STATE HIGHWAY 48 FORCE MAIN RELOCATION

November 10, 2026

1. CHANGES TO BID FORM:

a. Installation of HDPE pipe via Horizontal Directional Drilling option was added as an alternative to the PVC pipe via open trench and steel casing requirement.
b. Bid items No. 13 & 14 were reduced in quantity to 3 months.
c. Description changes in Bid Item No. 11.
d. Addendum #1 acknowledgement added.
e. 1 page added.

2. ANSWERS AND CLARIFICATIONS TO BIDDERS' QUESTIONS:

	BIDDERS QUESTION	BND RESPONSE
1.	Can a second small section of concrete be removed on the north side of the point of connection to the lift station?	*Concrete pavement has been recently placed and removal shall be limited at the site. No more than 20 square yards shall be impacted at the site.*
2.	Can a 30' to 40' section of the 12" steel casing be installed via open cut on the south side of the Highway?	*There is no objection to installing the steel casing via open cut construction outside of the Forza Steel USA concrete pavement section. The contractor will be required to obtain approval from TxDOT for performing construction within TxDOT Right-of-Way at no additional cost to the owner.*
3.	Can the proposed 4" DR-25 pipe be replaced with 4" DR-11 fusible pipe and be installed by directional bore instead?	*An additive alternate will be included for installation of fusible HDPE pipe via HDD. A minimum 6" IPS PE4710 HDPE DR 11 pipe shall be provided to maintain a minimum inside diameter of 4". Requirements will be included in Addendum No. 1.*
4.	Is a geotechnical report available for this project?	*No geotechnical report is available for this project. The contractor shall conduct a geotechnical investigation if deemed necessary at no additional cost to the owner.*
5.	Will a fiberglass liner be an acceptable alternate to the PVC lining stated on the plans on sheet C605?	*A fiberglass liner will be accepted as an alternate to the PVC liner. Requirements will be included in the Specification 33 31 11.*
6.	The only type of PVC coatings are liners. will there be a specification provided for the type of PVC liner that is wanted?	*Yes. Rehabilitation requirements will be included in Specification 33 31 11. The bid schedule will be updated accordingly.*

3. CHANGES TO DRAWINGS:

a. Sheet C602 was revised to clarify wet well dimensions and modify note #7.

4. CHANGES TO SPECIFICATIONS:

a. Specification 33 31 11 was revised to include details on wet well and manhole rehabilitation.

Bid Form

STATE HIGHWAY 48 FORCE MAIN RELOCATION

Place: Board of Commissioners - Brownsville Navigation District
1000 Foust Road
Brownsville, Texas 78521

Due Date: Before **2:00 P.M.**, **Tuesday, November 17, 2026**.

Proposal of _____ hereinafter called BIDDER, a corporation organized and existing under the laws of the State of _____, or a partnership or an individual doing business as _____.

To: The Brownsville Navigation District, Texas, hereinafter called OWNER.

Gentlemen:

The BIDDER, in compliance with your invitation for bids for the "**STATE HIGHWAY 48 FORCE MAIN RELOCATION**" project, having examined the drawings and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies, and to construct the project in accordance with the contract documents, within the time set forth herein, and at the attached unit prices. These price(s) are to cover all expenses incurred in performing the work required under the contract documents, of which this proposal is a part. These price(s) are firm and shall not be subject to adjustment provided this Proposal is accepted within ninety (90) days after the time set for receipt of proposals.

BIDDER hereby agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed" to be issued by the OWNER and to fully complete the project within (90) ninety calendar days after notice to proceed, as defined in the specifications. BIDDER further agrees to pay as liquidated damages, the sum of five hundred ($500.00) dollars for each consecutive calendar day thereafter as hereinafter provided in Article 3 of the Agreement.

BIDDER agrees to perform all work for which he contracts as described in the specifications and as shown on the plans, for the attached unit prices:

SUBCONTRACTORS. BIDDER proposes that he will perform the majority of the work at the project site with his own forces and that specific portions of the work not performed by the BIDDER will be subcontracted and performed by the following subcontractors.

Subcontracted Work	Name of Subcontractor

STATE HIGHWAY 48 FORCE MAIN RELOCATION

BIDDER Agrees to perform all the work described in the Contract Documents
for the following Unit Prices (which include any and all applicable taxes and fees):

Tuesday, November 17, 2026

BASE WORK:

#	DESCRIPTION	EST. QTY.		UNIT COST	AMOUNT
SANITARY SEWER IMPROVEMENTS					
1	Tie-In to LS (including removing and reinstalling existing Rolling gate track, capping and plugging existing 4-Inch Force Main)	1	LS		
2	Tie-in to Exist. Manhole	1	LS		
3	4-Inch PVC C 905 DR-25 Force Main (including Trench Backfill, appurtenances, thrust blocks) Complete In-Place	1,570	LF		
4	4-Inch PVC C 905 DR-25 Force Main in 12-inch Steel Casing installed via trenchless construction including dewatering, spacers and restrained joints to install the force main complete in place	357	LF		
5	Trench Safety	1,570	LF		
6	Dewatering	1,570	LF		
7	1-inch Air Release Valve	2	EA		
8	3-inch Check Valve	2	EA		
9	3-inch Plug Valve	2	EA		
10	3-inch Ductile Iron above grade yard piping and supports as shown on the plans	10	LF		
11	Wet well and manhole rehabilitation per Spec Section 33 31 11 including dewatering, preparation, and grouting to install liner complete in place	2	EA		
MISCELLANEOUS					
12	Mobilization	1	LS		
13	Traffic Control	3	MO		
14	SWPPP (Signed by a Texas Registered Professional Engineer)	3	MO		
15	Erosion Control (Including all TPDES required Permitting, Reporting and Monitoring)	1	LS		
16	Trench Safety Plan	1	LS		
17	Concrete Pavement (incl. flexible base and stabilized subgrade)	20	SY		
18	Site Restoration including hydromulch seeding, gravel replacement & ditch grading.	1,570	LF		

TOTAL BASE BID: _____

ALTERNATIVE WORK:

#	DESCRIPTION	EST. QTY.		UNIT COST	AMOUNT
ALTERNATIVE BID					
3A	6-Inch fusible HDPE IPS PE4710 DR-11 Force Main installed via HDD including entry and exit pits, butt fusion joints, drilling fluid, HDD monitoring potholes, appurtenances, fittings, restrained joints, thrust blocks, testing and flushing) Complete In-Place	1,570	LF		
3	4-Inch PVC C 905 DR-25 Force Main (including Trench Backfill, appurtenances, thrust blocks) Complete In-Place **(DEDUCT)**	1,570	LF		
4A	6-Inch fusible HDPE IPS PE4710 DR-11Force Main in 12-inch Steel Casing installed via trenchless construction including dewatering, spacers and restrained joints to install the force main complete in place	357	LF		
4	4-Inch PVC C 905 DR-25 Force Main in 12-inch Steel Casing installed via trenchless construction including dewatering, spacers and restrained joints to install the force main complete in place **(DEDUCT)**	357	LF		

TOTAL BASE BID + ALTERNATIVE BID: _____

BIDDER Acknowledges receipt of the following addenda:

ADDENDUM #1 _____

_____

_____

_____

In case of discrepancy, the unit price amount shall govern.

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

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

BIDDER agrees that this Bid shall be good and may not be withdrawn for a period of ninety (90) days after the scheduled closing time for receiving bids.

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

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

Respectfully submitted,

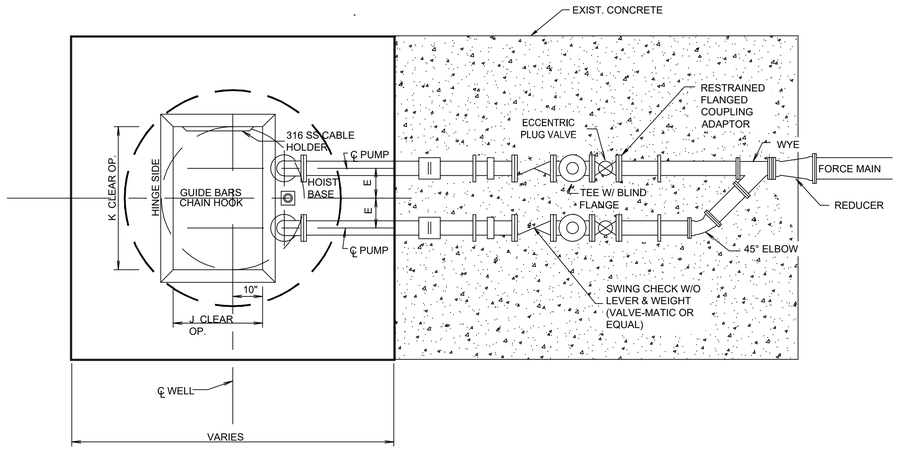
By: _____

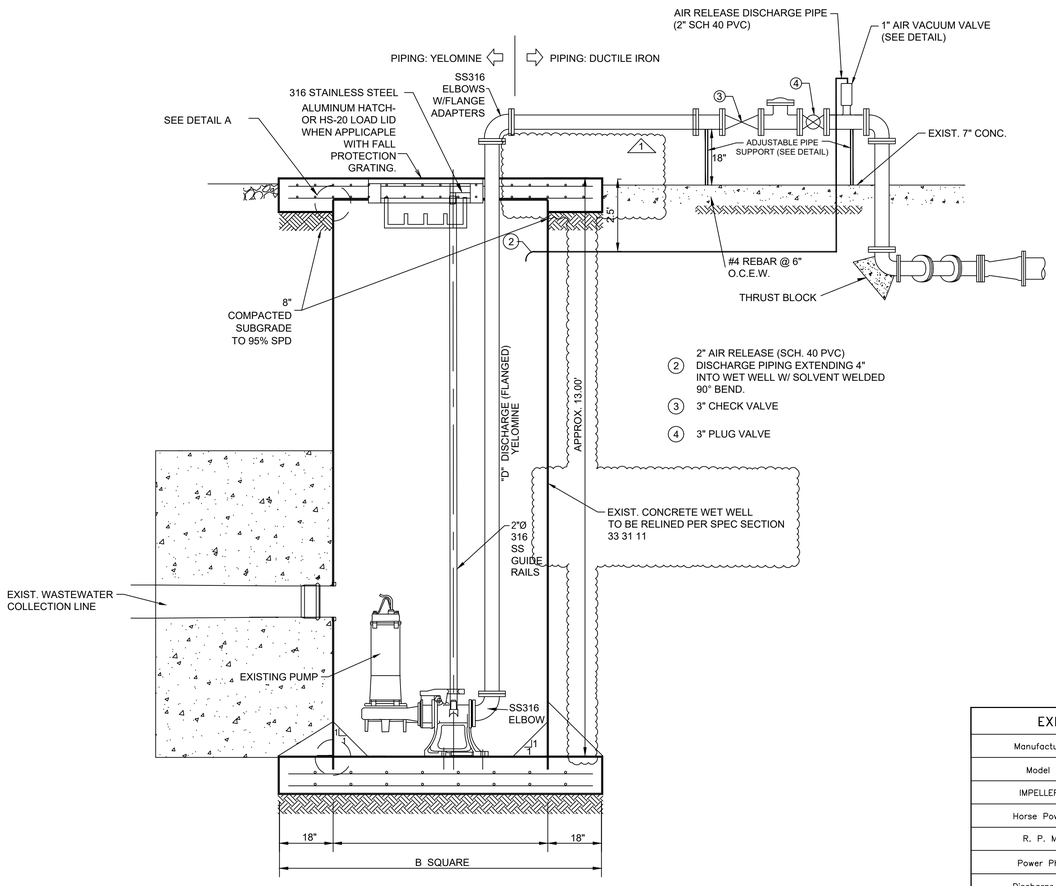
Seal affixed here
if BID is by a
Corporation

_____
Title

_____
Address

Attest: _____ _____





PROFILE VIEW
NOT TO SCALE

PLAN VIEW AT BASE ELEVATION

NOT TO SCALE

NOTES

1. ALL CONCRETE SHALL BE 6 SACK–4,000 PSI DESIGN. MAXIMUM WATER/CEMENT RATIO: 0.45.
2. ALL CONCRETE SHALL BE CURED A MINIMUM OF 7 DAYS. CURING SHALL CONSIST OF PLACEMENT NON–DISTURBANCE AND ONE OF THE FOLLOWING TREATMENTS OF EXPOSED SURFACES: A) FLOODING WITH WATER, B) BURLAP SACKS KEPT WET AT ALL TIMES, OR C) USE OF CURING COMPOUND.
3. ALL CONCRETE EDGES SHALL BE ROUNDED OR CHAMFERED 1/2".
4. ALL REBAR SHALL BE GRADE 60 AND TIED AT EACH JUNCTION, REBAR SPLICE, IF REQUIRED, SHALL HAVE A MINIMUM OF 18" OVERLAP OR 40 BAR DIAMETER, WHICHEVER IS GREATER.
5. ALL VALVE VAULT PLUMBING SHALL BE FLANGED AND PIPING SHALL BE DI.
6. EPOXY BONDING AGENT SHALL BE USED AT JOINT BETWEEN GROUT AND LOWER SLAB.

1

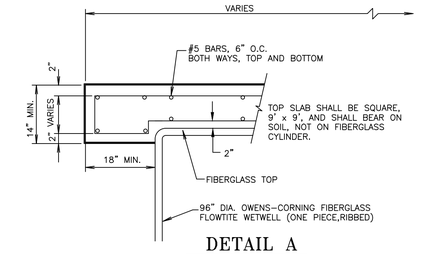
7. WETWELL BACKFILL: BACKFILL OF THE WETWELL SHALL BE PERFORMED IN MAXIMUM 6" LOOSE LAYERS WITH BANK RUN SAND OR SANDY MATERIAL WITH NOT MORE THAN 20 PASSING THE #200 SIEVE ACCORDING TO ASTM D1140. BACKFILL LAYERS SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY AT OPTIMUM MOISTURE CONTENT (TO +2%) WITH MECHANICAL TAMPERS. HEAVY EQUIPMENT SHALL NOT BE OPERATED CLOSER TO THE WETWELL THAN A DISTANCE EQUAL TO THE HEIGHT OF THE BACKFILL.
8. ALL SURFACES AND PIPING INSIDE THE WETWELL EXCEPT FIBERGLASS SURFACE, BOTTOM FLOOR, PUMPS, POWER AND CONTROL CABLES, AND THE STAINLESS STEEL GUIDE RAILS SHALL BE COATED WITH 100 POLYURETHANE. COATING SYSTEM SHALL CONSIST OF ALL THE FOLLOWING:
   A) PRIOR TO COATING, CLEAN ALL SURFACES BY WATER BLASTING WITH 10 SANDBLASTING, 100% SOLIDS, THERMOSETTING, ELASTOMERIC, UNFILLED CHEMICALLY CURED.
   B) APPLY ONE COAT OF POLIBRID 705X CONCRETE PRECOAT AT 15 MILS DFT. ACCORDING TO MANUFACTURER'S RECOMMENDATIONS, 10% MURIATIC ACID OR SAND BLASTING.
   C) APPLY ONE COAT OF POLIBRID 705 TOPCOAT AT 80 MILS DFT. ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
9. PUMP CABLE TO BE CONTINUOUS FROM SUB. PUMPS TO CONTROL PANEL.
10. A1" WATER SERVICE AND 3/4" HOSE BIB WITH PRESSURE/VACCUM BREAKER SHALL BE INSTALLED ON L.S. SITE.
11. ALL BOLTS INSIDE WETWELL SHALL BE 316 STAINLESS STEEL.
12. ALL PIPING INSIDE VALVE VAULT SHALL BE COATED WITH A TWO PART EPOXY COATING OF TNEMEC SERIES N69 PAINT, 6 MILS DFT OF PRIMER AND TWO COATS OF 6 MILS DFT OF TOPCOAT.
13. LIFT STATION SHALL BE ENCLOSED WITH SECURITY FENCE AND LOCKABLE GATE (MINIMUM 8FT CHAIN–LINK).
14. INSTALL GRAVEL OR CRUSHED ROCK UPON GEOTEXTILE MEMBRANE SUPPORTED BY 2" COMPACTED BANK RUN SAND BEDDING. SLOPE GEOTEXTILE MEMBRANE TO DRAIN AWAY FROM WET WELL.

2" AIR RELEASE (SCH. 40 PVC)
2 DISCHARGE PIPING EXTENDING 4" INTO WET WELL W/ SOLVENT WELDED 90° BEND.

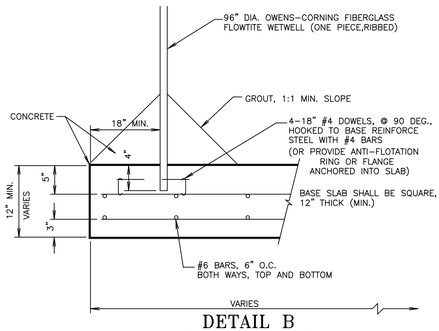
3 3" CHECK VALVE

4 3" PLUG VALVE

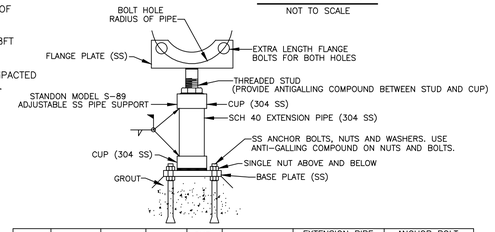
EXISTING PUMP DATA	
Manufacturer	HCP PUMP
Model	80 AFC 22.2
IMPELLER	–
Horse Power	–
R. P. M.	–
Power Phase	–
Discharge Size	–
Maximum Solids	–
G.P.M.	TDH
–	–
–	–
–	NORMAL OPERATING POINT - PUMP EFFICENCY (%)
–	–



DETAIL A
NOT TO SCALE



DETAIL B
NOT TO SCALE



PIPE SIZE	HOLE RADIUS	FLG PLATE	THRD STUD	CUP ID	BASE PLATE	EXTENSION PIPE SIZE REQ'D NOTE 1	ANCHOR BOLT HOLE DIAMETER NOTE 2
3"	3.00"	.250"	1"x6"	2.5"	4"x6"x1/2"	2"	9/16"
4"	3.75"	.250"	1"x6"	2.5"	4"x6"x1/2"	2"	9/16"
6"	4.75"	.250"	1"x6"	2.5"	4"x6"x1/2"	2"	9/16"
8"	5.87"	.250"	1"x6"	2.5"	4"x6"x1/2"	2"	9/16"
10"	7.125"	.250"	1"x6"	2.5"	4"x6"x1/2"	2"	9/16"
12"	8.50"	.250"	1"x6"	2.5"	4"x6"x1/2"	2"	9/16"
14"	9.375"	.375"	1.5"x6"	3.5"	8"x8"x1/2"	3"	3/4"
16"	9.625"	.375"	1.5"x6"	3.5"	8"x8"x1/2"	3"	3/4"
18"	11.375"	.375"	2"x6"	4.5"	12"x12"x5/8"	4"	3/4"
20"	12.50"	.375"	2"x6"	4.5"	12"x12"x5/8"	4"	3/4"
24"	14.75"	.375"	2"x6"	4.5"	12"x12"x5/8"	4"	3/4"

NOTES:
1. MAXIMUM 4" LONG
2. ANCHOR BOLT EMBEDMENT PER BOLT MANUFACTURER
3. HOT DIP GALVANIZE AFTER FABRICATION.

PIPE SUPPORT DETAILS
NOT TO SCALE

PORT OF BROWNSVILLE
STATE HIGHWAY 48 FORCE MAIN RELOCATION
BROWNSVILLE, TX

halff
1075 PAREDES LINE RD., SUITE B
BROWNSVILLE, TEXAS 78521-2696
TEL. (956) 303-7100

REVISION NO.	DATE	DESCRIPTION
1	11/10/2026	ADDENDUM #1

11/10/2026

STATE OF TEXAS
MICHAEL A. SALINAS
123342
LICENSED PROFESSIONAL ENGINEER

THE SEAL OPPOSITE APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY:
MICHAEL SALINAS, P.E. 123342
NAME PE LICENSE NO.
11/10/2026
DATE

THE RECORD COPY OF THIS DRAWING IS ON FILE AT THE OFFICES OF:
HALFF ASSOCIATES, INC.

#312 TX
FIRM / BUSINESS NO. STATE

PROJECT NO.: 63708.001
ISSUED: 4/10/2026
DRAWN BY: JG
CHECKED BY: MS
SCALE: 1" = 20'
SHEET TITLE:

LIFT STATION DETAILS

C602

FILE NAME: A:\63000s\63708\001\PW\CADD\Sheets\C-PLN-GN-63707-001.dwg DATE: November 10, 2026, TIME: 11:45 AM, USER: ah3818

SECTION 33 31 11 – SANITARY SEWER PIPE WORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. Under this section is included the furnishing, laying, jointing and testing of all sewer pipe, including sewer pipe and sewer appurtenances, both in open cut and in tunnels, as shown on the drawings or as directed by the Engineer.

1.2 UNIT PRICES

A. Unit Prices.

1. Payment for normal depth sanitary sewer, up to 8 feet deep, by open-cut or augered with or without casing is on a linear foot basis for each size of pipe. Depth is measured from bottom of the pipe to the proposed natural ground. Separate pay items are used for open-cut and augered installation.

2. Payment for sanitary sewer, greater than 8-foot in depth, by open-cut or augered is on a linear foot basis for each 2-foot increment for depths greater than 8 feet. Depth is measured from bottom of the pipe to the proposed natural ground.

3. Payment for normal depth manholes, up to 8 feet deep, is on a unit price basis for each manhole installed. Depth is measured from proposed top of cover to sewer invert.

4. Payment for manholes, greater than 8-foot in depth, is on a unit price for each manhole installed for each 2-foot increment. Depth is measured from proposed top of cover to sewer invert.

5. Payment for sanitary service connections in on a unit price for each single, double, short and long service connection installed.

6. Payment for force mains installed by open-cut or augered with or without casing is on a linear foot basis for each size of pipe installed. Separate pay items are used for open-cut and augered installation.

7. Payment for manholes rehabilitated by liner including bench is on a unit price basis for each liner installed up to 15 feet deep.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Gravity Sewer Pipe

1. Gravity sewer pipe may be of any of the following classifications. Any pipe found defective, not meeting the specifications, or improperly installed shall be rejected and so

marked and shall be replaced by pipe approved by the Engineer at no additional cost to Utility Owner.

a. Pipe and fittings shall be manufactured in conformance with the materials and methods described in ASTM Specification D-3034. Joint seals shall be compression type rubber gaskets in compliance with the requirements of ASTM Specification D-1869.

b. Pipe and fittings shall be manufactured in conformance with the materials and methods described in ASTM Specification F-789 and UNI-B-10. Gaskets shall comply with the requirements of ASTM Specification F-477.

2. Manholes

a. Manholes shall be constructed of glass fiber-reinforced isophalic polyester resin containing chemically enhanced sand for use in sanitary sewer applications. They shall be a one-piece unit of one class, fabricated in a composite laminate. Walls shall be of uniform thickness and shall be free from thin spots and voids. Exterior surface shall be free of ridges and sharp protrusions and reinforcement. Interior surface shall also be smooth and free of ridges to allow for self-cleaning. The exterior surface shall be covered with graded sand to facilitate bonding to the concrete base pad, cement stabilized sand backfill and cement grout used to seal around all incoming lines. Manholes shall conform to the following design criteria:

1. ASTM D-3753 "Standard Specification of Glass-Fiber reinforced Polyester Manholes."
2. ASTM C-581 "Practice for determining chemical resistance of chemical thermosetting resins used in glass-fiber reinforced structures intended for liquid Service."
3. ASTM D-2412 "Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel Plate Loading."
4. ASTM D-695 "Test Methods for Compressive Properties of Rigid Plastics."
5. ASTM D-2584 "Test Method for Ignition Loss of Cured Reinforced Resins."
6. AASHO H-20 Axial Loading Nominal inside diameter of the manhole shall be 48".
   Thickness of the manhole shall be 0.50" nominal. Height shall be selected in accordance with project plans.

b. Dimensions: The manhole shall be a circular cylinder, reduced at the top to a circular manway not smaller than 30” inside diameter. Manholes shall be produced in half-foot increments in length +/- 2”. Nominal inside diameters shall be 48”, 60”, and 72“as shown in the design details. Tolerance on the inside diameter shall be +/- 1%.

c. Configuration: The manway reducing cone section shall be centered on the manhole barrel and 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 required monolithic design to prevent infiltration and/or exfiltration through the manhole.

d. Loading: The manhole shall be manufactured in one class of load rating. This class shall be H-20 wheel load (minimum 16,000 pounds dynamic wheel load).

e. Manufacturer and Certification: The manholes shall be Containment Solutions, Inc. Flowtite Fiberglass Manholes or approved equal that conforms to ASTM D. 3753-81, Standard Specifications for Fiberglass Reinforced Polyester Manholes and all noted applicable documents. The manufacturer shall submit written certification that their product meets the requirements of ASTM D. 3753-81 with test results of specified manholes included.

B. Force Mains

1. Pressure sewer pipe will be the following classification. Any pipe found defective, not meeting the specifications, or improperly installed shall be rejected and so marked and shall be replaced by pipe approved by the Engineer at no additional cost to Utility Owner.

   a. Polyvinyl chloride pipe for force mains shall conform to AWWA Standard "Polyvinyl Chloride (PVC) Pressure Pipe" C-900 - 750 Class 100 DR25 latest revision. Fittings for polyvinyl chloride (PVC) pipe shall be Ductile Iron Class 125 "Compact Fittings" short body, tar coated (not cement lined). Transition gaskets shall also be included, unless otherwise noted on the contract bid document or drawings.

   b. Polyvinyl chloride pipe for directional bored force mains shall conform to Fusible AWWA C-900 DR-25 PVC.

2. Force Main Valves to include operator, actuator, handwheel, chain wheel, extension stem, floor stand, operating nut, chain, wrench, and accessories to allow a complete operation from the intended operating level.

   Valve same size as adjoining pipe, unless otherwise noted in the design plans. Valve ends shall be suited for adjacent piping.

   Exposed valves shall be painted or coated as per the design plans and in accordance with the manufacturer’s instructions.

   a. Plug Valves:
      (1) Eccentric Plug Valve 3-inches to 12-inches:
         1. Nonlubricated type rated 175 psi, drip tight shutoff with pressure from either direction, cast-iron body, exposed service flanged ends per ASME B16.1, unless otherwise shown.
         2. Plug cast iron with round or rectangular port of no less than 80-percent of connecting pipe area and coated with Buna-N, seats welded nickel, stem bearings lubricated stainless steel or bronze, stem seal multiple V-rings , or U-cups with O-rings of nitrile rubber, grit seals on both upper and lower bearings.
         3. Operators:
            a. 3-inch to 6-inch Valves: Wrench lever manual.

b. 8-inch to 12-inch Valves: Totally enclosed, geared, manual operator with handwheel, 2-inch nut, or chain wheel. Size operator for 1.5 times the maximum operating shutoff pressure differential for direct and reverse pressure, whichever is greater.

4. Manufacturers:
   a. Valmatic; 5600F/5700F
   b. Milliken; Millcentric Series 600

(2) Eccentric Plug Valve 24-inches to 48-inches:

1. Nonlubricated type rated 150 psi CWP, drip tight shutoff with pressure from either direction, cast-iron body, exposed service flanged ends per ASME B16.1, unless otherwise shown.
2. Plug cast iron with round or rectangular port of no less than 70-percent of connecting pipe area and coated with Buna-N, seats welded nickel, stem bearings lubricated stainless steel or bronze, stem seal multiple V-rings , or U-cups with O-rings of nitrile rubber, grit seals on both upper and lower bearings.
3. Totally enclosed, geared, manual operator with handwheel, 2-inch nut, or chain wheel. Size operator for 1.5 times the maximum operating shutoff pressure differential for direct and reverse pressure, whichever is greater.
4. Manufacturers:
   a. Valmatic; 5600F/5700F
   b. Milliken; Millcentric Series 600

C. Service Connections

1. Property service connections shall be installed using Polyvinyl Chloride Pipe (PVC). The pipe type shall be specified in the service line detail shown in the design plans.

D. Concrete Surface Coatings

1. All interior manhole concrete surfaces shall be coated with 8mils of Raven 155 epoxy primer and 125 mils of Raven 405 – 100% solids, solvent-free ultra-high build epoxy system manufactured by Raven Lining Systems, Broken Arrow, Oklahoma or Engineer approved equal.

E. Chemical Grout Material - chemical grout specially formulated to stop active infiltration, seal cracks and around penetrations according to ASTM F2414 Standard Practice for Sealing Sewer Manholes Using Chemical Grouting.

1. The grout shall quickly react with water to form a waterproof membrane. Minimum set time shall be established to ensure grout travel is achieved to stop active infiltration. Reaction time and shrinkage shall be controllable with the use of chemicals supplied by the same manufacturer.
2. The grout shall be non-toxic in its cured form. Page 14 of 46 d.

3. Oakum Water Plugs shall include rapid setting, oil-free oakum and hydrophilic grout to seal active infiltration. Oil-free oakum meeting Federal Specification HH-P-117 saturated with a hydrophilic urethane resin specially formulated for leak control.

F. PVC riser section shall be AWWA C900 compliant, DR-51 pressure class PVC pipe, manufactured by Diamond Plastics Corp or approved equal.
   1. Resilient materials for connectors and filler rings shall be manufactured from natural rubber, polyisoprene, neoprene, nitrile, or ethylene propylene diene monomer (EPDM) synthetic rubber.
   2. Inserts shall be single piece barrel and concentric reducer construction without seams, joints, or sections, comprised of chopped strand and continuous fiber glass reinforcement within isophthalic polyester resin containing finely graded sand. Materials shall be resistant to corrosive attack from sanitary sewage and sewer gases including sulfuric acid and shall satisfy the 100,000-hour criterion in ASTM D3753.
   3. Interior and exterior surfaces shall be smooth and free of sharp projections and protruding glass fibers. No blisters or delamination shall be visible.
   4. Inserts shall be sized to fit inside existing manholes and allow grade rings and frame between the top and finish grade. Wall thickness shall provide an AASHTO H-20 load rating and wall stiffness of 36 psi minimum.
   5. Sealant between PVC riser and the surfaces of the manhole base shall be a quick-setting polyurethane grout as recommended by the manufacturer.

G. Fiberglass liner
   1. The resins used shall be a commercial grade unsaturated polyester resin or other suitable polyester or vinyl ester resin.
   2. The reinforcing materials shall be commercial Grade “E” type glass in the form of continuous roving and chop roving, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.
   3. The inner surface exposed to the chemical environment shall be a resin-rich layer of 0.010 to 0.020 inch thick. The inner surface layer exposed to the corrosive environment shall be followed with a minimum of two passes of chopped roving of minimum length 0.5 inch (13 mm) to maximum length of 2.0 inch and shall be applied uniformly to an equivalent weight of 3 oz/ft. Each pass of chopped roving shall be well rolled prior to the application of additional reinforcement. The combined thickness of the inner surface and interior layer shall not be less than 0.10 inch.
   4. The fiberglass manhole and all related components shall be fabricated from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems.
   5. Physical properties:

Description	Hoop Direction(psi)	Axial Direction(psi)
Tensile Strength	18,000	5,000
Tensile Modules	0.6 x 106	0.7 x 106
Flexural Strength	26,000	4,500
Flexural Modules	1.4 x 106	0.7 x106
Compressive	18,000	5,000

   6. The complete manhole liner shall have a minimum dynamic-load rating of 16,000 lbs. when tested in accordance with A.S.T.M. 3753 8.4 (note 1).To establish this rating the complete manhole shall not leak, crack, or suffer other damage when load tested to

40,000 lbs. and shall not deflect vertically downward more than 0.25 in. at the point of load application when loaded to 24,000 lbs.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. For all pipe, the Contractor shall familiarize himself with the TCEQ Chapter 217 Separation Distance Requirements and verify that all proposed work conforms to these regulations. The Contractor shall immediately notify Utility Owner and the Engineer once the Contractor discovers that field conditions cannot meet the TCEQ Chapter 217 Separation Distance Requirements.

B. After the trench is excavated to grade as specified, it shall be filled to grade with a minimum 6-inch bank run sand layer, in accordance with 31 06 20.16 - Utility Backfill Materials. This material shall be mechanically tamped to a density minimum of 90%. This material shall provide a smooth and uniform pipe bed for the entire length of the sewer pipe barrel. Trench foundation preparation may require dewatering, gravel bedding, or cement stabilized sand to create a stable foundation for pipe installation. Stable foundation conditions and trench improvements will be at the direction of the Utility Owner Inspector or the Engineer and at no additional costs to the Owner.

C. Trenching and pipe laying shall be uniformly in a straight line and to uniform elevations unless otherwise specified on the plans. Pipe and fittings shall be carefully handled to avoid damage. Before placing pipe into the trench, the outside of the spigot and the inside of the bell shall be wiped clean and dry, free from oil and grease. Every precaution shall be taken to prevent foreign material from entering the pipe. During layout operation, no debris, tools, clothing or other material shall be placed into the pipe. After placing a length of pipe into the trench, the spigot end shall be centered in the bell, the pipe forced home, brought to the correct alignment and covered with an approved backfill material. Detectable warning metallic tape with “Sewer Line Below” shall be buried as directed by the Utility Owner inspector, but no greater than 4' below the finished grade. The width of the metallic tape shall be 6-inches wide or as specified by the manufacturer.

D. Watertight Joint Materials: The contractor must exert every reasonable effort to secure a watertight joint and prevent infiltration of ground water into or exfiltration of sewage out of all pipe sewers and property service connections. Any joint materials found to be defective or not meeting the specifications shall be rejected and replaced by approved joint materials at no additional cost to Utility Owner.

E. Polyvinyl Chloride Pipe (PVC) Jointing: The contractor shall make certain before jointing polyvinyl chloride pipe that the ring groove in the bell of the pipe is clean with no dirt or foreign material that could interfere with proper seating of the ring. Make sure pipe end is clean. Wipe with a clean dry cloth around the entire circumference from the end to one (1) inch beyond the reference mark. Lubricate the spigot end of the pipe, using only the lubricant supplied by the manufacturer. Be sure the entire circumference is covered. The coating shall be the equivalent of a brush coat of enamel paint. It can be applied by hand, cloth, pad,

sponge, or glove. Do not lubricate the ring groove in the bell to avoid lubrication causing ring displacement. The level end is then inserted into the bell so that it is in contact with the ring. Brace the bell, while the level end is pushed in under the ring, so that previously completed joints in the line will not be close. The spigot end is pushed until the reference mark on the spigot end is flush with the end of the bell. If undue resistance to insertion of the level end is encountered or the reference mark does not reach the flush position, disassemble the joint and check the position of the ring. If it is twisted or pushed out of its seat, lean the ring, bell and level end and repeat the assembly steps.

F. Water stop joints shall be Polyvinyl Chloride (PVC) or other similar approved joint materials.

G. Sewer Appurtenances - Appurtenances to the sewer shall be provided and laid in accordance with the drawings and in the manner as specified herein. Appurtenances in addition to those required by the drawings or the proposal, as approved or directed by the Engineer, shall be paid for under the appropriate items of the proposal.

H. Service Branches and Fittings - Branches and fittings shall be provided and laid as and where directed. T-branches and Y-branches, placed in the sewer for property service connections, shall be located by the contractor, as directed by the Engineer, at such points in the sewer so as to result in the property service connection having the shortest length possible between the sewer and property line or easement line, unless otherwise indicated on the drawing or directed by the Engineer.

I. The Contractor shall install all service lines in accordance with TCEQ separation distance and Southern Building Code requirements. Contractor shall notify the Inspector or Engineer prior to the installation of any service that is in question in accordance to the TCEQ separation or Southern Building Code requirements. Where not approved street grade has been established, the depth of the connection shall be based on the assumed future street grade or on the present street or ground surface, as determined by the Engineer. At times when pipe laying is not in process, the open ends of the pipe shall be closed by a watertight plug or other approved means. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

J. Stubs - Stubs for future sewer pipe shall be installed as indicated by the drawings. If the specified length of the stub is exceeded, there will be no additional cost to Utility Owner unless the extra length is ordered by the Engineer. Existing sewer pipe stubs shall be removed as required, but only when directed by the Engineer.

K. Stacks - Stacks shall be constructed as and where directed. The height of the stack shall be as indicated on the drawings, set forth in the proposal, as determined by the Engineer. The stack shall encased in-concrete in accordance with the Design Plans.

L. Drop Inlets - Drop inlets to the manhole shall be constructed as and where indicated by the drawings of either of the types shown on the Design Plans, as directed by the Engineer.

M. Cleanouts - Cleanouts on all service laterals shall be installed at the location shown on the plans and in accordance with the Design Plans.

N. Manholes - Manholes shall be constructed as shown in Design Plans to the elevations shown on the plan-profile sheets, and in accordance with manufacturer's installation instructions.

1. Prepare excavation at manhole location should be at least 12-inches wider than the proposed concrete foundation slab specified and to provide working room around manhole.
2. Verify the depth of manhole is sufficient to allow 12 to 18-inches from the finished grade and the cone support ring, as per design plans.
3. For unstable trench foundation, provide a minimum of 4 to 6-inches of crushed limestone or 2-inch gravel, or until a stable foundation is achieved.

4. Set manhole as per manufacturer's installation instructions. Level and plumb manhole and connect sewer lines to manhole with a seal ring as manufactured by Northtown Pipe Protection Products or equal (as per ASTM C-923 requirements). A concrete base encasement shall be placed at least 12 inches outside of the diameter of the manhole and shall come over the top of the anti-flotation ring a minimum of 12 inches. All sides of incoming and outgoing sewer lines shall be covered with a minimum of 6-inches of concrete. Manhole levels shall be verified throughout the placement and finishing of concrete base construction.
5. Backfilling is allowed as soon as the concrete base has hardened enough to provide sufficient support for manhole and fill. Native soil (or band run sand, as specified in Section 31 06 20.16 – Utility Backfill Materials, in unstable areas), free of large stones, debris, or concrete chunks may be used for backfill. Backfill should be place evenly around manhole in 12" maximum loose lifts and should thoroughly tamped to 90% standard proctor density. Each layer shall be completely compacted before the next layer is installed to avoid uneven lateral pressure which could move the manhole out of plumb. Backfill material shall be subject to approval by the Engineer.
6. Contractor shall maintain the stability of the excavation during backfilling of the manhole which includes both trench protection and dewatering efforts.
7. To bring the manhole to finished grade and provide support for ring and cover, construct chimney using polyethylene rings by Lad Tech or approved equal.

O. Concrete Coating - All concrete surfaces within the manhole shall be coated with 100% solids, solvent-free ultra-high build epoxy coating system. Surfaces to be coated shall be cleaned by sandblasting or by water-blasting with 10% muriatic acid prior to coating. Coating system shall consist of 125 mils of Raven 405 epoxy coating, applied in accordance with manufacturer's recommendations, alternative coating system approved in advance by Engineer.

P. Stoppers and Bulkheads - Open ends of pipes and branches smaller than 15 inches in diameter shall be sealed with stoppers, plugs, or caps, cemented into place in an acceptable manner using a rubber gasket between the stopper and socket. All openings to the pipeline shall be satisfactorily protected from the entrance of earth, water or other material. If a temporary bulkhead is constructed to prevent sewage from backing into the trench excavation

or to prevent foreign material from entering the sewer from the new sewer trench, the contractor shall be responsible for reconstructing, repairing, or replacing those portions of the existing sewers removed or damaged by his operations. Existing bulkheads shall be removed as indicated by the drawings or set forth in the proposal, but not until directed by the Engineer.

3.2 REHABILITATION

A. Preparation
   1. Prior to the application or installation of a coating or lining system, the manhole surfaces shall be cleaned and prepared to produce a uniform, sound, clean and neutralized surface suitable for installation or application of the specified system, and to promote adhesion to the manhole surfaces when required.
   2. Before starting cleaning or preparation work, install a perforated device, catch bucket, or other straining device to prevent construction debris from entering downstream pipes.
   3. Standard Portland cement - concrete (not quick setting high strength cement) must cure a minimum of 28 days prior to application of the coating product(s), unless otherwise approved by the Owner.
   4. Clean interior surfaces of manhole to produce a uniform, sound, clean and neutralized surface suitable for installation or application of the specified SYSTEMS, and to promote adhesion to the manhole surfaces when required for performance of the SYSTEMS being installed.

B. Sealing Active Infiltration
   1. Hand apply hydraulic water plug or chemical grout designed to instantly stop running water or seepage in concrete structures. The applicator shall apply material in accordance with manufacturer's recommendations in accordance with the following minimum specifications:
      a. The area to be repaired must be clean and free of debris.
      b. Once cleaned, prepare crack or hole by chipping out loose material to a minimum depth recommended.
      c. As recommended by the manufacturer, place a generous amount of the hydraulic water plug material to the active leak, with a smooth fast motion, maintaining external pressure as recommended by the manufacturer, repeat until leak is stopped.
      d. Proper application should not require special mixing of product or special curing requirements after application.
      e. Oil-free oakum water plugs are made by saturating oakum with chemical grouts following approved submittals and using additives as required. Place and cure following manufacturer's recommendations.
      f. Injection grouting shall consist of the injection of chemical grouts following approved submittals to stop active infiltration installed in accordance with ASTM F2414.
   2. Installation
      a. Excavate around the manhole as necessary to prevent soil and debris from falling into manhole while frame and grade rings are removed. Set aside frame and cover for reuse in rehabilitated manhole.
      b. Cut the chip the concrete benches so that the insert will be evenly supported when lowered into place. Accurately locate incoming and outgoing sewer lines and cut the

insert for a close fit within 1 inch of both. Seal the cut edges with resin as recommended by the manufacturer.

c. Lower the insert into a 4-inch-deep layer of quick-setting polyurethane grout mixture, making sure that the sewer lines and insert openings align.
d. Place a 6-inch-deep layer of quick-setting grout at the bottom of the annular space between the insert and the wall.
e. Seal the sewer openings with Oakum soaked in sealing gel.
f. Fill the remaining annular space with polyurethane grout. Consolidate the grout without damage to the insert.
g. Install the grade rings, frame, and cover, sealing the surfaces between the reducer, the grade rings, and the frame.

3.3 TESTING

A. All sewer lines must be tested in accordance with 30 TAC §217.57. The Owner must retain copies of all test results which must be made available to the executive director upon request. The Owner must certify in writing that all wastewater lines have passed all required testing to the appropriate regional office within 30 days of test completion and prior to use of the new collection system.

1. For a collection system pipe that will transport wastewater by gravity flow, the design must specify an infiltration and exfiltration test or a low-pressure air test in accordance with ASTM F-1417.

a. Low Pressure Air Exfiltration Testing: The following materials will be furnished by the contractor and utilized for air testing sewer mains:

1) Compressor Air Supply: Any source which will provide at least three hundred (300) cubic feet per minute at one hundred (100) pounds per square inch. The compressor air supply shall be furnished by the contractor.

Plugs, valves, pressure gauges, air hose, connections and other equipment necessary to conduct the air test shall be furnished by the contractor. The test equipment for air testing will consist of valves, plugs, and pressure gauges used to control the rate at which air flows to the test section and to monitor the air pressure inside the plugs. Test equipment shall be assembled as follows:

a. hose connection
b. shut off valve
c. throttle valve
d. pressure reduction valve
e. gauge cock
f. monitoring pressure gauge

2) Test Procedures - The following procedures will be utilized for air testing sewer mains:

a. Apply air pressure until the pressure inside the pipe reaches 4 psig.

b. Allow the pressure inside the pipe to stabilize, then bleed back to 3.5 psig.

c. At 3.5 psig, the time, temperature and pressure will be observed and recorded. A minimum of five (5) readings will be required for each test. If the time in seconds for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than that shown in the following table, the pipe shall be presumed to be free from defect. When these rates are exceeded, pipe breakage, joint leakage, or leaking plugs are indicated and an inspection must be made to determine the cause. The contractor shall affect such repairs as may be required to accomplish a successful air test.

Table 1 Minimum Test Time for Various Pipe Sizes

Nominal Pipe Size, in.	T(time) min/100 ft.	Nominal Pipe Size, in.	T(time) min/100 ft.
3	0.2	21	3.0
4	0.3	24	3.6
6	0.7	27	4.2
8	1.2	30	4.8
10	1.5	33	5.4
12	1.8	36	6.0
15	2.1	39	6.6
18	2.4	42	7.3

b. Leakage Test - A leakage test may be requested by the Owner to determine excessive infiltration and to assure that the sewer section is substantially watertight. The Engineer may order the contractor to make leakage tests of as many sections as may be necessary to determine whether the work complies with the criteria for the rate of leakage. A section shall consist of a reach from one manhole to the next manhole provided the manholes are at least 300 feet apart and preferably 400 feet. Leakage tests shall be conducted, and measurements made, for a minimum of one hour. The tests may be conducted over a longer period with no reduction in the rate of leakage.

1) Leakage into Sewer - Leakage into the sewer including manholes, shall not exceed a rate of 50 gallons per 24 hours per inch diameter per mile of sewer. There shall be no gushing or spurting streams entering the sewer or manhole and where encountered they shall be repaired regardless of the rate of infiltration at no additional cost to Utility Owner. Where practicable, the tests for leakage into the sewers shall be made at a time when the groundwater level is at a maximum, but it must be at least one foot above the top of the pipe of the highest elevation in the section being tested.

2) Leakage out of Sewer - Where the groundwater level is less than one foot above the top of-the pipe and where conditions will permit, the sewers shall be subjected to an internal pressure by plugging the pipe at both ends and then

filling the sewer and manholes with clean water to a height above the top of the pipe sufficient to obtain satisfactory measurements to determine the rate of leakage, but no less than 2-feet above the top of the upstream pipe. The rate of leakage from the sewers will be determined by the amount of water volume lost during the testing period or by the volume of water needed to maintain the original water surface level. Leakage from the sewers under test shall not exceed a rate of 50 gallons per 24 hours per inch diameter per mile of sewer, except that an allowance of an additional 10 percent of gallonage shall be permitted for each additional 2 feet of head over a basic 2-foot minimum internal head.

3) Requirements of the Contractor - The contractor shall construct such weirs or other means of measurements as may be required, shall furnish water and shall do all necessary pumping to enable the tests to be properly made. When a leakage test fails, the contractor shall do such other work as may be necessary until the rate of leakage meets the above requirements, as determined by additional leakage tests.

c. Deflection Testing for Gravity PVC Sewer Lines

1) No sooner than 30 days, nor later than 12 months after the pipe has been installed and backfilling has been completed, tests for deflection will be made. A deflection of more than 5 percent of the inside diameter of the pipe shall be cause for rejection, and the line will be removed and replaced at the contractor's expense. A GO-NO-GO Deflection Testing Mandrel, to be furnished by the contractor, and certified by the Owner and Engineer, shall be used. The testing shall consist of the following:

a. Completely flush the line, if required, making sure the pipe is clean of any mud or debris that would hinder the passage of the mandrel.

b. During the final flushing of the line, attach a floating block or ball to the end of the mandrel pull rope and float the rope through the line.

c. After the rope is threaded through the line, connect the pull rope to the mandrel and place the mandrel in the entrance of the rope.

d. Connect a retrieval rope to the back of the mandrel to pull it back if necessary.

e. Remove all slack in the pull rope and place a tape marker on the rope at the ends of the pipe where the mandrel will exit, determining the location of the mandrel in the line.

f. Using manhole guide pulleys, draw mandrel through the sewer line, if any irregularity of pipe deformation exceeding the allowable 5 percent is encountered in the line, the line shall be uncovered at the point.

g. If an obstructed or over-deflected section is found, locate it; uncover pipe; inspect the pipe; if any damaged pipe is found, replace it. Backfill as per design plans.

h. Re-test this entire section for deflection.

i. Any pipe removed shall be replaced by use of gasketed repair couplings. Every deflection test shall be conducted in the presence of the Owner's or Engineer's representative.

2) The Contractor shall furnish all labor and material required to clean and flush and complete all testing required by this specification in accordance with Section f, below. The Owner, at their discretion, may televise the sewer lines. The Contractor shall furnish and install all required traffic control methods, as per TMUTCD, needed for the Owner to conduct the televising of the Work. If there is an insufficient roadway within the project area, the contractor will furnish the equipment necessary to gain full access to the site.

d. Manhole Leakage Testing

1) After completion of manhole construction, wall sealing, or rehabilitation, but prior to backfilling, test manholes for water tightness using hydrostatic or vacuum testing procedures. Manholes shall be tested after installation with all connections (existing and/or proposed) in place. Final acceptance in accordance with the requirements of this specification will consist of vacuum testing of the completed and installed manhole in place to include manhole/adjustment rings and manhole casting. The Contractor shall furnish all labor and material required to complete all testing required by this specification.

a. Vacuum Testing: Vacuum testing shall be performed as follows:

1. Plug influent and effluent lines, including service lines, with suitably sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test; follow manufacturer’s safety and installation recommendations. Place plugs a minimum of 6 inches outside of manhole walls. Brace inverts to prevent lines from being dislodged if lines entering manhole have not been backfilled. Install vacuum tester head assembly at top access point of manhole and adjust proper seal on straight top section of manhole structure. Following manufacturer’s instructions and safety precautions, inflate sealing element to the recommended maximum inflation pressure; do not overinflate.

2. Evacuate manhole with vacuum pump to 10 inches mercury (Hg), disconnect pump, and monitor vacuum for two minutes.

3. If the vacuum pressure drop exceeds 1-inch Hg over a two-minute time period, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

4. MATERIALS - Test equipment shall be assembled as follows:

   ii. Engine
   iii. Vacuum Pump
   iv. Hose
   v. Test Head Device capable of sealing opening in manhole casting as required.

   vi. Pneumatic test plugs – These plugs shall have a sealing length equal to or greater that the diameter of the connecting pipe to be sealed.
   vii. monitoring pressure gauge (rotameter)

b. Hydrostatic Exfiltration Testing: Hydrostatic exfiltration testing shall be performed as follows:

   1. Seal wastewater lines coming into the manhole with an internal pipe plug. Then, fill the manhole with water and maintain it full for at least one hour.

   2. The maximum leakage for hydrostatic testing shall be 0.025 gallons per foot of manhole diameter per foot of manhole depth per hour.

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

c. All testing shall be done by the contractor and witnessed by the Owner. All manholes and structures shall be tested as finished and completed for final acceptance.

   Any defective work or materials shall be corrected or replaced by the contractor and retested. This shall be repeated until all work and materials are acceptable.

e. Force Main Hydrostatic Testing

   1) After the pipe and appurtenance have been installed, test line and drain. Prevent damage to the Work or adjacent areas. Use clean water to perform tests.

   2) The Owner may direct tests of relatively short sections of completed lines to minimize traffic problems or potential public hazards.

   3) Test pipe in the presence of the Owner.

4) Test pressures shall be at the normal operating pressure of the force main plus 50 psi. Normal operating pressure of the force main shall be the rated total dynamic head with all lift station pumps operating.

5) Test pipe at the required pressure for a minimum of 4 hours according to requirements TCEQ Chapter 217.68 requirements.

6) Maximum allowable leakage shall be as calculated by the following formula:

$$L = (S)\ (D)\ (P^{0.5}) / 155{,}400$$

Where:

L = Acceptable Leakage (gallons/hour/1,000-feet of pipe, based on a leakage rate of 10 gallons per inch of diameter per mile of pipe per day).
S = Length of pipe (feet).
D = Inside diameter of pipe (inches).
P = Pressure (pounds/square inch).

7) Correct defects, cracks, or leakage by replacement of defective items or by repairs as approved by the Utility Owner.

8) Plug openings in the force main after testing and flushing. Use cast iron plugs or blind flanges to prevent debris from entering the tested pipeline.

f. Sanitary Sewer Television Inspection

The Owner, at their discretion, may televise the sewer lines to determine all sources and conditions of the leakage. The Owner will provide all personnel and televising equipment for the test.

1) After construction of the sanitary sewer main and prior to placement of the final course of asphalt, the newly constructed sanitary sewer shall be televised immediately upon cleaning. Any abnormalities such as, but not limited to, misaligned joints, cracked/defected pipe, rolled gaskets, shall be repaired by the contractor at his expense. Sections requiring repair shall be re-televised to verify condition of repair. No additional compensation shall be provided for repair or re-televising.

2) If necessary, the Contractor shall perform bypass pumping operations in accordance with all other specification requirements and as outlined below.

a. The Contractor shall furnish all labor, supervision, tools, equipment, appliances, and materials to perform all operations in connection with bypass pumping of sewage flow for the purpose of preventing interference with the televising of the sanitary sewer manholes and mainlines as well as providing reliable sewer service to the occupants of the buildings being served.

b. The Contractor will be required to provide adequate pumping equipment and force mains in order to maintain reliable sanitary sewer service in all sanitary sewer lines involved in this project. The Contractor shall notify the Owner should a surcharge occur during the televising process which results in overflows of sewage. In case of bypass equipment failure, the Contractor shall discontinue work and release sewer flows until such time as equipment failure is corrected.

c. The location of the pump(s), force main(s), and discharge points shall be approved by the Owner. Under no circumstances shall the flow be interrupted or stopped, such that damage is done to either private or public property, or sewage flows or overflows into a storm sewer or natural waterway.

d. The Contractor shall provide bypass pumping of sewage around each segment(s) of pipe that is to be televised and shall be responsible for all required bulkheads, pumps, equipment, piping, and other related appurtenances to accomplish the sequence of pumping. A qualified person shall man the pumps, on-site, at all times during the bypassing procedure.

e. All piping, joints, and accessories shall be designed to withstand the maximum bypass system pressure, or a minimum of 50 psi, whichever is greater. During bypass pumping, no sewage shall be leaked, dumped, or spilled into or onto any area outside of the existing sanitary sewer system. When bypass pumping operations are complete, all piping shall be drained into the sanitary sewer prior to disassembly.

f. The Contractor shall demonstrate that the pumping system is in good working order and can successfully handle flows during cleaning and televising operations, prior to commencing with the cleaning and televising of the system.

g. The Contractor shall be required to have all materials, equipment, and labor necessary to complete the repair or replacement on the jobsite prior to isolating the sewer manhole or line segment and beginning bypass pumping operations.

h. The Contractor shall plug off and pump down the sewer manhole and/or line segment in the immediate work area and shall maintain the sanitary sewer system so that surcharging does not occur. The Contractor shall coordinate with all property owners to ensure that no damage will be caused to their property during any and all sewer televising work. The Contractor shall complete the televising as quickly as possible and shall satisfactorily meet all requirements prior to discontinuing bypass pumping operations and returning flow to the sewer manhole or line segment. The Contractor shall ensure that no damage will be caused to private property as a result of bypass pumping operations. Ingress and egress to adjacent properties shall always be maintained. Ramps, steel plates, or other methods shall be employed by the Contractor to facilitate traffic over surface piping.

i. If sewage accidentally drains into the drainage system or is spilled within the project, the Contractor shall immediately stop the overflow, notify the Owner, and take the necessary action to clean up and disinfect the spillage using an HTH, or equal, chemical.
j. Traffic management shall be done under the approval of respective City, County, or State Traffic Departments. The Contractor shall not open cut existing streets to accommodate bypass pumping piping unless specific written approval is given.

g. Pigging Test

1) After completion of hydrostatic testing and prior to final acceptance, test force mains longer than 200 feet by pigging to ensure piping is free of obstructions.

2) Pigs: Provide proving pigs manufactured of an open-cell polyurethane foam body, without any coating or abrasives which would scratch or otherwise damage interior pipe wall surface or lining. Pigs shall be able to pass through reductions of up to 65 percent of the nominal cross-sectional area of the pipe. Pigs shall be able to pass through standard fittings such as 45-degree and 90-degree elbows, crosses, tees, wyes, gate valves, or plug valves, as applicable to the force main being tested.

3) Test Execution: Pigging test shall be conducted in the presence of the Utility Owner. Provide at least 48-hour notice of scheduled pigging of the force main prior to commencing the test.

END OF SECTION

PAGE INTENTIONALLY LEFT BLANK