

# COUNTY OF MEDINA STANDARD SPECIFICATION FOR CONSTRUCTION

## Underground Utility Encasement Pipe Installation

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### 1. Description

This Item shall govern installation of encasement pipe by methods of boring and open cut trenching. This item shall also include, but not be limited to other construction activities such as traffic control measures, removal of all materials encountered in jacking or boring pipe operations, disposal of all material not required in the work, grouting, backfilling and re-vegetation.

### 2. Materials

**Pipe:** Carrier pipe and encasement pipe shall be the size, type, thickness and class to carry as a minimum, loads as defined as "H-20" by the American Association State Highway and Transportation Officials (AASHTO).

**End Seal:** End seals shall be sized to securely attach to the exterior of casing and carrier pipe to prevent water, dirt and debris from entering the annular space between the installed pipe. The end seal shall be pull-on, wrap-around or heat shrinkable. No concrete, grout or bricks will be acceptable.

**Casing Spacers:** Casing spacers shall be constructed of high-density polyethylene and shall be sized to securely fasten on to the carrier pipe barrel outside diameter. They shall be furnished with a minimum runner height to prevent the pipe from resting or sliding on its joint during and after installation.

**Grout:** Grout shall be used to completely fill any annular space between the bore and installed casing pipe.

**Lubricants:** Water shall be used as a lubricant for jacking operations and may contain clay based and/or polymer additives to reduce the skin friction of the installed pipe.

**Sand:** Construct backfill or bedding composed of sand, hydraulic cement, and water.

**Materials:** Use materials that meet the following requirements:

- A. **Cement.** Furnish hydraulic cement that meets the requirements of TxDOT's DMS 4600, "Hydraulic Cement," TxDOT's Hydraulic Cement Quality Monitoring Program (HCQMP), and ASTM C-150 Type I Portland Cement.

- B. **Sand.** Furnish sand that is clean, durable, and meeting the following requirements:
1. Deleterious Materials:
    - a. Clay lumps less than 0.5 percent when tested in accordance with TxDOT standard laboratory test procedure Tex-413-A.
    - b. Lightweight pieces less than 5.0 percent when tested in accordance with ASTM C123.
    - c. Organic impurities show a color darker than the standard color when tested in accordance with TxDOT standard laboratory test procedure Tex-408-A.
  2. The plasticity index is less than or equal to six (6) when tested in accordance with TxDOT standard laboratory test procedure Tex-106-E.
  3. Meet the following gradation requirement when tested in accordance with TxDOT standard laboratory test procedure Tex-401-A:

**Gradation Chart**

Sieve Size	Percent Passing
3/8 in.	100
No. 200	5-30

- C. **Water.** Furnish mixing and curing water that is free from oils, acids, organic matter, or other deleterious substances.
- D. **Sand-Cement Mixture.** Unless otherwise approved, use a sand-cement mixture that produces a minimum unconfined compressive strength of 100 psi at 48-hours. The minimum percentage of cement to be added with the sand to meet the minimum compressive strength will be determined in accordance with TxDOT standard laboratory test procedure Tex-120-E, Part I.

**Gravel:** Furnish and install materials for stabilizing subgrade in trenches.

**Materials:** Provide the following subgrade filler materials:

- A. **Concrete.** Concrete subgrade filler composed of concrete conforming to the provisions of Item No. 300, "Concrete (natural aggregate)," Class B.
- B. **Gravel.** Gravel subgrade filler composed of well graded, crushed stone meeting the gradation requirements below. Wear must not be more than 40% when tested in accordance with TxDOT standard laboratory test procedure Tex-410-A.

**Gradation Requirements**

Sieve Size	Criteria
2-inch	100% passing
1-3/4-inch	95% passing
1/4-inch	90% retained

### 3. **Traffic Control**

During construction operations, until the work pits or trenches are backfilled and fill material compacted, traffic barricades shall be furnished and maintained by the Contractor. The Contractor shall submit the proposed pit/trench location and traffic control plan for review by the County or designated representative. The review by the County will not relieve the Contractor from responsibility to obtain specified results in a safe, workmanlike manner. The location of the work pit or trench and associated traffic control measures required for the operations shall conform to the requirements of the TxDOT Manual on Uniform Traffic Control Devices (TMUTCD).

### 4. **Construction Methods**

#### A. **Boring.**

1. **Boring Pit Location:** Where installation of pipe is required under roads or other facilities by jacking or boring methods, construction shall be undertaken in such a manner that it will not interfere with operation of any railroad, street, highway, utility or other facility and shall not weaken or damage any embankment or structure. All appropriate permits shall be acquired prior to the initiation of the work. At a minimum, bore pit location on rural highway crossings must be 30 feet from main lanes. On low-volume highways, the bore pit must be 16 feet from main lanes.

Suitable pits or trenches shall be excavated for the purpose of conducting the jacking or boring operations and for joining pipe. Work shall be securely sheeted and braced to prevent earth caving and to provide a safe and stable work area. Contractor shall be responsible for all Trench Safety Design and Implementation.

The boring shall proceed from a work pit provided for the boring equipment and the workers. The location of the pit shall be approved by the County or designated representative. The boring shall be done mechanically using either a pilot hole or the auger method.

2. **Excavation:** When the grade of the pipe at the boring end is below the ground surface, suitable pits or trenches shall be excavated to provide sufficient room to conduct the jacking or boring operations and for placement of end joints of the pipe. In order to provide a safe and stable work area, the excavated area shall be securely sheeted and braced to prevent earth caving. Contractor shall be responsible for all Trench Safety Design and Implementation.

## **B. Open Cut Trench.**

### **1. Excavation**

The Contractor shall perform all excavation of every description and of whatever substances encountered to the lines and grades shown on the plans as approved by the County. During excavation, material suitable for backfilling shall be stockpiled in orderly manner a sufficient distance from banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill shall be removed and properly disposed of by the Contractor or as directed by the County. Grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods.

Sheeting and shoring shall be installed in accordance with safety requirements for the protection of the work, adjoining property, and for the safety of the personnel. Unless otherwise indicated, excavation shall be by open cut. Short sections of a trench may be tunneled, if in the opinion of the County, the pipe or structure can be safely and properly installed or constructed, and backfill can be properly compacted in such tunnel sections. Contractor shall be responsible for all Trench Safety Design and Implementation.

- 2. Trenching:** Trench walls shall be vertical in excavations and the practice of undercutting at the bottom or flaring at the top will not be permitted unless approved by the County. In special cases where trench flaring is permitted and directed by the County, the trench walls shall remain vertical to a depth of at least 1 foot above the top of the pipe. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of pipe on the undisturbed soil at every point along its entire length, except for the portions of pipe sections where it is necessary for bells and for the proper sealing of pipe joints. Bell holes and depressions for joints shall be dug after the trench bottom has been graded in order that the pipe may rest upon the bedding for as much of its full length as practicable.

The depth of cut shall extend to a minimum of 6 inches lower than the invert of the pipe and shall be determined by the contractor. The width of the trench shall be at least the outside diameter of the pipe plus 6 inches on each side of the pipe.

It shall be understood that the depth of cut as initially indicated may be more or less than the actual excavated depth due to ground conditions existing at the site.

Whenever wet or otherwise unstable soil that is incapable of properly supporting the structure or pipe, as determined by the County, is encountered in the bottom of the excavation or trench, such soil shall be removed and the

excavation or trench backfilled to the proper grade with a gravel subgrade filler as specified above.

Where trash, debris, rock, boulder or coarse gravel with a particle size larger than 1 ¾ inch is encountered at the bearing level, the Contractor shall, as approved by the County, over-excavate and remove such materials to a depth not less than 12 inches below the bottom of the pipe and replace with a gravel material conforming to the requirements above. Contractor shall be responsible for all Trench Safety Design and Implementation.

### **3. Bedding**

Bedding material may consist of sand, gravel subgrade filler, or pea gravel or other materials approved by the County for the fill around the conduit casing.

Remove loose, sloughing, or caving soil from the bottom and sidewall of trenches immediately prior to placement of bedding materials. Place bedding to the depths shown on the Standard Detail or project plans.

For pipe installation, manually spread bedding materials around pipe to provide uniform bearing and side support when compacted. Protect flexible pipe from damage during placing of pipe zone bedding material. Perform placement and compaction directly against undisturbed soils in trench sidewalls.

Do not place trench shields or shoring within the height of the bedding zone unless means to maintain density of compacted bedding material are used as approved by the county. If moveable supports are used in the bedding zone, lift supports incrementally to allow placement and compaction of material against undisturbed soil.

Compact bedding material to its specific compaction requirements using pneumatic tampers in restricted areas, and vibratory-plate compactors or engine-powered jumping jacks in unrestricted areas. Compact each lift, not to exceed 6-inches, before proceeding with placement of next lift. Water tamping is not allowed.

### **4. Backfilling**

Trenches shall not be backfilled until the construction structures or appurtenances, as installed, conform to the requirements specified. Where specified, 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 for protection against corrosion, care shall be taken not to damage the coating.

Where a trench has been improperly backfilled, or where settlement occurs, the identified section shall be excavated to the depth and length required by the county, then refilled and compacted to the grade and compaction. 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 ninety-five percent (95%) unless otherwise shown on the plans.

5. **Pavement Repair:** In paved areas, cut pavement along the pavement replacement limits. Pavement shall be saw cut. After compacting the backfill, restore pavement to a condition equivalent to that existing at the start of construction. Restore pavement damaged outside the replacement limits.

Permanent pavement replacement, if necessary, shall begin immediately after all testing of each segment of piping is satisfactorily completed.

## 5. **Cleanup and Restoration**

It shall be the Contractor's responsibility to keep the construction site neat, clean and orderly at all times. Cleanup shall be vigorous and continuous to minimize traffic hazards or obstructions along the streets and to driveways. Trenching, backfill, pavement repair (as necessary), and cleanup shall be coordinated as approved by the County. The County may regulate the amount of open ditch and may halt additional trenching if cleanup is not adequate to allow for orderly traffic flow and access.

Materials at the site shall be stored in a neat and orderly manner so as not to obstruct pedestrian or vehicular traffic. All damaged material shall be removed from the construction site immediately and disposed of in a proper manner. Surplus excavated materials become the property of the Contractor for disposal at Contractor's expense. After trenching, the Contractor shall immediately remove all excavated materials unsuitable for or in excess of, backfill requirements. Immediately following the pipe laying work as it progresses, the Contractor shall backfill, grade and compact all excavations and shall immediately clean up and remove all unused soil, waste and debris and restore all surfaces and improvements to a condition equal or superior to that before construction began and to an appearance which compliments the surroundings. The Contractor shall grade and dress the top 6 inches of earth surfaces with soil or other material similar and equal to the surrounding, fill and smooth any visible tracks or ruts, replace and re-establish all damaged or disturbed turf or other vegetation and otherwise make every effort to encourage the return of the entire surface and all improvements to a pleasant appearance and useful condition appropriate and complimentary to the surroundings and equal or similar to that before construction began.