



SAN ANTONIO  

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RIVER AUTHORITY

# Wastewater System Design Standards

January 18, 2022

## 1.00 Introduction

- 1.01** The following standards are for the design of utilities to be dedicated to the San Antonio River Authority (the “River Authority”) and/or operated by the River Authority. Please review the following standards carefully and contact the River Authority for a consultation meeting to address any related variances or other construction related matters. Terms in this document are as defined in the River Authority Utility Service Regulations. In the event of a discrepancy between this document and the Utility Service Regulations, the Utility Service Regulations control.
- 1.02** For owner or Developer information, information on the provision of Services by the River Authority, or to set an initial meeting, please send requests to the Utilities Development e-mail at [UtilitiesDevelopment@sara-tx.org](mailto:UtilitiesDevelopment@sara-tx.org)
- 1.03** The River Authority reserves the right to revise these standards and grant variances at its discretion as provided in the Utility Service Regulations.

## 2.00 Design and Documents

- 2.01 Transmittal Letter.** A Transmittal Letter shall be provided with each set of Plans and Reports pursuant to TCEQ Chapter 217, Subchapter A – Administrative Requirements. These documents shall be submitted to TCEQ by the engineer and a copy provided to the River Authority.
- 2.02 Engineering Report.** A signed and sealed report prepared by a registered professional engineer pursuant to the Final Engineering Report requirements in TCEQ Chapter 217, Subchapter A – Administrative Requirements. These documents shall be submitted to TCEQ by the engineer and a copy provided to the River Authority.
- 2.03 Plan Sheets.** Plans shall be sized 11x17 or 22X34 inches (preferred). 24x36 inches will be accepted. All scales and original sizes clearly noted. Final plans shall be dated, signed and sealed by a registered professional engineer in the state of Texas.
- 2.04 Cover Sheet.** The cover shall include a vicinity map showing the project location within the general local county region, a location map delineating the site, a project title, a general summary description of work, an index of sheets, and approval blocks for signatures.
- 2.05 Plan and Profile Sheet.** Sheets shall be scaled to 1” = 40’ (horizontal) and 1” = 4’ (vertical) preferred. 1” = 50’ (horizontal) and 1” = 5’ (vertical) will be accepted, unless otherwise approved by the River Authority. Plan sheets shall also include a scale bar. All notes of construction shall be explicitly called out. Utility locations shall be shown in both plan and profile views and separation distances shall be clearly shown. All piping shown on

drawings shall be labeled as to the size, type, class, process fluid contained, and flow direction. Latest available local Appraisal District lot lines and ownership information shall be present for all existing neighboring properties and Off-Site infrastructure properties. 100-year floodplain shall be clearly delineated utilizing Atlas 14 data, if available. If lines are greater than 15 feet deep, then boring logs shall be shown in the profile. If Off-Site infrastructure is present, then limits of construction with permanent and temporary construction easements shall be clearly shown in the plan view, as well as an access location and any staging areas for the contractor. Any On-Site easements that will not be incorporated into Right of Way shall be clearly shown.

**2.06 Details Sheet.** All necessary details shall be shown for the construction of the project. Survey controls and bore locations shall also be delineated.

### **3.00 General**

**3.01** Provide complete reports and design submittals for River Authority review and approval. Provide one hard copy and one electronic copy in PDF format. Refer to the review timeframe published on the River Authority's website.

**3.02** Copies of each construction submittal (shop drawings, product data, etc.) shall be provided electronically for River Authority review and approval prior to fabrication. Refer to the review timeframe published on the River Authority's website.

**3.03** Copies of all test reports and results shall be provided to the River Authority from the testing laboratory.

**3.04** Provide TCEQ Plan Approval letter to River Authority prior to construction.

**3.05** River Authority shall be present for a substantial completion walkthrough and will include comments for incorporation into the punch list.

**3.06** Provide the following materials prior to acceptance of facilities by River Authority. Provide one electronic copy unless noted otherwise:

**3.06.1** Certificate of substantial completion and Engineer's certification of final completion in accordance with approved plans, specifications, and permits.

**3.06.2** Copies of all close-out submittals required by regulatory agencies (city, county, TCEQ, etc.).

**3.06.3** Waiver of lien by contractor (and subcontractors, as appropriate).

**3.06.4** Warranty certificates, both from contractor and from manufacturer(s),

valid for one year from date of project final acceptance.

- 3.06.5** Record drawings and other documents. Contractor shall provide one complete full-size set of “red lined” as-built drawings in PDF format. Engineer shall prepare corrected CAD drawings (each sheet signed and stamped “record drawing”) and submit to River Authority electronically.
- 3.06.6** Provide the as-builts in the required GIS format in accordance with the GIS Standards for Utilities Development and the River Authority Technical Specifications for Utilities Construction. These documents may be accessed at the following web address: <https://www.sariverauthority.org/public-services/utilities/utilities-development-resources>.
- 3.06.7** All previously approved easements in the name of River Authority as required for operation of the facilities.

#### **4.00 General Design Requirements**

- 4.01** Design and installation shall be in accordance with TCEQ rules and AWWA standards, and in accordance with River Authority standards as further described and referred to in this document.
- 4.02** Locator wire shall be installed on all applicable sanitary sewer mains and laterals.
- 4.03** Noise and odor impacts shall adhere to all state and local regulations.
- 4.04** Piping friction losses shall be calculated with a Hazen-Williams coefficient no greater than 130.
- 4.05** Sanitary tapping saddles are not allowed. Inserta Tees, or an approved equal, will be allowed for tying new laterals into existing mains. The River Authority will require an inspection of all installations prior to covering. If more than five (5) connections are made to an existing main, CCTV inspection of the exiting main testing must be performed and submitted for review and approval.
- 4.06** All piping shall be designed in straight alignment. Gravity mains in excess of 20 feet below finished grade as measured from pipe invert to finished grade must be approved by the River Authority prior to finalizing the design.
- 4.07** Pipe bells shall be installed in upstream direction.
- 4.08** A minimum horizontal and vertical clearance between water/wastewater and other utilities set forth in TCEQ Chapter 217 and Chapter 290 shall be maintained. Shared trenches are not allowed.

- 4.09 Wastewater pipe joints shall be centered at crossings with water utilities, including wastewater laterals and horizontal and vertical clearances set forth in TCEQ Chapter 217 and Chapter 290 shall be maintained.
- 4.10 Wastewater piping (including mains, services, and laterals) shall be sleeved with steel casing if located under box culverts or multiple barrel storm sewer crossings regardless of size and single barrels 30” or larger.
- 4.11 Wastewater piping shall be sleeved in steel casing under roadways when designated by the ROW permit grantor. When crossing a TxDOT roadway, the casing shall extend from right of way boundary to right of way boundary. For piping parallel to a roadway and then crossing the roadway at 90 degrees, the piping shall be cased within one foot of the fitting.
- 4.12 Wastewater service laterals shall be 6” minimum diameter.
- 4.13 When design criteria is not specified in this document or by the River Authority, the designer shall use the following standards and procedures outlined in the following references:
- The ASCE Manuals and Reports on Engineering Practice, specifically MOP 60/WEF Manual of Practice No. FD-5 - Gravity Sanitary Sewer Design and Construction, latest edition
  - AWWA M23 – PVC Pipe Design and Installation, latest edition
  - AWWA M45 – Fiberglass Pipe Design, latest edition
  - Uni-Bell Handbook of PVC Pipe Design and Construction, latest edition
  - Metcalf and Eddy’s “Wastewater Engineering” series
  - Uniform Plumbing Code, latest edition

If conflicts in design criteria are noted in the manuals listed, the River Authority design procedures shall take precedence.

- 4.14 Collection System and Lift Station Design Standards:
- Average Daily Flow = 240 gallons/day/EDU
  - Peaking Factor = 2.5
  - Inflow and Infiltration = 300 gallons/acre

## 5.00 Gravity Wastewater Mains Design Requirements

- 5.01 Low pressure sanitary sewer collection systems are not allowed.

- 5.02 Gravity wastewater mains may be installed within roadways. For Local Roads, mains may be placed in the center of a roadway. For Arterial and Collector Roads, mains shall be centered in one lane of traffic.
- 5.03 All wastewater and storm piping shall have profile drawings, regardless of size. All profiles shall show all utility crossings. Wastewater service laterals shall be shown on storm profiles. Water and storm profiles shall be shown or overlaid onto wastewater piping profiles.
- 5.04 All pipelines shall have a minimum of four feet of cover.

## **6.00 Lift Stations, Force Mains and Appurtenances Design Requirements**

- 6.01 Air release valves shall be provided for all force mains regardless of main size.
- 6.02 Force mains and valves shall be located outside of roadways, pavement, curbs, etc., unless specifically approved otherwise. Force mains shall be installed a minimum of four feet behind back of curb and have a minimum of four feet of cover.
- 6.03 Mechanical restraints for pressure piping systems shall be installed.
- 6.04 Lift station wet wells can be either cast-in-place concrete, precast concrete or fiberglass. Engineering report shall include storage capacity, backfill requirements based on the site geotechnical report, buoyancy calculations, pump and valve selections, force main capacity calculations, gravity main capacity calculations, electrical and SCADA requirements, and meet the design report requirements for TCEQ.
- 6.05 Lift Station pumps shall be from an approved manufacturer. Stainless lifting chain shall be installed for the full depth to the pump.
- 6.06 A detailed system analysis shall be performed to select a suitable pump. The selected pump shall be the best efficiency and performance over the operating range to be used over the lifespan of the pump to maximize energy savings and minimize operational costs. Each operating range shall be fully defined in the report.
- 6.07 Velocity in force mains shall be between two and six feet per second in all phases of the lift station (if a multiple phase lift station).
- 6.08 Plug valves shall be installed on force mains in easily accessible locations, as designated by River Authority, and shall meet TCEQ minimum spacing requirements.
- 6.09 A standby diesel pump is required for all lift stations. A standby generator must be submitted to the River Authority for approval.

- 6.10** SCADA and programming shall be coordinated with River Authority. Contact the River Authority for the latest SCADA standards. Programming and any software used on a River Authority lift station shall become the property of the River Authority.
- 6.11** Buoyancy calculations shall show a minimum 1.5 factor of safety for the lift station wet well.
- 6.12** All lift station discharge piping shall be ductile iron above ground pipe. Plug valves, pressure gauges, flow meters, check valves, air release valves, and the bypass pumping ports shall be installed.
- 6.13** Bypass pumping port shall have a six-inch cam lock connection with check and plug valve. The bypass port shall be located upstream of the flow meter so that all flow passes through the flow meter.
- 6.14** The wet well shall have a stilling well for pressure transducers.
- 6.15** The lift station site shall be graded to drain and have a six-inch layer of two-inch diameter washed gravel with weed barrier on all non-paved areas.
- 6.16** The lift station site shall be fenced with six-foot tall chain-link fencing, two feet of three-strand barbed wire and a minimum 16-foot slide gate. Contractor to install a two-foot wide concrete mow strip under all fencing.
- 6.17** The lift station site shall have an LED site light with hinged steel pole.
- 6.18** The site shall have a hose bib with reduced pressure zone (RPZ) backflow prevention. Hose bib plan detail shall be provided by River Authority.
- 6.19** Pump controls, SCADA equipment, and starters shall be placed under a galvanized steel electrical shelter. The River Authority recommends that the engineer visit a River Authority lift station prior to designing the lift station for their particular lift station.
- 6.20** The lift station site shall have a driveway that allows access with a long wheelbase truck, with adequate room to access the wet well with a boom truck for pump removal.
- 6.21** All interior concrete wet well surfaces shall be coated using an approved product and have minimum one-inch thickness, smooth trowel finish, and spray curing compound in accordance with the manufacturer's specifications.
- 6.22** All metal in airspace of lift station shall be Type 316 stainless steel or approved alternative. Coating shall be used on all surfaces susceptible to corrosion.
- 6.23** Minimum lift station site is 100 X 100 feet.

## **7.00 Materials**

- 7.01** Gravity wastewater pipe and fittings shall be green color gasketed at a minimum ASTM D3034 SDR26, unless otherwise noted in River Authority Specifications. At water crossings including fire hydrant leads, white color gasketed ASTM D2241 SDR26 shall be used for mains and laterals.
- 7.02** Force main piping shall be green color C900 DR25, unless otherwise noted in River Authority Specifications. Fittings shall be AWWA C153 compact mechanical joint ductile iron with restraints. Pipe bell joint restraints shall be installed. Field apply anti-seize compound prior to assembly.
- 7.03** All other fasteners shall be 304 stainless steel (e.g. hardware, screws, anchor bolts, rods, flange bolts and nuts, etc.). All bolts and nuts shall be heavy hex. Field apply anti-seize compound prior to assembly. Bolts and nuts shall not be painted.
- 7.04** All buried metal pipe, fittings, hydrants, and valves shall be wrapped with eight mil poly.
- 7.05** Paint shall be high-build epoxy with topcoat of polyurethane. All materials specifications shall be reviewed and approved by the River Authority prior to installation.
- 7.06** Portland cement shall conform to requirements of ASTM C150 and shall be Type V (Sulfate Resistant Cement Type).

## **8.00 Testing**

- 8.01** All testing shall be arranged and paid for by the contractor and witnessed by the River Authority.
- 8.02** All testing must be complete prior to paving streets.
- 8.03** All testing must be complete prior to performing tie-ins to existing wastewater systems.
- 8.04** All storm, water, reuse, and wastewater utilities must be complete prior to performing wastewater pressure testing.
- 8.05** Contractor shall perform pre-testing to verify passing results prior to requesting River Authority inspection. Contractor shall provide a connection point for River Authority digital test gauge.
- 8.06** Contractor shall perform trench backfill density testing at intervals specified by the design engineer, exact locations to be designated by inspector and provide copies of reports to River Authority electronically.



- 8.07 All gravity wastewater piping shall be subject to low pressure air testing in accordance with TCEQ requirements. Infiltration and exfiltration testing are not allowed.
- 8.08 Mandrel testing shall be performed in accordance with TCEQ requirements. Mandrel shall be pulled by hand through all gravity wastewater mains prior to installation of corrosion-resistant manhole lining, but no earlier than 30 days after backfilling is complete.
- 8.09 All manholes, regardless of vehicular traffic detouring, shall be vacuum tested in accordance with TCEQ requirements after completion of backfill, compaction, and final grading of road base. Testing shall be performed prior to installation of asphalt paving and prior to installation of corrosion-resistant manhole lining. Vacuum testing shall be performed with a plate type test head placed on top of completed manhole metal casting ring which has been installed and encased in concrete at final grade. Manholes shall be tested per TCEQ and River Authority Specification standards. Infiltration and exfiltration testing are not allowed.
- 8.10 Contractor shall perform video inspection of gravity wastewater piping after application of corrosion-resistant manhole lining and provide video inspections and written reports to the River Authority digitally.
- 8.11 Contractor shall follow TCEQ pipe testing procedures and allowable leakage for force mains and test every valve section (i.e. test against every valve in closed position). Test pressure shall be the maximum rating of material installed.
- 8.12 Testing can be performed by a professional engineer licensed in the State of Texas with prior approval by the River Authority. In the event that the River Authority staff is not witnessing the testing, documentation of passing tests must be signed and sealed by an engineer and submitted to the River Authority.

## **9.00 Construction Requirements**

- 9.01 All water and wastewater installations must be inspected and approved by River Authority prior to backfilling or otherwise covering the work. This includes crossings of water and wastewater by other utilities. If trench is backfilled prior to inspection, the River Authority will not approve the work until the trench is exposed for inspection. River Authority will perform a maximum of one inspection daily for one hour between 8:00 a.m. and 5:00 p.m., excluding weekends and holidays. Call or email to schedule inspections. 72 hours' advance notice is required for all inspections.
- 9.02 Trench excavation and pipe installation will not be permitted until subgrade has been established. Survey staking must be installed prior to and maintained during trench excavation and pipe installation. Survey staking shall include horizontal and vertical control at a minimum of 50-foot station intervals.

- 9.03** Valve boxes and appurtenances shall be painted. Painted curb cut markings shall be provided at valves and services using safety green for sewer and safety purple for reclaimed. Concrete curbs shall be stamped with “S” to indicate location of sanitary sewer lateral.
- 9.04** All exposed vertical and horizontal concrete edges shall be formed with  $\frac{3}{4}$ ” chamfer strips. Concrete in unpaved areas shall be 6” above finish grade.
- 9.05** Existing manholes that are disturbed shall be restored to be in full compliance with current standards including testing, corrosion-resistant lining, rings, and covers, etc.
- 9.06** All cleanouts shall be 6-inches and installed within 10-feet of the property line. Cleanout shall be installed in the ROW and cannot be located under driveways or sidewalks unless otherwise approved by the River Authority Plan Review Team.