

TECHNICAL SPECIFICATIONS  
FOR  
BORING AND CASING FOR STORM SEWERS

1. Description

The work to be performed hereunder shall consist of the installation of a casing pipe for the purpose of installing a storm sewer as shown on the drawings or as called for in these Specifications. It shall include the excavation of a boring pit, auger boring between the points specified on the drawings, furnishing and installing of the carrier pipe, and disposing of the excavated materials in the manner herein provided.

2. Materials

(a) Casing Pipe

1. The casing pipe shall be of steel meeting the latest approved American Railway Engineering Association Specifications for Pipelines for Carrying Flammable and Nonflammable Substances.” The steel casing pipe shall have a minimum yield strength of 35,000 psi and shall have the minimum wall thickness shown in the following table:

TABLE OF MINIMUM WALL THICKNESS FOR STEEL CASING  
PIPE FOR E72 LOADING

<u>CARRIER PIPE</u>	<u>CASING PIPE</u>	<u>NOMINAL THICKNESS</u>
4	8	0.281 inch
6	12	0.281 inch
8	16	0.312 inch
10	20	0.344 inch
12	24	0.406 inch
14	27	0.469 inch
16	30	0.469 inch
18	30	0.469 inch
20	36	0.532 inch
24	36	0.532 inch

2. When the casing pipe is installed without benefit of a protective coating, the wall thickness shown above shall be increased to the nearest standard size, which is a minimum of 0.063 inch greater than the thickness shown.

(b) Carrier Pipe

The carrier pipe shall be as called for in the plans.

### 3. Construction Requirements for Boring

#### (a) Boring

1. The boring shall be accomplished by means of auguring to the size, line, and grade shown on the drawings.

#### (b) Installation of Casing Pipe

1. Jack the steel casing pipe into place as the boring proceeds. Weld sections of casing pipe together to provide watertight joints.
2. Do not remove unacceptable casing without prior approval from the Engineer. If the removal of casing pipe is permitted, make proper provisions to prevent caving in of the earth surrounding the casing.

#### (c) Installation of Carrier Pipe

1. The carrier pipe shall be furnished by the Contractor. Upon acceptance of the casing, install the carrier pipe in the casing by jacking it through the casing. If necessary to achieve proper line and grade on the carrier pipe, strap wood or other suitable blocking to the carrier pipe to offset any minor variations in the alignment of the casing.

#### (d) Layout of Work

1. The Owner will provide the necessary control points required by the Contractor for this construction. The Contractor will provide the detailed layout required to keep the tunnel or bore on grade.

#### (e) Guarantee of Work

1. Guarantee a usable completed casing between the points specified and to the line and grade specified. The allowable tolerance at the downstream end point of the bore shall be such that the invert of the carrier pipe may be positioned within a vertical area limited on the top by an elevation no higher than the elevation shown on the drawings and on the bottom by an elevation no lower than the existing inlet pipe invert. For sewers, the sides shall be a minimum of 8 inches inside the interior face of the manhole at the end of the bore.
2. The allowable tolerance at the upstream end point of the bore shall be such that the invert of the carrier pipe may be positioned at the elevation shown on the drawings.

### 4. Construction Requirements for Tunneling Alternative

#### (a) General

In the event boring and jacking is impossible because of pipe size, rock, or other factors and the highway department or railroad will not permit open cutting, make crossings by tunneling using liner plates. Conduct tunneling operations as approved by the railroad or highway department. If voids are caused by the tunneling operations, fill by pressure grouting or by other approved methods that will provide proper support.

(b) Galvanized Plates

1. After the plates are formed to shape, the plates shall be galvanized on both sides by the hot dip process. A coating of prime western spelter, or equal, shall be applied at the rate of not less than 2 ounces per square foot of double exposed surface. If the average spelter coating as determined from the required samples is less than the amount specified above, or if any one specimen shows a deficiency of 0.2 ounce, the lot shall be rejected. Spelter coating shall be of first class commercial quality free from injurious defects such as blisters, flux, and uncoated spots.
2. The outside of the plates shall be give a bituminous coating meeting the AASHO M-190 specifications for bituminous protected corrugated metal pipe.

(c) Design and Construction

1. Construct the tunnel and completely line on the inside with structural steel line plates meeting all requirements specified hereinafter. The dimensions of the tunnel shall be as shown on the drawings.
2. The tunneling operation is to commence from a pit that is a minimum of 12 feet long and 4 feet wider than the diameter of the tunnel, bottom to grade, and sheeted and shored, if necessary. Furnish line and grade stakes.
3. All excavation for the entire length of the tunnel shall be done by tunneling, and the work may be done from either or both ends of the conduit. Trim the periphery of the tunnel smooth to fit the outside of the steel liner plate as nearly as is practical, and fill all space outside of the steel liner plate with a sand cement grout mixture.
4. Install the steel liner plates immediately after the excavated material has been removed. Do not remove material more than 24 inches ahead of the installed liner plates.
5. Provide all necessary bracing, bulkheads, and/or shields to ensure complete safety to all traffic at all times during the progress of the work, and perform the work in such a manner as to not interfere with normal traffic over the work.
6. The steel lining shall consist of plates 16 inches wide, and each circumferential ring shall be composed of the number and length plates necessary to complete the required diameter.
7. The inside diameter of the completed ring shall be as shown on the drawings, and no part of the plate or reinforcing ribs will be allowed to extend inside this net diameter.
8. The strength of the tunnel lining will be determined by its section modulus. In no case shall it be less than 0.0590 inch cubed per inch of plate width based on the average for one ring of plates. Thickness of the metal for these steel plates shall be not less than 10 gauge, allowing for standard mill tolerances. The tunnel strength shall be equal to AASHO railroad E80 loading at the depth of cover obtaining.

9. All plates shall be punched for bolting on both longitudinal and circumferential seams and shall be fabricated so as to permit complete erection from the inside of the tunnel. The longitudinal seam shall be of the lap type with offset equal to gauge of metal for the staggered bolt construction fabricated so as to allow the cross section of the plate to be continuous through the seam. All plates shall be of uniform fabrication, and those intended for one size tunnel shall be interchangeable.
10. The material used for the construction of these plates shall be new and unused and suitable for the purpose intended. Workmanship shall be first class in every respect.
11. Install the carrier pipe to the line and grade shown on the drawings. After the carrier pipe is installed adequately block it, and backfill the space between the carrier pipe and the tunnel liner with sand. The method of placing this sand shall be approved by the Engineer.

5. Method of Measurement

- (a) The quantity of carrier pipe shall be measured by the linear foot for each size and type of pipe shown on the bid schedule and shall be the horizontal length of the pipe installed complete in place as measured along the centerline of the conduit from end to end.
- (b) No separate payment will be made for the excavation of the boring pit, auger boring between the points specified on the drawings, furnishing and installing the casing pipe, disposing of the excavated materials and for all incidentals necessary to complete the item in accordance with the Plans and Specifications.

6. Basis of Payment

The accepted quantities of carrier pipe, measured as provided for above, will be paid for at the Contract unit price per linear foot for each size and type of pipe constructed, complete in place, which price shall be full compensation for labor and materials and for completing all incidentals necessary to complete the item in accordance with the Plans and Specifications.