

Designer Note: Use this special provision whenever necessary to jack a storm sewer/pipe culvert underneath an existing Railroad track. Jacking pipes under Railroad Right-of-Way generally requires using a steel casing and specially designed pipe to meet railroad loading requirements. This provision is intended as a starting point and should be modified to meet your project and railroad requirements. Check to see that current A.R.E.A. specifications are included herein and are still applicable. Discuss in detail with the District Project Support Unit (Utilities/Agreements). Specify the length, inside diameter, type of loading, type of material, and wall thickness for the casing pipe. Fill in the following data as applicable to your project:

*Storm Sewer or Pipe Culvert

**Pipe Diameter

10-24-96 Revised measurements to metric.

([REDACTED] STORM SEWER/PIPE CULVERT) JACKED IN PLACE, [REDACTED] INCHES ([REDACTED] MM)

Effective July 1, 1994

Revised January 1, 2007

This work shall consist of jacking a _____ under the railroad embankment in accordance with Section 552 of the Standard Specifications and this special provision.

A _____ ft. (_____ m) long, _____ inch (_____ mm) diameter steel casing pipe meeting ASTM A-53 Grade _____ for _____ loading and a wall thickness of _____ inches (_____ mm) will be required.

The casing pipe shall be installed in accordance with the following portions of Chapter 1, Part 5, of the latest edition of the A.R.E.A. Manual:

(INCLUDE HERE ALL APPLICABLE SPECIFICATIONS from the latest edition of the "Manual for Railroad Engineering" as listed at the end of this provision).

A jacking plan shall be provided to the Engineer and Railroad Company for approval.

Method of Measurement. [REDACTED] jacked in place of the different diameters will be measured for payment in foot (meter) in place.

Excavation in rock will be measured for payment as specified in Article 502.12.

Basis of Payment. This work will be paid for at the contract unit price per Foot (Meter) for [REDACTED] JACKED IN PLACE, of the diameter specified, which price shall include the [REDACTED], metal liner, including backfilling all voids between the [REDACTED] and metal liner, all other materials and equipment necessary to install the [REDACTED] and all excavation except excavation in rock.

Excavation in rock will be paid for as specified in Article 502.13 for Rock Excavation for Structures.

Manual for Railroad Engineering

5.2 Specifications for Pipelines Conveying Non-Flammable Substances

5.2.1 SCOPE

Pipelines included under these specifications are those installed to carry steam, water or any non-flammable substance which, from its nature or pressure, might cause damage if escaping on or in the vicinity of railway property. The term "Engineer" as used herein means chief engineer of the railway company, or his authorized representative.

5.2.2 GENERAL REQUIREMENTS

Pipelines under railway tracks and across railway Rights-of-Way shall be encased in a larger pipe or conduit called the casing pipe as indicated in Fig. 5.2.2.1. Casing pipe may be omitted under the following conditions:

- (a) Under secondary or industry tracks as approved by the engineer.
- (b) On pipelines in streets where joints are of leak-proof construction and the pipe material will safely withstand the combination of internal pressure and external loads.
- (c) For non-pressure sewer crossings where the pipe strength is capable of withstanding railway loading.

Pipelines shall be installed under tracks by boring or jacking, if practicable.

Pipelines shall be located, where practicable, to cross tracks at approximately right angles thereto but preferably at not less than 45° degrees and shall not be placed within culverts nor under railway bridges where there is likelihood of restricting the area required for the purpose for which the bridges or culverts were built, or of endangering the foundations.

Pipelines laid longitudinally on railway Rights-of-Way shall be located as far as practicable from any tracks or other important structures. If located within 25' (7.5 m) of the centerline of any track or where there is danger of damage from leakage to any bridge, building or other important structure, the carrier pipe shall be encased or of special design as approved by the Engineer.

Any replacement of a carrier pipe shall be considered a new installation, subject to the requirements of these specifications.

Where laws or orders of public authority prescribe a higher degree of protection than specified herein, then the higher degree of protection so prescribed shall supersede the applicable portions.

Pipelines and casing pipe shall be suitably insulated from underground conduits carrying electric wires on railway Rights-of-Way.

5.2.3 CARRIER PIPE

Carrier pipe and joints shall be of accepted material and construction as approved by the engineer. Joints for carrier line pipe operating under pressure shall be mechanical or welded type.

The pipe shall be laid with sufficient slack so that it is not in tension.

5.2.4 CASING PIPE

Casing pipe and joints shall be of leak-proof construction, capable of withstanding railway loading.

The inside diameter of the casing pipe shall be at least 2" (50 mm) greater than the largest outside diameter of the carrier pipe, joints or couplings, for carrier pipe less than 6" (150 mm) in diameter; and at least 4" (100 mm) greater for carrier pipe 6" (150 mm) and over in diameter. It shall, in all cases, be great enough to allow the carrier pipe to be removed subsequently without disturbing the casing pipe or roadbed.

Table 5.2.4.1.1

Minimum Wall Thickness for Steel Casing Pipe for E 72 Loading

Nominal Thickness inches (mm)	Nominal Diameter inches (mm)
0.188 (5.0)	14 (Under 350)
0.219 (5.5)	14 & 16 (350 & 400)
0.250 (6.4)	18 (450)
0.281 (7.0)	20 (500)
0.312 (8.0)	22 (550)
0.344 (9.0)	24 (600)
0.375 (9.5)	26 (650)
0.406 (10.0)	28 & 30 (700 & 750)
0.438 (11.0)	32 (800)
0.469 (12.0)	34 & 36 (850 & 900)
0.500 (13.0)	38, 40 & 42 (950, 1000 & 1050)

When casing is installed without benefit of a protective coating, and said casing if not cathodically protected, the wall thickness shown above shall be increased to the nearest standard size, which is a minimum of 0.063 in. (1.6 mm) greater than the thickness shown except for diameters under 12-3/4 in. (325 mm).

5.2.4.1 Steel Pipe

Steel pipe shall have a minimum yield strength of 35,000 psi (241,320 kPa).

5.2.4.2 Cast Iron Pipe

Cast iron pipe may be used for a casing provided the method of installation is by open trench. Cast iron pipe shall conform to American National Standards Institute A 21. The pipe shall be of the mechanical-joint type or plain-end pipe with compression-type couplings. The strength of cast iron pipe to sustain external loads shall be computed in accordance with ANSI A 21.1 "Manual for the Computation of Strength and Thickness of Cast Iron Pipe."

5.2.4.3 Concrete Pipe

For pressure under 100 psi (690 kPa) in the carrier pipe, the casing pipe may be reinforced concrete pipe conforming to the AREA Specifications for Reinforced Concrete Culvert Pipe, Part 10, Chapter 8, or bituminous-coated corrugated metal pipe conforming to the AREA specifications for such pipe, Part 4, this Chapter.

5.2.4.4 Length of Pipe

Casing pipe under railway tracks and across railway rights-of-way shall extend to the greater of the following distances, measured at right angles to centerline of track:

- (a) 2' (600 mm) beyond toe of slope.
- (b) 3' (1 m) beyond ditch.
- (c) A minimum distance of 25' (7.5 m) from centerline of outside track when end of casing is below ground.
- (d) If additional tracks are constructed in the future or the railway determines that the roadbed should be widened, the casing shall be extended correspondingly.

5.2.5 CONSTRUCTION

Casing pipe shall be so constructed as to prevent leakage of any substance from the casing throughout its length except at ends. Casing shall be so installed as to prevent the formation of a waterway under the railway, with an even bearing throughout its length, and shall slope to one end (except for longitudinal occupancy).

Where casing and/or carrier pipe is cathodically protected, the engineer shall be notified and suitable test made to ensure that other railway structures and facilities are adequately protected from the cathodic current in accordance with the recommendations of current Reports of Correlating Committee on Cathodic Protection, published by the National Association of Corrosion Engineer.

5.2.5.1 Method of Installation

- (a) Installations by open-trench methods shall comply with Installation of Pipe Culverts, Part 4, this Chapter.

- (b) Bored or jacked installations shall have a bored hole diameter essentially the same as the outside diameter of the pipe plus the thickness of the protective coating. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe (including coating) by more than approximately 1" (30 mm), remedial measures as approved by the Chief Engineer of the railway company shall be taken. Boring operations shall not be stopped if such stoppage would be detrimental to the railway.
- (c) Tunneling operations shall be conducted as approved by the Engineer. If voids are caused by the tunneling operations, they shall be filled by pressure grouting or by other approved methods which will provide proper support.

5.2.5.2 Depth of Installation

5.2.5.2.1 Casing Pipe

Casing pipe under railway tracks and across railway Rights-of-Way shall be not less than 5-1/2 ft. (1.7 m) from base of railway rail to top of casing at its closest point, except that under secondary or industry tracks this distance may be 4-1/2 ft. (1.4 m). On other portions of Rights-of-Way where casing is not directly beneath any track, the depth from ground surface or from bottom of ditches to top of casing shall not be less than 3 ft. (1 m).

5.2.5.2.2 Carrier Pipe

Carrier pipe installed under secondary or industry tracks without benefit of casing shall be not less than 4-1/2 ft. (1.4 m) from base of railway rail to top of pipe at its closest point or less than 3 ft. (1 m) from ground surface or from bottom of ditches.

5.2.5.2.3 On Right-of-Way

Pipeline laid longitudinally on railway Rights-of-Way 50' (15 m) or less from centerline of track, shall be buried not less than 4' (1.2 m) from ground surface to top of pipe. Where pipeline is laid more than 50' (15 m) from centerline of track, minimum cover shall be at least 2' (600 mm).

5.2.5.3 Shut-Off Valves

Accessible emergency shut-off valves shall be installed within effective distances each side of the railway is mutually agreed to by the Engineer and the pipeline company. Where pipelines are provided with automatic control stations at locations and within distances approved by the engineer, no additional valves shall be required.

5.2.6 APPROVAL OF PLANS

Plans for proposed installation shall be submitted to and meet the approval of the Engineer before construction is begun.

Plans shall be drawn to scale showing the relation of the proposed pipeline to railway tracks, angle of crossing, location of valves, railway survey station, Right-of-Way lines and general layout of tracks and railway facilities. Plans should also show a cross section (or sections) from field survey, showing pipe in relation to actual profile of ground and tracks. If open-cutting or tunneling is necessary, details of sheeting and method of supporting tracks or driving tunnel shall be shown.

In addition to the above, plans should contain the following data:

	Carrier Pipe	Casing Pipe
Contents to be handled		
Outside diameter		
Pipe material		
Specification and grade		
Wall thickness		
Actual working pressure		
Type of joint		
Coating		
Method of installation		

Protection at ends of casing:

Both ends:	One end:	Type:	ft. (m)	in. (mm)
Bury: Base of rail to top of casing				
Bury: (Not beneath tracks)				
Bury: (Roadway ditches)				

5.2.7 EXECUTION OF WORK

The execution of the work on railway Rights-of-Way, including the supporting of tracks, shall be subject to the inspection and direction of the Engineer.