

**ADDENDUM NO. 2**

**FOR BID DOCUMENTS, SPECIFICATIONS AND PLANS  
FOR CONSTRUCTION OF**

**LAGUNA MADRE WATER DISTRICT  
PROPOSED SANITARY SEWER, WATER AND PAVING IMPROVEMENTS  
FOR LONG ISLAND VILLAGE SEASIDE LIVING COMMUNITY  
BID No. LIV -24-05-01**

May 13, 2024

TO: PROSPECTIVE BIDDERS

This Addendum shall become an integral part of the Bidding Documents and shall be reflected in the bids submitted. Acknowledge receipt of this Addendum by indicating such in Bid Form. **FAILARE TO DO SO MAY SUBJECT BIDDER TO DISQUALIFICATION.**

1. Changes to Contract Documents
  - a. Front End Documents - Specifications
    - i. Changes (highlight yellow) Section - 330576 Fiberglass Manholes and Manhole Frame and Cover - Invert Stub-outs pipe shall be I.P.S. Pressure 160 psi Ring-Tite Joints SDR 26. - Attached
    - ii. Changes (highlight yellow) Section - 333111 Public Sanitary Sewerage Gravity Piping - Pipe shall be I.P.S. Pressure 160 psi Ring-Tite Joints SDR 26. -Attached
    - iii. Section 331413 - Public Water Utility Distribution Piping - Meters shall be provided to contractor by Laguna Madre Water District. **Installation** of Meter shall be by contractor according to Item 53 - Waterline Service Connection to Water Meter & 2" PVC Casing (Long Side) and Item 54 - Waterline Service connection to Water Meter (Short Side) of **Bid Proposal**.
    - iv. Section 333213 - Packaged Wastewater Pumping Stations - System Curves for Lift Station No. 1 and Master Lift Station are provided. Attached
2. Questions
  - a. May a submersible pump package be a substitution for both lift stations? **No**, both lift stations shall be constructed according to specifications and plans.

*William F. Ueckert Jr.*



May 13, 2024

**SECTION 330576 - FIBERGLASS MANHOLES AND MANHOLE FRAME AND COVER**

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

1. Fiberglass manholes.
2. Frames and covers.
3. Fiberglass Manhole Inserts (Liners)

## B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for manhole base pad.
2. Section 330505.33 "Infiltration and Exfiltration Testing" and Section 330505.36 "Vacuum Testing" for testing requirements for manholes.
3. Section 333111 "Public Sanitary Sewerage Gravity Piping" for piping connections to manholes.

## 1.2 REFERENCE STANDARDS

## A. Manholes

1. Fiberglass manholes shall be fabricated in accordance with ASTM D3753- "Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wetwells," latest edition, and the referenced design criteria as follows:
  - a. ASTM C581 Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass-Fiber-Reinforced Structures Intended for Liquid Service
  - b. ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics
  - c. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
  - d. ASTM D2412 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
  - e. ASTM D2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
  - f. ASTM D2584 Standard Test Method for Ignition Loss of Cured Reinforced Resins
  - g. ASTM D3034 Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
  - h. ASTM F794 Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
  - i. AASHTO M-306, H-25

## B. Manhole frame and cover

1. Manhole Frame and Cover shall be constructed with a polymer matrix, non-metallic, fiber reinforced, composite, manhole cover; capable of withstanding traffic loading requirements that meet or exceed H-20 & H-25 rating. Manhole Frame and Cover shall offer the following features such as: self-aligning design, anti-rotating construction, secure bolting into manhole, and compatibility with inner dish for maximum inflow and SSO prevention.
  - a. AASHTO M306-10 Proof Load Proof Load Testing HS-25
  - b. ASTM C 1028-07 e1 Static Coefficient of Friction
  - c. ASTM D 790-17 Flexure Testing
  - d. ASTM D 790-17 Flexure Testing After UV Exposure
  - e. ASTM D 256-10 Izod Pendulum Impact
  - f. ASTM D 635-18 Burning Rate
  - g. ASTM D 4060-14 Taber Abrasion (10,000 Cycles)
  - h. ASTM D 570-98 Water Absorption
  - i. ASTM G 154-16 UV (1,000 Hours)
  - j.

### 1.3 DEFINITIONS

- A. Bedding: Specialized material placed under manhole prior to installation and subsequent backfill operations.

### 1.4 UNIT PRICES

- A. Fiberglass Manhole:
  1. Basis of Measurement: By **Each**.
  2. Basis of Payment: Includes excavation, bedding, manhole, backfill, concrete, anchor, cover frame and cover, to indicated unit depth (~~<Insert> m~~), and forming and sealing pipe of inlets and outlets.
- B. Fiberglass Manhole Inserts (Liners):
  1. Basis of Measurement: By **Each**.
  2. Basis of Payment: Includes installation of the insert, cover frame and cover, to indicated unit depth (~~<Insert> m~~), and forming and sealing pipe of inlets and outlets.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Handling: Comply with manhole manufacturer instructions for unloading, and moving precast manholes and drainage structures.
- C. Storage:
  1. Store materials according to manufacturer instructions.

2. Store manholes to prevent damage to Owner's property or other public or private property.
3. Repair property damaged from materials storage.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Take precautions to prevent damage to interior or exterior surfaces when handling.
3. Provide additional protection according to manufacturer instructions.

## 1.6 WARRANTY

- A. Furnish one- year manufacturer's warranty for fiberglass manholes.

## PART 2 - PRODUCTS

### 2.1 SUBMITTALS

- A. Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications.
1. Contractor to submit cut sheets prior to commencement of work.
  2. Submit proposed methods, equipment, materials and sequence of operations for water construction.
  3. Submit plan operations so as to minimize disruption of utilities to occupied facilities or adjacent property.
  4. Submit all test reports.

### 2.2 MATERIAL REQUIREMENTS

- A. Fiberglass Manhole
1. Fiberglass reinforced polyester manhole shall be manufactured from commercial grade polyester resin or other suitable polyester or vinyl ester resins with fiberglass reinforcements. Manhole shall be a one piece unit manufactured to meet or exceed all specifications of ASTM D-3753 latest edition.
  2. The resins used shall be a commercial grade unsaturated polyester resin or other suitable polyester or vinyl ester resin.
  3. 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.
  4. The complete manhole 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 inch at the point of load application when loaded to 24,000 lbs.

5. The manhole cylinder shall have the minimum pipe-stiffness values shown in the table below when tested in accordance with A.S.T.M. 3753 8.5 (note 1).

Length - Feet	F/AY - PSI
3-6.5	0.75
7-12.5	1.26
13-20.5	2.01
21-25.5	3.02
26-35	5.24

6. The fiberglass manhole shall have the following physical properties:

	<u>Hoop Direction</u>	<u>Axial Direction</u>
Tensile Strength (psi)	18,000	5,000
Tensile Modules (psi)	0.6 x 10 <sup>6</sup>	0.6 x 10 <sup>6</sup>
Flexural Strength (psi)	26,000	4,500
Flexural Strength (psi)	1.4 x 10 <sup>6</sup>	0.7 X 10 <sup>6</sup>
Compressive (PSI)	18,000	5,000

7. 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 system.

**B. Manhole frame and cover**

1. Manhole frame and cover shall be produced using Sheet Molding.
2. Manhole frame and cover shall be a non-metallic unique composition of fiber reinforced to ensure maximum strength and durability.
3. The manhole frame and cover shall have the following physical properties:
 

ASTM D790-17 Flexure Strength Cover	20,393 psi
ASTM D790-17 Flexure Strength Retention After UV Exposure Cover	
Pass >85% Retention	
ASTM D790-17 Flexure Strength Frame	19,728 psi
ASTM D790-17 Flexure Strength Retention After UV Exposure Cover	
Pass >85% Retention	
ASTM C1028-07e1 Static Coefficient of friction	0.674
ASTM D256-10 Izod Impact Testing	1,473 J/m
ASTM D635-18 Rate of Burning in Horizontal	Pass Self Extinguish
ASTM D4060-14 Taber Abrasion Testing 10,000 cycles Cover	60.2 mg
ASTM D4060-14 Taber Abrasion Testing 10,000 Cycles Frame	72.3 mg
ASTM C501-84 Wear & Abrasion Testing 1,000 cycles Cover	Pass <300
ASTM C501-84 Wear & Abrasion Testing 1,000 cycles Frame	Pass <300
ASTM D570-98 Water Absorption	0.37%
ASTM G154-16 UV Testing Cover & Frame 1,000 Hours	No deformation
AASHTO Proof Load Testing 40,000 lbs.	Pass No crack
AASHTO Proof Load Testing 50,000 lbs.	Pass No crack
Leak Test 24-Hrs	0.0

**2.3 MANUFACTURING REQUIREMENTS**

**A. Fiberglass Manhole**

1. Dimensions: The manhole shall be a circular cylinder, reduced at the top to a circular manway not smaller than 22 1/2" inside diameter. Manholes shall be produced in half-foot increments in length +/- 2". Nominal inside diameters shall be 42", 48", 54", 60", 66", and 72". Tolerance on the inside diameter shall be +/- 1%. Other diameters as agreed upon between purchaser and the manufacturer are covered by this specification..
  2. Configurations: 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 concentric and 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.
  3. Manway reducer cone section shall be self-centering to permit vertical height adjustment (raising or lowering) of manhole by contractor utilizing manufacturer provided materials and detailed written instructions.
  4. Class: 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).
  5. Stubouts and Connections: Stubouts shall be installed. Installation of SDR, PVC, or 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.
  6. Manhole Bottom: Resin and glass fiber reinforced manhole bottoms shall be provided. Manholes shall be provided with glass reinforced bottom section designed to withstand the hydrostatic head pressure, empty and water to grade. Fiberglass ribs or fiberglass structural members shall be utilized to meet the design criteria. Stiffeners shall be of non-corrosive materials encapsulated in fiberglass. FRP encapsulated wood or lumber will not be permitted. Bottom sections shall be furnished with an integral 3" wide anchoring flange. Invert and bench shall be factory installed utilizing non-corrosive materials encapsulated in fiberglass minimum 1/4" thick.
  7. Pipe invert stubouts shall be I.P.S. Pressure 160 psi Ring-Tite Joints SDR 26. **No adapters shall be allowed.**
  8. Fiberglass manholes 48" and 60" diameter shall have a minimum wall thickness of 0.5 inches.
- B. Manhole frame and cover
1. Manhole frame and cover shall be produced using Sheet Molding.
  2. Manhole frame and cover shall be a non-metallic unique composition of fiber reinforced to ensure maximum strength and durability.
  3. Frame and cover shall be comprised of non-metallic materials. The composite shall not consist of metallic components imbedded in the polymer matrix and there should be no structural materials made of metal inside the body of the frame or the cover. Materials used to produce a composite manhole frame and cover shall be thermosetting resins, fibers, plastics, recycled plastics, and/or additives that enhance physical properties such as UV, strength, impact resistance, and durability. The frame and cover should be a solid, uniformed, non-porous, capable of withstanding the conditions and corrosive environment found in sanitary sewer and heavy traffic loading.
  4. Frame and cover must have two gaskets, one gasket sealing the cover to the manhole, and one gasket that seals the insert dish to the frame to prevent water from leaking through the ring and cover.
  5. Frame and cover shall have anti-rotation alignment tabs. These tabs allow the user to align the bolt holes uniformly so that they may tighten the securing bolts properly without damage and able to prevent free rotation of cover.

6. Frame and cover must include inner dish for double barrier protection from inflow and SSOs. Inner dish must be supplied by same manufacturer as composite frame and cover. Inner dish shall be constructed of non-metallic structural components and same rigid composite material as frame and cover. Inner dish shall be bolted down to frame with independent gasket and seal connected to the ring and must be bolted and fixed to inner diameter of ring.
7. Bolt and nut threading must be able to be removed and replaced in the event of threading becoming damaged. There shall be four (4) 316 SS 1/2" Bolts and 316 SS Pick Hole on the cover.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine areas for suitable conditions where fiberglass manholes will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Mark each manhole with waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- B. Coordinate placement of inlet and outlet pipe as required by other Sections.
- C. Do not install manholes where Site conditions induce loads exceeding structural capacity of manholes or structures.
- D. Inspect manholes immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

#### 3.3 INSTALLATION

- A. Excavation for manholes shall be made with vertical sides and minimum dimensions permitting construction of the manhole in accordance with the attached Standard Details. Manholes are to be built to an elevation not less than that of the existing ground surface, or as shown on the drawings.

END OF SECTION 330576

## SECTION 333111 - PUBLIC SANITARY SEWERAGE GRAVITY PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Related Requirements:

1. Section 330505.33 "Infiltration and Exfiltration Testing" for infiltration testing of gravity-flow sewerage piping.
2. Section 330505.43 "Mandrel Testing" for deflection testing of plastic sewerage piping.
3. Section 330576 "Fiberglass Manholes" for manholes for sanitary sewerage piping.

#### 1.2 DEFINITIONS

- ##### A. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.

#### 1.3 REFERENCE STANDARDS

- ##### A. The publications listed below form a part of this specifications to the extent referenced.

1. Texas Commission of Environmental Quality
  - a. Chapter 217
2. ASTM D 1784 Standard Specifications for Rigid PVC Compounds and Chlorinated PVC Compounds
3. ASTM D 3034 Standard Specifications for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe Fittings
4. ASTM 3212 Standard Specifications for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
5. ASTM 3139 Standard Specifications for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals
6. ASTM 477 Standard Specifications for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
7. ASTM D 2122 – Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.
8. ASTM D 2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
9. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

#### 1.4 UNIT PRICES

##### A. Pipe and Fittings:

1. Basis of Measurement: By **Linear Foot**.



2. Measurement shall be from center of manhole to center of manhole or end of main.
3. Basis of Payment: Includes excavation, bedding, backfill, installation of pipe and fittings, to indicated depth.
4. Pipe shall be I.P.S. Pressure 160 psi Ring-Tite Joints SDR 26.
5. Pipe shall be color **GREEN**.

B. Sanitary Sewer Service Connection:

1. Basis of Measurement: By **Each**.
2. Basis of Payment: Includes excavation and backfill; installation of wyle to main, installation of pipe from wyle to cleanout on street right of way.
3. Pipe shall be color **GREEN**.

## 1.5 COORDINATION

- A. Coordinate Work of this Section with Texas Commission of Environmental Quality - Chapter 217.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Storage:
1. Store materials according to manufacturer instructions.
  2. Store valves in shipping containers with labeling in place.
- C. Protection:
1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  2. Block individual and stockpiled pipe lengths to prevent moving.
  3. Provide additional protection according to manufacturer instructions.

## PART 2 - PRODUCTS

### 2.1 SANITARY SEWER PIPE

A. Material

1. Nominal outside diameters and wall thickness shall conform to the requirements of ASTM D 3034. Integral bell joint pipe shall have a single rubber gasket conforming to ASTM F477 and shall be Pipe shall be I.P.S. Pressure 160 psi Ring-Tite Joints SDR 26. Pipe shall be furnished in standard lengths of 20 feet.
2. Pipe shall be legibly and permanently marked in ink with the following minimum information:
  - Manufacturer's name or trademark and production code
  - Nominal size (for example, 8")
  - PVC Cell classification 12454

- The legend “I.P.S. Pressure 160 psi SDR 26” “ASTM  
3. D 3034” Pipe color shall be **GREEN**.

## 2.2 PERFORMANCE REQUIREMENTS

### A. Perform Work according to:

1. Texas Commission of Environmental Quality Chapter 217.

## 2.3 SUBMITTALS

- ### A. Contractor shall submit manufacturer’s product data, instructions, recommendations, shop drawings, and certifications.
1. Contractor to submit cut sheets prior to commencement of work.
  2. Submit proposed methods, equipment, materials and sequence of operations for sewer construction.
  3. Submit plan operations so as to minimize disruption of utilities to occupied facilities or adjacent property.
  4. Submit all test reports and pre and post sewer television inspection video. .

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- ### A. Examine substrates, areas, and conditions, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- ### B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- ### A. Correct over-excavation with fine aggregate.
- ### B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- ### C. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
- ### D. Protect and support existing sewer lines, utilities, and appurtenances.
- ### E. Utilities:
1. Maintain profiles of utilities.
  2. Coordinate with other utilities to eliminate interference.
  3. Notify Engineer if crossing conflicts occur.

### 3.3 INSTALLATION OF PIPING

#### A. Piping:

1. Install pipe, fittings, and accessories according to [ASTM D2321], and seal joints watertight.
2. Lay pipe to slope gradients as indicated on Drawings.
3. Begin at downstream end of system and progress upstream.
4. Lay bell-and-spigot pipe with bells upstream.
5. PE Pipe Encasement: Comply with AWWA C105, Method [A] [B].
6. Do not displace or damage pipe when compacting.
7. Maintain 9 feet of horizontal separation between water main and sewer piping according to TCEQ Publication RG-195 Section 290.44 (e)(1). All separation distances shall be measured from outside surface of each of the respective pieces.
8. Location of waterlines: The following rules apply to installations of waterlines, wastewater mains or laterals, and other conveyances/appurtenances identified as potential sources of contamination. Furthermore, all ratings specified shall be defined by ASTM or AWWA standards unless stated otherwise. New mains, service lines, or laterals are those that are installed where no main, service line, or lateral previously existed, or where existing mains, service lines, or laterals are replaced with pipes of different size or material.
  - a. When new potable water distribution lines are constructed, they shall be installed no closer than nine feet in all directions to wastewater collection facilities. All separation distances shall be measured from the outside surface of each of the respective pieces.
  - b. Potable water distribution lines and wastewater mains or laterals that form parallel utility lines shall be installed in separate trenches.
  - c. No physical connection shall be made between a drinking water supply and a sewer line. Any appurtenance shall be designed and constructed so as to prevent any possibility of sewage entering the drinking water system.
9. Where the nine-foot separation distance cannot be achieved, the following criteria shall apply.
  - a. New waterline installation - parallel lines.
    - 1) 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.

- 2) 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.
  - 3) 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.
- b. New waterline installation - crossing lines.
- 1) Where a new potable waterline crosses above a wastewater main or lateral, the segment of the waterline pipe shall be centered over and must be perpendicular to 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. When crossing an existing wastewater main or lateral and it is disturbed or shows signs of leaking, the wastewater main or lateral shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure-rated pipe embedded in cement stabilized sand (see clause (v) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.
  - 2) The potable waterline shall be at least two feet above an existing, non-pressure rated wastewater main or lateral.
  - 3) The potable waterline shall be at least six inches above an existing, pressure-rated wastewater main or lateral.
  - 4) Where a new potable waterline crosses a new, non- pressure rated wastewater main or lateral, the segment of the waterline pipe shall be centered over and shall be perpendicular to 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. The materials and method of installation shall conform to one of the following options:

- 5) 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. 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.
- 6) When a new waterline crosses under a wastewater main or lateral, the waterline shall be encased as described for wastewater mains or laterals constructed of ductile iron or steel pipe with mechanical or welded joints as appropriate. An absolute minimum separation distance of one foot between the waterline and the wastewater main or lateral shall be provided. When a new waterline crosses under a wastewater main, the procedures must be followed.
- 7) Where a new potable waterline crosses a new, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over and shall be perpendicular to the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the center line 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. The wastewater pipe shall have a minimum pressure rating of at least 150 psi. 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.
- 8) Where cement stabilized sand bedding is required, the cement stabilized sand shall have a minimum of 10% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 2.5 bags of cement per cubic yard of mixture). The cement stabilized sand bedding shall be a minimum of six inches above and four inches below the wastewater main or lateral. The use of brown coloring in cement stabilized sand for wastewater main or lateral bedding is recommended for the identification of pressure rated wastewater mains during future construction.

- 9) Waterline and wastewater main manhole or lateral manhole or cleanout separation. The separation distance from a potable waterline to a wastewater main manhole or lateral manhole or cleanout shall be a minimum of nine feet. Where the nine-foot separation distance cannot be achieved, the potable waterline shall be encased in a joint of at least 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five-foot intervals with spacers or be filled to the springline with washed sand. The encasement pipe shall be centered on the crossing and both ends sealed with cement grout or manufactured sealant.
- 10) Location of fire hydrants. Fire hydrants shall not be installed within nine feet vertically or horizontally of any wastewater main, wastewater lateral, or wastewater service line regardless of construction.

B. Wye Branches and Tees:

1. Concurrent with pipe-laying operations, install wye branches and pipe tees at locations indicated on Drawings.
2. Use standard fittings of same material and joint type as sewer main (I.P.S. Pressure 160 psi SDR 26).
3. Maintain minimum 5-foot separation distance between wye connection and manhole. No service connection will be made directly to manhole.

C. Sanitary Sewer Service Connection:

1. Construct sanitary sewer service connection from wye branch to terminal point at street right-of-way.
2. Use standard fittings of same material and joint type as sewer main (I.P.S. Pressure 160 psi SDR 26).
3. Where depth of main pipeline warrants, construct riser-type laterals from wye branch.
4. Minimum Depth of Cover over Piping: 3 feet.
5. Minimum Separation Distance between Laterals: 5 feet.
6. Sanitary sewer service connection will commence at the wyle at the main to a tee with a cleanout at ground level with a plug. See plan detail.
7. Install watertight plug, braced to withstand pipeline test pressure thrust, at termination of lateral.

D. Excavation

1. The Engineer will review the submittal of the Contractor's proposed excavation shoring system to verify the general scope of the work, to determine that qualified professional engineering services are used and to determine that appropriate construction techniques are proposed for use. This review shall not, in any way, be construed to relieve the Contractor from sole responsibility for the design and safety of such shoring.
2. Trenching in paved areas shall be saw cut or scored and broken ahead of trenching operations, and shall be cut or trimmed to a neat edge after backfilling. Any pavement damaged outside of the cuts shall be saw cut and restored prior to final paving.

3. The Contractor shall do all excavation of whatever substance is encountered to the lines and grades shown on the plans. All material suitable for use as backfill shall be piled in an orderly manner at a sufficient distance from the edge of the trench to avoid overloading and to prevent sliding into the trench. The Contractor shall do such grading or work as is necessary to prevent surface water from entering the excavation. Storage of equipment or material on street right of way shall not be allowed after normal working hours.
4. All pipe materials and accessories shall be on site prior to excavation. Unless otherwise specifically approved by the Engineer, the length of open trench shall not exceed one hundred feet (100') ahead of pipe laying, and no excavated trench shall remain un-backfilled at end of day.
5. Trenches shall be excavated at least six inches (6") below the barrel of the pipe and the bottom re-filled with gravel bedding according to plan detail.
6. Trenches must be kept free from water by dewatering while the pipe or structures are being installed, concrete is setting, and until backfill has progressed to a sufficient height to anchor the work against possible flotation or leakage.
7. The Contractor shall do all excavation of whatever substance is encountered to the lines and grades shown on the plans. All material suitable for use as backfill shall be piled in an orderly manner at a sufficient distance from the edge of the trench to avoid overloading and to prevent sliding into the trench. The Contractor shall do such grading or work as is necessary to prevent surface water from entering the excavation. Storage of equipment or material on street right of way shall not be allowed after normal working hours.
8. Trench Safety Plan
  - a. For trenches and excavations five feet (5') or more in depth, the Contractor shall submit to the Engineer a detailed plan, and any revisions thereto, showing design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazards of caving ground.
  - b. Such plan shall be submitted at least ten (10) working days before the Contractor intends to begin trenching or do excavation work.
  - c. If such plan varies from the shoring system standards established by the OSHA, the plan shall be prepared, sealed and signed by a Civil or Structural Engineer registered in Texas. Signed and sealed copies of calculations necessary to qualify the system shall also be submitted.

E. Bedding

1. A filter fabric (M140N) or equal shall be placed around the perimeter of the trench below the gravel bedding to the springline of the pipe, according to plan detail.
2. Gravel bedding shall be six (6) inches in depth and shall be crushed stone per TxDOT ITEM 421, Grade 2, 3 or 4 according to plan detail.

F. Backfill

1. Initial backfill shall be select material (SC, GC, CL) with a Max LL=40, PI=7-18. This fill shall be placed from the top of the bedding to 12-inches above top of pipe.
2. Secondary backfill shall be On-Site soils free of roots, organics or other degradable/material. The material shall be placed in 8-inch loose lifts to achieve a compacted thickness of 6-inch to a 98% density.

**G. Testing**

1. Sanitary sewer systems, including main sewers and laterals, shall be tested for tightness, alignment, cleanliness, and compliance with these Standards after completion of all backfilling and prior to request for final inspection. Contractor shall notify the Engineer at least five (5) working days in advance of proposed testing dates. All testing shall be performed under the presence of the Engineer or Inspector.
2. The Contractor shall take all necessary precautions to prevent any joint from drawing ground water while the pipeline and its appurtenances are being tested. Contractor shall, at own expense, correct any excess leakage and repair any damage to the pipe, structures, and appurtenances resulting from or caused by this test. Where the actual leakage exceeds the allowable leakage, the Contractor shall discover the cause and remedy it before the test is accepted. If the leakage is less than that allowed and leaks are observed, such leaks shall be repaired at the Engineer's direction.
3. Gravity sanitary sewer system shall be tested by Low Pressure Air Testing according to Section 330505.33 "Infiltration and Exfiltration Testing.
4. Gravity sanitary sewer system shall not exceed a deflection of more than 5%. After pipe has been backfilled for at least 30 days, a mandrel test shall be performed according to Section 330505.43 "Mandrel Testing"

**3.4 TOLERANCES**

- A. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet.

**3.5 PROTECTION**

- A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
- B. Cap open ends of piping during periods of Work stoppage.

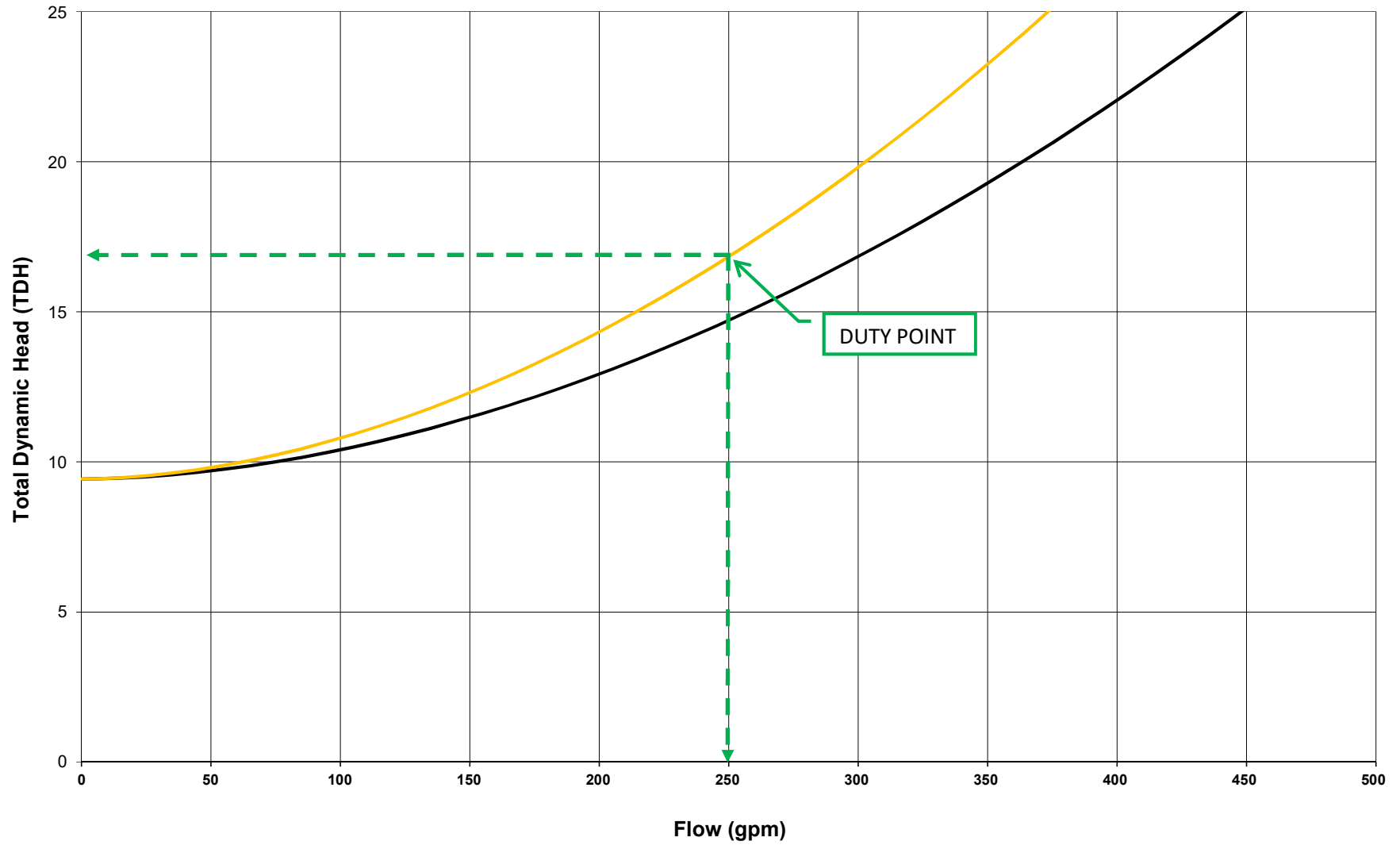
END OF SECTION 333111



### Lift Station No.1 - SYSTEM CURVE Submersible Pumps

— C Factor = 120

— C Factor = 100



# Master Lift Station SYSTEM CURVE

