

## SECTION 5

### WATER MAIN CONSTRUCTION

#### BORING UNDER HIGHWAYS AND RAILROADS

1. SCOPE: This section shall include furnishing all labor, tools, equipment and other incidentals required to bore casing pipe under highways or railroads.

2. BORINGS: Procedures for boring shall be in accordance with the best accepted methods of the construction and as shown on the plans and specified and detailed in these specifications.

A. Boring Under Highways: Lines installed under highways shall be bored as shown on the detail drawings submitted to the local Department of Transportation Engineer as part of the Department of Transportation Encroachment Permit. Casings will be installed of the type, size, and thickness as specified herein or on the detail drawings. The Contractor shall be responsible for notifying the Department of Transportation and the District at least 24 hours prior to any contemplated work and for securing any required permits for performing the work. All work shall be accomplished under the supervision of the Department of Transportation Engineer and/or inspector and District personnel.

1. Carrier Pipe: Carrier pipe used under highways shall be of an approved material and installed to the satisfaction of the District and the District Engineer of the Department of Transportation. Carrier pipe shall be of the same material specified for water main construction unless otherwise noted.

2. Casing Pipe: The inside diameter of the casing pipe shall not be less than 2 inches greater than the largest outside diameter of the joints and couplings for carrier pipe less than 6" O.D., and 4" greater for carrier pipe 6" and larger. It shall, in all cases, be great enough to easily remove carrier pipe without disturbing the casing pipe. All casing pipe shall have appropriately sized casement spiders installed inside to allow for the carrier pipe to be suspended in the middle of the casing pipe.

(a) Pipe Size 8" & Smaller: Schedule 40 wrought steel or wrought iron pipe having a wall thickness as shown below may be used for casing pipe 8" and smaller.

SCHEDULE 40

DIAMETER OF PIPE INCHES	WROUGHT STEEL WALL THICKNESS INCHES	WROUGHT IRON WALL THICKNESS INCHES
2-1/2	.203	.208
3	.216	.221
3-1/2	.226	.231
4	.237	.242
5	.258	.263
6	.280	.286
8	.322	.329

(b) Pipe Sizes 8" and Larger: Steel pipe for casings 8" and larger shall be manufactured from steel having a minimum yield strength of 35,000 psi with the minimum wall thickness as shown below:

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DIAMETER INCHES	MINIMUM WALL THICKNESS INCHES
10	.188
12	.188
16	.250
18	.250
20	.250
24	.250
30	.312
36	.375

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(c) Installation: The minimum depth from the roadway surface to the top of the casing pipe at its closest point shall be three feet. The casing pipe ends shall be protected from the entrance of foreign material. The casing pipe shall extend from ditch line to ditch line or toe to toe of fill unless otherwise noted on the plans or specified herein.

Contractors shall be required to provide shoring of boring pits and trenches more than 5 feet deep in accordance with the South Carolina Department of Transportation and Federal Occupational Health and Safety Administration.

B. Borings Under Railroads: All work on railroad rights-of-way shall be done under the supervision of the Chief Engineer of the railroad, or his authorized representative, who shall be notified at least 15 days before construction is begun. In addition, this work shall only be done in the presence of the authorized representative of the Chief Engineer of the railroad or his authorized representative and District personnel. No methods shall be used that, in the opinion of the railroad representative and/or District, could be hazardous to the railway. All applicable Railroad Permits shall be approved by the railroad and obtained by the Engineer before any construction begins within the 100' railroad right-of-way.

1. Carrier Pipe: Carrier line pipe and joints shall be of the material shown on the details of the railroad encroachment agreements or as approved by the Chief Engineer or his authorized representative and the District.

2. Casing Pipe: The inside diameter of the casing pipe shall not be less than 2 inches greater than the largest outside diameter of the joints and couplings for the carrier pipe less than 6" O.D. and 4" greater for carrier pipe 6" and larger. It shall, in all cases, be great enough to easily remove carrier pipe without disturbing the casing pipe. All casing pipe shall have appropriately sized casement spiders installed inside to allow for the carrier pipe to be suspended in the middle of the casing pipe.

Steel pipe manufactured from steel having a minimum yield strength of 35,000 psi and having a minimum permissible wall thickness as listed below shall be used as casing pipe.

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DIAMETER INCHES	MINIMUM WALL THICKNESS INCHES
10	.188
12	.251
16	.312
18	.313
20	.375
24	.407
30	.469

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3. Installation: The depth from the base of the railway rail to the top of the casing at the closest point shall not be less than 5-1/2 feet. Also, there should not be less than 3 feet from the bottom of the side ditches to the top of the casing pipe. The casing pipe ends shall be protected from the entrance of foreign materials. The casing shall extend 50 feet either side of the centerline of the railroad track unless otherwise noted on the plans or specified herein.

Contractors shall be required to shore all pits used for boring if it is over 5 feet deep.

3. METHOD OF MEASUREMENT: Bores shall be measured in linear feet from end to end of casing pipe installed and accepted. This item shall include casing pipe and other materials, tools, equipment, labor and incidentals required to bore and install casing as shown on the details and as directed by the highway or railroad district Engineer and/or resident Engineer.