

Special Specification 7176

Sanitary Sewer



1. DESCRIPTION

1.1. Scope of Work

Provide and install complete sanitary sewer construction and adjustments in conformity with the details shown on the plans, as described herein, in compliance with the Department's Utility Accommodation Policy (UAP)(Title 43, T.A.C., Sections 21.31-21.55) or as directed.

Reference specifications of the American Society for Testing and Materials (ASTM), American Water Works Association (AWWA) and American National Standards Institute (ANSI) will mean the latest standard in effect on the date of the proposal.

2. MATERIALS

All materials furnished for this project will be new. A manufacturer's certificate of compliance will be acceptable for quality control.

3. CONSTRUCTION

3.1. Excavation

Excavation as required to complete the work as outlined herein will be performed in accordance with Item 400, "Excavation and Backfill for Structures".

3.1.1. Trench Excavation Protection

Excavation greater than 5-ft. in depth is to be protected as specified in Item 402, "Trench Excavation Protection", or Item 403, "Temporary Special Shoring".

3.1.2. Trenches

Trench walls shall be vertical. The practice of undercutting at the bottom or flaring at the top will not be permitted except where it is justified for safety or at the Engineer's and/or Inspector's direction. In special cases, where trench flaring is required, the trench walls shall remain vertical to a depth of at least 1 foot above the top of the pipe.

The trench bottom shall be square or slightly curved to the shape of the trenching machine cutters. The trench shall be accurately graded along its entire length to provide uniform bearing and support for each section of pipe installed upon the bedding material. Bell holes and depressions for joints shall be dug after the trench bottom has been graded and bedding installed. The pipe shall rest upon the new bedding material for its full length.

Where over-excavation occurs and when not as directed by the Engineer or Inspector, the under-cut trench shall be restored to grade at no cost to SAWS by replacement with a material conforming to the requirements of the bedding material or a material approved by the Engineer.

3.2. Width of Trench

Minimum Width of Trench. The minimum width of pipe trenches, measured at the crown of the pipe, shall be not less than 12 inches greater than the exterior diameter of the pipe, exclusive of bells. The minimum base width of such trench shall be not less than 12 inches greater than the exterior diameter of the pipe, exclusive of special structures or connections. Such minimum width shall be exclusive of trench supports and not greater than the width at the top of the trench.

Maximum Width of Trench. The maximum allowable width of trench for pipelines measured at the top of the pipe shall be the outside diameter of the pipe (exclusive of bells or collars) plus 24 inches. A trench wider than the outside diameter plus 24 inches may be used without special bedding if the Contractor, at his sole expense, furnishes pipe of the required strength to carry additional trench load. Such modifications shall be submitted to the Inspector and approved in writing. Whenever such maximum allowable width of trench is exceeded, except as provided for in the contract documents, or by written approval of the Engineer, the Contractor, at his sole expense, shall encase the pipe in concrete from trench wall to trench wall, or with other approved pipe bedding material. Any excavation wider than this maximum width or subsequent surface or paving work, will be done at the Contractor's sole expense.

3.2.1. Classification of Excavated Materials

No classification of excavated materials will be made. Excavation and trench work is to include the removal and subsequent handling of all materials excavated in accordance with Item 400, "Excavation and Backfill for Structures".

3.2.2. Grade of Trench Bottom

The trench is to be over-excavated to a depth of 6-in. below the grade line established for the bottom of the pipe, regardless of the type of pipe. The grade line of the pipe is to then be met by the addition of a layer of approved bedding material as directed.

3.2.3. Excavation Below Grade

Any part of the bottom of the trench excavated below the limits specified in Section 3.2.2., "Grade of Trench Bottom", is to be corrected with approved material and compacted as directed. Should excessive over-excavation occur, except at bell holes, the grade is to be restored in accordance with the methods described in Section 3.2.4, "Unstable Conditions at Grade", at no cost to the Department.

3.2.4. Unstable Conditions at Grade

Where the bottom of the trench at grade is found to be unstable or to include ashes, cinders, any type of refuse, vegetable or other organic material, or large pieces of fragments or inorganic materials which in the judgment of the Engineer should be removed, the Contractor is to excavate and remove such unsuitable material to the a depth no less than 6-inches below pipe. Before the pipe is laid the grade is to be restored by backfilling with an approved material in layers of 3-in. prior to compaction. The layers are to be slightly moistened and thoroughly compacted so as to provide a uniform and continuous bearing and support for the pipe at every point between bell or collar holes. The finished grade is to be accurately graded to provide uniform bearing and support for each section of pipe at every point along its entire length except for the portions of the pipe sections where it is necessary to excavate for bell holes and for the proper seating of pipe joints.

3.2.5. Caution in Excavation

The Contractor is to proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures and utilities may be determined whether shown on the plans or not. Machine excavation is not permitted closer than 12-in. on either side of other existing underground utilities. The Contractor is to be responsible for the repair of such structures and utilities when broken or damaged. He is also to be responsible for adjusting alignment and trench grades with reference to such structures in order to obtain specified clearance for the sewer main construction.

Whenever the Engineer determines that it is necessary to explore and excavate to determine the location of existing underground structures and utilities, the Contractor is to make explorations and excavations for such purposes at his expense. Backfill Material Derived from Excavation.

Any excess excavated material, not utilized after all fill requirements have been met, shall become the responsibility of the Contractor. The Contractor shall dispose of it by hauling and wasting outside the limits of the rights-of-way or easements of this project and of public thoroughfares and water courses, in conformity with pertinent City, County, State and Federal codes and ordinances and in a manner meeting the approval of the Engineer.

3.2.6. Trench Restoration

The surface of the backfilled trench shall be restored to match the previous existing conditions. This shall include final grading, placement of topsoil and seeding, placement of sod (such as at homes or businesses that had maintained grass), or other unprepared and prepared surfaces.

Trenches in alleys actively being used by vehicles (such as trash pickup, vehicle parking, etc.) shall be restored by grading and compacting to 98% or higher with a minimum of 4 inches of flexbase materials for the entire width of the alley. Asphaltic materials shall have a compaction density of 95%. Alleys not actively used by vehicles shall be graded and compacted to 98% or higher from the top of the initial backfill to the bottom of the pavement section, then spread grass seed for entire width of the alley.

Trenches in paved streets shall be covered with a temporary all weather surface to allow for vehicular traffic until the final asphalt/concrete paving is complete. This surface shall be a minimum of 4 inches compacted and rolled asphaltic black base, either hot-mix or cold-mix applied. It is the Contractor's responsibility to maintain this surface until the final street restoration is complete. Temporary street striping may also be required. This surface must be removed prior to final asphaltting.

All street work shall be done in accordance with the latest TXDOT construction specifications. Included in this requirement is replacement of any curbs or sidewalks damaged or removed during the construction.

No separate payment for the surface restoration is permitted. The cost for this work must be included in the appropriate bid item.

3.2.7. Pavement.

The Contractor is to remove pavement and surfaces as a part of the trench excavation. The removal of pavement and surfaces and their restoration is to be based on the minimum trench widths as specified, plus 6-in. either side or as otherwise provided herein. The Contractor is to use such methods as sawing, drilling, or chipping to assure the breaking of the pavement along straight lines.

If the Contractor removes or damages pavement or surfaces beyond the limits specified above, such pavement and surfaces are to be restored at the expense of the Contractor.

Where water line construction necessitates cutting through existing streets outside the limits of new street construction, said streets are to be replaced in kind as directed. Where, in the opinion of the Engineer, it is necessary to maintain traffic across a trench, the Contractor is to install temporary metal bridges as necessary to facilitate the movement of traffic.

The street surface adjacent to the trench is to be kept free of surplus spoil. Construction materials are to be placed at locations that will minimize interference with the traveling public.

3.2.8. Concrete Sidewalks, Driveways, Etc.

All concrete sidewalks, driveways, etc., are to be cut with a concrete saw. When transverse expansion or "dummy" joints are encountered, the concrete is to be removed to the nearest transverse joint on each side

of the trench and restored. The depth of cut is to be such that upon removal of the concrete, the sides of the cut are to be straight and square.

Existing reinforcing wire fabric or bars are to be cut and removed to permit completion of trench excavation, pipe laying, and backfill operations. When the backfill operations have been completed, the existing reinforcement is to be replaced in its original position and satisfactorily spliced prior to the replacement of concrete over the new trench alignment.

Transverse "dummy" joints are to be made by a jointing tool or other means acceptable, and are to match in depth and thickness in the existing transverse joints.

Expansion joint material is to be provided where new construction abuts the existing curb or driveway if the Engineer deems it necessary.

Concrete is to be spaded, tamped, and thoroughly compacted until mortar entirely covers the surface and has a monolithic finish. The top surface is to be floated, troweled, and finished to match the existing concrete surface.

Immediately after finishing, the concrete surface is to be protected by a membrane compound curing agent, or by wetted cotton or burlap mats. Either method is to be subject to approval.

3.2.9. Dewatering.

Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding areas.

The contractor shall not allow water to accumulate in excavations or at subgrade level. Remove water to prevent softening of foundation bottoms and soil changes detrimental to stability of subgrades and foundations. Provide and maintain dewatering system components necessary to convey water from excavations.

Convey water removed from excavation and rainwater to collecting or runoff areas away from buildings and other structures. Establish and maintain temporary drainage ditches and other diversion outside excavation limits. Do not use trench excavations as temporary drainage ditches.

Dewatering devices shall be provided by the Contractor with filters to prevent the removal of fines from the soil.

Should the pumping system draw fines from the soil, the Engineer shall order immediate shutdown, and remedial measures will be responsibility of the Contractor.

Upon completion of the dewatering work, the Contractor shall remove all equipment and leave the construction area in a neat, clean, condition that is acceptable to the Owner.

The Contractor shall maintain ground water table at least 12 inches below the finished excavation subgrade.

Dewatering Performances. Performances of the dewatering system for lowering ground water shall be measured by observation wells on piezometers installed in conjunction with the dewatering system, and these shall be documented at least daily. The Contractor shall maintain a log of these readings and submit them to the Owner.

No direct payment shall be made for costs associated with dewatering. All costs in connection therewith shall be included in the applicable contract price for the item to which the work pertains.

3.2.10. Bedding and Backfill

3.2.10.1. General

Trenches shall not be backfilled until the construction structures or appurtenances, as installed, conform to the requirements specified. Where specified, only the secondary backfilling may incorporate excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand and gravel, soft shale or other approved materials, free from large clods of earth or stones. Where pipe is specially coated or sleeve/tape wrapped for protection against corrosion, care shall be taken not to damage the coating or sleeve/tape wrap.

Where a trench has been improperly backfilled, or where settlement occurs, the identified section shall be excavated to a depth and length 50 feet beyond the failed area, then refilled and compacted to the grade and compaction level required. The use of sand backfill shall not be allowed. All compaction within the secondary backfill zone shall be such that the apparent dry density of each layer shall be not less than 98% from the top of the initial backfill to the bottom of pavement section. The pavement (asphalt) section shall have 95% compaction density with a maximum dry density at + or – 2% optimum moisture content as determined by tests on samples as outlined in the latest provisions of TX-DoT Testing Method Tex 113-E or most applicable approved equal provisions, unless otherwise shown on the contract documents. At the time of compaction, the water content shall be at optimum moisture content, + or - 2% points.

3.2.10.2. Initial Backfill

Prior to laying the pipe, the normal or select bedding material will be shaped to conform to the outside diameter of the pipe as shown on the plans. Bedding material shall be consolidated to assure it is incorporated from the bottom of the trench up to the pipe centerline. A hand-held vibrator, commonly used for concrete work, can be used for this purpose. The vibrator shall be inserted every 3 feet on each side of the pipe.

For sewer lines up to 24 inches in diameter initial backfill material shall be placed in two lifts above the bedding material the pipe is set on. The first lift shall be spread uniformly and simultaneously on each side and under the bottom quadrant of the pipe to the midpoint or spring line of the pipe. Consolidate the Initial Backfill material as specified for bedding.

Placement of the first lift of initial backfill shall be subject to inspection and approval prior to placement of second lift, which shall extend from the spring line of the pipe to a minimum of 1 foot above the top of the pipe. The second lift shall be evenly spread in a similar manner as the first lift.

For diameters 24 inches and larger, initial backfill material shall be evenly and simultaneously spread alongside, under the lower quadrant the pipe and over the pipe in 12 inch lifts to a point sufficient to a minimum of 1 foot above the top of the pipe. Consolidate the Initial Backfill material as specified for bedding.

3.2.10.3. Secondary Backfill

The secondary backfill material shall be placed in maximum 12 inch loose lifts or as directed by the Design Engineer and/or Inspector.

3.3. Gate Valves, Valve Boxes, Adjustments

Gate valve installation shall include valve, reaction blocking, cast iron boot, valve box extension (having ductile iron riser pipe), valve box, concrete collar (where subjected to vehicular traffic), and valve box lid. Gate valves constructed in the terrace shall be constructed with No. 3 bars all around.

The valve box shall be placed in such a manner to prevent shock or stress being transmitted to the valve. All valves located 6 feet and deeper shall include valve key extensions inside the valve box. The Contractor has the option to install fully adjustable valve box and valve key extension systems, on all valves located between 6 feet and 13 feet. Adjustable valve box and valve key extension systems shall be centered over the valve's operating nut with the box cover flush with the finished pavement surface or located at another level as directed by the Engineer. Valve boxes located in streets or other area subject to vehicular traffic shall be provided with concrete collars as shown in these standard drawings.

Collars around such valve boxes shall be formed and finished off neatly and in a sound workmanlike manner. Valve pits shall be located so that the valve operating nut is readily accessible for operation through the opening in the valve box. The valve box shall be set flush with the finished pavement surface or at other finish elevations as may be specified. Pits shall be constructed in such a manner to permit minor valve repairs and provide protection to the valve and pipe from impact (where penetrating through pit walls).

In Pressure Zones 9-16, all valves 6 inches and larger shall be supported on a concrete pad in accordance with details shown in the plans.

Existing valve boxes located within the limits of new street construction which are in conflict are to be adjusted to match proposed finish grades.

Valve boxes installed as part of a new valve and mainline construction project are considered "new valves." Adjustments to "new valves" are incidental to the installation of the valve. No separate pay will be given to adjust "new valves" to finished grade.

3.4. Concrete Encasement, Cradles, Saddles and Collars

Concrete Encasement. When concrete encasement is shown on the plans or when directed, the trench is to be excavated and fine graded to a depth conforming to the details and sections shown on the plans. The pipe is to be supported by pre-cast concrete blocks of the same strength as the concrete for encasement and securely tied down to prevent floatation. Encasement concrete is to be placed to a depth and width conforming to details and sections shown on the plans.

Concrete Cradles. When concrete cradles are shown on the plans or when directed, the trench is to be prepared and the pipe supported in the same manner as described in Concrete Cradles, of this Section. The cradle shall be constructed in accordance with details and sections shown on the plans. Strap/Tie Downs shall be No. 4 rebar diameter minimum or better as determined by the Water System Inspector.

Concrete Saddles. When shown on the plans or when directed, pipe to receive concrete saddle is to be backfilled in accordance with Section 3.2.10 of this specification to the spring line and concrete placed for a depth and width conforming to details and sections shown on the plans.

Concrete Collars. When shown on the plans or when directed, concrete collars are to be constructed in accordance with details and sections shown on the plans.

4. MEASUREMENT

4.1. Sewer Excavation and Non-stabilized Backfill

Sewer excavation and non-stabilized backfill will be measured in accordance with Item 400, "Excavation and Backfill for Structures" but will not be measured for payment and will be considered subsidiary to the sewer line installation

4.2. Trench Excavation Protection

Trench excavation protection will be measured by the foot along the centerline of the trench where the depth exceeds 5-ft.

4.3. Concrete Encasement, Cradles, Saddles and Collars

Concrete encasement, cradles, saddles and collars for pipe will be measured by the cubic yard as dimensioned on the plans or as directed, complete in place. Reinforcing if required will not be measured.

4.4. Adjust Valve Box

Will be measured as each assembly adjusted to corresponding finished grade.

5. PAYMENT

- 5.1. **Sewer Excavation.** Payment for sewer excavation and non-stabilized backfilling in accordance with these specifications will not be paid for directly but will be included in the unit price bid for the sanitary sewer pipe installation. Select bedding and stabilized backfill will be paid for under their own items of work.
- 5.2. **Trench Excavation Protection.** Payment will be made at the unit price bid for "Sanitary Sewer (Trench Excavation Protection)" in place. This price shall be full compensation for all labor, equipment, materials, tools, all components of the trench protection system which can include but not limited to sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, dewatering/diversion of water to provide adequate/acceptable drainage, any additional excavation or backfill required, jacking, jack removal, removal of the trench support after completion and all other labor, materials, tools, equipment and incidentals necessary to complete the work.
- 5.3. **Concrete Encasement, Cradles, Saddles and Collars.** Payment will be made at the unit price bid for "(Concrete Encasement, Concrete Cradles, Concrete Saddles and Concrete Collars" which shall be full compensation for all labor, equipment, materials, tools, and incidentals to complete the work.
- 5.4. **Adjust Valve Box.** Payment will be made at the unit price bid which shall be full compensation for each valve box adjusted to finished grade including all labor, materials, and incidentals to complete the work.