

CONSTRUCTION STANDARDS

FOR

**PUBLIC UTILITY LINES
AND LIFT STATIONS**

**FORT BEND COUNTY WATER CONTROL
& IMPROVEMENT DISTRICT NO. 2**

FORT BEND AND HARRIS COUNTIES, TEXAS

REVISED

July 6, 1995

Error! Bookmark not defined.. **PURPOSE**

The purpose of these standards is to define the minimum requirements for public water and sanitary sewer construction within the jurisdiction of Fort Bend County WC&ID No. 2, in conjunction with the District's "Rules and Regulations Governing the Construction of District Facilities."

These standards supersede all prior construction standards and are effective July 6, 1995. The District Rate Order and other orders may contain construction procedures and remain in effect.

Error! Bookmark not defined.. **SPECIFICATIONS**

Current City of Houston Standard Specifications with the latest amendments, addenda and revised drawings are to be followed within the jurisdiction of Fort Bend County WC&ID No. 2, except as noted in these Construction Standards:

Variations from these construction standards will be allowed only with written permission of the District Engineer, the General Manager of the District, or the Board of Directors.

All water and sanitary construction shall conform to the latest revision of the Southern Standard Plumbing Code. All plumbers must register with and be approved by the District in accordance with the District's Rate Order.

For utility construction within State, County, or City roadway, railroad right-of-way, or pipeline easement, the specifications of the appropriate agency may supersede the minimum requirements shown in these standards.

Error! Bookmark not defined.. **BONDS**

Fort Bend County WC&ID No. 2 requires the assignment of any payment and performance bonds issued in connection with construction of facilities, the assignment of any manufacturer's warranties, as well as a one-year maintenance bond from all owners or developers who build public facilities. The one-year maintenance bond period shall begin once the District has conditionally in writing accepted the project for operation. Procedures regarding bonds are outlined in the District's "Rules and Regulations Governing the Construction of District Facilities."

The City of Missouri City, The City of Stafford, and Fort Bend County may require performance or maintenance bonds for work within public right-of-way or easements. All applicants are directed to consult with Missouri City, Stafford, and Fort Bend County as applicable regarding building permits and bonds before beginning construction.

Error! Bookmark not defined.. **APPLICATION FOR CONSTRUCTION OF UTILITY IMPROVEMENTS**

Error! Bookmark not defined.. Application to construct District facilities must be filed prior to construction of the facilities. An inspection fee of two percent (2%) of construction cost must be paid before beginning construction. A sample of the application is shown as Appendix A on Page 11 and may be obtained from the District's offices. Construction must not begin until authorized by the District in writing.

Error! Bookmark not defined.. Three (3) copies of as-built plans are required to be delivered to the District office before service connections will be made and before the District will begin maintenance of the public water and sewer main.

Error! Bookmark not defined.. **INSPECTION PROCEDURES**

Error! Bookmark not defined.. A representative of the District shall have the right to monitor periodically the construction of the District facilities. **24-hour** notice BEFORE beginning construction is required. **48-hour** notice BEFORE working on weekends or holidays is required. Work done without advance notice to the District may be required to be removed and replaced.

Error! Bookmark not defined.. Waterline pressure tests and tie-in of new waterlines to existing District lines will be monitored by a representative of the District and Engineering Representative.

Error! Bookmark not defined.. Sanitary sewer and force main pressure tests and tie-in of new sanitary sewers and force mains to existing District lines will be monitored by a representative of the District and Engineering Representative.

Error! Bookmark not defined.. Start-up of public lift station shall be witnessed by the District's operator and Engineer's representative. Proper function of lift station controls shall be verified by the Contractor BEFORE demonstrating the lift station operation to the District.

Error! Bookmark not defined.. Backfilling of public line trench must be accomplished within 24-hours of inspection and approval. No debris will be permitted in the trench.

Error! Bookmark not defined.. The District will require that the public line be uncovered at the Owner's cost if it is backfilled without District inspection and approval.

Error! Bookmark not defined.. The contractor shall comply with all laws

applicable to Trench Safety. OSHA standards shall be followed at all times.

Error! Bookmark not defined.. **WATER MAINS**

Error! Bookmark not defined.. Layouts.

Error! Bookmark not defined.. Loops. All water mains shall be looped whenever possible. Dead ends shall not exceed 600 feet. A blow-off valve in box, flush with grade, or fire hydrant is required on all dead ends.

Error! Bookmark not defined.. Fire Protection. A grid of six-inch (6") and larger mains is required. Eight-inch (8") and larger mains shall be used when more than one (1) intermediate flushing valve or fire hydrant is required.

If fire protection is planned, piping must be approved by Underwriter's Laboratories or Factory Mutual.

Approval of the construction drawings is not warranty by the District that adequate fire protection is provided. **Calculations of fire flows and on-site flow tests are the Owner's responsibility.**

Fire mains in public right-of-way or easements do not need metering. Private fire lines must have detector check valves/Backflow Prevention Assemblies installed in accordance with the District's "Construction Standards for Private Service Connections."

Error! Bookmark not defined.. Water Main Location.

Error! Bookmark not defined.. In street right-of-way, as close to five feet (5_) as possible to edge of public right-of-way, but not under sidewalk.

Error! Bookmark not defined.. In easement 10 feet wide adjacent to right-of-way. No paved parking in easement without District approval.

Error! Bookmark not defined.. Pipe for Water Mains.

Error! Bookmark not defined.. Minimum Diameter. Minimum of 4-inch (4") mains.

Special Minimum Diameter Within Missouri City. For projects within Missouri City city limits, minimum water main size is eight inches (8").

Error! Bookmark not defined.. Depth. For 12-inch (12") and smaller lines, provide four-feet (4_) of cover below final grade. For 16-inch (16") and larger mains, provide five feet (5_) of cover below final grade.

Error! Bookmark not defined.. Material.

Error! Bookmark not defined.. For larger than 12-inch (12") pipe:

(**Error! Bookmark not defined.**) Ductile iron pipe conforming to AWWA C-151, electrical conductivity and corrosion protection required. Wrap in 8 mil black polyethylene.

(**Error! Bookmark not defined.**) Polyvinylchloride (PVC) pipe conforming to AWWA C-905, DR-26.

b. For a six-inch (6") to 12-inch (12") pipe:

(1) Ductile iron pipe conforming to AWWA C-151. Electrical conductivity and corrosion protection required. Wrap in 8 mil black polyethylene.

(2) Polyvinylchloride (PVC) pipe conforming to AWWA C-900, DR-18.

c. For four-inch (4") pipe:

(1) Ductile iron pipe conforming to AWWA C-151, electrical conductivity and corrosion protection required. Wrap in 8 mil black polyethylene.

(2) Polyvinylchloride (PVC) pipe conforming to AWWA C-900, DR-14.

d. Hydrostatic test - to conform to AWWA C-600 (using 125 psi pressure). Test must be witnessed by a representative of the District.

e. Manufactured within the United States.

Error! Bookmark not defined.. Valves.

Error! Bookmark not defined.. Locations.

Error! Bookmark not defined.. At fire hydrant wye - one (1) valve on the stem.

Error! Bookmark not defined.. At other tees - two (2) valves.

Error! Bookmark not defined.. At crosses - three (3) valves.

Error! Bookmark not defined.. At connection to existing system - one (1) valve.

Error! Bookmark not defined.. In the right-of-way, on extended lot lines and not under pavement, driveways, or sidewalks.

Error! Bookmark not defined.. The maximum distance between water main valves shall not exceed 1,000 feet. Valves shall be planned so that no more than four (4) valves must be closed to isolate any portion of the water main.

Error! Bookmark not defined.. Type.

Error! Bookmark not defined.. Gate valves [12-inches (12") and smaller]: Furnish gate valves with gray or ductile cast iron body, resilient seated, non-rising stem, O-ring seal with two-inch (2") square operating nut. Gate valves must conform to AWWA C-509, Resilient Seated Gate Valves for Water and Sewerage Systems. Provide a mechanical joint or a hub-end, gasketed valve to match the pipe selected. Provide a valve stem which turns counterclockwise to open.

Error! Bookmark not defined.. Butterfly Valves [Larger than 12-inches (12")]: Furnish butterfly valves with gray or ductile cast iron body, O-ring seals with two-inch (2") square operating nut. Butterfly valves must conform to AWWA C-504, Rubber Seated Butterfly Valves. Provide a mechanical joint or hub-end, gasketed valve to match the pipe selected. Provide a valve stem which turns counterclockwise to open.

Error! Bookmark not defined.. Brand. Mueller, Kennedy, American Darling, or Dresser M & H.

Error! Bookmark not defined.. Joints.

Error! Bookmark not defined.. Water mains - push-on.

Error! Bookmark not defined.. Fire hydrant stem - mechanical joint and flanged, or mechanical joint.

Error! Bookmark not defined.. Boxes. Cast iron box and stack.

Error! Bookmark not defined.. Fire Hydrants.

Error! Bookmark not defined.. Location.

Error! Bookmark not defined.. Curb-and-gutter streets: three feet (3_) behind face of curb.

Error! Bookmark not defined.. Open ditch streets: One-foot (1_) from edge of and within public right-of-way.

Error! Bookmark not defined.. At each street intersection and at each cul-de-sac longer than 300 feet.

Error! Bookmark not defined.. Single-family areas: 500 feet (500_) interval, maximum.

Error! Bookmark not defined.. Multi-family or commercial areas, including reserves, 300-foot (300_) interval, maximum.

Error! Bookmark not defined.. Type. Three-way, counterclockwise opening, Mueller, Kennedy, or American Darling. Fire hydrants must conform to AWWA C-502, Dry-Barrel Fire Hydrants.

Error! Bookmark not defined.. Joints. Flanged.

Error! Bookmark not defined.. Nozzles. Two (2) 2½-inch (2½") National Standard; one (1) 4_-inch (4_) City of Houston Standard.

Error! Bookmark not defined.. Pipe Lead. ductile iron Schedule 51 or C900.

Error! Bookmark not defined.. Painting.

Error! Bookmark not defined.. Paint cap of hydrant per City of Houston code for size of water main in the roadway.

<u>Size</u>	<u>Color</u>
6"	Yellow
8"	White

10-20"
24-60"

Green
Orange

Error! Bookmark not defined.. Paint barrel of hydrant silver.

Error! Bookmark not defined.. Depth of Bury. The centerline of the 4_ " nozzle shall be 16 inches (16") above finished grade after lot grading is complete.

Error! Bookmark not defined.. Fittings.

Error! Bookmark not defined.. PVC Pipe. Rubber gasketed fittings conforming to applicable provisions of AWWA C-900, AWWA C-905, and ASTM C-111. Same material and pressure class as the water main.

Error! Bookmark not defined.. Ductile Iron Pipe. Rubber gasketed fittings conforming to AWWA C-111. Same material and pressure class as the water main.

Error! Bookmark not defined.. Concrete Thrust Blocking. Thrust blocking is required for all valves, fire hydrants, and fittings.

Error! Bookmark not defined.. Excavation, Bedding, and Backfill.

Error! Bookmark not defined.. Excavation.

Error! Bookmark not defined.. Lines crossing existing streets, driveways, and similar obstructions are to be bored and jacked or tunneled. All other excavations are to be by the open cut method.

Error! Bookmark not defined.. The excavation shall provide a minimum of six inches (6") between the pipe and the sides of the trench. The depth of the excavation shall be six inches (6") lower than the grade shown for the pipe.

Error! Bookmark not defined.. Bedding.

Sand bedding is required around the pipe with a minimum compacted depth of six inches (6") above and below the pipe across the width of the trench. Excavated soil may be used for backfill above the sand backfill.

Error! Bookmark not defined.. Backfilling.

Error! Bookmark not defined.. Under Pavement. Place and compact, to not less than 95% of maximum dry density as determined by AASHTO Standard Method T-99, sand to within one-foot (1_) of bottom of the asphalt or concrete surface course. Cover with asphaltic concrete or concrete as specified by the State, County, City of Stafford, or City of Missouri City.

Error! Bookmark not defined.. All Other Backfill. Backfilling shall be done with selected material which is good earth, sand, or gravel, and free from large rocks or hard, lumpy material unless the rocks or lumps are not more than approximately four inches (4") in greatest diameter and are scattered in the spoil. No material of a perishable, spongy, or otherwise unsuitable nature shall be used in backfilling. Bricks, broken concrete, pieces of asphalt pavement, and all building materials are unsuitable backfill.

Error! Bookmark not defined.. Method of Consolidating Backfill. Compaction shall be by mechanical means. Water tamping is not allowed.

Error! Bookmark not defined.. **SANITARY SEWER MAINS**

Error! Bookmark not defined.. Location.

Error! Bookmark not defined.. Residential. 10-foot (10_) easement along street right-of-way or in the street right-of-way. **Sanitary sewers are not allowed in rear lot line easements.**

Error! Bookmark not defined.. Commercial. 10-foot (10_) easement along street right-of-way or in the street right-of-way. **Sanitary sewers are not allowed in rear lot line easements.**

Error! Bookmark not defined.. Multi-Family. All lines within the project must be private and will not be maintained by the District.

Error! Bookmark not defined.. No paved parking is allowed in an easement without prior District approval. When an easement parallels the road right-of-way, driveways may cross the easement.

Error! Bookmark not defined.. Pipes for Sanitary sewer Mains.

Error! Bookmark not defined.. Minimum Diameter. Minimum diameter

is eight inches (8").

Error! Bookmark not defined.. Depth. Provide minimum four feet (4_) of cover below final grade.

Error! Bookmark not defined.. Slope. Slope is to be per City of Houston recommended grades. If an outfall is shallow or a conflict exists, Texas Natural Resource Conservation Commission minimum slopes may be used with prior approval from a representative of the District.

Error! Bookmark not defined.. Material.

Error! Bookmark not defined.. Ductile iron pipe conforming to AWWA C-151, electrical conductivity and corrosion protection required. Wrap in 8 mil black polyethylene.

Error! Bookmark not defined.. Polyvinylchloride (PVC) pipe conforming to ASTM Specifications D-3034 (SDR 26).

Error! Bookmark not defined.. Manholes.

Error! Bookmark not defined.. Diameter. Inside diameter 4_-0".

Error! Bookmark not defined.. Spacing. 400 feet (400_) maximum.

Error! Bookmark not defined.. Material.

Error! Bookmark not defined.. In street right-of-way, use monolithic or precast concrete.

Error! Bookmark not defined.. In commercial areas and in easement adjacent to street right-of-way, use monolithic or precast concrete.

Error! Bookmark not defined.. In residential areas and in easements along street right-of-way, use monolithic or precast concrete.

Error! Bookmark not defined.. Brick manholes or fiberglass manholes are not allowed.

Error! Bookmark not defined.. Manhole adjustments are to be made with precast rings, no bricks allowed.

Error! Bookmark not defined.. All precast manhole joints to be O-ring gasketed.

Error! Bookmark not defined.. All precast adjustment rings to have mastic adjustment material (ram-nek).

4. Wall Thickness. Per City of Houston.
5. Drop Manholes. Drop manholes are required for all drops greater than two feet (2_).
6. Ring Size. Minimum 32-inch (32").

Error! Bookmark not defined.. Field Test. Air testing is required per "Fort Bend County WC&ID No. 2 Leakage Test for Sewer Mains for Ductile Iron, and PVC Pipe." See Appendix B.

Error! Bookmark not defined.. Excavation, Bedding, and Backfill.

Error! Bookmark not defined.. Excavation.

Error! Bookmark not defined.. When crossing private roads, utility construction shall minimize inconvenience to the property owner involved. Road surface and subgrade shall be restored to original condition or better.

Error! Bookmark not defined.. Open cut of existing public road shall be made only with prior approval of the appropriate municipality. Sheeting and bracing shall be used to prevent caving when necessary.

Error! Bookmark not defined.. Cut the sides of trenches as nearly vertical as possible. The minimum width of trench is pipe outside diameter (O.D.) plus eight inches (8"). The maximum trench width is pipe O.D. plus 20 inches (20"). Width of trench is measured 12 inches (12") above top of pipe when pipe is laid to grade.

Error! Bookmark not defined.. When boring and jacking or tunneling, the pipe material shall be steel or ductile iron pipe. PVC pipe may be used once a casing of steel or ductile iron is in place.

Error! Bookmark not defined.. Bedding. Bedding for pipes shall be cement stabilized sand from 6-inches below to 6-inches above the pipe. Should the excavation be carried below grade, backfill to desired pipe grade with cement-stabilized sand, which is compacted until it is firm and unyielding.

Error! Bookmark not defined.. Backfilling.

Error! Bookmark not defined.. Under Pavement. When open cut of a public or private road or driveway has been made, backfill to the pavement base with 2.0 sack cement-stabilized sand compacted to 95% of maximum dry density as determined by AASHTO Standard Method T-99. Follow compaction procedures outlined in the City of Houston Standards. Place pavement base over cement-stabilized sand, and patch the pavement using accepted construction standards.

Error! Bookmark not defined.. All Other Backfill. Backfilling shall be done with selected material which is good earth, sand, or gravel, and free from large rocks or hard, lumpy material unless the rocks or lumps are not more than approximately four inches (4") in greatest diameter and are scattered in the spoil. No material of a perishable, spongy, or otherwise unsuitable nature shall be used in backfilling. Bricks, broken concrete, pieces of asphalt pavement, and all building materials are unsuitable backfill. Place and compact backfill in 12-inch (12") lifts to 90% of maximum dry density as determined by AASHTO Standard Method T-99. Round over trench slightly to allow for settlement.

Error! Bookmark not defined.. Method of Consolidating Backfill. Compaction shall be by mechanical means. Water tamping is not allowed.

Error! Bookmark not defined.. Services. Service taps and laterals shall be installed before new paving is complete. Pushing services under existing pavement is required. Open cut of roadways will not be permitted for service lines.

For all new subdivisions, all near side and far side sewer services shall be installed to the property line before pavement construction and in conjunction with construction of the main lines.

Error! Bookmark not defined.. Trench Safety Systems. The Contractor shall comply with all laws applicable to Trench Safety. OSHA standards shall be followed at all times.

Error! Bookmark not defined.. **SANITARY SEWER FORCE MAINS**

Error! Bookmark not defined.. Location. See Section VII. A.

Error! Bookmark not defined.. Pipes for Sanitary Sewer Force Mains.

Error! Bookmark not defined.. Minimum Diameter. Minimum diameter is four-inches (4").

Error! Bookmark not defined.. Depth. Provide minimum four feet (4_) of cover below final grade.

Error! Bookmark not defined.. Material.

Error! Bookmark not defined.. Ductile iron pipe conforming to AWWA C-151, electrical conductivity and corrosion protection required. Wrap in 8 mil black polyethylene.

Error! Bookmark not defined.. Polyvinylchloride (PVC) pipe conforming to AWWA C-900 and AWWA C-905. For larger than 12-inch (12") pipe provide DR-26. For six-inch (6") to 12-inch (12") pipe provide DR-18. For four-inch (4") pipe provide DR-14.

Error! Bookmark not defined.. Air Release Manholes.

Error! Bookmark not defined.. Location. Provide air release manholes at all sanitary sewer force main high points to release excess air and relieve vacuums.

Error! Bookmark not defined.. Diameter. Inside diameter 4_-0".

Error! Bookmark not defined.. Material. Monolithic or precast concrete with pea gravel bottom to drain.

Error! Bookmark not defined.. Air-Vacuum Valve. Provide a combination air-vacuum valve as manufactured by Apco or Val-Matic or approved equivalent.

Error! Bookmark not defined.. **REGULATIONS OF OTHER ENTITIES**

These construction standards are not intended to replace the regulations of other governmental or private entities whose jurisdiction includes new subdivisions within the limits of Fort Bend County WC&ID No. 2.

--o0o--

APPENDIX B

Fort Bend County WC&ID No. 2 Leakage Test for Sewer Mains for Ductile Iron and PVC Pipe

After backfilling and removing debris from each section of sewer lines, conduct a line acceptance test under observation of an inspector. 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.

Error! Bookmark not defined.. Minimum Requirements for Equipment.

(**Error! Bookmark not defined.**) Control Panel

(**Error! Bookmark not defined.**) Low-Pressure air supply connected to control panel.

(**Error! Bookmark not defined.**) Pneumatic plugs of acceptable size for diameter of pipe to be tested; capable of withstanding internal test pressure without leaking or requiring external bracing.

(**Error! Bookmark not defined.**) Air hose from control panel to:

(**Error! Bookmark not defined.**) Air Supply

(**Error! Bookmark not defined.**) Pneumatic Plugs

(**Error! Bookmark not defined.**) Sealed Line for Pressurizing

(**Error! Bookmark not defined.**) Sealed line for monitoring internal pressure

Error! Bookmark not defined.. Testing Pneumatic Plugs. Test plugs before using in actual test installation. Place one (1) length of pipe on ground and seal at both ends with pneumatic plugs to be checked. Pressurize plugs to 25 psig; then pressurize sealed pipe to 5 psig. The plugs are acceptable if they remain in place against the test pressure without external aids.

Error! Bookmark not defined.. Compensation for Ground Water Pressure. Where ground water exists, install a capped pipe nipple at the same time the sewer line is placed. Use a ½-inch (½") capped pipe nipple approximately 10 inches (10") long. Make the installation through the manhole wall on top of the sewer line where the line enters the manhole.

Immediately before performing the line acceptance test, remove the pipe cap, clear the pipe nipple with air pressure, and connect a clear plastic tube to pipe nipple. Support the tube vertically and allow water to rise in the tube. After the water stops rising, measure the height in feet of water over the invert of the pipe. Divide this height by 2.3 feet/psi to determine the ground water pressure to be used in line testing.

Error! Bookmark not defined.. Line Testing. After pneumatic plugs have been checked, place plugs in line at manholes and inflate plugs to 25 psig. Introduce low-pressure air into the sealed line until the internal air pressure reached 4 psig

greater than the ground water pressure. Allow at least two (2) minutes for air pressure to stabilize. If at least 3.5 psig over ground water pressure is maintained, disconnect the air hose from the control panel to the air supply and measure the time of the pressure drop between 3.5 and 2.5 psig above ground water pressure.

The installation is acceptable if the air loss rate does not exceed 0.003 cfm per square foot of internal pipe surface with an average test pressure of 3.0 psig greater than ground water pressure. The line between manholes is within acceptable limits if the time for the 1 psig pressure drop is not less than the time computed by the following equation:

$T = 0.0850(D)(K)/(Q)$ where T = time for pressure to drop 1.0 pounds per square inch gauge in seconds.

$K = 0.00049(D)(L)$, but not less than 1.0.

D = Average inside diameter in inches.

L = Length of line of same pipe size in feet.

Q = Rate of Loss, assume $0.0015 \text{ ft.}^3/\text{min.}/\text{ft.}^2$ internal surface.