Clark County
Standard Specifications for Underground Crossings of Railroad Right of Way

1.0 General

1.1 The execution of work on the railroad right of way must be coordinated with the railroad operator.

1.2 Where practicable, pipelines will cross tracks at approximately right angles. If possible avoid crossings of less than 45 degrees.

1.3 Pipelines shall not be placed;
- 1.3.1 in a culvert.
- 1.3.2 under a railway bridge.

1.4 Pipelines shall not be placed any closer than 45 feet to any portion of a railway bridge, building or other important structure, except in special cases and then by special design, as approved by Clark County.

1.5 Pipelines shall be installed under tracks by boring or jacking, if practicable.
- 1.5.1 Boring excavation must not exceed the outside diameter of the pipe.
- 1.5.2 Jacking or boring of corrugated metal pipe, or pipe with flanges, bells or couplings will not be permitted.

1.6 If open cutting or tunneling is necessary, submit complete description of materials to be used, proposed specifications and drawings including details of method of supporting the tracks, sheeting, de-watering, and cut/tunnel design with application.

1.7 Existing railroad ditches will;
- 1.7.1 Not be disturbed or,
- 1.7.2 Be restored to previous condition or,
- 1.7.3 Be reconstructed per a special design as approved by Clark County.

1.8 Insulators;
- 1.8.1 Will be of standard manufacture; not homemade.
- 1.8.2 Will center the carrier in the casing.
- 1.8.3 Will be nonconductors of electricity.
- 1.8.4 Will not be biodegradable.
- 1.8.5 Will not be sand or wood.
- 1.8.6 Will be 8 feet on center or less.
- 1.8.7 A minimum of 2 insulators will be attached to each piece of carrier pipe.
- 1.8.8 An insulator will be placed within 2 feet of each end of the casing.

1.9 End of casing seals;
- 1.9.1 Will be of standard manufacture; not homemade.
- 1.9.2 Will not be biodegradable.

1.9.3 Will be flexible; grout is not acceptable.
1.9.4 Burs, slag, rough or sharp edges will be removed from the ends of the casing prior to the installation of the end seals.

1.10 If cathodic protection is desired, submit details with application.

2.0 Pipelines Carrying Flammable Substances

2.1 Including oil, gas, gasoline, petroleum products or other flammable, corrosive or volatile substances.

2.2 Casing Pipe Material: Steel
2.2.1 Steel casing thickness, see table 8.1.
2.2.2 Steel casing diameter, see table 8.2.

2.3 Carrier pipe to be supported by insulators.

2.4 Both ends of the casing will be sealed and vented.

2.5 Joints for carrier line pipe shall be mechanical or welded type.

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

3.0 Pipelines Carrying Non-Flammable Substances Under Pressure

3.1 Including steam, water or other non-flammable substance which from it's nature or pressure might cause damage if escaping on, or in the vicinity of, railroad property.

3.2 Casing Pipe Material: Steel
3.2.1 Steel casing thickness, see table 8.1.
3.2.2 Steel casing diameter, see table 8.3.

3.3 Carrier pipe to be supported by insulators.

3.4 Both ends of the casing will be protected against the entrance of foreign material, but shall not be tightly sealed.

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

4.0 Pipelines Carrying Non-Flammable Substances At Less Than 100 P.S.I.

4.1 May include sewers and drains.

4.2 Casing Pipe Material: Steel
Casing/Pipe Material: Reinforced Concrete Pipe
4.2.1 Steel casing thickness, see table 8.1.
4.2.2 Steel casing diameter, see table 8.3.

4.2.3 Reinforced concrete pipe need not be cased, unless conditions exist which will endanger the security of the track or other structures.

4.2.4 Design loading for reinforced concrete pipe shall include, earth pressure, Cooper E-80 live load, impact and any other surcharge loads.

4.2.5 Reinforced concrete pipe, see table 8.4.

4.3 Carrier pipe to be supported by insulators.

4.4 Both ends of the casing will be protected against the entrance of foreign material, but shall not be tightly sealed.

5.0 Fiber Optic and Electrical Underground Crossings

5.1 Including metallic and non-metallic carriers

5.2 Casing Pipe Material: Steel

5.2.1 Casing and installation requirements per pipelines carrying non-flammable substances under pressure.

5.3 The conduit containing the carrier shall be insulated from the casing pipe.

5.4 The carrier shall be laid with sufficient slack that it is not stressed at minus 25^{o} Fahrenheit. (minus 32^{o} Celsius)

5.5 Submit the following information with application;

- Number and type of cables.
- Voltage.
- Type and size of protection.

6.0 Longitudinal Pipelines

6.1 Pipelines laid longitudinally on railroad right of way, shall be buried not less than 5 feet from the ground surface to top of casing.

6.2 Longitudinal pipelines located within 25 feet of the centerline of any track, or 45 feet from the nearest bridge, building or other important structure, or where there is danger of damage from leakage to any track, bridge, building or other important structure, shall be encased or of special design as approved by Clark County.

7.0 Attachments

7.1 Drawing UG-1 railroad pipeline casing requirements.

7.2 Drawing UG-2 example of railroad pipeline casing length computation.

8.0 Tables

Clark County
Standard Specifications for Underground Crossings of Railroad Right of Way

Table 8.1

WALL THICKNESS FOR STEEL CASING PIPE
(MINIMUM YIELD STRENGTH 35,000 P.S.I.)

DIAMETER OF PIPE INCHES	UNCOATED PIPE MIN. THICKNESS INCHES
UNDER 14	0.188
14 AND 16	0.281
18	0.312
20	0.344
22	0.375
24	0.406
26	0.438
28 AND 30	0.469
32	0.500
34 AND 36	0.531
38, 40 AND 42	0.563
44 AND 46	0.594
48	0.625
50	0.656
52	0.688
54	0.719
56 AND 58	0.750
60	0.781
62	0.813
64	0.844
66 AND 68	0.875
70	0.906
72	0.938

Table 8.2

PIPE LINES CARRYING
FLAMMABLE SUBSTANCES

OUTSIDE DIAMETER OF CARRIER PIPE INCHES	ID OF CASING SHALL EXCEED OD OF CARRIER BY INCHES
UNDER 8	2
8 TO 16	3 1/2
GREATER THAN 16	4 1/2

Table 8.3

PIPE LINES CARRYING
NON-FLAMMABLE SUBSTANCES

OUTSIDE DIAMETER OF CARRIER PIPE* INCHES	ID OF CASING SHALL EXCEED OD OF CARRIER* BY INCHES
UNDER 6	2
6 OR GREATER	4

*including joints, bells, or couplings

Table 8.4

REINFORCED CONCRETE PIPE LINES CARRYING
NON-FLAMMABLE SUBSTANCES

DEPTH OF CARRIER PIPE FEET		MINIMUM PIPE STRENGTH ASTM C-76
14 or Less	with no analysis	Class V wall "B"
Greater than 14	analysis must be performed minimum pipe strength	Class IV wall "B"

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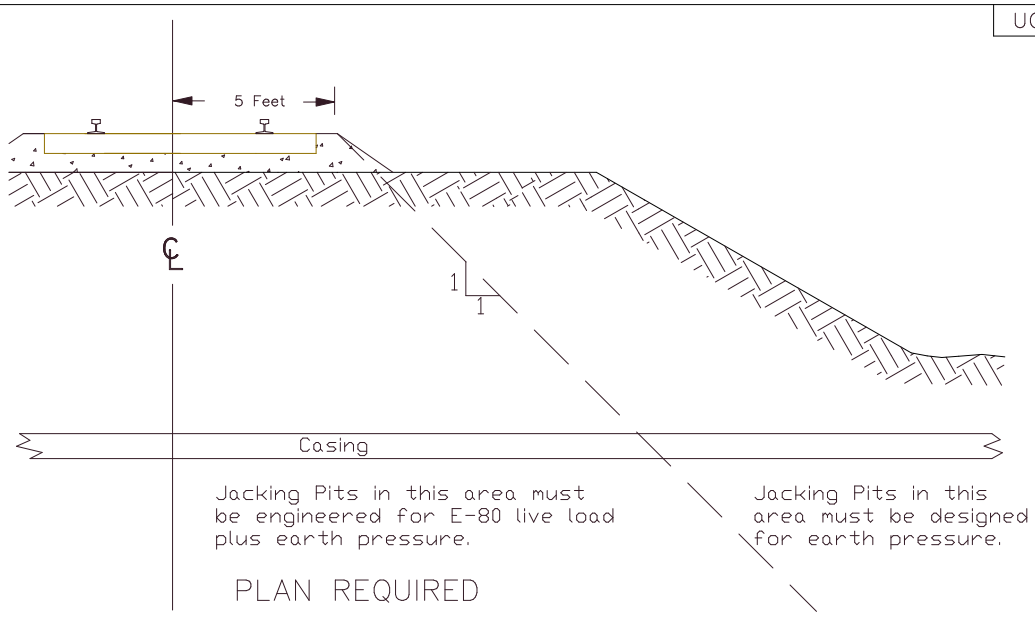
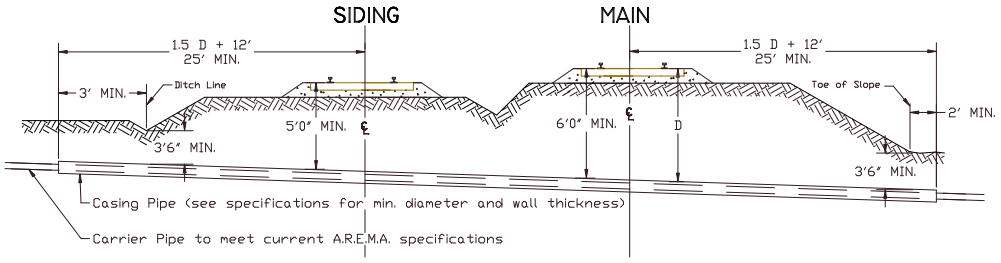
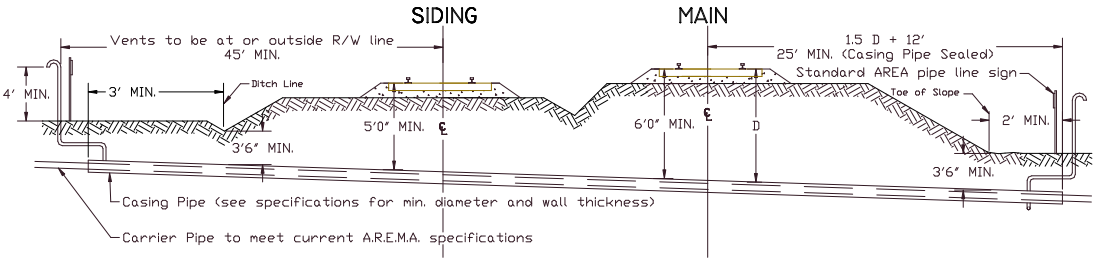
UG–1



PIPELINES CARRYING NON-FLAMMABLE SUBSTANCES



PIPELINES CARRYING FLAMMABLE SUBSTANCES



NOTE: All lateral minimum dimensions measured normal to ℄ of outside track.

RAILROAD PIPELINE CASING REQUIREMENTS

Clark County
Standard Specifications for Underground Crossings of Railroad Right of Way

UG–2

EXAMPLE

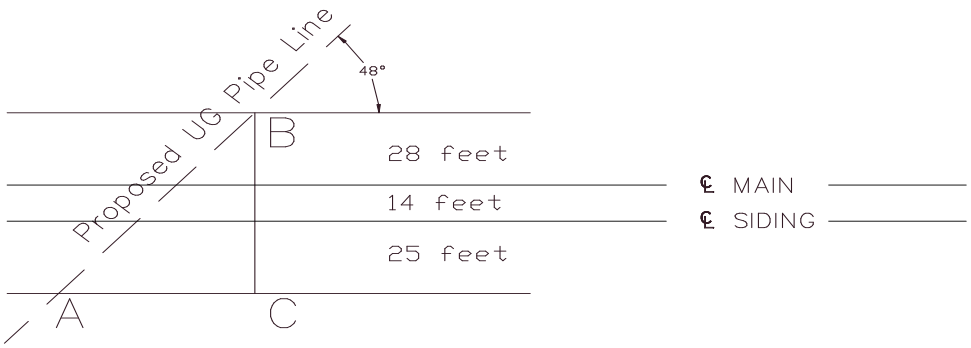
A field survey has determined:

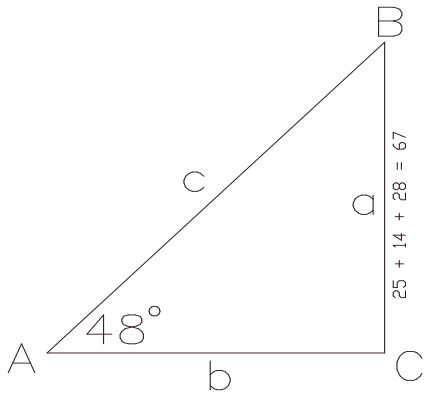
The depth of the proposed pipeline under the main is 10.4 feet.
The depth of the proposed pipeline under the siding is 7.9 feet.
The proposed pipeline crosses the track at 48°.
The main and siding are on tangent.
The ℄ of the siding is 14 feet from the ℄ of the main.

Formula: 1.5 D + 12 feet or 25 foot minimum.

MAIN: 10.4 x 1.5 + 12 =
MAIN: = 27.6 round to 28 feet

SIDING: 7.9 x 1.5 + 12 =
SIDING: = 23.85 use minimum 25 feet





$$c = \frac{a}{\sin A}$$

$$c = \frac{67}{.74314}$$

$$c = 91.50$$

92 feet of casing required

NOTE: Depth is measured top of tie to top of casing.

RAILROAD PIPELINE CASING LENGTH COMPUTATION