINEER and their respective officers, agents and employees, from*

*and against all damages, claims, losses, demands, suits, judgements and costs, including reasonable attorneys' fees and expenses, arising out of or resulting from the performance of the work, provided that any such damages, claim, loss, demand, suit, judgement, cost or expense:*

- (1) Is attributable to bodily injury, sickness, disease or death or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom; and,*
- (2) Is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any one of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.*

*The CONTRACTOR will indemnify the OWNER and the ENGINEER against all legal claims for payment of subcontractors, laborers, workmen, and suppliers of material, equipment, or services. If required, the CONTRACTOR must furnish satisfactory evidence that all such obligations have been paid, discharged, or waived. Should the CONTRACTOR fail to meet these obligations and the claimant makes written notice to the OWNER, the OWNER may pay directly any such claims. Whether or not the OWNER pays the claim, the OWNER may withhold payment to the CONTRACTOR until satisfactory evidence is furnished that the CONTRACTOR'S obligations have been fully discharged. With such evidence, payments will be resumed. This provision must not be interpreted to obligate the OWNER to the CONTRACTOR or his surety.*

*The obligation of the CONTRACTOR under this Paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, drawings, reports, surveys, Change Orders, designs or specifications, or the giving of or the failure to give directions or instructions by the ENGINEER, his agents or employees, provided such giving or failure to give is the primary cause of the injury or damage.*

**3.18 INSURANCE.** *The CONTRACTOR at his own expense shall purchase, maintain and keep in force such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR'S operations under the Contract, whether such operations be by himself or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. Insurance coverage shall include, but is not limited to:*

- (1) Liability insurance which protects CONTRACTOR from claims under workmen's compensation acts and from any other claims for damages or personal injury, including death. Protection will cover any claim resulting from performance of the work, whether by himself, any subcontractor, or anyone directly or indirectly employed by either. Insurance must be maintained with a company or companies to which the OWNER has no reasonable objection.*
- (2) Comprehensive general liability insurance will be provided with the OWNER, the ENGINEER, and their employees as additional insureds. This general liability insurance will include contractual liability insurance required to meet the CONTRACTOR'S obligations under the provision for indemnification.*

(3) *Comprehensive automobile liability insurance.*

(4) *The limits for bodily injury and property damage will be as established in the Contract Documents or as required by law, whichever is greater.*

3.18.1 **CERTIFICATE OF INSURANCE.** *Before commencing any of the work, CONTRACTOR shall file with the OWNER valid Certificates of Insurance acceptable to the OWNER and the ENGINEER. Such Certificates shall contain a provision that coverages afforded under the policies will not be cancelled until at least fifteen days' prior written notice has been give to the OWNER.*

*The CONTRACTOR shall also file with the OWNER valid Certificates of Insurance covering all sub-contractors.*

#### 4. PROSECUTION AND PROGRESS

4.01 **TIME AND ORDER OF COMPLETION.** *It is the meaning and intent of this contract, unless otherwise herein specifically provided, that the CONTRACTOR shall be allowed to prosecute his work at such times and seasons, in such order of precedence, and in such manner as shall be most conducive to economy of construction: provided, however, that the order and time of prosecution shall be such that the work shall be substantially completed as a whole and in part, in accordance with this contract, the construction drawings and specifications, and within the time of completion designated in the Proposal; provided, also, that when the OWNER is having other work done, either by contract or by his own force, the ENGINEER may direct the time and manner of constructing the work done under this contract, so that conflict will be avoided and the construction of the various works being done for the OWNER shall be harmonized.*

*The CONTRACTOR shall submit, at such times as may reasonably be requested by the ENGINEER, schedules which shall show the order in which the CONTRACTOR proposes to carry on the work, with dates at which the CONTRACTOR will start the several parts of the work, and estimated dates of completion of the several parts.*

4.02 **EXTENSION OF TIME.** *Should the CONTRACTOR be delayed in the completion of the work by any act or neglect of the OWNER or ENGINEER, or of any employee of either, or by other contractors employed by the OWNER, or by changes ordered in the work, or by strikes, lockouts, fires, and unusual delays by common carriers, or unavoidable cause or causes beyond the CONTRACTOR'S control, or by any cause which the ENGINEER shall decide justifies the delay, then an extension of time shall be allowed for completing the work, sufficient to compensate for the delay, the amount of the extension to be determined by the ENGINEER, provided, however, that the CONTRACTOR shall give the ENGINEER prompt notice in writing of the cause of such delay.*

4.03 **HINDRANCES AND DELAYS.** *No claims shall be made by the CONTRACTOR for damages resulting from hindrances or delays from any cause (except where the work is stopped by order of the OWNER) during the progress of any portion of the work embraced in this contract. In case said work shall be stopped by the act of the OWNER, then such expense as in the*

*judgement of the ENGINEER is caused by such stoppage of said work shall be paid by the OWNER to the CONTRACTOR.*

## 5. MEASUREMENT AND PAYMENT

5.01 QUANTITIES AND MEASUREMENTS. *No extra or customary measurements of any kind will be allowed, but the actual measured and/or computed length, area, solid contents, number and weight only shall be considered, unless otherwise specifically provided.*

5.02 ESTIMATED QUANTITIES. *This agreement, including the specifications, construction drawings, and estimate, is intended to show clearly all work to be done and material to be furnished hereunder. Where the estimated quantities are shown for the various classes of work to be done and material to be furnished under this contract, they are approximate and are to be used only as a basis for estimating the probable cost of the work and for comparing the proposals offered for the work. It is understood and agreed that the actual amount of work to be done and material to be furnished under this contract may differ somewhat from these estimates, and that where the basis for payment under this contract is the unit price method, payment shall be for the actual amount of such work done and material furnished.*

*Where payment is based on the unit price method, the CONTRACTOR agrees that he will make no claim for damages, anticipated profits or otherwise on account of any differences which may be found between the quantities of work actually done, the material actually furnished under this contract and the estimated quantities contemplated and contained in the proposal; provided, however, that in case the actual quantity of any major item should become as much as 20% more than, or 20% less than the estimated or contemplated quantity for such items, then either party to this Agreement, upon demand, shall be entitled to a revised consideration upon the portion of the work above or below 20% of the estimated quantity.*

*A "Major Item" shall be construed to be any individual bid item incurred in the proposal that has a total cost equal to or greater than five (5) per cent of the total contract cost, computed on the basis of the proposal quantities and the contract unit prices.*

*Any revised consideration is to be determined by agreement between the parties, otherwise by the terms of this Agreement, as provided under "Extra Work."*

5.03 PRICE OF WORK. *In consideration of the furnishing of all the necessary labor, equipment and material, and the completion of all work by the CONTRACTOR, and on the completion of all work and of the delivery of all material embraced in this Contract in full conformity with the specifications and stipulations herein contained, the OWNER agrees to pay the CONTRACTOR the prices set forth in the Proposal hereto attached, which has been made a part of this contract. The CONTRACTOR hereby agree to receive such prices in full for furnishing all material and all labor required for the aforesaid work, also for all expense incurred by him, and for well and truly performing the same and the whole thereof in the manner and according to this Agreement.*

5.04 PARTIAL PAYMENTS. *On or before the 10<sup>th</sup> day of each month, the CONTRACTOR shall prepare and submit to the ENGINEER for approval or modification a statement showing as completely as practicable the total value of the work done by the CONTRACTOR up to and including the last day of the preceding month; said statement shall also include the value of all sound materials delivered on the site of the work that are to be fabricated into the work.*

*The OWNER shall then pay the CONTRACTOR on or before the 25<sup>th</sup> day of the current month the total amount of the approved statement, less 10 per cent of the amount thereof, which 10 per cent shall be retained until final payment, and further less all previous payments and all further sums that may be retained by the OWNER under the terms of this Agreement. It is understood, however, that in case the whole work be near to completion and some unexpected and unusual delay occurs due to no fault or neglect on the part of the CONTRACTOR, the OWNER may---upon written recommendation of the ENGINEER---pay a reasonable and equitable portion of the retained percentage to the CONTRACTOR; or the CONTRACTOR at the OWNER'S option, may be relieved of the obligation to fully complete the work and, thereupon, the CONTRACTOR shall receive payment of the balance due him under the contract subject only to the conditions stated under "Final Payment."*

5.05 USE OF COMPLETED PORTIONS. *The OWNER shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work or such portions may not have expired but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of or delays the work, the CONTRACTOR shall be entitled to such extra compensation, or extension of time, or both, as the ENGINEER may determine.*

*The CONTRACTOR shall notify the ENGINEER when, in the CONTRACTOR'S opinion, the contract is "substantially completed" and when so notifying the ENGINEER, the CONTRACTOR shall furnish to the ENGINEER in writing a detailed list of unfinished work and will add thereto such items as the CONTRACTOR has failed to include. The "substantial completion" of the structure or facility shall not excuse the CONTRACTOR from performing all of the work undertaken, whether of a minor or major nature, and thereby completing the structure or facility in accordance with the Contract Documents.*

5.06 WARRANTY. *The CONTRACTOR warrants to the ENGINEER and the OWNER that all materials and equipment furnished under this contract will be new and of good quality. No material used by the CONTRACTOR for any temporary purpose will be incorporated in the permanent structure without written consent of the ENGINEER. All furnished materials to be incorporated in any permanent structure will be manufactured within the United States of America or its possessions. The CONTRACTOR also warrants that all work will be of good quality, free from faults and defects, conforming to Contract Documents.*

*All work not conforming to these standards will be considered defective. If required, the CONTRACTOR must furnish satisfactory evidence of the kind and quality of materials and equipment.*

5.07 GUARANTEE. *Upon completion of the work, the CONTRACTOR will provide his written guarantee in a form satisfactory to the ENGINEER. It will guarantee all the work to be free of faulty materials and improper workmanship. The CONTRACTOR agrees to replace, without*

*cost to the OWNER, any work found to be improper or imperfect and to make good all damage to other work caused by such replacement. The guarantee period for the work is one year from work completion, as determined by the ENGINEER'S certificate of completion. Additional guarantees for specific items may also be required. These guarantees must be approved by the ENGINEER before acceptance and final payment is made.*

*The CONTRACTOR will supply the OWNER with copies of all guarantees and warranties, which have been made to the CONTRACTOR by suppliers or subcontractors, with an assignment of these guarantees and warranties to the OWNER. Assignments will not relieve the CONTRACTOR of his responsibility in case of a supplier's or subcontractor's failure to fulfill guarantee or warranty provisions.*

*Neither certificate of completion, nor final payment, nor any provision in Contract Documents relieves the CONTRACTOR of responsibility for faulty materials or workmanship during guarantee periods.*

**5.08 FINAL COMPLETION AND ACCEPTANCE.** *Within ten (10) days after the CONTRACTOR has given the ENGINEER written notice that the work has been completed, or substantially completed, the ENGINEER and the OWNER shall inspect the work and within said time, if the work be found to be completed or substantially completed in accordance with the Contract Documents, the ENGINEER shall issue to the OWNER and the CONTRACTOR his Certificate of Completion, and thereupon it shall be the duty of the OWNER within ten (10) days to issue a Certificate of Acceptance of the work to the CONTRACTOR or to advise the CONTRACTOR in writing of the reason for non-acceptance.*

**5.09 FINAL PAYMENT.** *Prior to Final Payment, CONTRACTOR must furnish a written guarantee (5.07) and Affidavits showing all bills owing against the work by the CONTRACTOR are paid in full. Upon the issuance of the Certificate of Completion, the ENGINEER shall proceed to make final measurements and prepare final statement of the value of all work performed and materials furnished under the terms of the Agreement and shall certify same to the OWNER, who shall pay to the CONTRACTOR on or after the 30<sup>th</sup> day, and before the 35<sup>th</sup> day, after the date of the Certificate of Completion, the balance due the CONTRACTOR under the terms of this Agreement, provided he has fully performed his contractual obligations under the terms of this contract; and said payment shall become due in any event upon said performance by the CONTRACTOR. Neither the Certificate of Acceptance nor the final payment, nor any provision in the Contract Documents, shall relieve the CONTRACTOR of the obligation for fulfillment of any warranty which may be required.*

**5.10 PAYMENTS WITHHELD.** *The OWNER may, on account of subsequently discovered evidence, withhold or nullify the whole or part of any certificate to such extent as may be necessary to protect himself from loss on account of:*

- (a) Defective work not remedied.*
- (b) Claims filed or reasonable evidence indicating probable filing of claims.*
- (c) Failure of the CONTRACTOR to make payments properly to subcontractors or for material or labor.*
- (d) Damage to another contractor.*

- (e) *Reasonable doubt that the work can be completed for the unpaid balance of the contract amount.*
- (f) *Reasonable indication that the work will not be completed within the contract time.*

*When the above grounds are removed or the CONTRACTOR provides a Surety Bond satisfactory to the OWNER, which will protect the OWNER in the amount withheld, payment shall be made for amounts withheld because of them.*

5.11 DELAYED PAYMENTS. *Should the OWNER fail to make payment to the CONTRACTOR of the sum named in any partial or final statement, when payment is due, then the OWNER shall pay the CONTRACTOR, in addition to the sum shown as due by such statement, interest thereon at the rate of six (6) per cent per annum, unless otherwise specified, from date due as provided under "Partial Payments" and "Final Payments," until fully paid, which shall fully liquidate any injury to the CONTRACTOR growing out of such delay in payment, but the right is expressly reserved to the CONTRACTOR in the event payments be not promptly made, as provided under "Partial Payments," to at any time thereafter treat the contract as abandoned by the OWNER and recover compensation, as provided under "Abandonment of Contract," unless such payments are withheld in accordance with the provisions of "Payments Withheld."*

## 6. EXTRA WORK AND CLAIMS

6.01 CHANGE ORDERS. *Without invalidating this Agreement, the OWNER may, at any time or from time to time, order additions, deletions or revisions to the work; such changes will be authorized by Change Order to be prepared by the ENGINEER for execution by the OWNER and the CONTRACTOR. The Change Order shall set forth the basis of any change in contract price, as hereinafter set forth for Extra Work, and any change in contract time which may result from the change.*

*In the event the CONTRACTOR shall refuse to execute a Change Order which has been prepared by the ENGINEER and executed by the OWNER, the ENGINEER may in writing instruct the CONTRACTOR to proceed with the work as set forth in the Change Order and the CONTRACTOR may make claim against the OWNER for Extra Work involved therein, as hereinafter provided.*

6.02 MINOR CHANGES. *The ENGINEER may authorize minor changes in the work not inconsistent with the overall intent of the Contract Documents and not involving an increase in Contract Price. If the CONTRACTOR believes that any minor change or alteration authorized by the ENGINEER involves Extra Work and entitles him to an increase in the Contract Price, the CONTRACTOR shall make written request to the ENGINEER for a written Field Order.*

*In such case, the CONTRACTOR by copy of his communication to the ENGINEER or otherwise in writing shall advise the OWNER of his request to the ENGINEER for a written Field Order and that the work involved may result in an increase in the Contract Price.*

*Any request by the CONTRACTOR for a change in Contract Price shall be made prior to the beginning the work covered by the proposed change.*

6.03 EXTRA WORK. *It is agreed that the basis of compensation to the CONTRACTOR for work either added or deleted by a Change Order or for which a claim for Extra Work is made shall be determined by one or more of the following methods:*

*Method (A) – By agreed unit prices; or*

*Method (B) – By agreed lump sum; or*

*Method (C) – If neither Method (A) nor Method (B) be agreed upon before the Extra Work is commenced, then the CONTRACTOR shall be paid the “actual field cost” of the work, plus fifteen (15) percent.*

*In the event said Extra Work be performed and paid for under Method (C), then the provisions of this paragraph shall apply and the “actual field cost” is hereby defined to include the cost to the CONTRACTOR of all workmen, such as foreman, timekeepers, mechanics and laborers, and materials, supplies, teams, trucks, rentals on machinery and equipment, for the time actually employed or used on such Extra Work, plus actual transportation charges necessarily incurred, together with all power, fuel, lubricants, water and similar operating expenses, also all necessary incidental expenses incurred directly on account of such Extra Work, including Social Security, Old Age Benefits and other payroll taxes, and, a rateable proportion of premiums on Performance and Payment Bonds and Maintenance Bonds, Public Liability and Property Damage and Workmen’s Compensation, and all other insurance as may be required by law or ordinance, or directed by the OWNER, or by them agreed to. The ENGINEER may direct the form in which accounts of the “actual field cost” shall be kept and the records of these accounts shall be made available to the ENGINEER. The ENGINEER or OWNER may also specify in writing, before the work commences, the method of doing the work and the type and kind of machinery and equipment to be used; otherwise these matters shall be determined by the CONTRACTOR. Unless otherwise agreed upon, the prices for the use of machinery and equipment shall be determined by using 100 per cent, unless otherwise specified of the latest schedule of Equipment Ownership Expense adopted by the Associated General Contractors of America. Where practicable the terms and prices for the use of machinery and equipment shall be incorporated in the Written Extra Work Order. The fifteen (15) per cent of the “actual field cost” to be paid the CONTRACTOR shall cover and compensate him for his profit, overhead, general superintendence and field office expense, and all other elements of cost and expense not embraced within the “actual field cost” as herein defined, save that where the CONTRACTOR’S Camp or Field Office must be maintained primarily on account of such Extra Work; the cost to maintain and operate the same shall be included in the “actual field cost.”*

*No claim for Extra Work of any kind will be allowed unless ordered in writing by the ENGINEER. In case any orders or instructions, either oral or written, appear to the CONTRACTOR to involve Extra Work for which he should receive compensation or an adjustment in the construction time, he shall make written request to the ENGINEER for written order authorizing such Extra Work. Should a difference of opinion arise as to what does or does not constitute Extra Work, or as the payment therefor, and the ENGINEER insists upon its performance, the CONTRACTOR shall proceed with the work after making written request for written order and shall keep an accurate account of the “actual field cost” thereof, as provided under Method (C). The CONTRACTOR will thereby preserve the right to submit the matter of payment to arbitration, as hereinbelow provided.*

6.04 TIME OF FILING CLAIMS. *It is further agreed by both parties hereto that all questions of dispute or adjustment presented by the CONTRACTOR shall be in writing and filed with the ENGINEER within thirty (30) days after the ENGINEER has given any directions, order or instruction to which the CONTRACTOR desires to take exception. The ENGINEER shall reply within thirty (30) days to such written exceptions by the CONTRACTOR and render his final decision in writing. In case the CONTRACTOR should appeal from the ENGINEER'S decision, any demand for arbitration shall be filed with the ENGINEER and the OWNER in writing within ten (10) days after the date of delivery to CONTRACTOR of the ENGINEER'S final decision. It is further agreed that final acceptance of the work by the OWNER and the acceptance by the CONTRACTOR of final payment shall be a bar to any claims by either party, except where noted otherwise in the Contract Documents.*

6.05 ARBITRATION. *All questions of dispute under this Agreement shall be submitted to arbitration at the request of either party to the dispute. The parties may agree upon one arbiter, otherwise, there shall be three, one named in writing by each party, and the third chosen by the two arbiters so selected; or if the arbiters fail to select a third within ten (10) days, he shall be chosen by a District Judge serving the County in which the major portion of the project is located, unless otherwise specified. Should the party demanding arbitration fail to name an arbiter within ten (10) days of the demand, his right to arbitrate shall lapse, and the decision of the ENGINEER shall be final and binding on him. Should the other party fail to choose an arbiter within ten (10) days, the ENGINEER shall appoint such arbiter. Should either party refuse or neglect to supply the arbiters with any papers or information demanded in writing, the arbiters are empowered by both parties to take ex parte proceedings.*

*The arbiters shall act with promptness. The decision of any two shall be binding on both parties to the contract. The decision of the arbiters upon any question submitted to arbitration under this contract shall be a condition precedent to any right of legal action. The decision of the arbiter or arbiters may be filed in court to carry it into effect.*

*The arbiters, if they deem the case demands it, are authorized to award the party whose contention is sustained, such sums as they deem proper for the time, expense and trouble incident to the appeal, and if the appeal was taken without reasonable cause, they may award damages for any delay occasioned thereby. The arbiters shall fix their own compensation, unless otherwise provided by agreement, and shall assess the cost and charges of the arbitration upon either or both parties. The award of the arbiters must be made in writing.*

## 7. ABANDONMENT OF CONTRACT

7.01 ABANDONMENT BY CONTRACTOR. *In case the CONTRACTOR should abandon and fail or refuse to resume work within ten (10) days after written notification from the OWNER, or the ENGINEER, or if the CONTRACTOR fails to comply with the orders of the ENGINEER, when such orders are consistent with the Contract Documents, then, and in that case, where performance and payment bonds exist, the Sureties on these bonds shall be notified in writing and directed to complete the work, and a copy of said notice shall be delivered to the CONTRACTOR.*

*After receiving said notice of abandonment the CONTRACTOR shall not remove from the work any machinery, equipment, tools, materials or supplies then on the job, but the same, together with any materials and equipment under contract for the work, may be held for use on*

*the work by the OWNER or the Surety on the performance bond, or another contractor in completion of the work; and the CONTRACTOR shall not receive any rental or credit therefor (except when used in connection with Extra Work, where credit shall be allowed as provided for under Section 6, Extra Work and Claims), it being understood that the use of such equipment and materials will ultimately reduce the cost to complete the work and be reflected in the final settlement.*

*Where there is no performance bond provided or in case the Surety should fail to commence compliance with the notice for completion hereinbefore provided for, within ten (10) days after service of such notice, then the OWNER may provide for completion of the work in either of the following elective manners:*

*7.01.1 The OWNER may thereupon employ such force of men and use such machinery, equipment, tools, materials, and supplies as said OWNER may deem necessary to complete the work and charge the expense of such labor, machinery, equipment, tools, materials and supplies to said CONTRACTOR, and expense so charged shall be deducted and paid by the OWNER out of such moneys as may be due, or that may thereafter at any time become due to the CONTRACTOR under and by virtue of this Agreement. In case such expense is less than the sum which would have been payable under this contract, if the same had been completed by the CONTRACTOR, then said CONTRACTOR shall receive the difference. In case such expense is greater than the sum which would have been payable under this contract, if the same had been completed by said CONTRACTOR, then the CONTRACTOR and/or his Surety shall pay the amount of such excess to the OWNER; or*

*7.01.2 The OWNER under sealed bids, after five (5) days notice published one or more times in a newspaper having general circulation in the county of the location of work, may let the contract for the completion of the work under substantially the same terms and conditions which are provided in this contract. In case any increase in cost to the OWNER under the new contract as compared to what would have been the cost under this contract, such increase shall be charged to the CONTRACTOR and the Surety shall be and remain bound therefor. However, should the cost to complete any such new contract prove to be less than what would have been the cost to complete under this contract, the CONTRACTOR and/or his Surety shall be credited therewith.*

*When the work shall have been substantially completed the CONTRACTOR and his Surety shall be so notified and Certificates of Completion and Acceptance, as provided in Paragraph 5.06 hereinabove, shall be issued. A complete itemized statement of the contract accounts, certified to by the ENGINEER as being correct, shall then be prepared and delivered to the CONTRACTOR and his Surety, whereupon the CONTRACTOR and/or his Surety, or the OWNER as the case may be, shall pay the balance due as reflected by said statement, within fifteen (15) days after the date of such Certificate of Completion.*

*In the event that statement of accounts shows that the cost to complete the work is less than that which would have been the cost to the OWNER had the work been completed by the CONTRACTOR under the terms of this contract; or when the CONTRACTOR and/or his Surety shall pay the balance shown to be due by them to the OWNER, then all machinery, equipment, tools, materials, or supplies left on the site of the work shall be turned over to the CONTRACTOR and/or his surety. Should the cost to complete the work exceed the contract price, and the CONTRACTOR and/or his Surety fail to pay the amount due the OWNER within the time designated hereinabove,*

*and there remains any machinery, equipment, tools, materials or supplies on the site of the work, notice thereof, together with an itemized list of such equipment and materials, shall be mailed to the CONTRACTOR and his surety at the respective addresses designated in this contract, provided, however, that actual written notice given in any manner will satisfy this condition. After mailing, or other giving of such notice, such property shall be held at the risk of the CONTRACTOR and his Surety subject only to the duty of the OWNER to exercise ordinary care to protect such property. After fifteen (15) days from the date of said notice the OWNER may sell such machinery, equipment, tools, materials or supplies and apply the net sum derived from such sale to the credit of the CONTRACTOR and his Surety. Such sale may be made at either public or private sale, with or without notice, as the OWNER may elect. The OWNER shall release any machinery, equipment, tools, materials or supplies, which remain on the work, and belong to persons other than the CONTRACTOR or his Surety, to their proper OWNERS. The books on all operations provided herein shall be open to the CONTRACTOR and his Surety.*

*7.02 ABANDONMENT BY OWNER. In the case the OWNER shall fail to comply with the terms of this contract, and should fail or refuse to comply with said terms within ten (10) days after written notification by the CONTRACTOR, then the CONTRACTOR may suspend or wholly abandon the work, and may remove therefrom all machinery, tools, and equipment, and all materials on the site of work that have been included in payments to the CONTRACTOR and have not been wrought into the work. And thereupon the ENGINEER shall make an estimate of the total amount earned by the CONTRACTOR, which estimate shall include the value of all work actually completed by said CONTRACTOR (at the prices stated in the attached proposal where unit prices are used), the value of all partially completed work at a fair and equitable price, and the amount of all Extra Work performed at the prices agreed upon, or provided for by the terms of this contract, and a reasonable sum to cover the cost of any provisions made by the CONTRACTOR to carry the whole work to completion and which cannot be utilized. The ENGINEER shall then make a final statement of the balance due the CONTRACTOR by deducting from the above estimate all previous payments by the OWNER and all other sums that may be retained by the OWNER who shall pay the CONTRACTOR on or before thirty (30) days after the date of the notification by the CONTRACTOR the balance shown by said final statement as due the CONTRACTOR, under the terms of this Agreement.*

## SUPPLEMENTARY CONDITIONS OF THE CONTRACT

These supplementary conditions amend the general conditions of this project by addition or deletion of certain provisions. The paragraph numbers for supplementary conditions correspond with the affected paragraph numbers of the general conditions. All other paragraphs of the general conditions remain unaltered. Work-related specifications of a general nature can be found in Division 1 of these specifications.

### SECTION 1.02 – CONTRACT DOCUMENTS

Add the following new paragraph to Section 1.02:

Accompanying these specifications and forming an integral part thereof are the following drawings for construction of the SE Quad Water and Sewer Extension Project, Phase 1A – Water; Phase 1A – Sewer and Phase 1B – Lift Station and Force Main to the SE Quadrant in Pecos, Texas.

#### Sheet No.

#### Title

#### Phase 1A – Water Line Extension

1	Cover Sheet and Notes
2	Horizontal Alignments
3	Overall Water Line Layout
4	Legal Descriptions & Easements
5	Water Line Plan & Profile - Sta. 0+15 to 13+00
6	Water Line Plan & Profile - Sta. 13+00 to 26+00
7	Water Line Plan & Profile - Sta. 26+00 to 33+30
8	Water Service Plan & Profile - Sta. 0+15 to 13+00
9	Sanitary Sewer Lateral Sta. 0+00 to 1+15
10	Details
11	Details

#### Phase 1A - Sanitary Sewer

12	Cover Sheet and Notes
13	Horizontal Alignments
14	Overall Sanitary Sewer Layout
15	Legal Descriptions & Easements
16	Sanitary Sewer Line "A" Sta. 0+00 to 14+00
17	Sanitary Sewer Line "A" Sta. 14+00 to 29+00
18	Sanitary Sewer Line "A" Sta. 29+00 to 44+00
19	Sanitary Sewer Line "A" Sta. 44+00 to 58+74.64
20	Sanitary Sewer Lateral Sta. 0+00 to 4+50
21	Sanitary Sewer Details
22	Sanitary Sewer Details

Phase 1B - Sanitary Sewer Lift Station and Force Main

1	Cover Sheet and Index
2	Horizontal Alignments
3	Overall Sanitary Sewer Layout
4	Legal Descriptions & Easements
5	Lift Station Site Plan
6	Lift Station Assembly Plan & Cross Section
7	Sanitary Sewer 10" Force Main Sta. 49+00 to 59+42.50
8	Sanitary Sewer 10" Force Main Sta. 34+00 to 49+00
9	Sanitary Sewer 10" Force Main Sta. 19+00 to 34+00
10	Sanitary Sewer 10" Force Main Sta. 4+75 to 19+00
11	Sanitary Sewer Line "F" Sta. 0+00 to 1+88.74
12	Sanitary Sewer Line "G" Sta. 0+00 to 4+75
13	Sanitary Sewer Details
14	Sanitary Sewer Details
15	Sanitary Sewer Details
16	Electrical Site Plan
17	Electrical Plan, Riser and Details
18	Electrical Specifications

Also included are the following Specifications with latest amendments, addenda and revised drawings that pertain to the contract work.

City of Pecos	SEWER WORKS CONSTRUCTION STANDARDS
City of Pecos	WATER WORKS CONSTRUCTION STANDARDS
TCEQ	CHAPTER 217 SUBCHAPTER C AS APPLICABLE
TCEQ	CHAPTER 290 SUBCHAPTER D AS APPLICABLE
REEVES	COUNTY ROW RULES AND REGULATIONS FOR UTILITY CONSTRUCTION WITHIN REEVES COUNTY ROAD ROWS

SECTION 3.10 – PERFORMANCE AND PAYMENT BONDS

Add the following paragraph(s)

A performance and payment bond is required for this CONTRACT using the attached forms or other form acceptable to the OWNER.

## SECTION 3.18 – INSURANCE

Add the following new paragraphs 3.18 (5) and 3.18 (6):

3.18 (5) The CONTRACTOR shall provide and maintain Comprehensive General Liability Insurance with Bodily Injury limits of not less than \$500,000 for any one person and \$1,00,000 for two or more persons in any one accident, and a Property Damage Limit of not less than \$500,000 for any one accident.

3.18 (6) The CONTRACTOR shall provide and maintain Comprehensive Automobile Liability Insurance with Bodily Injury limits of not less than \$100,000 for any one person and \$300,000 for two or more persons in a single accident, and Property Damage limit of not less than \$50,000 for any one accident.

3.18 (7) The CONTRACTOR shall provide and maintain General Umbrella Liability Insurance with limits of not less than \$1,000,000.

At the end of the section, add the following paragraphs:

The Owner (The Town of Pecos City) and Engineer shall be named in all Contractor and Subcontractor insurance policies as an “additional insured.”

The insurance carrier shall provide the Owner with thirty (30) days advance written notice of any change, cancellation or termination of coverage.

Any additional expense for the modification or endorsements to the insurance policy required in this section shall be paid by the Contractor without additional payment by the Owner.

#### SECTION 4.01 – TIME AND ORDER OF COMPLETION

Add the following sentence to the seconds paragraph:

This schedule shall be submitted to the Engineer before the notice to proceed is prepared. The schedule should be relative to the beginning of the contract period, which is 10 days after the notice to proceed, or the date of actual move-in, whichever is earlier.

#### SECTION 4.02 – EXTENSION OF TIME

Add the following paragraph:

The CONTRACTOR has reviewed the calendar day contract time for the work considering the time of the year proposed for the work and has acknowledged in the bidding documents a total contract period of performance for the work. The Contractor and Owner agree that time is of the essence of this Contract. The Contractor and the Owner agree that a breach of this Contract by failure to complete the work in the specified time will cause harm to the Owner, and further agree that the harm the Owner would sustain and the actual measure of damages the Owner would incur from the breach are very difficult to ascertain. Therefore, the Contractor and Owner agree that for each calendar day the Work or any portion thereof shall remain uncompleted after the expiration of the time limit set in the Contract, including extensions granted under the provisions of these General Conditions, Contractor shall be liable to Owner for liquidated damages in the amount of \$500 for each such calendar day.

#### SECTION 5.03 – PRICE OF WORK

Add the following paragraph:

The CONTRACTOR agrees to remove tax charges from any and all materials to be provided and to protect, install, test and place into service all materials into the project work.

## SECTION 5.04 – PARTIAL PAYMENTS

Replace the first clause of the first paragraph with the following:

On or before the second (2<sup>nd</sup>) day of each month, ...

Delete the following clause from the first paragraph:

...; said statement shall also include the value of all sound materials delivered on the site of the work that are to be fabricated into the work.

Add the following sentence to the first paragraph:

The OWNER will pay for installed items at the contract unit price only. There will be not progress payments for materials stored on or off site.

Add the following paragraph:

Partial payments will be made only during the contract construction period. Should the project not be substantially complete as defined in the General Conditions with the specified period, the OWNER is not obligated to make partial payments as otherwise required.

-- o 0 o --

## AGREEMENT

STATE OF TEXAS

COUNTY OF REEVES

THIS AGREEMENT ("Agreement") is made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2020, by and between the Town of Pecos City (the "Owner") c/o Seth Sorensen, City Manager, 115 West 3<sup>rd</sup> Street, Pecos, Texas 79772, and \_\_\_\_\_ of the City of \_\_\_\_\_, County of \_\_\_\_\_, and State of \_\_\_\_\_, hereinafter termed "Contractor."

All capitalized terms used herein shall be given the meanings set forth in the General Conditions. MBS Development Services LLC shall be referred to herein as the "Engineer."

For and in consideration of the mutual covenants hereinafter set forth, and under the conditions expressed in the Bonds bearing even date herewith, the Contractor and Owner hereby agree as follows:

Contractor shall commence and complete the Work generally described as follows:

Phase 1A – Water Line Extension  
for  
The Town of Pecos City, Texas  
To serve the SE Quadrant  
according to those particular Plans and Technical Specifications  
prepared by Engineer  
in the initial Contract Price of \$\_\_\_\_\_

and all Extra Work in connection therewith, under the terms as stated in the General and Special Conditions of the Agreement, and, at Contractor's own proper cost and expense, to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said Work, in accordance with the conditions and prices stated in the Bid attached hereto and in accordance with the Contract Documents, including, but not limited to, Invitation to Bidders, Instructions to Bidders, General and Special Conditions of the Agreement, Plans, and other drawings and printed or written explanatory matter thereof, and the Technical Specifications, on file with Engineer. Contractor represents and warrants to the Owner that it has carefully examined this Agreement and all other Contract Documents, which are made a part of the Contract, and is thoroughly familiar therewith.

The Contractor hereby agrees to begin work within seven **(7) calendar** days after written Notice to Proceed has been given by Engineer. Contractor hereby also agrees to achieve Substantial Completion of the Work within **140 calendar days** after the date of the written Notice to Proceed.

Owner agrees to pay Contractor for completion of the Work in accordance with the Contract Documents the initial Contract Price of \_\_\_\_\_ (\$ \_\_\_\_\_) plus or minus any increases or decreases to the initial Contract Price as provided by the Contract. Contractor will be paid in current funds for the performance of the Contract in accordance with the Bid submitted therefor, subject to additions and deductions as approved by Change Order under the Contract Documents, and to make payments on account thereof as provided therein.

IN WITNESS WHEREOF, the parties to these presents have executed this Agreement in the year and day first above written.

The Town of Pecos City  
Owner

ATTEST:

By:

Name: Seth Sorensen

Title: City Manager, Town of Pecos City

---

Contractor

ATTEST:

By:

Name:

Title:

---

(The following to be executed if Contractor is a Corporation)

I, \_\_\_\_\_, certify that I am the secretary of the Corporation named as Contractor herein; that \_\_\_\_\_, who signed this Contract on behalf of Contractor, was then \_\_\_\_\_ of said Corporation; that said Contract was duly signed for and on behalf of said Corporation by authority of its governing body and is within the scope of its corporate powers.

Signed: \_\_\_\_\_

Corporate Seal

## AGREEMENT

STATE OF TEXAS

COUNTY OF REEVES

THIS AGREEMENT ("Agreement") is made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2020, by and between the Town of Pecos City (the "Owner") c/o Seth Sorensen, City Manager, 115 West 3<sup>rd</sup> Street, Pecos, Texas 79772, and \_\_\_\_\_ of the City of \_\_\_\_\_, County of \_\_\_\_\_, and State of \_\_\_\_\_, hereinafter termed "Contractor."

All capitalized terms used herein shall be given the meanings set forth in the General Conditions. MBS Development Services LLC shall be referred to herein as the "Engineer."

For and in consideration of the mutual covenants hereinafter set forth, and under the conditions expressed in the Bonds bearing even date herewith, the Contractor and Owner hereby agree as follows:

Contractor shall commence and complete the Work generally described as follows:

Phase 1A – Sanitary Sewer  
for  
The Town of Pecos City, Texas  
To serve the SE Quadrant  
according to those particular Plans and Technical Specifications  
prepared by Engineer  
in the initial Contract Price of \$\_\_\_\_\_

and all Extra Work in connection therewith, under the terms as stated in the General and Special Conditions of the Agreement, and, at Contractor's own proper cost and expense, to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said Work, in accordance with the conditions and prices stated in the Bid attached hereto and in accordance with the Contract Documents, including, but not limited to, Invitation to Bidders, Instructions to Bidders, General and Special Conditions of the Agreement, Plans, and other drawings and printed or written explanatory matter thereof, and the Technical Specifications, on file with Engineer. Contractor represents and warrants to the Owner that it has carefully examined this Agreement and all other Contract Documents, which are made a part of the Contract, and is thoroughly familiar therewith.

The Contractor hereby agrees to begin work within seven **(7) calendar** days after written Notice to Proceed has been given by Engineer. Contractor hereby also agrees to achieve Substantial Completion of the Work within **160 calendar days** after the date of the written Notice to Proceed.

Owner agrees to pay Contractor for completion of the Work in accordance with the Contract Documents the initial Contract Price of \_\_\_\_\_ (\$ \_\_\_\_\_) plus or minus any increases or decreases to the initial Contract Price as provided by the Contract. Contractor will be paid in current funds for the performance of the Contract in accordance with the Bid submitted therefor, subject to additions and deductions as approved by Change Order under the Contract Documents, and to make payments on account thereof as provided therein.

IN WITNESS WHEREOF, the parties to these presents have executed this Agreement in the year and day first above written.

The Town of Pecos City  
Owner

ATTEST:

By:

Name: Seth Sorensen

Title: City Manager, Town of Pecos City

---

Contractor

ATTEST:

By:

Name:

Title:

---

(The following to be executed if Contractor is a Corporation)

I, \_\_\_\_\_, certify that I am the secretary of the Corporation named as Contractor herein; that \_\_\_\_\_, who signed this Contract on behalf of Contractor, was then \_\_\_\_\_ of said Corporation; that said Contract was duly signed for and on behalf of said Corporation by authority of its governing body and is within the scope of its corporate powers.

Signed: \_\_\_\_\_

Corporate Seal

## AGREEMENT

STATE OF TEXAS

COUNTY OF REEVES

THIS AGREEMENT ("Agreement") is made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2020, by and between the Town of Pecos City (the "Owner") c/o Seth Sorensen, City Manager, 115 West 3<sup>rd</sup> Street, Pecos, Texas 79772, and \_\_\_\_\_ of the City of \_\_\_\_\_, County of \_\_\_\_\_, and State of \_\_\_\_\_, hereinafter termed "Contractor."

All capitalized terms used herein shall be given the meanings set forth in the General Conditions. MBS Development Services LLC shall be referred to herein as the "Engineer."

For and in consideration of the mutual covenants hereinafter set forth, and under the conditions expressed in the Bonds bearing even date herewith, the Contractor and Owner hereby agree as follows:

Contractor shall commence and complete the Work generally described as follows:

Phase 1B – Lift Station & Force Main  
for  
The Town of Pecos City, Texas  
To serve the SE Quadrant  
according to those particular Plans and Technical Specifications  
prepared by Engineer  
in the initial Contract Price of \$\_\_\_\_\_

and all Extra Work in connection therewith, under the terms as stated in the General and Special Conditions of the Agreement, and, at Contractor's own proper cost and expense, to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said Work, in accordance with the conditions and prices stated in the Bid attached hereto and in accordance with the Contract Documents, including, but not limited to, Invitation to Bidders, Instructions to Bidders, General and Special Conditions of the Agreement, Plans, and other drawings and printed or written explanatory matter thereof, and the Technical Specifications, on file with Engineer. Contractor represents and warrants to the Owner that it has carefully examined this Agreement and all other Contract Documents, which are made a part of the Contract, and is thoroughly familiar therewith.

The Contractor hereby agrees to begin work within seven **(7) calendar** days after written Notice to Proceed has been given by Engineer. Contractor hereby also agrees to achieve Substantial Completion of the Work within **160 calendar days** after the date of the written Notice to Proceed.

Owner agrees to pay Contractor for completion of the Work in accordance with the Contract Documents the initial Contract Price of \_\_\_\_\_ (\$ \_\_\_\_\_) plus or minus any increases or decreases to the initial Contract Price as provided by the Contract. Contractor will be paid in current funds for the performance of the Contract in accordance with the Bid submitted therefor, subject to additions and deductions as approved by Change Order under the Contract Documents, and to make payments on account thereof as provided therein.

IN WITNESS WHEREOF, the parties to these presents have executed this Agreement in the year and day first above written.

The Town of Pecos City  
Owner

ATTEST:

By:

Name: Seth Sorensen

Title: City Manager, Town of Pecos City

---

Contractor

ATTEST:

By:

Name:

Title:

---

(The following to be executed if Contractor is a Corporation)

I, \_\_\_\_\_, certify that I am the secretary of the Corporation named as Contractor herein; that \_\_\_\_\_, who signed this Contract on behalf of Contractor, was then \_\_\_\_\_ of said Corporation; that said Contract was duly signed for and on behalf of said Corporation by authority of its governing body and is within the scope of its corporate powers.

Signed: \_\_\_\_\_

Corporate Seal

**PERFORMANCE BOND**

STATE OF TEXAS

Contract Date \_\_\_\_\_

COUNTY OF \_\_\_\_\_

Date Bond Executed \_\_\_\_\_

PRINCIPAL \_\_\_\_\_

SURETY \_\_\_\_\_

OWNER The Town of Pecos City, Texas

SUM OF BOND (in words and figures) \_\_\_\_\_  
being 100 per cent of the Contract Price.

Contract for \_\_\_\_\_, Texas (the "Contract").

KNOW ALL PERSONS BY THESE PRESENTS, that we, Principal and Surety above named, are held and firmly bound unto Owner, its successors and assigns, in the penal sum of the amount stated above, for the payment of which sum well and truly to be made, we bind ourselves and our respective heirs, executors, administrators, officers, directors, shareholders, partners, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal entered into that certain Contract with Owner, which Contract is expressly incorporated herein for all purposes.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION IS SUCH, that if Principal well and truly performs the work in accordance with the plans, specifications and any other contract documents, during the original term of the Contract and any extensions thereof that may be granted by Owner, with or without notice to Surety, and during the life of any guaranty or warranty required under the Contract, then this obligation is void; otherwise it is to remain in full force and effect. Should the Principal fail to faithfully and strictly perform the work as required by the Contract in all its terms, the Surety will be liable for all damages, losses, expenses and liabilities that the Owner may suffer in consequence thereof.

This Bond is given in compliance with the provisions of Chapter 2253 of the Texas Government Code, as amended, which is incorporated herein by this reference. However, all of the express provisions contained herein and in the Contract are applicable where or not within the scope of said statute.

Surety hereby agrees, for value received, that no change, extension of time, alteration or addition to the terms of the Contract or to work performed under the Contract, or to the plans, specifications or drawings accompanying the Contract, will in any way affect its obligations 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 to be performed thereunder.

The bound parties have executed this instrument pursuant to authority of their respective governing body, to be effective on the same date of the Contract.

\_\_\_\_\_ ATTEST  
PRINCIPAL

By \_\_\_\_\_ By \_\_\_\_\_

Name \_\_\_\_\_ Name \_\_\_\_\_

Title \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_ (SEAL)

\_\_\_\_\_ ATTEST  
SURETY

By \_\_\_\_\_ By \_\_\_\_\_

Name \_\_\_\_\_ Name \_\_\_\_\_

Title \_\_\_\_\_ Title \_\_\_\_\_

(SEAL)

Physical Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Mailing Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Local Recording Agent Personal Identification Number: \_\_\_\_\_

Agency Name: \_\_\_\_\_

Agency Address: \_\_\_\_\_

Agency Telephone \_\_\_\_\_

**Surety must attach its original Power of Attorney to this Bond.**

**CERTIFICATE AS TO CORPORATE PRINCIPAL**

I, \_\_\_\_\_, certify that I am the secretary of the corporation named as Principal in the Bond; that \_\_\_\_\_, who signed the Bond on behalf of Principal, was then \_\_\_\_\_ of the corporation; that I know his or her signature, and his or her signature is genuine; and that the Bond was duly signed for and on behalf of the corporation by authority of its governing body.

\_\_\_\_\_  
Signature of Corporate Secretary (Corporate Seal)

**ATTACH POWER OF ATTORNEY**

# PAYMENT BOND

STATE OF TEXAS

Contract Date: \_\_\_\_\_

COUNTY OF \_\_\_\_\_

Date Bond Executed \_\_\_\_\_

PRINCIPAL \_\_\_\_\_

SURETY \_\_\_\_\_

OWNER The Town of Pecos City, Texas

PENAL SUM OF BOND (in words and figures) \_\_\_\_\_  
being 100 per cent of the Contract Price.

Contract for \_\_\_\_\_, Texas (the "Contract").

KNOW ALL PERSONS BY THESE PRESENTS, that we, Principal and Surety above named, are held and firmly bound unto Owner, its successors and assigns, in the penal sum of the amount stated above, for the payment of which sum well and truly to be made, we bind ourselves and our respective heirs, executors, administrators, officers, directors, shareholders, partners, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal entered into the Contract with Owner, which Contract is expressly incorporated herein for all purposes.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION IS SUCH, that if Principal shall promptly pay claimants for all labor, subcontracts, materials and specially fabricated materials performed or furnished under or by virtue of the Contract, and duly authorized modifications and normal and usual extras thereto, notice of which modifications to Surety being hereby waived, then this obligation shall be void, otherwise to remain in full force and effect. Should Principal fail to promptly pay claimants for all labor, subcontracts, materials and specially fabricated materials performed or furnished under or by virtue of the Contract, Surety is hereby bound to make such payments on behalf of Principal up to a total aggregate amount equal to the penal sum of the Bond. Labor, subcontracts, materials, and specially fabricated materials shall be construed in accordance with Chapter 2253, Texas Government Code.

PROVIDED, HOWEVER, that Owner having required Principal to furnish this bond in order to comply with the provisions of Chapter 2253, Texas Government Code, all rights and remedies on this Bond shall inure solely to such claimants and shall be determined in accordance with the provisions, conditions, and limitations of the aforesaid Government Code to the same extent as if they were copied at length herein.

The bound parties have executed this instrument pursuant to authority of their respective governing body, to be effective on the same date of the Contract.

\_\_\_\_\_ ATTEST  
PRINCIPAL

By \_\_\_\_\_ By \_\_\_\_\_

Name \_\_\_\_\_ Name \_\_\_\_\_

Title \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_ (SEAL)

\_\_\_\_\_ ATTEST  
SURETY

By \_\_\_\_\_ By \_\_\_\_\_

Name \_\_\_\_\_ Name \_\_\_\_\_

Title \_\_\_\_\_ Title \_\_\_\_\_

(SEAL)

Physical Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Mailing Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Local Recording Agent Personal Identification Number: \_\_\_\_\_

Agency Name: \_\_\_\_\_

Agency Address: \_\_\_\_\_

Agency Telephone \_\_\_\_\_

**Surety must attach its original Power of Attorney to this Bond.**

**CERTIFICATE AS TO CORPORATE PRINCIPAL**

I, \_\_\_\_\_, certify that I am the secretary of the corporation named as Principal in the Bond; that \_\_\_\_\_, who signed the Bond on behalf of Principal, was then \_\_\_\_\_ of the corporation; that I know his or her signature, and his or her signature is genuine; and that the Bond was duly signed for and on behalf of the corporation by authority of its governing body.

\_\_\_\_\_  
Signature of Corporate Secretary (Corporate Seal)

**ATTACH POWER OF ATTORNEY**

## **SUMMARY OF WORK**

Summary of Work of the three (3) Contracts includes the following:

*Contract One, Phase 1A – Water:*

3,600 linear feet of new 8", 12" and 16" PVC, C-900 DR 18 waterline with fittings, valves, restraints and fire hydrants to be constructed along the west side of CR 118. The work also includes a service manifold crossing the County Road to provide connections for domestic, irrigation and fire services to the Pecos Regional Sports Park.

*Contract Two, Phase 1A – Sewer:*

6,560 linear feet of new 8", 10", 12", 15" and 18" gravity SDR 26 PVC sewer main with fiberglass reinforced manholes to be constructed along the south side of the Pecos Regional Sports Park (starting at CR 118) and proceeding eastward to connect to a proposed new lift station located near US Highway 285. The work also includes a stub-out for future connection of the sewer service from the Pecos Regional Sport Park.

*Contract Three, Phase 1B – Lift Station and Force Main:*

665 linear feet of new 10" gravity SDR 26 PVC sewer main with fiberglass reinforced manholes, to be constructed along CR 116 and connecting into the existing Town of Pecos City sanitary sewer system near IH-20. The work also includes 5,500 linear feet of 10" HDPE force main to be constructed along the west side of US Highway 285 from a new 900 GPM automatic triplex lift station with FRP wet well, electrical and controls. Phase 1B will connect to Phase 1A (sewer) near the lift station and the new force main will connect into a new gravity manhole just east of CR 118 along CR 116.

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**ITEM NO. 100  
MOBILIZATION**

**1001**      **DESCRIPTION:** This item shall govern the mobilization of personnel, equipment, and supplies at the project site in preparation for beginning work on other contract items. Mobilization shall include, but is not limited to, the movement of equipment, personnel, material, supplies, etc. to the project site and the establishment of office and other facilities necessary prior to beginning the work.

**1002**      **MEASUREMENT:** Measurement of the Item, Mobilization, as specified herein, will be by the "Lump Sum," as the work progresses.

**1003**      **PAYMENTS:** Partial payments of the "Lump Sum" bid for mobilization will be as follows: (The adjusted contract amount for construction items, as used below, is defined as the total contract amount, less the lump sum bid for Mobilization and Preparing Right-Of-Way).

1.      When 1% of the adjusted contract amount for construction items is earned, 50% of the "Lump Sum" bid.
2.      When 5% of the adjusted contract amount for construction items is earned, 75% of the "Lump Sum" bid will be paid. Previous payments under this item will be deducted from the above amount.
3.      When 10% of the adjusted contract amount for construction items is earned, 90% of the "Lump Sum" bid will be paid. Previous payments under this item will be deducted from the above amount.
4.      Upon completion of all work under this contract, payment for the remainder of the "Lump Sum" bid for Mobilization will be made.  
NOTES: Cost for Insurance and Bond is inclusive to cost of Mobilization Item.
5.      The Owner will not pay for materials approved by the Owner and stored on site that are to be incorporated into the "PROJECT WORK" in accordance with the plans.

The combined total bids for Item No. 100, Mobilization and Item No. 101, Preparing Right-of-Way

shall not exceed 15% of the base project bid. A base bid shall be defined as all bid items excluding Item No. 100, Mobilization and Item No. 101, Preparing Right-of-Way. A bid containing a combined total for the above mentioned pay items in excess of 15% shall be considered unbalanced and shall be rejected.

- End of Specification -

**ITEM NO. 101**  
**PREPARING RIGHT-OF-WAY**

**1011**      **DESCRIPTION:** This item shall govern preparing the right-of-way for construction operations by removing and disposing of all obstructions from the right-of-way and from designated easements where removal of such obstructions is not otherwise provided for in the contract documents.

Such obstructions shall be considered to include, but not be limited to, remains of houses or structures not completely removed by Contractor or others, foundations, floor slabs, concrete, brick, lumber, plaster, cisterns, septic tanks, basements, abandoned utility pipes or conduits, equipment or other foundations, fences, retaining walls, outhouses, shacks, and all other debris, as well as buried concrete slabs, curbs, driveways and sidewalks.

This item shall also include the removable of trees, stumps, bushes, shrubs, brush, roots, vegetation, logs, rubbish, paved parking areas, miscellaneous stone, brick, drainage structures, manholes, inlets, abandoned railroad tracks, scrap iron and all debris, whether above or below ground, except live utility facilities.

This item shall not govern the demolition of buildings by the use of explosives. Such demolition work shall be governed by the use of a special specification controlling the work.

It is the intent of this specification to provide for the removal and disposal of all obstructions to the new construction, together with other objectionable materials, not specifically provided for elsewhere by the contract documents.

Unless shown otherwise in the contract documents,, all fences along the right-of-way which are damaged or removed temporarily by the Contractor shall be replaced by the Contractor to an equal or better condition, at no additional cost to the OWNER.

**1012**      **CONSTRUCTION METHODS:** Areas designated in the contract documents shall be cleared of all obstructions, vegetation, abandoned structures, etc., as defined above, except trees or shrubs specifically designated by the engineer for preservation. Trees and shrubs designated for preservation shall be carefully trimmed as directed and shall be protected from scarring, barking, or other injuries during construction operations. Exposed ends of pruned limbs shall be treated with an approved pruning material.

Unless otherwise indicated in the contract documents, all underground obstructions shall be removed to the following depths:

1. In areas to receive embankment, 2 feet below natural finished grade.
2. In areas to be excavated, 2 feet below the lowest elevation of the excavation;
3. All other areas, 2 feet below finished grade.

Holes remaining after removal of all obstructions, objectionable materials, vegetation, etc., shall be backfilled and tamped, and the entire area shall be bladed to prevent ponding of water and to provide drainage. In areas that are to be immediately excavated, backfilling and blading may be eliminated. Areas to be used as burrow sites and material sources shall have all obstruction, objectionable materials, vegetation, etc., removed to the complete extent necessary to prevent such objectionable matter from becoming mixed with the material to be used in the construction.

Where a conduit is shown to be replaced, it shall be removed in its entirety, and all connections to the existing conduit or pipe shall be made. Where an existing conduit or pipe is to be cut and plugged, the line shall be cut back not less than 2 feet, and a plug of concrete not less than 2 feet long shall be poured and held in the end of the conduit or pipe. The plug may also be accomplished by using a precast stopper grouted into place.

Material to be removed will be designated as “salvageable” or “non-salvageable” in the contract documents prior to bidding by the Contractor. All “salvageable” material will remain the property of the OWNER and will be stored at the site as directed by the Owner’s representative. All “non-salvageable” materials and debris removed shall become the property of the Contractor and shall be removed from the site and shall be disposed of properly.

All asphaltic material shall be disposed of or recycled at the facility authorized to accept the asphalt for such purposes and applicable to appropriate guidelines and regulations.

**1013**            **MEASUREMENT:** Preparing Right-of-Way for new construction will be measured by the acre.

**1014**            **PAYMENT:** This item will be paid for at the contract unit price bid per acre for Preparing Right-of-Way, which price shall be full compensation for work herein specified, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work.

**NOTES:** Additional requirements by Owner: Adherence to Pecos Ordinances as part of bid item.

- End of Specification -

**ITEM NO. 545  
WOOD FENCING**

**5451 DESCRIPTION:** This section provides for the installation of an eight-foot (8'-0") high cedar fence with stain.

**5452 SUBMITTALS:** Submit shop drawings as specified in Division 1, General Requirements.

**5453 PAYMENTS:** No separate payment will be made for wood fencing. Include payment in lump sum bid price.

**5454 GUARANTEE:** For a period of 12 months after final acceptance, the contractor shall warrant that the equipment shall be free of defects in material and workmanship under normal use and service when properly installed. The contractor shall repair or replace, F.O.B. point of shipment, such equipment or any part thereof furnished by the manufacturer which is found to be defective after inspection by the manufacturer or Engineer.

**5455 PRODUCTS:**

**5456 LUMBER:**

1. Rails. Provide 2" x 4" pressure-treated pine or cedar rails with 2" x 2" x 4" galvanized cleats supporting the bottom of the rails.
2. Pickets. Provide No. 1 Grade standard 5/8-inch (5/8"), fresh-cut, rough Western Cedar pickets specifically selected for fencing. The pickets shall be six (6) or eight (8) inches wide with a notched top.
3. Rot Board. Provide a 1" x 6" 0.40 pressure-treated pine runner.

**5457 POSTS:** Provide Schedule 40, galvanized steel posts according to the following schedule:

	<u>Minimum Hole Diameter</u>	<u>Hole Depth</u>
Intermediate Posts	8-inches	3'-6"
Corner Posts and Walking Gate Posts	9-inches	3'-6"

Extend the concrete-filled hole six-inches (6") deeper than the post.

**5458**      **HARDWARE:** Provide galvanized steel brackets, as manufactured by Wac-a-Brac or approved equal, to firmly attach the rails to the posts and to join the rails together end-to-end. Provide galvanized or aluminum screw-grip nails to attach pickets to rails and to join rails.

**5459**      **CONCRETE:** Provide concrete as specified in Division 3, Concrete, except 2,000 psi concrete may be used.

**54510**      **GALVANIZING:** Hot-dip galvanize all metals, hardware and post in accordance with ASTM A153-80.

**54511**      **EXECUTION:**

**54512**      **POSTS:** Set posts plumb and true on maximum six-foot (6') centers in holes filled with concrete according to the following schedule:

	<u>Minimum Hole Diameter</u>	<u>Hole Depth</u>
Intermediate Posts	8-inches	3'-6"
Corner Posts and Walking Gate Posts	9-inches	3'-6"

Extend the concrete-filled hole six-inches (6") deeper than the post.

**54513**      **FENCE:** Install the top rail seven feet (7'), the middle rail four feet (4'), and the bottom rail one foot (1') above the ground. Attach the rails to the posts with proper brackets. Join the rails end-to-end at the post or within one foot (1') of the post. Stagger the rail joints for the three rails. Attach each picket to the rails with two (2) nails per rail. Install the pickets vertical and continuous. Stain the fence with two (2) coats of Olympic No. 716 Armstrong No. 1303 wood sealer or Sherwin Williams No. 111.51 cuprinol UV sun block Deck & Wood Seal, inside and out. (Color to be selected by owner). Provide and construct a 1" x 6" Cedar Rot Board along bottom of fence. Attach to post using 2" x 4" P.T. Pine or Cedar splice.

- End of Specification -

**ITEM NO. 550**  
**TRENCH EXCAVATION SAFETY PROTECTION**

**550.1**     **DESCRIPTION:** This item shall govern the trench excavation safety protection required for the construction of all trench excavation protection systems to be utilized in the project and including all additional excavation and backfill necessitated by the protection system.

A trench shall be defined as a narrow excavation made below the surface of the ground or pavement. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less (measure at the bottom of the excavation), the excavation is also considered to be a trench. In addition, "Trench Excavation Protection" will not be limited to these applications, but may be used whenever deemed expedient and proper to ensuing work.

**550.2**     **CONSTRUCTION:** Trench excavation safety protection shall be accomplished as required by the latest provision of Part 1926, Subpart P - Excavations, Trenching, and Shoring of the Occupational Safety and Health Administration (OSHA) Standards and Interpretations, or the most applicable approved equal provision, as may be amended.

**550.3**     **MEASUREMENT:** Trench Excavation Safety Protection shall be measured by the linear foot along the centerline of any OSHA defined trench that may be entered by personnel and is not greater than 15 feet wide, including manholes and other structures.

**550.4**     **PAYMENT:** Payment for Trench Safety Excavation Protection, measured as prescribed above, shall be made at the unit price bid per linear foot of Trench Excavation Safety Protection regardless of the depth or width of the trench.

Payment shall include all components of the Trench Excavation Safety Protection System which can include, but not be limited to, sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, dewatering or temporary diversion and proper recapture and transportation of water to provide adequate drainage. Payment shall also include the additional excavation and backfill required, any jacking, jack removal, and removal of the trench supports after completion.

Payment of all work prescribed under this item shall be full compensation for all additional excavation and backfill associated with the item; for any retention by

Contractor of structural design/geotechnical/safety/equipment consultant; for furnishing, placing and removing all shoring, sheeting, or bracing; for dewatering or temporary diversion and proper recapture and transportation of water; for all jacking and jack removal; and for all other labor, material, tools, equipment and incidentals necessary to complete this portion of the work.

- End of Specification -

**ITEM NO. 804M**  
**EXCAVATION, TRENCHING AND BACKFILL**

**8041**      **DESCRIPTION:** This section shall govern the excavation, trenching, and backfilling for water, sanitary sewer, and recycled water construction, unless otherwise noted in the contract documents. The work shall include all necessary drainage, dewatering, pumping, bailing, sheeting, shoring and incidental construction. All existing utilities shall be protected from damage during the excavation and backfilling of trenches and, if damaged, shall be replaced by the Contractor at his expense. Unless otherwise shown in the contract documents, all excavation shall be unclassified and shall include all materials encountered regardless of their nature or the manner in which they are removed, to include but not limited to rock, stone, sand, organic material, or whatever material is encountered. The Contractor shall at all times conform to the latest applicable provision of subpart "P" entitled "Excavation, Trenching, and Shoring of OSHA Safety and Health Regulations for Construction", or most applicable approved equal provision. An excavation plan submittal signed and sealed by a Texas licensed professional engineer shall be submitted for review and acceptance by the Owner or Engineer, if applicable, one week prior to start of actual construction activities where the planned excavation is 20 feet or greater.

**8042**      **SUBMITTALS:** Submit any applicable manufacturer's product data, instructions, recommendations, and certifications.

**8043**      **EXCAVATION:** The Contractor shall perform all excavation of every description and of whatever substances, including rock, encountered to the lines and grades shown in the contract documents or determined by the Engineer. During excavation, material suitable for backfilling shall be stockpiled in orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill shall be removed and properly disposed of by the Contractor or as directed by the Engineer. Grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods.

Sheeting and shoring shall be installed in accordance with all applicable safety requirements for the protection of the work, adjoining property, and for the safety of all personnel. Unless otherwise indicated, excavation shall be by open cut, whether by hand, backhoe, ram-hoe, rock saw, or whatever method as necessary.

1. Safety Devices: The Contractor shall provide and maintain barricades, flags, torches, and other safety devices as required by local, state, and federal codes and ordinances and conduct work to create a minimum inconvenience to the public.

Temporary suspension of work does not relieve responsibility for the above requirements.

2. Safety and Health Regulations: The Contractor shall at all times conform to all of the latest applicable regulations of Subpart "P" entitled "Excavation, Trenching, and Shoring of OSHA Safety and Health Regulations for Construction," or most applicable approved equal provisions, and all other applicable state and local rules and regulations

**8044**

**TRENCHING:**

1. Trench walls shall be vertical. The practice of undercutting at the bottom or flaring at the top will not be permitted except where it is justified for safety or at the Engineer's and/or Owner's representative's direction. In special cases, where trench flaring is required, the trench walls shall remain vertical to a depth of at least 1 foot above the top of the pipe.

The trench bottom shall be square or slightly curved to the shape of the trenching machine cutters. The trench shall be accurately graded along its entire length to provide uniform bearing and support for each section of pipe installed upon the bedding material. Bell holes and depressions for joints shall be dug after the trench bottom has been graded and bedding installed. Unless soils encountered at grade allow for elimination of special bedding material, The pipe shall rest upon the new bedding material for its full length.

Where over-excavation occurs and when not as directed by the Engineer or Inspector, the under-cut trench shall be restored to grade at no cost to the OWNER by replacement with a material conforming to the requirements of the bedding material or a material approved by the Engineer.

**Minimum Width of Trench:** The minimum width of pipe trenches, measured at the crown of the pipe, shall be not less than 12 inches greater than the exterior diameter of the pipe, exclusive of bells. The minimum base width of such trench shall be not less than 12 inches greater than the exterior diameter of the pipe, exclusive of special structures or connections. Such minimum width shall be exclusive of trench supports and not greater than the width at the top of the trench.

**Maximum Width of Trench:** The maximum allowable width of trench for pipelines measured at the top of the pipe shall be the outside diameter of the pipe (exclusive of bells or collars) plus 24 inches.

The depth of cut for pay purposes may be more or less than the actual excavated depth. The variation is based on the surface elevation prior to the Contractor's operation and the invert of the sewer line.

2. When unsuitable bearing materials such as water, silt, muck, trash, debris or rock in ledge, boulder or coarse gravel (particle size larger than 1-3/4 inch) is encountered at the bearing level, the Contractor shall over-excavate and remove such materials to a depth no less than 6 inches below the bottom of the pipe and replace it with a clean, coarse material conforming to the requirements of Paragraph 804.5.2.a.3, 804.6.1, or as approved by the Engineer and/or Owner's representative.
3. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.
  - a. The Contractor shall not allow water to accumulate in excavations or at subgrade level. Remove water to prevent softening of foundation bottoms and soil changes detrimental to stability of subgrades and foundations. Provide and maintain dewatering system components necessary to convey water from excavations.
  - b. Convey water removed from excavation and rainwater to collecting or runoff areas away from buildings and other structures. Establish and maintain temporary drainage ditches and other diversions outside excavation limits. Do not use trench excavations as temporary drainage ditches.
  - c. Dewatering devices shall be provided by the Contractor with filters to prevent the removal of fines from the soil.
  - d. Upon completion of the dewatering work, the Contractor shall remove all equipment and leave the construction area in a neat, clean, condition that is acceptable to the Owner's representative.
  - e. The Contractor shall maintain groundwater table at least 12 inches below the finished excavation subgrade.
  - f. No direct payment shall be made for costs associated with dewatering. All costs in connection therewith shall be included in the applicable contract price for the item to which the work pertains.

#### **8045**

#### **BACKFILLING SANITARY SEWER TRENCHES:**

1. General: Trenches shall not be backfilled until the construction structures or appurtenances, as installed, conform to the requirements specified. Where specified, all backfilling may incorporate excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand and gravel, soft shale or other approved materials, free from large clods of earth or stones. Where pipe is

specially coated or sleeve/tape wrapped for protection against corrosion, care shall be taken not to damage the coating or sleeve/tape wrap.

Where a trench has been improperly backfilled, or where settlement occurs, the identified section shall be excavated to a depth and length 50 feet beyond the failed area, then refilled and compacted to the grade and compaction level required. The use of sand backfill shall not be allowed. All compaction within the secondary backfill zone shall be such that the apparent dry density of each layer shall be not less than 95% from the top of the initial backfill to the bottom of pavement section. The pavement (asphalt) section shall have 95% compaction density with a maximum dry density at + or - 2% optimum moisture content as determined by tests on samples as outlined in TX-DoT Testing Method Tex 113-E unless otherwise shown on the plans. At the time of compaction, the water content shall be at optimum moisture content, + or - 2% points.

See Table 1 at the end of this specification for an outline of the bedding and initial backfill requirements for various pipe types.

2. Sanitary Sewer Backfilling: Backfilling for sanitary sewers is divided into three (3 separate zones: (a) bedding: the material in the trench bottom in direct contact with the bottom of the pipe; (b) initial backfill: the backfill zone extending from the surface of the bedding to a point 1 foot above the top of the pipe; and (c) secondary backfill: the backfill zone extending from the initial backfill surface to the top of the trench. Materials and placement for each of the zones shall be as described herein.

a. Bedding:

- (1) Stable Material: Existing stable material present during excavation includes:

Trench bottom (free of water, muck, debris);

Rock in boulder, ledge or coarse gravel (particle size not larger than 1- $\frac{3}{4}$  inch) formations;

Coarse sand and gravels with maximum particle size of 1- $\frac{3}{4}$  inch, various graded sands and gravels containing small percentages of fines, generally granular and non-cohesive either wet or dry; and

Fine sands and clayey gravels; fine sand, sand-clay mixtures, clay and gravel-clay mixtures.

- (2) Unstable Material: Existing unstable materials are silt, muck, trash or

debris in the trench bottom bearing level; rock on boulder ledge or coarse gravel (particle size larger than 1- 3/4 inch) formations.

- (3) **Bedding Material:** The existing material at the bearing level shall be removed and replaced to a minimum depth of 6 inches or 1/8 of the outside diameter of the pipe, whichever is greater, with bedding material. The bedding material shall extend up the sides of the pipe sufficient to embed the lower quadrant of the pipe. The bedding material shall be composed of well-graded, crushed stone or gravel conforming to the following requirements unless modified by the Engineer in writing.

<u>Sewer Gravel</u>	<u>Percent</u>
Passing 1-1/2 inch sieve	100
Passing 1 inch sieve	90 to 100
1/2" inch sieve	15 to 60
Passing No. 4 sieve	0 to 10
Passing No. 8 sieve	0 to 5

- (4) **Consolidating Backfill Material:** The Initial Bedding material shall be consolidated to assure it is incorporated from the bottom of the trench up to the pipe centerline. A hand-held vibrator, commonly used for concrete work, can be used for this purpose. The vibrator shall be inserted every 3 feet on each side of the pipe.
- b. **Initial Backfill:** Initial backfill is defined as backfill having a thickness in its compacted state from the surface of the bedding to a point 12" above the top of the pipe.

Initial backfill shall consist of gravel which conforms to the requirements of Item No. 804.5.2. a (3).

For sewer lines up to 24 inches in diameter initial backfill material shall be placed in two separate lifts above the bedding material the pipe is set on. The first lift shall be spread uniformly and simultaneously on each side and under the bottom quadrant of the pipe to the mid-point or spring line of the pipe.

Consolidate the Initial Backfill material as per section 804.5.2.(6).

Placement of the first lift of initial backfill shall be subject to inspection and approval prior to placement of second lift, which shall extend from the

spring line of the pipe to a minimum of 12” above the top of the pipe. The second lift shall be evenly spread in a similar manner as the first lift.

- c. **Secondary Backfill:** Secondary backfill is defined as backfill from 12” above the top of the pipe to the top of the trench or bottom of pavement section. Secondary backfill shall be constructed in accordance with details shown in the construction documents.

Secondary backfill shall generally consist of materials removed from the trench and shall be free of brush, debris and trash. Rock or stones having a dimension larger than 6 inches at the largest dimension shall be sifted out and removed before the material is used in the secondary backfilling zone. Secondary backfill material shall be primarily composed of compactible soil materials. The secondary backfill material shall be placed in maximum 12 inch loose lifts or as directed by the Design Engineer and/or Owner’s representative.

- d. **Trench Surface Restoration:** The surface of the backfilled trench shall be restored to match the previous existing conditions.

Trenches in paved streets shall be covered with a temporary all- weather surface to allow for vehicular traffic until the final or replacement asphalt/concrete paving is complete. This surface shall be a minimum of 4 inches compacted caliche base. It is the Contractor’s responsibility to maintain this surface until the final street restoration is complete. This surface must be removed prior to final asphaltting. All street work shall be done in accordance with the latest City of Pecos Public Works’ construction specifications.

Included in this requirement is replacement of any curbs or sidewalks damaged or removed during the construction.

No separate payment for the surface restoration is permitted. The cost for this work must be included in the appropriate bid item.

**8046**

**BACKFILLING POTABLE WATER TRENCHES:** Mains and service line trenches shall be excavated in accordance with Item No. 804.3 and Item No.804.4 for placement of potable water appurtenances.

- 1. Bedding/Initial Backfilling: The bedding and initial backfill materials for concrete steel cylinder pipe (CSC), ductile iron pipe (DI), HDPE Pipe, Wrapped Steel Pipe, and Polyvinyl Chloride Pipe (PVC) in all nominal diameters shall be composed of well graded crushed stone or gravel conforming to the following requirements unless modified by the Engineer.

Modified Grade 5 gravel:

<u>MODIFIED GRADE 5</u>	<u>PERCENT</u>
Retained on 1/2" sieve	0
Retained on 3/8" sieve	0-5
Retained on No. 4 sieve	20-80
Retained on No. 10 sieve	75-100
Retained on No. 20 sieve	98-100

The quantity and thickness of materials lifts and compaction of initial backfill materials shall be in accordance with the provisions of Item No. 804.5.2.b and Item No. 804.6.1.

Where copper services (3/4" – 2") are installed, initial backfill shall be sand conforming to the following requirements: Natural sand or sand produced from crushed gravel or crushed rock maximum 1/4-inch; 95 percent shall pass No. 4 sieve, free from clay and organic material, with a maximum 8 percent passing the No. 200 sieve. Larger services utilizing DI pipe or PVC (C-900) pipe shall be backfilled the same as mains.

2. Secondary Backfill: Secondary backfill materials for all types and sizes of pipe shall be as defined in Item No. 804.5.2. (c), "Secondary Backfill." Secondary backfill materials shall be placed and compacted in accordance with the provisions of Item No. 804.5.2. (c), "Secondary Backfill."
3. Trench Surface Restoration: Trench surface restoration shall be accomplished as defined in Item No. 804.5.2. (d).

**8047 DISPOSAL OF EXCAVATED MATERIALS:** Any excess excavated material, not utilized after all fill requirements have been met, shall become the responsibility of the Contractor. The Contractor shall dispose of it by hauling, spreading and placing in a manner and location meeting the approval of the Owner and Engineer.

**8048 QUALITY CONTROL:**

1. The Contractor shall procure, store, and place materials from either onsite or offsite sources which comply with the specified requirements.
2. Quality Control Testing: The Contractor shall be responsible for compaction in accordance with the appropriate Specification. Compaction tests will be done at one location point randomly selected or as indicated by the Owner's representative, on at least two (2) separate 12 inch loose lifts and at a spacing of one (1) test in between each manhole or fire hydrant.

The Owner's representative shall determine the depth at which the density test shall be taken. All depths shall be considered for testing without a predetermined maximum or minimum.

***Note:** Tests requirements above are indicated as a minimum requirement, but maybe subjected to follow more stringent requirements as established by other appropriate agencies (such as City of Pecos Public Works).*

***Note:** Any failed test shall require the Contractor to remove and replace that layer of backfill to 50 feet from either side from the failed test location. The Contractor will also be required at no cost to Owner to provide two additional tests at the replaced location where the initial test failed and at one location point, randomly selected or as indicated by the Owner's representative.*

The Contractor shall be responsible for all costs in connection with the proctor and density tests, and for verifying that necessary compaction levels were achieved. These tests shall be performed by an independent testing laboratory selected by the Contractor and approved by the Owner. The Contractor shall provide access to the test area, associated trench excavation safety protection, and backfilling of the test areas at the Contractor's expense.

**8049**            **MEASUREMENT:** Excavation, Trenching and Backfill will not be measured for payment.

**804.10**           **PAYMENT:** No direct payment shall be made for incidental costs associated with quality control testing, excavation, trenching and backfilling for water mains and sanitary sewers, and all costs in connection therewith shall be included in the applicable contract price for the item to which the work pertains.

- End of Specification -

**ITEM NO. 812**  
**WATER MAIN INSTALLATION**

**812.1**      **DESCRIPTION:** This item shall consist of water main installation in accordance with these specifications and as directed by the Owner's Representative.

**812.2**      **SUBMITTALS:**

1.      Product Data: Submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.

**812.3**      **MATERIALS:** The materials for water main installation shall conform to the specifications contained within the latest revision of AWWA Material Specifications for "PVC C-900 Water Pipe."

1.      PVC water pipe shall be blue in color. PVC pipe markings shall include:
  - a.      Manufacturer's name or trademark;
  - b.      Standard to which it conforms;
  - c.      Pipe size;
  - d.      Material designation code;
  - e.      Pressure rating;
  - f.      SDR number or schedule number;
  - g.      Potable water laboratory seal or mark attesting to suitability for potable water;
  - h.      A certifier's mark may be added; and
  - i.      Manufactured date (installation shall not exceed one year from this date)

2. White-colored PVC pipe is acceptable if labeled in accordance with item A.

## 812.4

### CONSTRUCTION:

1. Start of Work: The Contractor shall start his work at a tie-in or point designated by the Owner's Representative. Pipe shall be laid with bell ends facing in the direction of pipe laying, unless otherwise authorized or directed. All valves and fire hydrants must be installed as soon as pipe laying reaches their established location. All pipe shall be installed to the required lines and grades with fittings, valves, and hydrants placed at the required locations. Spigots shall be centered in bells or collars, all valves and hydrant stems shall be set plumb, and fire hydrant nozzles shall face as per City of Pecos standard details or as directed by the Engineer. No valve or other control on the existing system shall be operated for any purpose by the Contractor unless a representative of the City of Pecos is present.

Crossing Other Underground Lines: New water mains crossing any other utility shall have a minimum of 24 inches of cover over the top of the pipe, unless otherwise waived or modified by the Engineer. Excavation around other utilities shall be done by hand for at least 12 inches all around. Any damage to the protective wrap on any gas lines or electrodes shall be reported immediately to the respective owner. Any damage to other utilities shall be reported to their proper governing entity. In both these cases of utility damage, Contractor shall also promptly notify the Owner's Representative.

2. Pipe Separation - Parallel Lines:
  - a. Where a new potable waterline parallels an existing, non-pressure or pressure-rated wastewater main or lateral and the licensed professional engineer licensed in the State of Texas is able to determine that the existing wastewater main or lateral is not leaking, the new potable waterline shall be located at least two feet above the existing wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the existing wastewater main or lateral. Every effort shall be exerted not to disturb the bedding and backfill of the existing wastewater main or lateral.

- b. Where a new potable waterline parallels an existing pressure-rated wastewater main or lateral and it cannot be determined by the licensed professional engineer if the existing line is leaking, the existing wastewater main or lateral shall be replaced with at least 150 psi pressure-rated pipe. The new potable waterline shall be located at least two feet above the new wastewater line, measured vertically, and at least four feet away, measured horizontally, from the replaced wastewater main or lateral.
- c. Where a new potable waterline parallels a new wastewater main, the wastewater main or lateral shall be constructed of at least 150 psi pressure-rated pipe. The new potable waterline shall be located at least two feet above the wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the wastewater main or lateral.

3. Pipe Separation - Crossing Lines:

- a. Where a new potable waterline crosses an existing, non-pressure-rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral is disturbed or shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure-rated pipe.
- b. Where a new potable waterline crosses an existing, pressure-rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure-rated pipe.

- c. Where a new potable waterline crosses a new, non-pressure-rated wastewater main or lateral and the standard pipe segment length of the wastewater main or lateral is at least 18 feet, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The wastewater main or lateral shall be embedded in cement stabilized sand for the total length of one pipe segment plus 12 inches beyond the joint on each end.
  
- d. Where a new potable waterline crosses a new, non-pressure-rated wastewater main or lateral and a standard length of the wastewater pipe is less than 18 feet in length, the potable water pipe segment shall be centered over the wastewater line. The materials and method of installation shall conform with one of the following options:
  - (1) Within nine feet horizontally of either side of the waterline, the wastewater pipe and joints shall be constructed with pipe material having a minimum pressure-rating of at least 150 psi. An absolute minimum vertical separation distance of two feet shall be provided. The wastewater main or lateral shall be located below the waterline.
  - (2) All sections of wastewater main or lateral within nine feet horizontally of the waterline shall be encased in an 18-foot (or longer) section of pipe. Flexible encasing pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The encasing pipe shall be centered on the waterline and shall be at least two nominal pipe diameters larger than the wastewater main or lateral. The space around the carrier pipe shall be supported at five-foot (or less) intervals with spacers or be filled to the springline with washed sand. Each end of the casing shall be sealed with watertight non-shrink cement grout or a manufactured watertight seal. An absolute minimum separation distance of six inches between the encasement pipe and the waterline shall be provided. The wastewater line shall be located below the waterline.

4. Pipe Grade: Water mains 16" or smaller shall have a minimum of 48 inches of cover from the proposed final finish ground/street/elevation. Water mains 20" and above shall have a minimum of 50 inches of cover over the top of the pipe from the proposed final finish ground/street/elevation unless otherwise waived or modified by the Engineer. Pipe grades shall be as required by the plans or as directed by the Engineer. Grades shall be met as specified by Item No. 804 "Excavation, Trenching and Backfilling." Precaution shall be taken to ensure that the pipe barrel has uniform contact with the cushion material for its full length except at couplings. The couplings shall not be in contact with the original trench bottom prior to backfilling. Cushion material shall be placed under the coupling and compacted by hand prior to backfilling so as to provide an even bearing surface under the coupling and pipe. Changes in grade shall be made only at joints.
5. Cushion and Cushion Materials: Prior to placing pipe in a trench, the trench shall have been excavated to the proper depth as required in Item No. 804 "Excavation, Trenching, and Backfilling." Approved imported materials or Engineer-approved materials selected from suitable materials from the excavation shall be smoothly worked across the entire width of the trench bottom to provide a supporting cushion.
6. Structures to Support Pipe: When either the Contractor or Engineer note that the material at the bottom of a trench is unstable or unsuitable, it shall be removed and replaced with approved material which may be properly compacted in place to support the pipe.
7. Lowering Pipe and Appurtenances into Trench: Proper implements, tools, and facilities satisfactory to the Owner's Representative shall be provided and used by the Contractor for the safe and convenient completion of work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece, by means of a derrick, ropes, or other suitable tools or equipment in such a manner as to prevent damage to water main materials and protective coatings, polywrap sleeving, and linings. Under no circumstances shall water main materials, pipes, fittings, etc., be dropped or dumped into the trench. Extreme care shall be taken to avoid damaging polywrap films.

8. Pipe Laying: Every precaution shall be taken to prevent foreign material from entering the pipe during installation. Under adverse trenching conditions, work stoppage for more than 24 hours and/or as otherwise required by the Engineer, a manufactured cap/plug is to be used to prevent any foreign type material entering the pipe. The cap/plug shall be left in place until it is connection to an adjacent pipe. The interior of each pipe shall be inspected for foreign material or defects, and the pipe shall be cleaned or rejected if any defects are found, respectively.

After placing a length of pipe in the trench, the jointed end shall be centered on the pipe already in place, forced into place, brought to correct line and grade, and completed in accordance with these requirements. The pipe shall be secured in place with approved backfill material tamped around it. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be rejected by the Engineer and/or Owner's Representative and shall be replaced with pipe and fittings of proper dimensions. Precautions shall be taken to prevent dirt or other foreign matter from entering the joint space.

At times when pipe laying is halted, the open end of pipe in the trench shall be closed by a watertight plug or other means approved by the Inspector. Pipe in the trench which cannot temporarily be jointed shall be capped or plugged at each end to make it watertight. This provision shall apply during all periods when pipe laying is not in progress. Should water enter the trench, the seal shall remain in place until the trench is pumped completely dry. The Contractor shall provide all plugs and caps of the various sizes required.

9. Deviations in Line or Grade: Wherever obstructions not shown in the contract documents are encountered during the progress of the work and interfere to an extent that an alteration in the plan is required, the Engineer shall have the authority to change the plans and direct a deviation from the line and grade or to arrange with the owners of the structures for the removal, relocation, or reconstruction of the obstructions. Any deviation from the line shall be accomplished by the use of appropriate bends unless such requirement is specifically waived by the Engineer. These deviations shall clearly and accurately be reflected in the Contractor's submittal of the redline drawings for permanent recording purposes.

Whenever it is necessary to deflect pipe from a straight line, the deflection shall be as directed by the Engineer and as described herein. In no case shall the amounts shown in Table 812-1, "Maximum Deflections of Ductile Iron Pipe" and Table 812-2, "Maximum Deflections of Concrete Steel Cylinder Pipe," be exceeded.

10. Cutting Pipe: The cutting of pipe for inserting valves, fittings, or closure

pieces shall be accomplished in a neat and workmanlike manner so as to produce a smooth end at right angles to the axis of the pipe. The recommendations of the pipe manufacturer shall be strictly followed by the Contractor. Only qualified and experienced workmen shall be used and, under no circumstances, shall a workman not equipped with proper safety goggles, helmet and all other required safety attire be permitted to engage in this work.

All cuts made on ductile-iron pipe shall be done with a power saw. The cuts shall be made at right angles to the pipe axis and shall be smooth. The edges of the cut shall be finished smoothly with a hand or machine tool to remove all rough edges. The outside edge of pipe should be finished with a small taper at an angle of about 30 degrees. Solid sleeves or cast couplings shall be allowed on precast/prefab vaults only. All other fire line services shall be installed with full joints of pipe.

To facilitate future repair work on water mains, no sections less than 3 feet in length between fittings shall be allowed.

11. Joint Assembly: Rubber Gasketed Joints: The installation of pipe and the assembly of rubber gasketed joints shall conform to the pipe manufacturer's assembly instructions. The method of inserting spigot ends of pipe in bells or collars known as "stabbing" shall not be permitted with pipe larger than 6 inches in size. Spigot ends of pipe larger than 6 inches in size must be properly inserted in the joint by means of suitable pushing/pulling devices or an approved manufacture's method.

- a. Mechanical Couplings: Mechanical couplings shall be assembled and installed according to the standards recommended by the manufacturer.

Mechanical coupling consists of a cylindrical steel middle ring, two steel follower rings, two rubber compound gaskets, and a set of steel bolts. The middle ring is flared at each end to receive the wedge-shaped gasket which is compressed between the middle ring flare and the outer surface of the pipe by pressure exerted on the follower rings through the bolt circle.

Prior to the installation of the mechanical coupling, the pipe ends shall be cleaned by wire brush or other acceptable method to provide a smooth bearing surface for the rubber compression gasket. The pipe shall be marked to align the end of the coupling which will center it over the joint. After positioning, the nuts shall be drawn up finger tight. Uniform pressure on the gaskets shall be applied by tightening alternate bolts on the opposite side of the circle in incremental

amounts. Final tensioning shall be accomplished with a torque wrench and in a manner similar to the tightening procedure. The coupling shall then be left undisturbed for 24 hours to allow the gaskets to "pack in." Final torque check shall then be made prior to coating and wrapping the joint. Table 812-3 ("Torque for Mechanical Couplings"), sets forth the proper torque for various sized mechanical couplings and is included for the convenience of the Contractor.

- b. **Restraint Joints:** Restraint Joints shall be installed as shown on the plans or as directed by the Engineer. Installation shall conform to the manufacturer's recommendation.
- 12. **Removal of Old Mains and Valves:** Contractor shall remove the old main land valves as specified in the Contract Document or as indicated on the plans.
- 13. **Abandoned Valves:** Valves abandoned in the execution of the work shall have the valve box and extension packed with sand to within 8 inches of the street surface. The remaining 8 inches shall be filled with 2,500 psi concrete or an equivalent sand-cement mix and finished flush with the adjacent pavement or ground surface. The valve covers shall be salvaged and returned to the Owner.
- 14. **New Valves Covers:** At no time during construction shall any valves covers be inaccessible for operation. Work shall be suspended until this requirement is met. No additional claims for cost or schedule delays will be accepted.

#### **812.5**

**MEASUREMENT:** Water main installed will be measured by the linear foot for each size and type as follows:

Measurements will be from the center line intersection of runs and branches of tees to the end of the valve of a dead end run.

Measurements will also be between the center line intersection of runs and branches of tees. Where the branch is plugged for future connection, the measurement will include the entire laying length of the branch or branches of the fitting.

The measurement of each line of pipe of each size will be continuous and shall include the full laying lengths of all fittings and valves installed between the ends of such line except that the laying length of reducers will be divided equally between the connected pipe sizes. Lines leading to a tapping connection with an existing main will be measured to the center of the main tapped.

**812.6**

**PAYMENT:** Payment for water main installed will be made at the unit price bid per linear foot of pipe of the various sizes installed by the open cut method. Such payment shall also include excavation, selected embedment material, backfill, compaction, polyethylene sleeve, hauling and disposition of surplus excavated material, including all existing pipe, fittings, appurtenances to be abandoned or removed (where specified or shown in the contract documents)

<b>TABLE 812-1</b>					
<b>MAXIMUM DEFLECTIONS OF DUCTILE-IRON</b>					
<b>Nominal Pipe Diameter</b>	<b>Maximum Deflection Angle</b>	<b>Maximum Deflection In Inches</b>		<b>Approximate Radius Of Curve In Inches</b>	
		<b>18 Ft.</b>	<b>20 Ft.</b>	<b>18 Ft.</b>	<b>20 Ft.</b>
6"	4°25'	16.7	18.5	234	260
8"	3°51'	14.6	16.2	268	297
10"	3°42'	14.0	15.5	279	310
12"	3°08'	11.9	13.2	327	363
16"	2°21'	8.8	9.7	440	488
20"	1°55'	7.2	8.0	540	600
	1°35'	6.0	6.7	648	720

**TABLE 812-2**

**MAXIMUM DEFLECTIONS OF CONCRETE STEEL CYLINDER**

Nominal Pipe Diameter	Maximum Deflection Angle	Maximum Deflection In Inches		Approximate Radius Of Curve In Inches	
		16 Ft.	20 Ft.	16 Ft.	20 Ft.
16"	2°20'	--	9.8	--	500
20"	1°52'	--	7.8	--	600
24"	1°34'	--	6.6	--	750
30"	1°16'	--	5.3	--	900
36"	1°02'	--	4.3	--	1100
42"	0°54'	--	3.8	--	1300
48"	0°47'	2.6	--	1170	--
54"	0°44'	2.5	----	1237	--
60"	0°54'	3.0		1024	-

**TABLE 812-3****TORQUE FOR MECHANICAL COUPLINGS**

	<b>Bolt</b>	
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<b>Coupling Size</b>	<b>Diameter</b>	<b>Torque</b>
2" to 24"	5/8"	75 ft-lb
2" to 24"	3/4"	90 ft-lb
30" & 36" (1/4" x 7" Middle Rings)	5/8"	65 ft-lb
30" thru 36" (3/8" & heavier Middle Rings)	5/8"	70 ft-lb
30" to 48"	3/4"	80 ft-lb
48" to 72"	3/4"	70 ft-lb

- End of Specification -

**ITEM NO. 818**  
**PVC (C-900, C-905 and C-909) PIPE INSTALLATION**

**8181**      **DESCRIPTION:** This item shall consist of PVC (C-900, C-905 and C-909) pipe installation in accordance with these specifications and as directed by the Engineer. Pipe shall be pressure-rated at 200 psi (DR-14) – or 150 psi (DR-18) per the Contract Documents. Deflection of PVC (C-900, C-905 and C-909) pipe shall not be allowed.

**8182**      **SUBMITTALS:** Product Data: Submit manufacturer’s product data instructions, recommendations, shop drawings, and certifications.

**8183**      **MATERIALS:** The materials for PVC pipe installation shall conform to the specifications contained within the latest revision of AWWA Material Specification for “Polyvinyl Chloride (PVC) Pipe.”

**8184**      **CONSTRUCTION METHOD:** PVC (C-900, C-905 and C-909) pipe shall be installed as specified within Item No. 812, “Water Main Installation” of these specifications. PVC (C-900, C-905 and C-909) mains shall be laid to the depth and grades shown in the contract documents. The pipe shall be laid by inserting the spigot end into the bell flush with the insertion line or as recommended by the manufacturer. At no time shall the bed end be allowed to go past the “insertion line.” A gap between the end of the spigot, and the adjoining pipe is necessary to allow for expansion and contraction.

Joint Restraints: For all mains consisting of PVC (C-900, C-905 and C-909), joint restraints shall be installed in accordance with manufacturer’s recommendations. Joint restraints shall be non-directional and installed to fully restrain the system as shown or called out on the plan drawings.

PVC (C-900, C-905 and C-909) pipe shall be field cut using a power saw with a steel blade or abrasive disc, depending on the size of pipe. If a bevel is needed after field cutting, it should be in accordance with the latest applicable recommendations of Uni-Bell or ASTM/AWWA standards. Such work will be subject to approval by the Owner’s Representative.

Tracer Wire: Tracer wire shall be utilized for location purposes and taped directly to the pipe. Tracer wire shall be of solid core (14 gauge insulated), and shall be taped to the main in minimum of 10 inch increments. Wire shall also come up to the top of valve extensions and fire hydrant stems, as directed by the Inspector.

**8185**      **MEASUREMENT:** PVC (C-900, C-905, and C-909) pipe will be measured by the linear foot for each size and type as follows:

Measurements will be from the center line intersection of runs and branches of tees to the end of the valve of a dead end run.

Measurements will also be between the center line intersection of runs and branches of tees. Where the branch is plugged for future connection, the measurement will include the entire laying length of the branch or branches of the fitting.

The measurement of each line of pipe of each size will be continuous and shall include the full laying lengths of all fittings and valves installed between the ends of such line except that the laying length of reducers will be divided equally between the connected pipe sizes. Lines leading to a tapping connection with an existing main will be measured to the center of the main tapped.

**8186**

**PAYMENT:** Payment for PVC (C-900, C-905 and C-909) pipe installed will be made at the unit price bid per linear foot of pipe of the various sizes installed by the open cut method. Such payment shall also include excavation, selected embedment material, backfill, compaction, polyethylene sleeve, hauling and disposition of surplus excavated material, including all existing pipe, fittings, appurtenances to be abandoned (where specified or shown in the contract documents).

- End of Specification -

**ITEM NO. 826**  
**VALVE BOX ADJUSTMENTS**

**826.1**      **DESCRIPTION:** This Item shall consist with the adjusting of existing valve boxes in accordance with these specifications and as directed by the Engineer.

**826.2**      **MATERIALS:** The materials for valve boxes shall conform to the specifications contained within the latest revision of AWWA Material Specification for "Valve Boxes."

1.      Construction Method: The valve box shall be placed in such a manner to prevent shock or stress from being transmitted to the valve. It shall be centered and plumb over the operating nut of the valve with the box cover flush with the surface of the finished pavement or at such other level as may be directed by the Owner's Representative. Valve boxes located in streets or other area subject to vehicular traffic shall be provided with concrete collars as shown on the construction drawings. Collars around such valve boxes shall be formed and finished off neatly and in a workmanlike manner.

Valve box shall be located so that the valve operating nut is readily accessible for operation through the opening in the valve box. The valve box shall be set flush with the surface of the finished pavement or at such other elevations as may be specified. Pits shall be constructed so that it permits minor valve repairs and provides the valve and pipe protection from impact where they pass through the pit walls.

2.      Existing valve box: Existing valve boxes shall be defined as boxes which are located within the right-of-way of the specified area of construction operations and are in conflict. These boxes shall be adjusted to match proposed finished grades. Valve boxes installed as part of a new valve and mainline construction project are considered "new valves." Adjustments to "new valves" are incidental to the installation of the valve. Separate pay shall not be given to adjust "new valves" to finished grade.

**826.3**      **MEASUREMENT:** Adjustment of valve boxes will be measured by the unit of valve boxes adjusted to the finished grade.

**826.4**

**PAYMENT:** Payment for "Valve Box Adjustment" shall be made at the contract unit price.

- End of Specification -

## **ITEM 828 GATE VALVES**

**828.1 DESCRIPTION:** This item shall consist of gate valves installed in accordance with these specifications and as directed by the Engineer.

**828.2 SUBMITTALS:** Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.

**828.3 MATERIALS:** The materials for all gate valves shall conform to the specifications contained within the latest revision of AWWA Material Specification covering "Resilient Seated Gate Valves and Tapping Valves."

**828.4 CONSTRUCTION:** Gate valve installation shall include: valve, reaction blocking, cast iron boot, valve box extension (having ductile iron riser pipe), valve box, concrete collar (where subjected to vehicular traffic), and valve box lid.

The valve box shall be placed in such a manner to prevent shock or stress being transmitted to the valve. All valves located 6 feet and deeper shall include valve key extensions inside the valve box. The Contractor has the option to install fully adjustable valve box and valve key extension systems, on all valves located between 6 feet and 13 feet. Adjustable valve box and valve key extension systems shall be centered over the valve's operating nut with the box cover flush with the finished pavement surface or located at another level as directed by the Engineer. Valve boxes located in streets or other area subject to vehicular traffic shall be provided with concrete collars as shown on the construction drawings. Collars around such valve boxes shall be formed and finished off neatly and in a sound workmanlike manner. Contractor shall insure that poly film used for anti-corrosion is protected and smoothly wrapped to form a covering around the gate valve and box.

Valve pits shall be located so that the valve operating nut is readily accessible for operation through the opening in the valve box. The valve box shall be set flush with the finished pavement surface or at other finish elevations as may be specified. Pits shall be constructed in such a manner to permit minor valve repairs and provide protection to the valve and pipe from impact (where penetrating through pit walls).

**828.5 MEASUREMENT:** Gate valves and valve boxes will be measured by the unit of each such assembly of the various sizes of gate valves and valve boxes installed to the finished grade.

**828.6 PAYMENT:** Payment for gate valves, complete with valve box, will be made at the unit price bid for each assembly of the various sizes of gate valves and valve boxes installed.

- End of Specification -

**ITEM NO. 832**  
**TAPPING SLEEVES AND VALVES**

**832.1**      **DESCRIPTION:** This item shall consist of tapping sleeves and valves installed in accordance with these specifications and as directed by the Engineer. The use of size on size taps shall not be permitted.

**832.2**      **SUBMITTALS:** Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.

**832.3**      **MATERIALS:** The materials for tapping sleeves and valves shall conform to the specifications contained within the latest revision of AWWA Material Specification for "Tapping Sleeves" and "Resilient Seated Gate Valves and Tapping Valves."

**832.4**      **CONSTRUCTION:** The installation work involved in tapping sleeves and valves shall consist of: excavation, backfilling the excavation with approved selected material, tapping sleeve, approved reaction blocking, tapping valve, valve box assembly, concrete collar (where subjected to street traffic), and cast iron lid. New taps will not be permitted closer than 2 feet of a joint or existing tap. The use of a shell-type cutter shall be required when tapping sleeves and valves. Whenever working on potable or recycle water systems, the shell cutter shall be disinfected with bleach prior to the start of work. The cutting edge shall be sharp and round. Any defective cutters shall be rejected by the Inspector.

All the tapping sleeves shall be air tested to 50 psi prior to tapping the main line. The valve box shall be placed in such a manner to prevent shock or stress from being transmitted to the valve. Valve boxes shall be centered over the valve's operating nut with the box cover flush with the finished pavement surface or located at another level as directed by the Owner's Representative. Valve boxes located in streets or other areas subject to vehicular traffic shall be provided with concrete collars as shown in the accompanying standard drawings. Collars around such valve boxes shall be formed and finished off neatly and in a sound workmanlike manner. Contractor shall insure that poly film used for anti-corrosion is protected and smoothly wrapped to form a covering around the gate valve and box.

**832.5**      **MEASUREMENT:** Tapping Sleeves, Valves, and Boxes will be measured by the unit of each such assembly of the various sizes of tapping sleeves, valves and boxes approved and installed.

**832.6**      **PAYMENT:** Payment for Tapping Sleeves and Valves, complete with boxes, will be made at the unit price bid for each such assembly of the various types and sizes of valves and valve boxes installed and approved

- End of Specification -

**ITEM NO. 834**  
**FIRE HYDRANTS**

**834.1**      **DESCRIPTION:** This item shall consist of fire hydrant installations using joint restraints in accordance with these specifications and as directed by the Engineer with the construction plans. Salvage and disposal of the fire hydrant identified in the plans shall be no separate pay item and inclusive of the bid item. *Fire hydrant valve shall be inclusive of bid item.*

**834.2**      **SUBMITTALS:**

1.      Product Data:      Submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.

**834.3**      **MATERIALS:** The materials for fire hydrant installations shall conform to the specifications contained within the latest revision of AWWA Material Specification for "Fire Hydrants."

**834.4**      **CONSTRUCTION:**

1.      General: Hydrants shall be connected to mains as shown in the contract documents or as directed by the Engineer. They shall be installed in accordance with the construction drawings and manufacturer's recommendations. Hydrants shall also be installed in a location where there is accessibility and in a safe location where there is a minimum possibility of damage from vehicles or injury to pedestrians. In situations where hydrants are placed directly behind curbs, hydrant barrels shall be set so that no portion of the hydrant will be less than 12 inches nor more than 7 feet from the back of the curb. Where hydrants are set in the lawn spaces between the curb and the sidewalk or between the sidewalk and the property line, no portion of the hydrant or nozzle cap shall be within 6 inches of the sidewalk.

Setting final grade of fire hydrants to match proposed or existing field conditions is the responsibility of Contractor.

Hydrants shall be set in accordance with the construction drawings and shall be set plumb and shall have their nozzles parallel with, or at right angles to, the curb with the pumper nozzle facing the curb. Drainage and concrete pads shall be provided at the base of hydrants as specified. No fire hydrant drainage system or pit shall be connected to a storm or sanitary sewer.

The Contractor shall install anchored or flanged style fittings.

2. Restrained Joints: Restrained mechanical joints that require field welding or groove cuts into the pipe barrel for restraint will not be accepted. Restrained joints shall be furnished for pipe at all changes in direction as indicated in the contract documents, or as directed by the Engineer. Restrained mechanical joints shall be locked mechanical joints. All joints shall conform to the manufacturer's recommendations. The restraint system shall be capable of a test pressure twice the maximum sustained working pressure of 350 psi for ductile iron and PVC pipe.
3. Replacing and Relocating Existing Fire Hydrants: When existing fire hydrants are to be replaced or relocated, the work shall be accomplished by either of the following:
  - a. Cutting or installing a tee of the size and type as indicated in the contract documents or as directed by the Engineer.
  - b. Using a tapping sleeve and valve of the size and type as indicated in the contract documents to install a new fire hydrant to an existing or new water main. Size on size taps will not be permitted.
  - c. Relocating the existing fire hydrant by closing the existing fire hydrant branch valve, removing the existing fire hydrant, extending the fire hydrant branch and installing the existing fire hydrant as specified herein.

The Contractor shall salvage the existing fire hydrants and other materials as designated in the field by the Inspector and shall deliver this material to the City of Pecos materials storage yard. Fire hydrant branches shall be abandoned by cutting and capping the fire hydrant cast iron tee at the service main and the surface restored to its original condition.

After a fire hydrant has been set, hydrants shall be painted with a suitable primer and finished with oil-based aluminum paint from the top of the hydrant to a point 18-20 inches below the center line of the pumper nozzle and applied to all exposed metal surfaces above the hydrant base flange. The payment for fire hydrant painting shall be included in the unit cost for installing the fire hydrant.

Installation on Water Mains: Ductile iron pipe, cast iron and ductile iron fittings, and valves used in the placement of fire hydrants and connections to the main will be considered part of the fire hydrant installation and not a part of the main construction. No separate payment will be made for this pipe. Hydrants shall be connected to the mains as shown in the contract documents or as directed by the Engineer. Hydrants shall also be installed in a location where there is accessibility and in a safe location where there is a minimum possibility

of damage from vehicles or injury to pedestrians. Contractor shall insure that poly film used for anti-corrosion is protected and smoothly wrapped to form a covering around the fire hydrant lower barrel and connective piping and valves.

**834.5**            **MEASUREMENT:** Standard Fire Hydrants with 6 inch Valve and Box will be measured by the unit of each fire hydrant, valve, and box installed. Relocate Fire Hydrants will be measured by the unit of each fire hydrant relocated.

Standard Fire Hydrants with Tapping Sleeve, 6 inch Valve, and Box will be measured by the unit of each fire hydrant, including the various sizes of tapping sleeves, valves and boxes installed.

**834.6**            **PAYMENT:** Payment shall include: excavation, backfill, branch line pipe, nipples, and fittings, polyethylene sleeve where required, asphalted material for ferrous surfaces, joint restraints, concrete pad and restoration of existing fire hydrant sites.

- End of Specification -

**ITEM NO. 836**  
**GREY-IRON AND DUCTILE-IRON FITTINGS**

- 8361**      **DESCRIPTION:** This item shall consist of grey-iron and ductile-iron fittings installation and adjustment installed in accordance with these specifications and as directed by the Engineer.
- 8362**      **SUBMITTALS:** Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, and necessary certifications.
- 8363**      **MATERIALS:** The materials for grey-iron and ductile-iron fittings installation shall conform to the latest provisions of American National Standard for Ductile-Iron (ANSI)/ American Water Works Association (AWWA) C153/A21.53, Compact Fittings 3-inch through 64-inch and ANSI/AWWA C110/A21.10, Full Body Fittings 3-inch through 48-inch for Water Service or most applicable approved equal provisions.
- 8364**      **CONSTRUCTION:** All fittings shall be either restrained mechanical joint compact or flanged joint, unless otherwise specified in the contract documents. All mechanical joint compact fittings shall be installed using approved restraining glands. No separate payment will be made for these restraining glands. Approved adapters shall be used where necessary to provide a transition between pipes and/or fittings of differing outside diameters. Thrust blocking shall only be utilized, in addition to restraining glands, if specified in the contract documents, when tying into existing non-restrained pipe, or when approved by the Owner's Representative. Anti-corrosion protection consisting of polyethylene sleeve and asphaltic material for ferrous surfaces shall be applied to exterior surfaces of all fittings installed. Anti- corrosion embedment shall be provided as specified in Item No. 804, "Excavation, Trenching and Backfill."
- 8365**      **MEASUREMENT:** Ductile-Iron and Grey-Iron Fittings will be measured by their weight as listed in Table 836-1 of this specification of the various sizes of fittings installed.

8366

**PAYMENT:** Payment for Grey-Iron and Ductile-Iron Fittings shall be for Mechanical Joint Compact fittings (AWWA) C153/A21.53 and/or flanged fittings. Payment will be made at the unit price bid for each ton of fittings to the nearest one-hundredth of a ton of fittings installed. Individual fitting weights used for payment calculations will be the weights of fittings listed in Table 836-1 of this specification. Weights of glands, bolts, nuts, gaskets (all types) are considered subsidiary to the fittings and no separate payment will be made for their weight. Payment for fitting weights listed in Table 836-1 shall be full compensation for excavation, installation, anti-corrosion protection, select anti-corrosion embedment material and installation, hauling and disposition of surplus excavated materials, all glands, bolts, nuts, rubbers, and flange gaskets of whatever type required, and concrete thrust/reaction blocking, if required.

TABLE 836-1							
WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)							
BENDS							
Size (Inches)	MJ Compact (C153)	MJ (C110)	FLG SB	Size (Inches)	MJ Compact (C153)	MJ (C110)	FLG SB
1/4 Bend (90 Degrees)				1/8 Bend (45 degrees)			
4	25	55	44	4	21	51	36
6	43	86	67	6	35	75	57
8	61	125	115	8	50	110	105
12	119	258	236	12	96	216	196
16	264	454	478	16	200	345	315
20	447	716	878	20	337	555	485
24	602	1105	1085	24	441	777	730
30	979	1740	1755	30	775	1393	1355
36	1501	2507	2135	36	1140	2163	1755
42	2277	3410	3055	42	1652	2955	2600
48	3016	4595	4095	48	2157	4080	3580
BENDS							
Size (Inches)	MJ Compact	MJ (C110)	FLG SB	Size (Inches)	MJ Compact	MJ (C110)	FLG SB

	(C153)				(C153)		
1/16 Bend (22-1/2 Degrees)				1/32 Bend (11-1/4 degrees)			
4	18	50	35	4	17	50	40
6	32	75	64	6	30	73	56
8	46	110	90	8	42	109	90
12	85	220	194	12	74	220	193
16	175	354	315	16	153	354	315
20	314	550	505	20	265	553	505
24	414	809	528	24	339	815	760
30	668	1500	1385	30	603	1410	1395
36	963	2182	1790	36	830	2195	1805
42	1354	3020	2665	42	1210	3035	2680
48	1790	4170	3665	48	1523	4190	3695

<b>TABLE 836-1 CONTINUATION</b>				
<b>WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)</b>				
<b>TEES</b>				
<b>Size (Inches)</b>		<b>Weight</b>		
<b>Run</b>	<b>Branch</b>	<b>MJ Compact (C153)</b>	<b>MJ (C110)</b>	<b>FLG Short Body</b>
24	6	466	1035	1089
	8	487	1047	1060
	12	539	1075	1125
	16	625	1109	1070
	20	729	1504	1510
	24	785	1617	1685
30	8	739	1808	-
	12	800	1842	1801
	16	959	1885	-
	20	1026	1941	-
	24	1228	2496	2475
	30	1373	2531	2615
36	24	1548	2710	2255

<b>TABLE 836-1 CONTINUATION</b>				
<b>WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)</b>				
<b>TEES</b>				
<b>Size (Inches)</b>		<b>Weight</b>		
<b>Run</b>	<b>Branch</b>	<b>MJ Compact (C153)</b>	<b>MJ (C110)</b>	<b>FLG Short Body</b>
3	3	26	56	53
4	3	31	76	54
	4	33	80	60
6	4	49	114	90
	6	60	124	98
8	4	65	163	155
	6	76	175	148
	8	89	188	179
12	4	99	316	322
	6	115	325	297
	8	127	339	346
	12	162	407	369
16	6	226	563	573
	8	240	565	555
	12	283	615	590
	16	326	676	635
20	6	344	750	773
	8	371	766	720
	12	427	799	816
	16	503	975	950
	20	566	1068	1005

	30	1901	3545	3000
	36	2012	3686	3160
42	24	2272	3690	3245
	30	2512	4650	4125
	36	3048	5119	5360
	42	3225	6320	5580
48	24	2934	4995	4385
	30	3147	5140	4455
	36	4046	6280	5555
	42	4249	8130	7195
<b>TABLE 836-1 CONTINUATION</b>				
<b>WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)</b>				
<b>CROSSES</b>				
<b>Size (Inches)</b>		<b>Weight</b>		
<b>Run</b>	<b>Branch</b>	<b>MJ Compact (C153)</b>	<b>MJ (C110)</b>	<b>FLG Short Body</b>
24	6	566	1025	-
	8	578	1085	1045
	12	610	1153	1110
	16	663	1256	1200
	20	975	1733	1675
	24	907	1906	1835
30	8	650	1795	-
	12	870	1925	1865
	16	900	1950	-
	20	1220	2060	-
	24	1497	2776	2675
	30	1808	3188	3075
36	24	1853	2928	2980
	30	2580	3965	-
	36	2698	4370	4370
42	24	2415	3910	-
	30	2920	5040	-
	36	3788	5835	-
	42	3908	6493	7145

<b>TABLE 836-1 CONTINUATION</b>				
<b>WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)</b>				
<b>CROSSES</b>				
<b>Size (Inches)</b>		<b>Weight</b>		
<b>Run</b>	<b>Branch</b>	<b>MJ Compact (C153)</b>	<b>MJ (C110)</b>	<b>FLG Short Body</b>
3	3	34	70	-
4	3	42	90	-
	4	46	105	-
6	4	63	140	-
	6	74	160	160
8	4	88	185	185
	6	97	205	205
	8	105	239	234
12	4	114	340	-
	6	135	360	360
	8	151	382	385
	12	199	493	495
16	6	250	590	575
	8	270	619	605
	12	332	685	-
	16	409	811	790
20	6	358	760	-
	8	379	822	790
	12	413	883	860
	16	550	1117	1085
	20	598	1274	1230

48	24	3435	5210	-
	30	4145	5495	-
	36	4873	6790	-
	42	5465	8815	-
	48	5588	9380	-

<b>TABLE 836-1 CONTINUATION</b>				
<b>WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)</b>				
<b>CAPS</b>			<b>PLUGS</b>	
<b>Size (Inches)</b>	<b>MJ Compact (C153)</b>	<b>MJ (C110)</b>	<b>MJ Compact (C153)</b>	<b>MJ (C110)</b>
4	10	17	12	16
6	16	29	19	28
8	24	45	30	46
12	45	82	54	85
16	95	160	97	146
20	141	235	146	218
24	193	346	197	350
30	362	644	381	626
36	627	912	688	884
42	893	1322	1200	1222
48	1076	1737	1550	1597

<b>TABLE 836-1 CONTINUATION</b>				
<b>WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)</b>				
<b>SOLID SLEEVES</b>				
<b>Size (Inches)</b>	<b>Weight</b>			
	<b>MJ Short Compact (C153)</b>	<b>MJ Long Compact (C153)</b>	<b>MJ Short (C110)</b>	<b>MJ Long (C110)</b>
4	17	21	35	46
6	28	35	45	65
8	38	48	65	86
12	57	77	113	143
16	127	172	192	257
20	201	258	258	359
24	264	337	340	474
30	500	651	690	1005
36	725	960	947	1374
42	877	1209	1187	1628
48	1406	1516	1472	2033

<b>TABLE 836-1 CONTINUATION</b>			
<b>WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)</b>			
<b>CONCENTRIC REDUCERS</b>			
<b>Size (Inches)</b>			<b>Weight</b>
<b>Large End</b>	<b>Small End</b>	<b>MJ Compact (C153)</b>	<b>MJ (C110)</b>
6	4	27	59
8	4	38	81
8	6	41	95
12	4	70	136
12	6	69	150
12	8	70	167
16	6	134	234
16	8	136	258
16	12	126	310
20	12	213	427
20	16	221	492
24	12	304	562
24	16	315	633
24	20	315	727
30	16	596	1027
30	20	599	1085
30	24	492	1204
36	20	1042	1459
36	24	785	1580
36	30	655	1868
42	24	1356	2060
42	30	1112	2370
42	36	1116	2695
48	30	1722	3005
48	36	1650	3370
48	42	1429	3750

<b>TABLE 836-1 CONTINUATION</b>		
<b>WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)</b>		
<b>2" Tapped Tees and Crosses</b>		
<b>Size (Inches)</b>	<b>Weight</b>	
	<b>MJ Compact (C153)</b>	<b>MJ (C110)</b>
4	24	47
6	36	71
8	54	97
10	69	130
12	87	169
20	-	259
24	-	320

<b>TABLE 836-1 CONTINUATION</b>		
<b>WEIGHTS OF GREY-IRON AND DUCTILE-IRON FITTINGS (LBS.)</b>		
<b>OFFSETS</b>		
<b>Size (Inches)</b>	<b>Weight</b>	
	<b>MJ Compact (C153)</b>	<b>MJ (C110)</b>
4 x 6	35	75
4 x 12	55	83
6 x 6	35	110
6 x 12	67	138
6 x 24	96	189
8 x 6	82	164
8 x 12	98	209
8 x 24	141	280
12 x 6	121	320
12 x 12	178	420
12 x 24	240	645
20 x 12	-	1025
20 x 24	-	1245

- End of Specification -

**ITEM NO. 839**  
**ANCHORAGE/THRUST BLOCKING AND JOINT RESTRAINT**

- 839.1**      **DESCRIPTION:** This item shall consist of anchorage/thrust blocking installation and adjustment, in accordance with these specifications and as directed by the Engineer. Restrained lengths shall be installed according to the manufacturer's recommendation.
- 839.2**      **MATERIALS:** The materials for anchorage/thrust blocking installation and pipe restraint devices shall conform to the appropriate specifications contained within the latest revision of AWWA Material Specifications.
- 839.3**      **CONSTRUCTION:** Suitable anchorage/thrust blocking or joint restraint shall be provided at all of the following main locations: dead ends, plugs, caps, tees, crosses, valves, and bends. All mechanical (joint) restraints shall be bidirectional. Anchor blocks shall be constructed solidly behind the fitting and symmetrical with the axis of resultant thrust, except where this is not possible as in the case of gravity anchorage for vertical bends. Special-ties and anchor fittings may be utilized in conjunction with blocking when shown in the contract documents or as directed by the Engineer.

All thrust blocking shall be a minimum of 3,000 psi concrete placed between solid ground and the fitting except as otherwise shown in the contract documents. The area of bearing in contact with solid ground shall be that shown in the contract documents or as directed by the Engineer.

In all cases, the design of thrust blocking shall be of sufficient size to withstand an assumed soil lateral load bearing capacity of 3,000 psf, unless specified otherwise in the contract documents. When specifically requested by the Contractor and approved by the Engineer, the maximum soil lateral load bearing capacity that will be allowed for the design of thrust blocking shall be 5,000 psf. When soil lateral load bearing capacities of 4,000 psf or 5,000 psf are recorded for design of thrust blocks, copies of soil tests made for determining the lateral load bearing capacity of the subject soil shall be submitted to the Engineer for approval.

The blocking shall be placed so that pipe and fitting joints will be accessible.

Pipe polywrap shall be placed between the pipe or fitting and the concrete.

The reaction block on the unused branch of a fitting shall be poured separately from the block across the back of the fitting. If they are poured simultaneously, a rigid partition shall be placed between the blocks.

Valves 12 inches or larger in size shall be supported on a concrete pad extending vertically from 12 inches below the bottom of the valve to the lower quarter point of the hub and laterally from face to face of hubs and transversely from wall to wall of the trench.

**839.4**      **MEASUREMENT:** Anchorage/Thrust Blocking or Joint Restraints are considered subsidiary to the work and no separate payment will be made to the Contractor for this work.

**839.5**      **PAYMENT:** Anchorage/Thrust Blocking or Joint Restraints are considered subsidiary to the work and no separate payment will be made to the Contractor for this work.

- End of Specification -

**ITEM NO. 840**  
**WATER TIE-INS**

- 840.1**      **DESCRIPTION:** This item shall consist of water main tie-ins installed in accordance with these specifications and as directed by the Engineer. Operation of valves 12-inch and larger shall be coordinated through the City of Pecos.
- 840.2**      **SUBMITTALS:**
- A. Product Data: Submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.
- 840.3**      **MATERIALS:** The materials for water main tie-ins shall conform to the specifications contained within the latest revision of AWWA Material Specifications for all appropriate items.
- 840.4**      **CONSTRUCTION:** The Contractor shall make tie-ins from new water mains to existing water mains as shown in the contract documents or as directed by the Engineer. The Contractor shall be responsible for all shutdowns and isolation of the existing mains; cutting pipe for the connection; dewatering the excavation; customer notification of the shutdown; and all other requirements as directed by the Inspector in order to provide completion of this effort in a safe and secure manner. Work performed by the Contractor on mains 12 inches and larger, will require operation of any valves by City of Pecos forces. Therefore ample coordination beforehand (2 work days) shall be provided by the Contractor for this interaction to occur. All tie-ins shall be done after normal work hours, (8am-5pm). During construction, the planned shutdown and tie-in work shall be accomplished at a time which will be at the least inconvenience to the customers. No additional compensation will be provided for tie-ins accomplished after normal working hours.
- 840.5**      **MEASUREMENT:** Tie-ins will be measured by the unit of each such assembly of the various sizes of tie-ins installed at the proposed main.
- 840.6**      **PAYMENT:** Payment for "Tie-ins" will be made at the unit price bid for each tie- in of the various types and sizes completed from an existing main to the proposed main to be accepted. Such payment shall include; shut-down and isolation of the existing main to which the new main is to be connected, cutting pipe for the connection, dewatering the excavation, and customer notification of service interruption. Connections between new and existing mains which are made with tapping sleeves and valves and by cutting-in tees will be processed as a no separate pay item. There will be no separate pay item for any related parts, tools, and equipment.

- End of Specification -

**ITEM NO. 841**  
**HYDROSTATIC TESTING OPERATIONS**

**8411**      **DESCRIPTION:** This item shall consist of hydrostatic testing operations, of water mains in accordance with these specifications.

**8412**      **MATERIALS:** The materials for hydrostatic testing operations installation and adjustment shall conform to the appropriate specifications contained within the latest revision of AWWA Material Specifications.

**8413**      **PROTOCOL:**

1.      Flushing: Immediately upon completion of water main work, the Contractor shall flush all mains affected by the scope of the work. This flushing shall consist of completely filling sections of main between valves and then displacing such initial volumes of water by introducing clear water from existing facilities into and through the main to the point of discharge from the main being flushed. The flow-through shall continue until it is determined all dust, debris, or foreign matter that may have entered during pipe laying operations has been flushed out. All new mains shall then be left under system pressure for testing.

To avoid damage to pavement and inconvenience to the public, fire hoses shall be used to direct flushing water from the main into suitable drainage channels or sewers. The contractor is to coordinate with the Owner's Representative prior to flushing.

2.      Operation of Valves: No valve in the Owner's water distribution system shall be operated by the Contractor without prior permission of the Owner's Representative.
3.      Hydrostatic Test: All new mains shall be hydrostatically field tested at a maximum test pressure of 150 psi before acceptance by the Engineer or Owner's Representative. It is the intent of these Specifications that all joints be watertight and that all joints which

are found to leak by observation during any test shall be made watertight by the Contractor. When repairs are required, the hydrostatic field test shall be repeated until the pipe installation conforms to the specified requirements and is acceptable to the Engineer/Owner's Representative. The Contractor shall insure that the Engineer/Owner's Representative be present for the duration of the pressure test.

4. Test Procedures: After the new main has been laid and backfilled as specified (but prior to chlorination and replacement of pavement), it shall be filled with water for a minimum of 24 hours and then subjected to a hydrostatic pressure test.

The specified test pressure shall be supplied by means of a pump connected to the main in a satisfactory manner. The pump, pipe connection, and all necessary appurtenances including gauges and meters shall be furnished by the Contractor. Unless otherwise specified, the Owner will furnish water for filling lines and making tests through existing mains. Before applying the specified test pressure, all air shall be expelled from the main. To accomplish this, taps shall be made, if necessary, at the points of highest elevation and afterwards tightly plugged at no cost to the Owner. At intervals during the test, the entire route of the new main shall be inspected to locate any leaks or breaks. If any are found, they shall be stopped or repaired, and the test shall be repeated until satisfactory results are obtained. The hydrostatic test shall be made so that the maximum pressure at the lowest point does not exceed the specified test pressure.

The duration of each pressure test shall be a minimum of 4 hours for new mains in excess of 1000 linear feet and a minimum of 1 hour for new mains less than 1000 linear feet after the main has been brought up to test pressure. The test pressure shall be measured by means of a tested and properly calibrated pressure gauge acceptable to the Engineer/Owner's Representative. All pressure tests shall be continued until the new main meets the requirements of these Specifications.

Should any test of pipe in place disclose leakage greater than that listed in Table 841-1 or 841-2, "Hydrostatic Test Leakage Allowances," as applicable, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

Leakage is defined as the quantity of water supplied into the newly laid main, or any valved section of it, necessary to maintain the specified leakage test pressure after the main has been filled with water and the air expelled.

**8414**      **MEASUREMENT:** Hydrostatic Pressure Test will be measured by the unit of each successful test conducted.

**8415**      **PAYMENT:** Payment for "Hydrostatic Pressure Test" will be made at the unit price bid for each successful test. Such payment shall also include all pipe, valves, fittings, pumping equipment, pressure gauge, and other required apparatus incidental to the conduct of the test.

**TABLE 841-1****HYDROSTATIC TEST LEAKAGE ALLOWANCES (MAXIMUM) @ 150 PSI**

Nominal Diameter & Type Pipe	ALLOWABLE LEAKAGE IN GALLONS PER HOUR (GPH)*													
	100 L.F.	200 L.F.	300 L.F.	400 L.F.	500 L.F.	600 L.F.	700 L.F.	800 L.F.	900 L.F.	1000 L.F.	2000 L.F.	3000 L.F.	4000 L.F.	5000 L.F.
6" DI**	0.11	0.22	0.33	0.44	0.55	0.66	0.77	0.88	0.99	1.10	2.20	3.30	4.40	5.50
8" DI**	0.15	0.29	0.44	0.59	0.71	0.88	1.03	1.18	1.32	1.47	2.94	4.41	5.88	7.35
12" DI**	0.22	0.44	0.66	0.88	1.10	1.32	1.54	1.76	1.98	2.20	4.40	6.60	8.80	11.00
16" DI**	0.29	0.59	0.88	1.18	1.47	1.76	2.06	2.35	2.65	2.94	5.88	8.82	11.76	14.70
20" DI**	0.39	0.74	1.10	1.47	1.84	2.21	2.55	2.94	3.31	3.68	7.63	11.04	14.72	18.40
20" CSC	0.08	0.16	0.24	0.32	0.40	0.47	0.55	0.63	0.71	0.79	1.58	2.37	3.16	3.95
24" DI**	0.44	0.88	1.32	1.76	2.21	2.65	3.09	3.53	3.97	4.41	8.82	13.23	17.64	22.05
24" CSC	0.1	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.95	1.90	2.85	3.80	4.75
30" DI**	0.55	1.1	1.66	2.21	2.76	3.31	3.86	4.42	4.97	5.52	11.04	16.56	22.08	27.60
30" CSC	0.12	0.24	0.35	0.47	0.59	0.71	0.83	0.94	1.06	1.18	2.36	3.54	4.72	5.90
36" DI**	0.66	1.32	1.99	2.65	3.31	3.97	4.63	5.3	5.96	6.62	13.24	19.86	26.48	33.10
36" CSC	0.14		0.28	0.57	0.71	0.85	0.99	1.14	1.28	1.42	2.84	4.26	5.68	7.10
42" DI**	0.77	1.54	2.32	3.09	3.86	4.63	5.4	6.18	6.95	7.72	15.44	22.16	30.88	38.60
42" CSC	0.17	0.33	0.5	0.66	0.83	1	1.16	1.33	1.49	1.66	3.32	4.98	6.64	8.30
48" DI**	0.88	1.77	2.65	3.53	4.42	5.3	6.18	7.06	7.95	8.83	17.66	26.16	35.32	44.15
48" CSC	0.19	0.38	0.57	0.76	0.95	1.13	1.32	1.51	1.7	1.89	3.78	4.98	6.64	8.30
54" CSC	0.21	0.42	0.63	0.84	1.05	1.26	1.47	1.68	1.89					
60" CSC	0.24	0.48	0.72	0.96	1.2	1.44	1.68	1.92	2.16					

\* PVC pipe shall be tested to DI pressures. GPH for CSC Pipe are manufacturer's maximum.

\*\* DI pipe includes mechanical and push-on joints.

<b>TABLE 841-2</b>										
<b>Hydrostatic Test Leakage Allowances (Maximum) @ 200 PSI</b>										
<b>Nominal Pipe Diameter</b>	<b>Allowable Leakage in Gallons Per Hour (GPH)*</b>									
	<b>100 L.F.</b>	<b>200 L.F.</b>	<b>300 L.F.</b>	<b>400 L.F.</b>	<b>500 L.F.</b>	<b>600 L.F.</b>	<b>700 L.F.</b>	<b>800 L.F.</b>	<b>900 L.F.</b>	<b>1000 L.F.</b>
6" DI**	0.13	0.25	0.38	0.51	0.64	0.6	0.89	1.02	1.14	1.27
8" DI**	0.17	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.7
12" DI**	0.26	0.51	0.77	1.02	1.28	1.53	1.79	2.04	2.3	2.55
16" DI**	0.34	0.68	1.02	1.36	1.7	2.04	2.38	2.72	3.06	3.4
20" DI**	0.43	0.85	1.28	1.7	2.13	2.55	2.98	3.4	3.83	4.25
20" CSC	0.08	0.16	0.24	0.32	0.4	0.47	0.55	0.63	0.71	0.79
24" DI**	0.51	1.02	1.53	2.04	2.55	3.06	3.57	4.08	3.59	5.1
24" CSC	0.1	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.95
30" DI**	0.64	1.27	1.91	2.55	3.19	3.82	4.46	5.1	5.73	6.37
30" CSC	0.12	0.24	0.35	0.47	0.59	0.71	0.83	0.94	1.06	1.18
36" DI**	0.76	1.53	2.29	3.06	3.82	4.58	5.35	6.11	6.88	7.64
36" CSC	0.14	0.28	0.43	0.57	0.71	0.85	0.99	1.14	1.28	1.42
42" DI**	0.89	1.78	2.68	3.57	4.46	5.35	6.24	7.14	8.03	8.92
42" CSC	0.17	0.33	0.5	0.66	0.83	1	1.16	1.33	1.49	1.66
48" DI**	1.02	2.04	3.06	4.08	5.1	6.11	7.13	8.15	9.17	10.19
48" CSC	0.19	0.38	0.7	0.76	0.95	1.13	1.32	1.51	1.7	1.89
54" CSC	0.21	0.42	0.63	0.84	1.05	1.26	1.47	1.68	1.89	2.1
60" CSC	0.23	0.46	0.69	0.92	1.15	1.38	1.61	1.84	2.07	2.3

\* PVC pipe shall be tested to DI pressures. GPH for CSC pipe are manufacturer's maximum.

\*\* DI pipe includes mechanical and push-on joints.

- End of  
Specification

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**ITEM NO. 844**  
**BLOW-OFF ASSEMBLIES**

**844.1**      **DESCRIPTION:** This item shall consist of blow-off assemblies installed in accordance with these specifications and as directed by the Engineer.

**844.2**      **MATERIALS:** The materials for blow-off assemblies, installation and adjustment shall conform to the specifications contained within the latest revision of AWWA Material Specification.

**844.3**      **CONSTRUCTION:** Permanent and temporary blow-off assemblies shall be installed where shown on the plans and/or at locations designated by the Engineer/Owner and at the end of all dead end mains in accordance with the Texas Administrative Code (TAC) rules to include 30 TAC § 290.44.(d)(5), (6).

The permanent blow-off shall consist of the following: all galvanized iron pipe, valve, and fittings of the various sizes shown on the plans, 6 inch valve box assembly and concrete collar around the valve box. The temporary blow-off shall consist of the following; all galvanized iron pipe, valve and fittings of the various sizes shown on the plans. Valve box shall be raised or installed to finished grade and installed in accordance with the construction drawings.

**844.4**      **MEASUREMENT:** Permanent Blow-off assemblies will be measured by the unit of each such assembly of the various sizes of permanent blow-offs installed.

Temporary Blow-off assemblies will be measured by the unit of each such assembly of the various sizes of temporary blow-offs installed.

**844.5**      **PAYMENT:** Payment for Permanent and Temporary Blow-off will be made at the unit price bid for each such assembly of the various types and sizes installed in accordance with the details shown in the construction drawings. Such payment shall also include excavation, selected embedment material, anti-corrosion embedment when specified, and the hauling and disposition of surplus excavated materials.

- End of Specification -

**ITEM NO. 846**  
**AIR RELEASE ASSEMBLIES**

**846.1**      **DESCRIPTION:** This item shall consist of air release assemblies installed in accordance with these specifications and as directed by the Engineer.

**846.2**      **SUBMITTALS:** Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, etc.

**846.3**      **MATERIALS:** The materials for air release assemblies installation and adjustment shall conform to the specifications contained within the latest revision of AWWA Material Specification for "Air Release, Vacuum and Combination Air Valves."

**846.4**      **CONSTRUCTION:** Air release assemblies shall be installed at the location shown in the contract documents or as directed by the Engineer.

Air release assemblies in an open trench water main installation shall be installed in accordance with the construction drawings and shall include the valve, valve boxes, tapping saddle, pipe, fittings, accessories and appurtenances. It shall also include the service line and tap to the main line.

**846.5**      **MEASUREMENT:** Air release assemblies will be measured by the unit of each such assembly of the various sizes of air release assemblies installed.

**846.6**      **PAYMENT:** Payment for air release assemblies will be made at the unit price bid for each such assembly of the various sizes installed in accordance with the details shown in the Construction Drawings. Such payment shall also include: excavation, selected embedment material, anti-corrosion embedment when specified, hauling and disposition of surplus excavated materials, blocking, and various types and sizes of meter boxes.

- End of Specification -

## **ITEM NO. 847 DISINFECTION**

**847.1**      **DESCRIPTION:** This item shall consist of disinfection of new mains utilizing Calcium Hypochlorite (HTH) in accordance with these specifications.

**847.2**      **MATERIALS:** The materials for disinfection shall conform to the appropriate specifications contained within the latest revision of AWWA Material Specifications.

**847.3**      **CONSTRUCTION:** After the new mains have successfully passed the pressure test specified in Item No. 841, "Hydrostatic Testing Operations," the Contractor will disinfect only those mains shown in the contract documents. This disinfection shall include: chlorination, flushing, and placing the mains into service. All disinfection requirements shall be accomplished by the Contractor.

1.      Operation of Valves: During and after disinfection of mains less than or equal to 16 inches in diameter, the Contractor shall notify the City so that a competent representative can be present whenever valves are to be operated that will affect the pressure in any part of the work for which the Contractor is responsible.
2.      Contractor's Personnel and Equipment: The Contractor shall supply labor and equipment necessary to make all excavations required for chlorination, equipment connections, subsequent flushing, and placing the mains into service.
3.      Safeguarding and Backfilling Open Holes: The Contractor shall be responsible for safeguarding any open holes excavated or left open for flushing and disinfection purposes. Following completion of disinfection, the Contractor shall backfill holes in accordance with appropriate provisions of Item No. 804, "Excavation, Trenching and Backfill."
4.      General: Mains shall be disinfected with dry HTH where shown in the contract documents or as directed by the Owner's Representative, and shall not exceed a total length of 800 feet. This method of disinfection will also be followed for main repairs. The Contractor shall utilize all appropriate safety measures to protect his personnel during disinfection operations.
5.      Dosage: The Contractor shall disinfect the new or replaced mains with HTH of 70% available chlorine furnished by the Contractor. Sufficient

HTH shall be used to obtain a minimum chlorine concentration of 50 ppm.

A heaping tablespoon holds approximately ½ ounce, and a standard measuring cup holds approximately 8 ounces.

6. Filling the Main: Those sections of main to which the dry HTH has been applied shall be filled slowly to allow for the even distribution of the disinfecting material. The manipulation of valves shall be under the supervision of the Owner's representative.
7. Holding Time: The length of time that sections of main disinfected with HTH shall be allowed to stand undisturbed will depend upon the particular job and Texas Commission on Environmental Quality (TCEQ) criteria.
  - a. When circumstances permit a shutdown with no customers out of service, the required minimum detention time will be 24 hours with a 50 ppm chlorine dosage.
  - b. When customers are out of service during a shutdown with no leakage past valves, the required minimum detention time will be 3 hours and the chlorine dosage will be 300 ppm.
  - c. When customers are out of service with some leakage past valves, the required minimum detention time will be 30 minutes with a 500 ppm chlorine dosage.
8. Flushing: Following the expiration of the specified holding time, the treated section of main shall be flushed thoroughly by the Contractor in accordance with the applicable provisions of Item No. 841, "Hydrostatic Testing Operations." Flushing shall continue until no chlorine remains detectable by taste or odor or until the chlorine residual is less than 0.3 ppm. The Contractor must make provisions for the disposal and runoff of the flushing operations in order to minimize erosion or impact to residents.
9. Preventing Reverse Flow: Valves shall be manipulated so that the strong chlorine solution in the line being treated will be flushed out of the main and will not flow back into the line supplying the water.
10. Supervision. All disinfection of mains shall be done under the general supervision of the Owner's Representative.

11. Additional Treatment: Should the new main fail to meet minimum public health standards for bacteriological quality after flushing, further treatment shall be performed by the Contractor. In no case, however, shall the new line be acceptable as complete and satisfactory until the bacteriological quality of the water taken from the main meets the standards of the TCEQ.

**8474**      **MEASUREMENT:** Disinfection operations are considered subsidiary to the work and no separate measurement will be made by the Contractor for this work.

**8475**      **PAYMENT:** Disinfection operations are considered subsidiary to the work and no separate payment will be made to the Contractor for this work.

The Contractor is required to provide all appurtenances to the pipe to allow for proper disinfection procedures.

- End of Specification-

**ITEM NO. 848M**  
**SANITARY SEWERS**

**848.1**      **DESCRIPTION:** This item shall govern the furnishing, installation, adjustment, or replacement of sanitary sewer pipe of the size and type specified by the project's plans and specifications.

All plans, materials and specifications shall be in accordance with the Texas Administrative Code (TAC) rules to include: 30 TAC 213 and Design Criteria for Sewerage Systems 30 TAC 217 or any revisions thereto as applicable.

All new manhole covers shall be visible and accessible at all times. New manhole covers shall not be covered by pavement.

**848.2**      **SUBMITTALS:**

**Product Data:** Submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.

**848.3**      **MATERIALS:** Materials for sanitary sewer pipe and fittings shall be flexible. All pipe not listed shall be subject to pre-approval by the Engineer.

1.      Flexible Pipe:

- a.      Any flexible pipe having a deflection of the inside diameter greater than 5% after 30 days of installation will not be accepted.

Unless directed otherwise by the Engineer, a "GO, NO-GO" Deflection Testing Mandrel built in accordance with the detail drawing, as shown in the DD-848 Standard Drawing Series, and 30 TAC § 217, shall be furnished at the Contractor's expense and shall be used in testing pipe deflection for acceptance. Refer to Specification Item No. 849, "Air and Deflection testing," for more information about mandrel deflection testing.

- b.      Working room: The working room for flexible pipe shall be a minimum of 6 inches.
- c.      Pipe Stiffness: All mains are to be SDR 26 PVC (ASTM D3034-08) with a pressure rating of 115 psi.
- d.      At waterline crossings and where water and sewer mains are parallel and separation distance cannot be achieved as per 30 TAC § 217.53, use extra stiff pipe SDR 26 PVC (ASTM D2241-09) with a pressure rating of 150 psi. This shall include all lateral piping as well.

- e. All sanitary sewer piping shall pass the low pressure test, as described in 30 TAC § 217.57.
- 2. PSM Polyvinylchloride (PVC) Sewer Pipe: Pipe shall be made from class 12454-B materials as prescribed in ASTM D1784-11. For pipes 4 inches to 15 inches in diameter, fittings and joints shall conform to ASTM D3034-08 and D3212-07, with the exception that solvent cement joints shall not be used. All pipes that are 18 inches to 36 inches in diameter shall meet the requirements of ASTM F679-08.
- 3. Pressure Pipe/Force Mains: Pipe shall be made from Class 1254-A or 1254-B, as defined in ASTM D1784-11. All pipe, fittings, and joints shall meet or exceed the requirements of ASTM D2241-09, with the exception that solvent cement joints shall not be used. The pressure rating, size, and pressure class shall be as shown in the contract documents. Pipe shall have an integral bell and gasket seal with the locked-in type gasket reinforced with a steel band or other rigid material conforming to ASTM F477-10. The joint shall comply with the requirements of ASTM D3139- 98(2011). All required joint restraint shall be approved by the Engineer prior to the work being accepted. Pressure pipe/Force mains are required to have 1” diameter clean gravel material used as bedding. Pipes also shall be hydrostatically tested at a minimum of 100 psi after their construction to ensure proper construction.
- 4. Mechanical or compression joints, concrete jointing collars, or non-reinforced rubber adaptors shall be used only as approved by the Engineer.

**848.4**

**CONSTRUCTION:** All sanitary sewer mains shall be constructed in accordance with the specifications herein outlined and in conformity with the required lines, grades, and details shown in the contract documents and as directed by the Engineer. Successful passage of the air test and mandrel test (for flexible pipe, 30 days after installation), as described under TCEQ criteria, shall be required for the acceptance of the mains.

- 1. Water Main Crossings: Where gravity or force main sewers are constructed in the vicinity of water mains, the requirements of the 30 TAC § 217.53 shall be met.
- 2. For excavation, trenching and backfill requirements see Specification Section for “Excavation, Trenching and Backfill.”
- 3. Pipe Installation: The Contractor will inspect all pipe before it is placed in the trench and will reject any sections found to be damaged or defective to a degree that would affect the structural integrity of the pipe. Rejected pipe shall be immediately removed from the site of the work and replaced with

new acceptable pipe. The Contractor shall commence installation of the pipe at the downstream end of the sanitary sewer line and proceed non-stop in a forward upstream direction. No pipe shall be laid within 10 feet of any point where excavation is in progress. Pipe installation shall proceed upgrade with the bell pointing in the upstream direction of flow. Pipe shall be lowered into the trench without disturbing the prepared bedding or the trench sides. The drilling of lifting holes in the field will not be permitted. Pipe shall be installed by means of a concentric pressure being applied to the pipe with a mechanical pipe puller. Pulling or pushing a joint of pipe in place by using a crane, bulldozer, or backhoe will not be permitted. Pipe shall be “pulled home” in a straight line with all parts of the pipe on line and grade at all times. No side movement or up and down movement of the pipe will be permitted during or after the pulling operation. Should coupled joints of pipe be out of line or off grade, they shall be removed one joint at a time and brought to the proper line and grade. The lifting or moving of several joints of coupled pipe at one time to close a partially open joint or to fine grade under laid joints of pipe will not be permitted.

Contractor shall insure that all existing or proposed manholes or structures shall remain visible and accessible at all times. No manhole or structure covers shall be covered by pavement, equipment, or other obstructions other than a removable, temporary lid provided for safety.

4. Pipe Separation: Sewer pipe separation distances shall be maintained in accordance with TCEQ rules 30 §217.53.
  - a. A sewer collection system that parallels a public water supply pipe must have a vertical separation of at least two feet between outside diameters of the pipes.
  - b. A sewer collection system that parallels a public water supply pipe must have a horizontal separation of at least four feet between outside diameters of the pipes.
  - c. A sewer system that crosses a public water supply pipe shall have a minimum separation distance of six inches between outside diameters of pipes. All sewer collection piping must be below a public water supply pipe.
  - d. A sewer collection system that crosses over a public water supply pipe shall be encased in a joint of at least 150 psi pressure class pipe.
    - (1) Pipe shall be centered on the crossing;
    - (2) Pipe shall be sealed at both ends with manufactured seal;

- (3) Pipe shall be at least 18 feet long;
  - (4) Pipe casing shall be at least two nominal sizes larger than the wastewater collection pipe. Steel or PVC pipe may be used for casing of at least 150 psi pressure class.
  - (5) Pipe shall be supported by spacers between the collection system pipe and the encasing pipe at a maximum of five-foot intervals.
5. Laser Beams: The use of laser beams for vertical control may be used at the option of the Contractor. Contractor shall provide a written summary to the Owner's Representative of all elevations that all installed, repaired, or replaced sewer main enter and exit a manhole or structure.

No pipe shall be installed in tunnels except as noted in the contract documents or by approval of the Engineer. If the Contractor finds it necessary to install pipe in tunnels not provided in the contract documents, he shall submit to the Engineer a detailed outline of procedures, methods, and use of materials depending on existing soil conditions. This information requires review and approval prior to the commencement of work.

No horizontal or vertical curves shall be permitted in conformance with appropriate regulatory agency requirements.

Before leaving the work unattended, the upper ends of all pipelines shall be securely closed with a tight fitting plug or closure. The interior of laid pipe shall be kept free from dirt, silt, gravel, or foreign material at all times. All pipes in place must be approved by the Inspector before backfilling.

**848.5 MEASUREMENT:** All sewer pipes will be measured from center of manhole to center of manhole or end of main. Measurement will be continuous through any fittings in the main.

**848.6****PAYMENT:**

1. Sewer pipe will be paid for at the contract bid price per linear foot complete in place for the type, size and depth constructed. Said price shall be full compensation for furnishing all materials, including pipe, couplings, trenching, pumping, concrete, plugs, laying and jointing, backfilling, select bedding and initial backfill material, tamping, water, labor, tools, equipment, and other incidentals necessary to complete the work.
2. When the minimum separation distances for any water and sewer piping facilities cannot be maintained per 30 TAC §217.53, Contractor shall install SDR-26 PVC pipe (150 psi pressure rated). Payment for this higher pressure rated pipe shall be made the contract bid price per linear foot complete in place for the type, and size constructed.
3. Sewer pipe fittings, as part of the main line such as wyes and tees, are inclusive in the cost of this item.
4. Pay cuts will be measured from the top of ground prior to the Contractor's operation and along the centerline of the pipe to the invert of the pipe.

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**ITEM NO. 849**  
**SANITARY SEWER PIPE AIR AND DEFLECTION TESTING**

- 849.1 DESCRIPTION:** This item shall consist of air and deflection tests in accordance with this specification and as directed by the Engineer.
- 849.2 SUBMITTALS:** Contractor shall submit manufacturer's product data instructions, recommendations, shop drawings, and certifications.
- 849.3 MATERIALS:** The materials installed for air and deflection tests shall conform to the appropriate specifications contained within the latest revision of 30 TAC §217.
- 849.4 TESTING OF INSTALLED PIPE:** The Contractor shall perform a low-pressure air test, or an infiltration/exfiltration test, and a mandrel test before the installed work shall be considered accepted. If a gravity collection main is composed of flexible pipe, a deflection test will also be required. Flexible pipe is defined as pipe that will deflect at least 2% without structural distress. Contractor shall insure that all testing is performed in the presence of the Owner's representative, with copies of all written test results made available to the Owner. Tests shall conform to the following requirements:

1. Low-Pressure Air Test: The procedure for the low-pressure air test shall conform to the procedures described in ASTM C828, ASTM C924, and ASTM F1417 (or other appropriate procedures), except for testing times. The test times shall be as outlined in this section. For sections of pipe less than 36-inch average inside diameter, the following procedure shall apply. 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 = 0.000419xDxL, 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 foot internal surface shall be used since a K value of less than 1.0 shall not be used.

The minimum testing times for each pipe diameter is as follows:

<b>Pipe Diameter</b>	<b>Minimum Time</b>	<b>Length for Minimum Time</b>	<b>Time for Longer Length</b>
<b>Inches</b>	<b>Seconds</b>	<b>Feet</b>	<b>Seconds/Ft</b>
6	340	398	0.855
8	454	298	1.520
10	567	239	2.374
12	680	199	3.419
15	850	159	5.342
18	1,020	133	7.693
21	1,190	114	10.471
24	1,360	100	13.676
27	1,530	88	17.309
30	1,700	80	21.369
33	1,870	72	25.856

\* Note: Test time starts after the required 60 seconds of stabilization time has transpired.

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 testing period, then the test shall continue for the entire test duration as outlined above or until failure.

2. Infiltration/Exfiltration Test: The total exfiltration, as determined by a hydrostatic head test, must not exceed 50 gallons per inch of diameter per mile of main per 24 hours, at a minimum test head of 2 feet above the crown of the main at an upstream manhole. The Contractor shall use an infiltration test in lieu of an exfiltration test when mains are installed below the ground water level. In such cases, the total exfiltration, as determined by a hydrostatic head test, must not exceed 50 gallons per inch diameter per mile of main 24 hours at a minimum test head of 2 feet above the crown of the main at an upstream manhole, or at least 2 feet above the existing groundwater level, whichever is greater. If the quantity of infiltration or exfiltration exceeds the maximum

quantity specified, the Contractor shall propose to the Engineer, and receive approval therefrom, all necessary remedial action, solely at the Contractor's own cost, in order to reduce the infiltration or exfiltration to an amount within the limits specified herein.

3. Deflection Testing: As stated in the 30 TAC § 217, deflection test shall be performed on all flexible pipe installed.
  - a. For mains with inside diameters less than 27 inches, a rigid mandrel shall be used to measure deflection.
  - b. For main with an inside diameter 27 inches and greater, a method approved by the Engineer shall be used to test for vertical deflections.

The deflection test must be accurate to within  $\pm 0.2\%$  deflection. The test shall be conducted after the final backfill has been in place at least 10 days. No pipe shall exceed a deflection of five percent. If a pipe should fail to pass the deflection test, the problem shall be corrected and a second test shall be conducted after the failed area's final backfill has been in place an additional 10 days. The tests shall be performed without mechanical pulling devices. Upon completion of construction, the Engineer shall certify to the Owner that the entire installation has passed the deflection test. This certification shall be provided for the Owner to consider the requirements of the approval have been met.

- a. Mandrel Sizing. The rigid mandrel shall have an outside diameter (O.D.) not less than 95% of the inside diameter (I.D.) of the pipe. The inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, shall be the average outside diameter minus two minimum wall thicknesses for O.D. controlled pipe and the average inside diameter for I.D. controlled pipe. All dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.
- b. 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 mandrel shall have a length of at least 75% of the inside diameter of the pipe. A proving ring shall be provided and used for each size mandrel in use.
- c. Method Options: Adjustable or flexible mandrels are prohibited. A television inspection is not a substitute for the deflection test.

**849.5**        **MEASUREMENT:** Air/Infiltration/Exfiltration and Deflection Testing will not be measured for payment.

**849.6**        **PAYMENT:** No direct payment shall be made for Air/Infiltration/Exfiltration and Deflection Testing, and all costs in connection therewith shall be included in the applicable contract price for the item to which the work pertains.

- End of Specification -

**ITEM NO. 853M**  
**SANITARY SEWER GLASS-FIBER**  
**REINFORCED POLYESTER (FRP) MANHOLES**

**8531**      **DESCRIPTION:** This item shall govern the construction of FRP sanitary sewer manholes, complete in place and the materials therein, including manhole ring and covers. All material and construction work shall be in accordance with current Texas Commission on Environmental Quality (TCEQ) rules to include: Design Criteria for Sewage Systems (30 TCEQ § 217), or any revisions thereto, as applicable. All constructed FRP manholes shall be watertight. Manhole covers shall be water resistant. Sewer manhole ring and cover castings shall meet the current requirements of AASHTO Designation M306-10.

**8532**      **SUBMITTALS:** Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.

**8533**      **MATERIALS:**

1.      FRP Manholes: All manholes shall be watertight, Glass-Fiber Reinforced Polyester Manholes shall be a one-piece monolithic designed unit constructed of glass-fiber reinforced, supplier-certified, unsaturated isophthalic polyester resin containing chemically enhanced silica to improve corrosion resistance, strength and overall performance. FRP manholes shall be manufactured in strict accordance with ASTM D3753-12.
2.      Exterior Surface: For a UV inhibitor, the resin on the exterior surface of the manhole shall have gray pigment added for a minimum thickness of 0.125 inches.
3.      Dimension: Manholes shall be a circular cylinder, reduced at the top to a circular manway not smaller than 30 inches (inside diameter). Manholes shall also be produced in whole foot increments of length +/- 2 inches. Nominal inside diameter shall be 48 inches. Tolerance on the inside diameter shall be +/- 1%. The minimum wall thickness for all FRP manholes (all depths) shall be 0.50 inches. Unless otherwise shown in the contract documents or approved by the Engineer, standard sanitary sewer FRP manholes shall be constructed on influent or effluent pipes less than

24-inches in diameter. The maximum vertical height of the diameter adjustment section or cone shall be 36 inches.

4. Configuration: The manway reducer must provide a bearing surface on which a standard ring and cover may be supported and adjusted to grade. The reducer shall be joined to the barrel section at the factory with resin and glass fiber reinforcement, thus providing the required monolithic design to prevent infiltration and/or exfiltration through the manhole.
5. Class: Manholes shall be manufactured in one class of load rating. This class shall be AASHTO H-20 wheel load.
6. Stub-outs and Connections: Primary connections to the manhole may be by either of the following methods:
  - a. Installation of SDR PVC sewer pipe stub-outs to the manhole. Installation of SDR PVC sewer pipe must be performed by sanding, priming, and using resin fiber-reinforced hand lay-up. The resin and fiberglass shall be the same type and grade as used in the fabrication of the fiberglass manhole.
  - b. Install main connections using a pre-cut “u” shaped hole followed with alignment of pipe, sealing of pipe directly to the manhole wall all around using sanding, priming and resin fiber-reinforced hand lay-up, followed by concrete encasement of the finished assembly, such that all cuts, pipes and inverts are encased and watertight.
7. Manhole Bottom: Manholes are required to have a “poured” concrete base, using minimum 3,000 psi concrete with horizontal reinforcing bars located at center of the bottom slab (#5 @ 12” OCEW). The walls of the manhole shall be set prior to pouring the concrete base to provide a minimum depth of 4” of concrete embedment. Dowel bars (#4 x 12” long) shall be supported in drilled holes around the manhole base on a 24” spacing and embedded into the concrete manhole base. Contractor shall insure that all concrete is properly consolidated using vibrators. The Manhole bottoms shall be a minimum 10-inches thick.
8. Marking and Identification: All manholes shall be marked in letters no less than 1 inch in height with the following information:
  - Manufacturer’s name or trademark;
  - Manufacturer’s factory location;
  - Manufacturer’s serial number;
  - Manhole length;
  - ASTM Designation;

9. Manhole Rings and Covers: The standard manhole ring and cover shall be ductile iron and manufactured to the dimensions shown herein. The cover may contain a hole or opening for venting, depending upon their specific location. Lifting slots cast into the covers shall be provided for lifting purposes. The nominal cover diameter shall be 32 inches, with a 30 inch clear opening, as required by TCEQ. Rings shall have a minimum of four 1 inch holes/slots for anchoring purposes. Rings shall be a minimum of 4-1/2 inches in height, or as otherwise accepted by the Engineer. Slots for embedment/lightening are not allowed in ring flanges.

The finished ring and cover shall have the bearing surfaces machined ground and sets of rings and covers shall be marked in such a way that they can be matched for assembly in the field. All covers shall have the words "City of Pecos Sanitary Sewer" cast thereon. Ring and cover shall have the approved foundry's name, part number, country of origin preceded by "Made in" (example: MADE IN USA) in compliance with the country of origin law of 1984, and production date (example: mm/dd/yy) for tracking purposes. Each casting must be marked with DI and ASTM A536 or A536 80-55-06 to verify the materials used. Castings without proper markings shall be rejected.

10. Throat Rings: Throat rings shall be made of HDPE and have a maximum thickness of 4 inches. The internal diameter shall match that of the ring and cover's opening. Concrete shall conform to the provisions of Item No. 300 "Concrete (Natural Aggregate)." A minimum of two and a maximum of four throat rings may be used at each manhole installed.
11. Bedding and Backfill: Bed all Manholes with quick setting concrete up to a level of 12" over the top of primary entering and exiting pipes and surrounding the entire manhole to provide anchoring for water table fluctuations. Backfill from 12" over the top of primary entering and exiting pipes may be clean "in-situ" material saved from the manhole excavation and placed back into the annular space in compacted lifts of maximum thickness of 12."

## CONSTRUCTION:

12. Manholes shall be constructed of materials and workmanship as prescribed by these specifications, at such places shown in the contract documents and in conformity with the typical details.
13. Fiberglass manholes must be installed according to manufacturer's installation instructions. In addition to these instructions, local codes may apply and should be consulted as applicable in manhole installation. Correct manhole installation requires proper concrete foundation, good backfill and proper handling to prevent manhole damage and insure long-term corrosion resistant service.
14. Prepared excavation at manhole location should be at least wide enough to accommodate the slab or concrete specified and to provide working room around manhole. Ensure the depth of manhole is sufficient to allow between two and four concrete rings for adjustment of ring and cover at top of final grade.
15. Manhole Base: Use initial backfill material of clean 1" diameter gravel to provide 4 to 6 inches of leveling base prior to setting up pipe entries and exits and pouring encasement concrete.
16. Set Manhole: To lift manhole, insert 4 inches x 4 inches timber crosswise inside the manhole to the underside of the collar with a rope or woven fabric slings attached to backhoe or other lifting device and lower the manhole. Level manhole and connect sewer lines to manhole. A concrete base encasement shall be placed at least 12 inches from the manhole and shall come over the top of the anti-flotation ring a minimum of 12 inches.
17. Invert and Bench Area: The invert and bench area can be formed with wet hydraulic concrete and finished with an epoxy sealant.
18. Backfill Material: Initial backfill material consisting of concrete shall be used for backfill around the manhole for a minimum distance of one foot from the outside surface and extending from the bottom of the excavation to a height of 12" over the top of the entering and exiting pipes. Secondary backfill material consisting of "in-situ" clean materials may be used for the remainder of the backfill, subject to approval by the Engineer.

19. Backfill Procedure: Backfill material shall be placed in layers of not more than 12 loose measure inches and mechanically tamped to 98% Standard Proctor Density. Flooding will not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the fiberglass manhole structure.
20. Sealing: After curing, seal the inside of the manhole with a cementitious coat first, followed by an epoxy coating (or other sealing compounds approved by the Engineer) prior to running the hydrostatic test.
21. Testing: All structures must pass a leakage test. The Contractor shall test each structure (after assembly, backfilling and sealing) for leakage, separate and independent of the all other sanitary sewer piping, by means of either a hydrostatic test, vacuum test, or other methods approved by the Engineer.

Conduct a hydrostatic leakage test in the following manner:

Hydrostatic Testing: Hydrostatic testing shall be conducted by utilizing approved plugs to seal all influent and effluent pipes in the structure and filling the structure to the top of the structure with water. Additional water may be added over a 24 hour period to compensate for absorption and evaporation losses. At the conclusion of the 24 hour saturation period, the structure shall be filled to the top of the structure and observed. Any measureable loss within a 30 minute period shall be considered an unsuccessful test and thus require the Contractor to assess the needed repairs, perform such repairs (subject to the approval of the Engineer), and notify the Owner's Representative when the retest will be performed. All effort, materials, or other costs shall be solely at the Contractor's expense.

Acceptance: Structures will be accepted with relation to leakage test requirements, if they meet the criteria above. Any structure which fails the initial test must be repaired with a suitable material based on the material of which the structure is constructed. Structures shall be repaired on the exterior surface only. The structure shall be retested as described above until a successful test is attained. After a successful test, the temporary plugs will be removed. To ensure that the plugs have been removed, Contractor shall only do so in the presence of the Inspector.

Measurement and Payment: leakage testing of new structures will not be a pay item. The cost of this work will be included in the bid price for the new structure.

8534

**MEASUREMENT**

1. FRP sanitary sewer manholes (0 to 6 or 0 to 15 feet deep) as designated in the contract documents shall be measured as the total number of such manholes constructed, measured from the lowest invert elevation to the top of the ring.
2. FRP sanitary sewer manholes (deeper than 6 feet or deeper than 15 feet) as designated in the contract documents shall be measured as the total number of vertical feet below the 6 foot or 15 foot standard depth and the bottom of the invert down to a maximum depth of 22 feet.

8535

**PAYMENT**

1. FRP sanitary sewer manholes shall be paid at the contract unit price bid for each such manhole. The price shall be full compensation for all FRP sections, throat adjustments, rings and covers, interior inverts and flowlines, ring encasements when required, manhole concrete base and exterior encasement, initial and final backfill, material, labor, tools, equipment testing and incidentals necessary to complete the work.
2. Gravel subgrade, bedding or backfill, when used for manholes shall not be measured separately for payment.

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**ITEM NO. 854**  
**SANITARY SEWER LATERALS**

**854.1**      **DESCRIPTION:** This item shall govern sanitary sewer laterals installed in accordance with these specifications and as directed by the Engineer. This item shall also consist of the installation of a two-way sewer cleanout at the property line. Maximum slope of a lateral is 4%.

**854.2**      **SUBMITTALS:**

Product Data: Submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.

**854.3**      **MATERIALS:** The materials for sanitary sewer laterals shall conform to the specification contained in Item No. 848, "Sanitary Sewers."

**854.4**      **CONSTRUCTION:**

1.      Sanitary sewer laterals fittings and appurtenances shall conform to the material specifications and shall be installed by the Contractor as specified herein, and in accordance with the Construction Drawings.
2.      Designation of Lateral: A sewer pipe located between the sanitary sewer main and the adjacent land, is designated as a "sanitary sewer lateral" and includes stub-outs for future lines.
3.      Lateral Installation: All lateral installations shall be performed in accordance with Item Nos. 848; "Sanitary Sewers" 804, "Excavation, Trenching and Backfill," and as described herein. For sanitary sewer mains that are 12 inch in diameter or smaller, all laterals not connected to a manhole shall be connected using the appropriate size tee/wye placed in line with the main line. For mains larger than 12 inch, insert-a-tee conforming to ASTM 3034-08, or approved or equal, shall be used. Where waterline crossings with sanitary sewer laterals are less than the regulated separation distances, all lateral piping shall be SDR-26 PVC pipe (ASTM D2241-09), with a pressure rating of 150 psi.

**854.5**      **MEASUREMENT:** Sanitary sewer laterals shall be measured by the linear feet installed at the various diameter sizes or per each if a single joint of pipe is to be placed. The measured dimension shall be taken from the centerline of the main to the connection point or end. Measurement will be continuous through any fittings in the main.

**854.6**

**PAYMENT:** Sanitary sewer laterals shall be paid for at the contract bid price per linear foot complete in place for the type, and size constructed or per “each” if a single joint of pipe is being placed. Price shall be full compensation for furnishing all materials, including pipe, pipe fittings (to include wyes, tees, bends), pumping, bedding, trenching or boring, trench protection, backfilling, tamping, cutting pavement and surface structures of whatever type encountered and replacement with whatever type specified and other incidentals required to complete the work.

When the minimum separation distances for any water and sewer piping facilities cannot be maintained per 30 TAC §217.53, contractor shall install SDR-26 PVC pipe (150 psi pressure rated). Payment for this higher pressure rated pipe shall be made at the contract bid price per linear foot complete in place for the type and size constructed.

Payment for the lateral shall be inclusive of the one-way clean out, fittings, cap, and any necessary materials to complete the work described in this item.

- End of Specification -

**ITEM 866**  
**SEWER MAIN TELEVISION INSPECTION**

**866.1**      **DESCRIPTION:** The Contractor shall furnish all labor, materials, equipment, and incidentals to provide the televising and a NASSCO-(PACP) standard video, recorded in MPEG-1 format and written to DVD video, of sewer main and manholes utilizing a color, closed-circuit television inspection unit to determine their condition. The video shall include an inclinometer, visible on the video being viewed, noting the slope of the main being televised.

**866.2**      **GENERAL:** After completion of the work specified in the contract documents, and prior to placement of the final course of asphalt or other final surface, the newly constructed sanitary sewer main shall be televised immediately upon cleaning. Televising shall be observed by the Owner's representative or Engineer and contractor, as the camera is run through the system. Any abnormalities such as, but not limited to, misaligned joints, cracked/defected pipe, rolled gaskets, shall be repaired by the Contractor solely at his expense. Sections requiring repair shall be re-televised to verify condition of repair. No additional compensation shall be provided for all needed repairs, re-cleaning, or re-televising efforts.

**866.3**      **EXECUTION:** The Contractor shall provide a DVD and log of the televised system for review and approval by the Owner's representative. If the Contractor provides a DVD of such poor quality that it cannot be properly evaluated, the Contractor shall re-televising as necessary and provide a DVD of good quality at no additional cost to Owner.

The television unit shall also have the capability of displaying in color, on DVD, pipe inspection observations such as pipe defects, sags, points of root intrusion, offset joints, service connection locations, and any other relevant physical attributes. Each DVD shall be permanently labeled with the following:

1.      Project name;
2.      Date of television inspection;
3.      Station to station location and size of sanitary sewer;
4.      Street/easement location;
5.      Name of Contractor;
6.      Date DVD submitted;

7. DVD number;

The Contractor shall provide a line diagram area sketch and written log for each completed segment of DVD sewer main describing the section being televised, flow and camera direction, position of service connections, description and location of failures, pipe condition, weather conditions, and other significant observations.

The television inspection equipment shall have an accurate footage counter which displays on the monitor the exact distance of the camera from the center of the starting manhole. A camera with rotating and panning lens capabilities is required. The camera height shall be centered in the conduit being televised. The speed of the camera through the conduit shall not exceed 40 feet per minute. The produced video shall also have an inclinometer that displays the slope of the sewer main being televised.

The Contractor shall be required to have all materials, equipment, and labor force necessary to complete all videotaping on the job site prior to isolating the sewer manhole segment and beginning videotaping operations.

The Contractor shall not be allowed to float the camera. There may be occasions during the televised inspection of a manhole section when the camera will be unable to pass an obstruction. At that time, and prior to proceeding, the Contractor shall contact the Owner's representative. If the length of sewer main cannot be televised because of obstructions, the Contractor shall clean the system as is necessary.

No lateral connections shall be made to the sanitary sewer main at the "12 o'clock" position. All lateral connections shall clearly indicate which side of the sanitary sewer main it was installed from.

The Contractor is solely responsible for any damage of sewer mains as a direct result of televising operations. Any repair shall also be the responsibility of the Contractor.

The method(s) used for securing passage of the camera are at the discretion of the Contractor, and as approved by the Inspector.

No separate and/or additional payment will be made for any excavation, man entry, or any other method which may be required to retrieve video equipment that may have been hung up, destroyed, and/or lost during the operation.

**866.4**

**MEASUREMENT AND PAYMENT:** Measurement and payment will be made for the work to be done on the basis of the total price bid for “quality control testing” and shall be considered full compensation for all labor, materials, equipment, tools, logging, cleaning and incidentals necessary to complete the work, as illustrated below:

- End of Specification -

**ITEM NO. 868**  
**SANITARY SEWER SYSTEM CLEANING**

**868.1**      **SCOPE:** The Contractor shall furnish all labor, equipment, and materials necessary for cleaning the sanitary sewer system, including the removal of all debris/solids, sand, grease, grit, rock, etc. from the sewer mains, manholes, or structures to facilitate television inspection.

**868.2**      **DESCRIPTION:** The Contractor shall be required to have all materials, equipment, and labor necessary to complete the cleaning of the sanitary sewer system on the jobsite prior to isolating it for the cleaning process.

The Contractor shall only use the type of cleaning identified below to perform the necessary removal of all material which will not create hazards to health, property, affect downstream treatment plant processes, or damage to the sanitary sewer system.

The sanitary sewer mains, manholes, and structures shall be cleaned using mechanical, hydraulically-propelled, and/or high velocity sewer cleaning equipment. The cleaning process shall remove all debris, grease, sand, silts, solids, rags, rock, etc. from each sewer segment, including the manhole(s) or structures. Selection of cleaning equipment and the method for cleaning shall be based on the condition of the sanitary sewer lines at the time work commences. All cleaning equipment and devices shall be operated by experienced personnel. Satisfactory precautions shall be taken to protect the sanitary sewer lines, manholes, or structures from damage that might be inflicted by the improper use of the cleaning process or equipment. Any damages done to a sewer line manhole, or structure by the Contractor shall be repaired by the Contractor at no additional cost and to the satisfaction of Owner. Cleaning shall also include the manhole or structure wall washing by a high pressure water jet.

1.      Hydraulic Cleaning: Hydraulic-propelled devices which require a head of water to operate must utilize a collapsible dam. The dam must be easily collapsible to prevent damage to the sewer line, property, etc. When using hydraulically-propelled devices, precautions shall be taken to insure that the water pressure created does not cause damage or flood public or private property. The Contractor shall not increase the hydraulic gradient of the sanitary sewers beyond the elevation that could cause overflow of sewage into area waterways or laterals. The flow of wastewater present in the sanitary sewer line shall be utilized to provide necessary fluid for hydraulic cleaning devices whenever possible.

2. High Velocity Cleaning: Cleaning equipment that uses a high velocity water jet for removing all debris shall be capable of producing a minimum volume of 50 gpm, with a pressure of 1,500 psi, for the sanitary sewer main and 3,500 psi for the (manhole) structure at the pump. To prevent damage to older sewer lines and property, a pressure less than 1,500 psi can be used. A working pressure gauge shall be used on the discharge of all high pressure water pumps. The Contractor shall use, in addition to conventional nozzles, a nozzle which directs the cleaning force to the bottom of the pipe for sewers 18" and larger in diameter. The Contractor shall operate the equipment so that the pressurized nozzle continues to move at all times. The pressurized nozzle shall be turned off or reduced anytime the hose is on hold or delayed in order to prevent damage to the line.
  
3. Mechanical Cleaning: Mechanical cleaning, in addition to normal cleaning when required, shall be with approved equipment and accessories driven by power winching devices. The Contractor shall submit the equipment manufacturer's operational manual and guidelines to the Owner's representative, which shall be followed strictly unless modified by the Owner's representative. All equipment and devices shall be operated by experienced operators so that they do not damage the pipe in the process of cleaning. Buckets, scrapers, scooters, porcupines, kites, heavy duty brushes, and other debris-removing equipment/accessories shall be used as appropriate and necessary in the field, in conjunction with the approved power machines. The use of cleaning devices such as rods, metal pigs, porcupines, root saws, snakes, scooters, sewer balls, kites, and other approved equipment, in conjunction with hand winching device, and/or gas, electric rod propelled devices, shall be considered normal cleaning equipment.

**8683**

**GENERAL REQUIREMENTS:** In addition to the requirements specified herein, the Contractor shall maintain a clean work area and surrounding premises within the work limits so as to comply with Federal, State, and local environmental and anti-pollution laws, ordinances, codes, and regulations when cleaning and disposing of waste materials, debris, and rubbish. The contractor shall also keep the work and surrounding premises within work limits free of accumulations of dirt, dust, waste materials, debris, and rubbish. Suitable containers for storage of waste materials, debris, and rubbish shall be provided until time of disposal. It is the sole responsibility of the Contractor to secure a licensed legal dump site for the disposal of this material. Under no circumstances shall sewage or solids removed from the main or manhole be dumped on the ground, streets, ditches, catch basins, storm drains, or sanitary sewers. Cost for this item shall be included in the price bid for sanitary sewer system cleaning.

More than one type of equipment/attachments may be required at any given

location within the project scope. When hydraulic or high velocity cleaning equipment is used, a suitable sand trap, weir, dam, or suction shall be constructed in the downstream manhole in such a manner that all the solids and debris are trapped for removal.

Whenever hydraulically-propelled cleaning tools which depend upon water pressure to provide their cleaning force, or any tool which retard the flow of water in the sanitary sewer mains are used, precautions shall be taken to insure that the water pressure created does not cause any damage or flooding to public or private property being served by the manhole section involved. Any damage of property, as a result of flooding, shall be the sole liability and responsibility of the Contractor. The flow of wastewater present in the sanitary sewer system shall be utilized to provide necessary fluid for hydraulic cleaning devices whenever possible. When additional quantities of water from fire hydrants are necessary to avoid delay in normal working procedures, the water shall be conserved and not used unnecessarily. The Contractor shall be responsible for obtaining a water source and all related charges for the set-up, including the water usage bills from respective water purveyor agency. All expenses shall be considered incidental to the cleaning of the existing sanitary sewer system.

**868.4**

**MEASUREMENT AND PAYMENT:** The Contractor shall be fully responsible and shall be paid for sewer system cleaning as part of "Construction Quality Control Testing" for furnishing all labor, hauling, materials, equipment, tools, debris disposal, inspection, and incidentals necessary to complete the work.

- End of Specification -

## ITEM 1500

### FRP LIFT STATION SPECIFICATION

#### 1. *Description*

##### 1.1. Scope of Work:

Contractor shall furnish all labor, materials, equipment and performance of all work necessary or incidental to order, accept delivery of, furnish and install a triplex prefabricated fiberglass reinforced polyester (FRP) automatic lift station. The lift station shall be a completely factory-assembled unit, requiring wet well installation, reassembly and installation of factory packaged components and only minor adjustments, calibration and start-up in the field.

#### 2. *Quality Assurance*

##### 2.1. Qualifications of Manufacturer:

2.1.1. The manufacturer shall demonstrate the ability to fabricate the wet well and various lift station components, as shown in the plans and as specified herein, utilizing adequate number of skilled workmen, equipment, tools, facilities, and subcontractors. The complete lift station shall be manufactured by Gicon Pumps and Equipment "or approved equal". Manufacturer shall provide a list of similar projects located in Texas that contained comparable components and have been operating for at least five (5) years.

##### 2.2. Referenced Standards

2.2.1. ASTM A36 (Latest Revision): Standard Specification for Structural Steel.

2.2.2. ASTM A283D (Latest Revision): Standard Specification for Structural Steel.

2.2.3. ASTM D883 (Latest Revision): Definitions of Terms Relating to Plastics.

2.2.4. ASTM D3753 (Latest Revision): Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wet Wells.

2.2.4. ASTM D695 (Latest Revision): Test Method for Compressive Properties of Rigid Plastics

2.2.5. ANSI B16.1 (Latest Revision): Standard Specification for 125 lb. Standard Flat Face Cast Iron Flanges.

#### 3. *Submittals*

3.1. Shop Drawings and Manufacturer's Literature: The prefabricated FRP lift station manufacturer shall prepare shop drawings for the complete lift station including structural and opening details, equipment mounting and location details, and manufacturer's cut sheets for each item of equipment in the lift station. The main component of the submittals shall be an 8½" x 11" drawing of the complete prefabricated FRP lift station prepared by the manufacturer. Manufacturer's cut sheets shall indicate capacities, dimensions, and materials of construction for all equipment in the prefabricated FRP lift station. Manufacturer shall also provide a certification that the FRP wet well meets all requirements of ASTM D3753. Prior to fabrication, shop drawings shall be reviewed and approved by the Engineer.

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### FRP LIFT STATION SPECIFICATION

#### **4. *Operating and Maintenance Manuals:***

- 4.1. The prefabricated FRP lift station supplier shall prepare a complete operations and maintenance (O&M) manual for the complete lift station. The O&M manual shall include routine maintenance requirements and spare parts lists for each major item of equipment in the lift station. The names and telephone numbers of companies where spare parts and/or trained service technicians are available shall also be included for each item of equipment. Four (4) sets of manuals are required prior to release of final payment to the Contractor.

#### **5. *Delivery and Handling***

##### 5.1. Conditions for Delivery and Handling:

- 5.1.1. The manufacturer of the prefabricated FRP lift station shall coordinate with the contractor so that the lift station is delivered to the jobsite on time for installation. Handling instructions shall be provided by the lift station manufacturer with the lift station to insure proper handling of the lift station structure. After delivery to the jobsite, the wet well shall not be dropped or impacted and the contractor shall store the motor control panel off the ground in a dry location until it is mounted and supplied with electrical service. The contractor shall also insure that all pump power and control cables, as well as float cables are protected from submergence until they are properly installed and sealed.

#### **6. *Guarantee***

- 6.1. The prefabricated FRP lift station manufacturer shall guarantee the complete prefabricated FRP lift station to be free from defects in materials and workmanship for a period of one year from the date of final acceptance.

#### **1. *Materials***

- 1.1. Fiberglass Reinforced Polyester Wet Well and Integral/Separate Valve box: Unless otherwise indicated the plastic terminology used in this specification shall be in accordance with the definitions given in American Society for Testing and Materials (ASTM) designations D883 - Definitions of Terms Relating to Plastics and D3753 - Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wet Wells.

#### **2. *Resins:***

- 2.1. The resins used shall be unsaturated, commercial grade polyester and shall be evaluated as a laminate by test/certification or determined by previous service/certification to be acceptable for the intended environment. The resins used may contain the minimum amount of inert fillers or additives required to improve handling properties. Up to 5% by weight of thixotropic agent, which will not interfere with visual inspection, may be added to the resin for viscosity control. Resins may not contain pigments or dyes.

#### **3. *Reinforced Material:***

- 3.1. The reinforcing material shall be multiple layers of a commercial grade of glass fiber continuous strand matting, having a coupling agent, which will provide a suitable bond

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### FRP LIFT STATION SPECIFICATION

between the glass reinforcement material and resin. The surface exposed to the sewer environment shall be resin rich and shall have no exposed fibers.

#### 4. *Laminate Structure:*

4.1. The FRP laminate shall consist of a resin rich inner surface: chop-spray interior liner; and, a chop- hoop filament- wound structural exterior layer.

##### 4.1.1. Inner surface:

4.1.1.1. The resin rich inner surface shall be free of cracks and crazing with smooth finish and no exposed fibers, with an average of not over two (2) pits per square foot, providing the pits are less than 0.125 inches in diameter and 0.06 inches in depth. Pits must be covered with sufficient resin to avoid exposure of any fiberglass reinforcement material. Some waviness shall be permissible as long as the surface is smooth and waviness does not exceed 0.125 inches in depth. Between 0.01 to 0.02 inches of resin, rich surface shall be provided.

4.1.1.2. Chop-Spray Interior Liner: The interior liner shall be reinforced by 25 to 35% by weight of chopped strand glass fiber having fiber lengths from 0.5 to 2.0 inches. The chop-spray interior liner protects the chop-hoop filament-wound structural exterior liner from corrosion damage caused by “wicking” of the wet well liquid contents. A minimum of 0.150 inches of chop-spray interior liner shall be provided.

4.1.1.3. Chop-Hoop Filament-Wound Structural Exterior Layer:  
The structural reinforcement of the wet well shall be by the chop-hoop filament-wound manufacturing method only. The axial reinforcement shall be continuous-strand glass fiber. The longitudinal reinforcement shall be chopped-strand glass fiber. The glass fiber reinforcement content of the chop-hoop filament wound structural exterior layer shall be 50 to 80% by weight. The exterior surface of the wet well shall be relatively smooth with no exposed reinforcement fibers or sharp projections. Hand finish work is permissible to prevent reinforcement fiber exposure. The wall thickness of the chop-hoop filament-wound structural exterior layer shall vary with the wet well height to provide the aggregate strength necessary to meet the tensile and flexural physical properties requirements.

#### 5. *Physical Properties:*

5.1. Wet Well FRP Wall Laminate: The wet well FRP wall laminate must be designed to withstand wall collapse or buckling based on the depth shown in the construction documents, and following assumptions and third party specifications:

5.1.1.1. Hydrostatic Pressure of 62.4 lbs. per square foot, with empty interior

5.1.1.2. Saturated soil weight of 120 lbs. per cubic foot

5.1.1.3. Soil Modulus of 700 pounds per square foot

5.1.1.4. Pipe stiffness values as specified in ASTM D3753

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### FRP LIFT STATION SPECIFICATION

The wet well FRP laminate must be constructed to withstand or exceed two times the assumed loading on any depth of the wet well.

#### **6. Wet Well FRP Bottom Laminate:**

- 6.1. The wet well FRP bottom laminate shall have less than 0.375 inches of center elastic deflection deformation when in service in totally submerged conditions and shall include an anchoring flange.

#### **7. FRP Laminate Surface Hardness:**

- 7.1. The finished FRP laminate will have a Barcol Hardness of at least 90% of the resin manufacturer's specified hardness for the fully cured resin per ASTM D-2583. The Barcol Hardness shall be the same for both interior and exterior surfaces.

#### **8. Wet Well Top Flange:**

- 8.1. The wet well top flange shall have an outside diameter at least 4.0 inches greater than the inside diameter of the well and shall not reduce the structural integrity of the wet well.
- 8.2. A six-hole pattern shall accommodate the mounting of a cover with at least 0.375 inches in diameter 300 series stainless steel fasteners. Non-corroding stainless steel threaded inserts shall be fully encapsulated with non-continuous mat or chopped-strand glass fiber reinforcement. The inserts shall have an offset tab to prevent stripping or spinning out when removing and reinserting cover fasteners.

#### **9. Steel Anti-Floatation Flange:**

- 9.1. The steel anti-floatation flange shall be constructed from 0.1875 inches thick ASTM A36 structural steel plate, encapsulated in at least 0.125 inches of chopped-strand glass fiber reinforcement on all sides. The steel anti-floatation flange shall be square with outside dimensions of at least 4.0 inches greater than the wet well inside diameter. The steel anti-floatation flange shall be attached to the wet well bottom with chopped-strand glass fiber reinforcement. Contractor shall place the wet well on a concrete pad and fill with concrete covering the entire steel anti-floatation flange. The amount of concrete shall be sufficient to prevent floatation of the wet well based on the jobsite conditions.

#### **10. Pump Quick Disconnect Mounting Studs:**

- 10.1.1. Shall be 300 series stainless steel threaded studs of at least 0.375 inches in diameter shall be used. The studs shall first be threaded into the 0.1875" inches thick ASTM A36 structural steel anti-floatation flange/bottom of the wet well and then welded into place. Once installed, the studs shall be sealed with at least two layers of non-continuous glass fiber mat or chopped-strand glass fiber reinforcement.

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### FRP LIFT STATION SPECIFICATION

#### **11. Discharge Coupling:**

- 11.1. One or more 6" NPT 304 stainless steel couplings welded in the center of a 14-gauge stainless steel plate, finished with black enamel, shall be factory installed with at least 0.375 inches in diameter 300 series stainless steel fasteners. The wet well wall penetrations shall be sealed with silicone sealer placed inside of an integral FRP flange, factory installed with the wet well. A sufficient quantity and type of "Link-Seal" type modular, mechanical, interlocking, synthetic rubber links shaped to continuously fill the annular space between the discharge pipe and the FRP sleeve shall be used to provide a hydrostatic seal. The integral FRP sleeve shall be connected to the wet well or valve box wall using epoxy/fiberglass and matting layers constructed and attached at the factory.

#### **12. Electrical Coupling:**

- 12.1. An NPT full stainless steel coupling full welded in the center of a 14-gauge stainless steel plate, finished with black enamel, shall be factory installed with at least 0.375 inches in diameter 304 series stainless steel fasteners. The wet well wall penetrations shall be sealed with silicone or fiberglass sealer.

#### **13. Inlet Hub:**

- 13.1. A 12" nominal pipe diameter FRP inlet hub shall be provided and installed at the factory such that it is integral with the wet well and attached using epoxy/fiberglass and matting layers meeting the same criteria as the wet well.

#### **14. Float Bracket:**

- 14.1. Float Bracket shall be fabricated from 304 series stainless steel with four compression style cord grips to maintain float level position. It shall be factory installed with at least 0.375 inches in diameter 300 series stainless steel fasteners. The wet well wall penetrations shall be sealed with silicone or fiberglass sealer.

#### **15. Ventilation:**

- 15.1. A 304 stainless steel or fiberglass "goose neck" wet well vent with bird screen shall be supplied by the manufacturer that complies with all applicable codes, to be installed by the Contractor on a factory mounted connection pipe of matching diameter. Vents are required in the top section of the main wet well and the valve vault.

#### **16. Slide Rail Assembly:**

- 16.1. The slide rail assembly shall include pump quick disconnect discharge elbow, sealing flange with rail guide, upper guiderail bracket, lifting cable and guiderails.

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### FRP LIFT STATION SPECIFICATION

#### **17. Pump Quick Disconnect (QDC) Discharge Elbow:**

- 17.1. The pump quick disconnect (QDC) discharge elbow, made of stainless steel, designed to mount directly on the wet well floor, will be supplied for each pump. It shall have a standard ANSI B16.1 125 lb. flange, flat faced and drilled on the discharge side, with a machined mating pump connection. The design shall be such that connection between the pump and QDC is made without the need for any nuts, bolts or gaskets.

#### **18. Sealing Flange with Rail Guide:**

- 18.1. The sealing flange with rail guide shall be mounted on each pump discharge. It shall have a machined mating flange, which matches the QDC discharge elbow. Sealing of this pump and discharge piping connection shall be accomplished by a simple linear downward motion of the pump along the guiderails culminating with the entire weight of the pumping unit supported by the QDC discharge elbow.

#### **19. Upper Guiderail Bracket:**

- 19.1. The upper guiderail bracket, made from 304 stainless steel, shall align and support the two guiderails at the top of the wet well. It shall bolt directly to the hatch frame of aluminum upper guiderail bracket and incorporate a beveled stainless steel inserts for secure rail installation.

#### **20. Lifting Cable:**

- 20.1. The lifting chain shall be 304 series stainless steel with a diameter of at least 3/16" and a nominal breaking strength of at least 2500 pounds.

#### **21. Guide Rails**

- 21.1 The guide rails will be 2" Schedule 40, 304 Stainless steel.

#### **22. Submersible Pumps:**

22.1 Non-clog, centrifugal, solids handling pumps specifically designed for wastewater application and built for interchanging like parts on multiple pumps. The duty point is 750 GPM @ 40' TH with a minimum capacity of 1000 GPM@53'TH when two (2) pumps are running at the same time.

Impeller: Fine grained cast iron, double shrouded, non-clogging and capable of handling unscreened sewage.

Casing: Fine grained cast iron, single piece volute type for high efficiency and passage of solids; adaptable for slide rail system.

Shaft Seal: tandem mechanical shaft seal system

Paint: Two coat paint system for superior surface protection in a wastewater environment.

Seal Leakage Sensor (FLS): a small internal float switch is used to detect the presence of water in the stator chamber.

Leakage Sensor Detector Circuit: The FLS, when activated, will cause the patented 24 volt MiniCAS monitoring relay to signal an alarm and, if desired, stop the pump. The MiniCAS 24 volt to be built-into the pump control panel for each pump.

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### FRP LIFT STATION SPECIFICATION

#### **23. Motor Control Panel:**

The control panel will be Triplex as called out on the construction drawings with circuit breakers, Nema size contactors, control power transformer, HOA switches, run lights alternator and high water alarm. The pilot devices will be float switches. The panel will have a Nema 4X stainless steel enclosure with a dead front. The panel will also include all controls, alarms and components called out on the electrical drawings.

#### **24. Discharge Pipe and Fittings:**

24.1 The supplied discharge piping and check valves and gate valves shall be stainless steel.

#### **25. Valves Vault**

25.1. The wet well and integral/separate valve box cover shall be constructed using 0.250-inch-thick mill finish aluminum diamond plate with 304 series stainless steel hardware. The access hatch shall have a recessed handle and skid resistant design. The cover shall be mounted to the wet well and integral/separate valve box with a least six 304 series stainless steel fasteners of at least 0.375 inches in diameter.

#### **26. Controls**

26.1. Direct acting float switches shall be supplied made of stainless steel and with Teflon coatings. Mount the switches on a stainless steel cable using stainless steel hardware. Provide a separate float switch for each of the control points shown on the drawings. All float switch elevations shall be adjustable.

#### **1. Lift Station Installation**

##### 1.1.

##### Installation

- 1.1.1. The prefabricated FRP lift station shall be installed by the contractor according to the lift station manufacturer's published instruction and with a factory representative on site during the installation.
- 1.1.2. Fully reassemble the internals and make all connections including piping, valving, drains and electrical.
- 1.1.3. Arrange and coordinate with the power company to make the power drop with transformers and meter necessary for long term power supply.

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FRP LIFT STATION SPECIFICATION

**2. Field Quality Control**

2.1. Start-Up Service:

- 2.1.1. The initial startup of the prefabricated FRP lift station shall be performed by a qualified Representative who will conduct field tests with the Engineer and Owner's Representative to demonstrate that pump operation conforms to these Specifications. Supply all incidentals needed for field testing. If the pump performance does not comply with Specifications take corrective measures to remove and replace pumps with pumps that satisfy the requirements specified.
- 2.1.2. Provide copies of the Operation and Maintenance Manuals
- 2.1.3. Installation inspection by the City of Pecos and the Engineer, followed by any corrective measures required of the Contractor.
- 2.1.4. Satisfactory operation of the wet well and pumps for 7 consecutive days under Owner's control. If needed, Contractor shall make appropriate corrections or adjustments until a full 7 days is reached.
- 2.1.5. It shall be the responsibility of the factory representative to supervise the startup activities and instruct the Owner's personnel in the proper Operation and Maintenance, procedures for the entire prefabricated FRP lift station and associated equipment (8-hours of training time is required, coordinated by the Contractor).

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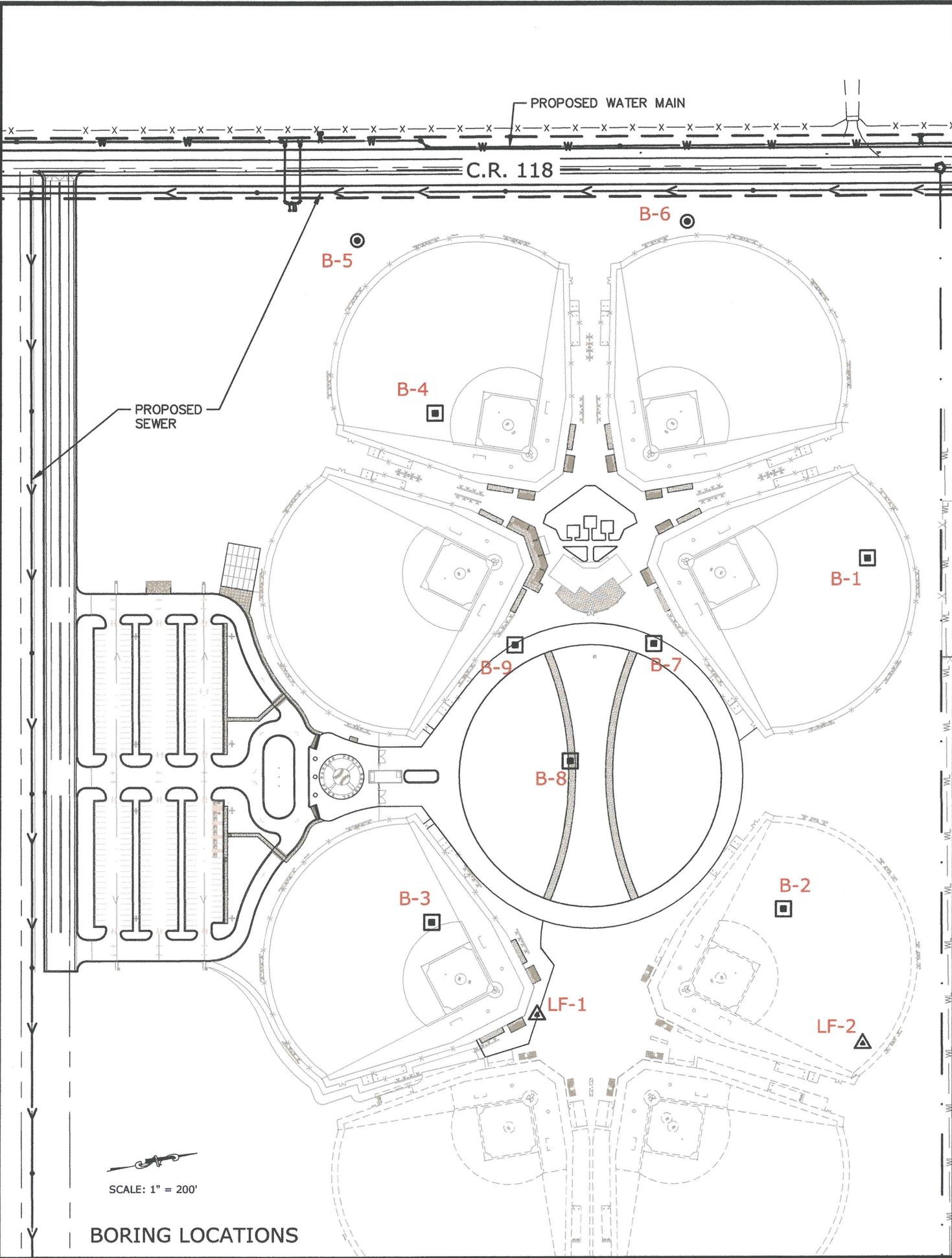
**ATTACHMENT**

**Available Soils Borings**

**SE QUADRANT AREA**

**PECOS, TEXAS**

Town of Pecos City  
July 2020  
Job No. 101-006-00



# LOG OF BORING B-3



RRC Power and Energy, LLC  
 3801 Doris Lane  
 Round Rock, TX 78664  
 Telephone: (512) 992-2087  
 Fax: (512) 251-2518

CLIENT: Kleinman Consultants, PLLC  
 PROJECT: Baseball Park  
 LOCATION: Pecos, TX  
 NUMBER: WT1602025  
 DATE(S) DRILLED: 2/5/16

RENEWABLE LOG - MIDLAND - LOG A GNNL01.GDT - 3/14/16 09:15 - Z:\GINT\PROJECTS\2016\WT1602025 BASEBALL PARK\WT1602025 BASEBALL PARK.GPJ

FIELD DATA		LABORATORY DATA							DRILLING METHOD(S):			
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
					LL	PL	PI					
<b>GROUNDWATER INFORMATION:</b> Groundwater encountered at 17 ft. during drilling and measured at 14.5 ft. 24 hours immediately after drilling												
<b>SURFACE ELEVATION:</b>												
<b>DESCRIPTION OF STRATUM</b>												
5	N = 14 N = 22 N = 9 N = 49											SANDY SILTY CLAY (CL-ML), light tan to light brown, stiff to very stiff, dry  Moist  Weakly cemented, hard
10	N = 20										53	SANDY SILT (ML), tan, very stiff, moist
15	N = 36											
20	N = 30 N = 50/6"		24.6								49	SILTY SAND (SM), tan, dense, saturated, fine grained
Total Depth = 24.5 ft.												
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION										<b>REMARKS:</b> GPS COORDINATES: Lat. 31.390061, Long. -103.485547		

# LOG OF BORING B-4



RRC Power and Energy, LLC  
 3801 Doris Lane  
 Round Rock, TX 78664  
 Telephone: (512) 992-2087  
 Fax: (512) 251-2518

CLIENT: Kleinman Consultants, PLLC  
 PROJECT: Baseball Park  
 LOCATION: Pecos, TX  
 NUMBER: WT1602025  
 DATE(S) DRILLED: 2/5/16

FIELD DATA		LABORATORY DATA								DRILLING METHOD(S):			
SOIL SYMBOL	DEPTH (FT)	SAMPLES	MOISTURE CONTENT (%)	ATTERBERG LIMITS			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	GROUNDWATER INFORMATION:	
		N: BLOWS/FT P: TONS/SQ.FT T: BLOWS R: % RQD: %		LL	PL	PI						SURFACE ELEVATION:	
												DESCRIPTION OF STRATUM	
5		N = 11 N = 45 N = 33 N = 25									65	SANDY SILTY CLAY (CL-ML), tan, stiff to hard, dry	
10		N = 74/10"											
15		N = 18		NP	NP	NP					43	SILTY SAND (SM), tan, medium dense to very dense, saturated, fine grained  Gypsum traces	
20		N = 58											
25		N = 33										Total Depth = 25 ft.	

RENEWABLE LOG - MIDLAND - LOG A GNNL01.GDT - 3/14/16 09:15 - Z:\GINT\PROJECTS\2016\WT1602025 BASEBALL PARK\WT1602025 BASEBALL PARK.GPJ

N - STANDARD PENETRATION TEST RESISTANCE  
 P - POCKET PENETROMETER RESISTANCE  
 T - TXDOT CONE PENETRATION RESISTANCE  
 R - ROCK CORE RECOVERY  
 RQD - ROCK QUALITY DESIGNATION

REMARKS:  
 GPS COORDINATES: Lat. 31.390526, Long. -103.488225

# LOG OF BORING B-5



RRC Power and Energy, LLC  
 3801 Doris Lane  
 Round Rock, TX 78664  
 Telephone: (512) 992-2087  
 Fax: (512) 251-2518

CLIENT: Kleinman Consultants, PLLC  
 PROJECT: Baseball Park  
 LOCATION: Pecos, TX  
 NUMBER: WT1602025  
 DATE(S) DRILLED: 2/5/16

FIELD DATA		LABORATORY DATA								DRILLING METHOD(S):	
SOIL SYMBOL	DEPTH (FT)	SAMPLES N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ.IN)	MINUS NO. 200 SIEVE (%)
				LL	PL	PI					
5		N = 14 N = 33 N = 60								49	

DRILLING METHOD(S):  
 Continuous Flight Auger

GROUNDWATER INFORMATION:  
 No groundwater encountered during drilling

SURFACE ELEVATION:  
 DESCRIPTION OF STRATUM  
 SANDY LEAN CLAY (CL), brown, soft, dry  
 SILTY, CLAYEY SAND (SC-SM), light tan, medium dense to very dense, dry, fine grained  
 SILTY SAND (SM), light tan, very dense, dry, fine grained  
 Total Depth = 5.5 ft.

RENEWABLE LOG - MIDLAND - LOG A GNNL01.GDT - 3/14/16 09:15 - Z:\GINT\PROJECTS\2016\WT1602025 BASEBALL PARK\WT1602025 BASEBALL PARK.GPJ

N - STANDARD PENETRATION TEST RESISTANCE  
 P - POCKET PENETROMETER RESISTANCE  
 T - TXDOT CONE PENETRATION RESISTANCE  
 R - ROCK CORE RECOVERY  
 RQD - ROCK QUALITY DESIGNATION

REMARKS:  
 GPS COORDINATES: Lat. 31.390329, Long. -103.489220

# LOG OF BORING B-6



RRC Power and Energy, LLC  
 3801 Doris Lane  
 Round Rock, TX 78664  
 Telephone: (512) 992-2087  
 Fax: (512) 251-2518

CLIENT: Kleinman Consultants, PLLC  
 PROJECT: Baseball Park  
 LOCATION: Pecos, TX  
 NUMBER: WT1602025  
 DATE(S) DRILLED: 2/5/16

FIELD DATA		LABORATORY DATA										DRILLING METHOD(S):	
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ.FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Continuous Flight Auger
					LL	PL	PI						GROUNDWATER INFORMATION:
													SURFACE ELEVATION:
													DESCRIPTION OF STRATUM
5	5	X X X	N = 14  N = 24  N = 57	11.0								58	SANDY LEAN CLAY (CL), brown, soft, dry SANDY SILTY CLAY (CL-ML), light tan, stiff to hard, dry
													Total Depth = 5.5 ft.
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION													REMARKS: GPS COORDINATES: Lat. 31.391829, Long. -103.488972

RENEWABLE LOG - MIDLAND - LOG A GNNL01.GDT - 3/14/16 08:15 - Z:\GINT\PROJECTS\2016\WT1602025 BASEBALL PARK\WT1602025 BASEBALL PARK.GPJ

# LOG OF BORING B-9



RRC Power and Energy, LLC  
 3801 Doris Lane  
 Round Rock, TX 78664  
 Telephone: (512) 992-2087  
 Fax: (512) 251-2518

CLIENT: Kleinman Consultants, PLLC  
 PROJECT: Baseball Park  
 LOCATION: Pecos, TX  
 NUMBER: WT1602025  
 DATE(S) DRILLED: 2/6/16

RENEWABLE LOG - MIDLAND - LOG A GNNL01.GDT - 3/14/16 09:15 - Z:\GINT\PROJECTS\2016\WT1602025 BASEBALL PARK\WT1602025 BASEBALL PARK.GPJ

FIELD DATA		LABORATORY DATA										DRILLING METHOD(S):	
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ.FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	Continuous Flight Auger
					LL	PL	PI						GROUNDWATER INFORMATION:
													Groundwater encountered at 17 ft. during drilling and measured at 12.5 ft. 2 hours after drilling
													SURFACE ELEVATION:
													DESCRIPTION OF STRATUM
	5	N = 12 N = 19 N = 25 N = 66											SANDY SILTY CLAY (CL-ML), light tan, stiff to hard, dry
	10	N = 43									51		SANDY SILT (ML), light brown, hard, dry
	15	N = 34									50		Tan, saturated below 12 ft.
	20	N = 20											SILTY SAND (SM), with Gypsum, brown, medium dense, saturated, fine to medium grained
	25	N = 42											
	30	N = 33		22.5								51	SANDY SILT (ML), brown, hard, saturated
													Total Depth = 30 ft.
N - STANDARD PENETRATION TEST RESISTANCE P - POCKET PENETROMETER RESISTANCE T - TXDOT CONE PENETRATION RESISTANCE R - ROCK CORE RECOVERY RQD - ROCK QUALITY DESIGNATION												<b>REMARKS:</b> GPS COORDINATES: Lat. 31.390679, Long. -103.486916	

# LOG OF BORING LF-1



RRC Power and Energy, LLC  
 3801 Doris Lane  
 Round Rock, TX 78664  
 Telephone: (512) 992-2087  
 Fax: (512) 251-2518

CLIENT: Kleinman Consultants, PLLC  
 PROJECT: Baseball Park  
 LOCATION: Pecos, TX  
 NUMBER: WT1602025  
 DATE(S) DRILLED: 2/6/16

FIELD DATA		LABORATORY DATA								DRILLING METHOD(S): Continuous Flight Auger				
SOIL SYMBOL	DEPTH (FT)	SAMPLES N: BLOWS/FT P: TONS/SQ.FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ. FT)	STRAIN AT FAILURE (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)			
				LL	PL	PI								
DESCRIPTION OF STRATUM														
[Hatched pattern]	0 - 10										5	10	SANDY SILTY CLAY (CL-ML), light tan, dry	
[Vertical lines]	10 - 25		▽								15	20	25	SANDY SILT (ML), tan, moist
														Total Depth = 25 ft.

RENEWABLE LOG - MIDLAND - LOG A GNNL01.GDT - 3/14/16 09:15 - Z:\GINT\PROJECTS\2016\WT1602025 BASEBALL PARK\WT1602025 BASEBALL PARK.GPJ

N - STANDARD PENETRATION TEST RESISTANCE  
 P - POCKET PENETROMETER RESISTANCE  
 T - TXDOT CONE PENETRATION RESISTANCE  
 R - ROCK CORE RECOVERY  
 RQD - ROCK QUALITY DESIGNATION

REMARKS:  
 GPS COORDINATES: Lat. 31.390440, Long. -103.484946  
 Surface is covered with broken glass, rubble, ceramic, old rubber tires, wood and metal scraps. The purpose of this borehole is to identify possible subsurface landfill material. None was observed.

# BORING LOG KEY

FIELD DATA		LABORATORY DATA							DRILLING METHOD(S): Continuous Flight Auger/Hollow-stem Auger/Wet Rotary/NX Core	
SOIL SYMBOL	DEPTH (FT)	SAMPLES N: BLOWS/FT P: TONS/SQ.FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)			DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ.FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
			LL	PL	PI					
GROUNDWATER INFORMATION: Subsurface water was not encountered either during or upon completion of the drilling operations.										
SURFACE ELEVATION: ft.										
DESCRIPTION OF STRATUM										

-- TESTING SYMBOLS DEFINITIONS --

N - STANDARD PENETRATION TEST RESISTANCE  
P - POCKET PENETROMETER RESISTANCE  
T - TRIAXIAL CONE PENETRATION RESISTANCE  
R - ROCK CORE RECOVERY  
RQD - ROCK QUALITY DESIGNATION

## TYPICAL SOIL AND ROCK SYMBOLS (USCS CLASSIFICATION)

 Lean Clay (CL)	 Poorly-Graded Sand (SP)	 Claystone
 Fat Clay (CH)	 Well-Graded Sand (SW)	 BASALT:
 Silt (ML)	 Poorly-Graded Gravel (GP)	 Limestone
 Elastic Silt (MH)	 Well-Graded Gravel (GW)	 Sandstone
 Silty Sand (SM)	 Clayey Gravel (GC)	 Siltstone
 Clayey Sand (SC)	 Silty Gravel (GM)	 Fill Material
 Silty, Clayey Sand (SC-SM)	 Silty Clay (CL-ML)	 Shale

## DEGREE OF WEATHERING

- 1) Unweathered: No evidence of any chemical or mechanical alteration.
- 2) Slightly weathered: Slight discoloration on surface, slight alteration along discontinuities, less than 10% of the rock volume altered.
- 3) Moderately weathered: Discoloring evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering "halos" evident, 10% to 50% of the rock volume altered.
- 4) Highly weathered: Entire mass discolored, alteration pervading nearly all of the rock with some pockets of slightly weathered rock noticeable, some minerals leached away.
- 5) Decomposed: rock reduced to a soil with relic rock texture, generally molded and crumbled by hand.

## SOIL STRUCTURE

- Calcareous.....Containing calcium carbonate
- Slickensided.....The presence of planes of weakness having a slick and glossy appearance
- Interbedded.....Alternating layers of varying material



**Summary of Laboratory Test Results**  
**Baseball Park - Pecos**  
 RRC Project No. 1602025

Bore No.	Depth (ft)	USCS Soil & Rock Classification	Particle Size Distribution				Atterberg Limits			In-Situ Water Content (%)	Water Soluble Matter (mg/kg)		Approximate Gypsum Content
			Passing by Weight (%)				LL <sup>1</sup>	PL <sup>2</sup>	PI <sup>3</sup>		Chlorides	Sulfates	
			#4	#40	#200	#4							
B-01	4-5.5	Sandy CL-ML	100	98	67				24.6				
B-01	13.5-15	SM	99	85	47				18.2			23	
B-02	2-3.5	Sandy CL-ML	100	97	70				23.7				
B-02	6-7.5	SM	99	95	48		NP	NP	23.3				
B-02	8.5-10	SM							16.2				
B-03	8.5-10	Sandy ML	100	96	53				40.1				
B-03	18.5-20	SM	100	93	49				24.6			25	
B-04	0-1.5	Sandy CL-ML	100	96	65				36.3				
B-04	13.5-15	SM	100	72	43		NP	NP	47.8				
B-04	18.5-20	SM	100	90	48				24.6				
B-05	2-3.5	SC-SM	98	92	49				31.8				
B-06	0-1.5	Sandy CL-ML	100	94	58				11.0			20	
B-07	2-3.5	Sandy CL				24	15	9					
B-07	4-5.5	SC	100	90	45				9.2			19	
B-07	6-7.5	Sandy ML	100	93	60				19.0			16	
B-07	13.5-15	Sandy ML	100	91	52				41.9*				
B-08	2-3.5	Sandy CL-ML	100	91	59				13.0			16	
B-08	4-5.5	Sandy CL				24	16	8					
B-08	9.5-10	SM	100	78	26				12.3				
B-08	23.5-25	Sandy ML	96	79	60				24.7				
B-09	8.5-10	Sandy ML	99	94	51				33.9				
B-09	13.5-15	Sandy ML	93	80	50				43.2				
B-09	28.5-30	Sandy ML	100	98	51				22.5			6	
B3/B7	2-3.5	Sandy CL									3,990	4,600	
B2/B4	2-3.5	Sandy CL-ML									2,000	4,980	