

## NOTICE

(Bid # 2025-001)

Posted: 02/18/2025

The City of Mercedes is requesting sealed Bids from qualified individuals/firms to provide **Sanitary Sewer Expansion Services for Mile 2 E**. Qualified applicants are invited to submit qualifications and bids for the provision of these services. In order to be considered, bids must address each of the requests for information included in this document.

All addenda, notices, additional information, etc. will be posted on the City of Mercedes website at [www.cityofmercedes.com](http://www.cityofmercedes.com).

One (1) original copy of the bid and one (1) electronic copy must be sealed and returned to the City of Mercedes, City Hall, no later than **10:00 a.m. CST on Friday, March 7, 2025**, to the attention of:

City Manager  
Mercedes City Hall  
400 S. Ohio Ave.  
Mercedes, TX 78570

All bids must be clearly marked with **“Bid 2025-001 – Sanitary Sewer Expansion.”** Bidders are responsible for delivery of response by the date and time set for the closing of the bid acceptance. Responses received after the date and time set for the closing will not be considered.

The City of Mercedes reserves the right to reject any and all bids and waive informalities in bids received.

All inquiries concerning the Bids must be made in writing and addressed to the address or email address listed below, with e-mail being the preferred method.

City of Mercedes  
Joselynn Castillo  
City Secretary  
400 S. Ohio Ave.  
Mercedes, TX 78570  
Phone: 956-565-3114  
Email: [jcastillo@cityofmercedes.com](mailto:jcastillo@cityofmercedes.com)

Joselynn Castillo  
City Secretary

**Rio Delta Engineering**

Project Name: MILE 2 E SANITARY SEWER EXTENSION	BID FORM
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**SANITARY SEWER IMPROVEMENTS**

ITEM #	DESCRIPTION	QUANTITY	UNIT COST	AMOUNT
1	8" PVC SDR 26	1300 LF		
2	MANHOLE (18'-15')	3 EA		
3	TRENCH EXCAVATION PROTECTION	1300 LF		
4	TIE IN/ OPEN CUT PATCH & REPAIR	1 LS		
5	TRAFFIC CONTROL	1 LS		
6	DEWATERING	1 LS		

**BID GRAND -TOTAL:** \_\_\_\_\_

\_\_\_\_\_  
**CONTRACTOR AUTHORIZED SIGNATURE**

\*All prices quoted are to be complete, in place.

This work can be completed in \_\_\_\_\_  
calender days.

# **Technical Specifications**

## **SECTION 01568 – EROSION AND SEDIMENT CONTROL**

### **PART 1 – GENERAL**

#### **WORK INCLUDED**

Provide all equipment and materials, and do all work necessary to construct complete erosion and sediment control program for minimizing erosion and siltation during the construction phase of the project. The erosion and sediment control provisions specified herein are the minimum requirements for an erosion control program. The Contractor shall provide additional erosion and sediment control materials and methods as required to affect the erosion and siltation control principles specified herein.

#### **SUBMITTALS**

Proposed methods, materials to be employed, and schedule for effective erosion and siltation control as well as preventing erosion damage shall be submitted for approval. Submittals shall include:

Propose methods for effecting erosion and siltation control, including plans indicating location of erosion control devices and siltation basins.

List of proposed materials including manufacturer's product data.

Schedule of erosion control program indicating specific dates from implementing programs in each major area of work.

#### **EROSION CONTROL PRINCIPLES**

The following erosion control principles shall apply to the land grading and construction phases:

Stripping of vegetation, grading, or other soil disturbance shall be done in a manner, which will minimize soil erosion.

Whenever feasible, natural vegetation shall be retained and protected.

Extents of areas, which are exposed and free of vegetation and the duration of its exposure, shall be kept within practical limits.

Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbances.

Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.

Sediment shall be retained on-site.

Erosion control devices shall be installed as early as possible in the construction sequence prior to start of clearing and grubbing operations and excavation work. Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to six months, and temporary erosion protection when erosion exposure period is expected to be less than six months.

Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.

Temporary erosion protection shall be accomplished by covering with an erosion protection material, as appropriate for prevailing conditions.

## **PART 2 – PRODUCTS**

### **HAY BALES**

Hay bales for construction of erosion control devices shall be new, firm, wire or nylon-bound livestock feed-grade.

### **SILT FENCING**

Silt fencing for construction of erosion control devices shall be new and un-used. Silt fencing shall be as approved by the Engineer.

## **PART 3 – EXECUTION**

### **HAY BALE CHECK DAM**

Hay bale check dam shall be constructed and installed at surface runoff discharge points from the major work areas before start of clearing and grubbing.

### **HAY BALE CATCH BASIN FILTER**

Catch basin filters shall be placed at all inlets to drainage structures as structures are installed. Outlet protection work shall be constructed before runoff is allowed to enter

the drainage system. Construction and location of catch basins filters shall be as those areas affected by surface runoff from the area of construction. Existing catch basins will be protected from sediment.

## MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES

Watercourses and drainage swales adjacent to construction activities shall be monitored twice each month for evidence of silt intrusion and other adverse environmental impacts, which shall be corrected immediately upon discovery.

Culverts, drainage ditches and storm sewer pipes shall be kept clean and clear of obstructions during construction.

## EROSION CONTROL DEVICES

Sediment behind the erosion control device shall be checked twice a month and after each heavy rain. Silt shall be removed if greater than six (6) inches deep.

Conditions of erosion control devices shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.

Hay bales shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of bales shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath bales.

Silt fences shall be maintained plumb and anchored to the ground without any major tears in material that will allow sediment to be released. Any torn or destroyed silt fence shall be replaced. Silt fence shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath the silt fence.

Sediment deposits shall be disposed of properly, in a location and manner which will not cause sediment nuisance elsewhere.

## REMOVAL OF EROSION CONTROL DEVICES

Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be regraded.

Erosion protection material shall be kept securely anchored until acceptance of completed entire project.

## PAYMENT

Erosion and sediment control shall be incidental and subsidiary to bid items identified in proposal form.

## **SECTION 01570 – TRAFFIC REGULATION**

### **PART 1 - GENERAL**

#### SECTION INCLUDES:

Construction parking control

Flag persons

Flares and lights

Haul routes

Traffic signs and signals

Removal

### **PART 2 - PRODUCTS**

#### SIGNS, SIGNALS, AND DEVICES

Post Mounted and Wall Mounted Traffic Control and Informational Signs

Traffic Control Signals: As approved by local jurisdictions.

Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

Flagman Equipment: As required by local jurisdictions.

### **PART 3 – EXECUTION**

#### CONSTRUCTION PARKING CONTROL

Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

Monitor parking of construction personnel's vehicles [in existing facilities]. Maintain vehicular access to and through parking areas.

Prevent parking on or adjacent to access roads or in non-designated areas.



## FLAG PERSONS

Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

## FLARES AND LIGHTS

Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

## HAUL ROUTES

Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

## TRAFFIC SIGNS AND SIGNALS

At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.

Relocate as Work progresses, to maintain effective traffic control.

## REMOVAL

Remove equipment and devices when no longer required.

Repair damage caused by installation.

Remove post settings to a depth of 2 feet.

**SECTION 02080**

**ADJUSTING MANHOLES CLEANOUTS, INLET, & WATER  
VALVE RISERS**

**PART 1 - GENERAL**

1.01 GENERAL DESCRIPTION OF WORK:

- A. This work shall consist of furnishings and installation of materials and for adjusting manholes, cleanouts, inlets or water valves risers in accordance with details on the plans and as specified herein as directed by the ENGINEER.
- B. Manholes, cleanouts, inlets and water valve risers shall be adjusted to position and/or elevation as shown on the plans or as ordered by the ENGINEER and in accordance with these specifications.

**PART 2 - PRODUCTS**

2.01 GENERAL:

- A. Manhole, cleanout, and inlet covers, water valve risers, and brick in good condition, removed in the process of adjustment, may be re-used.
- B. Additional materials required shall be provided as required.

2.02 MATERIALS:

- A. Concrete
  - 1. Concrete for inlets shall be 3000 psi (28 day compressive strength) concrete containing a minimum of 5 sacks cement per cubic yard.
- B. Mortar:

1. Mortar shall be composed of 1 part Portland Cement and 2 parts clean, sharp mortar sand suitably graded for the purpose by conforming in other respects to the provisions of Section 03300 for fine aggregate.
2. Hydrated lime or lime putty may be added to the mix, but in no case shall it exceed 10 percent by weight of the total dry mix.

C. Reinforcement:

1. Reinforcing steel shall be deformed and shall conform to ASTM Designation A-615.

D. Brick:

1. Bricks shall be of first quality, sound, hard-burned brick. Shale bricks, if used, shall be homogeneous, thoroughly and uniformly burned.
2. Clay brick shall conform to the requirements of ASTM Designation C 32, Grade NA or equal, shall be acceptable.

E. Frames, Grates, Rings and Covers:

1. When prefabricated steel extension rings are furnished, the material shall be ASTM A36 or equal.

F. Miscellaneous Items:

1. Cast iron for supports, steps and inlet units shall conform to the shape and dimensions indicated. The casting shall be clean and perfect, free from sand or blowholes or other defects. Cast iron casting shall meet the requirements of ASTM A48, Class 30. steel for temporary covers when used with Stage Construction shall be adequate for the loads imposed.

## **PART 3 – EXECUTION**

### 3.01 INSTALLATION OF DRAINAGE FACILITIES:

- A. Existing manholes, cleanouts and water valve risers located within areas of base and sub-base construction shall be located and referenced and the rings and covers and risers removed carefully and stored by the Contractor.
- B. Rings, covers, plates, or grates broken in the process of removal and cleaning or lost or stolen shall be replaced in kind by the Contractor at his expense.
- C. Manholes shall be broken down to below sub grade elevation and covered with hatch covers prior to beginning excavation and sub grade preparation.
- D. Removal of curb and gutter, and sidewalk for installation of a storm inlet shall be made at a scored or full depth joint.
- E. If manholes are to be lowered the brickwork shall be removed to a point where the corbel will not exceed 1” per course of brick, in order to obtain the proper diameter at the top for resetting the ring and cover.
- F. Upon completion of the flexible base, the manholes, and water valves shall be located from the reference points and the top portion of the manhole rebuilt and water valve risers reset so that they will be flush with the proposed asphalt surfacing.
- G. When manholes are located within pavement areas to be overlaid with hot mix asphaltic concrete, the Contractor may in lieu of removing the cast iron ring and adding concrete adjustment rings, provide prefabricated steel extension rings.
- H. The Prefabricated Steel Extension Rings shall be either of the one-piece or two-piece type as necessary for the amount of adjustment.

- I. The Prefabricated Steel Extension Rings shall be installed in accordance with the manufacture's instructions.
- J. Inlets to be adjusted shall be broken down as necessary and rebuilt to the elevations as shown on the plans.

**PART 4 – MEASUREMENT AND PAYMENT**

**4.01 MEASUREMENT AND PAYMENT:**

- A. No bid item is established for these items, this work shall be considered subsidiary to the contract and no direct payment will be made.

## **SECTION 02160 – TRENCH SAFETY SYSTEM**

### **SCOPE**

This section shall cover CONTRACTORS furnishing a Trench Safety System, and all labor and materials for installation and maintenance of the Trench Safety System.

### **APPLICATION**

For any trench excavation at a depth of five (5) feet or greater or where shown on plans, provide trench safety system. Trench safety system shall be in accordance with details shown on CONTRACTOR'S Trench Excavation and Shoring Safety Plan.

### **QUALITY ASSURANCE**

Trench safety system to meet appropriate requirements established in Section 756.022 of the Texas Health and Safety Code and Occupational Safety and Health Administration (OSHA) Safety and Health Regulations, 29 CFR 1926, Subpart P – Excavations, Trenching and Shoring, as may be amended, and OSHA's proposed standards on trenching excavation published in Volume 54, No. 209 of the Federal Register, October 31, 1989; Pages 45959-45991. Those standards are incorporated into these specifications by reference. Should the applicable OSHA standards be modified or amended, the more stringent standards shall apply.

### **SUBMITTALS**

The CONTRACTOR shall provide upon request a Trench Excavation and Shoring Safety Plan for the Project. The Plan shall incorporate the detailed plans and specifications for a Trench Safety System conforming to OSHA standards. The Plan shall account for project site conditions, CONTRACTOR'S trench construction means, methods, techniques or procedures, the relationship of spoil to edge of trench, and CONTRACTOR'S equipment to be used in construction of project facilities requiring trench Safety System(s). CONTRACTOR shall submit a certificate signed and sealed by a Registered Professional Engineer licensed in the State of Texas stating that CONTRACTOR'S Trench Safety System Plan has been designed in conformance with appropriate OSHA standards and applicable specifications as required by this item. CONTRACTOR'S Trench Safety System Plan shall demonstrate the type(s) of Trench Safety System to be used on the project.

### **MATERIALS**

The CONTRACTOR shall furnish the materials used in the Trench Safety System, as approved by the OWNER, to comply with the requirements of the work of the CONTRACTOR as specified therein.

## Timber

Trench sheeting materials to be full size, a minimum of two inches in thickness, solid and sound, free from weakening defects such as loose knots and splits.

## Steel Sheet Piling

Steel sheet piling shall at a minimum conform to one of the following specifications:

ASTM A328  
ASTM A572, Grade 50  
ASTM A690

Steel for stringers (walers) and cross braces shall conform to ASTM A588.

## Steel Trench Boxes

Portable steel trench box shall at a minimum be constructed of steel conforming to ASTM Specification A-36. Connecting bolts used shall conform to Specifications ASTM A-307. Welds to conform to requirements of AWS Specification D1.1

## Other Materials

Other materials to be utilized shall at a minimum conform to applicable ASTM standards.

## INSTALLATION

Trench safety system shall be constructed, installed, and maintained in accordance with the Trench Safety System Plan prepared by the CONTRACTOR'S Registered Professional Engineer.

## Timber Sheeting

Timber sheeting and size of uprights, stringers (walers), and cross bracing to be installed in accordance with CONTRACTOR'S plan. In no case shall the sizes of the timber sheeting members be less than, or the spacing greater than, those given in Table P-2 in OSHA Part 1926, Sub-part P – Excavation, Trenching and Backfilling. Place cross braces in a horizontal position, space them vertically, and secured to prevent sliding, falling, or kick-outs. Cross braces and stringers (walers) to be placed at splices of uprights, in addition to other locations required.

## Steel Sheet Piling

Steel sheet piling of equal or greater strength may be used in lieu of timber trench shoring shown in the OSHA tables (proposed standards). Drive steel sheet piling to at least minimum depth below trench bottom as recommended by CONTRACTOR'S Registered Professional Engineer providing design. Place cross braces in A true horizontal position, space them vertically and secure them to prevent Sliding, falling, or kick-outs. Cross-braces to be placed at each end or stringers (walers), in addition to other locations required.

## Trench Boxes

Portable trench box may be used in lieu of timber trench shoring shown in the OSHA tables (proposed standards) and shall be designed to provide equal or greater protection than timber trench shoring shown in the OSHA tables. In cases where top of portable trench box will be below top of trench, the trench must be sloped to the maximum allowable slope for the soil conditions existing on the Project. In areas where a sloped trench will affect the integrity of existing structures, CONTRACTOR to protect structures prior to sloping trench.

## Trench Jacks

When jacks are used for cross bracing and/or stringers (walers), the trench jacks Shall provide protection greater than or equal to the timber cross bracing shown in the OSHA tables (proposed standards). Trench jacks to be placed at each end of stingers (walers) in addition to other locations required.

## SUPERVISION

CONTRACTOR must provide competent supervisory personnel at each trench while work is in progress to ensure CONTRACTOR's methods, procedures, equipment, and materials pertaining to the safety systems in this item are sufficient to meet requirements of Texas Law and OSHA Standards.

## MAINTENANCE OF SAFETY SYSTEM

The safety system shall be maintained in the condition as shown on the Trench Excavation and Shoring Safety Plan as designed by the CONTRACTOR's Registered Professional Engineer. The CONTRACTOR shall take all necessary precaution to ensure no loads, except those provided for in the plan, are imposed upon the trench safety system.



## INSPECTION

CONTRACTOR shall make daily inspection of trench safety system to ensure that the system meets OSHA requirements. Daily inspections to be made by competent personnel. If evidence or possible cave-ins or slides is apparent, all work in the trench shall cease until necessary precautions have been taken to safeguard personnel entering trench. CONTRACTOR to maintain permanent record of daily inspections.

## REMOVAL

Bed and backfill pipe to a point at least one (1) foot above top of pipe or other embedded items prior to removal of any portion of trench safety system. Bedding and backfill to be in accordance to other applicable specification items. Backfilling and removal of trench supports shall be in accordance with CONTRACTOR's Trench Excavation and Shoring Safety Plan. Removal of trench safety system to be accomplished in such a manner to cause no damage to pipe or other embedded items. Remove no braces or trench supports until all personnel have evacuated the trench. Backfill the trench to within five (5) feet of natural ground prior to removal of entire trench safety system.

## MEASUREMENT AND PAYMENT

Payment for trench safety shall be subsidiary to the price for the construction of the proposed improvements.

## **SECTION 02210 – SITE GRADING**

### **PART 1 – GENERAL**

#### REFERENCES

American Society for Testing and Materials (ASTM):

ASTM D1140-54 – Standard Test Method for Amount of Material in Soils Finer than the No. 200 (75-um) Sieve.

ASTM D1557-78 – Standard Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18-in. (457-mm) Drop.

ASTM D4253-83 – Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table.

ASTM D4318-84 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

#### DEFINITIONS

**Influence Zone Under Foundations, Pavements, or Sidewalks:** Area below foundation or pavement and sidewalk sub-base bounded by one horizontal to two vertical slope extending outwards from 1-ft beyond outer edge of foundation, pavement or sidewalk.

**Influence Zone Around Piping or Electrical Ducts:** Area below limits bounded by line 12 in. above pipe or duct and by one horizontal to two vertical slope extending outwards from that line 1-ft beyond outer edge of pipe or duct.

**Unsuitable Material:** Topsoil, peat, organic soils, and materials containing slag, cinders, foundry sand, debris, and rubble or soil with less than required bearing capacity as determined by ENGINEER.

#### SUBMITTALS

Submittals of shop drawings and cut-sheets for materials used shall be in accordance with the standard general conditions of the contract.

#### QUALITY ASSURANCE

Testing shall be provided by the Owner. Any subsequent testing necessary for work that was found to be inadequate or not in accordance with the specifications shall be billed to the Contractor.

## PROJECT/SITE CONDITIONS

Notify corporations, companies, individuals or authorities owning above or below ground conduits, wires, pipes or other utilities running to property or encountered during grading operations.

Cap or remove and relocate services in accordance with instructions by owners of said services.

Protect, support, and maintain conduits, wires, pipes or other utilities that are to remain in accordance with requirements of owners of said services.

## **PART 2 – PRODUCTS**

### FILL MATERIALS

Conform to requirements of the plans and specifications..

## **PART 3 – EXECUTION**

### EXAMINATION

Examine surfaces to receive fill to determine existence of areas loosened by frost action, softened by flooding or weather or of unsuitable materials.

### PREPARATION

Fill settled areas where excavations or trenches were backfilled and holes made by demolition, tree removal, and site preparation work.

Natural soils or compacted fill softened by frost, flooding or weather shall be removed, replaced, and compacted.

Remove unsuitable material from under walks, parking, and driveway areas.

Proof roll areas to receive refill material to detect soft or loose zones prior to placing fill. Remove and replace soft or loose zones.

Keep construction site free draining.

Plow, step, or bench slopes steeper than one vertical to four horizontal.

Disc level surfaces

Grading within influence zone of existing or future structures or piping and electrical ducts shall be in accordance with the plans and specifications..

#### PLACING FILL

Conform to requirements of Section 02223.

#### FIELD QUALITY CONTROL

##### Rough Grading Tolerances:

Grade to four inches below finished grade in areas to receive topsoil, but not unless new grade is less than four inches above existing grade. Grade to bottom of the base-course in areas to receive paving or riprap. Maximum allowable variation from design elevation is one inch in ten feet Degree of finish shall be ordinarily obtainable from either blade-grader or scraper operations, except as otherwise specified.

Rough grading areas, including excavated and filled sections and adjacent transition areas shall be reasonably smoothed, compacted, and free from irregular surface changes.

Conform to requirements of the plans and specifications.

#### ADJUSTMENT AND CLEANING

##### Excess Material:

OWNER has first right to excess grading material suitable for backfilling or site grading, not required at job site.

Remove material not required by OWNER from site.

Stockpile material suitable for backfill where indicated on Drawings or designated by ENGINEER. Place no fill where trenches for sewers, water lines, or other utilities will be located.

Remove material not suitable for backfilling or site grading and unsuitable materials from site.

Rough grade areas within grading lines and areas which are disturbed to achieve grade lines and grades as indicated on Drawings, with allowance for thickness of pavements, sidewalks, and topsoil.

## **SECTION 02222- EXCAVATION**

### **PART 1 - GENERAL**

#### SECTION INCLUDES

Excavation for slabs-on-grade and paving.

Excavation for site structures.

#### RELATED SECTIONS

Section 02160 Trench Safety System

Section 02223 Backfilling

Section 02225 Trenching: Excavation for utility trenches

#### FIELD MEASUREMENTS

Verify that survey benchmark and intended elevations for the Work are as indicated.

Verify location of all underground utilities and/or structures. Notify respective utility companies 48 hours in advance of proposed activity.

### **PART 2 - PRODUCTS**

Not Used.

### **PART 3 - EXECUTION**

#### PREPARATION

Identify required lines, levels, contours, and datum.

Identify known underground, above ground, and aerial utilities. Stake and flag locations.

Notify respective utility companies and location centers to locate utilities in the vicinity of the work.

Protect above and below grade utilities, which are to remain.

Protect plant life, lawns, and other features remaining as a portion of final landscaping.

Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

Any pavement surfaces or underground structures removed during excavation shall be replaced or placed back in proper working order. Pavement areas over the proposed utility line shall be stabilized with cement, within the top 12" if the finished elevation.

## EXCAVATION

Underpin adjacent structures, which may be damaged by excavation work, including utilities and pipe chases.

Excavate subsoil required to accommodate slabs-on-grade, paving and site structures, and construction operations.

Machine slope banks to angle of repose or less, until shored.

Grade the top perimeter of excavation to prevent surface water from draining into excavation.

Hand trim excavation and remove loose matter.

Remove lumped subsoil, boulders, and rock.

Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

Correct unauthorized excavation at no extra cost to Owner.

Correct areas over-excavated by error, and no extra cost to Owner.

Remove excavated material from site.

## FIELD QUALITY CONTROL

Field inspection may be performed under provisions of contract.

Provide for visual inspection of bearing surfaces.

## PROTECTION

Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

## **SECTION 02223 - BACKFILLING**

### **PART 1 - GENERAL**

#### SECTION INCLUDES

Site structure backfilling to subgrade elevations or finish elevations.

Trench filling and backfilling.

Fill under slabs-on-grade and paving.

Consolidation and compaction.

Fill for over-excavation.

#### RELATED SECTIONS

Section 02222 Excavation

Section 02225 Trenching: Backfilling of utility trenches

Section 03300 Cast-in-Place Concrete: Concrete materials

#### REFERENCES

ANSI.ASTM C136 - Methods for Sieve Analysis of Fine and Coarse Aggregates.

ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.

ANSI/ASTM D1556 - Test Methods for Density of Soil in Place by the Sand-Cone Method.

ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 kg) Rammer and 18 inch (457mm) Drop.

### **PART 2 - PRODUCTS**

#### FILL MATERIALS

Type A Gravel: Washed natural stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
2 ½ inch	100
2 inch	60 - 90
1 ¼ inch	25 - 50
1 inch	30 - 45
¾ inch	0

Type B Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following:

1. Minimum Size: 1/4 inch.
2. Maximum Size: 5/8 inch

Type C Sand: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

Sieve Size	Percent Passing
6 inch	100
¾ inch	100
No. 4	30 - 80
No. 40	5 - 30
No. 200	0 - 5

Type D Coarse Aggregate Type A1, as indicated in Section 02207.

Type E Select Fill: Material shall consist of homogenous soil free of organic matter and rocks larger than 6 inches in diameter and possessing Plasticity Index from 3% to 15%, and with a liquid limit of 30% or less, or specified by the Geotechnical Engineer.

Subsoil (Common Fill): Reused or imported, free of gravel larger than 3-inch size, and debris.

Concrete: Lean concrete with a compressive strength of 2,000 psi, as indicated on plans.

### **PART 3 - EXECUTION**

#### **EXAMINATION**

Verify fill materials to be reused are acceptable.



Verify foundation perimeter drainage installation has been inspected.

Verify underground tanks are anchored to their own foundation to avoid floatation after backfilling.

## PREPARATION

Generally, compact subgrade to density requirements for subsequent backfill materials.

Cut out soft areas of subgrade not capable of insitu compaction. Backfill with Type E fill, and compact to a density equal to, or greater than the requirements for subsequent backfill material.

Prior to placement of any aggregate base course material at gravel paved areas, compact subsoil to 95 percent of its maximum dry density in accordance with ANSI/ASTM D698.

## BACKFILLING

Backfill areas to contours and elevations with unfrozen materials.

Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

Place geotextile fabric over Type A fill prior to placing the next lift of fill.

Granular Fill: Place and compact materials in continuous layers not exceeding 6 inches compacted depth.

Soil Fill (Type E): Place and compact material in continuous layers not exceeding 12 inches compacted depth or as per the Geotechnical Engineer's recommendation.

Employ a placement method that does not disturb or damage protective cover and utilities in trenches.

Maintain optimum moisture content of backfill materials to attain required compaction density.

Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

Backfill simultaneously on each side of unsupported foundation walls until all supports are in place.

Slope grade away from site structures minimum 3in 10 feet, unless noted otherwise on plans.

Make grade changes gradual. Blend slope into level areas.

Remove surplus backfill materials from site.

#### TOLERANCES

Top Surface of Backfilling Under Paved Areas: Plus or minus one inch from required elevations.

#### FIELD QUALITY CONTROL

Field inspection and testing may be performed under provisions of the contract.

Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and ANSI/ASTM D1557.

Compaction testing will be performed in accordance with ANSI/ASTM D1556; ANSI/ASTM D1557; ANSI/ASTM D698.

If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

#### PROTECTION OF FINISHED WORK

Protect finished work under provisions of the contract.

Re-compact fills subjected to vehicular traffic.

## **SECTION 02225A – TRENCHING**

### **PART 1 - GENERAL**

#### **SECTION INCLUDES**

Excavate trenches for on-site and off-site utilities as required for the construction of the proposed improvements.

Compacted bedding under fill over utilities to subgrade elevations or finished grade elevations.

Backfilling and compaction.

#### **RELATED SECTIONS**

Section 02160 Trench Safety System

Section 02223 Backfilling: General backfilling

#### **REFERENCES**

ANSI/ASTM C136 - Methods for Sieve Analysis of Fine and Coarse Aggregates.

ANSI/ASTM D698 – Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.

ANSI/ASTM D1556 – Test Methods for Density of Soil in Place by the Sand-Cone Method.

ASNI/ASTM D1557 – Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.54 kg) Rammer and 18 inch (457 mm) Drop.

#### **SUBMITTALS**

Submit under provisions of the contract or as requested by the Engineer.

Samples: Submit 10 lb. sample of each type of Type fill to testing laboratory, in airtight containers.

#### **FIELD MEASUREMENTS**

Verify that survey benchmark and intended elevations for the Work are as shown on drawings.

## **PART 2 - PRODUCTS**

### FILL MATERIALS

Types A, B, C, D, E, Common Fill, and Lean Concrete materials as specified in Section 02223.

### BED MATERIALS

Type 1 Material: As specified for Type A in Section 02223.

Type 2 Material: As specified for Type B in Section 02223.

Type 3 Material: As specified for Type C in Section 02223.

Type 4 Material: As specified for Type D in Section 02223.

Type 5 Material: As specified for Type E in Section 02223.

Subsoil (Common Fill) Material: As specified in Section 02223.

Concrete: Lean concrete with a compressive strength of 2,000 psi and as indicated on plans.

## **PART 3 - EXECUTION**

### EXAMINATION

Verify fill materials to be reused, is acceptable.

### PREPARATION

Identify required lines, levels, contours, and datum.

Maintain and protect existing utilities remaining, which pass through work area.

Protect plant life, lawns, and other features remaining as a portion of final landscaping.

Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

Protect above and below grade for utilities that are to remain.

Cut out soft areas of subgrade not capable of insitu compaction. Backfill with Type 4 fill and compact to density equal to or greater than the requirements for subsequent backfill material.

## EXCAVATION

Excavate subsoil required for storms sewer, gravity sanitary sewer, water, and gas to points of connection to building or utility system.

Cut trenches sufficiently wide to enable installation of utilities and allow inspection.

Excavation shall not interfere with normal 45 degree bearing splay of foundations.

Hand trim for bell and spigot pipe joints. Remove loose matter.

Remove lumped subsoil, boulders, and rock.

Correct unauthorized excavation at no cost to Owner.

Correct areas over-excavated by error at no cost to Owner.

Stockpile excavated material in area designated on-site and remove excess material not being used, from site. Remove excavated material from site.

## BEDDING

Support pipe and conduit during placement and compaction of bedding fill.

## BACKFILLING

Backfill trenches to contours and elevations with unfrozen materials.

Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

Place geotextile fabric over Type A fill prior to placing next lift of fill, over perforated pipe.

Granular Fill: Place and compact materials in continuous layers not exceeding 6 inches compacted depth.

Soil Fill: Place and compact material in continuous layers not exceeding 12 inches compacted depth.

Employ a placement method that does not disturb or damage conduit or pipe in trench, and any improvements adjacent to trench work.

Maintain optimum moisture content of backfill materials to attain required compaction density.

Remove surplus backfill materials from site.

#### TOLERANCES

Top Surface of Backfilling: Under Paved Areas: Plus or minus one inch from required elevations.

Top Surface of General Backfilling: Plus or minus one inch from required elevations.

#### FIELD QUALITY CONTROL

Field inspection and testing will be performed under provisions of the Contract and upon request of the Engineer.

Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and ANSI/ASTM D1557.

Compaction testing will be performed in accordance with ANSI/ASTM D1556; ANSI/ASTM D1557; ANSI/ASTM D698.

If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

#### PROTECTION OF FINISHED WORK

Protect finished Work under provisions of the Contract.

Re-compact fills subjected to vehicular traffic.

## **SECTION 02370**

### **TEMPORARY SEDIMENT & EROSION CONTROL**

#### **PART 1- GENERAL**

##### 1.01 GENERAL DESCRIPTION:

- A. “Temporary Sediment and Erosion Control” shall be coordinated with the permanent soil-erosion-control features specified elsewhere in the contract to the extent practical to assure economical, effective and continuous erosion control throughout the construction and post construction period.
- B. These control measures shall at no time be used as a substitute for the permanent control measures unless otherwise directed by the Engineer and they shall not include measures taken by the Contractor at his expense under Sub articles 4(a) through (e) to control conditions created by his construction operations
- C. The temporary measures shall include dikes, dams, berms, sediment basins, fiber mats, jute netting, temporary seeding, straw mulch, asphalt mulch, plastic liners, rubble liners, baled-hay retards, dikes, slope drains, and other devices specified by the Engineer.

#### **PART 2- PRODUCTS**

##### 2.01 MATERIALS

- A. The materials will be specified in the plans, standard specifications, special specifications or special provisions, the Engineer may specify other materials and work as the need arises.
- B. The estimated items of temporary erosion control will be indicated on the plans; however, the Engineer may increase or decrease the quantity of these items as the need arises.
- C. The Engineer has the authority to define erodible earth and the authority to limit the surface area of erodible earth material exposed by preparing right of way, clearing and grubbing, the surface area of erodible-earth material exposed by excavation, borrow and embankment construction operations (except for commercial operations) and to direct the Contractor to provide temporary pollution-control measures to prevent contamination of adjacent streams, other water- courses, lakes, ponds or other areas of water impoundment.

### **PART 3- EXECUTION**

#### **3.01 TEMPORARY CONSTRUCTION**

- A. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains and use of temporary mulches, mats, seeding or other control devices or methods directed by the Engineer as necessary to control soil erosion.

### **PART 4- MEASUREMENT AND PAYMENT**

#### **4.01 MEASUREMENT AND PAYMENT:**

- A. No bid item is established for these items, this work shall be considered subsidiary to the contract and no direct payment will be made.



## **SECTION 02510 – ASPHALTIC CONCRETE PAVING**

### **PART 1 – GENERAL**

SECTION INCLUDES:

A. PRIME COAT (CUTBACK ASPHALTIC MATERIAL)

B. HOT-MIX ASPHALTIC PAVEMENT “TYPE D”

C. SURFACE TREATMENTS

#### **A. PRIME COAT (CUTBACK ASPHALTIC MATERIAL)**

DESCRIPTION

This item shall govern for the application of asphaltic material on the complete base course and/or other approved areas in accordance with these specifications.

MATERIALS

The asphaltic material for the prime shall be cutback MC-30 and shall be applied at 0.20 gallons per S.Y. and shall meet the requirements of Item 300, “Asphalts, Oils and Emulsions” of the 1993 Texas Department of Transportation Standard Specifications.

CONSTRUCTION METHODS

Prime Coat shall not be applied when the air temperature is below 60 degrees F and falling, but it may be applied when the air temperature is above 50 degrees F and rising, the air temperature being taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions are not suitable.

When the area and/or base are satisfactory to receive the prime coat, the surface shall be prepared by sweeping or other approved methods.

The asphaltic material shall be applied on the prepared surface by an approved self-propelled pressure distributor so operated as to distribute the material in one or several applications to achieve the rate shown on the plans, evenly and smoothly, under a pressure necessary for proper distribution.

The Contractor shall provide all necessary facilities and equipment for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the junction of two (2) distributor loads.

All equipment used in storing or handling asphaltic material shall be kept clean and in good operating condition at all times and shall be operated in such a manner that there will be no contamination of the asphaltic material.

No traffic, hauling or placing of any subsequent courses shall be permitted over the freshly applied prime coat. Two fair weather days is the usual curing period before subsequent courses are placed.

The contractor shall be responsible for the maintenance of the surface until it is covered with the specified pavement course.

The contractor shall apply the asphalt at a temperature within the limits recommended in said Item 300 "Asphalts, Oils and Emulsions."

#### MEASUREMENT

The quantity of cutback Asphaltic Prime Coat shall be measured in square yards of the area primed at the rate of 0.20 gallons per S.Y.

#### PAYMENT

The work performed and materials furnished will not be paid for directly, but shall be incidental to the H.M.A.C.

### **B. HOT-MIX ASPHALTIC CONCRETE PAVEMENT**

#### DESCRIPTION

This item shall consist of a base course, a leveling up course, a surface course or any combination of these courses as shown on the plans, each to be composed of a compacted mixture of mineral aggregate an asphaltic material mixed hot in a plant.

The pavement shall be constructed on the previously completed and approved sub grade, base, existing pavement, bituminous surface or in the case of a bridge, on the prepared floor slab, as herein specified and in accordance with the details shown on the plans.

#### MATERIALS AND PAVING MIXTURES

Materials and paving mixtures used in Hot Mix Asphaltic Concrete Pavement shall meet the Material and Paving mixtures requirements as set forth in Item 340 "Hot Mix Asphaltic Concrete Pavement" of the 1993 Texas Department of Transportation (TX DOT) Standard Specifications except that reclaimed asphalt pavement (RAP) will not be permitted. Crushed gravel screening may be used.

Prior to laying any asphalt, Contractor shall submit a Hot-Mix-Concrete mixture design for approval. The contractor shall provide for quality control at the plant to ensure that paving material delivered to the site conforms to the requirements of these specifications and to the mix design.

## CONSTRUCTION METHODS

Construction methods used in Hot-Mix Asphaltic Concrete Pavement shall meet the Construction Methods requirements as set forth in Item 340 “Hot-Mix Asphaltic Concrete Pavement” of the Texas Department of Transportation Standard Specifications, 1993, with the following additions:

Applications of Hot-Mix Asphaltic Concrete Pavement shall not begin unless the temperature is at least 50 degrees F in the shade and rising.

## EQUIPMENT

Mixing plants and all equipment used to lay and compact the mixture that will not continuously produce a mixture of mat meeting all of the requirements here, and on the engineering plans, shall not be allowed.

## MEASUREMENT

The quantity of asphaltic concrete pavement shall be measured by square yards as actually placed at the rate or thickness specified and compacted in the complete and accepted work in accordance with the plans and specifications for the project.

## PAYMENT

The work performed and the materials furnished, will be paid for by the number of square yards of asphaltic concrete pavement placed at the contract unit price bid per square yard which includes cleaning the existing base course and the prime coat at the specified rate of application.

## C. SURFACE TREATMENTS

### DESCRIPTION

This item shall govern for the construction of a surface treatment composed of a single, double or triple application of asphaltic material, each covered with aggregate, constructed on existing pavements or on the prepared base course or surface in accordance with these specifications. This item shall also govern for the furnishing of aggregate (Stockpiled). Quantities for the different types of surfaces and materials will be as shown on the Basis of Estimate in the plans.

This item shall meet the requirements of Item 316 “Surface Treatment” of the Texas Department of Transportation 1993 Standard Specifications for the Construction of Highways, Streets and Bridges with the exceptions, as modified below:

1) General

The fifth paragraph is voided and replaced by the following:

Unless otherwise authorized by the Engineer in writing, surface treatments shall be applied during the warm weather period between April 15 and September 15 when the air temperature taken in the shade is above 70 degrees F and is rising. Surface treatments shall not be applied when the air temperature is below 80 degrees F and is falling. Asphaltic material shall not be placed when general weather conditions are not suitable, in the opinion of the Engineer.

The eleventh paragraph is voided and replaced by the following:

- Aggregate stockpiles remaining on the public’s right-of-way after the
- 2) final payment of the project will become property of Starr County Precinct #1.
  - 3) Materials to be used and the rate of applications are as follows:

- (A) Aggregate (Type PB GR 4) (1CY/125 S.Y.)
- (B) Tack Coat (AC-15P) (0.20 Gal/S.Y.)

## MEASUREMENT

Surface treatment will be measured by the square yard of complete surface area covered with the types, grades and rates of materials specified on the plans or approved by the Engineer.

## PAYMENT

The work performed and materials furnished will not be paid for directly, but shall be incidental to the H.M.A.C.



# SECTION 02511 – CALICHE PAVING

## PART 1 – GENERAL

### SUBMITTALS

Test Results

### QUALITY ASSURANCE

Testing: Sampling and testing will be done at an independent testing laboratory paid for by CONTRACTOR.

### PRODUCTS

### MATERIALS

Caliche-paving materials to meet the requirements of TXDOT 1993 Standard Specifications Item 247

Material to be Grade 4.

Material to have a minimum laboratory California Bearing Ratio of 50.

Prime coat: Cutback MC-30.

### EXECUTION

#### PREPARATION

Check sub grade as to soundness, outline, and contour. Prepare sub grade for areas to be paved by scraping down bumps and irregularities to obtain smooth, even bed.

Remove and replace with any area, including soft or spongy spots, where displacement in sub grade is more than ½ inch in front of rollers.

#### INSTALLATION

Place materials when surface is dry and atmospheric temperature is above 40 degrees F.

Prior to and during compaction shape material and maintain to dimensions and contour. Keep surface of each layer true and smooth.

Compact to 98% of maximum density before succeeding layer is placed.

Variations from true profile and section shall not be more than 3/8 inch.

Prime compacted caliche surface at the rate of 0.20 gallons per square yard.

## FIELD QUALITY ASSURANCE

Testing: Optimum Moisture Content and Maximum Density: Comply with AASHTO T99, Method C, with replacement of fraction aggregate retained on  $\frac{3}{4}$  inch sieve with No. 4 to  $\frac{3}{4}$  inch material.

**SECTION 02600**

**SANITARY SEWERS**

**PART 1- GENERAL**

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Trenching, Backfilling and Compacting: Section 02225.
- B. Water Transmission Lines : Section 02556.

1.02 SUBMITTAL

- A. Submit manufacturer's certification that products meet specification requirements.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials on manufacturer's original skids or in original unopened protective packaging. Owner reserves the right to reject material left from another job.
- B. Store materials to prevent physical damage.
- C. Protect materials during transportation and installation to avoid physical damage.

1.04 GENERAL DESCRIPTION OF WORK COVERED

- A. Furnish and install all sewer pipe, fittings and structures, and accessories required for sanitary sewer construction as indicated.

1.05 QUALITY ASSURANCE

- A. Comply with latest published editions of American Society of Testing and Materials (ASTM) Standards:

- 1. ASTM D2321- Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow



## Applications.

2. ASTM D3212- Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
3. ASTM F477- Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
4. ASTM D3034- Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
5. ASTM F794- Poly (Vinyl Chloride) (PVC) Ribbed Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
6. ASTM F679- Standard Specification for Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings (SDR35).
7. ASTM F949- Standard Specification for Poly (Vinyl Chloride) (PVC) Ribbed Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
8. ANSI A21.11- Rubber Gasket Joints for Cast Iron and Ductile-Iron Pressure Pipe and Fittings.
9. ASTM D3753- Standard Specification for Glass Fiber Reinforced Polyester Manholes.
10. ASTM C-923- Standard Specification for Resilient Manhole Connectors.
11. ASTM C-478- Specification for Pre-cast Reinforced Concrete Manhole Sections.
12. ASTM C-443- Specification for Joints for Circular Concrete Sewer and Culvert pipe using Rubber Gaskets.
13. ASTM C-1244- Specification for Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

14. AWWA C-151- Specification for Ductile Iron Pipe and Fittings.
15. ASTM D-1248- Standard specification for Polyethylene Plastics Molding and Extrusion Materials.
16. AWWA C-105- Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for Water and Other Liquids.
17. AWWA C-110- Gray Iron And Ductile Iron Fittings 3-inch through 48-inch, for Water and Other Liquids.
18. ASTM D-3350- Specification for Polyethylene Plastic Pipe and Fittings Materials.
19. ASTM F-714- Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter (3-inch IPS and larger).
20. ASTM D-3261- Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Pipe and Tubing.
21. ASTM D-1784- Rigid Poly (Vinyl Chloride) (PVC) Compounds, and Chlorinated Poly (Vinyl Chloride) (CPVC) Compound.
22. AWWA C900- Polyvinyl Chloride (PVC) Pressure Pipe 4-inch through 12-inch for water distribution.
23. AWWA C905- Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameter 14-inch through 36-inch.

## **PART 2- PRODUCTS**

### **2.01 GENERAL REQUIREMENTS**

- A. Pipe furnished may be any one of materials specified herein for sanitary sewer construction unless shown otherwise on plans or bid forms.

- B. All pipe shall be marked in accordance with applicable standard specification under which pipe is manufactured unless otherwise specified.

## 2.02 POLYETHYLENE PIPE AND FITTINGS (PE)

- A. Comply with ASTM D3350 and ASTM F-714 for polyethylene (PE) solid wall pipe and fittings for use in pressure sanitary sewers. Wall thickness shall be as shown on the plans.
- B. Fittings shall comply with the performance requirements of ASTM D2683 or ASTM D3261 for molded or fabricated fittings of the size and pressure class as required.
- C. Provide pipe and fittings with minimum performance requirements of ASTM D1248, Type III Class C, Category 5, Grade P34 and ASTM D3350 as indicated in this specification and as shown in the plans and details.

## 2.03 POLYVINYL CHLORIDE PLASTIC PIPE (PVC)

- A. Comply with ASTM D3033, D3034, ASTM F679, CT-1 walls, or ASTM F-794 for pipe using material conforming to ASTM D1784 for pipe and fittings.
  - 1. Sewers 6-inches to 10-inches shall conform to ASTM D3034.
  - 2. Sewers 12-inches to 30-inches shall conform to ASTM D3034, ASTM F-679 (T-1 wall), or ASTM F-794 for pipe using material conforming to ASTM D1784 for pipe and fitting.
  - 3. Sewers 36-inches and larger shall conform to ASTM F-949, ASTM D3034, ASTM F-679 or ASTM F-794 for pipe using material conforming to ASTM D1784 for pipe and fitting.
- B. Use single elastomeric gasket push-on joints complying with ASTM D3212.
- C. Provide pipe and fittings with minimum performance capabilities of SDR-26 dimension ratio for gravity sewers of less than 10-feet in

depth or cover. Where directed by the Engineer and as indicated on the plans, sewers greater than 10-feet in depth shall meet SDR26 or AWWA C900 or C905 requirements.

- D. Lubricant to be in accordance with the requirements of ASTM D3212. Lubricant to be suitable for lubricating the parts of the joints in the assembly. The lubricant to not have any deteriorating effects on the gasket and pipe materials.
- E. SDR 35 shall be used for service laterals.
- F. Mark all pipe and fittings.

#### 2.04 DUCTILE IRON PIPE AND FITTINGS

- A. Comply with the latest published edition of American Water Works Association (AWWA) Standards:
  - 1. AWWA C110 & C110a- Gray Iron and Ductile-Iron Fittings, 2-inch through 48-inch for water and other liquids.
  - 2. AWWA C111- Rubber Gasket Joints for Cast Iron Pressure Pipe and Fittings.
  - 3. AWWA C150- Thickness Design of Ductile-Iron Pipe.
  - 4. AWWA C151- Ductile-Iron Pipe, centrifugally cast in metal mold or sand lined molds, for water or other liquids.
  - 5. AWWA C153- Ductile-Iron Compact fittings, 3-inch through 12-inch for water and other liquids.
  - 6. ASSA C900- Polyvinyl Chloride (PVC) Pressure Pipe 4-inches through 12-inches for water.
  - 7. Polyethylene encasement for the protection of ductile and cast iron pipes, fittings valves, and appurtenances shall be furnished and installed in accordance with the requirements of AWWA C-105.

8. Lining and Coating- Ductile and cast iron pipes, fittings valves, and appurtenances for sanitary sewer service shall be furnished with corrosion resistant interior lining furnished by the manufacturer:
  1. Polyethylene “polybond”
  2. Polyurethane “Corropipe II TX 5”
  3. Ceramic-Epoxy “Protecto 401”
  4. Engineer Approved Equal
9. Exterior Coating- Ductile and cast iron pipes, fittings valves, and appurtenances for sanitary sewer service shall be furnished with outside surfaces coated with a bituminous coating 1 mil thick in accordance with ANSI A21.6 or ANSI A21.51.

## 2.05 MANHOLES, STRUCTURES AND PIPE ACCESSORIES

### A. Fittings

1. Fittings allowed only on service laterals.
2. Fittings shall equal or exceed quality of pipe. Fittings shall be full-bodied gasket fittings or inserted gasketed compression fittings on line size greater than 15-inches as shown in the plans and details.

### B. Pre-cast Reinforced Concrete Manholes & Sections

1. Pre-cast reinforced concrete manhole base sections, riser sections, tops, cones and special sections shall conform to the requirements of ASTM C478-93. The pre-cast sections shall have rubber gasket compression joints conforming to the material and performance requirements of ASTM C443.
2. Pre-cast Concrete Manhole Base: A steel reinforced concrete base shall be used with pre-cast concrete manhole sections. This base shall be furnished with confined O-ring joints in

conformance with ASTM C443. The reinforced concrete pre-cast manhole base as shown on the plans shall be manufactured in accordance with ASTM C478.

3. Watertight, size-on-size resilient connectors allowing for differential settlement shall be used to connect pipe to manholes. Pipe to manhole connectors shall conform to ASTM C-923.
4. Minimum wall thickness will be 5-inches.
5. Concrete and reinforcing steel in foundation shall comply with Section 03300.

C. Cast-in-Place Manholes

1. Concrete and reinforcing steel shall comply with Section 03300.
2. Construction details as indicated (D-2).
3. Minimum wall thickness will be 5-inches.
4. Provide cast-in-place rubber gasket for connection of required sewer line or watertight, size-on-size resilient connectors allowing for differential settlement shall be used to connect pipe to manholes. Pipe to manhole connectors shall conform to ASTM C-923.

D. Fiberglass Manholes

1. Fiberglass manholes shall be in accordance with ASTM D3753 "Glass Fiber Reinforced Polyester Manholes, latest revision. The minimum wall thickness for all manholes at all depths shall be .40-inches. The inside diameter of the manhole barrel shall be either 48-inches or 1.5 times the nominal pipe diameter of the largest pipe, which ever is larger, or as indicated on the plan sheets.
2. Pipe Connectors- Watertight, size-on-size resilient connectors

allowing for differential settlement shall be used to connect pipe to manholes. Pipe to manhole connectors shall conform to ASTM C-923 or shall be InsertaTee as shown in the plans and specification details. Joints for sewer pipe for line and drop connections in sizes 4-inches – 15-inches shall be made by means of gasketed inserted watertight compression connection or approved equal as shown in the plans and details. Install in accordance with the manufacturer's written instructions. Connections for pipe larger than 15-inches shall be made using a pre-approved connection. Install in accordance with the manufacturer's written instructions.

#### E. Manhole Accessories

1. Manhole lid and cover:
  - a. Gray cast iron, with minimum clear opening 30-inches.
  - b. Use Western Iron Works A770R or approved equal with vent holes.
  - c. Provide anchor bolt holes for exposed manhole tops.
2. Manhole Rings:
  - a. Provide minimum of three throat rings between cone and manhole, maximum eight.
  - b. lid and cover.
3. Coating- Coating and lining of the interior vertical surfaces, if required, shall be as noted in the plans and details. Materials shall be installed and applied in accordance with the written instructions and specifications of the manufacturer at the thickness and quality as noted in the plans and details as approved by Engineer.
4. Manhole Inserts- Provide manhole insert to fit the manhole frame rim upon which the manhole cover rests.

- a. Insert body shall be made of high density polyethylene copolymer material that meets ASTM D 1248, Class A, Category 5, Type III. Minimum thickness 1/8-inch.
- b. Gasket shall be of closed cell neoprene and have pressure sensitive adhesive on one side and be placed under the weight-bearing surface of the insert by the manufacturer.
- c. Lift strap of 1-inch woven polyethylene (seared on all cut ends to prevent unraveling). Strap shall be attached to the rising edge of the bowl off the insert by means of stainless steel rivet and washer.
- d. Vent shall have 1/8-inch hole located on the side wall of the insert 3/4-inch below the lip.
- e. Load capacity insert shall have certified test data verifying minimum collapse load of 1500 lbs. minimum applied to a 5.50-inch square area in the center of the insert.

### **PART 3- EXECUTION**

#### 3.01 GENERAL:

- A. Provide all labor, equipment and materials and install all pipe, fittings, specials and appurtenances as indicated or specified.

#### 3.02 PIPE INSTALLATION

##### A. Handling

- 1. Handle in a manner to insure installation in sound and undamaged condition.
  - a. Do not drop or bump.
  - b. Use slings, lifting lugs, hooks and usher devices designed to protect pipe, joint elements, and coatings.



2. Ship, move and store with provisions to prevent movement or shock contact with adjacent units.
3. Handle with equipment capable of work with adequate factor of safety against overturning or other unsafe procedures.

B. Installation

1. Installation, jointing and testing of pipe, fittings, and accessories shall be in accordance with the provisions of the applicable reference standard and in accordance with the requirements of this specification and related specifications referenced or contained in the contract documents for pressure or gravity sewers.
2. Lay pipe to slope gradient noted on the drawings.
3. Utilize equipment, methods, and materials insuring installation to lines and grades as indicated.
  - a. Do not lay on blocks unless pipe is to receive total concrete encasement.
  - b. Use laser or minimum of 3 batter boards for control of line and grade.
  - c. Obtain approval from Engineer for method proposed for transfer of line and grade from control to the work.
4. Install pipe of size, material, strength class, and joint type with embedment shown for plan location.
5. Insofar as possible, commence laying of pipe at downstream end of line, and, install pipe with bell ends in direction of pipe laying. Sewer pipe shall have spigot ends in direction of flow. Obtain approval for deviations therefrom.
6. Clean interior of all pipe, fittings and joints prior to installation. Exclude entrance of foreign matter during discontinuance of installation.

- a. Close open ends of pipe with snug fitting closures.
  - b. Do not let water fill trench. Include provisions to prevent flotation should water control measures prove inadequate.
  - c. Remove water, sand, mud and other undesirable materials from trench before removal of end cap.
7. Inspect pipe prior to installation to determine if any pipe defects are present.
  8. Brace or anchor as required to prevent displacement after establishing final position.
  9. Perform only when weather and trench conditions are suitable.
  10. Observe extra precaution when hazardous atmospheres might be encountered.
  11. Separation distances between public water supply pipes and wastewater collection system pipes or manholes.

(1) Collection system pipes must be installed in trenches separate from public water supply trenches.

(2) Collection system pipes must be no closer than nine feet in any direction to a public water supply line.

(3) If a nine-foot separation distance cannot be achieved, the following guidelines will apply.

(A) If a collection system parallels a public water supply pipe the following requirements apply.

(i) A collection system pipe must be constructed of cast iron, ductile iron, or PVC meeting ASTM specifications with at least a 150 pounds per square inch (psi) pressure rating for both the pipe and

joints.

(ii) A vertical separation must be at least two feet between the outside diameters of the pipes.

(iii) A horizontal separation must be at least four feet between outside diameters of the pipes.

(iv) A collection system pipe must be below a public water supply pipe.

(B) If a collection system pipe crosses a public water supply pipe, the following requirements apply:

(i) If a collection system is constructed of cast iron, ductile iron, or PVC with a minimum pressure rating of 150 psi, the following requirements apply:

(I) A minimum separation distance is six inches between outside diameters of the pipes.

(II) A collection system pipe must be below a public water supply pipe.

(III) Collection system pipe joints must be located as far as possible from an intersection with a public water supply line.

(ii) If a collection system pipe crosses under a public water supply pipe and the collection system pipe is constructed of acrylonitrile butadiene styrene (ABS) truss pipe, similar semi-rigid plastic composite pipe, clay pipe, or concrete pipe with gasketed joints, the following requirements apply:

(I) A minimum separation distance is two feet.

(II) If a collection system pipe is within nine

feet of a public water supply pipe, the initial backfill around the collection system pipe must be:

(-a-) sand stabilized with two or more 80 pound bags of cement per cubic yard of sand for any section of collection system pipe within nine feet of a public water supply pipe.

(-b-) installed from one quarter of the diameter of the collection system pipe below the centerline of the collection system pipe to one pipe diameter (but not less than 12 inches) above the top of the collection system pipe.

(iii) If a collection system crosses over a public water supply pipe, one of the following procedures must be followed:

(I) Each portion of a collection system pipe within nine feet of a public water supply pipe must be constructed of cast iron, ductile iron, or PVC pipe with at least a 150 psi pressure rating using appropriate adapters.

(II) A collection system pipe must be encased in a joint of at least 150 psi pressure class pipe that is:

(-a-) centered on the crossing;

(-b-) sealed at both ends with cement grout or manufactured seal;

(-c-) at least 18 feet long;

(-d-) at least two nominal sizes larger than the wastewater collection pipe; and

(-e-) supported by spacers between the collection system pipe and the encasing pipe at a maximum of five-foot intervals.

(4) Public water supply pipe and collection system manhole separation.

(A) Unless collection system manholes and the connecting collection system pipe are watertight, as supported by leakage tests showing no leakage, they must be installed a minimum of nine feet of horizontal clearance from an existing or proposed public water supply pipe.

(B) If a nine-foot separation distance cannot be achieved, the requirements in paragraph (3) of this subsection apply.

12. Auger or jack casing pipe in place where shown on plans.

### C. Jointing

1. General requirements:

a. Locate joints to provide for differential movement at changes in type of pipe embedment, at changes from rock to soil trench bottom, and structures.

(1) Not more than 18 inches from structure wall, or

(2) Support pipe from wall to first joint with concrete cradle structurally continuous with base slab or footing of structure.

b. Perform in accordance with manufacturer's recommendations.

c. Clean and lubricate all joint and gasket surfaces with lubricant recommended.

- d. Utilize methods and equipment capable of fully homing or making up joints without damage.
- e. Check joint opening and deflection for specification limits.

D. Closure Pieces

- 1. Connect two segments of pipelines or a pipeline segment and existing structure with short sections of pipe fabricated for the purpose.
- 2. Observe specifications regarding location of joints, type of joints and pipe materials and strength classifications.

E. Temporary Plugs

- 1. Furnish and install temporary plugs at each end of work for removal by others when completed ahead of adjacent contract or where indicated.
- 2. Remove from pipe laid under adjacent contract in order to complete pipe connection when work by other contractor is finished prior to work at connection point under this contract.
- 3. Plugs
  - a. Use test plugs as manufactured by pipe supplier, or
  - b. Fabricate by Contractor of substantial construction.
  - c. Must be watertight against heads up to 20 feet of water.
  - d. Secure in place in a manner to facilitate removal when required to connect pipe.

3.03 MANHOLE INSTALLATION

- A. Foundations to be poured in place, or to be pre-cast concrete base

- sections in accordance with the requirements of ASTM C-478. See Standard Details included herein.
- B. Construct manhole foundation and channel inverts integrally for cast in place manhole foundations. See Standard Details included herein.
  - C. Pre-cast manhole sections of ruse with cast in place manhole based may be installed after foundation concrete has attained 75% of design strength.
  - D. Forms for cast-in-place manhole may be installed after foundation concrete has attained 75% of design strength.
  - E. Manhole foundation and manhole may be installed simultaneously if manhole section is supported on concrete blocks and foundation concrete placed under and around bottom section.
  - F. Install manhole sections and joints in accordance with the requirements of the specification.
  - G. Heat materials for casting in place in freezing weather and protect work from cold; maintain temperature of work at 40° F. for at least 24 hours after placing.
  - H. Invert Channels: Inverts: The bottom of the manhole shall be provided with a “U” shaped channel that is as much as possible a smooth continuation of the inlet and outlet pipes.
    - 1. For manholes connected to pipes less than 15-inches in diameter the channel depth shall be at least half the largest pipe diameter.
    - 2. For manholes connected to pipes 15 to 24-inches in diameter the channel depth shall be at least three fourths the largest pipe diameter.
    - 3. For manholes connected to pipes greater than 24-inches in diameter the channel depth shall be at least equal to the largest pipe diameter.
    - 4. In manholes with pipes of different sizes, the tops of the pipes

shall be placed at the same elevation and flow channels in the invert sloped on an even slope from pipe to pipe. The bench provided above the channel shall be sloped at a minimum of 0.5-inch per foot.

5. Where sewer lines enter the manhole higher than 24-inches above the manhole invert, the invert shall be filleted to prevent solids deposition.
  6. Drop Manholes: A drop manhole as shown in the details shall be provided for a sewer entering a manhole more than 30-inches above the insert. A drop pipe of the same pipe material and size shall be provided for a sewer pipe entering a manhole more than 24-inches above the invert. The drop pipe shall be constructed on the outside of the manhole utilizing Wyes and Ells to provide a smooth drop and a clean out leg as shown on the details. The drop pipe shall be encased with concrete unless otherwise directed by the Engineer. Concrete shall extend from the bottom of the manhole base up to the bottom of the incoming sewer pipe, concrete shall also extend from the outside wall of the manhole out past the Wye on the Wye branch with a minimum of six inches (6") on each side.
- I. Pipe Connection
1. Make watertight.
  2. Use rubber gasket or size resilient connectors allowing for differential settlement conforming to ASTM C-9232.
  3. All connectors shall be at flowing of manhole.
- J. Exterior Pipe Support (Rigid Pipe)
1. Support vitrified clay pipe on concrete cradle from manhole connection to first joint on each side of manhole as indicated.
  2. Provide pipe joint within 18 inches of manhole wall.
- K. Castings, frames, and fittings



1. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed.
  2. The unit shall be protected until mortar or concrete is set.
- L. Coatings if required in the specifications and details shall be applied after Engineer's approval of structure.

### 3.04 ACCEPTANCE TESTS FOR SEWER PIPELINES

#### A. Infiltration Testing

1. General
  - a. Maximum infiltration for each section of sewer pipe shall not exceed 50 gal/mile/day/inch of pipe diameter.
  - b. Infiltration, exfiltration or air test may be used to prove compliance with infiltration requirement.
  - c. Acceptance of air test or exfiltration results will not preclude rejection of work if infiltration is measured and exceeds limitation.
  - d. After backfilling and removing debris from each section of sewer line, conduct a line acceptance test under observation of the Engineer. Copies of all test results shall be made available to the Engineer upon request. Test the sanitary sewer lines in strict accordance with the following leakage test using low pressure air. If the test results indicate an unacceptable installation, locate the source of leakage, correct the defect, and retest until the installation is proven satisfactory.
  - e. Tests should conform to the following requirements:
    - (1) Infiltration or Exfiltration Tests. The total exfiltration as determined by a hydrostatic head

test, shall not exceed 50 gallons per inch diameter, per mile of pipe per 24 hours at a minimum test head of two feet above the crown of the pipe at the upstream manhole.

- (2) When pipes are installed below the groundwater level an infiltration test shall be used in lieu of the exfiltration test. The total infiltration, as determined by a hydrostatic head test, shall not exceed 50 gallons per inch diameter per mile of pipe per 24 hours at a minimum test head of two feet above the crown of the pipe at the upstream manhole, or at least two feet above existing groundwater level, whichever is greater.
- (3) For construction within the 25 year flood plan, the infiltration or exfiltration shall not exceed 10 gallons per inch diameter per mile of pipe per 24 hours at the same minimum test head.
- (4) If the quantity of infiltration or exfiltration exceeds the maximum quantity specified, remedial action shall be undertaken in order to reduce the infiltration or exfiltration to an amount within the limits specified.

## 2. Air Test

- a. Furnish all facilities required including: (1) Necessary piping connections. (2) Test pumping equipment. (3) Pressure gauges or manometers. (4) Bulkheads. (5) All miscellaneous items required.
- b. Obtain approval from Engineer of equipment and methods proposed for use.
- c. Test pipe in sections determined by Contractor and approved by Engineer.
- d. Plug ends of line and cap or plug all connections to with-

stand internal test pressures.

- e. Introduce low pressure air until internal air pressure is 4.0 psi greater than the average back pressure of ground water above the pipe. (Add 0.43 psi for each vertical foot of ground water over the top of pipe.)
- f. Allow two minutes for air pressure to stabilize.
- g. Time required for pressure to decrease from 3.5 to 2.5 psi greater than average back pressure of any ground water above pipe shall not be less than time in following table for given diameters.

**AIR TESTING TIMING**

<u>Pipe Diameter</u> <u>(Inches)</u>	<u>Seconds</u>
6	340
8	454
10	567
12	680
15	850
18	1020
21	1190
24	1360
27	1530
30	1700
36	1870

- h. Repeat test as necessary after all leaks and defects have been repaired.

C. Deflection Testing

- 1. Perform on flexible pipe.
- 2. Use a mandrel to test for a maximum 5 percent deflection unless otherwise specified in the contract document.

3. The mandrel shall be sized and constructed as follows:

(A) Mandrel Sizing.

(i) A rigid mandrel must have an outside diameter (OD) not less than 95% of the base inside diameter (ID) or average ID of a pipe, as specified in the appropriate standard by the ASTMs, American Water Works Association, UNI-BELL, or American National Standards Institute, or any related appendix.

(ii) If a mandrel sizing diameter is not specified in the appropriate standard, the mandrel must have an OD equal to 95% of the ID of a pipe. In this case, the ID of the pipe, for the purpose of determining the OD of the mandrel, must equal be the average outside diameter minus two minimum wall thicknesses for OD controlled pipe and the average inside diameter for ID controlled pipe.

(iii) All dimensions must meet the appropriate standard.

(B) Mandrel Design.

(i) A rigid mandrel must be constructed of a metal or a rigid plastic material that can withstand 200 psi without being deformed.

(ii) A mandrel must have nine or more odd number of runners or legs.

(iii) A barrel section length must equal at least 75% of the inside diameter of a pipe.

(iv) Each size mandrel must use a separate proving ring.

(C) Method Options.

(i) An adjustable or flexible mandrel is prohibited.

(ii) A test may not use television inspection as a substitute for a deflection test.

(iii) If requested, the executive director may approve the use of a deflectometer or a mandrel with removable legs or runners on a case-by-case basis.

4. Conduct no sooner than thirty (30) days after final backfill.
5. Use no mechanical pulling devices.
6. Uncover all irregularity or pipe deformation exceeding 5%. Replace all damaged pipe reround non-damaged pipe and tamp the embedment and initial backfill.
7. Any pipe removed shall be replaced by use of gasketed repair couplings.
8. Conduct deflection test in the presence of the Owner's or Engineer's representative.
9. Manhole Testing: Successful passage of a vacuum or hydrostatic test shall be required for acceptance of all sanitary sewer manholes and sanitary sewer structures. If a manhole fails a leakage test the manhole must be made watertight and retested. Hydrostatic testing shall be conducted by plugging with Engineer approved plugs all influent and effluent pipes in the manhole and filling the manhole with water to the top of the manhole cone with water, and maintain the test for at least one hour. Additional water may be added over a twenty-four (24) hour period to compensate for absorption and evaporate losses. At the conclusion of the twenty-four (24) hour saturation period the manhole shall be filled to the top of the manhole cone and observed. The maximum leakage for hydrostatic testing shall be 0.025 gallons per foot diameter per foot of manhole depth per hour. Any loss within a thirty (30) minute period shall be considered an unsuccessful test. Vacuum testing shall be performed in accordance with the requirements of ASTM C-1244, Specification for Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

### 3.05 SERVICE CONNECTIONS:

- A. Install service connections at each dwelling or business place, or as directed by Engineer.
- B. Services wyes: install wyes, 4-inch branch diameter unless shown otherwise on plans. See standard detail, "Typical Service Connection",
- C. Risers: use in lieu of wyes for service connections where invert of sewer is 15 feet or more below ground surface or where shown on plans. See standard detail, "Typical Riser Service Connection". Place suitable stopper in end of connection, cement stopper in place with cold bituminous joint compound.
- E. Backfill trench only after recording exact location of service connection. Place engineer approved maker tape above service piping in excavation within 3-feet of the surface.
- F. Make no connections to house sewers or extend service connections beyond this contract without written permission of Engineer.
- G. Backfill trench only after entire service line and wye connection has been inspected and approved by Engineer. Compact as specified in Section 02225, "Trenching, Backfilling and Compacting".
- H. Street crossings shall have a minimum of 3 feet of cover to sub-grade unless approved by Engineer.
- I. No payment for service lines will be made until all specified requirements have been met.

### 3.06 CONNECTIONS TO EXISTING DRAINS AND SEWER SYSTEM

- A. Connect existing sanitary service drains which cross new sewer line through equal sized wye.
- B. Connect no storm drains to new sewers.

- C. Connections to existing manholes:
  - 1. Cut hole in existing manhole at required elevation.
  - 2. Insert new sewer pipe flush with inside of manhole.
  - 3. Grout new pipe in place.
  - 4. Reconstruct manhole bottom to suit new connection.
  
- D. Connections to existing sewer:
  - 1. Build new manhole around existing sewer.
  - 2. Break out existing sewer inside of manhole and construct bottom to suit new connection.

#### **PART 4- MEASUREMENT AND PAYMENT**

##### 4.01 SANITARY SEWER PIPE

- A. Sanitary sewer pipe shall be measured from center of manhole to center of manhole or end of main. The sewer pipe shall be measured along the center of the pipe without considering fittings or other pipe connections. Sanitary sewer pipe will be paid at the contract bid price per linear feet complete in place at various depths for the type, size and depth constructed.
  
- B. Compensation will be for furnishing all materials, labor, equipment, tools and incidentals required by the construction of the sanitary sewer pipe, all in accordance with the plans and these specifications.
  
- C. If sanitary sewer pipe fails or does not pass appropriate mandrel test, Contractor shall remove and replace that part of the sewer pipe at no cost to the Owner.

##### 4.02 SANITARY SEWER MANHOLE

- A. A bid item is established for these items, this work shall be paid on a per unit basis as established on the Bid Form.





## SECTION 02620 – PVC PIPE

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Polyvinyl chloride pressure pipe for water distribution and sanitary sewers in nominal diameters 4 inches through 24 inches.
- B. Polyvinyl chloride sewer pipe for sanitary sewers in nominal diameters 4 inches through 48 inches.

#### 1.2 REFERENCES

- A. ANSI A21.10 (AWWA C110) – Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids.
- B. ANSI A21.11 (AWWA C111) – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- C. ASTM D2241 – Standard Specification for Polyvinyl Chloride Plastic Pipe (SDRPR).
- D. ASTM D2321–Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- E. ASTM D2444 – Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)
- F. ASTM D3034 - Specification for Type PSM Polyvinyl Chloride Sewer Pipe and Fittings.
- G. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- H. ASTM D3212 - Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- I. ASTM F477- Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- J. ASTM F679- Specification for Polyvinyl Chloride Large – Diameter Plastic Gravity Sewer Pipe and Fittings.

- K. AWWA C900- Polyvinyl Chloride Pressure Pipe, 4 in. through 12 in. for Water Distribution.
- L. AWWA C905 – Polyvinyl Chloride Water Transmission Pipe, Nominal Diameters 14 in. through 36 in.
- M. UNI-B-11 – Recommended Standard Specification for Polyvinyl Chloride Water Transmission Pipe (Nominal Diameters 14” – 36”).
- N. UNI-B-13 – Recommended Standard Performance Specification for Joint Restraint Devices for Use with Polyvinyl Chloride Pipe.

### 1.3 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300-Submittals.
- B. Submit shop drawings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges, and special details.

### 1.4 SOURCE QUALITY CONTROL

- A. Submit manufacturer’s affidavit that PVC pipe meets requirements of AWWA C900 or AWWA C905 for pressure pipe applications or the appropriate ASTM standard specified for gravity sewer pipe.
- B. Submit certification of National Sanitations Foundation (NSF) approval for pipe to be used for potable water service.

### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Store pipe under cover out of direct sunlight and protect from excessive heat or harmful chemicals in accordance with the manufacturer’s recommendations.

## **PART 2 - PRODUCTS**

### 2.1 WATER SERVICE PIPE

- A. Pipe 4 in. through 12 in.: AWWA C900, Class 150, DR 18; nominal 20 foot lengths; cast iron equivalent outside diameters.
- B. Pipe 16 in. through 24 in.: AWWA C905, Class 235, DR 18; nominal 20 foot lengths; cast iron equivalent outside diameters.

- C. Joints: ASTM D3139; push-on type joints in integral bell or separate sleeve couplings. Gaskets and seals: ASTM F477; elastomeric; factory installed and glued in place. Do not use socket type or solvent weld type joints.

2.2 BENDS AND FITTINGS FOR PVC PRESSURE PIPE

- A. Bends and Fittings: ANSI A21.10; ductile iron; ANSI A21.11 single rubber gasket push-on type joint; minimum 150 psi pressure rating.
- B. Coatings and Linings:
  1. Conform to requirements of Section 02610 – Ductile-Iron Pipe and Fittings.
  2. Provide cement-lined fittings for potable water service.
  3. Provide polyethylene-lined fittings for wastewater and sludge service.

2.3 GRAVITY SANITARY SEWER PIPE

- A. Provide one of the following types/brands of pipe:

Wall Construction	Manufacturer	Product Options	ASTM Designation	SDR/Stiffness (Min.)	Diameter Size Range
Solid	J-M Pipe Certainteed	Approved equal	D3034	SDR 26/PS 115	6” to 10”
	Can-Tex Carlton Diamond	Approved equal	D3034	SDR 35/PS 46	12” to 15”
Solid (Pressure-rated)	J-M Pipe Certainteed	Approved equal	F679	SDR 35/PS 46	18” to 27”
	Can-Tex Carlton Diamond	Approved equal	AWWA C900 AWWA C905	DR 18/PS 364	4” to 12” 14” to 36”

- B. Joints: Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D3212, factory-assembled and securely locked or glued in place to prevent displacement.
- C. Fittings: Provide PVC gravity sewer sanitary bends, tee or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection, molded or factory fabricated. Saddle-type wye fittings are not acceptable.

**PART 3 - EXECUTIONS**

3.1 INSTALLATION

- A. Conform to requirements of Section 02556–Water Mains, and Section 02600- Sanitary Sewers

3.2 FIELD QUALITY CONTROL

- A. Conform to requirements of Section 02556–Water Mains, and Section 02600–Sanitary Sewers

## **SECTION 02800 – SANITARY SEWER PIPE TESTING AND CLEANUP**

### **GENERAL**

#### **DESCRIPTION**

This section covers the testing of pipe materials, joints, or other materials incorporated into on-site and off-site piping and leakage tests to determine water tightness. The Contractor shall furnish all the necessary equipment and be responsible for conducting all low-pressure air tests. In addition the Contractor is responsible for any necessary repair work on sections that do not pass the test, at no additional cost to the Owner.

All pipelines and sewers shall be tested. Test pressure, duration, and media shall be as specified by the Engineer and at a minimum local authority requirements. Care should be exercised to isolate equipment not rated for the specified test pressure to avoid damage to the equipment.

#### **LEAKAGE TESTS**

##### **LEAKAGE TESTS OF GRAVITY LINES**

All piping designated as on-site and off-site sewer shall pass leakage tests as specified herein. The tests must be performed in the presence of or a representative of the Engineer. The Contractor shall provide 24 hours minimum before beginning testing procedures. Leakage tests for water tightness of gravity sewer lines shall be completed in accordance with the following procedures.

##### **Air Testing:**

Prior to air testing the pipe shall be visually inspected to determine collapsed or crushed pipe. Verify that pipe is free of debris and obstructions. After visual inspection the section to be tested shall be cleaned flushed. After flushing, all pipe outlets in the test section shall be plugged and each plug shall be suitably and securely braced. No sealant shall be used in any newly installed sewer without prior approval of the Engineer. Proper structural repair work will be required. Date and time tests are conducted shall be recorded.

##### **Time Pressure Drop:**

Add air slowly to the portion of the pipe under test until the internal air pressure is raised to 4.0 pounds per square inch (greater than the average groundwater back pressure) is reached; the air supply shall be throttled to maintain that internal pressure for at least two minutes. Construction of connecting manholes shall meet with the requirements outlined above for the manholes as shown on the standard details. Maintain the internal pressure at 4.0 psig, by adding air until the air temperature inside the pipe under test has stabilized. At the end of the two-minute period, disconnect the air supply. When pressure decreases to 3.5 psig, start the stopwatch. Determine the time in seconds that is required for the

internal air pressure to reach 2.5 psig. The amount of air loss shall then be determined from the pipe size, length of test section and time in sections and compared with the time required by the Handbook of PVC Pipe, pages 417 and 418, tables 10.12 or 10.13 and in accordance with Uni-Bell PVC Pipe Association, Uni-B-6-90, Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe.

**Safety Provisions:**

Plugs used to close the sewer pipe for the air tests must be securely braced to prevent the unintentional release of a plug, which can become a high velocity projectile. Gauges, air piping manifolds, and valves shall be located at the top to enter a manhole where a plugged pipe is under pressure. No personnel shall be allowed inside the manholes while pressurizing the lines or while test is being conducted. No internal pressure shall be allowed to exceed 9 psig.

**PRESSURE CONDUIT LEAKAGE TESTS**

The pipe to be tested must be sufficiently backfilled to prevent movement while under pressure.

Leakage tests for all piping specified to be “Hydrostatically Tested” shall be made by filling the main with water and increasing the pressure to the testing pressure specified by the Engineer. In no case shall the test pressure exceed the rating of the pipe, valves, fittings or appurtenances.

The duration of the leakage test shall be as specified by the Engineer and as recommended by the local utility authority.

The maximum leakage per hour for buried piping shall be calculated by the following formulas:

All rubber gasket or o-ring joints

$$L = \frac{(N * D * \sqrt{P})}{7,400}$$

- L= Allowable Leakage (gallons per hour)
- N= Number of Joints in Pipeline Tested
- D= Nominal Diameter (inches)
- P= Test Pressure (psi)

Leakage of all exposed piping shall be zero throughout the duration of the test.

The main shall not be accepted until the actual leakage is equal to or less than the allowable. In addition, all obvious leaks shall be repaired.

## MANHOLE LEAKAGE TESTS

Upon completion of installation, each, manhole will be visually inspected to insure the water tightness integrity. Manholes on the project shall be tested in the following manner:

### In Wet Ground Conditions:

The ground shall be water jetted around the manhole to insure a positive head of water. And that after completely saturating the earth surrounding the manhole, a visual inspection shall be made and the manhole shall be found bottle tight. If any seepage appears, the manhole will be deemed to have not passed the test, and at the Engineer's discretion, additional manholes shall be tested to insure the watertight integrity of the entire manhole system.

### In Dry Ground Conditions:

The manhole shall be filled with water up to top of man way opening prior to installation of ring and cover. A visual inspection shall be made and the manhole shall be found bottle tight, a maximum 1" drop in water level shall be allowed during a one minute time period. If drop in water level greater than that allowed occurs, the manhole will be deemed to have not passed the test; and at the Engineer's discretion, additional manholes shall be tested to insure the watertight integrity of the entire manhole system.

Should any manhole not pass this test, it shall be resealed and retested at the Contractor's expense until satisfactory test results have been achieved.

## LEAKS ENCOUNTERED IN FINAL INSPECTION

In addition to passing the above described leakage tests, all obvious running leaks which may be observed in the final inspection shall be satisfactorily repaired.

## DEFLECTION TESTING

Deflection testing shall be performed on the total footage of PVC gravity sewer pipe. The deflection test shall occur after a 30-day consolidation of the backfill in the trench section. A maximum of 5% deflection is allowable.

The contractor shall use a mandrel deflection testing as follows:

Completely flush the line making sure the pipe is clean of any mud or trash that would hinder the passage of the mandrel.

During the final flushing of the line, connect the pull rope to the mandrel and place the mandrel in the entrance of the pipe.

Connect a second rope to the back of the mandrel. This will enable you to retrieve the mandrel if a blockage is encountered

Remove all the slack in the pull rope by gently pulling the rope at the far manhole. After the slack has been removed, place a tape marker on the rope close to the pipe where the mandrel will exit. If the mandrel encounters blockage, the marker will provide a means of measuring the traveled distance of the mandrel so that the restricted area can be located.

Draw the mandrel through the sewer.

An increasing resistance to pull is an indication of excessive deflection. If this occurs, measure beginning marker on the rope the distance to manhole. Locate section and replace bedding or pipe if visual examination reveals damage.

#### RETEST

Resistance to pull may be caused by not properly flushing or cleaning the line prior to testing. Actions to take prior to digging are as follows:

Remove mandrel and re-flush with water.

Preferably remove mandrel and pull a rubber, sewer-cleaning ball through the line with water to clear any mud or debris that did not flush during initial cleaning.

The mandrel O.D. shall be equal to the minimum pipe I.D. less the allowance for the maximum 5% deflection.

The test equipment used shall be certified, as satisfactory by the Engineer at the beginning of the project. The Engineer or his representative may at any time require a calibration check of the instrumentation used.

#### CLEANING UP

As the Construction work progresses, the Contractor shall backfill the trenches, remove excess excavated materials and other debris and do sufficient cleanup and blading of the trench surfaces to make the streets and alleys suitable for safe use of traffic.

After the construction work is completed and before final acceptance by the Owner, the Contractor shall remove all rubbish, excess materials, excess materials from excavations and other debris from the site of the work and all trench surfaces shall be bladed as heretofore specified. Adjacent road ditches and slopes, which have been disturbed by this construction, shall be restored to its original shape, density and condition. The cost of clean up shall be included in the bid prices for the various units of work. After the clean up has been completed, but before final acceptance by the Owner, the entire line must be tested to see that there are no obstructions in the line. Water for this testing shall be the responsibility of the Contractor. A rubber or plastic beach ball of same diameter as the pipe will be flushed through the line for this test.



## LINE CLEANING

All piping must be flushed to remove all mud and debris following construction. Materials flushed from the line shall not be allowed to enter the existing collection system.

## DISINFECTION

Following satisfactory completion of the acceptance test, all potable water lines shall be disinfected in accordance with the requirements of the local utility authority.

## **SECTION 03100 - CONCRETE FORMWORK**

### **PART 1 - GENERAL**

#### **SECTION INCLUDES:**

Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

Openings for other work.

Form accessories.

Form stripping.

#### **RELATED SECTIONS**

Section 03200 - Concrete Reinforcement.

Section 03300 – Cast-in-place Concrete.

#### **REFERENCES**

ACI 347- Recommended Practice For Concrete FORMWORK.

PS-1 - Construction and Industrial Plywood.

#### **DESIGN REQUIREMENTS**

Design, engineer and construct FORMWORK, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension, as indicated on plans.

#### **QUALITY ASSURANCE**

Perform Work in accordance with ACI 347.

Maintain one copy of each document on site.

#### **QUALIFICATIONS**

Design FORMWORK under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located in the State of Texas.

## REGULATORY REQUIREMENTS

Conform to applicable code for design, fabrication, erection and removal of FORMWORK.

## DELIVERY, STORAGE, AND HANDLING

Deliver, store, protect and handle products to site under provisions of the Contract.

Store off ground in ventilated and protected manner to prevent deterioration from moisture.

## COORDINATION

Coordinate work under provisions of the Contract.

Coordinate this Section with other Sections of work, which require attachment of components to FORMWORK.

If FORMWORK is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Engineer before proceeding.

## **PART 2 - PRODUCTS**

### WOOD FORM MATERIALS

Form Materials: At the discretion of the Contractor.

### PREFABRICATED FORMS

Preformed Steel Forms: Minimum 16-gauge matched, tight fitting stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, of sizes required; and as indicated on plans.

### FORMWORK ACCESSORIES

Form Ties: Snap-off type, galvanized metal, fixed or adjustable length, with waterproofing washer, free of defects that could leave holes in concrete surface.

Form Release Agent: Colorless mineral oil, which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

Corners: Filleted and chamfered, rigid plastic or wood strip type, size as indicated on plans using maximum possible lengths.

Dovetail Anchor Slot: Galvanized steel, 22-gauge thick, foam filled or non-filled as indicated on plans, release tape sealed slots, anchors for securing to concrete FORMWORK.

Nails, Spikes, Lag Bolts, Through Bolts, Anchorages:  
Sized as required, of sufficient strength and character to maintain FORMWORK in place while placing concrete.

Water stops: Rubber or Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F (46 degrees C) to plus 175 degrees F (79 degrees C) working temperature range, width indicated on plans, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

### **PART 3 - EXECUTION**

#### EXAMINATION

Verify lines, levels and centers before proceeding with FORMWORK. Ensure that dimensions agree with Drawings.

#### EARTH FORMS

Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

#### ERECTION FORMWORK

Erect FORMWORK, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

Provide bracing to ensure stability of FORMWORK. Shore or strengthen FORMWORK subject to over stressing by construction loads.

Arrange and assemble FORMWORK to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

Align joints and make watertight. Keep form joints to a minimum.

Provide fillet and chamfer strips on external corners.

#### APPLICATION FORM RELEASE AGENT

Apply form release agent on FORMWORK in accordance with manufacturer's recommendations.

Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings, which are effected by the agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

#### INSERTS, EMBEDDED PARTS, AND OPENINGS

Provide formed openings where required for items to be embedded in or passing through concrete work.

Locate and set in place items, which will be cast directly into concrete.

Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, and other inserts.

Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

Install water stops continuous without displacing reinforcement. Heat seal joints watertight.

Provide temporary ports or openings in FORMWORK where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

Close temporary openings with watertight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

#### FORM CLEANING

Clean and remove foreign matter within forms as erection proceeds.

Clean formed cavities of debris prior to placing concrete.

Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

During cold weather, remove ice and debris from within forms. Do not use de-icing salts or water to clean out forms, unless FORMWORK and concrete construction proceed within heat enclosure. Use compressed air or other means to remove foreign matter.

#### FORMWORK TOLERANCES

Construct FORMWORK to maintain tolerances required by ACI 301.

Camber slabs and beams  $\frac{1}{4}$  inch per 10 feet in accordance with ACI 301 and as indicated on plans.

#### FIELD QUALITY CONTROL

Inspect erected FORMWORK, shoring, and bracing to ensure that work is in accordance with FORMWORK design, and that supports, fastenings, wedges, ties, and items are secure.

#### FORM REMOVAL

Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

# **SECTION 03200 – CONCRETE REINFORCEMENT**

## **PART 1 – GENERAL**

### SECTION INCLUDES

Furnish all labor, materials, tools, equipment, and related items required to fabricate and place reinforcement for cast-in-place concrete including reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

### RELATED SECTIONS

Section 03100 – Concrete Formwork

Section 03001 – Concrete

### REFERENCES

ACI 301 – Structural Concrete for Buildings

ACI 318 – Building Code Requirements for Reinforced Concrete

ACI SP 66 – American Concrete Institute Detailing Manual

ANSI/ASTM A82 – Cold Drawn Steel Wire for Concrete Reinforcement

ANSI/ASTM A184 – Fabricated Deformed Steel Bar Mats for Concrete Reinforcement

ANSI/ASTM A185 – Welded Steel Wire Fabric for Concrete Reinforcement

ANSI/ASTM A496 – Deformed Steel Wire Fabric for Concrete Reinforcement

ANSI/ASTM A497 – Welded Deformed Steel Wire Fabric for Concrete Reinforcement

ANSI/AWS D1.4 – Structural Welding Code for Reinforcing Steel

ANSI/AWS D12.1 – Reinforcing Steel Welding Code

ASTM A615 – Deformed and Plain Billet Steel Bars for Concrete Reinforcement

ASTM A616 – Rail Steel Deformed and Plain Bars for Concrete Reinforcement

ASTM A617 – Axle Steel Deformed and Plain Bars for Concrete Reinforcement

ASTM A704 – Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement

ASTM A706 – Low-Alloy Steel Deformed Bars for Concrete Reinforcement

ASTM A767 – Zinc-Coated (Galvanized) Bars for Concrete Reinforcement

ASTM A775 – Epoxy-Coated Reinforcing Steel Bars

ASTM D3963 – Epoxy-Coated Reinforcing Steel

AWS D12.1 – Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction

CRSI – Concrete Reinforcing Steel Institute Manual of Practice

CRSI 63 – Recommended Practice for Placing Reinforcing Bars

CRSI 65 – Recommended Practice for Placing Bar Supports, Specifications and Nomenclature

## SUBMITTALS

Submit under provisions of the Contract and as requested by the Engineer

Shop Drawings: Indicate bar sizes, spacing, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices. Including splicing and laps of rod and shapes.

Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

## QUALITY ASSURANCE

Perform work in accordance with CRSI 63, 65 and Manual of Practice; ACI 301; ACI SP 66; ACI 318; ANSI/ASTM A184.

Submit certified copies of mill test report of reinforcement materials analysis.

Provide Engineer with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

Allowable tolerances: Fabricating

Sheared length – plus or minus one inch

Stirrups and ties – plus or minus one-half inch

Members more than eight inches but not over two feet deep – plus or minus one-half inch



Members more than two feet deep – plus or minus one inch  
Crosswise of members – space evenly within two inches of stated  
separation  
Lengthwise of members – plus or minus two inches

## COORDINATION

Coordinate work under provisions of the Contract.

Coordinate with placement of formwork, formed openings and other Work.

## **PART 2 – PRODUCTS**

### REINFORCEMENT

Reinforcing Steel: ASTM A615, 40 or 60 ksi yield grade; billet steel bars, domestic manufacturer, plain finish and as indicated on plans.

Reinforcing Steel Mat: ASTM A704, ASTM A615, 40 or 60 ksi yield grade; steel bars or rods, plain finish and as indicated on plans.

Stirrup Steel: ANSI/ASTM A82, plain finish and as indicated on plans.

Welded Steel Wire Fabric: ASTM A185 Plain Type; in flat sheets or coiled rolls; plain finish and as indicated on plans.

### ACCESSORY MATERIALS

Tie Wire: Minimum 16-gauge black annealed steel type.

Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.

Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel or stainless steel type; size and shape as required.

### FABRICATION

Fabricate concrete reinforcing in accordance with CRSI Manual of Practice; ACI SP 66; ACI 318; ANSI/ASTM A184.

Weld reinforcement reinforcing in accordance with ANSI/AWS D1.4; ANSI/AWS D12.1.

Galvanized or Epoxy Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with manufacturer's instructions.

Locate reinforcing splices not indicated on Drawings, at point of minimum stress.  
Review location of splices with Engineer.

### **PART 3 – EXECUTION**

#### **PLACEMENT**

Place, support and secure reinforcement against displacement. Do not deviate from required position.

Do not displace or damage vapor barrier.

Accommodate placement of formed openings.

Maintain concrete cover around reinforcing as indicated on plans.

#### **FIELD QUALITY CONTROL**

Field inspection may be performed under provisions of the Contract.

## **SECTION 03300A– CAST-IN-PLACE CONCRETE**

### **PART 1 – GENERAL**

#### SECTION INCLUDES

Cast-in-place concrete for inlets, flow control boxes, meter vaults, manhole structures, tanks, thrust blocks, slabs on grade, and as indicated on plans.

#### RELATED SECTIONS

Section 03100 - Concrete Formwork: Formwork and accessories

Section 03200 – Concrete Reinforcement

#### REFERENCES

ACI 301 – Structural Concrete for Buildings

ACI 302 – Guide for Concrete Floor and Slab Construction

ACI 304 – Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete

ACI 305R – Hot Weather Concreting

ACI 306R – Cold Weather Concreting

ACI 308 – Standard Practice for Curing Concrete

ACI 3 – Building Code Requirements for Reinforced Concrete

ANSI/ASTM D1190 – Concrete Joint Sealer, Hot-Poured Elastic Type

ANSI/ASTM D1751 – Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

ANSI/ASTM D1752 – Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

ASTM C33 – Concrete Aggregates

ASTM C94 – Ready-Mixed Concrete

ASTM C150 – Portland Cement

ASTM C260 – Air Entraining Admixtures for Concrete

ASTM C330 – Light Weight Aggregates for Structural Concrete

ASTM C494 – Chemicals Admixtures for Concrete

ASTM C618 – Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

## SUBMITTALS

Submit under provisions of the Contract and as requested by Engineer.

Product Data: Provide data on joint devices, attachment accessories, admixtures and mix design.

Samples: Submit two 6-inch long samples of expansion/contraction joint and control joint.

Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.

## PROJECT RECORD DOCUMENTS

Submit under provisions of the Contract.

Accurately record actual locations of embedded utilities and components, which are concealed from view.

## QUALITY ASSURANCE

Perform Work in accordance with ACI 301.

Maintain one copy of each document on site.

Acquire cement and aggregate from same source for all work.

Conform to ACI 305R when concreting during hot weather.

Conform to ACI 306R when concreting during cold weather.

## COORDINATION

Coordinate work under provisions of the Contract.

Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

## **PART 2 – PRODUCTS**

### **CONCRETE MATERIALS**

Cement: ASTM C150, Type I – Normal; Type IA – Air Entraining; Type II – Moderate; Type IIA – Air Entraining; Type III – High Early Strength; Type IIIA – Air Entraining; Type IV – Low Heat of Hydration; Type V – Sulphate Resistant; Portland type and as indicated on plans.

Fine Aggregates: ASTM C33; clean, hard, durable, uncoated, natural sand free from silt, loam or clay.

Coarse Aggregates: ASTM C33; hard, durable, uncoated, crushed, stone gradation sized in accordance with size No. 57 unless otherwise approved in mix design. Maximum aggregate size in accordance with ACI 318.

Water: Clean and free from oil, acid, alkalines, or other impurities not detrimental to concrete.

### **ADMIXTURES**

Air Entrainment: ASTM C260

Chemical: ASTM C494, Type A – Water Reducing; Type B – Retarding; Type C – Accelerating; Type D – Water Reducing and Retarding; Type E – Water Reducing and Accelerating; Type F – Water Reducing, High Range; Type G – Water Reducing, High Range and Retarding admixture.

Fly Ash: ASTM C618; maximum 2% loss on ignition.

### **ACCESSORIES**

Bonding Agent: Polymer resin emulsion; Polyvinyl Acetate; Latex emulsion; Two component modified epoxy resin; n-solvent two component polysulphide epoxy; Mineral filled polysulphide polymer epoxy; Mineral filled polysulphide polymer epoxy resin; Versamid cured epoxy; as indicated on plans.

Vapor Barrier: 6 mil thick clear polyethylene film, type recommended for below grade application; as indicated on plans.

Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

#### JOINT DEVICES AND FILLER MATERIALS

Joint Filler Type A: ASTM D1751; ASTM D994; Asphalt impregnated fiberboard or felt, ¼ inch thick; tongue and groove profile; as indicated on plans.

Joint Filler Type B: ASTM D1752; Closed cell; polyvinyl chloride; molded vinyl; foam, resiliency recovery of 95% if not compressed more than 50 % of original thickness; as indicated on plans.

Joint Filler Type C: ASTM D1752; Pre-molded sponge rubber, fully compressible with recovery rate of minimum 95%; as indicated on plans.

Construction Joint Devices: Integral galvanized steel or extruded plastic; to required thickness, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge; as indicated on plans.

Expansion and Contraction Joint Devices: ASTM B221 alloy, extruded aluminum; resilient elastomeric; vinyl; neoprene; filler strip with a Shore A hardness of 35 to permit plus or minus 25% joint movement with full recovery; extruded aluminum or vinyl cover plate, or longest manufactured length at each location, flush or recessed mounted; color as selected or indicated on plans.

Sealant: ASTM D1190; Hot applied, rubber; synthetic rubber; asphalt; polymer based asphalt; coal tar and rubber; compound.

#### CONCRETE MIX

Mix concrete in accordance with ACE 304. Deliver concrete in accordance with ASTM C94.

Provide concrete to the following mix design:

Strength: Concrete is classified and specified by ultimate compressive strength at age 28 days.

Proportions: Proportions of cement, aggregate, and water to attain required plasticity and compressive strength shall be in accordance with ACI 318. Do not make changes in proportions without Engineer's approval.

Concrete to yield following characteristics:

3,000 psi at 28 days, minimum slump 3 inches, and maximum slump 5 inches

As indicated on plans.

Use accelerating admixtures in cold weather only when approved by Engineer.

Use of admixtures will not relax cold weather placement requirements.

Use calcium chloride only when approved by Engineer.

Use set retarding admixtures during hot weather only when approved by Engineer.

Add air-entraining agent to normal weight concrete mix for work exposed to exterior.

### **PART 3 – EXECUTION**

#### **EXAMINATION**

Verify site conditions under provisions of Contract.

Verify requirements for concrete cover over reinforcement.

Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

#### **PREPARATION**

Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

In locations where new concrete is doweled to existing work, drill holes in existing concrete; insert steel dowels and pack solid with non-shrink grout.

#### **PLACING CONCRETE**

Place concrete in accordance with ACI 304; ACI 301; or ACI 318.

Notify Engineer minimum 24 minimum 24 hours prior to commencement of operations.

Ensure reinforcement, inserts, embedded parts, formed joint fillers, joint devices and related appurtenances are not disturbed during concrete placement.

Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by sealant applied between overlapping edges and ends or taping edges and ends.

Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.

Install joint fillers, primer and sealant in accordance with manufacturer's instructions.

Separate slabs on grade from vertical surfaces with ½ inch thick joint filler.

Extend joint filler from bottom of slab to within ½ inch of finished slab surface.

Install joint devices in accordance with manufacturer's instructions.

Install construction joint device in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

Install joint device anchors. Maintain correct position to allow joint cover flush with floor and wall finish.

Install joint covers in one piece or longest practical length, when adjacent construction activity is complete.

Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

Place concrete continuously between predetermined expansion, control, and construction joints.

Do not interrupt successive placement; do not permit cold joints to occur.

Place floor slabs in checkerboard pattern indicated.

Saw cut joints within 24 hours after placing. Using 3/16-inch thick blade, cut into ¼ inch depth of slab thickness.

Screed floors and slabs on grade level, maintaining surface flatness of maximum ¼ inch in 10 ft or as indicated on plans.



## CONCRETE FINISHING

Provide formed concrete surfaces to be left exposed, concrete walls, columns, beams, joists, with smooth rubbed; sand float; sack rubbed finish as indicated on plans.

Finish concrete floor surfaces in accordance with ACI 301.

Wood float surfaces which will receive, quarry tile, ceramic tile, or terrazzo will full bed setting system.

Steel trowel surfaces, which will receive carpeting, resilient flooring, seamless flooring, thin set quarry tile, or thin set ceramic tile.

Steel trowel surfaces, which are scheduled to be exposed.

In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains  $\frac{1}{4}$  inch per foot nominal or otherwise as indicated on Plans.

## CURING AND PROTECTION

Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

## FIELD QUALITY CONTROL

Field inspection and testing may be performed in accordance with ACI 301 and under provisions of the Contract or upon request of the Engineer.

Provide free access to Work and cooperate with appointed firm.

Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

Tests of cement and aggregates may be performed to ensure conformance with specified requirements.

Three concrete test cylinders will be taken for every 75 or less or 100 or less cubic yards of each class of concrete placed.

One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.

One slump test will be taken for each set of test cylinders taken.

## PATCHING

Allow Engineer to inspect concrete surfaces immediately upon removal of forms.

Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.

Patch imperfections as directed and in accordance with ACI 301.

## DEFECTIVE CONCRETE

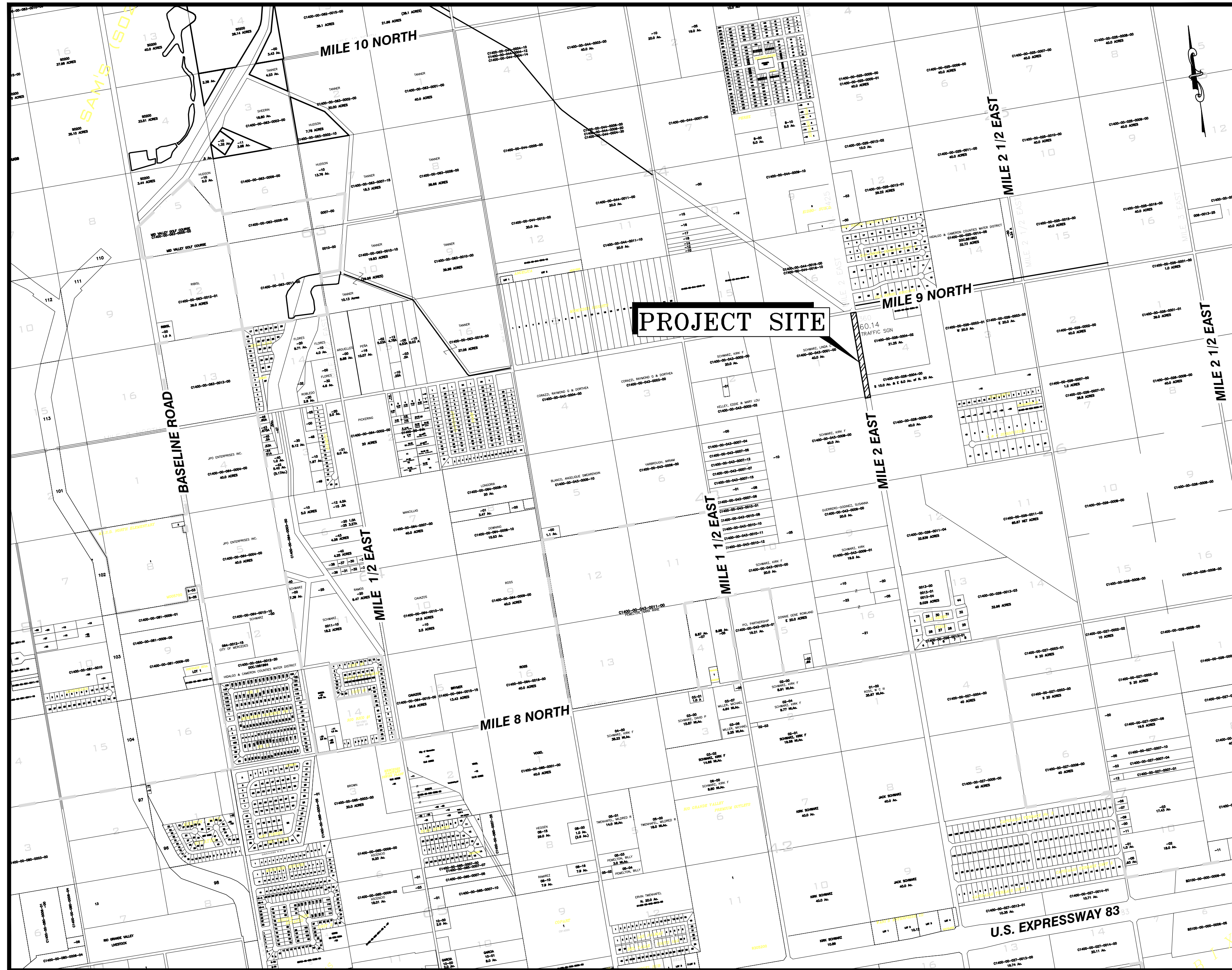
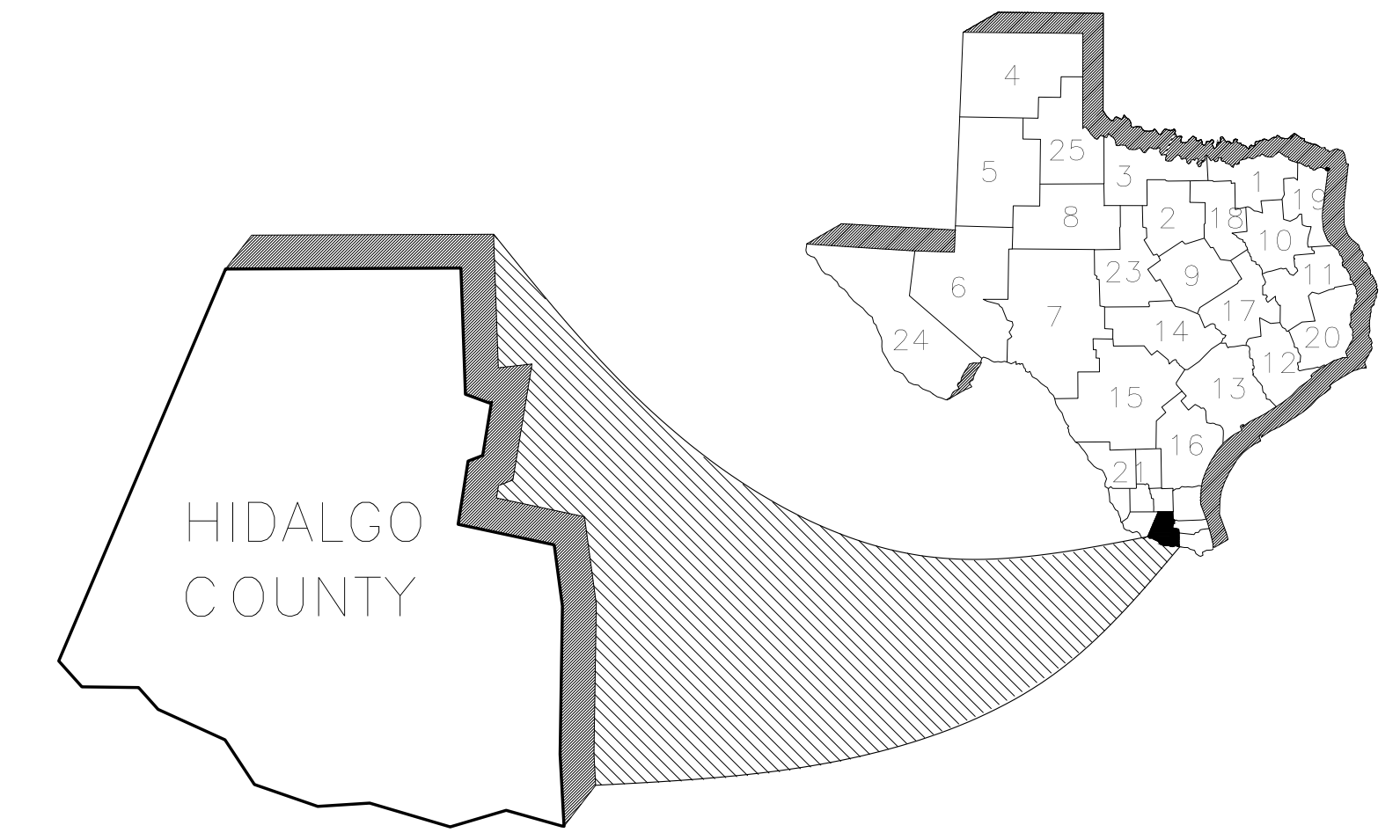
Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

The Engineer will determine repair or replacement of defective concrete.

Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

# MILE 2 E SANITARY SEWER EXTENSION

## CITY OF MERCEDES, TEXAS

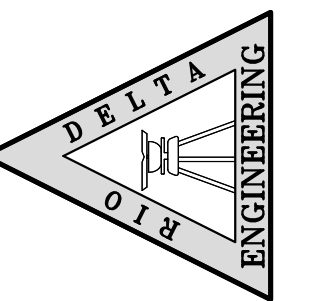


VICINITY MAP  
NOT TO SCALE

### INDEX OF SHEETS

SHT#	DESCRIPTION
SHT 1	COVER SHEET
SHT 2	EXISTING TOPOGRAPHICAL LAYOUT
SHT 3	SANITARY SEWER PLAN AND PROFILE LAYOUT
SHT 4	TYPICAL DETAILS

**RIO DELTA ENGINEERING**  
 FIRM REGISTRATION NO. F-7628  
 SURVEY FIRM NO. 10194027  
 921 S. 10TH AVENUE EDINBURG, TEXAS 78539  
 (TEL) 956-380-5152 (FAX) 956-380-5083



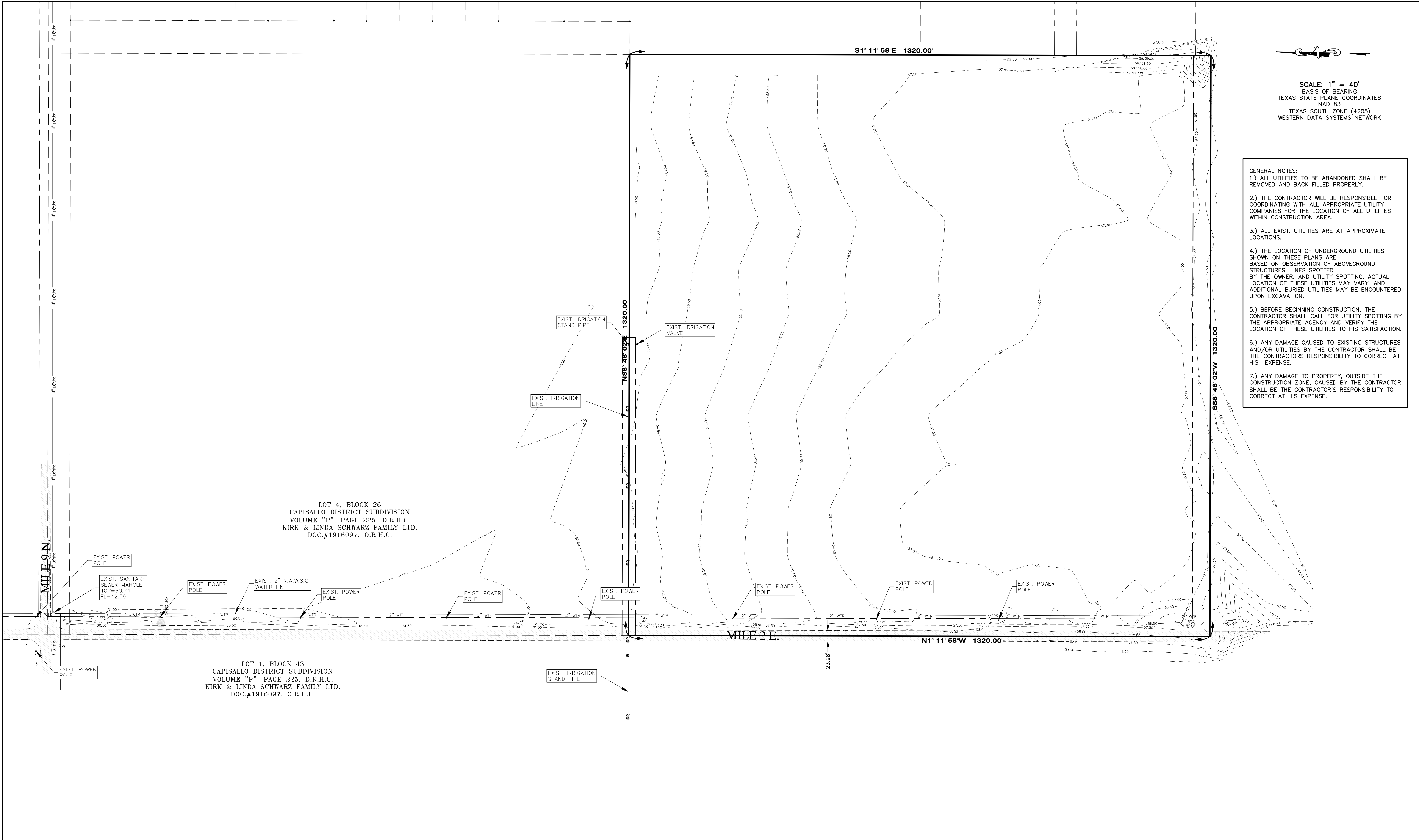
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ISSUED FOR:  
**PRELIMINARY**

**COVER SHEET**  
**MILE 2 E SANITARY SEWER EXTENSION**  
**HIDALGO COUNTY, TEXAS, TEXAS**

PROJECT:  
 ENGINEER: IVAN GARCIA P.E. R.P.L.S.  
 SURVEYOR: IVAN GARCIA P.E. R.P.L.S.  
 CHECKED: IVAN GARCIA P.E. R.P.L.S.  
 DRAWN: HR  
 SCALE: N.T.S.  
 DATE: SEPTEMBER 18, 2024  
 PROJECT: ENG 22 024  
 REVISIONS:  
 PAGE NO. **SHT 1**

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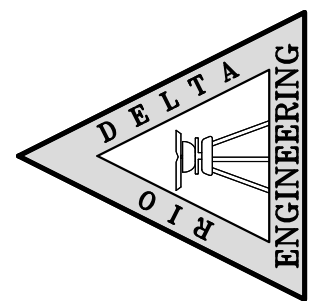
SCALE: 1" = 40'  
 BASIS OF BEARING  
 TEXAS STATE PLANE COORDINATES  
 NAD 83  
 TEXAS SOUTH ZONE (4205)  
 WESTERN DATA SYSTEMS NETWORK

- GENERAL NOTES:
- 1.) ALL UTILITIES TO BE ABANDONED SHALL BE REMOVED AND BACK FILLED PROPERLY.
  - 2.) THE CONTRACTOR WILL BE RESPONSIBLE FOR COORDINATING WITH ALL APPROPRIATE UTILITY COMPANIES FOR THE LOCATION OF ALL UTILITIES WITHIN CONSTRUCTION AREA.
  - 3.) ALL EXIST. UTILITIES ARE AT APPROXIMATE LOCATIONS.
  - 4.) THE LOCATION OF UNDERGROUND UTILITIES SHOWN ON THESE PLANS ARE BASED ON OBSERVATION OF ABOVEGROUND STRUCTURES, LINES SPOTTED BY THE OWNER, AND UTILITY SPOTTING. ACTUAL LOCATION OF THESE UTILITIES MAY VARY, AND ADDITIONAL BURIED UTILITIES MAY BE ENCOUNTERED UPON EXCAVATION.
  - 5.) BEFORE BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL CALL FOR UTILITY SPOTTING BY THE APPROPRIATE AGENCY AND VERIFY THE LOCATION OF THESE UTILITIES TO HIS SATISFACTION.
  - 6.) ANY DAMAGE CAUSED TO EXISTING STRUCTURES AND/OR UTILITIES BY THE CONTRACTOR SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CORRECT AT HIS EXPENSE.
  - 7.) ANY DAMAGE TO PROPERTY, OUTSIDE THE CONSTRUCTION ZONE, CAUSED BY THE CONTRACTOR, SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CORRECT AT HIS EXPENSE.

LOT 4, BLOCK 26  
 CAPITALLO DISTRICT SUBDIVISION  
 VOLUME "P", PAGE 225, D.R.H.C.  
 KIRK & LINDA SCHWARZ FAMILY LTD.  
 DOC.#1916097, O.R.H.C.

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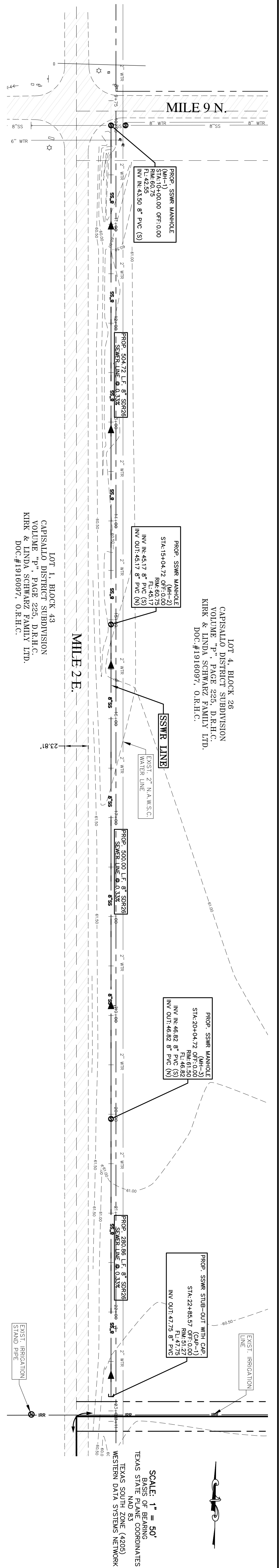
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ISSUED FOR:  
**PRELIMINARY**

**EXIST TOPO LAYOUT**  
**MILE 2 E SANITARY SEWER EXTENSION**  
 HIDALGO COUNTY, TEXAS, TEXAS

LEGEND			
	EXIST. GRATE INLET		1/2" IRON ROD SET
	EXIST. CURB INLET		1/2" IRON ROD FOUND
	EXIST. TELEPHONE PEDESTAL		FENCE CORNER FOUND
	EXIST. GRATE INLET		1/2-INCH IRON PIPE FOUND
	EXIST. LAMP POLE		RIGHT-OF-WAY POST FOUND
	EXIST. TRAFFIC POLE		CALCULATED POINT
	EXIST. GUY WIRE		COTTON PICKER SPINDLE SET
	EXIST. POWER POLE		ELECTRICAL BOX
	EXIST. WATER VALVE		EXIST. FLUSH VALVE
	EXIST. IRRIGATION VALVE		EXIST. SANITARY SEWER MANHOLE
	EXIST. FIREHYDRANT		EXIST. STORM SEWER MANHOLE
	EXIST. MAIL BOX		EXIST. FENCE LINE
	EXIST. BRICK MAIL BOX		EXIST. OVERHEAD ELECTRIC LINE
	EXIST. WATER METER		EXIST. UNDERGROUND CABLE
	EXIST. STREET SIGN		EXIST. UNDERGROUND GAS LINE

ENGINEER: IVAN GARCIA P.E. R.P.L.S.  
 SURVEYOR: IVAN GARCIA P.E. R.P.L.S.  
 CHECKED: IVAN GARCIA P.E. R.P.L.S.  
 DRAWN: HR  
 SCALE: 1"=100'  
 DATE: SEPTEMBER 18, 2024  
 PROJECT: ENG 22 024  
 REVISIONS:  
 PAGE NO. **SHT2**

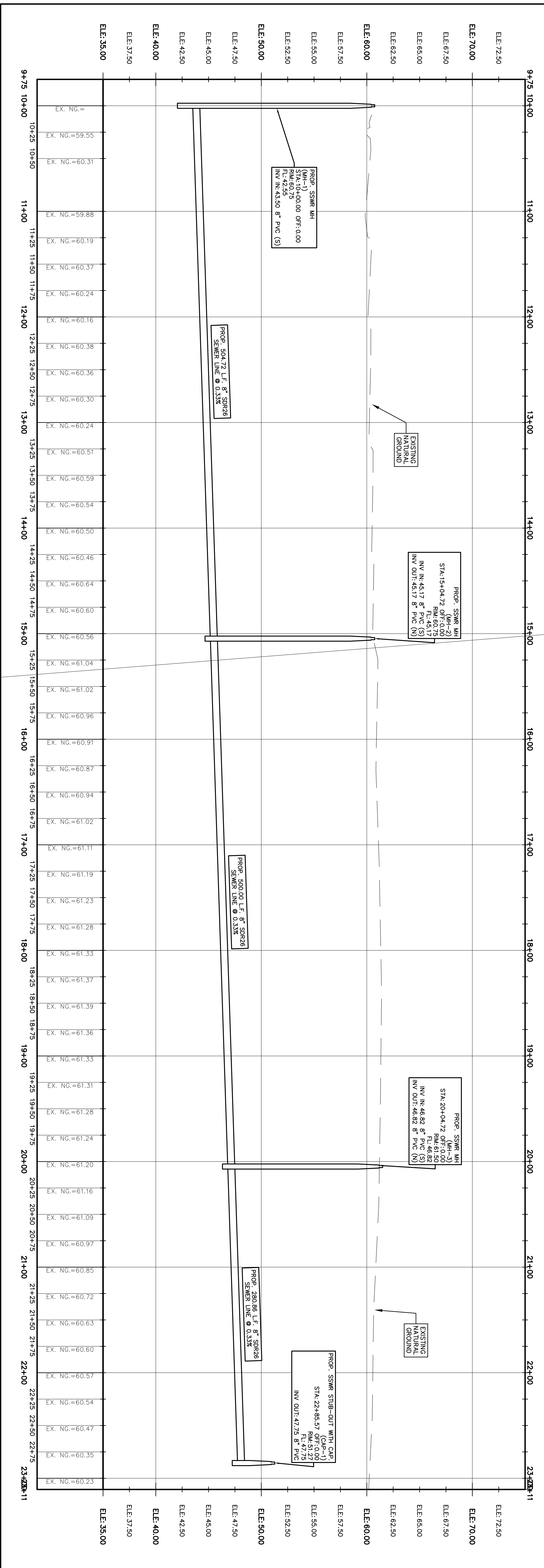


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**SANITARY SEWER PLAN MILE 2 E.**

HORIZONTAL SCALE: 1"=50'  
VERTICAL SCALE: 1"=5'



- NOTES:
- 1) ALL PIPES SHALL HAVE A MINIMUM COVER OF 3 FEET.
  - 2) ALL RINGS AND COVERS SHALL BE AT LEAST 22" IN DIAMETER AND THE COVERS SHALL HAVE THE CITY OF DONNA LOGO.

- NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY/RIGHT OF WAY OWNERS AND PROJECT ENGINEER PRIOR TO START OF CONSTRUCTION AND/OR ANY RELOCATIONS OF UTILITIES
  2. CONTRACTOR SHALL FOLLOW ALL RESPECTIVE REQUIREMENTS FROM UTILITY OWNERS AND PROJECT ENGINEER FOR ALL RELOCATIONS.
  - 3) CONTRACTOR WILL BEGIN DOWN STREAM END OF PROJECT AND CONTINUE UPSTREAM WITH PIPE GROVES FACING UPSTREAM.
  - 4) CONTRACTOR MUST LOCATE AND FIELD VERIFY ALL UTILITIES.
  - 5) ANY CONNECTION TO EXISTING SEWER MANHOLE MUST BE MADE USING AN "INSERT-A-TEE" ASSEMBLY.
  - 6) ALL SANITARY SEWER LINES SHALL BE SDR26 PIPE UNLESS OTHERWISE NOTED.

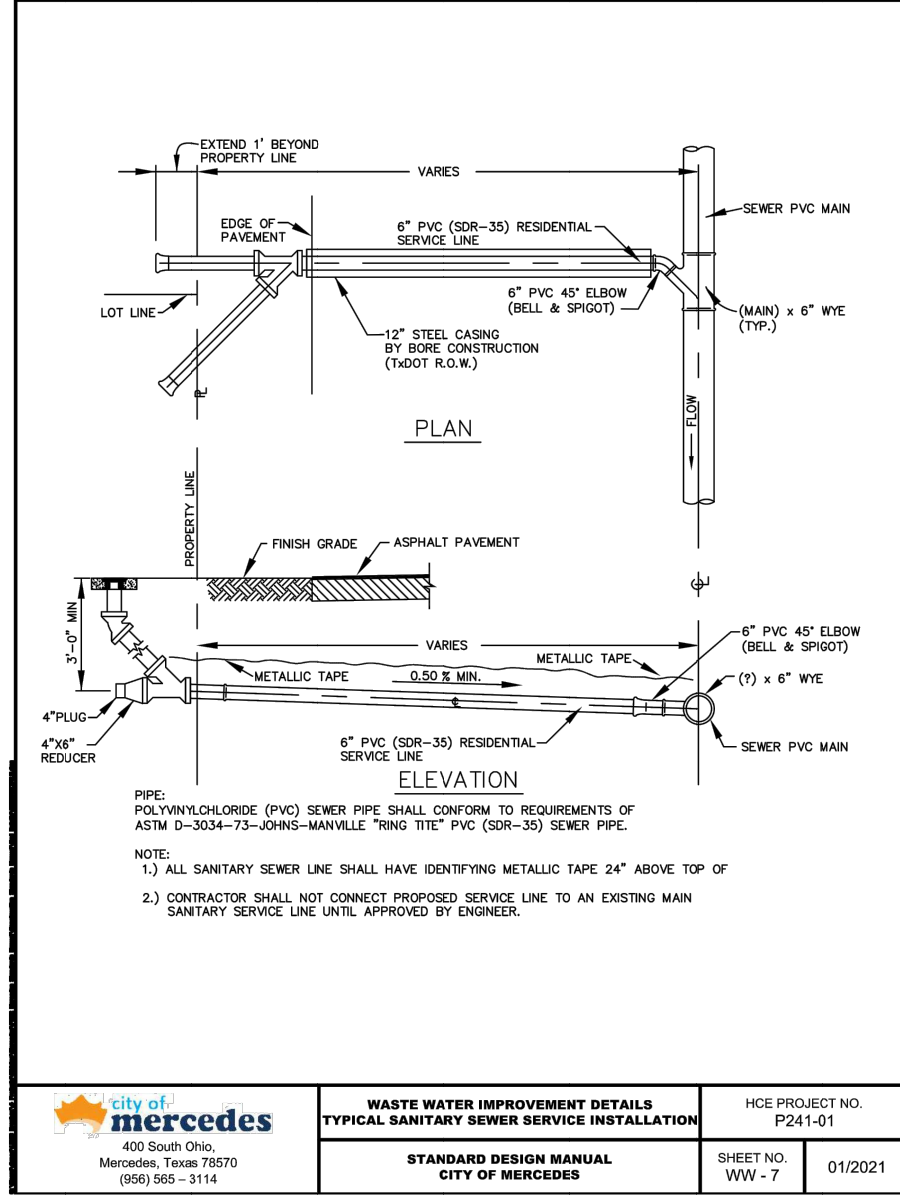
- GENERAL NOTES:
- 1) THE CONTRACTOR WILL BE RESPONSIBLE FOR COORDINATING WITH ALL APPROPRIATE UTILITY COMPANIES FOR THE LOCATION OF ALL UTILITIES WITHIN CONSTRUCTION AREA.
  - 2) ALL EXIST. UTILITIES ARE AT APPROXIMATE LOCATIONS.
  - 3) THE LOCATION OF UNDERGROUND UTILITIES SHOWN ON THESE PLANS ARE BASED ON RECORD DRAWINGS AND FIELD SPOTTING. THE LOCATION OF THESE UTILITIES MAY VARY, AND ADDITIONAL BURIED UTILITIES MAY BE ENCOUNTERED UPON EXCAVATION.
  - 4) BEFORE BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL CALL FOR UTILITY UTILITIES TO HIS SATISFACTION.
  - 5) ANY DAMAGE CAUSED TO EXISTING STRUCTURES AND/OR UTILITIES BY THE CONTRACTOR SHALL BE THE CONTRACTORS RESPONSIBILITY TO CORRECT AT HIS EXPENSE.
  - 6) ANY DAMAGE TO PROPERTY, OUTSIDE THE CONSTRUCTION ZONE, CAUSED BY THE CONTRACTOR, SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CORRECT AT HIS EXPENSE.
  - 7) SANITARY MANHOLES CONCRETE COLLARS SHALL BE SQUARE IN TRAFFIC AREAS AND ROUND IN GREEN AREAS

**SANITARY SEWER PROFILE MILE 2 E.**

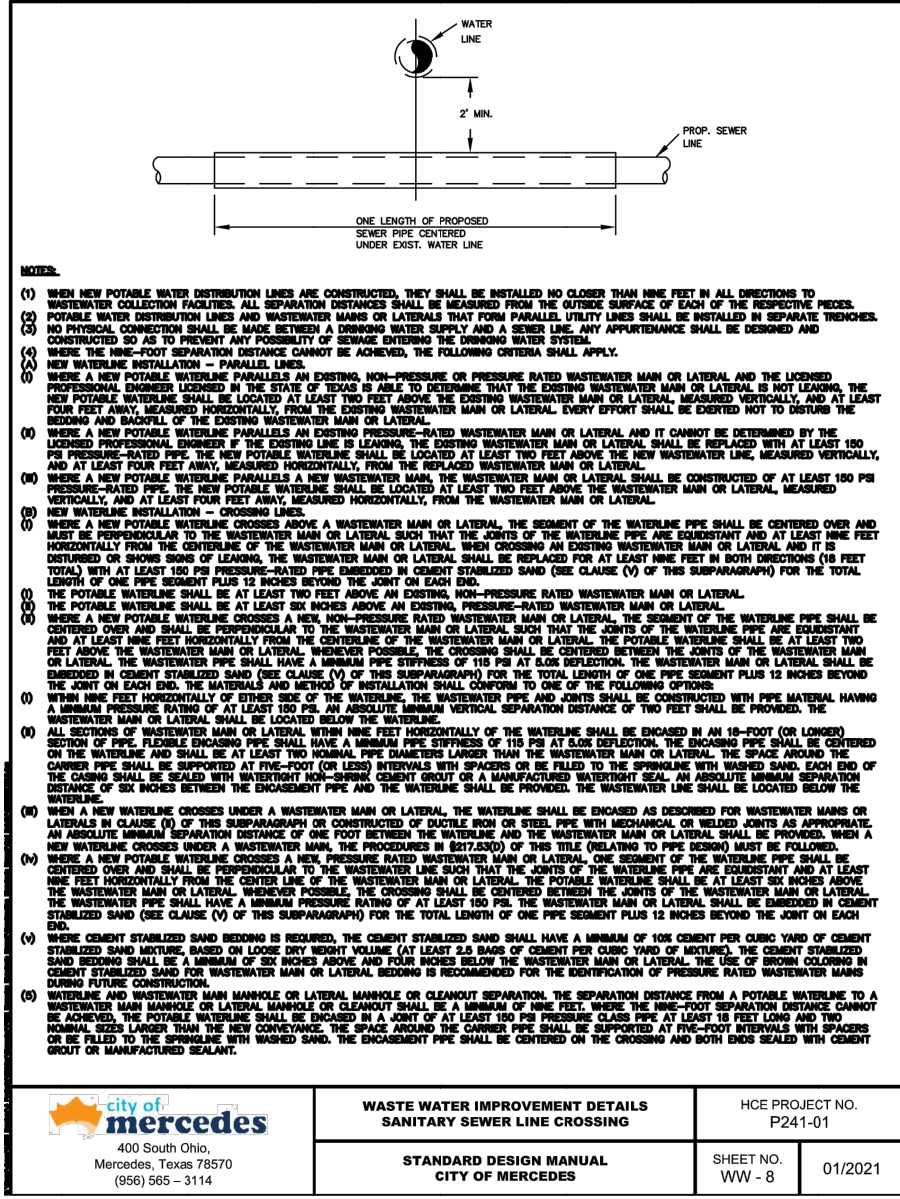
**LEGEND**

	EXIST. GRATE INLET		EXIST. FLUSH VALVE
	EXIST. CURB INLET		EXIST. IRRIGATION VALVE
	EXIST. TELEPHONE PEDESTAL		EXIST. FIREHYDRANT
	EXIST. GRATE INLET		EXIST. MAIL BOX
	EXIST. LAMP POLE		EXIST. BRICK MAIL BOX
	EXIST. TRAFFIC POLE		EXIST. WATER METER
	EXIST. GUY WIRE		EXIST. STREET SIGN
	EXIST. POWER POLE		EXIST. SANITARY SEWER MANHOLE
	EXIST. WATER VALVE		EXIST. STORM SEWER MANHOLE
	EXIST. FENCE LINE		EXIST. COTTON PICKER SPINDLE SET
	EXIST. OVERHEAD ELECTRIC LINE		EXIST. ELECTRICAL BOX
	EXIST. UNDERGROUND CABLE		
	EXIST. UNDERGROUND GAS LINE		
	1/2" IRON ROD SET		
	1/2" IRON ROD FOUND		
	FENCE CORNER FOUND		
	1/2-INCH IRON PIPE FOUND		
	RIGHT-OF-WAY POST FOUND		
	CALCULATED POINT		
	COTTON PICKER SPINDLE SET		
	ELECTRICAL BOX		

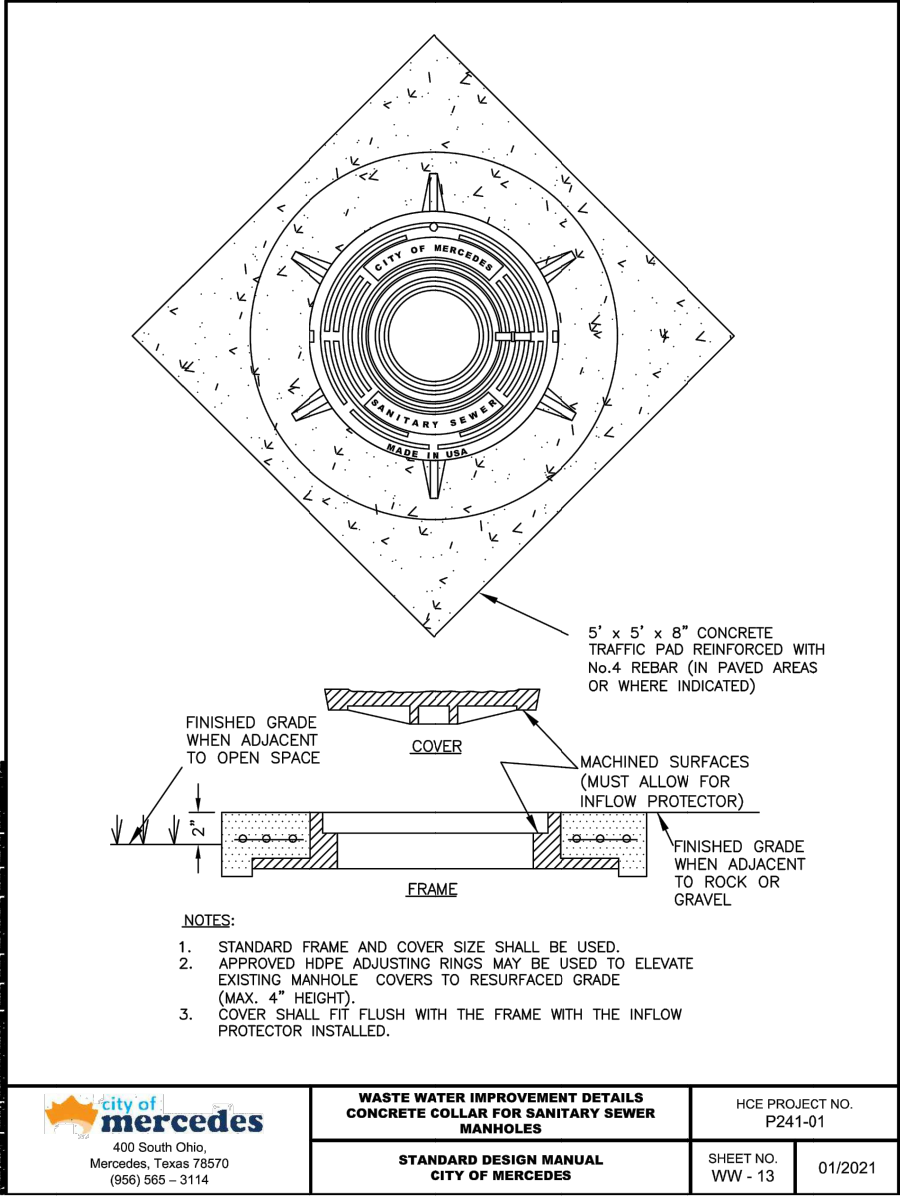
<p>PROJECT : ENGINEER : DRAWN : DATE : SCALE : REVISIONS :</p>	<h2 style="margin:0;">SSWR PLAN AND PROFILE</h2> <h3 style="margin:0;">MERCEDES SUBDIVISION</h3> <h3 style="margin:0;">HIDALGO COUNTY, TEXAS</h3>	<p><b>RIO DELTA ENGINEERING</b></p> <p>FIRM REGISTRATION No. F-7628 SURVEY FIRM No. 10194027 921 S. 10TH AVENUE EDINBURG, TEXAS 78539 (TEL) 956-380-5152 (FAX) 956-380-5083</p>	<p>THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE IAN GARCIA, P.E. 115662 ON SEPTEMBER 18, 2024. IT IS NOT TO BE USED FOR BIDDING OR PERMIT PURPOSES.</p> <p style="text-align: center;"><b>PRELIMINARY</b></p>
<p>PAGE NO. <b>SHT3</b></p>	<p>DATE: SEPTEMBER 18, 2024 PROJECT: ENG 22 024</p>		



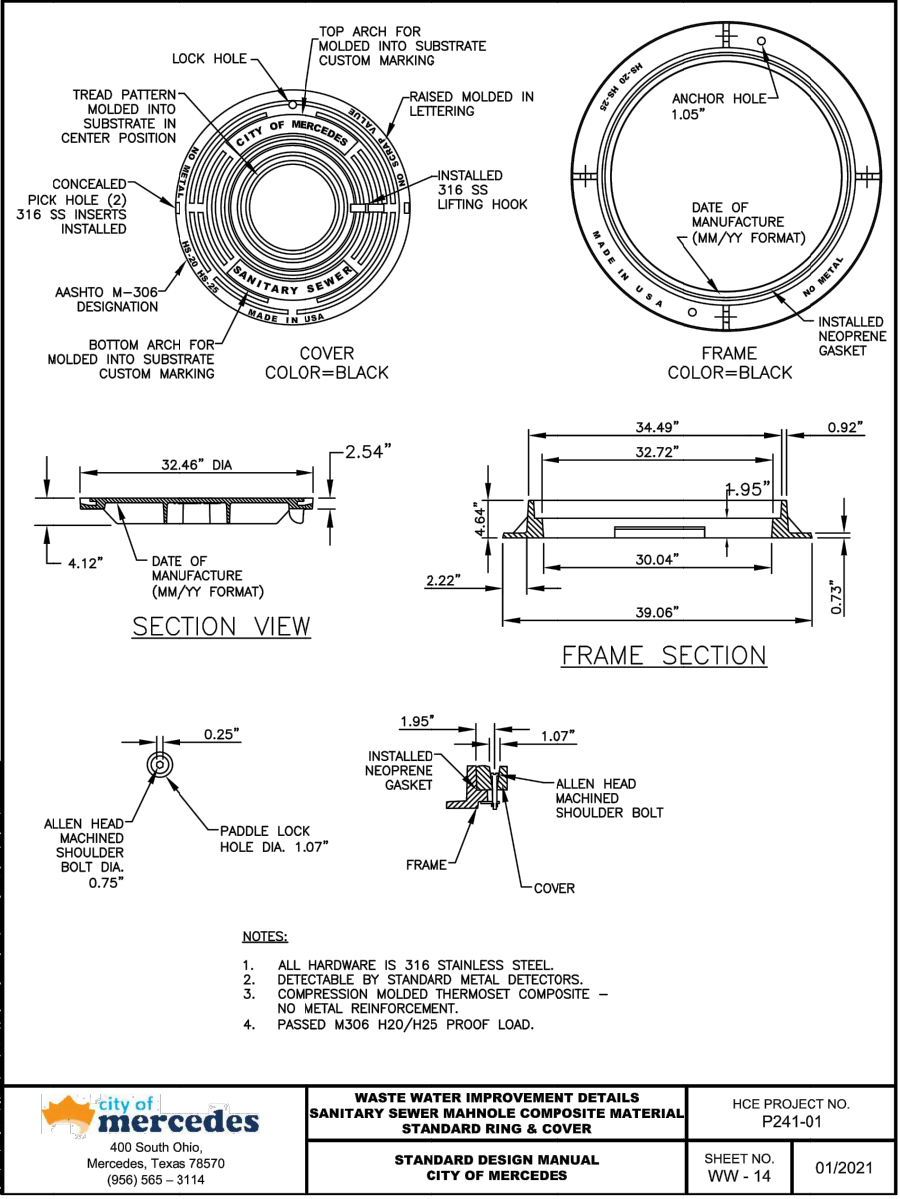
CITY OF MERCED 400 South Ohio Merced, Texas 76703 (956) 985-3114	<b>WASTE WATER IMPROVEMENT DETAILS</b> <b>TYPICAL SANITARY SEWER SERVICE INSTALLATION</b>	HCE PROJECT NO. P241-01
	STANDARD DESIGN MANUAL CITY OF MERCED	SHEET NO. WW-7



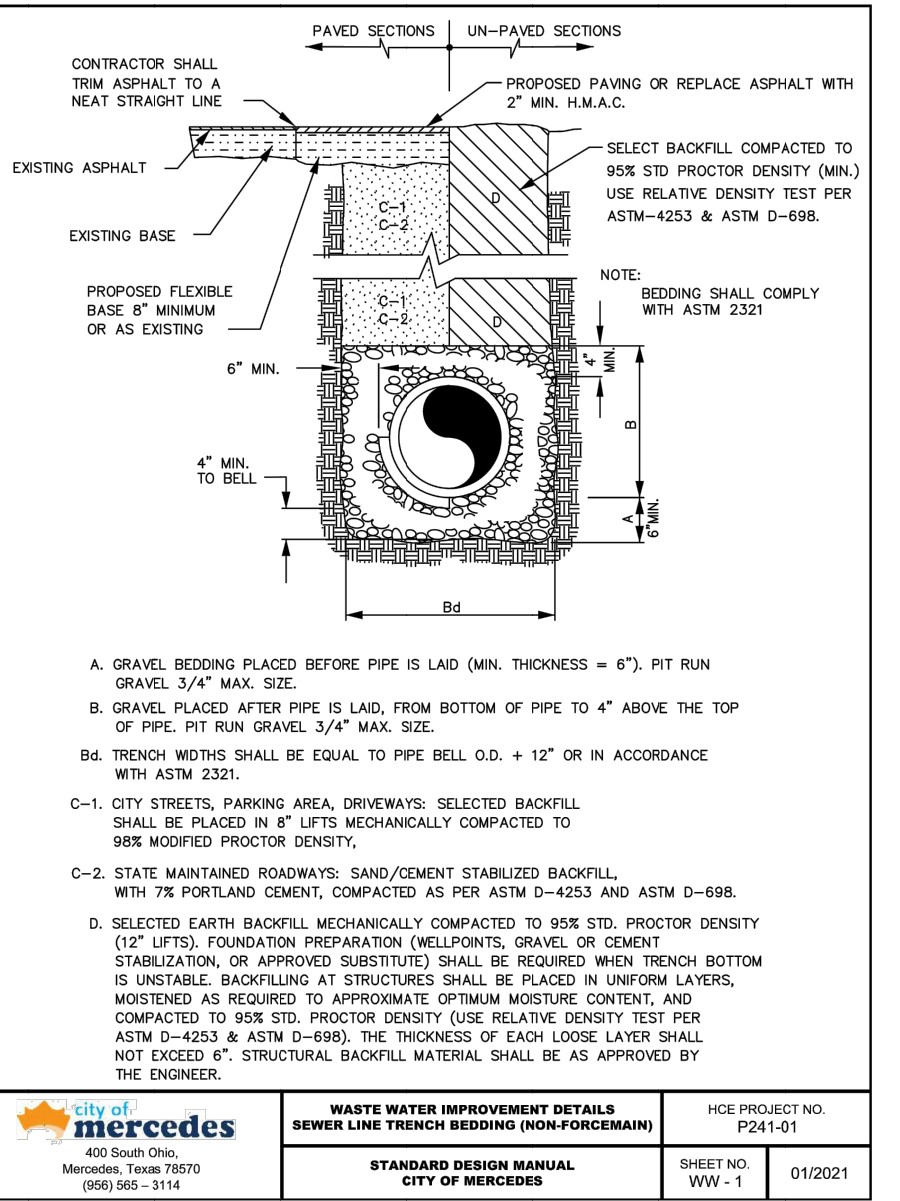
CITY OF MERCED 400 South Ohio Merced, Texas 76703 (956) 985-3114	<b>WASTE WATER IMPROVEMENT DETAILS</b> <b>TYPICAL SANITARY SEWER LINE CROSSING</b>	HCE PROJECT NO. P241-01
	STANDARD DESIGN MANUAL CITY OF MERCED	SHEET NO. WW-8



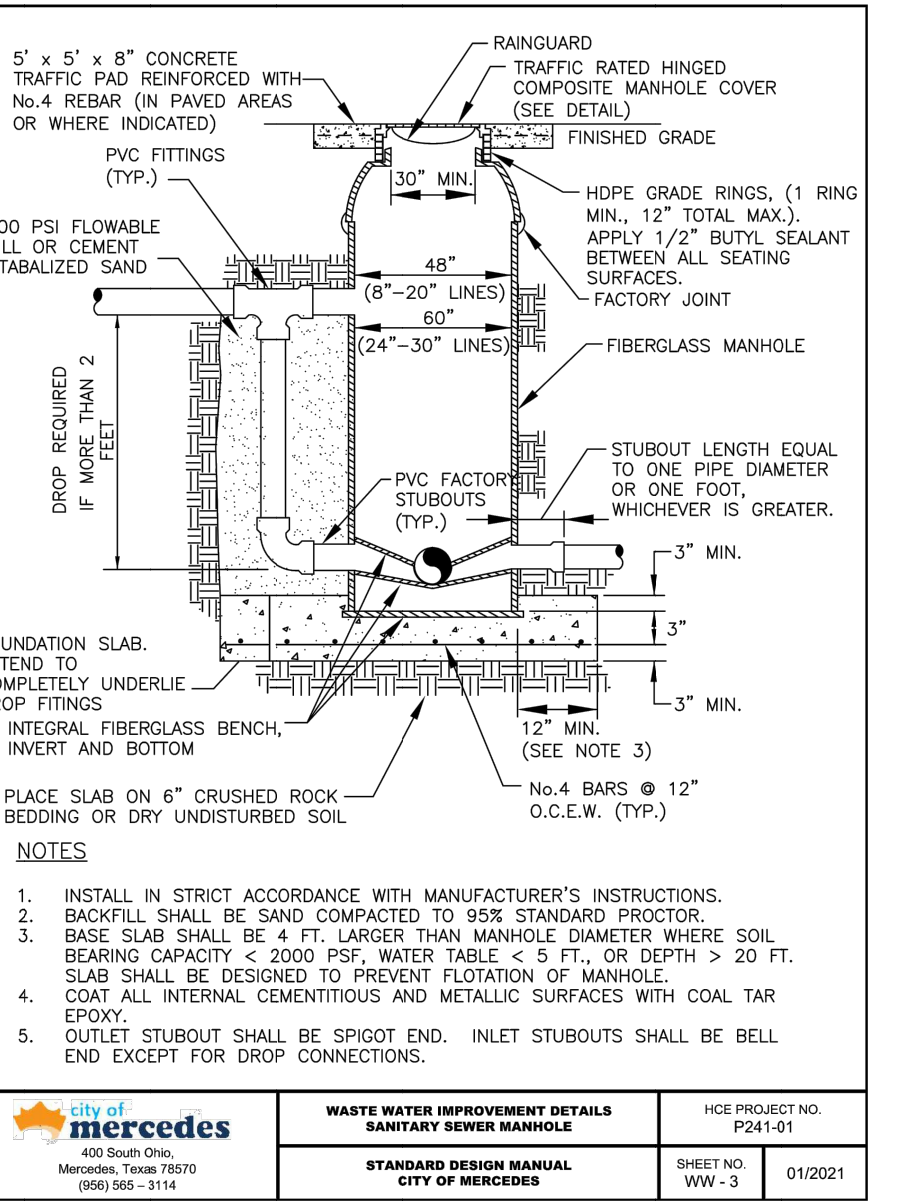
CITY OF MERCED 400 South Ohio Merced, Texas 76703 (956) 985-3114	<b>WASTE WATER IMPROVEMENT DETAILS</b> <b>TYPICAL SANITARY SEWER SERVICE CONNECTION</b>	HCE PROJECT NO. P241-01
	STANDARD DESIGN MANUAL CITY OF MERCED	SHEET NO. WW-4



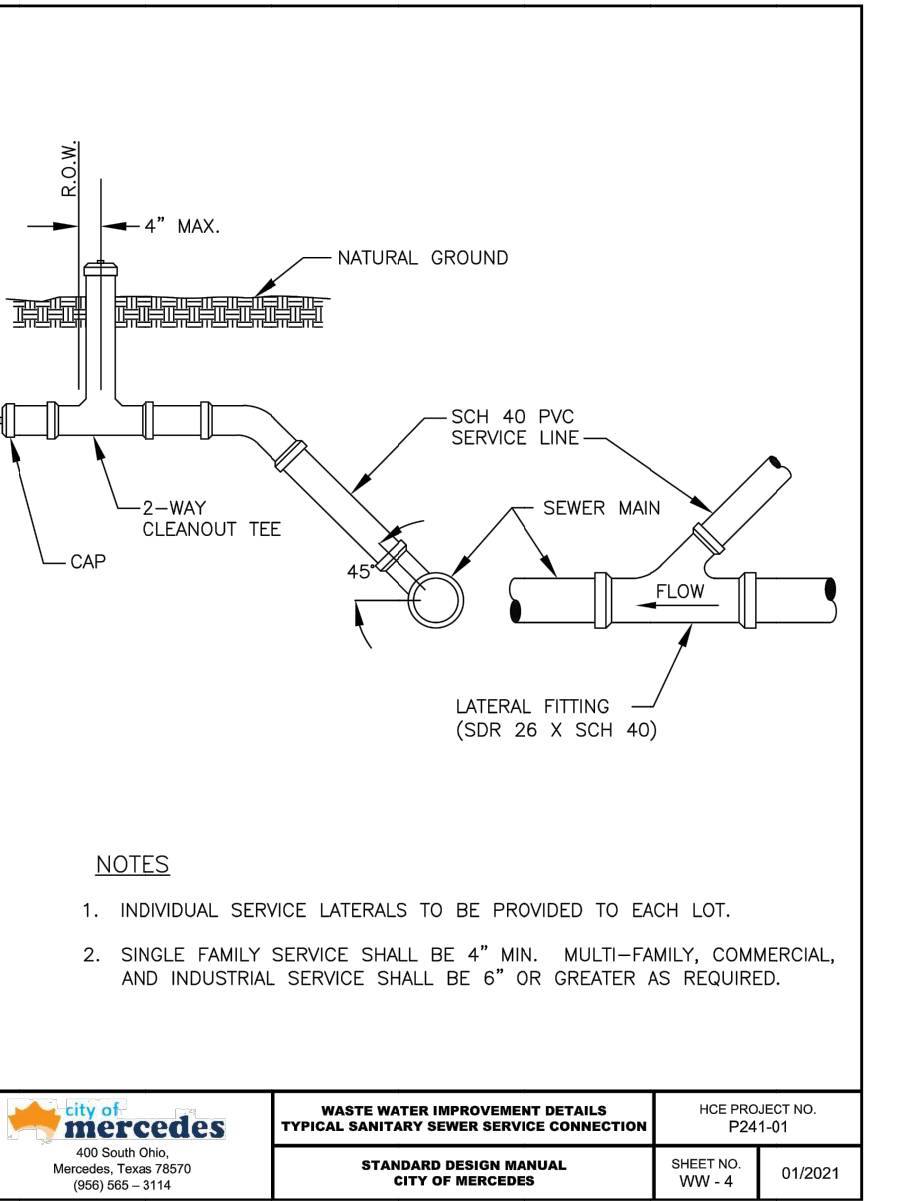
CITY OF MERCED 400 South Ohio Merced, Texas 76703 (956) 985-3114	<b>WASTE WATER IMPROVEMENT DETAILS</b> <b>SANITARY SEWER MANHOLE COMPOSITE MATERIAL STANDARD RING &amp; COVER</b>	HCE PROJECT NO. P241-01
	STANDARD DESIGN MANUAL CITY OF MERCED	SHEET NO. WW-14



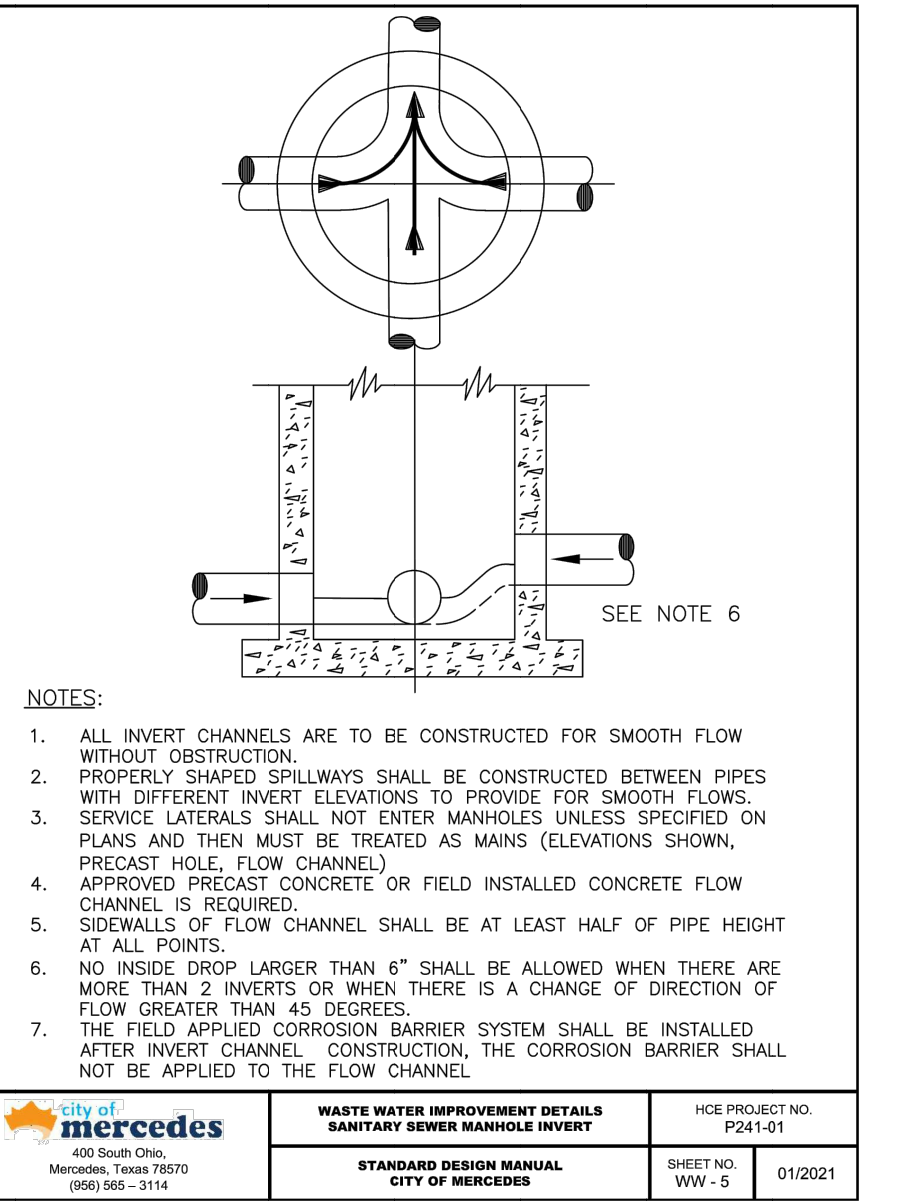
CITY OF MERCED 400 South Ohio Merced, Texas 76703 (956) 985-3114	<b>WASTE WATER IMPROVEMENT DETAILS</b> <b>SEWER LINE TRENCH BEDDING (NON-FORCEMAIN)</b>	HCE PROJECT NO. P241-01
	STANDARD DESIGN MANUAL CITY OF MERCED	SHEET NO. WW-1



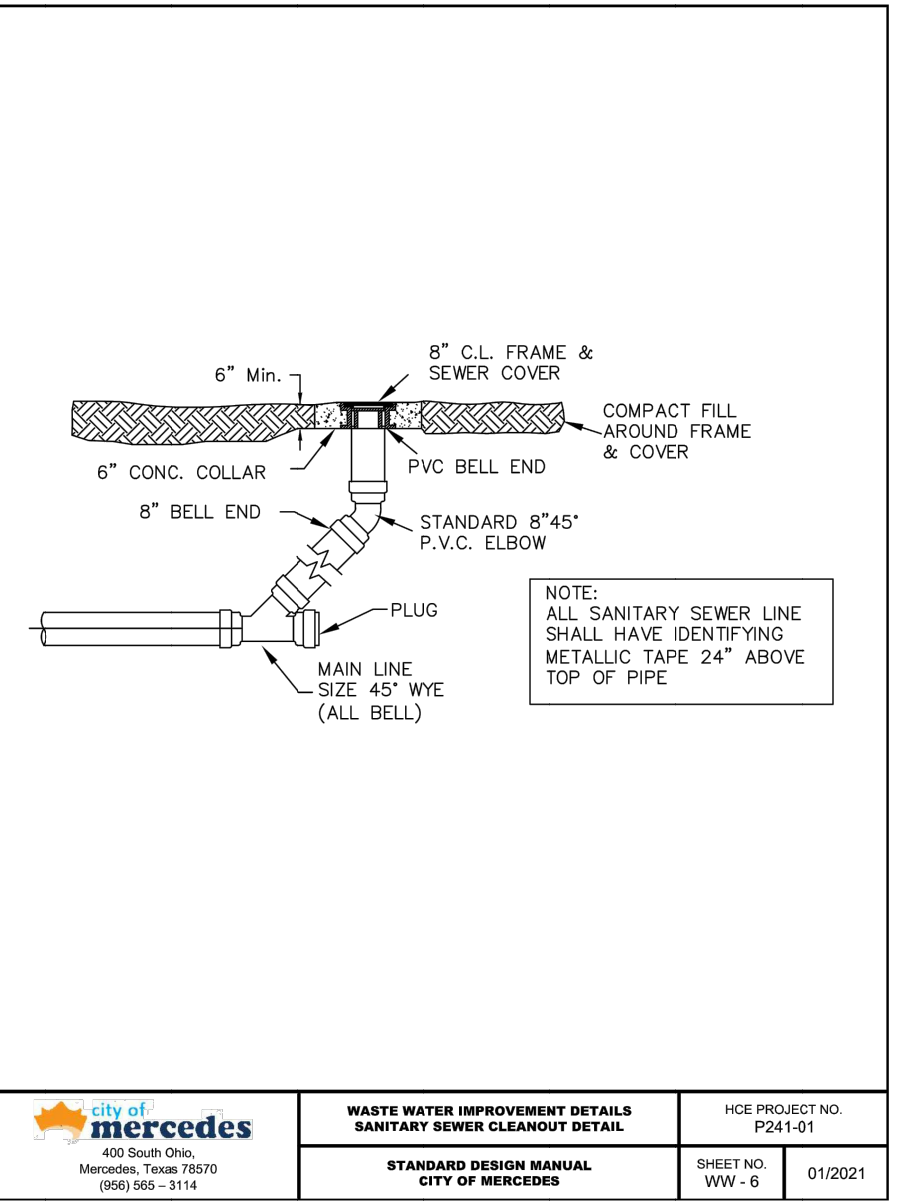
CITY OF MERCED 400 South Ohio Merced, Texas 76703 (956) 985-3114	<b>WASTE WATER IMPROVEMENT DETAILS</b> <b>TYPICAL SANITARY SEWER MANHOLE</b>	HCE PROJECT NO. P241-01
	STANDARD DESIGN MANUAL CITY OF MERCED	SHEET NO. WW-3



CITY OF MERCED 400 South Ohio Merced, Texas 76703 (956) 985-3114	<b>WASTE WATER IMPROVEMENT DETAILS</b> <b>TYPICAL SANITARY SEWER SERVICE CONNECTION</b>	HCE PROJECT NO. P241-01
	STANDARD DESIGN MANUAL CITY OF MERCED	SHEET NO. WW-4



CITY OF MERCED 400 South Ohio Merced, Texas 76703 (956) 985-3114	<b>WASTE WATER IMPROVEMENT DETAILS</b> <b>SANITARY SEWER MANHOLE INVERT</b>	HCE PROJECT NO. P241-01
	STANDARD DESIGN MANUAL CITY OF MERCED	SHEET NO. WW-5



CITY OF MERCED 400 South Ohio Merced, Texas 76703 (956) 985-3114	<b>WASTE WATER IMPROVEMENT DETAILS</b> <b>SANITARY SEWER CLEANOUT DETAIL</b>	HCE PROJECT NO. P241-01
	STANDARD DESIGN MANUAL CITY OF MERCED	SHEET NO. WW-6

Y: RDE ENGINEERING 2022.ENG 22.024\_SHT 4 TYPICAL DETAILS.dwg IVAN 10/15/2024 4:57 PM

**RIO DELTA ENGINEERING**  
 FIRM REGISTRATION NO. F-7628  
 SURVEY FIRM NO. 10194027  
 921 S. 10TH AVENUE EDINBURG, TEXAS 78539  
 (TEL) 956-380-5152 (FAX) 956-380-5083

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ISSUED FOR:  
**PRELIMINARY**

**TYPICAL DETAILS**  
**MILE 2 E SANITARY SEWER EXTENSION**  
 HIDALGO COUNTY, TEXAS, TEXAS

PROJECT:	
ENGINEER:	IVAN GARCIA P.E. R.P.L.S.
SURVEYOR:	IVAN GARCIA P.E. R.P.L.S.
CHECKED:	IVAN GARCIA P.E. R.P.L.S.
DRAWN:	HR
SCALE:	
DATE:	SEPTEMBER 18, 2024
PROJECT:	ENG 22.024
REVISIONS:	
PAGE NO.:	SHT4