

ENGINEERING DIRECTIVES AND STANDARDS

Volume	Chapter	Section	Directive Number	Effective Date
IV	2	1	9	3/3/1993

SUBJECT: PIPELINE CROSSINGS AND THE USE OF THERMOPLASTIC PIPE

1. **PURPOSE:** The purpose of this directive is to modify certain policies concerning pipelines within highway right-of-way.
2. **SCOPE:** This directive covers policies relative to steel pipeline crossings and the use of thermoplastic pipe for gas and water service.
3. **POLICY:**

I. STEEL PIPELINE CROSSINGS

When crossing a state highway, the utility company has a choice of one of the following options, unless otherwise informed by the Department:

- A) Encase pipeline from right-of-way to right-of-way. All conditions relative to encased crossings in the present DOTD Policy will apply.
- B) Uncased crossings of welded steel pipelines may be permitted provided additional protective measures are taken in lieu of encasement:
 - 1) On new installations, cover must be at least 5' below the roadway and 3' below ditches or drainage structures.
 - 2) Existing uncased pipelines under proposed highway construction may be allowed to remain in place if they are in compliance with Federal D.O.T. regulations for uncased crossings, and are not in conflict with highway construction or maintenance; provided both highway and utility officials are satisfied that the lines are, and will remain, structurally and operationally safe. These will be dealt with on a case by case basis.
 - 3) Protection, in the form of a concrete slab or other acceptable method, must be provided in vulnerable locations, such as below ditches when there is less than the minimum cover.
 - 4) Markers must be installed over the pipeline which clearly define its location, product carried, operator and telephone number.
 - 5) The relocated or adjusted pipeline should follow the same general alignment as the original crossing.
 - 6) Repairs beneath the roadway will not be allowed if it necessitates open cutting the roadway. Repairs are not allowed within control of access areas. If trouble with the crossing is experienced, the utility company must install a new crossing at 100% their cost.

II. THERMOPLASTIC PIPING FOR NATURAL GAS AND WATER FACILITIES

- A) Uncased crossings will be allowed for PVC water lines of any size and polyethylene natural gas lines up to 2" nominal diameter, contingent on the following conditions:
 - 1) Polyethylene piping used in gas service must conform to ASTM D 2513 Design of uncased crossings must be in accordance with Federal D.O.T. Title 49, however, in no case shall the wall thickness be less than that of SDR11.

- 2) PVC piping used in water service must be made from compounds conforming to ASTM D 1748, and piping must be manufactured in accordance with ASTM D 2241 and AWWA C-900. Wall thickness for uncased PVC water line crossings must be at least that of DR 21 for pipe less than 4" nominal diameter and DR 18 for pipe larger than 4" nominal diameter.
 - 3) Since the use of PVC for gas lines and polyethylene for water lines is rare, applications to install either will be scrutinized on a case by case basis.
 - 4) On new installations, cover must be at least 5' below the roadway and 3' below ditches or drainage structures.
 - 5) Repairs under the roadway will not be allowed if it necessitates open cutting the roadway. If trouble with the crossing is experienced the utility company must install a new crossing at 100% their cost. Repairs are also not allowed within control of access areas.
 - 6) Where possible, joints below the roadway should be avoided. However, if joints below the roadway are necessary, they should be solvent welded, fusion welded, or in the case of bell joint PVC pipe, mechanically restrained.
 - 7) Protection in the form of a concrete slab, or other acceptable method, must be provided in vulnerable locations, such as below ditches when there is less than the minimum cover.
 - 8) Markers must be installed over the pipeline which clearly define its location, product carried, operator and telephone number.
 - 9) Detection tape or wire must be installed with all thermoplastic underground facilities.
- B) Operating pressures for polyethylene gas pipeline systems will be in accordance with Federal D.O.T. Title 49.

III. GENERAL CONDITIONS

- A) Vitrified clay pipe and asbestos concrete pipe crossings will not be allowed.
 - B) Existing Department policies will remain applicable unless amended herein. On all installations within highway right-of-way, it is the responsibility of the utility company to comply with applicable industry and governmental codes and regulations, (Federal D.O.T. TITLE 49, ANSI/ASME B.31, AWWA STANDARDS, ETC.) and to provide the Department with drawings, specifications, and design information to substantiate compliance. In the event of conflict between standards or policies, the more stringent shall apply.
- 4. OTHER ISSUANCE AFFECTED:** These policies will supersede and previously written policies concerning the same subjects.
- 5. EFFECTIVE DATE:** This directive will become effective immediately upon receipt.

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INSTRUCTIONAL MEMORANDA
(SUPPLEMENT TO EDSM IV.2.1.9)

- I. In order for Department personnel to check the minimum allowable wall thickness requirements for steel pipeline crossings of hazardous materials, the following formula, as taken from D.O.T. Title 49, should be used:

FORMULA:

$$P = \frac{2 St(FxExt)}{D}$$

$$t = \frac{or PD}{2SFET}$$

Where P = internal design press.

t = nominal wall thickness.

S = min. yield strength.

D = nominal O.D.

F = design factor

Typical S values (psi)

API 5L, A53, A106 (Grade B)	- 35,000
API 5L - X42	- 42,000
- X52	- 52,000
- X56	- 56,000
- X60	- 60,000
- X65	- 65,000
- X70	- 70,000

Class	(F) Cased Crossing	(F) Uncased Crossing
1	.72	.6
2	.60	.5
3	.50	.5
4	.40	.4

E = joint factor = 1 for
seamless pipe.

T = temp. derating factor
= 1 for temp. less
than 250 deg. F.

The above listed formula, design factors, and compensate for normal external loading, provided the required depth of cover is maintained. Should there be unusual external forces on the pipeline, such as those caused by bending forces at elevation changes, the utility company must provide calculations verifying that allowable stresses are not exceeded.