

ITEM 430

CONSTRUCTION OF UNDERGROUND UTILITIES

- 430.1 Description. This Item shall govern for all excavation required for the construction of sewers, sewer structures, pipe culverts, appurtenances and connections and for the backfilling around completed sewers to the level of the original ground, all in conformity with the locations, lines and grades shown on the plans or as given by the Engineer and in accordance with these specifications. Trench excavation shall consist of the required excavation within the limits of the trench, the removal and proper utilization of all suitable trench excavation by placing in accordance with Item 132 "Embankment" or disposal of unusable material. This Item shall also govern for any necessary pumping or bailing and drainage and all sheeting and bracing of trench walls. Also governed by this Item are the cutting and restoration of pavement and base courses, the furnishing and placing of cement stabilized backfill, the hauling and storage of suitable excavated material for other uses and/or disposing of surplus or unsuitable materials and the bridging of trenches and other provisions for maintenance of traffic or access as provided herein.
- 430.2 Testing. Gravity sanitary sewer lines shall be "lamped". No sewer line shall be accepted, unless a clear lamp can be seen from manhole to manhole.
- 430.3 Excavation & Trench Preparation. Excavate trench to the alignment and depth required. All suitable excavated materials shall be utilized, insofar as practicable, in constructing the required underground utilities, roadway sections or in uniformly widening of embankment, flattening slopes, etc. or as directed by the Engineer. Unsuitable trench excavation and trench excavation in excess of that needed for construction shall be known as waste and shall become the property of the Contractor to be disposed of by the Contractor outside the limits of the right-of-way. The cost to haul and store suitable material for other uses or for disposal is incidental to this Item. Brace the trench and drain, as required, so that the work may be accomplished safely and efficiently. If necessary, install a dewatering system to provide a dry trench bottom. Pumps shall discharge into natural drainage channels or to drains. Shoring for excavations and trenches shall meet the requirements of the Latest Edition of OSHA Regulation 1926, Subpart P, and the Item 435 "Timber Ordered Left In Trench".

When disposing off site, the Contractor shall not place the waste (excess) material in an environmentally sensitive area, floodway or waters of the United States, including adjacent wetlands", as defined in the Clean Water Act and the Rivers and Harbors Act, unless he has previously obtained the appropriate Department of the Army Permit authorizing the activity. It is the responsibility of the Contractor to contact the proper authorities to determine the land use classification and to obtain necessary permits. If a disposal site is designated in the plans and is classified as wetlands, then the County shall be responsible for ensuring

that the appropriate Department of the Army permit has been obtained for the activity.

For pipes less than 30 inches in diameter, the minimum width of the trench shall be the width of the outside barrel of the pipe plus 24 inches, the maximum width of the trench shall be the width of the outside barrel of the pipe plus 36 inches. For pipe 30 inches and larger, the minimum trench width shall be the width of the outside barrel of the pipe plus 36 inches, and the maximum width of the trench shall be the width of the outside barrel of the pipe plus 48 inches.

Side sloping or benching of the trench, where permitted, will begin at one foot above the top of the pipe and will not encroach upon private property or endanger existing or future structures or underground utilities. Depth of trench, without sheeting or bracing shall comply with OSHA Regulation 1926.650.

The full width of the trench shall be excavated to a depth below the invert elevation of the pipe so as to permit placing the bedding material specified on the Standard Civil Drawings below the outside bottom of the pipe. Any additional depth excavated by the Contractor shall be replaced with an equal depth of cement stabilized sand. The cost of this additional material, in place shall be at the expense of the Contractor.

Where necessary, excavations shall have sheeting and bracing to prevent caving. At these locations, increase the trench width as required and leave the sheeting in place until the pipe has been laid and the backfill compacted to a depth of 2 feet over the pipe. Sheeting and bracing shall be in accordance with the Item 435 "Timber Ordered Left in Trench". All sheeting and bracing shall be designed to the requirements of OSHA Standard 1926, Subpart P (Latest Edition).

Sewers shall not be constructed or sewer pipe laid in the presence of water. All water shall be removed from the excavation sufficiently prior to the sewer placing operation to insure a dry, firm bed on which to place the sewer and shall be maintained in such unwatered condition until all concrete, cement stabilized sand, and mortar are cured. Removal of water may be accomplished by bailing, pumping or by a well point system as conditions warrant. The well point installation shall be in accordance with the Item 436 "Well Pointing". A seal slab shall be installed when Well Pointing is used for dewatering.

In the event that the excavation cannot be dewatered to the point where the pipe subgrade is free of mud, excessive wet soil, sand silt or clay with water, a seal slab shall be used in the bottom of the excavation. Such seal slab shall consist of a lean concrete mixture in accordance with Item 421, "Structural Concrete". The cast-in-place seal slab (7" thick) shall be a Class "D", 5 sacks of cement per cubic yard with a minimum compressive strength of 1,750 P.S.I. at 7 days and 2,500 P.S.I. at 28 days. The seal slab shall have minimum #4 rebar at 18 inch on centers, in each direction.

A precast seal slab, minimum 6" thick, may be used, provided that the joints of the seal slab do not coincide with or at the joints of the pipe. Contractor shall have an option of using a three day cylinder break test at no expense to Harris County.

For unstable conditions requiring outside forms, seals, sheeting, and bracing, or where groundwater is encountered, any additional excavation in width and backfill required shall be done at the Contractor's expense.

Portable trench boxes may be used in lieu of sheeting upon approval in writing by the Engineer. The trench box must be in accordance with OSHA Regulation 1926.650 (Latest Edition).

Use of the trench box does not relieve the Contractor of any liability for damages to person or property. When a trench box is moved, the jointed pipe or in-place backfill shall not be disturbed.

All materials from excavation operations not required for backfilling, if considered suitable shall be placed in embankments or wasted, in accordance with the Item 132 "Embankment". All material not suitable for use in embankments will be declared surplus by the Engineer and shall become the responsibility of the Contractor to dispose of as he wishes. Such surplus material shall be promptly removed from the work following the completion of the portion of the sewer involved. The cost to haul and store suitable material for other uses or for disposal is incidental to this Item.

Unless otherwise specifically approved, Contractor shall use ladder or wheel type trench-digging machinery, except where hand methods must be employed to avoid damage to existing structures above or below ground, or where hand excavation is indicated.

Engineer may limit the amount of trench opened or partially opened at any time in advance of the completed pipe laying operation and the amount of trench left unfilled. Open no more than 500 feet of trench on any street at any one time.

430.4 Pipe Laying. No pipe shall be laid in water or when the trench conditions or weather is unsuitable for such work, unless specifically approved by the Engineer.

Fit and lay the pipe to form a smooth and uniform invert. Laying of pipe shall commence at the lowest point, so that the spigot or tongue ends point in the direction of flow.

All other types of pipe shall be laid in accordance with the applicable provisions of this Item.

Field cutting of Polyvinyl Chloride pipe shall be in accordance with the pipe manufacturer's recommendations.

Minor deflections may be obtained in pipe joints. Contractor must obtain approval when the degree of deflection is necessary to deflect from a straight line. Where necessary to make major deflections in concrete pipe, use sections of pipe with beveled ends for deflections not greater than five degrees. For deflections greater than five degrees, use fabricated fittings for concrete pressure pipe.

When the pipe laying operation is halted, seal the open end of the pipe with a temporary plug. Plug is to remain in place until the pipe laying operation recommences.

Standard plugs shall be inserted into bells of all dead end pipe.

For gravity pipelines, use concrete a minimum of 6 inches on all sides of the pipe for encasing, embedding where indicated on the plans.

430.5 Backfilling. As soon as practicable after completion of laying and jointing of pipe, backfill the trench. Not more than 200 feet of the trench shall be left open after laying the pipe. Also backfill other structures, such as manholes, and junction boxes with material selected from the excavation, that is generally suitable for use as backfill.

Trenches shall be backfilled with material selected from sewer trench excavation, or obtained from other sources, shall be free from stones, which will interfere with compaction and free of large lumps which will not break down readily under compaction. Do not use material excavated in large lumps which will not break down or which cannot be spread in loose layers. Material excavated by trenching machine will generally be suitable for use as backfill. Cement stabilized sand shall be in accordance with the Item 433, "Cement Stabilized Sand Bedding and Backfill Material".

In the pipe zone, as shown on the drawings, cement stabilized sand placed to the depth shown by those drawings, deposited in the trench simultaneously on both sides of the pipe for the full width of the trench and to the height shown by those drawings. Moisten if necessary and tamp in approximately 4 inch layers, thoroughly compacting under and on each side of the pipe to provide solid backing against the external surface of the pipe. Walking or working on the completed pipeline, except as necessary in tamping or backfilling, shall not be permitted until the trench has been backfilled to at least 12 inches over the top of the pipe. The cement stabilized sand shall be placed in accordance with Item 433 "Cement Stabilized Sand Bedding and Backfill Material."

Backfill above the cement stabilized sand shall be placed as follows.

For trenches under proposed pavement or through asphaltic concrete, concrete, asphalt topped concrete flexible base with asphalt topping, shell or gravel surfaces on either public or private roads, streets or driveways, place backfill above the cement stabilized sand in approximately 6 inch layers, moistened if necessary and thoroughly compacted to 95% of

standard proctor in accordance with ASTM D698 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)). Tamped backfill shall be brought up to the required grade shown by the drawings. Where pipe is laid below the existing pavement or proposed pavement, the backfill material shall be the same, or an approved equivalent, as the material used below the pavement subgrade. For trenches through unimproved roadways, unsurfaced road shoulders or unimproved driveways, the procedures are the same as above, except that compaction above the pipe zone shall be 90 percent of standard proctor.

For trenches located in areas other than those previously stated, and not designated for improvement, place the in-situ material, used as backfill, above the cement stabilized sand as shown by the drawings, in approximately 6 inch layers, moistened if necessary and compacted to 90 percent of standard proctor density in accordance with ASTM designation D698. For the top layer of backfill, place a sufficient amount of previously excavated material neatly rounded over the trench to allow for settlement during consolidation. The Contractor shall supply any deficiency in quantity of materials for backfilling trenches or filling depressions caused by settlement.

Where required as shown in the plans, pipe to be installed under railroad embankment or highway or streets shall be in accordance with Item 431 "Jacking, Boring or Tunneling" or Item 432 "Tunnel Construction".

- 430.6 Restoration of Surfaces. Replace or repair sidewalks, driveway culverts, inlets, curbing, gutters, shrubbery, trees, fences, sod and other like obstructions removed or disturbed, to the condition equivalent to that existing prior to commencement of this work. Use concrete having a compressive strength of not less than 3,000 psi in 28 days for the replacement of curbing, gutters, inlets and sidewalks.

Use reasonable care in the removal and replacement of shrubbery and trees designated to be replaced at original locations. Where at all possible, ditch alignment will be such as to minimize this work. The restoration of asphalt topped flexible base and concrete streets shall be as specified under other items of these Standard Specifications.

- 430.7 Clean-Up. The Contractor shall remove from the site of the work and from public and private property temporary structures, rubbish, and waste materials, including excess excavated materials. The Contractor is responsible for disposing of all surplus earth. Any excess material from excavation that is suitable for use in road or embankment will be salvaged, stored and protected from any contamination for reuse. The Contractor shall seek approval from the Engineer before disposal of any excess earth.

The pipe laying operation shall be temporarily suspended if the clean-up is further behind than 2,000 feet.

430.8 Quality Assurance. The Testing Laboratory's representative will determine the moisture density relationship in accordance with ASTM D698 on material secured from the trench excavation. Samples secured from the cement stabilized sand supplier shall be blended with Portland cement in accordance with the Item 433 "Cement Stabilized Sand Bedding and Backfill Material.", and the moisture density relationship will be determined in accordance with ASTM D558 "Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures".

The Testing Laboratory's representative will determine the in place density in accordance with ASTM D1556, "Standard Test Methods for Density and Unit Weight of Soil in Place by Sand Cone Method" or D6938, "Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods". The minimum level of testing will consist of at least one test for each 100 linear feet of trench per lift of backfill.

430.9 Measurement & Payment. Gravity pipelines shall be measured by the linear foot of pipe actually laid, at finished grade, exclusive of pipe installed in tunnel construction, special structures, boxes, manholes, or other special sections, along pipe of size and at depth installed. Measure depth at manholes, at intervals not to exceed 50 feet between manholes, and at breaks in profile of natural ground from flow line of pipe to natural ground surface over center of pipe. Payment for gravity pipeline, furnished, installed and measured as stated shall be at the contract unit price bid for the type of pipe, size, and depth measured, as per pipe material specification, e.g. Item 460 "Reinforced Concrete Pipe".

Pressure pipelines shall be measured by the linear foot from the centerline of fitting to centerline of fitting, exclusive of pipe installed in tunnel construction, special structures or other special sections along pipe of the size and type installed. If depth of cut is shown on the proposal, measure depth at intervals not to exceed 50 feet and at breaks in profile of natural ground from flow line of pipe to natural ground surface over the center of the pipe.

If the depth of cut is not shown on the proposal, no consideration shall be made for depth at which the pipe is installed. Payment for pressure pipeline, furnished, installed and measured as stated shall be at the contract unit prices for the size and type (and depth, if shown on the proposal) measured.

No separate payment shall be made for concrete used for blocking, backing, encasement or embedding. Gravity lines and Pressure Pipelines shall be paid for in accordance with the applicable item of the material specification.

Concrete used in the repairing curbs, gutters and sidewalks shall be paid for by the linear foot or square yard, as designated on the proposal form. Pay for concrete used in repairing curbs, gutters and sidewalks, measured in the contract unit price bid for "Extra Concrete" of the class installed.

Pipe installed by tunneling shall be paid for in accordance with Item 431 or Item 432.

Street and driveway surfacing shall be paid for in accordance with the applicable item of those specifications.

No separate payment shall be made for ordinary bedding and select backfill, unless so indicated on the bid form.

No separate payment shall be made for hauling and storing suitable excavated trench material for other uses or for disposal of excess or unsuitable materials.

No separate payment shall be made for any bedding and backfill installed in accordance with these Standard Specifications and the Standard Civil Drawings.

Well Pointing shall be measured and paid for in accordance with the Item 436 "Well Pointing."

Seal slabs (with rebar) shall be measured by the square yard installed along the centerline of the structure. Payment for class "D" concrete seal slab shall be made at the unit price bid per square yard and shall include the price of all labor, material and equipment necessary to complete this Item.

There are line code(s), description(s), and unit(s) for this Item.

NOTE: This Item requires drawings that shall be incorporated into the contract documents.

NOTE: This Item requires other Standard Specifications.

Item 132 "Embankment"

Item 421 "Structural Concrete"

Item 431 "Jacking, Boring or Tunneling Pipe"

Item 432 "Tunnel Construction"

Item 433 "Cement Stabilized Sand Bedding and Backfill"

Item 435 "Timber Ordered Left in Trench"

Item 436 "Well Pointing"

Item 460 "Reinforced Concrete Pipe"

END OF ITEM 430