

25. Tunnels.

a. General.

- 1) This section discusses the typical situations which require the use of a tunnel for the installation of a water or sewer pipeline.
- 2) Use of tunnels. Due to higher construction costs for a tunnel, the first choice of water and sewer pipeline construction is to use the cut and cover method, for additional design guidance see Part Three, Section 19, (Geotechnical Considerations for Pipeline Alignments). However, under certain circumstances and in areas where the requirements of other jurisdictional authorities apply, tunnel construction will be required. If a water or pressure sewer tunnel is required, use a small diameter casing pipe with casing pipe spacers whenever possible, see Standard Details M/17.6 and M/17.7. Microtunneling can be considered in many cases where tunneling is desired or required.
- 3) Tunnel design and submittal requirements, see Part Three, Section 26 (Tunnel Design Criteria) and Section 20 (Geotechnical and Corrosion Submittals).

b. Conditions and Requirements for Tunnels.

- 1) Railroad crossing - Consolidated Rail Corporation (Conrail). Refer to the latest edition of the "Specifications for Pipeline Occupancy of Consolidated Rail Corporation Property" (Publication CE-8) for the design of tunnels crossing a Conrail right of way. Consider the requirements stated under Publication CE-8 and the following:
 - a) Provide on the plans, a specified method of installation, size and material for both the casing and carrier pipes. No alternatives will be allowed.
 - b) Design the casing pipe not less than five and one-half (5-1/2) feet from the base of the rail to top of the casing pipe at the closest point, except under sidings or industry tracks the distance may be four and one-half (4-1/2) feet, with approval from Conrail.
 - c) Pipelines to be abandoned are to be removed or filled with grout, compacted sand or other methods approved by Conrail.
 - d) Design the carrier pipe as either DIP, class 56 or RCP, class V, wall C, ASTM C 76. Steel pipe cannot be used as sewage carrier pipe.
 - e) Extend vent pipes not less than four (4) feet above ground surface.
 - f) Locate the face of all pits a minimum of twenty-five (25) feet from the centerline of the adjacent track, measured at right angles to the tracks.
- 2) Railroad crossing - CSX Transportation, Inc. Refer to the latest edition of "Application for Encroachments Upon the Right of Way of CSX Transportation, Inc", to design tunnels crossing CSX property. Consider the requirements stated under Application for Encroachments Upon the Right of Way of CSX Transportation, Inc and the following:
 - a) Casing pipe may be omitted for non-pressure sewer crossing where the pipe strength is capable of withstanding railway loading.



- b) Design mechanical or welded type joints for carrier pipe operating under pressure.
- c) Carrier pipe can be either Polyethylene or PVC, if all three of the following requirements are met: 1) pipeline is used for non-flammable substances, 2) working pressure is less than 100 psi, and 3) pipeline is encased in a larger steel casing pipe.
- 3) Railroad crossing - Amtrak. Refer to the latest edition of the "Requirements & Specifications for Pipeline Occupancy of National Railroad Passenger Corporation" (Publication Eng. 1604) for the design of tunnels crossing Amtrak property. Consider the requirements stated under Publication Eng. 1604 and the following:
 - a) Provide a tunneling shield for all liner plate installations 60-inch and larger. Design the shield to conform to and not to exceed the outside dimensions of the liner plate tunnel by more than one (1") inch at any point on the periphery. Due to this requirement to use tunneling shields for all liner plate installations, it will generally be more economical to use a jack and bore casing pipe installation.
 - b) Specify only four (4) flange liner plate or RCP, class V, wall C, ASTM C76 for the casing pipe. Smooth wall RCP bells with a nominal diameter of over 54-inch will not be permitted. Do not design liner plate tunnels for water pipelines.
 - c) Design the carrier pipe as either DIP, class 56 or RCP, class V, wall C, ASTM C 76.
 - d) Do not exceed the outside diameter of the casing pipe by more than one half (1/2") inch, during the over-cutting by the head of the auger in the boring method.
 - e) Block both ends of the casing pipe for carrier pipe of non-flammable substances in such a way as to prevent the entrance of foreign material, but allowing leakage to pass in the event that a carrier pipe breaks.
 - f) The use of explosives will not be permitted.
- 4) Rail Line crossing Maryland Transit Administration (MTA) Rail Lines.
 - a) For requirements, see Part 3, Section 3 (Pipelines Crossings and Clearance).
- 5) Maryland State Highway Administration (MSHA) crossings.
 - a) Refer to the latest edition of "Policy on the Accommodation of Utilities on State Highway Rights of Way" published by Maryland State Highway Administration. Provide the option of using jack and bore casing pipes and steel liner plates for tunnel construction.
 - b) Design the carrier pipes within a tunnel for the external loads as if they were not in a tunnel.
- 6) Other road crossings.
 - a) Crossing any access, secondary or primary roadway where traffic flow cannot be interrupted as determined by the jurisdictional authority.
 - b) For the design of tunnel construction method options and carrier pipe, see MSHA crossings.
- 7) Right of way crossings.



- a) Crossing the right of way of any county, municipality or utility upon which there exists pavement or other features that may not be disturbed.
 - b) If the crossing is short requiring only several lengths of pipes, then the economical tunneling method is to jack and bore a small diameter casing pipe and use casing pipe spacers as the support for the carrier pipe inside the casing, see Standard Details M/17.6 and M/17.7.
- 8) Crossing environmentally sensitive or hazardous waste contaminated areas.
- a) Tunneling may be required when crossing environmentally sensitive or hazardous waste contaminated areas whereby the disturbance to the critical upper soil layer is mandated to be minimized or avoided. Evaluate alternate pipeline alignments to determine the most cost effective and acceptable method for crossing or avoiding these areas.
 - b) In general, the tunnel methods to be used in these areas are the jack and bore casing pipe installation or the earth balanced micro tunneling method.

