

SECTION 02345 - CASING PIPE CONSTRUCTION

PART 1 - GENERAL

SUMMARY

Work Included. Provide casing pipes in the locations shown and according to details shown on the Drawings.

REFERENCES

ASTM A-449	Longitudinal Bolts
MDOT 8.08.03	Reinforcing Steel
ASTM A-53, Grade B	Carbon Steel
AASHTO M167	Bituminous Coating
AASHTO M190	Bituminous Coating
ASTM A513	Hot-dip Galvanizing
AREA	Part 5 -Pipelines

SUBMITTALS

Shop Drawings. Furnish shop drawings covering the items included under this section of the Contract.

CONTRACTOR shall submit complete plans and details of the boring installation, including:

- Arrangement of cutter head.
- Location and size of jacking and receiving pits.
- Shoring/Sheeting of jacking and receiving pits.
- Method of grouting.

CONTRACTOR shall notify ENGINEER four working days prior to beginning work on any railway property. ENGINEER will notify Railroad on behalf of OWNER.

PART 2 - PRODUCTS

STEEL PIPE FOR USE UNDER ROADWAYS

Steel pipe shall meet the requirements of MDOT. Jacked-in-place steel pipe shall meet the requirements of either ASTM A 53, Type E or S, Grade B; ASTM A 139 Grade B; or ASTM A 106 Grade B or C.

The ends of the steel pipe to be jacked shall be prepared for field welding at joints.

The nominal outside diameter and wall thickness, in inches, for steel pipe shall be as shown below.

<u>Nominal Size</u>	<u>Wall Thickness</u>
12	0.188
14	0.250
16	0.250
18	0.250
20	0.250
24	0.250
30	0.312
36	0.312
42	0.438
48	0.500
54	0.563

STEEL PIPE FOR USE UNDER RAILROAD TRACKS

Steel pipe used under railroads shall meet the requirements of The American Railway Engineering Association.

Pipe shall be ASTM A53, Type E or S, Grade B, or ASTM A160, Grade B or C, with a minimum yield strength of 35,000 psi.

Minimum wall thickness for steel casing pipe based on a Cooper E80 loading shall be as shown below (in inches).

<u>Nominal Size</u>	<u>Wall Thickness</u>
12	0.188
14	0.250
16	0.281
18	0.312
20	0.344
24	0.407
30	0.469
36	0.531
42	0.625
48	0.688
54	0.781

PART 3 - EXECUTION

PREPARATION

CONTRACTOR shall excavate and dispose of material of any nature required to carry out the work. All tunnel and shaft excavation shall be performed in accordance with any paragraphs under Division 2 Earthwork which may apply. All excavated material, except that needed for backfill, shall be promptly removed and disposed of.

Drainage. CONTRACTOR shall furnish, install, and maintain all facilities for collecting, conveying, and disposing of water in tunnels and shafts until the completion of the work as required in Section 02140. CONTRACTOR shall have on hand at all times sufficient machinery for all emergencies that are likely to arise on work of this character, and such machinery shall be kept in good working order. The pumping and power

supply to the pumps shall be under the direct charge of competent mechanics, constantly attended on a 24-hour basis.

Effective and continuous control of water during the placing of concrete will be required. CONTRACTOR shall maintain the groundwater table to a level two feet below the casing invert during construction.

Power and Lighting. All power machinery and tools used shall be operated by electricity or compressed air. No electric voltage in excess of 440 volts will be permitted. Transformers, if used, shall be mounted on platforms or in an approved enclosure. The use of gasoline in power is prohibited.

All machinery and equipment used in tunnel headings or shafts under gaseous conditions shall bear the approval plate of the United States Bureau of Mines.

Work shall be lighted with electricity at the expense of CONTRACTOR. A sufficient number of lights shall be provided to illuminate properly all parts of the work. All lighting circuits shall be thoroughly insulated and kept separate from power circuits. In gaseous conditions, all lamps shall be mounted in protected gas-and-vapor-proof fixtures.

INSTALLATION

Ventilation. CONTRACTOR shall keep the tunnel air in a condition suitable for the health of the workers and clear enough for the surveying operations. Provisions shall be made for quick removal of gases. Whenever a 24-hour tunneling operation exists, CONTRACTOR shall have attainable, within one hour's time, any spare piece of equipment or material vital to the tunnel operation.

Jacking and Boring Pipe. Jacking and receiving pits shall be completely sheeted to provide proper support for the banks and adequate support for reaction blocks. Jacking shaft shall be constructed long enough to provide room for jacking head frame, reaction blocks and two sections of pipe. The width shall be sufficient to allow ample working room. The backstops or reaction blocks shall be placed absolutely perpendicular in all directions to axis of the pipe and the guide timbers carefully installed to the proper line and grade.

Prior to jacking the pipe out of the shaft, the outside surface may be coated with bentonite or other suitable lubricant. Bentonite or other suitable lubricant may be applied at the front face of the lead pipe simultaneously with the jacking operation. A lubricant sill plank may be required in the heading to maintain vertical alignment.

The front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger from leading the pipe so that there will be no unsupported excavation ahead of the pipe.

The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered. If the obstruction cannot be removed without excavation in advance of the pipe, the casing pipe shall be filled with grout and abandoned unless otherwise directed by the ENGINEER.

Jacking pressure must be applied by a pushing frame at right angles to the line to avoid breaking the pipe or forcing it out of alignment. A positive stop boring arrangement to prevent excavation ahead of the pipe shall be provided. Excavation ahead of the pipe shall not be permitted.

When excavating, voids outside the pipe and disturbances of the surrounding material shall not exceed 1/2 inch. Excessive voids shall be filled immediately with sand or other suitable material and thoroughly compacted.

The jacking operation shall be continuous insofar as possible to prevent seizure of the pipe. However, if the operation is discontinued for any time, the excavation shall be safely supported with wood bulkhead and adequate blocking.

Grouting Casing Pipe. All voids around the outside of the jacked pipe shall be filled by means of pressure grouting with approved material as specified in MDOT Standard Specification 7.02. Grouting shall be completed within 48 hours of completing the bore.

A sufficient number of grout holes shall be provided in the casing pipe to ensure complete grouting of the space between the casing and the surrounding soil. Grouting pressure shall be sufficiently high to fill all voids.

Following satisfactory pipe grouting operations, the grout pipe shall be removed from the grout hole after the grout has taken its initial set. The space occupied by the grout pipe shall be completely filled with stiff mortar and troweled smooth at the inner face or a threaded plug installed.

Safety Requirements. All operations shall be conducted so as not to interfere with, interrupt, or endanger the operation of trains nor damage, destroy, or endanger the integrity of railroad facilities.

At all times when the work is being progressed, a field supervisor for the work with no less than twelve (12) months experience in the operation of the equipment being used shall be present. If boring equipment or similar machines are being used, the machine operator also shall have no less than twelve (12) months experience in the operation of the equipment being used.

CARRIER PIPE INSTALLATION

Carrier pipes shall be installed as specified in Section(s) 02720 and 15070. Pipe shall be the type and class as shown on the Drawings. Joint restraint, where required, shall be provided.

Pipe Placed in Casings. Under this section of the Work, CONTRACTOR shall place the carrier pipe, fill the annular space between the casing and carrier pipe with pea stone, place bulkheads, and complete all backfilling. All necessary skidding materials required to protect the carrier pipe shall be provided.

Casing Pipe Under State (MDOT) or County Roads. All void spaces between the casing pipe and carrier pipe shall be filled with sand meeting the requirements of MDOT Standard Specifications for natural sand 2NS. The sand shall be placed by flushing or other methods approved by ENGINEER. CONTRACTOR shall furnish sand fill holes in the carrier pipe as required to ensure complete filling of all void spaces.

Casing Pipe Under Railroads. The void space shall be filled to the springline of the carrier pipe with sand as specified above.

Sealing Casing Pipe Ends. The annular space at ends of casing pipe shall be bulkheaded with a minimum 8-inch thick solid masonry with a 1-inch fiberboard cushion between the masonry and carrier pipe

FIELD QUALITY CONTROL

CONTRACTOR shall provide all survey equipment and personnel necessary to maintain the casing or tunnel on correct alignment and grade during construction. ENGINEER shall provide reference points for use by CONTRACTOR.

END OF SECTION 02345