Section 02448

# PIPE AND CASING AUGERING FOR SEWERS

## PART 1 G E N E R A L

### 1.01 SECTION INCLUDES

A. Installation of casing for sewer pipe by dry augering or slurry boring methods, together with installation of sewer pipe in casing.

B. Installation of sewer pipe by slurry boring methods. Construction casing may be used at Contractor's option.

### 1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Casing, including sewer pipe, installed by augering methods in mid-run of open cut segments where shown on Drawings, will be measured and paid by linear foot from end to end of casing. Casing may be installed, at Contractor's option, at locations other than shown on Drawings, at no additional cost to City.

2. Sewer pipe installed by augering method in mid-run of open-cut segments where shown on Drawings, will be measured and paid by linear foot from end to end of augered section.

3. Pipe or casing segments installed by augering methods in locations other than mid-run of open cut segments and shown on Drawings, will be measured and paid by linear foot along centerline of completed sewer from centerline to centerline of manholes to ends of stubs or termination of pipe, and to inside face of lift stations and other structures.

4. Payment will include and be full compensation for labor, equipment, materials and supervision for excavation and construction of sewer, complete in place including disposal of excess materials, shoring, dewatering, utility adjustments, grouting, backfill, clean-up, and other related work necessary for construction as indicated on Drawings and specified in this Section.

5. Cost for pits and other excavations are included in unit price for pipe with or without casing.

6. Trench safety systems for pits are paid as specified in Section 02260 - Trench Safety Systems.

7. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 DEFINITIONS

A. Augering means either "dry augering" or "slurry augering".

B. Dry augering is jacking casing while excavating soil at heading and transporting spoil back through casing by otherwise uncased auger.

C. Slurry Auger Method: Installation of casing or pipe by first drilling small diameter pilot hole from shaft to shaft, followed by removing excess soil and installing pipe or conduit by pull back or jacking method.

1.04 REFERENCE STANDARDS

A. American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering.

B. American Association of State Highway and Transportation Officials (AASHTO).

1.05 REGULATORY REQUIREMENTS

A. Conform to Texas State Department of Highways and Public Transportation for installations under state highways. City will obtain required permits for State Highway crossings.

B. Installations Under Railroads:

1. Secure and comply with requirements of right-of-entry for crossing railroad company’s easement or right-of-way from railroad companies affected. Comply with railroad permit requirements.

2. Use dry auger method only.

3. Damages due to delays caused by railroad requesting work to be done at hours, which will not inconvenience the railroad, will be at no additional cost to City.

4. Maintain minimum 35-foot clearance from centerline of tracks.

1.06 SUBMITTAL

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. For installation by augering, submit for review:

1. Description of mechanized excavating equipment.

2. Method of controlling line and grade.

3. Grouting techniques to be used for filling annular void between sewer pipe and casing, and void between sewer pipe or casing and ground, including equipment, pumping and injection procedures, pressure grout types, and mixes.

4. Locations and dimensions of pits.

5. Pit design and construction drawings.

6. Identification of casings required and paid under Contract and casings installed at Contractor's option.

7. Design of casings.

8. Copy of railroad company permits and right-of-entry.

C. Prepare auger pit and casing design submittals that are site specific. Have auger pit and casing design submittals signed and sealed by qualified Professional Engineer registered in State of Texas.

D. Include in construction phase submittals:

1. Daily logs of augering and boring operations.

2. Settlement monitoring data to meet requirements of paragraph 3.05, Settlement Monitoring.

3. Submit daily logs and settlement monitoring data within 5 days after day of observation.

1.07 CRITERIA FOR DETERMINING CASING INSTALLATION LOADS

A. Select and design casing pipe and pipe joints to carry thrust of jacks or loads due to pulling mechanism in combination with overburden, earth and hydrostatic loads. Select casings for dry augering to withstand action of auger without damage.

B. Use Professional Engineer to determine design stresses, design deflections and factors of safety for design of casing. Present such determination as part of design submittal. Apply the following maximum casing pipe stresses and deflections to casings shown on Drawings:
1. Design stress in pipe wall: 50 percent of minimum yield point of steel or 18,000 psi, whichever is less, when subjected to applicable loading conditions.

2. Wall thickness: Maximum allowable deflection, which does not exceed 3 percent of nominal casing diameter.

C. Use Cooper E-80 locomotive loading distributions as criteria for railroad crossings in accordance with AREMA specifications for culverts. In design, account for additive loadings due to multiple tracks.

D. Use H-20 vehicle loading distributions as criteria for truck loading in accordance with AASHTO.

E. When not specifically indicated on Drawings, select casing diameter to permit practical installation (including skids when applicable) and grouting.

## PART 2 P R O D U C T S

### 2.01 MATERIALS

A. Provide casing pipe, which is straight, circular in section, uncoated, welded steel pipe, in accordance with Section 02502 - Steel Pipe and Fittings.

B. Provide sewer pipe in accordance with Section 02531 - Gravity Sanitary Sewers. Do not use high density polyethylene pipe for augering.

C. Provide restrained-joint sewer pipe when installing sewer pipe in slurry bored holes by pull-back method.

D. Supply grout as specified in Section 02431 - Tunnel Grout.

## PART 3 E X E C U T I O N

### 3.01 LOCATION AND SIZE OF AUGER PITS

A. Show location of auger pits on auger pit construction drawings. Locate auger pits for slurry boring so that distance between pits is no greater than 80 feet; and for dry augering not more than 120 feet apart.

B. Locate auger pits and associated work areas to avoid blocking driveways and cross streets and to minimize disruption to business and commercial interests. Avoid auger pit locations near areas identified as potentially contaminated.

C. Make size adequate for construction of structures indicated on Drawings. Provide adequate room to meet Contractor's operational requirements for augering.

D. Provide portable concrete traffic barrier around periphery of pit, meeting applicable safety standards. Properly maintain barrier throughout period pit remains open. Angle traffic barriers in direction of lane flow; do not place barriers perpendicular to on-coming traffic.

E. Provide full cover or other security fencing for each access pit in which there is no construction activity or which is unattended by Contractor's personnel.

3.02 DRY AUGERING OF CASING

A. Provide jacks, mounted on frame or against backstop, of capacity suitable for forcing excavating auger and casing through soil conditions to be encountered. Operate jacks so that even pressure is applied to casing.

B. Provide steerable front section of casing to allow vertical grade adjustments. Provide water level or other means to allow monitoring of grade elevation of auger casing.

C. Bentonite slurry may be used to lubricate casing during installation. Use of water to facilitate removal of spoil is permitted; however, water jetting for excavation of soil is not allowed when jacking casing.

D. Tolerances from lines and grades shown on Drawings for gravity sewer pipe installed in casing are plus or minus 6 inches in horizontal alignment, and plus or minus 1-1/2 inches in elevation.

3.03 SLURRY BORING OF CASING OR PIPE

A. Drill small diameter pilot hole and check for line and grade at receiving end. Redrill pilot hole when bored pipe does not meet specified tolerances.

B. Using pilot hole as guide, bore larger diameter hole of sufficient size for pipe or casing installation. Water jetting is not permitted.

C. Bentonite slurry may be used to maintain stable hole and furnish lubrication for pipe or casing installation.

D. Tolerances from lines and grades shown on Drawings for installed sewer pipe are plus or minus 6 inches in horizontal alignment and plus or minus 1-1/2 inches in elevation.

E. Completely fill annular space between sewer pipe and surrounding soil or casing with grout, without displacing pipe during grouting operation.

3.04 SEWER PIPE IN CASING

A. Grout annular void between sewer pipe and casing from end to end of casing. Block and brace sewer pipe to prevent movement during grout placement and to maintain specified line and grade. Grout as specified in Section 02431 - Tunnel Grout.

3.05 SETTLEMENT MONITORING

A. Monitor ground surface elevation along length of augering operation. Locate and record settlement monitoring points with respect to construction baseline and elevations. Record elevations to accuracy of 0.01 feet for each monitoring point location. Establish monitoring points at locations and by methods that protect them from damage by construction operations, tampering, or other external influences. As minimum, locate survey points as follows:

1. For road crossings: Centerline and each shoulder

2. Railroads: Track subbase at centerline of each track

3. Utilities and Pipelines: Directly above and 10 feet before and after utility or pipeline intersection

4. Long bores under improved areas such as pavements: Ground surface elevations must be recorded on centerline ahead of augering operations at locations not to exceed 50 feet apart (including points located for roads, railroads, utilities, and pipelines), or at least three locations per augering drive

B. Reading Frequency and Reporting. Take settlement survey readings:

1. Prior to auger excavation reaching point

2. After auger reaches monitoring point in plan

3. After grouting of ground supporting pipe or casing is complete

C. Immediately report to City Engineer movement, cracking, or settlement, which is detected.

D. Following substantial completion but prior to final completion, make final survey of monitoring points.

3.06 DISPOSAL OF EXCESS MATERIAL

A. Remove and dispose of spoil from job site in accordance with Section 01576 - Waste Material Disposal.

3.07 LEAKAGE TESTING

A. Test for leakage by low pressure air methods in accordance with Section 02533 - Acceptance Testing for Sanitary Sewer.

END OF SECTION