

1. **GENERAL REQUIREMENTS** *Sample reference only; contact authority for actual documents*

Pipe lines under railroad tracks or across or along railroad right-of-way shall conform to current American Railway Engineering Association Specifications. If laws or orders of public authority prescribe a higher degree of protection than specified herein, then the higher degree of protection so specified shall be adhered to.

Plans and specifications for proposed installation shall be submitted to the CE (Chief Engineer) and meet the approval of the railroad company before construction is begun. Plans shall be drawn to scale showing the relation of the proposed pipeline, angle of crossing, location of valves, railway survey station, right-of-way line and general layout of tracks and railway facilities. Plan should also show a cross-section (or sections) from field survey, showing pipe in relation to actual profile of ground and tracks, complete description of materials to be used, and location of jacking and receiving pits. If open cutting or tunneling is necessary, details of sheeting and method of supporting tracks or driving tunnel should be shown. The execution of the work on the railway right-of-way, including the supporting of tracks, shall be subject to the inspection and direction of the CE office.

Pipelines shall be installed under tracks by boring or jacking, if practicable, Boring excavation must not exceed the outside diameter of the pipe. Jacking or boring of corrugated metal pipe, cast iron pipe or pipe with flanges, bells or couplings will not be permitted. Directional boring will be allowed at the discretion of the Railroad. Soils investigation and a geotechnical report may be required.

Pipeline shall be located, where practicable, to cross tracks at approximately right angles thereto but preferably at not less than 45 degrees. Pipelines shall not be placed within a culvert, under railway bridges, nor closer than 100 feet to any portion of any railway bridge, building or other important structure, except in special cases and than be of special design as approved by the CE of the railway company.

Pipelines laid longitudinally in railway right-of-way shall be located as far as practicable from any tracks or other important structures. Pipelines carrying flammable products or products under pressure located within 25 feet of the centerline of any track or where there is danger of damage from leakage to any bridge, building or other important structure, shall be encased or of special design as approved by the CE of the railway company.

Pipelines laid longitudinally on the railway right-of-way, 50 feet or less from the centerline of track shall be buried not less than 4'6" from the ground surface to the top of pipe. If distance is more than 50 feet from centerline of track, minimum cover shall be 3 feet.

If additional tracks are constructed in the future and the Railway company determines that the roadbed requires widening, then the casing shall be extended correspondingly by the Licensee at the Licensee's cost.

All casing pipes, except those laid longitudinally, shall be sloped not less that 0.3%.

Pipelines shall not be installed on wood trestles but consideration will be given to permitting attachment to steel spans where unreasonable expense would be required to provide separate crossing over waterway, public way or railroad as approved by the CE.

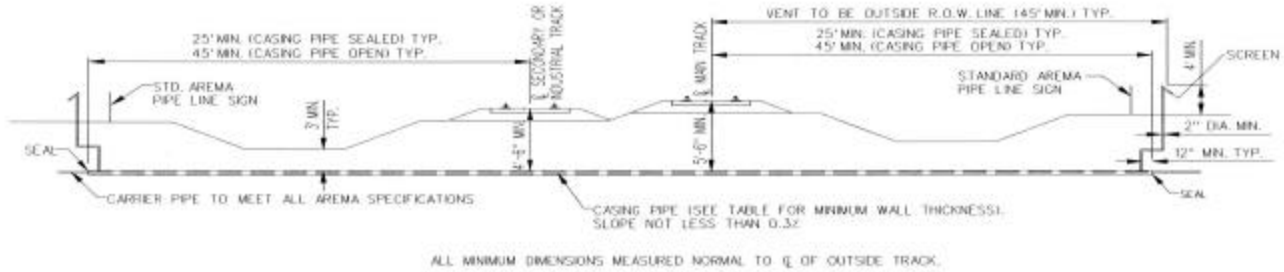
The ends of casing pipe shall be securely and permanently sealed to outside of carrier pipe with approved joint material against encroachment of outside elements. The vent pipes shall be connected to the top surface of casing pipe at both ends of the casing pipe.

Pipe Crossing Railway Casing Spacers and End seals

1. PIPELINES CARRYING FLAMMABLE SUBSTANCES

This includes oil, gas, gasoline, petroleum products or other flammable or highly volatile substance under pressure.

PIPE LINES CARRYING FLAMMABLE SUBSTANCES.



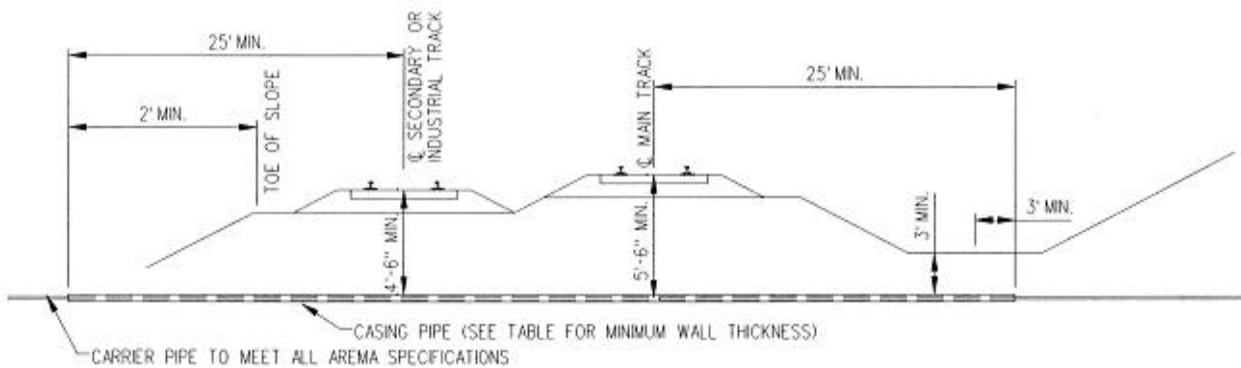
ALL MINIMUM DIMENSIONS MEASURED NORMAL TO Q. OF OUTSIDE TRACK.
THIS DRAWING COVERS OIL, GASOLINE, PETROLEUM PRODUCTS, OR OTHER FLAMMABLE OR HIGHLY VOLATILE SUBSTANCE UNDER PRESSURE.
NOTE: FOR NATURAL GAS PIPES ONLY, CASING PIPE MAY BE ELIMINATED IF PIPE IS STEEL AND INSTALLED A MINIMUM OF 18" BELOW TOP OF TIES.

At all other locations on the right-of-way the minimum ground cover for uncased steel natural gas pipes must be six (6) feet.

2. PIPELINES CARRYING NON-FLAMMABLE SUBSTANCES

This includes 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. Sewers and drains do not require casing pipe unless conditions exist which will endanger security of track, but must be of sufficient strength to withstand E-80 railway loading.

PIPE LINES CARRYING NON-FLAMMABLE SUBSTANCES.



ALL MINIMUM DIMENSIONS MEASURED NORMAL TO Q. OF OUTSIDE TRACK.
THIS DRAWING COVERS STEAM, WATER OR ANY NONFLAMMABLE SUBSTANCE WHICH FROM ITS NATURE OF PRESSURE MIGHT CAUSE DAMAGE IF ESCAPING ON OR IN THE VICINITY OF RAILWAY PROPERTY. SEWERS AND DRAINS DO NOT REQUIRE CASING PIPE UNLESS CONDITIONS EXIST WHICH WILL ENDANGER SECURITY OF TRACK, BUT MUST BE OF SUFFICIENT STRENGTH TO WITHSTAND E-80 LOADING.

PIPELINE CROSSING SPECIFICATIONS

CASING PIPE FOR E-80 LOADING

STEEL PIPE		
(REFERENCE SOURCE: AREMA, CHAPTER 1, PART 5). WALL THICKNESS FOR STEEL CASING PIPE (MINIMUM YIELD STRENGTH 35,000 psi)		
DIAMETER OF PIPE (INCHES)	PIPE COATED OR CATHODICALLY PROTECTED NOMINAL THICKNESS (INCHES)	PIPE NOT COATED OR CATHODICALLY PROTECTED NOMINAL THICKNESS (INCHES)
12 3/4 AND UNDER	0.188	0.188
14	0.188	0.250
16	0.219	0.281
18	0.250	0.312
20 AND 22	0.281	0.344
24	0.312	0.375
26	0.344	0.406
28	0.375	0.438
30	0.406	0.469
32	0.438	0.500
34 AND 36	0.469	0.531
38	0.500	0.562
40	0.531	0.594
42	0.562	0.625
44 AND 46	0.594	0.656
48	0.625	0.688
50	0.656	0.719
52	0.688	0.750
54	0.719	0.781
56 AND 58	0.750	0.812
60	0.781	0.844
62	0.812	0.875
64	0.844	0.906
66 AND 68	0.875	0.938
70	0.906	0.969
72	0.938	1.000

REINFORCED CONCRETE PIPE	
PIPE SHALL CONFORM TO A.S.T.M. DESIGNATION C-76. CLASS IV, WALL "B" (MIN.). ROUND PIPE SHALL HAVE CIRCULAR, NOT ELLIPTICAL REINFORCEMENT.	

CORRUGATED METAL PIPE	
PIPE SHALL BE GALVANIZED, BONDED AND ASPHALT COATED.	
GAGE OF METAL BEFORE GALVANIZING U.S. STD. GAGE	DIAMETER OF PIPE (INCHES)
14	18 AND UNDER
12	24, 30, AND 36
10	42 AND 46

Steel Casing Spacers - HDPE Casing Spacers-Wheel Rollers - End Seals

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