

Preliminary Investigation

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Effective Methods to Protect Underground Utilities

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Table of Contents

Background	2
Summary of findings	2
Gaps in findings.....	3
Contacts	3
Body of Preliminary Investigation.....	4
New Hampshire Department of Transportation NHDOT	4
Missouri Department of Transportation (MoDOT)	6
Alabama Department of Transportation (ALDOT)	10
Iowa Department of Transportation	12
Virginia Department of Transportation (VDOT)	17
Texas Department of Transportation (TxDOT)	19
Washington State Department of Transportation (WSDOT)	21
Michigan Department of Transportation (MDOT)	22
Oregon Department of Transportation (ODOT)	24
Massachusetts Department of Transportation (MassDOT)	25
Appendix	28
Appendix I - New Hampshire DOT	
Appendix II - Alabama DOT	
Appendix III - Iowa DOT	
Appendix IV - Virginia DOT	
Appendix V - Texas DOT	
Appendix VI - Washington DOT	
Appendix VII - Oregon DOT	
Appendix VIII - Massachusetts DOT	

Background

Buried utilities can pose a risk if struck, or fail due to deterioration. The Encroachment Permits Branch responds to multiple inquiries from utility companies challenging our current policies on buried utilities. Most of the challenges question our depth and encasement requirements. For example, a utility company claims that encasing their gas pipelines interferes with their ability to inspect their pipeline and might actually decrease the life of the pipeline, thus creating a potential for pipe failure.

Caltrans has a long-standing policy that underground high-risk utilities must be encased and be buried at specified depths depending on pipe size and product being transported. Encasement is required for all underground utilities placed within Caltrans right of way. This requirement is based on the need for mechanical protection (from being accidentally struck) and as a secondary containment (from leaks in the carrier pipe), to increase safety and to protect the public and highway workers from the hazards of a damaged, exposed, cut, or penetrated utility.

Summary of findings

The scope of the preliminary investigation (PI) was to compare the guidelines and procedures utilized by other state DOTs and municipalities by reviewing their encasement standards via survey questions, phone, email and web searches. The Preliminary Investigation (PI) compared what other state DOT guidelines and procedures are that allow high-risk utilities to exist safely within their right-of-way.

The following survey questions were asked in the online survey:

1. Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.
2. If encasement is required:
 - Do the requirements differ for the different utilities?
 - Does encasement design/strength differ for pipe material?
 - Does encasement design/strength differ for pipe location?
 - Does encasement design/strength differ for pipe installation method?
 - Does encasement design/strength differ for depth of pipe?
3. What are the design requirements for encasement at different depths?
4. Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.
5. Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

6. Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?
7. Do you have any state regulations regarding pipe encasement?
8. Are your encasement requirements based on access control?
9. Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?
10. Do you have life cycle costs or benefit analysis for encasement versus non-encasement?
11. What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Gaps in findings

The responses to survey questions were subject to the knowledge and information available to the respondents at the time of taking the survey.

Contacts

Numerous states were contacted to conduct this survey. The following states responded to the online survey:

- **New Hampshire Department of Transportation**
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Body of Preliminary Investigation

New Hampshire Department of Transportation NHDOT

At NHDOT, utility owner is responsible for the design of the utility facility to be installed within the highway right-of-way or attached to a highway structure. The Department is responsible to review for approval the utility's proposal with respect to the location of the utility facilities to be installed and the manner of installation or attachment. This includes the measures to be taken to preserve the safe and free flow of traffic, structural integrity of the roadway or highway structure, ease of highway maintenance, appearance of the highway, and the integrity of the utility facility.

The following are the responses from New Hampshire DOT to the survey questions:

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

Pipe encasement is required for pipelines of gas, water and sewer crossing the Right-of-Way or adjacent to bridge structures.

Q2: If encasement is required:

- **Do the requirements differ for the different utilities?** Not significantly.
- **Does encasement design/strength differ for pipe material?** The utility provides the design/strength for the specific situation.
- **Does encasement design/strength differ for pipe location?** The utility provides the design/strength for the specific situation.
- **Does encasement design/strength differ for pipe installation method?** Yes
- **Does encasement design/strength differ for depth of pipe?** Yes, as provided by the utility.

Q3: What are the design requirements for encasement at different depths?

Respondent skipped this question

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

Respondent skipped this question

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way? If so, please provide some information.

No.

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

No.

Q7: Do you have any state regulations regarding pipe encasement?

No.

Q8: Are your encasement requirements based on access control?

Indirectly as longitudinal facilities are not allow within the Limited Access Right-of-Way whereas longitudinal facilities in other Right-of-Way does not require encasement.

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

Other methods allowed besides encasement, such as slabs over the facility, further reduce the utilities ability to inspect their facilities.

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?
No.

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Respondent skipped this question

In addition to the survey responses, Appendix I includes the NHDOT Utilities Accommodation manual.

[Missouri Department of Transportation \(MoDOT\)](#)

Encasement provides protection of the adjacent facilities from damage due to the failure of the utility's pipe. It also facilitates the replacement or repair of the utility's pipe. Encasement creates issues with cathodic protection of the utility's pipe. With the exception of small service lines and cables, the encasement must have a diameter that is a minimum of 4" greater than the diameter of the carrier pipe. Continuous encasement is required under all roadways, medians, ramps, and shoulders. Utility companies will be allowed to use any material as a carrier or encasement for their product provided they accept responsibility of any future repairs and/or replacement of MoDOT facilities should a failure occur. An acceptable alternative to the conduit type encasement is Class B concrete poured around the facility at a minimum of 6 inches thick.

All buried utility crossing, public or private, must be made by auguring, boring or pushing under the roadway. In roadway curb and gutter section, the auger pits should be a minimum of 5 feet from the curb or on a 1:1 ratio. Example: If the utility line is 10 feet deep, the auger pit should be 10 feet from the roadway curb. A 1 inch void will be allowed around the utility line or encasement under the roadway. A \$5000 bond will be required on all new crossings.

All buried utilities installed parallel to the right of way must be a public utility. No private utilities are allowed to parallel state right of way. All buried facilities must stay within 6 feet of the right of way line. All cables, wires, small diameter pipes, pull boxes, pedestals, meters, manholes, and other such utility appurtenances shall be equipped with covers or guards to improve their visibility, should be installed at the right of way line, and should not be wider than 30 inches.

All overhead utility crossings must have a minimum vertical clearance of 18 feet over all state roads and vertical clearance must also meet National Electric Safety Code. All poles are to be installed within 2 feet of the right of way line and all anchors should be installed within 6 feet of the right of way line. All

overhead utilities installed parallel to the right of way line must be a public utility. No private utilities are allowed to parallel state right of way. All utility poles must be installed within 2 feet of the right of way line. All anchors and guy wires must stay within 6 feet of the right of way line.

Cutting pavement shall not be done without first obtaining approval by the state. When cutting pavement is approved, all cuts shall be made with a saw to a minimum depth of 2.5 inches, and a width of 12 inches greater than the trench required on either side. When the location is within 4 feet of a joint, the cut must be made at the joint, and must follow the joint. A minimum of 8 inches of a 6 bag concrete and 4 inches of compacted base rock is to be used to fill the hole. Concrete can be used in lieu of the compacted base rock.

The Utilities Accommodation manual for MoDOT can be found at:
<http://www.modot.org/design/UtilityResources/EPG-Utilities.htm>

The following are the responses from Missouri DOT to the survey questions:

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

Yes, for crossings. No, for parallel installations.

Q2: If encasement is required:

- Do the requirements differ for the different utilities? Yes
- Does encasement design/strength differ for pipe material? Yes
- Does encasement design/strength differ for pipe location? Yes
- Does encasement design/strength differ for pipe installation method? No
- Does encasement design/strength differ for depth of pipe? Yes

Q3: What are the design requirements for encasement at different depths?

It is dependent on the utility type in some cases. Typically rigid/steel encasements are allowed to be shallower than other encasements.

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

Encasement is not required on cathodically protected welded steel pipelines. Encasement is not required on pipelines less than 6 inches, but require a depth of 6 feet. Encasement is not required on waterlines less than 2 inches in diameter.

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

Respondent skipped this question

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

Respondent skipped this question

Q7: Do you have any state regulations regarding pipe encasement?

Yes, Missouri State Regulation 7 CSR 10.3

Q8: Are your encasement requirements based on access control?

Respondent skipped this question

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

Respondent skipped this question

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?

Respondent skipped this question

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Respondent skipped this question

Utility	Depth (inches)		Encasement Requirements
	Parallel	Crossing (measured from bottom of ditch)	
cable TV (coaxial non-fiber)	24	30	encased with a duct (enclosed tubular casing or raceway); encased from back of ditch to back of ditch
copper cable	24	30	encased with a duct (enclosed tubular casing or raceway); encased from back of ditch to back of ditch
fiber optic cable	30	42	encased with a smooth wall, welded steel pipe; must be encased from within 6 feet of right of way line to right of way line, warning tape must be placed above the line
fiber optic cable	30	72	all other encasement materials; must be traceable, must be encased from within 6 feet of right of way line to right of way line, warning tape must be placed above the line
electric	30	42	smooth wall, welded steel pipe; encased from back of ditch to back of ditch
electric	30	72	encased with a duct (enclosed tubular casing or raceway); encased from back of ditch to back of ditch
Welded Steel pipeline (any diameter)	30	30	encasement not required; must be cathodically protected against corrosion and triple coated in accordance with accepted pipeline construction standards
Plastic pipeline (any diameter)	30	30	encased with a smooth wall, welded steel pipe; encased from back of ditch to back of ditch
Plastic pipeline (greater than 6 inches)	30	72	all other encasement materials; must be traceable, encased from back of ditch to back of ditch
Plastic pipeline (less than or equal to 6 inches)	30	72	encasement not required; must be traceable
sewer - forced	30	30	encasement is required, material choice is up to the utility company; encased from back of ditch to back of ditch, must be traceable
sewer - gravity	30	30	encasement is not required unless crossing under Interstate , material choice is up to the utility company; encase from back of ditch to back of ditch, must be traceable
water (less than or equal to 2 inches)	42	42	encasement not required; must be traceable
water (greater than 2 inches)	42	42	encasement is required, material choice is up to the utility company; encased from back of ditch to back of ditch, must be traceable

Alabama Department of Transportation (ALDOT)

Alabama DOT requires the encasement of all utility facilities placed under the highway unless otherwise exempted within their manual, or unless a utility obtains approval to forego encasement.

Casings may be required for the following conditions and in other instances when indicated by the Department:

- 1) If expedient for the insertion, removal, replacement, or maintenance of carrier pipe crossings of freeways, expressways, and other controlled access highways, and at other locations where it is necessary in order to avoid open-trenched construction
- 2) As protection for carrier pipe from external loads or shock either during or after construction of the highway
- 3) As a means of conveying leaking fluids away from the area directly beneath the traveled way to a point of venting at or near the ROW line, or to a point of drainage in the highway ditch or a natural drainage way.

Encasement or other suitable protection may also be required for any pipeline (1) with less than minimum bury, (2) near footings of bridges or other highway structures or across unstable or subsiding ground, or (3) near other locations where there may be hazard.

Where the utility cannot give satisfactory assurance to Alabama DOT that the highway user and the highway structure are adequately protected without the use of encasement, casing will be required for (1) pressurized carrier pipes crossing under major highways, and (2) carriers of transmittants which are flammable, corrosive, expansive, energized, or unstable, particularly if carried at high pressure or potential.

The following are the responses from Alabama DOT to the survey questions:

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

Underground utilities that cross highways on the National Highway System are required to be encased. Utilities have been able to request a variance from the encasement requirement. We have recently established an encasement alternative for natural gas crossings.

Q2: If encasement is required:

- **Do the requirements differ for the different utilities?** There is an alternate for natural gas crossings.
- **Does encasement design/strength differ for pipe material?** Encasement has been required to be steel.
- **Does encasement design/strength differ for pipe location?** No
- **Does encasement design/strength differ for pipe installation method?** No
- **Does encasement design/strength differ for depth of pipe?** Yes

Q3: What are the design requirements for encasement at different depths?

The utility or engineer for the utility is responsible for the calculation.

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

If a utility is bored through rock, the encasement seems redundant.

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

Not aware of any.

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

Not aware of any.

Q7: Do you have any state regulations regarding pipe encasement?

Encasement is required as part of our DOT Utility Manual

Q8: Are your encasement requirements based on access control?

No. For the alternate for natural gas, there is extra depth of cover required (6' under pavement). For controlled access highways, additional depth over the alternate is required (10' under pavement).

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

We have put a concrete slab over utilities for protection. There is also a half concrete pipe cover that is acceptable.

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?

No. However, the natural gas industry claims that corrosion occurs rapidly in encased crossings. Uncased cathodically protected pipe can last almost indefinitely.

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Encasement pipe can prevent third party damage, where digging equipment can hit the encasement pipe and stop digging before damaging the carrier pipe. An uncased pipe is more likely to be damaged. An encased crossing may be perceived to be an issue and as a result, may be pigged more often, increasing its safety versus an uncased crossing that may not be inspected as often. Inspection may occur where

accessibility is easier. The positive is that the natural gas utilities are pleased with the new policy that may lead to more cooperation.

The utility manual for Alabama DOT can be found at:

<http://www.dot.state.al.us/rwwweb/doc/utilitiesgrid/UtilitiesManual.pdf>

In addition to the survey responses, Appendix II includes the Alabama Utilities Accommodation manual.

Iowa Department of Transportation

The following are the responses from Iowa DOT to the survey questions:

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

Yes in some cases.

Transverse crossings of water lines, most sanitary sewer crossings and some pipeline crossings.

<http://www.iowadot.gov/traffic/pdfs/UtilityPolicy.pdf>

115.13(5) Transverse occupancy--encasement and related requirements.

a. Trenchless construction. Underground transverse crossings of existing paved roadways shall be made by trenchless construction whenever practical. Any exception to this requirement must be specifically authorized by the district representative and noted in the permit.

b. Electrical service. Underground electrical service must be placed in a conduit from right-of-way line to right-of-way line and shall be clearly marked by the utility owner at the outer limits of the right-of-way.

c. Pipelines.

(1) Except as set out in 115.13(5)"c" (2), a pipeline carrying natural gas at an operating pressure of greater than 60 pounds per square inch, liquid petroleum products, ammonia, chlorine or other hazardous or corrosive products shall be encased from right-of-way line to right-of-way line.

(2) Encasement of a pipeline carrying a product listed in 115.13(5)"c"(1) is not required if the pipeline meets all of the following requirements and the utility owner certifies as a part of the permit that these requirements are met:

- It is welded steel pipeline.
- It is cathodically protected.
- It is coated in accordance with accepted industry standards.
- It complies with federal, state and local requirements and meets accepted industry standards regarding wall thickness and operating stress levels.

(3) A pipeline carrying a product listed in 115.13(5)"c"(1) shall be vented and marked at the outer right-of-way limits. The markers shall comply with accepted industry standards and include the following

information: name of the owner, telephone number to contact in case of an emergency, and type of product carried.

(4) Encasement of a natural gas pipeline with an operating pressure that is not greater than 60 pounds per square inch is not required if the pipeline is made of copper, steel or plastic; the pipeline is protected and installed in accordance with accepted industry standards; and the utility owner certifies as a part of the permit that these standards are met. Otherwise, encasement is required.

d. Communication cable. The department may require encasement of communication cable.

e. Sanitary sewer lines. Sanitary sewer lines, both gravity and force mains, shall be encased from right-of-way line to right-of-way line. Exception: A gravity flow line that is installed subsequent to highway construction need not be encased if it will meet all of the following requirements:

- (1) The opening is cut to the size of the carrier pipe so that there are no excessive voids around the pipe.
- (2) The pipe is of sufficient strength to withstand the external loads created by the vehicular traffic on the roadway being traversed.
- (3) Lines beyond the toe of fore-slope are properly embedded.

f. Waterlines. Waterlines shall be encased from right-of-way line to right-of-way line. Exceptions:

- (1) Encasement is not required where it is impractical due to existing conditions, as determined by the district representative. As a minimum, waterlines shall be encased from toe of fore-slope to toe of fore-slope.
- (2) Waterlines with an inside diameter of two inches or less need be encased only from toe of fore-slope to toe of fore-slope. Venting and sealing of the encasement are not required.
- (3) Properly embedded waterlines that are installed prior to highway construction need not be encased if extra strength cast iron or ductile iron pipe with mechanical joints and seals, or equivalent, is used from right-of-way line to right-of-way line.

g. Installations vulnerable to damage. Utility facilities that by reason of shallow depth or location are vulnerable to damage from highway construction or maintenance operations shall be protected with a casing, suitable bridging, concrete slabs or other appropriate measures.

h. Other installations. When it is acceptable to both the utility owner and the department, an underground utility facility not otherwise addressed in this subrule may be installed without protective casing if the installation involves trenched construction or small bores. Encasement requirements will be determined on an individual basis.

115.13(6) Longitudinal occupancy--encasement and related requirements.

a. Utility lines installed longitudinally to the primary highway right-of-way shall be encased at crossings of hard-surfaced side roads, streets and entrances in accordance with subrule 115.13(5).

b. Reserved.

Q2: If encasement is required:

- **Do the requirements differ for the different utilities?** Yes

- Does encasement design/strength differ for pipe material? Yes
- Does encasement design/strength differ for pipe location? No
- Does encasement design/strength differ for pipe installation method? Yes
- Does encasement design/strength differ for depth of pipe? No

Q3: What are the design requirements for encasement at different depths?

Depth is not considered

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

Pipelines.

(1) Except as set out in (2), a pipeline carrying natural gas at an operating pressure of greater than 60 pounds per square inch, liquid petroleum products, ammonia, chlorine or other hazardous or corrosive products shall be encased from right-of-way line to right-of-way line.

(2) Encasement of a pipeline carrying a product listed in (1) is not required if the pipeline meets all of the following requirements and the utility owner certifies as a part of the permit that these requirements are met:

- It is welded steel pipeline.
- It is cathodically protected.
- It is coated in accordance with accepted industry standards.
- It complies with federal, state and local requirements and meets accepted industry standards regarding wall thickness and operating stress levels.

(4) Encasement of a natural gas pipeline with an operating pressure that is not greater than 60 pounds per square inch is not required if the pipeline is made of copper, steel or plastic; the pipeline is protected and installed in accordance with accepted industry standards; and the utility owner certifies as a part of the permit that these standards are met. Otherwise, encasement is required.

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

There may be some but no specific examples are available.

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

No.

Q7: Do you have any state regulations regarding pipe encasement?

<http://www.iowadot.gov/traffic/pdfs/UtilityPolicy.pdf>

115.13(5) Transverse occupancy--encasement and related requirements.

a. Trenchless construction. Underground transverse crossings of existing paved roadways shall be made by trenchless construction whenever practical. Any exception to this requirement must be specifically authorized by the district representative and noted in the permit.

b. Electrical service. Underground electrical service must be placed in a conduit from right-of-way line to right-of-way line and shall be clearly marked by the utility owner at the outer limits of the right-of-way.

c. Pipelines.

(1) Except as set out in 115.13(5)"c"(2), a pipeline carrying natural gas at an operating pressure of greater than 60 pounds per square inch, liquid petroleum products, ammonia, chlorine or other hazardous or corrosive products shall be encased from right-of-way line to right-of-way line.

(2) Encasement of a pipeline carrying a product listed in 115.13(5)"c"(1) is not required if the pipeline meets all of the following requirements and the utility owner certifies as a part of the permit that these requirements are met:

- It is welded steel pipeline.
- It is cathodically protected.
- It is coated in accordance with accepted industry standards.
- It complies with federal, state and local requirements and meets accepted industry standards regarding wall thickness and operating stress levels.

(3) A pipeline carrying a product listed in 115.13(5)"c"(1) shall be vented and marked at the outer right-of-way limits. The markers shall comply with accepted industry standards and include the following information: name of the owner, telephone number to contact in case of an emergency, and type of product carried.

(4) Encasement of a natural gas pipeline with an operating pressure that is not greater than 60 pounds per square inch is not required if the pipeline is made of copper, steel or plastic; the pipeline is protected and installed in accordance with accepted industry standards; and the utility owner certifies as a part of the permit that these standards are met. Otherwise, encasement is required.

d. Communication cable. The department may require encasement of communication cable.

e. Sanitary sewer lines. Sanitary sewer lines, both gravity and force mains, shall be encased from right-of-way line to right-of-way line. Exception: A gravity flow line that is installed subsequent to highway construction need not be encased if it will meet all of the following requirements:

(1) The opening is cut to the size of the carrier pipe so that there are no excessive voids around the pipe.

(2) The pipe is of sufficient strength to withstand the external loads created by the vehicular traffic on the roadway being traversed.

(3) Lines beyond the toe of fore-slope are properly embedded.

f. Waterlines. Waterlines shall be encased from right-of-way line to right-of-way line. Exceptions:

(1) Encasement is not required where it is impractical due to existing conditions, as determined by the district representative. As a minimum, waterlines shall be encased from toe of fore-slope to toe of fore-slope.

(2) Waterlines with an inside diameter of two inches or less need be encased only from toe of fore-slope to toe of fore-slope. Venting and sealing of the encasement are not required.

(3) Properly embedded waterlines that are installed prior to highway construction need not be encased if extra strength cast iron or ductile iron pipe with mechanical joints and seals, or equivalent, is used from right-of-way line to right-of-way line.

g. Installations vulnerable to damage. Utility facilities that by reason of shallow depth or location are vulnerable to damage from highway construction or maintenance operations shall be protected with a casing, suitable bridging, concrete slabs or other appropriate measures.

h. Other installations. When it is acceptable to both the utility owner and the department, an underground utility facility not otherwise addressed in this subrule may be installed without protective casing if the installation involves trenched construction or small bores. Encasement requirements will be determined on an individual basis.

115.13(6) Longitudinal occupancy--encasement and related requirements.

a. Utility lines installed longitudinally to the primary highway right-of-way shall be encased at crossings of hard-surfaced side roads, streets and entrances in accordance with subrule 115.13(5).

b. Reserved.

Q8: Are your encasement requirements based on access control?

No, we take them to the ROW line.

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

Bridging or concrete slabs are sometimes used.

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?

No.

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Respondent skipped this question

In addition to the survey responses, Appendix III includes the Iowa Utilities Accommodation manual.

Virginia Department of Transportation (VDOT)

The following are the responses from Virginia DOT to the survey questions:

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

Yes.

A. Encasement pipe shall be required where it is necessary to avoid trenched construction, to protect carrier pipe from external loads or shock, or to convey leaking fluids or gases away from the areas directly beneath the traveled way if the utility has less than minimal cover; is near footings of bridges, utilities or other highway structures; crosses unstable ground; or is near other locations where hazardous conditions may exist. Encasements crossing non limited access rights-of-way shall extend a suitable distance beyond the slope for side ditches and beyond the back of curb in curbed sections. The district administrator's designee may require encasement pipe even if an installation meets industry standards for non-encasement. Casing pipe shall be sealed at the ends with approved material to prevent flowing water and debris from entering the annular space between the casing and the carrier. All necessary appurtenances such as vents and markers shall be included.

B. Uncased crossings of welded steel pipelines carrying transmittants that are flammable, corrosive, expansive, energized, or unstable, particularly if carried at high pressure, may be permitted subject to the following conditions: 1. The applicant provides supporting data documenting that its proposed installation meets or exceeds industry standards for unencased crossings, 2. The applicant provides supporting data documenting that the pipeline will support the anticipated load generated by highway traffic, and 3. All unencased pipeline crossings that fail must be relocated a minimum of 36 inches to either side of the failure. The failed line shall then be filled with grout and plugged at both ends.

Q2: If encasement is required:

- **Do the requirements differ for the different utilities?** No, but will traditionally be deeper at RR Crossings
- **Does encasement design/strength differ for pipe material?** No
- **Does encasement design/strength differ for pipe location?** No
- **Does encasement design/strength differ for pipe installation method?** No
- **Does encasement design/strength differ for depth of pipe?** No

Q3: What are the design requirements for encasement at different depths?

Typically longer encasements required at RR Crossings due to necessary extension past theoretical RR embankment

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

Yes. It is believed that current trenchless technology methods may produce joint welds that make the carrier pipe even stronger than the pipe at the weld points. We have used HDD FPVC and HDPE and have gone deeper under environmental features or roadways

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

N/A

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

We've had some utilities install only soil tight encasements with HDPE material. Not sure if immediate degradation of the carrier pipe has been seen, but it is estimated that depending the material of the carrier pipe, the pipe may be subject to more corrosion, or there will be seepage of groundwater in the casing. State requirements require for continuous sleeve of encasement with grouted ends.

Q7: Do you have any state regulations regarding pipe encasement?

Yes. 24VAC30-151-370 Also EP-1 of the VDOT Road and Bridge Specs Also Spec 232.02 of the Specifications

Q8: Are your encasement requirements based on access control?

Largely, yes.

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

Only with Trenchless technologies such as HDD, where the integrity of the pipe is as superior or far superior than a traditional pipe encasement. Also our locating surveys and SUE operations, as well as asbuilt records give us a greater comfort of where HDD operations are and how they are constructed, so that future conflicts can be avoided.

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?

No.

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Pros - (1) Ease of access to the utility from a maintenance perspective. (2) An easily identifiable location by traditional survey methods Cons - (1) Encasements oftentimes create conflicts with other utilities or roadway construction and operation. (2) Trenchless operations have become so reliable, that it is sometimes cheaper construction and time savings vs. encasement construction.

In addition to the survey responses, Appendix IV includes the Virginia Utilities Accommodation manual.

[Texas Department of Transportation \(TxDOT\)](#)

The following are the responses from Texas DOT to the survey questions:

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

(1) Encasement.

(A) Underground utility facilities crossing the highway shall be encased in the interest of safety, protection of the utility, protection of the highway, and for access to the utility facility. Casing shall consist of a pipe or other separate structure around and outside the carrier line. The utility must demonstrate that the casing will be adequate for the expected loads and stresses.

(B) Casing pipe shall be steel, concrete, or plastic pipe as approved by the district, except that if horizontal directional drilling is used to place the casing, high-density polyethylene (HDPE) pipe must be used in place of plastic pipe.

(C) Encasement may be of metallic or non-metallic material. Encasement material shall be designed to support the load of the highway and superimposed loads thereon, including that of construction machinery. The strength of the encasement material shall equal or exceed structural requirements for drainage culverts and it shall be composed of material of satisfactory durability for conditions to which it may be subjected.

Q2: If encasement is required:

- **Do the requirements differ for the different utilities?** Yes
- **Does encasement design/strength differ for pipe material?** No
- **Does encasement design/strength differ for pipe location?** No
- **Does encasement design/strength differ for pipe installation method?** Yes
- **Does encasement design/strength differ for depth of pipe?** No

Q3: What are the design requirements for encasement at different depths?

Depth. Where placements at the depths in this section are impractical or where unusual conditions exist, the department may allow installations at a lesser depth, but will require other means of protection, including encasement or the placement of a reinforced concrete slab.

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

(C) Encasement. Low-pressure gas pipelines crossing the pavement shall be placed in a steel encasement. The district may waive this encasement requirement if the pipeline is of welded steel construction and is protected from corrosion by cathodic protective measures or cold tar epoxy wrapping, and the utility signs a written agreement that the pavement will not be cut for pipeline repairs at any time in the future.

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

n/a

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

No

Q7: Do you have any state regulations regarding pipe encasement?

Texas Administrative Code 43 TAC 21.40

Q8: Are your encasement requirements based on access control?

No

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

Only the allowing of materials other than steel

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?

No

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

The oil and gas industry do not want to encase at all. What has not been taken into account is the main objective of encasement which is to move the hazard or exposure away from the roadway. Therefore protecting both the public and the road structure. Additionally an encasement allows an excavator a second chance if he nicks a encasement pipe that protects the carrier pipe.

In addition to the survey responses, Appendix V includes the Texas Utilities Accommodation manual.

Washington State Department of Transportation (WSDOT)

The following are the responses from Washington State DOT to the survey questions:

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

Yes - encasement is required for most pipelines occupying state highway right of way. Exceptions are allowed under certain circumstances, such as when the line meets federal cathodic protection requirements. For more information, please refer to the Washington Administrative Code: WAC 468-34-210.

Q2: If encasement is required:

- **Do the requirements differ for the different utilities?** Yes - for example, where casing is required by industry codes; for pressurized carrier pipes; hazardous substances.
- **Does encasement design/strength differ for pipe material?** Not currently
- **Does encasement design/strength differ for pipe location?** Possibly - to achieve adequate loading capabilities or due to proximity to bridge substructure
- **Does encasement design/strength differ for pipe installation method?** Yes - For example, encasement requirement may be waived where open cut or open trench would be authorized; however, open cuts to the highway are against policy and require a variance approval.
- **Does encasement design/strength differ for depth of pipe?** Possibly - to achieve adequate loading capabilities to bridge substructure

Q3: What are the design requirements for encasement at different depths?

There are currently no distinctions according to depth in adopted policy, but this may be a primary consideration if a variance to encasement policy were requested.

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

Utilities sometime request variances to established policies - including encasement. In such cases, adequate justification must be provided, and the appropriate internal subject matter experts are consulted.

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

In instances where a proposal to obtain a variance from encasement requirements is denied, the utility presumably pursues an alternate course of action - that we are not always aware of since it is off of DOT property.

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

We are aware of recent water pipe failures that have caused damage to the roadway. In these cases, the utility is required under state law, as well as the contractual provisions within utility permits, to correct the matter at its sole cost.

Q7: Do you have any state regulations regarding pipe encasement?

Yes - WAC 468-34-210.

Q8: Are your encasement requirements based on access control?

Access designation is a factor in determining whether encasement is required.

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

There have been discussions regarding the value of encasement when certain materials are used for water and sewer facilities (such as PVC or HDPE); however, we are not inclined to change our policy until more research is available.

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?

No

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Benefit-cost is the main issue. Highway authorities must exercise appropriate diligence for utility accommodation. If research supports the notion that encasement is superfluous in some instances, we are willing to consider it.

In addition to the survey responses, Appendix VI includes the Washington State DOT Utilities Accommodation manual.

[Michigan Department of Transportation \(MDOT\)](#)

At Michigan DOT, the utility owner is responsible for the design of the utility facility to be installed within the highway right-of-way or attached to a highway structure. The Department is responsible to review for approval the utility's proposal with respect to the location of the utility facilities to be installed and the manner of installation or attachment.

The following are the responses from Michigan DOT to the survey questions:

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

No

Q2: If encasement is required:

- Do the requirements differ for the different utilities? n/a
- Does encasement design/strength differ for pipe material? n/a
- Does encasement design/strength differ for pipe location? n/a
- Does encasement design/strength differ for pipe installation method? n/a
- Does encasement design/strength differ for depth of pipe? n/a

Q3: What are the design requirements for encasement at different depths?

No difference

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

Yes

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

No

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

No

Q7: Do you have any state regulations regarding pipe encasement?

Yes <http://mdotcf.state.mi.us/public/webforms/index.cfm> see forms 3701, 3702, 3703A-F, 3704A-F

Q8: Are your encasement requirements based on access control?

No

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

No

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?

No

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Respondent skipped this question

[Oregon Department of Transportation \(ODOT\)](#)

The following are the responses from Oregon DOT to the survey questions:

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

Under asphalt, yes. When along rock shoulder sometimes not

Q2: If encasement is required:

- **Do the requirements differ for the different utilities?** yes, high pressure natural gas requires more
- **Does encasement design/strength differ for pipe material?** yes, see above
- **Does encasement design/strength differ for pipe location?** yes, different terrain and known problem areas
- **Does encasement design/strength differ for pipe installation method?** No
- **Does encasement design/strength differ for depth of pipe?** No

Q3: What are the design requirements for encasement at different depths?

No

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

Yes, sometimes outside of travel lanes, no encasement may be allowed

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

No

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

Age of pipe and materials such as ductile for water and sewer

Q7: Do you have any state regulations regarding pipe encasement?

No

Q8: Are your encasement requirements based on access control?

Not access control, more of location

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

High pressure natural gas, lower depths

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?

No

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Safety of public and protection of highway system, the utilities have higher cost installation

In addition to the survey responses, Appendix VII includes the Oregon State DOT Utilities Accommodation manual.

[Massachusetts Department of Transportation \(MassDOT\)](#)

MassDOT is responsible for the review and approval of proposals from utility owners in accordance with the provisions in this Policy.

Utility owners in Massachusetts are responsible for designing the utility facility to be installed within the highway right of way and/or attached to a highway structure. Full consideration must be given to measures necessary to preserve and protect the maintenance, operation, safety, and aesthetic characteristics of the highway and/or structure. Depth, clearances, and separation between utility facilities and the work must be in accordance with the MassDOT Utility Accommodation Manual and any and all applicable codes, laws mandated by federal regulations, guidelines and policies, Massachusetts General Laws, OSHA, etc.

Q1: Is Pipe Encasement required for utilities in your Right of Way? If so, please explain.

Yes see Utility Accommodation Policy

<http://www.massdot.state.ma.us/Portals/8/docs/utilities/UAP.pdf>

This is the best I can do at this time.

Q2: If encasement is required:

- **Do the requirements differ for the different utilities?** Yes
- **Does encasement design/strength differ for pipe material?** no info
- **Does encasement design/strength differ for pipe location?** no info
- **Does encasement design/strength differ for pipe installation method?** no info
- **Does encasement design/strength differ for depth of pipe?** no info

Q3: What are the design requirements for encasement at different depths?

Respondent skipped this question

Q4: Do you have any cases where no encasement was selected over encasement? If so, please provide a brief description.

Respondent skipped this question

Q5: Are there situations where pipe encasement design requirements led to pipe diversions away from DOT right of way?, If so, please provide some information.

Respondent skipped this question

Q6: Do you have any information on pipe leaks related to the design of the pipe? If so, did these incidents lead to damage to the roadway, contamination of the right of way, or other?

Respondent skipped this question

Q7: Do you have any state regulations regarding pipe encasement?

Respondent skipped this question

Q8: Are your encasement requirements based on access control?

Respondent skipped this question

Q9: Do you have methods besides encasement that will provide the level of safety (protection, containment) you desire and allow utilities better access to inspect their facilities? Is there a win-win option in your case?

Respondent skipped this question

Q10: Do you have life cycle costs or benefit analysis for encasement versus non-encasement?

Respondent skipped this question

Q11: What are the pros and cons from your perspective and the utility company's perspective for encasement versus non-encasement?

Respondent skipped this question

In addition to the survey responses, Appendix VIII includes the Massachusetts State DOT Utilities Accommodation manual.

Appendix

APPENDIX I

New Hampshire Department of Transportation

IX. PIPELINES

A. General

1. Method of Protection

a) Encasement

In general, underground utility line crossings warrant encasement to: facilitate the carrier pipe removal and/or replacement, prevent a spill or mitigate its effects on the highway, protect the line from external loads and/or accidental dig-ups, access the utility, or prevent corrosion. Encasement shall be as specified for each type of line discussed herein. Casings shall consist of a pipe or other separate structure around and outside the carrier line and shall be designed to support the dead loads of the highway and superimposed loads thereon, including that of construction machinery. The strength of the casing shall, as a minimum, equal the structural capacity of drainage culverts in the area and shall be composed of durable materials designed to meet the conditions to which it may be subjected. Encasement is mandatory for bridge approaches, freeways, interchange ramps and railroad crossings. Casing shall be sealed at the ends to prevent debris and moisture from entering the annular space between the casing and carrier pipe.

b) Optional for Gas or Liquid Petroleum Pipelines

It is difficult to provide required cathodic protection for gas or liquid petroleum pipelines inside a casing. Pipeline protective coatings are frequently damaged during the insertion of the carrier pipe into casing pipes. Because of this, utilization of a sleeve must be applied judiciously by the utility and the Department on an individual basis.

These pipelines may be installed without encasement under secondary roads and non-freeways if the pipeline's design provides:

- (1) Increased wall thickness and/or higher strength pipe materials and/or greater cover, and
- (2) Adequate coating and wrapping and cathodic protection.
- (3) Complies with requirements of the USDOT's Pipeline Safety Regulations Parts 190 through 199.

2. Depth of Underground Pipelines and Conduits

The cover shall be as specified herein for each type of utility line. Where placement at such depths results in extreme hardships, the Department may approve other protection designed by the utility company in lieu of the depth specified (see Appendix B, pages B-1 and B-2).

3. Methods of Installation:

a) Trenchless Technology Construction and Controls

In general, underground utility line crossings within existing highways will be installed by jacking or boring (wet boring is not allowed) or by other Trenchless Technology methods as approved by the Chief of Design Services or District Engineer. Minimum cover of Jacking and Boring installations shall be five (5) feet (1.5 m) on secondary roads and ten (10) feet (3 m) under primary and freeway (LAROW) roadways unless approved by the Chief of Design Services.

When installed by jacking or boring, encasement of the line may be required. All jacking or boring pits (temporary access points) shall be located as far from the edge of the traveled way of the highway as possible—and outside the clear zone (unless approved by the Department). All pits shall be located and constructed so as not to compromise the integrity of highway structure footings or traffic operations. Pits shall, at a minimum, be located beyond a line created by a 1.5:1 slope projected down from the shoulder break of the roadway. The District Engineer or Chief of Design Services may require the use of support structures to achieve the proper degree of protection.

Backfilling of boring pits shall be compacted as specified in the NHDOT Standard Specifications for Road and Bridge Construction, Section 203, Part 3.8 - Density Requirements and Tests, latest revision thereof.

Other Trenchless Technologies which may be utilized for installing utilities facilities under a highway without disturbing the surface include: driving, piercing, dry boring, horizontal directional drilling, auger and slurry boring, pipe jacking and tunneling, impact moling and ramming and pipe bursting. These techniques shall follow the manufacturer's requirements and specifications. The Department may require additional special assurances or specifications for installations utilizing these methods.

Controls for Trenchless Technology – Where unstable soil conditions exist, boring or tunneling operations shall be conducted in such a manner as not to be detrimental to the roadside being crossed. Soil coring indicating the type of subsurface material and verifying the absence of rock may be required.

If an obstruction (such as rock) is hit during construction and the bore is to be abandoned, the void shall be grout filled immediately. Abandoned casings shall be backfilled with grout as well.

The use of water under pressure (jetting) or puddling will not be permitted to facilitate boring, pushing, or jacking operations. Horizontal directional drilling using approved drilling fluids, such as bentonite, may be used in accordance with Intelligent Horizontal Directional Drilling guidelines <http://nasdt.org/resources.html#5>. No directional boring work will be allowed until approved by the District Engineer, Chief of Design Services or the Turnpike Administrator.

All Directional Drilling methods utilized must include a locatable conduit system, with identification markers on each side of the Department's right-of-way.

b) Open Trench Construction:

Open trench construction within pavement structure limits will only be allowed when approved by the District Engineer and in no case is permitted on freeways. Approvals for open trenching not performed in conjunction with highway improvement projects will normally be limited to low volume roadways, urbanized non-controlled access roadways, or where soil or right-of-way conditions justify such an installation as determined by the Department. In conjunction with construction or reconstruction projects, the Chief of Design Services may allow open trench construction as coordinated with progress schedules of referenced projects.

Where trenching within the right-of-way is permitted, proper backfill compaction and materials will be required. Compaction shall equal that of the surrounding soil and restoration of the area's vegetation will be required. Erosion control measures as defined in the NHDES "Best Management Practices" manual or as determined by the District Engineer or Chief of Design Services are required.

Where open trenching across an existing roadway is permitted, backfill and compaction requirements will be specified by the Department in accordance with the Department's Standard Specifications for Road and Bridge Construction. All pavement trenching edges will be saw cut. Pavement restoration will be designed to prevent both front wheels of vehicles from impacting the patch at the same time and pavement restoration edges shall be at an angle different than the normal snowplow angle to avoid plow conflict.

4. Safety Measures During Construction

a) Traffic Control

The primary function of all temporary traffic control is to provide for the safe and efficient movement of vehicles, bicyclists, and pedestrians through or around construction work zones while reasonably protecting workers and equipment. A concurrent objective of the temporary traffic control is the efficient construction and maintenance of the highway and utilities.

As a minimum, the Utility shall comply with the Manual on Uniform Traffic Control Devices (MUTCD), current edition and State signing standards for all utility work.

The safe passage of vehicular traffic, bicyclists, and pedestrians through and around construction work zone, while minimizing confusion and disruption to traffic flow, shall have priority over all other utility activities. During the initial installation or construction of the facilities authorized by a permit, or during any future repair, removal, or relocation thereof, or during any miscellaneous operations and maintenance activities, the Utility shall at all times, install, maintain, and remove all signs, warning lights, channelization devices, and other safety devices as described in the MUTCD and the temporary traffic control plan. All temporary traffic control devices shall be removed from the Department's right-of-way as soon as practical when they are no longer needed. When work is suspended for short periods of time, temporary traffic control devices that are no longer applicable shall be removed or covered.

b) Blasting

If the need arises to utilize blasting during installation or repair of utility facilities all laws, ordinances and regulations, including the State of New Hampshire, Department of Transportation Standard Specifications for Road and Bridge Construction (latest revision), whichever is the most restrictive; shall be followed in the use, handling, loading, transporting and storage of explosives and blasting agents.

Any blasting shall receive prior approval from the District Engineer. The Department may require that detailed plans and procedures prepared by a licensed blaster be submitted by the Utility. Preblast surveys may also be a condition attached to an excavation permit for this work.

5. Locations of Installations

- a) Conditions that are generally unsuitable or undesirable for conduit pipeline crossings shall be avoided if possible. These include locations such as in deep cuts; near footings of bridges and retaining walls; across at grade intersections or ramp terminals; at cross drains where flow of water, drift, or stream bed flow may be obstructed; within basins of an underpass drained by a pump if a pipeline carries a liquid or liquefied gas; and in wet or rocky terrain where it will be difficult to attain minimum cover.

- b) Vertical and horizontal clearances between a pipeline and a structure, highway, or other utility facility shall be sufficient to permit maintenance of both the pipeline and the other facilities without interference.
- c) The locations of all pipelines will be reviewed by the Chief of Design Services or District Engineer to ensure that the proposed utility installation will not interfere with existing or currently planned highway facilities or with highway maintenance and operation processes.
- d) Highway drainage pipes and structures shall be protected during pipeline installation and maintenance. Utilization of existing drainage pipes as sleeves for pipelines is not permitted.

6. Product Transmission

- a) All applications for pipeline excavation permits must specify the transmittants and the maximum working, test, and design pressures of the carrier and casing (if a casing is required).
- b) Prior to any change in the pipeline's transmittants or increase in the working pressure from that specified in the original permit, the utility must notify the Department and obtain approval. The applicable codes must be specified in the request.

7. Drainage

Where it is necessary for pipelines to cross existing easement drainage flows outside of the right-of-way, the same minimum cover shall be maintained as when crossing drainage ditches within the highway right-of-way. Existing surface and subsurface drainage flows must not be obstructed or altered. In cases where soil conditions are such that erosion might occur or where it is not feasible to obtain specified depths, it shall be the responsibility of the utility owner to take such other measures as needed for safety and to protect the highway and the pipeline. Where grades on the pipelines must be maintained, such as gravity flow sewer lines, each case will be resolved on an individual basis and is subject to Departmental approval.

B. High Pressure Gas and Liquid Petroleum Lines Over 100 psig (680 kPa)

1. Cover

As used herein, depth of lines is the depth to top of carrier (if unencased), or casing, if required (see Appendix B, pages B-1 and B-2).

- a) For encased high-pressure gas or liquid petroleum lines the minimum cover for casing pipe shall be 30" (750 mm). For that portion of the carrier line outside of the casing pipe the minimum cover within the highway right-of-way shall normally be 36" (900 mm) except where crossing ditches where 48" (1200 mm) is required (see Appendix B, pages B-1 and B-2). Exceptions may be authorized to permit existing lines to remain in place with a maximum reduction of 6" (150 mm) in the above-specified cover. All lines normally shall be a minimum of 18" (450 mm) or one-half the diameter of the pipe, whichever is greater, beneath the bottom of the subgrade. Where materials and other conditions justify, such as on existing lines with encasement which are to remain in place, a minimum depth under subgrade of 12" (300 mm) or one-half the diameter of the pipe, whichever is greater, may be permitted.
- b) For unencased high pressure gas or liquid petroleum lines the minimum cover shall be 60" (1500 mm) under the pavement surface or 18" (450 mm) under the subgrade, whichever is greater. Under ditches the minimum cover shall be 48" (1200 mm) . Exceptions may be authorized by the District Engineer or the Chief of Design Services to permit a reduction in the specified depths of cover where the pipeline is protected by a reinforced concrete slab.

2. Encasement

- a) Where encasement is to be employed such encasement shall be provided under center medians and within the limits of pavement structure to a point beyond the ditch line for cut sections, 5' (1.5 m) beyond the toe of slope for fill sections, or 5' (1.5 m) beyond the face of curb of all urban section roadways including side streets and 25' (8 m) beyond any overpass or other structure where the line passes under it. Exceptions for encasement within a portion of the median may be approved when excessive median width or significant changes in the roadway cross-section make a continuous installation impractical (see also Appendix B, page B-3).

All pipelines shall be encased under a bridge approach slab or if they pass closer than 25' (8 m) from a structure footing.

- b) Where encasement is not employed, refer to Section IX.A.1.b (see also Appendix B, pages B-1 and B-2).
- c) Existing lines under rural highways within construction projects may be permitted to remain in place without encasement or extension of encasement if they are protected by a reinforced concrete slab or equivalent protection, or if they are located at a depth of 18" (450 mm) under the pavement subgrade and not less than 36" (900 mm) under the roadway ditch. If a reinforced concrete slab is to be used, it should meet the following standards:
 - (1) Width - three times the diameter of the pipe or 5' (1.5 m), whichever is greater.
 - (2) Thickness - 6" (150 mm) minimum.
 - (3) Reinforcement - 4 (#13) bars at 12" (300 mm) centers each way or equivalent wire mesh.
 - (4) Cover - the cushion between the bottom of slab and top of pipe shall be not less than 6" (150 mm). The area shall be filled with a lightweight, closed-cell material (i.e. Styrofoam).

The concrete slab shall be designed by a Professional Engineer licensed in the State of New Hampshire.

3. **Vents**

One or more vents shall be provided for each casing or series of casings. For casings longer than 150' (45 m), vents should be provided at both ends. On shorter casings a vent should be located at the high end with a marker placed at the low end. Vents shall be placed at the right-of-way line immediately above the pipeline, situated so as not to interfere with highway maintenance or be concealed by vegetation. Ownership of the lines shall be shown on the vents.

4. Markers

The utility company shall place a readily identifiable and suitable marker at each right-of-way line crossed by any high pressure gas or liquid petroleum line except where marked by a vent. A strip of warning tape shall be placed in the trench in compliance with industry standards for color, size and placement for all lines installed by open cut.

5. Drains

Drains for petroleum pipelines will not be permitted to outfall into roadway drainage ditches, natural watercourses, or highway rights-of-way.

6. Plastic Lines

Not allowed for High Pressure installations.

C. Medium and Low Pressure Gas Lines Under 100 psig (680 kPa)

1. Cover

For medium and low pressure gas lines the minimum cover within the right-of-way and under highway ditches, but outside the pavement structure, shall be 30" (750 mm) for either encased or unencased installations. Exceptions may be authorized to permit existing lines to remain in place with a maximum reduction of 6" (150 mm) in the above-specified depth. Medium and low pressure gas lines shall be a minimum of 18" (450 mm) or one-half the diameter of the pipe; whichever is greater, beneath the subgrade. Where materials and other conditions justify, such as on existing lines to remain in place, a minimum depth below the pavement structure (subgrade) of 6" (150 mm) or one-half the diameter of the pipe, whichever is greater, may be permitted.

As used herein, depth of lines is the depth to the top of carrier pipe or casing as applicable (see Appendix B, pages B-1 and B-2).

2. Encasement

Encasement of low and medium pressure gas lines shall comply with the requirements for high pressure lines as stated in Section IX.B.2.a. Lines placed without encasement shall be plastic or welded steel construction protected by approved coatings or cathodic protective measures.

3. Vents, Markers, Drains

See High Pressure Gas and Liquid Petroleum Lines, Section IX.B.3, B.4 and B.5.

4. Plastic Lines

Plastic lines may be used provided the internal pressure will not exceed State & Federal Regulations, or the manufactures recommendations and the cover is at least 30" (750 mm). The maximum size of plastic lines shall not exceed 12" (300 mm). Where plastic pipe is installed a durable metal wire or magnetic tape shall be concurrently installed just above the pipe or other means shall be provided for detection.

5. Existing Lines

If an existing line is allowed to remain under the pavement of any highway, additional measures may be required to minimize any future need for cutting the pavement to make service connections. (Examples include the use of split sleeves or a reinforced concrete slab.)

D. Water Lines

1. Cover

The cover for water lines shall be a minimum of 60" (1500 mm). In addition, within pavement structure limits, installations shall be a minimum of 18" (450 mm) or one-half the pipe diameter whichever is greater, beneath the subgrade. The utility owner is responsible to assure that all water lines have proper cover or are suitably insulated to protect against freezing.

2. Encasement

All water lines under bridge approach slabs, under or within 25' (8 m) of the footing of any structure shall be encased. Any freeway crossing shall be encased within and beyond the right-of-way, or at a minimum 5' (1.5 m) beyond slope intercept of the original ground in fill sections or the slope ditch intercept in a cut section. Continuous welded ductile iron water lines of 12" (300 mm) diameter or less need not be encased under other (non-freeways) existing highways, provided the pipe is jacked or bored. For water lines installed by open cut, or installed concurrently with a highway improvement project, encasement will not be required if suitable extra heavy pipe is used.

3. Shutoff Valves

Shutoff valves shall be located beyond the limits of a structure, where a water line is accommodated, and on both sides of a structure footing (see Utility Installations on Structures, Section XIV).

4. Markers

- a) The utility company shall place a readily identifiable and suitable marker at each right-of-way line crossed by a water line. A strip of warning tape shall be placed in compliance with industry standards for color, size and placement in the trench for all lines installed by open cut.
- b) Where plastic pipe is installed a durable metal wire shall be concurrently installed or other means shall be provided for detection.

5. Drains

Water line encasement or drains may be permitted to outfall into roadside ditches at locations approved by the Department.

6. Plastic Lines

Plastic lines may be used provided they have at least 60" (1500 mm) of cover for roadway crossings and longitudinal segments. Crossings shall be encased in accordance with Section IX.A.1.a.

7. Existing Lines

If an existing line is allowed to remain under the pavement of any highway, additional measures may be required to minimize any future need for cutting the pavement to make service connections. (Examples include the use of split sleeves or a reinforced concrete slab.)

E. Sanitary Sewer Lines

1. Cover

The cover for sanitary sewer lines shall be a minimum of 60" (1500 mm). In addition, within pavement structure limits, installations shall be a minimum of 18" (450 mm) or one-half the pipe diameter whichever is greater, beneath the subgrade.

The utility owner is responsible to assure that all sewer lines have proper cover, or are suitably insulated to protect against freezing.

2. Encasement

Encasement requirements as stipulated in Water Lines, Section IX.D.2, shall apply for all pressurized sewer lines and any existing gravity line which does not comply with material or cover requirements.

3. Manholes

Manholes serving sewer lines up to 24" (600 mm) in diameter shall have a minimum inside diameter of 48" (1200 mm). For any increase in line size or number of pipes, the inside diameter of the manhole may be required to be increased a like amount. Manholes for large interceptor sewers should be specially designed, keeping the overall dimensions to a minimum. The outside diameter of the manhole chimney at the ground level shall not exceed 36" (900 mm). Any manholes allowed within the pavement shall be set flush with the pavement and will not be in the vehicular wheel path.

4. Drains

Sanitary sewer line encasement drains shall not outfall into roadway drainage ditches, natural watercourses, or the right-of-way.

5. Plastic Pipe

Where nonmetallic pipe is installed, a durable metal wire shall be installed concurrently or other means shall be provided for detection purposes.

6. Exception for Existing Lines in Urban Areas

The Department may permit existing lines in urban areas to remain in place provided the line is of satisfactory quality and depth, manholes are adjusted in conformance with general requirements herein, and provisions are made to assure that future service lines will not be in violation of access control or disturb any roadway.

X. UNDERGROUND POWER LINES

A. General

1. Cover

The minimum cover for underground power lines along and/or across the highway right-of-way, but outside the pavement structure (subgrade), shall be 30" (750 mm) except where crossing ditches where 48" (1200 mm) are required. A minimum depth of 18" (450 mm) shall be maintained under the pavement structure (subgrade). The District Engineer, or Chief of Design Services may authorize exceptions. Where materials and other conditions justify, exceptions may be authorized to permit existing lines to remain in place with a cover of 6" (150 mm) below subgrade.

2. Roadway Crossings

Underground power lines should be located at approximate right angles to the highway to the extent feasible and practical. Reasonable latitude may be exercised regarding the crossing angle of existing lines that are otherwise qualified to remain in place.

3. Encasement

All underground power lines within the highway right-of-way shall be in conduit. Conduit placed below pavement structure limits shall equal or exceed Schedule 80 PVC-EPC (Electrical Plastic Conduit). Conduit placed beyond horizontal pavement structure limits shall equal or exceed Schedule 40 PVC-EPC.

4. Markers

The utility company shall place a readily identifiable and suitable marker at each right-of-way line crossed by an underground power line. A strip of warning tape shall be placed in the trench in compliance with the American Public Works Association and industry standard for size, color and proper placement for all power lines installed by open cut.

5. Longitudinal

Longitudinal underground power lines, where permitted, shall be located on uniform alignments as near as practical to the right-of-way line with consideration given to provide space for possible future highway construction and/or future utility installations. For those installations that can not comply with the above requirements, the Commissioner may, on a case by case basis, approve the proposed installation as long as the proposed facility design precludes the need to relocate the facilities in the future.

6. Appurtenances

Underground power line installations that include above ground transformers or other utility appurtenances shall be located at or near the right-of-way line, outside the clear zone and maintenance operation area. For those proposed installations that can not comply with the above requirements the Commissioner may, on a case-by-case basis, approve the installation. The Utility shall document that the installation does not present a safety hazard to vehicular travel and that normal highway maintenance operations are not impeded.

7. Manholes

- a) Manholes shall be limited to those necessary for installation and maintenance of underground lines. On non-freeway highways existing manholes may be permitted to remain in place to service existing lines. The elevation of manhole rims and covers shall be set at finished grade. Except within urban type areas, new manholes will not be permitted within the traveled way or shoulder of a highway
- b) To conserve space within the right-of-way for highway and other utility services, manhole vault dimensions should be no larger than is necessary to hold the equipment involved and for safety standards to be assured for maintenance personnel. The outside width should not exceed 7' (2.1 m), with the length held to a reasonable minimum. The outside dimensions of a manhole chimney should not exceed the minimum required to support the manhole frame and cover. Manhole covers (for personnel access) shall be installed flush with finished grade and shall not be in the vehicular wheel path. The top of the roof of the manhole vault should be set to meet the minimum cover stipulated in Appendix B, pages B-1 and B-2
- c) Exceptions may be authorized provided that justification is supplied to the District Engineer or Chief of Design Services and it is found acceptable.

XI. UNDERGROUND COMMUNICATION LINES AND CABLE TELEVISION LINES

A. General

1. Cover

The minimum cover for underground communication lines and cable television lines along and/or across the highway right-of-way including highway ditches, but beyond the pavement structure (subgrade), shall be 30" (750 mm) for either encased or unencased installations. A minimum depth of 18" (450 mm) shall be maintained under the pavement structure (subgrade). The District Engineer or Chief of Design Services may authorize exceptions. Where materials and other conditions justify, exceptions may be authorized to permit existing lines to remain in place with a cover of 6" (150 mm) below subgrade.

2. Roadway Crossings

Underground communication lines and cable television lines should be located at approximate right angles to the highway to the extent feasible and practicable. Reasonable latitude may be exercised regarding the crossing angle of existing lines that are otherwise qualified to remain in place.

3. Encasement

- a) Underground communication lines and cable television lines crossing highways do not require conduit except where, in the judgment of the District Engineer or Chief of Design Services, such conduit is necessary for the protection of the highway facility. Conduit or other suitable protection is required for any communication facilities (a) with less than minimum cover, (b) within 25' (8 m) of the footings of bridges or other highway structures, or (c) under the approach slabs of structures.
- b) Conduit shall be designed to support the load of the highway and superimposed loads thereon, including that of construction machinery. The strength of the conduit placed within pavement structure limits shall equal or exceed structural requirements for PVC Schedule 80.

APPENDIX II

Alabama Department of Transportation

The minimum bury for utility installation within the ROW in other situations will be 1 meter on all types of highways. When installations must pass beneath highway drainage facilities, clearances will be approved on a project by project basis depending on the type of utility involved.

Minimum Bury Not Possible

Where less than minimum prescribed bury is necessary because of other utilities, water table, ordinances, or similar reasons, the pipe will be protected with a casing or concrete slab not in contact with the pipeline, or other suitable measures acceptable to the Department will be used. Where less than minimum prescribed bury is desired, a variance must be filed and the utility bears the responsibility of justifying that minimum bury cannot be obtained and of supplying the Department with sufficient documentation to verify the pertinent circumstances in support of the request.

Hazardous Transmittants

Cover for pipelines carrying transmittants which are flammable, corrosive, expansive, energized, or unstable will not be granted a variance for the minimum prescribed bury outlined in these standards.

National And Local Codes

The utility will not place a facility with less than the minimum bury required by national, state, local, or other applicable industrial codes governing the particular type of transmittant. A partial list of accepted industrial codes may be found in [§ 2.9](#) and [chapter 5](#) of this manual.

2.20.3 Encasement

The Department requires the encasement of all utility facilities placed under the highway unless otherwise exempted within this manual, or unless a utility obtains approval to forego encasement. The encasement maximizes safety of traffic and structural integrity of the highway. Where a utility desires to place a facility under the highway prism without encasement, it must file a variance request. The Department places the burden of proof on the utility if it contends that encasement is unnecessary. The following controls are provided for encasement of pipeline crossings of the highway.

Where Required

Casings may be required for the following conditions and in other instances when indicated by the Department:

1. If expedient for the insertion, removal, replacement, or maintenance of carrier pipe crossings of freeways, expressways, and other controlled access highways, and at other locations where it is necessary in order to avoid open-trenched construction
2. As protection for carrier pipe from external loads or shock either during or after construction of the highway
3. As a means of conveying leaking fluids away from the area directly beneath the traveled way to a point

of venting at or near the ROW line, or to a point of drainage in the highway ditch or a natural drainage way

Encasement or other suitable protection may also be required for any pipeline (1) with less than minimum bury, (2) near footings of bridges or other highway structures or across unstable or subsiding ground, or (3) near other locations where there may be hazard.

Transmittants to be Encased

Where the utility cannot give satisfactory assurance to the Department that the highway user and the highway structure are adequately protected without the use of encasement, casing will be required for (1) pressurized carrier pipes crossing under major highways, and (2) carriers of transmittants which are flammable, corrosive, expansive, energized, or unstable, particularly if carried at high pressure or potential.

Joint Use of Encasements

The Department encourages joint use of a single encasement pipe where right of way is limited and utility relocation costs are extraordinary. The utility companies involved shall contact the Utility Engineer, for review and approval prior to beginning design work, where a joint use encasement is being considered. Under normal circumstances, two different utilities will not be allowed to place their pipeline in a single encasement.

Coated Pipe

If coated pipe is used for jacking or boring, the same pipe may not be used for a carrier pipe unless a method is devised to ensure that there is no damage to the pipe coatings.

Pavement Support

Rigid encasement or suitable bridging will be used where support of pavement would be impaired by depression of flexible carrier pipe. Figure 2-3 illustrates this process.

Structural Design

Casings will be designed to support the load of the highway plus any superimposed loads. They will equal or exceed the structural requirements for highway drainage facilities. Casings should be composed of materials of satisfactory durability for conditions to which they may be exposed.

Length of Encasement

Where encasements are used they will (where practical) extend (1) as far from the toe of the fill slope as the depth of the pit required to install or maintain the encasement and pipeline or (2) back of the ditch far enough to allow the ditch to function as a drain while the pit is open for the installation of the encasement and carrier pipe or (3) far enough to pull the carrier pipe and prevent water from the ditch from getting into the encasement or subgrade of the highway during construction or maintenance operation.

On curbed sections encasement will extend outside the outer curb to a point far enough that the face of the pit (to install or maintain the encasement or pipe) will not be closer than 2 meters from the face of curb. Where appropriate, the encasement will extend to the access control line, to the outside of frontage roads, or to an indicated line that allows for future widening of the highway.

Seal

Casing pipe will be sealed at the ends with an approved flexible material to prevent flowing water and debris from entering the annular space between the casing and the carrier.

Appurtenances

The installation will include necessary appurtenances such as vents and markers. Where possible on crossings the vents will be located at the ROW line so that they serve as markers for the pipeline crossing of the highway. See [figure 2-2](#).

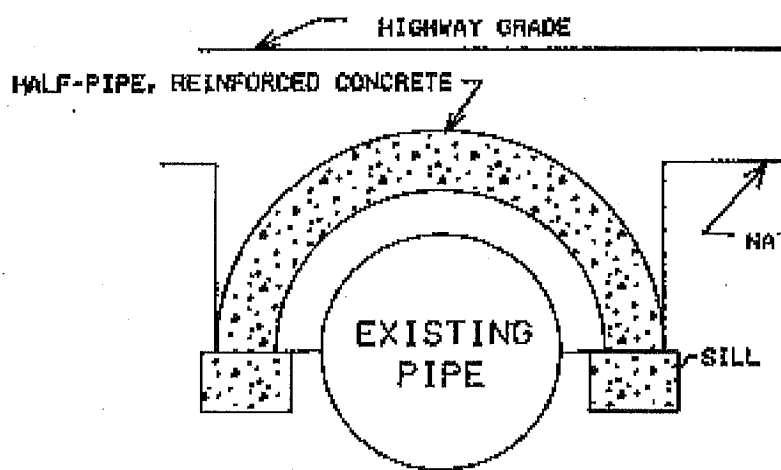
2.20.4 Allied Mechanical Protection for Encasement

For a few situations, pipeline crossings may be installed without encasement. Normally such an installation is limited to open-trenched construction and service lines with inside diameter less than or equal to 50 mm. Examples of encasement and allied mechanical protection are shown on [figure 2-4](#). The guidance in the following paragraphs applies when providing allied mechanical protection to uncased pipeline crossings of the highway.

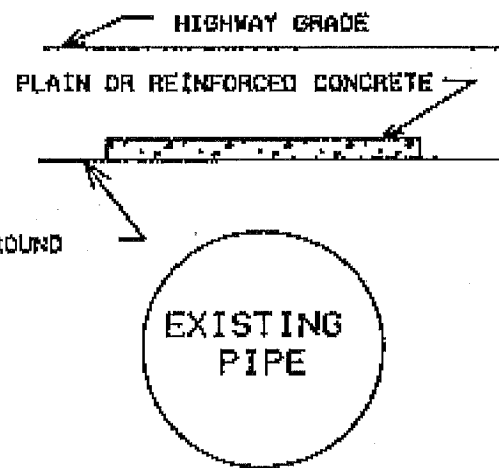
Carrier Pipe Design

On uncased construction, the carrier pipe will conform to the material and design requirements of appropriate utility industry and governmental codes and specifications. In addition, the carrier pipe will be designed to support the load of the highway plus any superimposed loads when the pipe is operated under all of its intended ranges of pressure. The installation will employ a higher factor of safety in the design, construction, and testing than normally would be required for cased construction. On new installations, or for retention of existing utility facilities under proposed highway construction, the utility's engineer, in accordance with the provisions of the state laws and regulations that regulate the practice of engineering in the State of Alabama, will certify to the Department that these facilities provide maximum reasonable protection to the highway facility, and minimum potential maintenance of the utility and highway facilities.

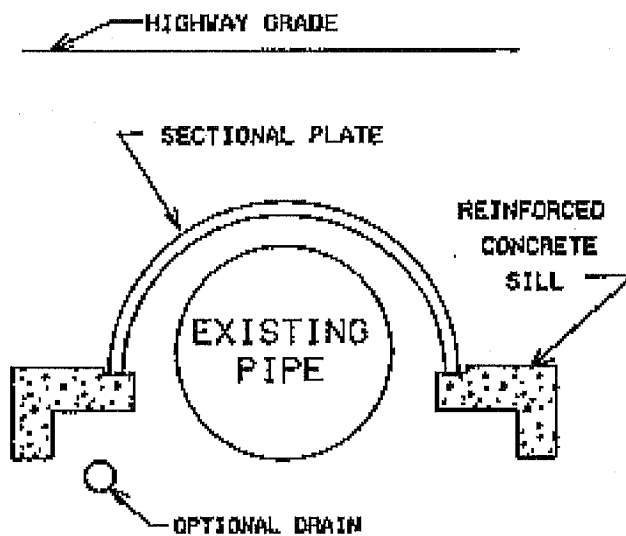
Figure 2-3 Examples of Protection of Existing Pipelines



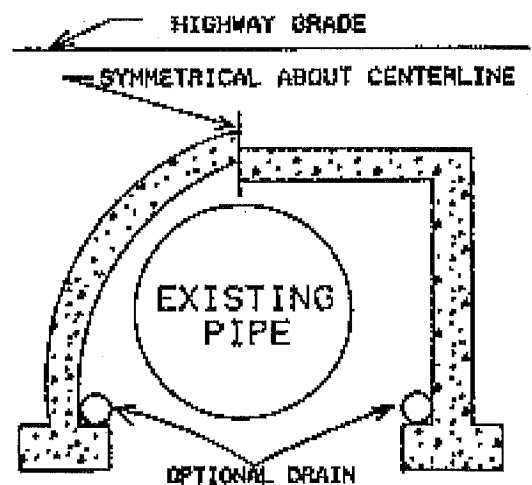
A) HALF-PIPE PROTECTION



B) FLOATING SLAB PROTECTION



C) PLATE ARCH PROTECTION



D) MONOLITHIC ARCH OR BOX

FIGURE 2-3
EXAMPLES OF PROTECTION OF EXISTING PIPELINES
(FROM AASHTO, 1994)

Protection of Existing Pipelines

Suitable bridging, concrete slabs, or other appropriate measures will be used to protect existing uncased pipelines if shallow bury or their location make them vulnerable to damage from highway construction or maintenance operations. Figure 2-3 illustrates an example of the protection methods. Existing pipelines may remain in place without further protective measures if they are of adequate depth and do not conflict with highway construction or maintenance operations provided that both highway and utility officials are satisfied that the lines are and will remain structurally sound and operationally safe.

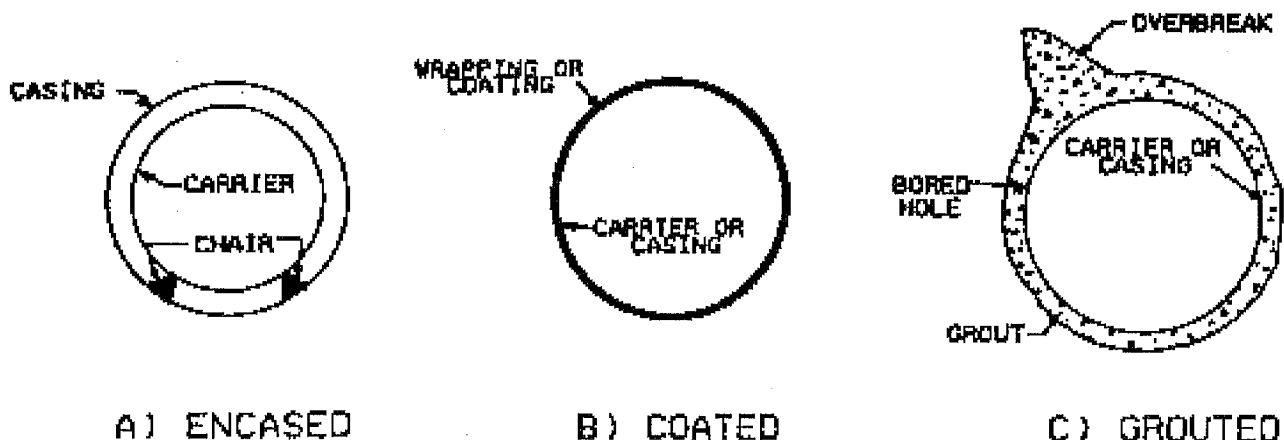
In Lieu of Encasement

Uncased crossings of welded steel pipelines carrying transmittants which are flammable, corrosive, expansive, energized, or unstable, particularly if carried at high pressure or potential, may be permitted, provided additional protective measures are taken in lieu of encasement. These measures will employ a higher factor of safety in the design, construction, and testing of the uncased carrier pipe. Thicker-wall pipe, radiograph testing of welds, hydro-static testing, coating and wrapping, and cathodic protection are some of the features that will be included in the design. The utility bears the responsibility of documenting to the Department that such treatment provides safety equivalent to, or exceeding, that of a cased crossing.

In order to place an uncased carrier under a highway facility, a variance request is required for both reimbursable and non-reimbursable adjustments. A variance request is required prior to, or with a request for authorization of relocation assemblies and/or permits. Variance requests for uncased crossings will not be approved subsequent to authorization of relocation plans and permits which show cased crossings.

The utility bears the responsibility of demonstration, to the Department of Transportation, that an uncased crossing is in the best interest of the public, the Department of Transportation, and the utility. Consideration should be given to the cost of installation and the cost of future maintenance, as well as the interest of the utility's facility. Each variance request shall be evaluated based upon individual merit.

Figure 2-4 Examples of Encasement and Allied Mechanical Protection



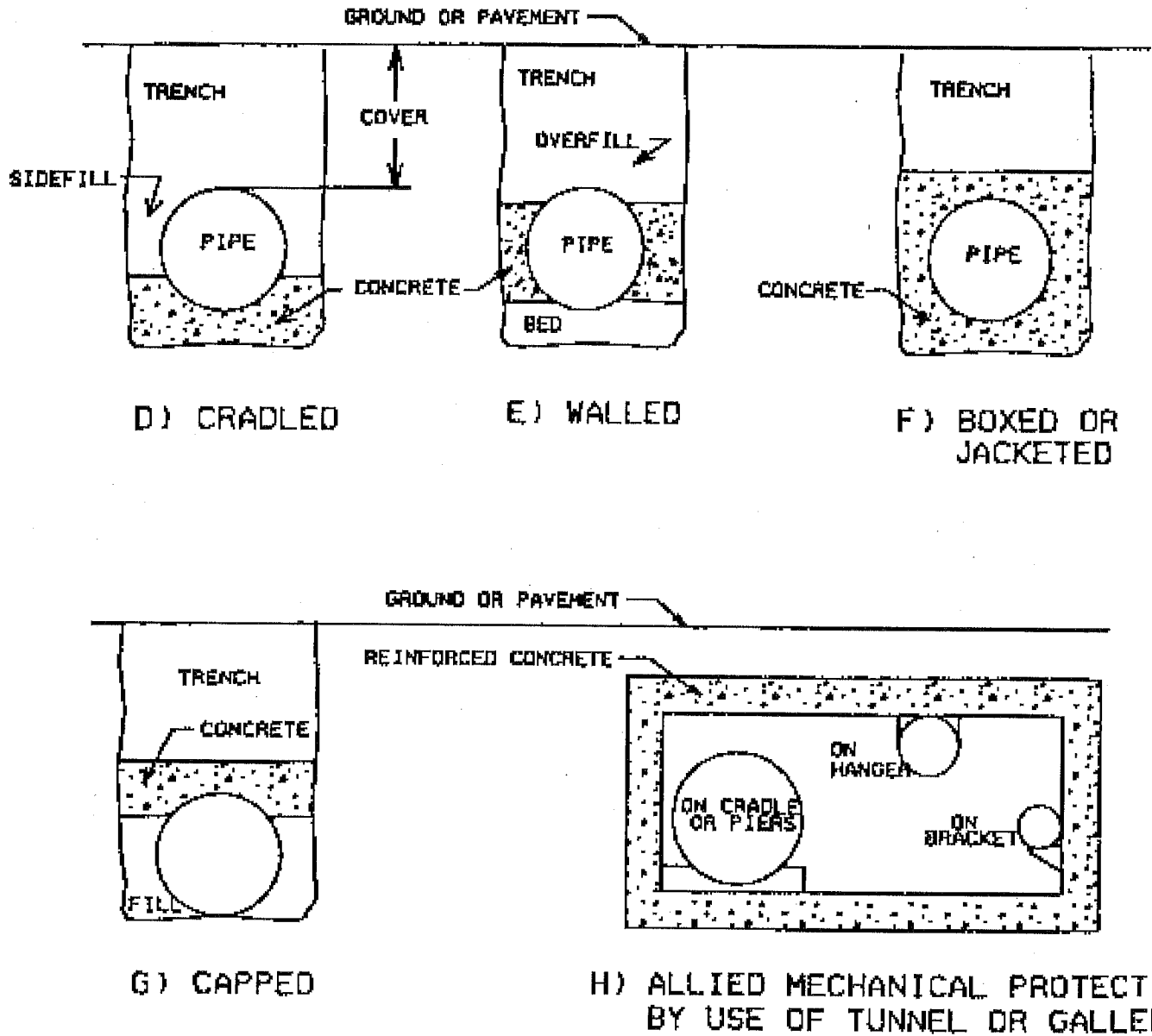


FIGURE 2-4
EXAMPLES OF ENCASEMENT AND ALLIED
MECHANICAL PROTECTION (FROM AASHTO, 1994)

Each variance request must include, but may not be limited to, the following minimum requirements:

A. Design, Construction, Testing

Additional measures shall be taken in the design, construction, and testing of uncased carriers. These shall

include additional protective measures to be taken in lieu of encasement. Measures shall include, but shall not be limited to:

1. Higher factor of safety in the design, construction, and testing of uncased carriers.
2. Welded steel pipe.
3. Thicker walled pipe.
4. Radiographic testing of welds.
5. Hydrostatic testing.
6. Coating and wrapping.
7. Protective concrete slabs under ditch lines.
8. Cathodic protection.

B. Professional Engineer's Certification

A qualified Professional Engineer shall certify the following:

1. The carrier will be designed to withstand all internal and external stresses, during and after construction operations, and during any subsequent maintenance operations.
2. The carrier will be designed, constructed and tested in accordance with all applicable federal and state requirements and in compliance with accepted industry standards.
3. The uncased crossing provides a degree of safety equal to or greater than a encased crossing.

C. Utility's Certification

A certification will be required from the utility stating that the uncased carrier will be designed, constructed, tested, and maintained in accordance with all applicable federal, state, and local requirements.

Additional requirements may be needed on a case by case basis.

Uncased Service Lines

Uncased service-line crossings of continuous-roll, type "K" copper pipelines with inside diameter 50 mm or less may be permitted. Uncased service-line crossings with inside diameter not greater than 50 mm may be permitted for natural gas service lines provided wrapped or coated steel pipe is used. Otherwise all water and gas service lines will be encased. Joints in uncased service lines will not be allowed under the roadway prism. PVC or PE encasement, with nominal size less than or equal to 100 mm, will be allowed for water service lines. Such encasement shall be Class 200 or higher.

A water service line and a gas service line serves no more than two customers.

Uncased Pipe Materials

Where trenched construction and backfill is allowed by the Department, uncased water lines or sanitary sewers may be allowed within the highway structure provided that ductile iron pipe is used.

Maintenance of Uncased Lines

Where the utility justifies not casing its facilities crossing the highway structure and the Department issues a permit accordingly, the Department considers such approval to be prima facie evidence that the utility owner will not open cut the highway structure for the purpose of maintaining the facility except in emergency situations. An emergency is a situation which threatens the safety of the public. Where emergency situations require that the highway be open cut, the utility will promptly notify the Division Engineer, and at the same time exercise every reasonable means to ensure the safety and convenience of the traveling public.

If failure occurs in an uncased crossing, the Department may require the utility to abandon the failed crossing and to replace it by boring, jacking, or other methods to avoid damage to the pavement or base structure.

2.20.5 Appurtenances

Vents, drains, markers, manholes, and valves are examples of appurtenances to pipeline installations. Controls for use of appurtenances include the following.

Vent Standpipes

Where used, vent standpipes will be located and constructed so that they do not interfere with maintenance or use of the highway and so that they will not be concealed by vegetation. Preferably they will be placed from 0 to 300 mm inside the fence or ROW line. An example is shown on [figure 2-2\(a\)](#). In urban areas vents will be allowed only where they do not affect pedestrian traffic.

In the situation where a gas pipe is lined (for example, a new plastic liner may be placed inside an existing galvanized pipe) and there is no space between the liner and the pipe, this pipe does not qualify as encased pipe and no venting is required.

Drains

The utility will provide drains for casings, tunnels, or galleries enclosing carriers of liquid, liquefied gas, or heavy gas. Drains may outfall into roadside ditches or at locations approved by the Department. The outfall will not be used as a wasteway for purging the carrier unless that is specifically authorized.

Markers

The utility will place readily identifiable and suitable markers along or within 300 mm of the ROW line to indicate the location of the underground utility crossing. Example markers are shown in [figure 2-2\(c\)](#). The marker will show an accurate offset to a longitudinal utility installation within the highway ROW. Markers will be placed at agreed-upon spacing, depending upon the type of installation and its potential hazard to the highway user, the highway structure, the highway ROW, maintenance personnel working on the highway ROW, or the facility itself. The spacing will be agreed upon by the utility company and the Division Engineer. Where curb-and-gutter highways are involved, an exemplary, suitable marker may be a metal plate or disc affixed to the curb. Vent pipes also may serve as a marker for these crossings. If free-standing markers are

used, they will be of sufficient height for visibility during mowing operations.

Manholes

The structures will be designed and located to cause the least interference to other utilities and future highway expansion. Every effort should be made to minimize manhole installations at street intersections and in the normal wheel path of driving lanes.

All access manhole rings and covers installed within the State ROW will be the traffic-bearing type. When manholes are allowed to remain inside the paved area, the utility will be responsible for adjusting manhole or valve-box covers in conjunction with resurfacing operations by the Department. Telephone junction boxes and similar appurtenances located outside the paved area should be able to withstand an HS-20 truck loading.

Valves

To isolate the crossing, valves will be installed in lines at or near ends of structures and near unusual hazards unless hazardous segments can be isolated within a reasonable distance by other readily available sectionalizing devices. Automatic shut-off valves are preferred unless the utility shows that such installation could be hazardous or have adverse effects on the utility system.

Cathodic Protection Location

Cathodic protection for pipelines will be placed by the utility owner at locations that preclude damage to highway bridges, reinforced concrete culverts, or other structures.

Detection of Non-Metallic Pipe

When installing non-metallic pipe underground the utility owner will install suitable markers that will enable the pipe to be located by electronic detection devices. Metallic tape or 12-gauge copper wire may be used for this purpose.

2.20.6 Restriction Against Varied Use

Subject to safety regulations adopted by the State of Alabama or the Federal government, the following precautionary measures apply to pipeline installation.

Required Information

Pipeline installation, or relocation permits, or agreements will specify the class of transmittant; the maximum working, test, or design pressures; and the design standards for the carrier.

Changes

When it is anticipated that there will be a change in the class of transmittant, or an increase in the maximum

design pressure specified in the permit or agreement, the utility will give the Division Engineer advance notice and obtain approval for such changes. The notice will also specify the applicable codes to be used.

The operating pressure for gas and water systems will be allowed to vary as long as it does not exceed the design strength of the pipeline. Such variations as are reasonable will not be considered to be changes in pressure.

2.20.7 Installation

Trenched Construction and Backfill

The integrity of the pavement structure, shoulders, and embankment slopes are the primary concern for this type of construction. The following guidelines have been prepared to address this concern.

Trenches

Where trenches are used, the shape and shoring will meet Occupational Safety and Health Act (OSHA) standards.

Bedding

Bedding will be provided to a depth of 150 mm or half the diameter of the pipe, whichever is smaller. Bedding will consist of granular material free of lumps, clods, stones, or frozen materials and will be graded to a firm but yielding surface without abrupt change in bearing value. Unstable soils and rock ledges will be excavated from the bedding zone and be replaced by suitable materials, or be stabilized in place. The bottom of the trench will be prepared to provide the pipe with uniform bedding throughout the length of the installation. The Division Engineer may waive the bedding requirement if the existing material in the bottom of the trench is satisfactory to provide uniform bedding of the pipe.

Backfill

When placed under the highway prism, backfill will conform to the Department's *Standard Specifications* in force at the time of installation. If the Division Engineer is uncertain of the backfill density, he will notify the utility and have Department personnel perform appropriate density tests. The owner will be charged the actual costs of the tests.

Backfill inside the highway ROW but not under the highway prism will be compacted to a density at least equal to the density of the surrounding soil. This will be accomplished by the use of tools and methods approved by the Division Engineer.

State Forces

In some instances, the Department may require that backfill or paving be performed by its own forces, or under its direction, at the expense of the utility, when the Division Engineer considers it to be necessary for the protection of the traveling public or the highway structure.

Pavement Structure

The pavement structure will be restored in appropriate layers, utilizing materials at least equal in quality and thickness of layer as the original construction.

Side Roads and Private Roads

Underground installations placed parallel to highways under the Department's jurisdiction, and which cross side roads and private drives within the normal State ROW, will be installed and maintained under the same standards as State-controlled routes. Full consideration will be given to the highway user, property owner, side roads, and private drives so that they are not blocked without the consent of the Division Engineer, who may wish to take into consideration the desires of the property owner. In general, the standards or requirements for crossing side roads and private drives within the normal highway ROW will be the same as those crossing the highway itself except where written permission from the Division Engineer is given in particular cases.

For side roads and private drives the following criteria give the method of installation:

1. If the road or street is unpaved, the utility may be installed by open cut and backfill in accordance with these accommodation standards
2. If a paved road or street has an average daily traffic (ADT) less than 500, the utility will be installed by boring but it normally will not be encased
3. If a paved road or street has an ADT greater than 500, the utility will be installed by boring and encasing in accordance with the requirements found in these standards
4. Private driveways and wide commercial-establishment paved aprons (such as for convenience stores and gas stations) represent special cases. They may be open cut with permission of the Division Engineer, providing that access to the commercial establishment can be maintained during the process. In making the decision, the Division Engineer may wish to honor the desires of the property owner

Blasting

Any blasting within the highway ROW will be in compliance with the blasting guideline in this chapter (§ 2.5) and will be approved in the permit or agreement. No blasting will be allowed near highway-structure footings. After obtaining approval, the utility will supply appropriate advance notice to the Department's inspector or the District Engineer of the date and time of each blasting action. A Department inspector will be on the project at all times when blasting operations are being conducted.

Open Surface Roads

When a utility facility is installed across or under the highway prism of an open surface road, the backfill and riding surface will be restored as specified by the Division Engineer.

Untrenched Construction and Grouting

The following guidelines have been prepared to control the placement of pipelines that are installed using

techniques other than trenched construction.

Driving

Pipe driving generally is possible only in very favorable soil conditions. This method may be permitted for pipes up to 75 mm in outside diameter. For depth of cover exceeding 2 meters driving may be permitted for pipes up to 125 mm outside diameter where soil conditions will permit.

Coring

No sluicing will be permitted within the highway prism during coring activities.

Wet-Boring

Wet boring or excavations which utilize high pressure fluid or hydro-jets is not currently an approved method for installation of pipelines underneath the highway. Utilities desiring to use this method must file a variance request. The addition of free water, which is not under pressure and is used as a lubricant to free an auger bit jammed in the borehole, will not be considered "wet-boring", and will not require a variance as long as the engineer is satisfied that the structural integrity of the highway will not be impaired.

Trenchless Technology

Methods of boring and tunneling which utilize the addition of environmentally safe lubricants, or drilling mud, will not be considered "wet-boring", and will not require a variance as long as the engineer is satisfied that the structural integrity of the highway will not be impaired.

Portals

Portal limits will be 2 meters back of the face of curb or outside the highway prism.

Oversize Boring and Grouting

The utility will restrict the oversize of the boring excavation to a reasonable minimum. Grout backfill will be required for the following occurrences:

1. Overbreaks
2. Unused holes
3. Grout will be used where the oversized hole is under the pavement and is so much larger than the pipe that the Department Inspector has reason to believe that earth might collapse into the void

Utility Tunnels and Bridges

Where these installations are justified, they will conform to the culvert and bridge practice of the Department. Since the need for these installations is very rare each request will be handled on an individual basis as a special case.

2.20.8 Retention and Relocation of Existing Pipelines

The Department has provided the following controls to govern the disposition of existing pipelines that fall in the path of highway construction projects.

Retention

An existing facility may be retained provided that (1) it meets all the requirements of codes and standards for safety of the utility facility, the highway contractor, and the finished highway or (2) it can be protected in place. [Figure 2-3](#) illustrates several acceptable types of protection.

Adjustment

An existing pipeline will be relocated in plan or grade where (1) the pipe bedding will be depressed by highway loads, (2) the top of the pipe is too close to the highway grade, or (3) the pipeline is too weak to support highway loads and cannot be adequately protected in place.

Highway Construction Operations

In cases where normal highway construction operation may endanger a pipeline to be retained in place, the Project Engineer will contact the utility and have the pipe line location identified precisely in line and grade. Temporary protection (such as steel plates, timber mats or earth bridges) may be required until sufficient cover has been constructed or the danger period has passed.

[Previous Section](#)

[Next Section](#)

2.27 UNDERGROUND ELECTRIC POWER AND COMMUNICATION LINES

2.27.1 General

Electrical and Communication LINES

Underground utility construction will conform to all applicable codes, standards, and specifications.

Bury

The minimum required depths of bury (or cover) depends upon the type of highway facility, the type of utility, the location within the ROW, and other factors. Examples of minimum bury include the following:

1. Underground electric power lines will have a minimum cover under ditches and within the limits of the ROW of 1.2 meters. Minimum cover under pavement will be 1.2 meters. Installations within the highway prism will be encased.
2. Underground communication lines will have a minimum cover under ditches and within the ROW limits of 1 meter on conventional highways and freeways. Minimum cover under pavement will be 1.2 meters. These facilities may be uncased within the limits of the highway structure provided the utility agrees not to open cut to maintain these facilities except under extreme emergencies.

Appurtenances

Pedestals or other above-ground utility appurtenances installed as part of buried cable plant will be located just inside the ROW line, well outside the highway maintenance area and outside of the clear-
roadside area.

Review Required

All proposed locations and utility designs will be reviewed by the Department to ensure that the proposed construction will not cause avoidable interference with the existing or planned highway facilities, or with highway operation or maintenance.

Spare Conduit or Duct

On both cased and uncased installations, particularly on crossings of the highway, consideration will be given to plans calling for the placement of spare conduit or duct to accommodate future expansion of underground lines.

Attachment to Structures

The Department's guideline ([§ 2.4](#)) for communication line attachments to highway structures will be followed.

General Controls

The general controls outlined in the Department's policy for pipelines ([§ 2.20](#)) as related to markers, installation, trenched or untrenched construction, and relocation, will be followed on underground installation of electric power and communication lines. Accurate markings of underground electric power lines are required.

Plowing Operations

Subject to the approval of the Department, a utility may be allowed to plow in a utility facility, provided it is able to maintain reasonable controls to ensure that the horizontal installation can be made within 300 mm of the approved location, and that the stipulated minimum cover can be obtained and maintained. It is the utility company's responsibility to provide the Department with a recommended procedure for restoring the highway ROW to its original state, or to an acceptable condition. Such installation will be allowed only between the highway prism and the ROW limits. No plowing operations will be allowed within the highway prism area.

Abandoned Lines

Where lines are abandoned in place, Department employees and other utilities have no way of knowing whether the abandoned lines are active. Often ROW that could be used for additional utility lines and carriers cannot be used. Therefore, when a utility abandons a line, it must notify the Division Engineer in writing. The Division Engineer may require removal of the abandoned line, and if so, the utility must secure a permit or agreement for the removal action.

2.27.2 Location and Alignment

Parallel Locations Desired

On longitudinal installations, locations parallel to the pavement at or adjacent to the ROW line are preferable to minimize interference with (1) highway drainage; (2) the structural integrity of the traveled way, shoulders, and embankment; and (3) the safe operation of the highway. As a minimum, where practical, their lateral location will be offset a suitable distance beyond the slope, ditch, or curb line as the Department may stipulate.

Perpendicular Crossings

Crossings will be located as near perpendicular to the highway alignment as practical.

Unsuitable Conditions

Conditions which generally are unsuitable or undesirable for underground crossings will be avoided. These include locations in deep cuts; near footings of bridges, culverts and retaining walls; across at-grade intersections or ramp terminals; at cross drains where flow of water, drift, or stream bedload may be obstructed; within basins of an underpass drained by a pump; and in wet or rocky terrain where it will be difficult to maintain minimum bury.

2.27.3 Cased and Uncased Construction

Uncased

Where it is acceptable to both the utility and the Department, underground communication cables crossing the highway may be installed without protective conduit or duct, provided the utility agrees not to open cut to maintain said facility, except in extreme emergency. An emergency is a situation that affects the health and safety of the public. Normally this type of installation will be limited to small bores for wire or cable facilities where soil conditions permit installation by boring a hole about the same diameter as the cable and pulling the cable through. Underground electric power lines will not be allowed to cross the highway without casing.

Length of Encasement

Encasements will extend a suitable distance beyond the slope or ditch line to allow installation or maintenance of the utility line without disrupting the highway. On curbed sections it will be extended outside the outer curbs by at least 2 meters. Where appropriate, the encasement will extend to an indicated line that allows for future widening of the highway.

Possible Encasement

Consideration will be given to encasement or other suitable protection for any wire or cable facilities (1) with less than minimum prescribed bury, (2) near the footings of bridges or other highway structures, or (3) near other locations where there may be hazard. PVC or PE encasement, with nominal size less than or equal to 100 mm, will be allowed for encasement of telecommunication lines. Such encasement shall be Class 200 or greater.

Documentation

The utility is required to furnish reasonable explanation and documentation for the control and construction methods to be employed for crossing of the highway before the proposed installations will

be considered by the Department. This is to ensure the necessary protection of the utility facility and the integrity and operation of the highway facility.

Protection

Where less than minimum cover is allowed across ditch sections, and where underground, encased electrical power lines cross ditch sections, a floating slab of concrete is recommended for protection of the facility and for highway maintenance operation. An example is shown in [figure 2-4\(g\)](#).

[Previous Section](#)

[Next Section](#)

APPENDIX III

**Iowa Department of
Transportation**

115.12(2) Pipeline attachments.

- a. Pipelines may be attached to primary highway bridges when installation below ground is not feasible, the design of the bridge can accommodate the attachment, and space is available.
- b. The permit application shall include a detailed sketch showing the method of attachment and weights of attachment. A separate permit is required for each bridge.
- c. Pipes shall be placed beneath the bridge's floor, inside the outer girders or beams (or in cells specifically designed for the installation), and above low steel or masonry of the bridge.
- d. Pipes shall be designed to withstand expected expansion or contraction forces. If necessary, expansion devices such as expansion joints, offsets or loops shall be used.
- e. Pipelines in cells or casings shall be vented and grounded whenever necessary.
- f. Pipelines that have an operating pressure of more than 75 pounds per square inch or that are larger than two inches in diameter shall have shutoffs not more than 300 feet from each end of the bridge.
- g. The department shall consider casing requirements on an individual basis. In some instances, thicker-walled or extra-strength pipe may be considered in lieu of encasement. Encasement is required for plastic pipe attachments to bridges.
- h. All costs attributable to the installation of an attachment to a bridge shall be paid by the utility owner unless the attachment is installed pursuant to a utility agreement.
- i. Welding or drilling holes in or attaching to structural steel primary members is prohibited.
- j. Utility facilities may be attached to noncritical concrete areas.
- k. Holes should not be cut in wing walls, abutments or piers.

- l. The utility owner shall provide an indemnity bond to be executed by either itself or by a responsible bonding company, at the department's option.
 - (1) The indemnifier under the bond shall, in the event of damage resulting from any cause whatsoever arising out of or from permission to attach a pipeline, indemnify the department against all loss or damage to it or any third party therefrom, including but not limited to the expense of repairing or replacing the bridge and the cost of alternate highway facilities for traffic during the period when the bridge is being repaired or replaced.
 - (2) The indemnity bond shall be kept in force for as long as the pipeline is attached to the bridge. The department may periodically review the amount of the bond and require adjustments in the bond amount.

115.12(3) Attachment fee.

- a. The utility owner shall pay to the department an attachment fee for attaching its utility facility to a primary highway bridge. The attachment fee is \$100 per bridge plus \$0.55 times the weight of the attachment in pounds per foot times the length of bridge in feet. The fee shall increase 3 percent per year after the base year of 2004.
- b. The attachment fee is due before any construction work commences within the right-of-way.
- c. Utility facilities belonging to or exclusively serving a city may, if the department considers it desirable, be attached to a primary highway bridge without assessment of an attachment fee.

115.12(4) Engineering fee. When a primary highway bridge is in the planning stages and the department designs the bridge to accommodate a requested attachment, the department shall assess to the utility owner an engineering fee. The engineering fee shall reimburse the department for the department's increased costs of design, construction and inspection due to the attachment. The department shall bill the fee to the utility owner when the department's work is complete.

115.12(5) Utility attachments to freeway border bridges. The department may permit a utility facility to be attached to an existing or planned freeway border bridge if the following conditions are met:

- a. The appropriate state agency of the adjoining state approves the attachment.
- b. Except for communication cable, the facility exits the freeway right-of-way as soon as physically practical after crossing the state line into Iowa.
- c. The attachment otherwise complies with this chapter, specifically including this rule on attachments and rule 115:16(306A) on longitudinal freeway occupancy.

761--115.13(306A) **Underground utility facilities.**

115.13(1) **Depth requirements.** (See Exhibit pages E-8 & E-9.)

- a. Minimum cover--roadway. The minimum required cover under a roadway is 48 inches.
- b. Minimum cover--other portions of right-of-way. The minimum required cover under other portions of the right-of-way is:
 - (1) 48 inches for electrical cable.
 - (2) 30 inches for communication cable except that 36 inches is required for longitudinal occupancy under freeway right-of-way.
 - (3) 36 inches for all other underground facilities.
- c. Rocky terrain. The department may allow an exception to the minimum depth requirement where rocky terrain makes it difficult to obtain the required depth. The department shall determine the minimum depth in these situations; however, no installation shall be authorized with less than 24 inches of cover.
- d. Other protective measures. In critical situations where the necessary cover cannot be obtained, the department may approve other protective measures.

115.13(2) **Measurement of cover.** The cover is measured from one of the following:

- a. On rural-type roadways, the lowest pavement surface edge.
- b. On urban-type roadways, the gutter flow line, excluding local depressions at inlets.
- c. Where longitudinal installations will be behind the curb, the top of the curb.
- d. The surface of the surrounding ground or the low point of the ditch.

115.13(3) **Casing.** A casing shall:

- a. Protect the highway from damage.
- b. Protect the carrier pipe from external loads or shock, either during or after construction of the highway.
- c. Convey leaking liquids or gases away from the area directly beneath the traveled way.
- d. Provide for repair, removal and replacement of the utility facility without interference to the highway.

115.13(4) **Seals.** Casing pipe shall be sealed at both ends with a suitable material to prevent water or debris from entering the annular space between the casing and the carrier, in accordance with generally accepted industry standards.

115.13(5) Transverse occupancy--encasement and related requirements.

- a. Trenchless construction. Underground transverse crossings of existing paved roadways shall be made by trenchless construction whenever practical. Any exception to this requirement must be specifically authorized by the district representative and noted in the permit.
- b. Electrical service. Underground electrical service must be placed in a conduit from right-of-way line to right-of-way line and shall be clearly marked by the utility owner at the outer limits of the right-of-way.
- c. Pipelines.
 - (1) Except as set out in 115.13(5)"c"(2), a pipeline carrying natural gas at an operating pressure of greater than 60 pounds per square inch, liquid petroleum products, ammonia, chlorine or other hazardous or corrosive products shall be encased from right-of-way line to right-of-way line.
 - (2) Encasement of a pipeline carrying a product listed in 115.13(5)"c"(1) is not required if the pipeline meets all of the following requirements and the utility owner certifies as a part of the permit that these requirements are met:
 - It is welded steel pipeline.
 - It is cathodically protected.
 - It is coated in accordance with accepted industry standards.
 - It complies with federal, state and local requirements and meets accepted industry standards regarding wall thickness and operating stress levels.
 - (3) A pipeline carrying a product listed in 115.13(5)"c"(1) shall be vented and marked at the outer right-of-way limits. The markers shall comply with accepted industry standards and include the following information: name of the owner, telephone number to contact in case of an emergency, and type of product carried.
 - (4) Encasement of a natural gas pipeline with an operating pressure that is not greater than 60 pounds per square inch is not required if the pipeline is made of copper, steel or plastic; the pipeline is protected and installed in accordance with accepted industry standards; and the utility owner certifies as a part of the permit that these standards are met. Otherwise, encasement is required.
- d. Communication cable. The department may require encasement of communication cable.

- e. Sanitary sewer lines. Sanitary sewer lines, both gravity and force mains, shall be encased from right-of-way line to right-of-way line. Exception: A gravity flow line that is installed subsequent to highway construction need not be encased if it will meet all of the following requirements:
 - (1) The opening is cut to the size of the carrier pipe so that there are no excessive voids around the pipe.
 - (2) The pipe is of sufficient strength to withstand the external loads created by the vehicular traffic on the roadway being traversed.
 - (3) Lines beyond the toe of foreslope are properly embedded.
- f. Waterlines. Waterlines shall be encased from right-of-way line to right-of-way line. Exceptions:
 - (1) Encasement is not required where it is impractical due to existing conditions, as determined by the district representative. As a minimum, waterlines shall be encased from toe of foreslope to toe of foreslope.
 - (2) Waterlines with an inside diameter of two inches or less need be encased only from toe of foreslope to toe of foreslope. Venting and sealing of the encasement are not required.
 - (3) Properly embedded waterlines that are installed prior to highway construction need not be encased if extra strength cast iron or ductile iron pipe with mechanical joints and seals, or equivalent, is used from right-of-way line to right-of-way line.
- g. Installations vulnerable to damage. Utility facilities that by reason of shallow depth or location are vulnerable to damage from highway construction or maintenance operations shall be protected with a casing, suitable bridging, concrete slabs or other appropriate measures.
- h. Other installations. When it is acceptable to both the utility owner and the department, an underground utility facility not otherwise addressed in this subrule may be installed without protective casing if the installation involves trenched construction or small bores. Encasement requirements will be determined on an individual basis.

115.13(6) Longitudinal occupancy--encasement and related requirements.

- a. Utility lines installed longitudinally to the primary highway right-of-way shall be encased at crossings of hard-surfaced side roads, streets and entrances in accordance with subrule 115.13(5).
- b. Reserved.

115.13(7) Multiduct systems. The department may require installation of a multiduct system to be shared with others. Details of the installation are subject to department approval. (A multiduct system is required for all occupancies in the locations shown on Exhibit page E-13.)

a. The department shall designate a "lead company" for the system. The lead company is generally the first utility owner requesting occupancy. The lead company is responsible for:

(1) Design and construction of the multiduct system.

(2) Maintenance of the multiduct system.

(3) Providing all capital required to construct the multiduct system.

b. Once a multiduct system has been established, the department shall require future occupancies to be located within one of the unoccupied inner ducts of the system. If all inner ducts are occupied, the department may require the establishment of an additional multiduct system.

c. Each occupant of a multiduct system shall share equally in the entire capital costs of the facility. As each new occupant is added to an existing system, the department shall require the new occupant to pay its proportionate share based on the number of inner ducts it occupies.

d. See subrule 115.16(8) for occupancy fees for longitudinal installations on freeways.

115.13(8) Procedures for backfilling trenched construction and jacking or boring pits.

a. When a carrier, pipe, conduit, or cable is placed by trenched construction, the backfill shall be placed and compacted so that there is no settlement or erosion. If settling or erosion of a trench is observed, it is the responsibility of the utility owner to correct the problem.

b. Jacking or boring pits shall be backfilled in the same manner as that described in paragraph "a" of this subrule.

c. Backfill under roadways or entrances shall be of a suitable material to minimize settlement. Examples of suitable material include granular backfill or flowable mortar.

115.13(9) Procedures for trenchless construction.

a. When trenchless construction techniques are used, the bore shall be as small as practical and in no case more than four inches larger than the facility or casing inserted.

b. Grout backfill is required for all unused holes and abandoned pipes. Grout or sand backfill is required for any borehole more than two inches larger than the installed

casing or other facility. All bored facilities shall be constructed in such a manner that surface water is not transported to or otherwise allowed access to groundwater.

115.13(10) Procedures for pavement removal.

- a. When the existing pavement must be cut to accommodate a utility installation, the cut shall be made with a concrete saw.
- b. The width of the pavement removal shall be a minimum of six feet. If the distance from the specified cut to any adjacent longitudinal or transverse joint or crack is less than four feet, the pavement shall be removed to that joint or crack.
- c. The district representative shall make the final determination on the required depth and width of cut.

115.13(11) Procedures for pavement replacement.

- a. Restoration of pavement shall be accomplished in accordance with methods approved by the district representative.
- b. The district representative may authorize temporary repair with bituminous material.
- c. A permanent patch shall be placed as soon as conditions permit.

115.13(12) Clear zone for pits.

- a. On freeways, jacking or boring pits are not allowed within the median. A jacking or boring pit shall be located in an area beyond the clear zone or the highway foreslope, whichever area locates the pit a greater distance from the edge of the traveled way, right-of-way width permitting.
- b. On rural-type, nonfreeway primary highways, jacking or boring pits are not allowed within the median. A jacking or boring pit shall normally be located in an area beyond the clear zone or the highway foreslope, whichever area locates the pit a greater distance from the edge of the traveled way, right-of-way width permitting. However, a jacking or boring pit may be allowed within the foreslope if it is specifically authorized by the district representative and noted in the permit.
- c. On urban-type, nonfreeway primary highways, jacking or boring pits should be located at least two feet back from the curb.
- d. Jacking or boring pits authorized within the clear zone shall be protected at all times. Protection may include backfilling of the pit, temporary barrier rail, reflective fence, or other measures. All measures must be approved by the district representative.

115.13(13) **Construction methods.** Casing and pipeline installations shall be accomplished by dry boring, tunneling, jacking, trenching, directional drilling or other approved methods.

- a. The use of water under pressure (jetting) or puddling to facilitate boring, pushing or jacking operations is not allowed.
- b. However, a boring operation that requires the use of water only to lubricate the cutter and pipe is considered dry boring and is allowed.

115.13(14) **Encasement material.** It is the responsibility of the utility owner to ensure that it complies with all applicable federal, state, local and franchise requirements and meets generally accepted industry standards in the selection of encasement materials.

761--115.14(306A) **Freeways.** (See Exhibit page E-11.)

115.14(1) **Access to utility facilities occupying freeway right-of-way.**

- a. Except for emergency work, access shall not be obtained from the freeway or its ramps during utility construction or maintenance operations. This means that access must be obtained from intersecting, adjacent or nearby public highways, streets, roads or trails or from private property. See subrules 115.9(3) and 115.19(2) for emergency work.
- b. Fence removal and replacement are subject to the limitations imposed by the permit.
- c. No gates or ladders shall be placed in or upon the right-of-way fence.
- d. The department shall notify the FHWA of any access it authorizes to the interstate system for utility work.

115.14(2) **Freeway clear zone requirements.** The clear zone requirements of subrule 115.5(5) apply to freeways. In addition:

- a. On freeways open to traffic, personnel, equipment or materials are not allowed in the median or within the clear zone area, right-of-way width permitting, during utility facility construction or maintenance operations, except for the stringing of transverse overhead conductors.
- b. In the interest of safety and when considered advisable, the district representative may authorize the placement of temporary poles in the median during cable or conductor stringing operations.

115.14(3) **Aboveground appurtenances.** Unless otherwise provided, aboveground appurtenances are not allowed within the right-of-way of freeways.

115.14(4) Existing facilities.

- a. A utility facility occupying land that subsequently becomes freeway right-of-way may remain within the right-of-way if the facility:
 - (1) Can be accessed from other than the freeway or its ramps.
 - (2) Does not adversely affect the safety, design, construction, operation, maintenance or stability of the freeway.
- b. If these conditions are not met, the facility shall be relocated.

761--115.15(306A) Transverse installations on freeways.

115.15(1) Interchange areas.

- a. Utility facilities are not allowed within the interchange area of intersecting freeways unless they are highway-related.
- b. In other interchange areas, the department may permit occupancy if access to the utility facility can be obtained from other than the freeway or its ramps. If a utility facility cannot reasonably be accessed from an intersecting, adjacent or nearby public highway, street, road or trail, the utility facility shall be installed on private property outside the interchange area.

115.15(2) Aboveground installations.

- a. Poles, guys and other supporting structures and related aboveground facilities should be located outside the freeway right-of-way. A single span shall be used to cross the freeway where the width of freeway right-of-way permits.
- b. Within interchange areas:
 - (1) Single-pole construction shall be used, with the number of poles kept to a minimum.
 - (2) Overhead lines shall be constructed on tangent, parallel to the intersecting road, without guys or anchors being placed in the areas between the ramps and the main roadways of the freeway. Guy poles shall be located as near to the freeway right-of-way line as practical.
 - (3) Poles should be located as close to the toe of foreslope of the intersecting road as practical, but shall remain outside the clear zone.
 - (4) Poles should be located as far from the main roadways and ramps of the freeway as practical. No poles are allowed within the median or within the clear zone along the ramp pavement and the freeway pavement.
 - (5) The use of self-supporting poles or towers, double arming and insulators, breakaway devices and dead-end construction should be considered.

115.15(3) Encasement requirements. Underground facilities crossing the freeway shall be encased from right-of-way-line to right-of-way line. Exception: Encasement of a pipeline carrying natural gas at an operating pressure of greater than 60 pounds per square inch, liquid petroleum products, ammonia, chlorine or other hazardous or corrosive products is not required if the pipeline meets the requirements of subparagraph 115.13(5)"c"(2).

761--115.16(306A) Longitudinal installations on freeways.

(A multiduct system is required for all occupancies in the locations shown on Exhibit page E-12.)

115.16(1) Type of installation permitted.

- a. The department may permit the installation of an underground utility facility if, in addition to complying with other provisions of this chapter, the facility specifically complies with this rule.
- b. Except as provided in this rule, no aboveground installations other than those needed to serve highway facilities are allowed.

115.16(2) Prohibitions on longitudinal occupancy.

- a. A utility facility shall not be used for transmitting gases or liquids or for transmitting products that are flammable, corrosive, expansive, highly energized or unstable.
- b. A utility facility shall not present a hazard to life, health or property if it fails to function properly, is severed or is otherwise damaged.
- c. No direct service connection to adjacent properties is allowed.
- d. No utility facility is allowed in or on a structure carrying a freeway roadway or ramp, except for freeway border bridges, as provided in subrule 115.12(5).

115.16(3) Minimal maintenance. Once installed, the utility facility shall require minimal maintenance.

115.16(4) Location and depth. The utility facility shall be located on uniform alignment, preferably within eight feet of the freeway right-of-way line, and at a location approved by the department.

- a. See subrule 115.13(1) for minimum depth requirements.
- b. Except for multiduct systems, borings and isolated locations as determined by the department, cable shall be installed by the plowing method.
- c. Utility accesses and splice boxes may be placed below the existing ground line. The location and number of installations are subject to department approval.

APPENDIX IV

**Virginia Department of
Transportation**

Permits are initiated by the utility owner for work on VDOT right of way and shall be prepared in accordance with the procedures outlined in the VDOT Land Use Permit Regulations (24 VAC 30-151).

Permit applications for work on VDOT controlled access right of way will be submitted to the District Land Use section located in the District in which the work is to be performed.

8.3.1 POLICY FOR INSTALLATION OF UTILITIES WITHIN NON-CONTROLLED ACCESS RIGHT OF WAY

Utility relocations required to accommodate transportation project construction shall be designed and constructed to conform to the requirements of the Land Use Permit Regulations (24 VAC 30-151).

The minimum vertical clearance for overhead power and communication lines above the highway, and the lateral and vertical clearances from bridges shall also conform to the National Electric Safety Code of the U.S. Bureau of Standards.

The minimum bury depth for underground crossings must also be in compliance with the Federal, State and other applicable industrial codes governing the particular type product being transmitted.

8.3.2 POLICY FOR INSTALLATION OF UTILITIES WITHIN CONTROLLED, LIMITED ACCESS RIGHT OF WAY

VDOT's policy and procedure affecting the accommodation of utilities within Controlled Access right of way are included in the Land Use Permit Regulations (24 VAC 30-151).

The guidelines contained in this chapter are to provide a quick reference to the required clearances for aerial crossing, depths for underground crossings, and

the longitudinal use of VDOT's controlled access right of way. The guidelines for the accommodation of utilities within controlled access right of way included in this chapter are not all inclusive.

The occupancy within controlled access right of way with new utilities and relocation of existing utilities must be authorized by a permit or agreement and requires the approval of the Chief Engineer.

VDOT expects that the number of crossings of these types of facilities will be minimized, and that where approved, crossings will be located as nearly as perpendicular to the highway alignment as practicable.

The minimum vertical clearance for overhead power and communication lines above the highway, and the lateral and vertical clearances from bridges shall also conform to the National Electric Safety Code of the U.S. Bureau of Standards.

The minimum bury depth for underground crossings must also be in compliance with the Federal, State and other applicable industrial codes governing the particular type product being transmitted.

8.3.3 GENERAL GUIDELINES

- a. When encasement pipe for an underground utility crossing is used on a fully controlled access highway, the encasement pipe shall extend from controlled access line to controlled access line. Encasement pipe shall be required where it is necessary to avoid trenched construction, to protect carrier pipe from external loads or shock, or to convey leaking fluids or gases away from the areas directly beneath the traveled way.

Encasement pipe shall be required if a utility has less than minimal cover, is near footings of bridges, utilities or other highway structures, crosses unstable ground, or is near other locations where hazardous conditions may exist. (See VDOT Land Use Permit Regulations 24 VAC 30-151)

- b. The vertical clearance to overhead utility lines crossing controlled access highways shall be a minimum 21 feet. (See VDOT Land Use Permit Regulations 24 VAC 30-151)
- c. Poles should not be placed within the controlled access lines in crossing situations except where no other viable alternative is available and only with VDOT consent.
- d. All underground utility crossings shall be installed to a minimum depth of 36 inches or the minimum appropriate industrial code, whichever is greater. (See VDOT Land Use Permit Regulations 24 VAC 30-151)
- e. Manholes and other points of access to underground utilities will not be permitted within the right of way of a fully controlled access highway, except for unusual circumstances, and then only with the approval of the Chief Engineer. (See VDOT Land Use Permit Regulations 24 VAC 30-151)
- f. Manholes and other points of access to underground utilities may be permitted within the right of way of a partially controlled access highway, only when they are located beyond the ditch line and/or toe of slope as planned for future widening, if any. (See VDOT Land Use Permit Regulations 24 VAC 30-151)

g. New utilities will not be permitted to be installed longitudinally within the controlled access lines of any highway, except that in special cases such installations may be permitted under strictly controlled conditions and then only with the approval of the Chief Engineer. However, in each such case the utility owner must show the following:

- (1) That the accommodation will not adversely affect maintenance safety, design, construction, operation or stability of the highway.
- (2) That the accommodation will not interfere with or impair the present use or future expansion of the highway.
- (3) That any alternative would be contrary to the public interest.
- (4) In no case will parallel installations be permitted which involves tree removal or severe tree trimming.

8.4 MINIMUM REQUIREMENTS FOR RELOCATION PLAN & ESTIMATE

The utility owner is responsible for preparing relocation plans and estimates after the Utility Field Inspection issues have been resolved. The plan and estimate must have a minimum of detail and information to be accepted and approved by VDOT.

The plans and estimates will include as a minimum the information outlined below.

8.4.1 PLAN

When preparing its plan of relocation, the utility owner may use as its base plan the VDOT plans furnished at Utility Field Inspection, or VDOT electronic project files which can be furnished upon request. See section 8.2 of this chapter for requesting digital files.

As a minimum the plans must include the following components where appropriate:

- a. Project centerline or baseline from which the utility facilities will be referenced;
- b. Existing and proposed right of way lines;
- c. North Arrow;
- d. Major construction features of the proposed roadway that involve the existing or proposed utility facility (i.e. curb and gutter, edge of pavement);
- e. Profiles or cross sections are required for aerial and underground crossings of the proposed roadways and where utilities are proposed within transportation project construction limits. Profiles or cross sections are required where utilities are involved with other construction features of the project such as storm drainage, drainage ditches, entrances, sound walls, retaining walls, temporary detours, etc;
- f. Existing and proposed utility facilities. Necessary detail showing size of major appurtenances such as poles, wires, conductors, cables, pedestals, hand holes, manholes, for both the existing and proposed facility must be shown on the plan;
- g. Length of facilities must be shown from which quantities are computed; and,
- h. Legend to delineate the existing and proposed facilities.

- i. Plans, cross section and or profiles are to be submitted on 23"x35" sheet or other standard sizes as approved by the Regional Utilities Manager or designee.
- j. Pole sizes, attachment heights, sag (worst case) and cable size are to be shown on the profiles or cross section.
- k. Pedestals, hand holes, manholes, cables and conduits sizes and depths are to be shown on the profiles or cross sections.

8.4.2 ESTIMATE

When preparing an estimate, the utility owner must use an appropriate estimate format to provide a detailed and specific estimate of cost. The estimate must be broken down into various categories and must include a list of individual line items that are eligible for reimbursement.

Estimate Format, Form UT-11 is found in Appendix 15 of this Manual.

Utility owners that have adopted their own estimate format and had it approved by VDOT, may use their own forms instead of Form UT-11.

The estimate must include the following components and attachments where appropriate:

- a. Detailed Estimate on Form UT-11 or similar format. Line item costs to be provided if appropriate are:
 - (1) Engineering;
 - (2) Right of Way Acquisition;

APPENDIX V

**Texas Department of
Transportation**

TITLE 43: TRANSPORTATION
PART 1: TEXAS DEPARTMENT OF TRANSPORTATION
CHAPTER 21: RIGHT OF WAY
SUBCHAPTER C: UTILITY ACCOMMODATION

§21.31 Definitions

The following words and terms, when used in this subchapter, shall have the following meanings, unless the context clearly indicates otherwise.

- (1) Active project - A highway project for which any phase of development has been programmed or an investigation and planning expense (IPE) authorization issued. A project is considered active until construction is completed and the project is placed under maintenance.
- (2) American Association of State Highway and Transportation Officials (AASHTO) - An association of state highway and transportation officials.
- (3) Clear roadside policy - A policy to increase safety, improve traffic operation, and enhance the appearance of highways by designing, constructing, and maintaining highway roadsides as wide, flat, and rounded as practical and as free as practical from physical obstructions above the ground and travelway such as trees, drainage structures, massive sign supports, utility poles, and other ground-mounted obstructions.
- (4) Common carrier - A person who owns, operates, or manages a pipeline or any part of a pipeline in the State of Texas for the transportation of crude petroleum to or from the public for hire, or engages in the business of transporting crude petroleum by pipeline. A common carrier may transport oil, oil products, gas, salt brine, fuller's earth, sand, clay, liquefied minerals or other mineral solutions.
- (5) Controlled access roadway - A highway on which owners or occupants of abutting lands and other persons are denied access to or from the highway except as authorized by the department.
- (6) Department - The Texas Department of Transportation.
- (7) Design vehicle load (HS-20) - A design load designation used for bridge design analysis representing a three-axle truck loaded with four tons on the front axle and 16 tons on each of the other two axles. The HS-20 designation is one of many established by AASHTO for use in the structural design and analysis of bridges.
- (8) District engineer - The chief administrative officer in charge of one of the 25 districts of the department.
- (9) Executive director - The executive director of the Texas Department of Transportation.
- (10) Frontage roads - A street or road auxiliary to, and located on the side of, an expressway or freeway that segregates local traffic from high-speed through traffic and provides service to abutting property and control of access.
- (11) High and low pressure gas lines - High pressure gas lines are pipelines that carry a gaseous substance and that are operated or may reasonably be expected in the future to operate at a pressure of over 60 pounds per square inch. Conversely, low pressure gas lines are those with an operating pressure not expected to exceed 60 pounds per square inch.

(12) Low volume highways and low volume farm-to-market roads - Any roadways other than controlled access highways which carry a traffic volume of 750 vehicles per day or less and upon which projected traffic volume at the design year is not anticipated to exceed 1,500 vehicles per day.

(13) Noncontrolled access roadway - A highway on which owners or occupants of abutting lands or other persons have access to or from the highway.

(14) Outer separation - The area between the traveled way of a roadway for through traffic and a frontage road or street.

(15) Pavement structure - The combination of the surface, base course, subbase, and a minimum eight inches of stabilized subgrade material which supports the traffic load and distributes it to the roadbed. A minimum of eight inches of subgrade stabilization is to be considered a part of the pavement structure.

(16) TMUTCD - The most recent edition of Texas Manual on Uniform Traffic Control Devices for Streets and Highways.

(17) Utilities - All lines and/or their accessories within the highway rights of way except those for highway-oriented needs. Such utilities may involve underground, surface, or overhead facilities either singularly or in combination. Accessories are any attachments, appurtenances, or integral parts of the utility (i.e., fire hydrants, valves, gas regulators, etc.). The placing of accessories within the highway right of way will be determined by such factors as type, size, safety, availability of space, etc.

Source Note: The provisions of this §21.31 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366; amended to be effective March 15, 2001, 26 TexReg 2055

§21.32 Purpose

These sections prescribe the minimums relative to the accommodation, method, and location for the installation, adjustment, and maintenance of utility facilities, including privately owned, within the rights-of-way of highways on the state highway system. These sections are developed in the interests of safety and protection, utilization, and future development of highways with due consideration given to public service afforded by adequate and economical utility installations.

Source Note: The provisions of this §21.32 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366.

§21.33 Application

(a) For highways under the jurisdiction of the department, the provisions of this undesignated head concerning utility accommodation shall apply to:

- (1) new utility installations;
- (2) additions to existing utility installations;
- (3) adjustments or relocations of utilities incident to highway construction; and
- (4) existing utility installations retained within the right-of-way.

(b) The provisions of this undesignated head, concerning utility accommodation will not be applied to

utility facilities presently located within the rights-of-way of completed highways for which agreements with the department were entered into prior to December 31, 1988.

(c) Various types of utility lines not specifically covered herein shall be considered within the provisions of this undesignated head concerning utility accommodation in accordance with the nature of the line. It shall be a general practice to consider all lines carrying caustic, flammable, or explosive materials under the provisions for high pressure gas and liquid fuel lines.

Source Note: The provisions of this §21.33 adopted to be effective May 29, 1989, 14 TexReg 2370; amended to be effective July 13, 1990, 15 TexReg 3751.

§21.34 Scope

These sections govern on matters concerning accommodation, location and methods for the installation, adjustment, relocation, and maintenance of utilities on highway rights-of-way, but do not alter current authority for their installation nor determination of financial responsibilities for placement or adjustment thereof. Where industry or governmental codes, orders, or laws require utilities to provide a higher degree of protection than provided herein, the higher degree of protection shall prevail.

Source Note: The provisions of this §21.34 adopted to be effective January 1, 1976.

§21.35 Exceptions

(a) Except as provided in §21.48 (relating to Traffic Structures), for a utility facility occupying the right of way under a use and occupancy agreement form as described in §21.53 of this title (relating to Use and Occupancy Agreement Forms), exceptions to any design, location, or methods of installation provisions contained in these sections relating to utility accommodation shall be recommended for approval by the District Engineer or designee and authorized by the Right of Way Division Director using the form entitled "Certification for Utility Accommodation".

(b) Except as provided in §21.48 of this title (relating to Traffic Structures), for a proposed utility installation on an existing highway placed by a notice of proposed installation form as described in §21.54 of this title (relating to Notice Forms), or by any instrument other than a use and occupancy agreement form, exceptions to any design, location, or methods of installation provisions contained in these sections shall be recommended for approval by the District Engineer or designee and authorized by the Maintenance Division Director.

(c) Requests for exceptions will be considered only where it is shown that extreme hardship and/or unusual conditions provide justification and where alternate measures can be prescribed in keeping with the intent of these sections. All requests for such exceptions shall be fully documented with design data, cost comparisons, and other information that may be pertinent.

Source Note: The provisions of this §21.35 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366; amended to be effective April 21, 1997, 22 TexReg 3443; amended to be effective February 21, 1999, 24 TexReg 1220

§21.36 Authority of Utilities

(a) Under existing state laws, various utility firms and agencies have a right to install their lines along

and/or across highway right-of-way. This includes those firms which are authorized by the laws of this state to transport and/or distribute natural gas, water, electric power, telephone (including cable television), and salt water and those which are authorized to construct and operate common carrier petroleum and petroleum product lines.

(b) Private lines should normally be allowed to cross, but should not be permitted longitudinally on highway right-of-way. This includes but is not limited to privately-owned lines from gas or oil wells, lines owned by oil companies within refinery and oil storage complexes, by firms which are engaged in businesses other than those described in subsection (a) of this section, and domestic lines owned by individuals.

Source Note: The provisions of this §21.36 adopted to be effective January 1, 1976.

§21.37 Location

(a) Utility lines shall be located to avoid or minimize the need for adjustment for future highway improvements and to permit access to the utility lines for their maintenance with minimum interference to highway traffic.

(b) On controlled access highways, the location shall permit maintenance of the utility by access from frontage roads where provided, nearby or adjacent roads and streets or trails along or near the highway right-of-way line, to the extent practicable, without access from the through traffic roadways or ramps.

(c) New utilities will not be permitted to be installed longitudinally within control of access lines of any freeway, except that in special cases such installations may be permitted under strictly controlled conditions. However, in each such case the utility owner must show that:

(1) the accommodation will not adversely affect the safety, design, construction, operation, maintenance, or stability of the freeway;

(2) the accommodation will not be constructed and/or serviced by direct access from the through traffic roadways or connecting ramps;

(3) the accommodation will not interfere with or impair the present use or future expansion of the freeway; and

(4) any alternative location would be contrary to the public interest. (This determination would include an evaluation of the direct and indirect environmental and economic effects that would result from the disapproval of the use of such right-of-way for the accommodation of such utility.)

(d) Where a utility already exists within the proposed right-of way of a freeway and it can be serviced, maintained, and operated without access from the through traffic roadways or ramps, it may remain as long as it does not adversely affect the safety, design, construction, operation, maintenance, or stability of the freeway; otherwise, it must be relocated.

(e) The longitudinal installation of a utility between the right-of-way line and the frontage road will not violate control of access in those control areas near ramp terminals.

(f) When longitudinal installations are proposed within existing access control lines as special cases and meet the conditions under subsection (c) of this section, a utility strip shall be established by locating a utility access control line between the proposed utility facility and the through roadway and ramps. Existing fences should be retained and, except along sections of freeways having frontage roads,

planned fences should be located at the freeway right-of-way line. Denial of access regarding property adjoining the right-of-way line will not be altered.

(g) Longitudinal installations shall be located on uniform alignment as near as practicable to the right-of-way line to provide space for future highway construction and for possible future utility installations.

(h) On highways with frontage roads, longitudinal utility installations will be located between the frontage roads and the right-of-way line. Utility lines shall not be placed or remain in the center median, or beneath through traffic roadways, ramps, or connecting roadways (including shoulders).

(i) Utility lines crossing the highway should be located at approximate right angles to the highway to the extent feasible and practicable. Reasonable latitude may be exercised as regards the crossing angle of existing lines which are otherwise qualified to remain in place.

(j) The horizontal and vertical location of utility lines should conform with the clear roadside practices of the department, consistent with the clearances applicable to all roadside obstacles.

(k) In utility installations, consideration shall be given to state and local requirements. It shall be the utility company's responsibility to determine if other utility lines exist or are planned at the proposed installation area. The utility company should insure that the proposed installation is compatible with existing or proposed utilities.

Source Note: The provisions of this §21.37 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366.

§21.38 Design

(a) The design of any utility installation will be the responsibility of the utility company. An installation within the highway right-of-way must be reviewed and approved by the department with regard to the location and the manner of adjustment. This includes the measures to be taken to preserve the safety and free flow of traffic, structural integrity of the roadway or highway structure, ease of highway maintenance, appearance of the highway, and the integrity of the utility facility. Utility installations on, over, or under the right-of-way of the state highway system shall conform with requirements contained herein and/or, as a minimum, the appropriate requirements outlined in the following, whichever is greater.

(1) Safety rules for the installation and maintenance of electric supply and communication lines - National Electric Safety Code.

(2) Title 49, Code of Federal Regulations, Part 192, Transportation of Natural and Other Gas by Pipeline: minimum federal safety standards and amendments.

(3) Title 49, Code of Federal Regulations, Part 195, Transportation of Liquids by Pipelines and amendments.

(4) Latest American Society for Testing and Materials (ASTM) specifications.

(5) Most recent edition of the Texas Manual on Uniform Traffic Control Devices.

(6) Latest edition of the Rules and Regulations for Public Water Systems, published by the Texas Department of Health, Water Hygiene Division.

(7) Most recent edition of the AASHTO policy entitled "A Policy on the Accommodations of Utilities Within Freeway Right of Way."

(b) All utility installations will be of durable materials designed for long life expectancy and relatively free from routine servicing or maintenance. In addition to the requirements herein, any existing utility lines to remain in place must be of satisfactory design and condition in the opinion of the district engineer.

(c) Special precautions should be taken during utility installations to avoid disturbing existing drainage courses. In addition, soil erosion should be held to a minimum and sediment from the construction site should be kept away from the roadway and drain inlets.

(d) Underground utility installations should be backfilled with pervious material and outlets provided for entrapped water. Underdrains shall be provided where necessary. No jetting or puddling beneath the roadway will be permitted.

(e) Clearances between underground utilities and storm sewers shall be a minimum of 12 inches if the installation can take place without disturbing the storm sewer installation. Otherwise, the minimum clearance will be 24 inches.

(f) On new installations or adjustment of existing utility lines provision for known or planned expansion of the utility facilities may be made, all at the sole expense of the utility firm. Any such expansion should be planned so as to minimize hazards and interference with highway traffic at a future date.

(g) Manholes shall be limited to those necessary for installation and maintenance of underground lines. In no case shall they be placed or permitted to remain in the pavement or shoulders of high volume roadways except at those locations on noncontrolled access highways in urban areas where necessary for existing lines which may be permitted to remain in place under existing or proposed roadways. Manholes may remain in place or be installed under traffic lanes of low volume roadways in municipalities, provided measures are taken to minimize such installations and to avoid their locations at intersections insofar as possible. Manholes vary as to size and shape depending on the type of utility they serve. To conserve space their dimensions should be the minimum acceptable by good engineering and safety standards. In general, the only equipment to be installed in manholes located on highway right-of-way is that which is essential to the normal flow of the utility, such as circuit reclosers, cable splices, relays, valves, and regulators. Other equipment such as substation equipment, large transformers, pumps, etc., should be located outside the limits of the highway right-of-way. Straight line manholes are the only type normally permitted within the right-of-way. The width dimensions should be no larger than is necessary to hold equipment involved and for safety standards to be assured for maintenance personnel. Outside width should not exceed seven feet, with the length to be held to a reasonable minimum. The outside diameter of the manhole chimney at the ground level should not exceed 36 inches. Where proven necessary the outside diameter of the chimney may be up to 50 inches. The top of the roof of the manhole should be five feet below ground level. Where such depth factor is impracticable sufficient data should be submitted to the department for handling as an exception. For width and depth requirements concerning sanitary sewer manholes refer to §21.46 of this title (relating to Sanitary Sewer Lines). All manhole covers shall be installed flush with the ground and/or pavement surface, whichever is applicable. In order to minimize vandalism, manhole covers placed anywhere within state right-of-way must weigh at least 175 pounds. All underground utilities within the highway right-of-way, including manhole rings and covers, must be designed for HS-20 loading.

Source Note: The provisions of this §21.38 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366.

§21.39 Aesthetics

a) To preserve and protect trees, shrubbery, and other aesthetic features on the highway right-of-way the department may specify the extent and methods of tree removal, tree trimming, or their replacement, and replacement of other aesthetic features, including installation methods of the underground or overhead utility. The district engineer shall use due consideration in establishing the value of trees and other aesthetic features in the proximity of a proposed utility line and any special district requirements justified by the value of the trees and other aesthetic features.

(b) The department shall specify prompt replacement of sod, removal of debris, and any other restoration necessary to place the highway in condition equal to that prior to the utility installation.

Source Note: The provisions of this §21.39 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366.

§21.40 Safety

(a) Appropriate measures shall be required in the interests of safety, traffic convenience, and access to adjacent property. Appropriate signs, markings, and barricades shall be placed by the utility prior to the beginning of construction and shall be maintained to properly warn motorists. All traffic control devices shall conform to the TMUTCD. No traffic shall be blocked or stopped at any time without the presence of a vested flagperson to warn and control traffic.

(b) Where the cost of installation is the responsibility of the utility firm, the department shall require reimbursement for its cost of measures that the department may take in the interests of traffic safety, or restoration and repairs to the highway, which are made necessary by the utility installation.

(c) It is the responsibility of the district engineer to provide inspection as needed to insure that installations are accomplished in a safe manner as approved by the department.

Source Note: The provisions of this §21.40 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366.

§21.41 Site Clean-up

Roadways adjacent to utility construction sites shall be kept free from debris, roadway construction material, and mud. At the end of every construction day, construction equipment and materials shall be removed as far from the roadway edges as feasible. When utility installation is complete, the right-of-way shall be reshaped to its original condition or better and the area reseeded or resodded to reduce erosion. Should settlement or erosion occur within six months after utility installation, the utility shall reshape, reseed, or resod the area.

Source Note: The provisions of this §21.41 adopted to be effective May 29, 1989, 14 TexReg 2370.

§21.42 Pipelines—General

(a) Method of protection.

(1) Encasement. In general, underground utility line crossings shall be encased in the interest of safety, protection of the utility, protection of the highway, and for access to the utility. Encasement shall be as specified for each type of line discussed herein. Casing shall consist of a pipe or other separate structure around and outside the carrier line and shall be designed to support the load of the highway and superimposed loads thereon, including that of construction machinery. The strength of the casing shall equal or exceed structural requirements for drainage culverts and it shall be composed of materials of satisfactory durability under conditions to which it may be subjected.

(2) Optional for gas or liquid petroleum pipelines. Welded steel pipeline crossings may be installed without encasement provided such pipelines conform with 49 Code of Federal Regulations, Part 192, Transportation of Natural and Other Gas By Pipeline or Part 195, Transportation of Liquids By Pipeline as applicable. In accordance thereof such pipelines shall provide:

(A) increased wall thickness and/or higher strength steel;

(B) greater depth of cover; and

(C) adequate markings as specified for each type of line discussed herein. Such pipelines shall also be designed to withstand internal design pressures and the superimposed loads of the roadway and traffic, including that of construction machinery.

(b) Manholes. Manholes serving this type of utility should be straight on line installations with a minimum overall width necessary to operate and maintain the enclosed equipment.

(c) Depth of underground lines. The depth of underground lines shall be as specified herein for each type of utility. Where placements at such depths are impractical or where unusual conditions exist, the department shall specify other protection as may be appropriate in lieu of the depth of bury required for the particular utility line.

(d) Methods of installation.

(1) Lines placed under any existing roadway shall be installed by boring or tunneling in accordance with appropriate specifications. Jacking may be used only when approved by the district engineer. When installed by jacking or boring, encasement of the line may be required.

(2) For rural (uncurbed) highway cross sections, all borings shall extend beneath all travel lanes plus:

(A) 30 feet from all freeway main lanes and other high-speed (exceeding 40 mph) highways except as indicated in subparagraph (B) of this paragraph;

(B) 16 feet for high-speed highways with current average daily traffic volumes of 750 vehicles per day or less;

(C) 16 feet for ramps; and

(D) 10 feet for low-speed (40 mph or less) highways.

(3) For urban (curbed) highway cross sections, all borings shall extend beneath travel and parking lanes and extend beyond the back of curb plus:

(A) 30 feet from high-speed (greater than 40 mph) facilities; and

(B) three feet from low-speed (40 mph or less) facilities, plus any additional width to clear an existing

sidewalk.

(4) All traffic control devices (signs, markings, barricades, etc.) used to warn motorists of the construction activity must conform to the TMUTCD.

(5) Where circumstances necessitate the excavation of a bore pit closer to the edge of pavement than set forth in paragraph (1) of this subsection, a guard fence or other approved protective devices will be installed for protection of the traveling public in accordance with current departmental standards. Bore pits shall be located and constructed in such a manner as not to interfere with highway structural footings, safe roadside clearance, or traffic operations. If necessary, shoring shall be utilized.

(6) The use of explosives for any excavations on the right-of-way incident to utility line installation shall be permitted only when the department has adequate assurance that no damage or hazard will be caused thereby. Such assurance should normally include detailed plans and procedures approved by a person who is qualified and experienced in the use of demolitions.

(7) Where longitudinal trenching on the right-of-way is permitted, backfill shall be compacted to densities equal to that of the surrounding soil. Trenching across jointed concrete pavement should not be permitted, and in no instance shall trenching across continuously reinforced concrete pavement be permitted. Exceptions may be made to permit trenching across low volume roadways or urban noncontrolled access roadways where conditions justify. Where trenching across other type pavements is justified, the department shall specify detailed methods for removal and replacement of embankment, base, and surfacing.

(e) Unsuitable conditions. Conditions which are generally unsuitable or undesirable for pipeline crossings should be avoided. These include locations such as deep cuts; near footings or bridges and retaining walls; across intersections at-grade or ramp terminals; at cross-drains where flow of water, drift, or stream bedload may be obstructed; within basins or an underpass drained by a pump if pipeline carries a liquid or liquefied gas; and in wet or rocky terrain where minimum depth of cover would be difficult to attain.

(f) Clearances. Vertical and horizontal clearances between a pipeline and a structure or other highway or utility facilities should be sufficient to permit maintenance of the pipeline and the other facilities.

(g) Drainage easements. Where it is necessary for pipelines to cross drainage easements, outside of the right-of-way, the same minimum depth of cover shall be maintained as required for crossing ditches inside of the right-of-way. In cases where soil conditions are such that erosion might occur or where it is not feasible to obtain specified depth, it shall be the responsibility of the utility owner to install retards, encasement, concrete slabs over the pipe, or take such other measures as needed for safety and to protect the highway and the pipeline. Where grades on the pipelines must be maintained, such as gravity flow sewer lines, each case will be worked on an individual basis, keeping in mind that the main purpose of the channel is to carry drainage water and that this flow must not be obstructed.

Source Note: The provisions of this §21.42 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366.

§21.43 High Pressure Gas and Liquid Petroleum Lines

(a) Depth of cover.

(1) For encased high pressure gas or liquid petroleum lines, the minimum total clear depth of cover for

casing pipe shall be 30 inches. For that portion of the carrier line outside of the casing pipe, including longitudinal portions, the minimum depth of cover within the highway right of way shall be 36 inches. Exceptions may be authorized to permit existing lines to remain in place with a reduction of six inches in the above specified depths of cover. All lines normally shall be a minimum of 18 inches or one-half the diameter of the pipe, whichever is greater, beneath the bottom of the pavement structure. Where materials and other conditions justify, such as on existing lines with encasement that are to remain in place, a minimum depth under the pavement structure of 12 inches or one-half the diameter of the pipe, whichever is greater, may be permitted.

(2) For unencased high pressure gas or liquid petroleum lines, the minimum depth of cover shall be 60 inches under the pavement surface or 18 inches under the pavement structure, whichever is greater. Under ditches, the minimum depth of cover shall be 48 inches. Exceptions may be authorized to permit a reduction in the specified depths of cover where the pipeline is protected by a reinforced concrete slab. As used herein, depth of lines is the depth to top of carrier (if unencased) or casing (if required).

(b) Crossings.

(1) Pipeline installations across highways may be encased or unencased. Where encasement is to be employed, the encasement shall be provided under center medians and from top of backslope to top of backslope for cut sections (or five feet beyond the toe of slope for fill sections, or face of curb) of all roadways including side streets, and five feet beyond any overpass or other structure where the line passes under it. Encasement may be omitted under center medians where their width is appreciably greater than normal rural standards.

(2) Where encasement is not employed the welded steel carrier pipe shall provide sufficient strength to withstand the internal design pressure and the dead and live loads of the pavement structure and traffic. Additional protective measures should include:

(A) heavier wall thickness and/or higher factor of safety in design;

(B) adequate coating and wrapping;

(C) cathodic protection; and

(D) other measures as required by Title 49, Code of Federal Regulations, Part 192 or Part 195.

(3) The minimum length of the additional protection as set forth in paragraph (2) of this subsection shall be the same as that required by encasement.

(4) Existing lines under low volume farm-to-market roads and low volume highways may be permitted to remain in place without encasement or extension of encasement if they are protected by a reinforced concrete slab or equivalent protection or if they are located at a depth of five feet under the pavement surface and not less than four feet under the roadway ditch. If a reinforced concrete slab is to be used, it should meet the following standards:

(A) width - three times the diameter of the pipe or five foot minimum, whichever is greater;

(B) thickness - six inch minimum;

(C) reinforcement - #4 bars at 12 inch centers each way or equivalent wire mesh;

(D) cover - the cushion between the bottom of slab and top of pipe shall be not less than six inches.

(c) Vents. One or more vents shall be provided for each casing or series of casings. For casings longer than 150 feet, vents should be provided at both ends. On shorter casings a vent should be located at the high end with a marker placed at the low end. Vents shall be placed at the right of way line immediately above the pipeline, situated so as not to interfere with highway maintenance or concealed by vegetation. Ownership of the lines shall be shown on the vents.

(d) Markers. The utility company shall place a readily identifiable and suitable marker at each right of way line where it is crossed by any high pressure gas or liquid petroleum line except where marked by a vent. Readily identifiable and suitable markers in sufficient number as determined by the district engineer shall be placed at the right of way line for lines installed longitudinally within the right of way.

(e) Above-ground appurtenances. Above-ground appurtenances, except vents, for gas lines shall not be permitted within the highway right of way.

(f) Exceptions to location requirements. In urban areas, existing longitudinal lines that are not under the pavement or shoulder of any roadway or in the center median of a controlled access highway may be permitted to remain in place provided all other requirements are met.

Source Note: The provisions of this §21.43 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366; amended to be effective March 15, 2001, 26 TexReg 2055

§21.44 Low Pressure Gas Lines

(a) Depth of cover. For low pressure gas lines the minimum depth of cover within the right of way and under highway ditches, but outside the pavement structure, including longitudinal portions, shall be 24 inches for either encased or unencased installations. Exceptions may be authorized to permit existing lines to remain in place with a reduction of six inches in the above specified depth. Low pressure gas lines shall be a minimum of 18 inches or one-half the diameter of the pipe, whichever is greater, beneath the bottom of the pavement structure. Where materials and other conditions justify, such as on existing lines to remain in place, a minimum depth under the pavement structure of 12 inches or one-half the diameter of the pipe, whichever is greater, may be permitted. As used herein, depth of lines is the depth to the top of carrier pipe or casing as applicable.

(b) Encasement. Low pressure gas lines shall be encased as required for high pressure gas and liquid petroleum lines or they may be placed without encasement if they are of welded steel construction and are protected from corrosion by adequate and approved cathodic protective measures, with specific agreement that the pavement will not be cut for repairs to the pipeline at any time in the future.

(c) Vents. Reference should be made to §21.43 of this subchapter.

(d) Markers. The utility company shall place a readily identifiable and suitable marker at each right of way line where it is crossed by a low pressure gas line except where marked by a vent. Readily identifiable and suitable markers in sufficient number as determined by the district engineer shall also be placed at the right of way line for lines installed longitudinally within the right of way.

(e) Plastic lines. Plastic lines may be used provided the internal pressure will not exceed 60 pounds per square inch, they are encased right of way line to right of way line on crossings, and have at least 30 inches of cover. The maximum size of plastic lines for crossings shall not exceed 24 inches. The maximum size of plastic lines placed longitudinally shall not exceed six inches. Where plastic pipe is installed longitudinally a durable metal wire shall be concurrently installed or other means shall be

provided for detection purposes.

(f) Above-ground appurtenances. Above ground appurtenances, except vents, for gas lines shall not be permitted within the highway right of way.

(g) Exception to location requirements. In urban areas, existing longitudinal lines which can be maintained without violating access control and that are not under the pavement or shoulder of any proposed roadway or existing roadway that is scheduled for a major improvement may remain in place provided all other requirements are met and provided further that measures are taken to minimize any future need for cutting pavement to make service connections on any high traffic roadway.

Source Note: The provisions of this §21.44 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366; amended to be effective March 15, 2001, 26 TexReg 2055

§21.45 Water Lines

(a) Depth of cover. The depth of cover for water lines shall be the same as stipulated for low pressure gas lines in §21.44 of this title (relating to Low Pressure Gas Lines).

(b) Encasement. Encasement shall be provided under normal width center medians and from center of ditch to center of ditch for cut sections (or five feet behind toe of slope for fill sections or face of curb) of all roadways. Encasement may be omitted under center medians where their width is appreciably greater than normal rural standards (76 feet). Encasement under side road entrances may be omitted in consideration of traffic volume, condition of roadway, maintenance responsibility, and local practice. Encasement under low traffic roadways may be omitted on existing water lines having an inside diameter of 24 inches or more and on new lines having an inside diameter of 30 inches or more, provided all other requirements are met.

(c) Plastic lines. Plastic lines may be used provided they have at least 30 inches of cover for both crossing and longitudinal segments. Crossings shall be encased in accordance with §21.42 of this title (relating to Pipelines - General) and §21.43 of this title (relating to High Pressure Gas and Liquid Petroleum Lines).

(d) Nonmetallic pipe detection. Where nonmetallic pipe is installed longitudinally a durable metal wire shall be concurrently installed or other means shall be provided for detection purposes.

(e) Exceptions to location requirements. Same as stipulated for low pressure gas lines in §21.44 of this title (relating to Low Pressure Gas Lines).

(f) Manholes. The outside diameter of the manhole chimney at the ground level shall not exceed 36 inches.

(g) Markers. The utility company shall place a readily identifiable and suitable marker at each right-of-way line where it is crossed by a water line.

(h) Irrigation and drainage facilities. Irrigation and drainage facilities installed across any highway right-of-way shall be designed and constructed in accordance with departmental standards for highway culverts or bridges.

(i) Ditches and canals. Longitudinal ditches and canals which would closely parallel the highway shall not be permitted nor will any appurtenances be permitted within the clear roadside area which would

constitute a hazard to traffic.

(j) Location of road. Extreme care shall be exercised in the location of levee roads or ditch rider roads where they intersect the highway so as to avoid establishing any hazards at points of critical sight distance.

Source Note: The provisions of this §21.45 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366.

§21.46 Sanitary Sewer Lines

(a) Depth of cover. The depth of cover for sanitary sewer lines shall be the same as stipulated for low pressure gas lines in §21.44 of this title (relating to Low Pressure Gas Lines).

(b) Encasement. Lines to be operated under pressure and those composed of materials not conforming to material or depth of cover requirements herein shall be encased as prescribed for water lines in §21.45 of this title (relating to Water Lines).

(c) Materials. New and relocated sewer lines crossing through traffic roadways, ramps, and connecting roadways, ramps and connecting roadways of controlled access highways, and any other high-traffic roadways shall be ductile iron, with satisfactory joints, or materials and designs which will provide equal or better protection of the integrity of the highway system and resistance to damage from sulfide gases and other corrosive elements to which they may be exposed. New and relocated longitudinal lines and those crossing low-traffic roadways may be of any material which has been proven to be of satisfactory strength and durability in local use, provided all other requirements are met.

(d) Nonmetallic pipe. Where nonmetallic pipe is installed longitudinally a durable metal wire shall be concurrently installed or other means shall be provided for detection purposes.

(e) Manholes. Manholes serving sewer lines up to 12 inches shall have a maximum ID of four feet. For any increase in line size greater than 12 inches the manhole ID may be increased a like amount. Manholes for large interceptor sewers should be specially designed, keeping the overall dimensions to a minimum. The outside diameter of the manhole chimney at the ground level shall not exceed three feet. For additional requirements refer to §21.38 of this title (relating to Design).

(f) Exception for existing lines in urban areas. Except where relocation is necessary to clear existing sewer lines from structures or other highway appurtenances or for other specific reasons, the department may permit existing lines in urban areas to remain in place at any location (except longitudinally under the center median, through traffic lanes or ramps of controlled access highways) provided the line is of satisfactory quality and depth, manholes are adjusted in conformance with general requirements herein, and provisions are made to assure that future service lines requiring violation of access control or disturbing any roadway will be avoided.

Source Note: The provisions of this §21.46 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366.

§21.47 Utility Structures

(a) Interstate highways. Where it would be more economical to carry one or several utility lines across a freeway in a tunnel or on a bridge rather than in separately trenched and encased crossings,

consideration should be given to providing a separate structure, specifically for the utility crossing. Such a structure may serve a joint purpose as a utility and pedestrian facility and/or sign support structure. In providing a utility tunnel or bridge, the following should be met.

- (1) Mutually hazardous transmittants, such as fuels and electric energy, shall be isolated by compartmentalizing or by auxiliary encasement of incompatible carriers.
 - (2) The utility tunnel or utility bridge structure shall conform in design, appearance, location, bury, earthwork, and markings to the culvert and bridge practices of the department.
 - (3) Where a pipeline on or in a utility structure is encased, the casing shall be effectively opened or vented at each end to prevent possible build up of pressure and to detect leakage of gases or fluids.
 - (4) Where a casing is not provided for a pipeline on or in a utility structure, additional protective measure shall be taken, such as employing a higher factor of safety in the design, construction, and testing of the pipeline than would normally be required for cased construction.
 - (5) Communication and electric power lines shall be suitably insulated, grounded and preferably carried in protective conduit or pipe from the point of exit from the ground to reentry. The cable should preferably be carried to a manhole located beyond the backwall of the structure. Carrier and casing pipe should be suitably insulated from electric power line attachments.
 - (6) Shut-off valves, preferably automatic, shall be installed in lines at or near ends of utility structures unless segments of the lines can be isolated by other sectionalizing devices within a reasonable distance.
 - (7) It is agreed by the utility companies that any maintenance, servicing or repair of the utility lines will be their responsibility.
- (b) Noninterstate highways. If a utility line (or lines) is on its own easement and it would be more economical to the department to adjust the line (or lines) across a highway by use of a utility tunnel or bridge rather than to provide separately trenched and cased crossing, consideration should be given to provision of such a structure. Where the utility line (or lines) is on a public right-of-way by sufferance and the adjustment of the utility is the sole responsibility of the private or public utility company, the department may permit the provision of a utility structure without cost to the department provided the conditions outlined in subsection (a) of this section and all other pertinent requirements are met. If a structure is to serve as a joint utility-pedestrian crossing or a joint utility-sign support structure, the department will participate in the same to the extent necessary for accommodation of pedestrians and/or highway signs only.

Source Note: The provisions of this §21.47 adopted to be effective January 1, 1976.

§21.48 Traffic Structures

- (a) The attachment of utility lines to bridges and separation structures is discouraged, since the proliferation of such lines and their maintenance constitute a hazard to traffic as well as complicating the widening or repair of such structures. Attaching utility lines to a highway structure can materially affect the structure, the safe operation of traffic, the efficiency of maintenance, and the overall appearance. Therefore, when it is feasible and reasonable to locate utility lines elsewhere, attachment to bridge structures will not be allowed.
- (b) Where other arrangements for a utility line to span an obstruction are not feasible, the department

may consider the attachment of such line to a bridge structure. Any exceptions which are permitted shall be handled in accordance with the conditions set forth in §21.47 of this subchapter and other pertinent requirements contained herein. Each such attachment will be considered on an individual basis, and permission to attach will not be considered as establishing a precedent for granting of subsequent requests for attachment. The following guides are established for attachment of utilities to bridges.

(1) When it is impractical to carry a self-supporting communication line across a stream or other obstruction, department policy is to permit the attachment of the line to its bridges. On existing bridges the state generally requires that the line be enclosed in conduits and so located on structures as not to interfere with stream flow, traffic, or routine maintenance operations. When a request is made prior to construction of a bridge, suitable conduits will be provided in the structure if the utility company bears the cost of all additional work and materials involved.

(A) When a line is attached to a bridge, the state will enter into a special agreement or contract with the utility company.

(B) In urban areas where it is the state's responsibility to provide for the adjustment of telephone lines or telephone conduits to accommodate the construction of a highway, and the adjustment provides for the placement of telephone conduits in a highway grade separation structure, the department will allow a reasonable number of spare telephone conduits in the structure provided the spares are placed at the time of construction and the telephone company bears the cost of these spare conduits.

(C) Where the construction of a highway makes it necessary to relocate telephone conduits and the proper adjustment, in the opinion of the department, provides for the placement of telephone conduits in the highway grade separation structure, the department will permit the telephone company to install replacement telephone conduits and a reasonable number of spares in the structure provided such conduits are placed at the time of construction and provided the company bears any extra structure cost occasioned by the presence of the telephone conduits.

(2) No gas or liquid fuel lines shall be attached to a bridge or grade separation structure without the specific approval of the executive director.

(3) Power lines are not permitted on bridges under any condition with the exception of low-voltage distribution lines where the cost of independent facilities to carry these lines would be prohibitive.

(4) When a municipality or utility company requests permission to attach a pipeline to a proposed bridge prior to construction, and the added load is sufficient to require an increase in the strength of the structure, or use of more costly materials or type of construction, the utility owner is required to pay for the increase in cost.

(5) When a utility company requests permission to attach a pipeline to an existing bridge, sufficient information should be furnished to allow a stress analysis to determine the effect of the added load on the structure. Other details of the proposed attachment as they effect safety and maintenance should also be presented. If the bridge structure is not of adequate strength to carry the increased weight or forces with safety, permission will not be granted.

(6) All requests for attachments to bridges or structures should originate with the utility company by its making application to the appropriate district engineer.

(A) For attachments to structures within active projects, requests for attachment along with the district engineer's recommendation should be forwarded to the director of the Bridge Division for review and concurrence. Adequate justification, including details and an estimate for an independent utility

crossing, should accompany the submission. If the attachment is allowed, the director of the Bridge Division will prepare a suitable agreement and forward it to the district for handling with the utility company for execution. Modification of the structural details to accommodate the utility and the responsibility of cost thereof will be developed by the director of the Bridge Division. Where applicable, the director of the Bridge Division will coordinate the submission with the director of the Right of Way Division. In addition, use and occupancy agreement forms shall be required as cited in §21.52 and §21.53 of this subchapter.

(B) For attachments to structures not within active projects, requests for attachment along with the district engineer's recommendation should be forwarded to the director of the Maintenance Division for review and concurrence. Adequate justification, including details and an estimate for an independent utility crossing, should accompany the submission. The proposal will then be forwarded to the director of the Bridge Division for review and determination of the effect of the proposed attachment on the existing structure. If the attachment is allowed, the director of the Bridge Division will prepare a suitable agreement and forward it to the district for handling with the utility company for execution. In addition, notice forms shall be required as cited in §21.52 and §21.54 of this subchapter.

Source Note: The provisions of this §21.48 adopted to be effective January 1, 1976; amended to be effective June 3, 1982, 7 TexReg 1953; amended to be effective May 29, 1989, 14 TexReg 2366; amended to be effective March 15, 2001, 26 TexReg 2055

§21.49 Overhead Power and Communication Line

(a) Type of construction. Longitudinal lines on the right-of-way shall be limited to single pole construction. Transverse lines should desirably be limited to single pole construction; however, where an existing or proposed utility is supported by "H" frames, towers, etc., the same type structures may be utilized for the crossing provided all other requirements herein are met.

(b) Vertical clearance. Except as stated herein, the minimum vertical clearance above the highway shall not be less than 22 feet for power lines, and 18 feet for communication and cable television lines. These clearances may be greater, as required by the National Electric Safety Code and governing laws.

(c) Location.

(1) In rural areas and at uncurbed sections in urban areas, poles supporting longitudinal lines shall be located from one to three feet from the right-of-way edge, except that at the option of the department this distance may be varied at short breaks in the right-of-way line. Guy wires placed within the right-of-way shall be held to a minimum and should normally be in line with the pole line; however, other locations may be permitted, but in no case shall the guy wires or poles be located closer than the minimum allowed for the specific design values for the highway class and volumes as shown in Appendix A of this section. At curbed sections, in urban areas, poles shall be located as far as practical behind the outer curbs and preferably adjacent to the right-of-way line. Steel poles with bases greater than 36 inches shall not be placed within the right-of-way except in extreme hardship situations and if sufficient space remains for other utilities. Exceptions may be considered where ample right-of-way exists and the poles are to be placed outside of the clear zone or in accordance with the minimum allowed for the specific design value for the highway class and volume, whichever is greater.

(2) At crossings, no poles will be permitted in the center median of any highway. Poles will only be permitted in outer separations or more than three feet inside the right-of-way where the right-of-way is of such extreme width (over 300 feet) that the cost of spanning it is excessive and where poles can be

located in accordance with the intent and provisions of paragraph (1) of this subsection.

(3) As a general rule, overhead power, communication, and cable television line crossings at bridges or grade separation structures should be avoided, if possible. If rerouting the line completely around the structure and approaches is not economically feasible, a minimum horizontal distance of 150 feet or a minimum vertical clearance of 30 feet should be provided to insure adequate safety for construction and maintenance operations.

(d) Horizontal clearances. The following Appendix A indicates the design values for horizontal clearances.

APPENDIX A HORIZONTAL CLEARANCES

Location	Functional Classification	Design Speed (mph)	Avg. Daily Traffic ¹	<u>Clear Zone Width (ft.)</u> ^{2, 3, 4}
				Minimum Desirable
Rural	Freeways	All	All	30 (16' for ramps)
Rural	Arterial	All	0 - 750	10 16
			750 - 1500	16 30
			1500 or more	30 -
Rural	Collector	45 or more	All	Use above rural arterial criteria.
		40 or less	All	10 -
		All	All	10 -
Rural	Local			
Urban	Freeways	All	All	30 (16' for ramps)
	All (curbed)	45 or less	All	1.5 from 3'
Urban				curb face
	All (uncurbed)	45 or more	All	Use above rural arterial criteria.
Urban	All (uncurbed)	40 or less	All	10 -
Urban	All (curbed)	50 or more	All	Use above rural arterial criteria insofar as available border width permits.
Urban				

¹ Average ADT over project life, i.e., 0.5 (present ADT and future ADT). Use total ADT on two-way roadways, directional ADT on one-way roadways.

² W/O barrier or other safety treatment of appurtenances.

³ Measured from edge of travel lane for all cut sections and for all fill sections where side slopes are 6:1 or flatter. Where fill slopes are steeper than 6:1 it is desirable to provide a hazard-free area beyond the toe of slope.

⁴ Desirable, rather than minimum, values should be used where feasible.

Source Note: The provisions of this §21.49 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366.

§21.50 Underground Power Lines

(a) Longitudinal. All underground power lines placed within the right of way may be directly buried at depths according to the voltages of power lines as follows.

VOLTAGE	MINIMUM DEPTH OF BURY
22,000 or less	30 inches
22,001 to 40,000	36 inches
40,001 and greater	42 inches

These depths are currently required by the National Electric Safety Code. Amendments to the Code may require greater depths in the future.

(b) Crossings. Power lines shall be encased (placed in conduit) and buried a minimum of 36 inches under roadway ditches, and 60 inches below the pavement surface.

(c) Encasement. Encasement shall be provided under center medians and from top of backslope to top of backslope for cut sections (or five feet beyond the toe of slope for fill sections, or face of curb) of all roadways including side streets and beneath and five feet beyond any overpass or other structure where the line passes under it. Encasement may be omitted under center medians where their width is appreciably greater than normal rural standards (76 feet). Existing lines under low-volume farm-to-market roads and low-volume highways may be permitted to remain in place without encasement or extension of encasement if they are protected by a reinforced concrete slab or equivalent protection or if they are located at a depth of six feet under the pavement surface and not less than four feet under the roadway ditch. If a reinforced concrete slab is to be used, it should meet the following standards:

- (1) width - five foot minimum;
- (2) thickness - six inch minimum;
- (3) reinforcement - #4 bars at 12 inch centers each way or equivalent wire mesh;
- (4) cover - the cushion between the bottom of slab and top of cable shall be not less than six inches.

(d) Markers. Readily identifiable and suitable markers in sufficient number as determined by the district engineer shall be placed at the right of way line for lines installed longitudinally within the right of way. Where an underground power line crosses, a marker shall be placed at each right of way line.

(e) Location. Longitudinal underground power lines may be placed by plowing or open trench method

and shall be located as set forth in §21.37 of this subchapter.

(f) Aboveground appurtenances. Aboveground utility appurtenances installed as a part of an underground power line shall be located at or near the right of way line, well outside the highway maintenance operation area.

(g) Manholes. Requirements for manholes shall be the same as cited in §21.38 of this subchapter.

Source Note: The provisions of this §21.50 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366; amended to be effective March 15, 2001, 26 TexReg 2055

§21.51 Underground Communication Lines

(a) Longitudinal. The minimum depth of cover for cable television and copper cable communications lines shall be 24 inches. The minimum depth of cover for a fiber optic facility shall be 42 inches; provided, however, that said minimum depth of cover may be not less than 36 inches if the owner/operator of a fiber optic facility waives damages and fully indemnifies the department in a form acceptable to the department.

(b) Crossings. Lines should be located at approximate right angles to the highway to the extent feasible and practicable. Reasonable latitude may be exercised as regards the crossing angle of existing lines which are otherwise qualified to remain in place.

(1) The minimum depth of cover for cable television and copper cable communication lines shall be 24 inches under ditches or 18 inches beneath the bottom of the pavement structure, whichever is greater.

(2) The top of a fiber optic facility shall be placed a minimum of 42 inches below the ditch grade or 60 inches below the top of the pavement structure, whichever is greater; provided, however, that said minimum depth of cover below the ditch grade may be not less than 36 inches or 60 inches below the top of the pavement structure whichever is greater if the owner/operator waives damages and fully indemnifies the department in a form acceptable to the department.

(3) Lines crossing highways do not require encasement except where in the judgment of the district engineer such encasement is necessary for the protection of the highway facility. Consideration should be given to encasement or other suitable protection for any communication facilities:

(A) with less than minimum bury;

(B) near footings of bridges or other highway structures; or

(C) near other locations where there may be hazards.

(4) When the installation of the line is to be accomplished by boring a hole the same or about the same diameter as the line and pulling it through, then encasement is not necessary. Where such conditions cannot be met, encasement should be provided. The annular void between the drilled hole and the line or casing should be filled with a satisfactory material to prevent settlement of any part of the highway facility over the line or casing.

(5) Encasement may be of metallic or nonmetallic material. Such encasement material shall be designed to support the load of the highway and superimposed loads thereon, including that of construction machinery. The strength of the encasement material shall equal or exceed structural requirements for drainage culverts and it shall be composed of materials of satisfactory durability under conditions to

which it may be subjected. The length of any encasement shall be provided under center medians and from top of backslope to top of backslope for cut sections (or five feet beyond the toe of slope for fill sections, or face of curb) of all roadways including side streets. Encasement may be omitted under center medians where their width is appreciably greater than normal rural standards (76 feet). Where encasement is not installed, specific agreement should be reached with the utility company that the pavement will not be cut for repairs any time in the future.

(c) Markers. The utility company shall place a readily identifiable and suitable marker at each right of way line where it is crossed by an underground communication line. Readily identifiable and suitable markers in sufficient number as determined by the district engineer shall be placed at the right of way line for lines installed longitudinally within the right of way. Where fiber optic lines are installed without a metal sheath or a metal casing, a durable metal wire shall be concurrently installed or other means shall be provided for detection purposes.

(d) Placement. Lines may be placed by plowing or open trench method and shall be located on uniform alignment as near as practical to the right of way line to provide space for possible future highway construction and for possible future utility installations. Distance from the right of way line will depend upon the terrain involved and obstructions such as trees and other existing underground utility lines. On highways with frontage roads, such installation will be located between the frontage roads and the right of way line. Unless authorized by the director of the Bridge Division, director of the Design Division, or director of the Maintenance Division, lines shall not be placed or remain in the center median, or beneath through-traffic roadways or connecting roadways (including shoulders).

(e) Above-ground pedestals. Above-ground pedestals or other utility appurtenances installed as a part of an underground communication line shall be located at or near the right of way line, well outside the highway maintenance operation area.

(f) Manholes. Requirements for manholes shall be the same as cited in §21.38 of this subchapter.

(g) Large equipment housings. Structures that are significantly larger in plan view than single poles may be placed on highway right of way with the following stipulations.

(1) The installation will not significantly hinder highway maintenance operations. This will include consideration of the height of the supporting slab above groundline.

(2) The housing will be placed at or near the right of way line.

(3) The installation will not reduce visibility and sight distance of the traveling public to the extent of creating an unsafe condition. This will be a particular item of consideration where such housings are proposed for placement at or near highway intersections.

(4) Assurance will be made that the dimensions of the housing are minimized, particularly where the need to allow space for highway improvement and accommodation of other utility lines are apparent. Outside depth, length, and height dimensions of the above-ground portion of the housing should not exceed 36 inches, 60 inches, and 54 inches respectively. The supporting slab should not project more than three inches above groundline.

(5) The installation shall be compatible with adjacent land uses.

Source Note: The provisions of this §21.51 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366; amended to be effective March 15, 2001, 26 TexReg 2055

§21.52 Forms—General

(a) Use and occupancy agreement forms and notice forms are provided for use for utility facilities installed, adjusted, relocated, or retained within highway right-of-way. These forms provide for a definite understanding as to the location and manner in which utilities will be installed and/or maintained and, where applicable, provide the necessary rights needed by the state to occupy the property interests held by the utility company.

(b) On highway routes within the corporate limits of municipalities all utility installations are to be in accordance with this part and subject to the state's approval.

(c) Other forms are also provided for conveyance of utility company property interests to the state when such interests within highway rights-of-way are abandoned.

Source Note: The provisions of this §21.52 adopted to be effective January 1, 1976.

§21.53 Use and Occupancy Agreement Forms

(a) Use and occupancy agreement forms are to be used when in connection with active highway projects an adjusted or relocated utility facility occupies part of the highway right of way or when a utility facility is retained within the highway right of way without adjustment unless the utility has a previously approved department use and occupancy agreement or approved notice form covering the right of way limits and which includes provisions for control of access when applicable. Such forms are used also when a utility has a prior property interest which is being retained within the highway right of way.

(b) These forms shall include such terms and conditions as may be prescribed by the director of the Right of Way Division to convey necessary information in order to protect and preserve the state highway system and the safety, health, and welfare of its use by the traveling public.

Source Note: The provisions of this §21.53 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366; amended to be effective March 15, 2001, 26 TexReg 2055

§21.54 Notice Forms

(a) Notice forms are provided for use for new utility installations after highway construction is completed. They are also provided for new utility installation placed before or during highway construction except:

(1) where the utility has a compensable property interest; or

(2) the state is participating in the adjustment or relocation cost of the utility installation.

(b) These forms shall include such terms, conditions, and utility location plans, as may be prescribed by the director of the Maintenance Division to convey necessary information and to protect and preserve the state highway system and the safety, health, and welfare, of its use by the traveling public. Utility location plans shall be in accordance with the requirements contained in this undesignated head concerning utility accommodation.

(c) In addition to the requirements in subsection (b) of this section, the district engineer may prescribe special district requirements which will be justified based on the specific soil, terrain, weather,

vegetation, trees, traffic characteristics, type of utility line, or other factors unique to the area.

(d) The district engineer is authorized to approve all notice forms except those on utility bridges, attachments to highway structures, or those which include exceptions as cited in §21.35 of this subchapter.

Source Note: The provisions of this §21.54 adopted to be effective January 1, 1976; amended to be effective May 29, 1989, 14 TexReg 2366; amended to be effective March 15, 2001, 26 TexReg 2055

§21.55 Abandoned Interests

When a utility installation is relocated off its property interests or outside the highway rights-of-way, the abandoned interest or rights of the utility company within the new highway right-of-way should be conveyed to the state.

Source Note: The provisions of this §21.55 adopted to be effective January 1, 1976.

§21.56 Metric Equivalents

All English units of measurement referenced in §§21.31-21.55 of this title (relating to Utility Accommodations) may be converted to metric equivalents as shown in Appendix B.

APPENDIX B

LENGTH

3"	.076m (Meters)
6"	.152 m
8"	.203 m
12" or 1'	.305 m
18"	.457 m
24" or 2'	.610 m
30"	.762 m
36" or 3'	.914 m
42"	1.067 m

48" or 4'	1.219 m
50"	1.270 m
54"	1.372 m
60" or 5'	1.524 m
72" or 6'	1.829 m
84" or 7'	2.134 m
10'	3.048 m
16'	4.877 m
18'	5.486 m
22'	6.706 m
30'	9.144 m
76'	23.165 m
150'	45.720 m
300'	91.440 m

SPEED

40 mph	62.372 km/h (Kilometers per hour)
45 mph	72.419 km/h
50 mph	80.465 km/h

WEIGHT

175 lbs.	79.380 kg (Kilograms)
4 U.S. short tons	3628.800 kg or 3.6t (Metric Tons)
16 U.S. short tons	14515.200 kg or 14.4t

PRESSURE

60 psi	414 kPa (Kilopascals)
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Source Note: The provisions of this §21.56 adopted to be effective July 9, 1996, 21 TexReg 5980; amended to be effective December 13, 1998, 23 TexReg 12474.

APPENDIX VI

Washington State Department of Transportation

120.04 Pipelines

Pipelines and casing installed within the operating right of way must meet the requirements of this manual, the WSDOT *Utilities Accommodation Policy*, and the references.

References to pipe in this section are inclusive of all types of pipe, including carrier pipe, casing, galleries, conduit, innerduct, or any other enclosure that may convey or contain a utility.

(1) New Installations

WAC 468-34-240(1)

Applications for proposed pipeline installations must specify:

- Capacity, count, class of transmittants, or other quantitative data.
- Maximum working, test, and/or design pressures.
- Industry design standards for the class of carrier.

(2) Changes in Existing Facilities

WAC 468-34-240(2)

Pipeline use is restricted to that which was originally approved. Changes in the use of an existing pipeline require advance approval by WSDOT. A new application could be required for any change in the originally approved facility, which may include:

WAC 468-34-240(1)

- Ownership (see 130.05, Utility Transfer of Ownership – Acceptance of Assignment).
- Capacity, count, class of transmittants, or other quantitative data.
- Increase or decrease in maximum working, test, and/or design pressures.
- Change in capacity.

Any changes made to previously approved installations should be documented appropriately.

(3) Abandoned, Deactivated, or Disconnected Pipeline

WAC 468-34-250(3)(d)

When it is determined a pipeline is no longer needed, the first consideration should be removal. If removal is determined to be infeasible, an abandoned pipeline may remain within the operating highway right of way provided doing so would not negatively affect the roadway structure or continued maintenance and operation of the highway facility. Abandoned pipe shall be backfilled with pressure grout or other suitable material as directed by WSDOT. (See 130.06, Abandoned, Deactivated, or Disconnected Utilities, for additional guidance.)

Best Practice

- (a) **Documentation of Abandoned, Deactivated, or Disconnected Pipelines** – To aid project design and delivery efforts within WSDOT, an accommodation document should be maintained on file for the abandoned in-place pipe defining the status, location, and ownership of the abandoned pipe.

Best Practice

- (b) **Hazardous Piping Material** – Ownership of any abandoned, deactivated, or disconnected pipelines composed of hazardous materials such as asbestos cement should remain the property of the utility until such time as the pipe is removed from the right of way and properly disposed of. Maintain an accommodation document for the utility and list the pipe as abandoned in the UFP database.

Best Practice

- (c) **Pipes Carrying Hazardous Material** – Abandoned, deactivated, or disconnected pipelines that may have transmitted hazardous substances such as petroleum or other products can remain in the right of way as long as the pipe has been flushed or otherwise decontaminated. The abandoned utility may be used for a subsurface conduit or casing if a future need arises in the area.

(4) Existing Pipelines: Adjustment

Adjustment of pipe location, depth, size, or capacity is often necessary due to utility needs, construction conflicts, existing shallow installation depth, damage, or other situations and/or conditions. When adjustment becomes necessary, all governmental and regulatory codes, industry standards and specifications, and WSDOT requirements shall be met. A new application is required for any change in the facility that was originally approved.

WAC 468-34-260

In general, utility installations and adjustments are to be made with due consideration to highway and utility costs and in a manner that will provide maximum safety to the highway users; will cause the least possible interference with the highway facility and its operation; and will not increase the difficulty or cost of maintenance of the highway.

See AASHTO's "A Policy on the Accommodation of Utilities Within Freeway Right-of-Way"

Where highway construction or alterations are considered, utility companies should be involved early in the design process. This will permit joint and parallel activities to be coordinated throughout the life of the highway project. Where utilities exist within the right of way of a highway to be widened or improved and a utility relocation is likely, consideration should be given to again accommodate those existing utilities within the highway right of way.

(5) Pipelines in Existence Prior to Highway Construction or Designation

Carrier pipelines in existence prior to highway construction or highway designation (such as an RJT), located within the operating right of way, may remain in place without protective measures provided the following requirements are met:

Best Practice

- Depth and existing location do not or will not conflict with highway improvements.
- The design and/or depth of the pipe are adequate to protect the pipe from loading as described in (7) below.
- Maintenance of the pipeline does not conflict with access limitations or the operational needs of the highway.
- The pipeline does not conflict with highway maintenance operations.
- The pipeline is installed to current industry and governmental standards, codes, and specifications.

(6) Pipeline Requirements: Location and Alignment

(a) **Crossings** – Generally, all highway utility crossings should meet the following conditions and requirements:

WAC 468-34-190

- Utilize subsurface construction techniques.
- Avoid impacting the roadway prism or highway drainage or other systems.
- Be located at a point that will, as much as practicable, avoid conflicts with planned highway improvements and ongoing operation and maintenance.
- Avoid installations within interchange areas. Freeway crossings should be made at locations where the chance of interference with future interchange access improvements will be minimized or avoided.
- Pipeline installation should be as normal to the centerline of the roadway as possible.
- Pipeline crossings should avoid deep cuts.
- Bridge footings, retaining walls, or other structures should be avoided whenever possible. (See 120.07, Bridges and Structures, for additional guidance.)

WAC 468-34-190(1)

WAC 468-34-190(2)

WAC 468-34-190(2)

Best Practice

- Perpetually wet areas, rocky terrain, or areas that may negatively affect highway drainage should be avoided and alternative locations considered. Alternative route analysis may be required from the utility to show that the proposed location is the only feasible location for installation.
- Wetlands or other environmentally sensitive areas should not be considered for utility installations and should be avoided whenever possible.

WAC 468-34-190(3)

- (b) **Longitudinal Installations** – When considering a proposed longitudinal utility installation, issues such as the general character of the surrounding area (rural or urbanized); the potential for local land development and subsequent increase in traffic volumes; the potential or planned highway improvements; and the right of way classification should be considered. The potential for utility relocation that may result from a highway improvement project should also be examined. When installation is necessary, all longitudinal utilities should be installed parallel to the highway centerline and as near the right of way line as possible.

WAC 468-34-190(3)

1. **Longitudinal Installations Within a Roadway or Median** – Longitudinal installations within any roadway prism or median area are a variance to WSDOT policy. Encasement requirements typically do not apply to all longitudinal installations within these areas, regardless of length of installation. (See 120.15, Casing, Conduit, Innerduct, and Encasement, for detailed guidance on encasement requirements, and 120.14, Variances: Types, Treatment, and Approval, for guidance on variance justification procedures.)

AASHTO

2. **Longitudinal Installations Within Limited Access Right of Way** – Longitudinal installations within limited access right of way are a variance to WSDOT policy. (See 120.14, Variances: Types, Treatment, and Approval, for guidance on variance justification procedures.)

(7) Pipeline Requirements: Materials and Construction

WAC 468-34-210(6)

WAC 468-34-230

WAC 468-34-250

- (a) **Pipe Material** – All pipes shall meet the following specific material and design requirements:

- Industry standards
- Regulatory codes and specifications
- End user product specifications

In general, WSDOT does not provide design oversight relating to utility adherence to regulatory codes. The focus of the department should be on the effects of construction, installation, and ongoing maintenance and operation of subsurface utilities upon the safety and long-term operation of the highway facility. However, this should not preclude WSDOT from identifying substandard designs or materials that may pose potentially negative or hazardous conditions upon the highway.

WAC 468-34-230

1. **Uncased Carrier Pipe** – Uncased carrier pipe shall be designed to support any highway construction or maintenance operation; the superimposed load of the highway structure itself; and any superimposed loads the roadway may be expected to withstand, including overweight loads. It is the responsibility of the utility to ensure pipe design takes into consideration how highway loading may affect the pipe under all operating ranges. Pressurized pipe must meet encasement requirements as defined in 120.15, Casing, Conduit, Innerduct, and Encasement.

(8) Trenched Construction

All trenched construction must meet the requirements of the current edition of WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* (*Standard Specifications*). When trenching and/or excavation impact the roadway prism, utility inspection oversight of the trenching work is required. The goal of trench restoration includes:

WAC 468-34-250

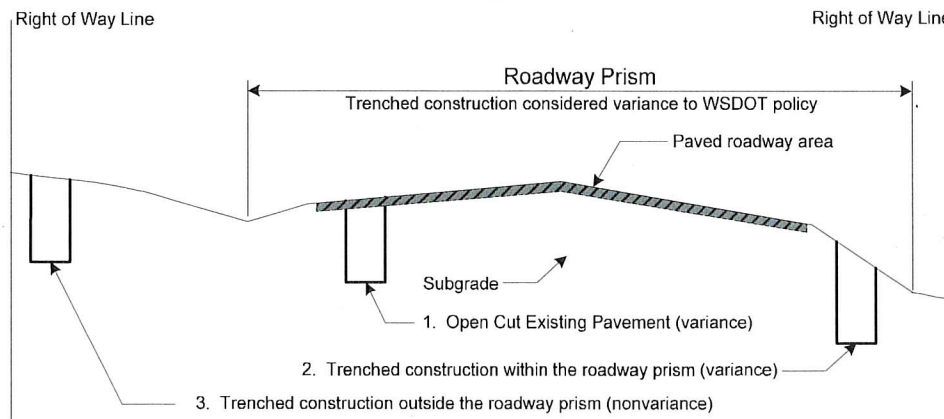
- Preserving the structural integrity of the roadway prism and other highway facilities.
- Securing piping material from deformation that may cause leakage.
- Avoiding the creation of drainage channels or blockage of existing subsurface drainage by placement of impervious backfill material such as may be encountered with the use of Controlled Density Fill (CDF) backfill in longitudinal trenches. The Region Materials Engineer and Maintenance Engineer, along with other region specialty groups, should review and approve longitudinal installations proposing CDF as a backfill material.

(9) Types of Trenched Construction

There are three basic types of trenches as they apply to utility accommodation. These are defined below and illustrated in [Figure 120-1](#), Types of Trenched Construction.

WAC 468-34-190

- Open cut construction: Requires cutting of existing paved roadways or shoulders, which includes both crossing and longitudinal installations as well as window cuts to accommodate bore pits or service connections.
- Trenched construction within the roadway prism: Includes longitudinal installations and window cuts to accommodate bore pits or service connections.
- Trenched construction outside the roadway prism.



Types of Trenched Construction

Figure 120-1

(10) Excavation in Roadway Prism

WAC 468-34-190(4)

Excavation such as bore pits, longitudinal trenched construction, and other types of excavation within the roadway prism that is adjacent to the edge of pavement requires shoring to avoid undermining the pavement. Shoring plans should be included as part of the approved Application for Utility Permit or Franchise.

WAC 468-34-190(4)

- (a) **Open Cuts** – Open cutting the existing paved roadway or shoulder to accommodate utility construction is a variance from WSDOT policy. Open cutting should only be considered as an installation method of last resort and only after a thorough review and justification process has been completed. Other route alternatives and subsurface utility construction methods must be justifiably eliminated as viable construction alternatives before an open cut proposal will be considered. (See [120.04\(14\)](#), Trenchless Construction, for additional guidance.)

Approval of utility installations proposing an open cut requires a significant effort by both the utility and WSDOT. As such, all costs associated with the review and approval of such a proposal shall be borne exclusively by the utility.

Supporting information for the variance approval should be maintained in the franchise/permit file documenting the review and approval process. (See [120.14](#), Variances: Types, Treatment, and Approval, for detailed guidance on justification procedures for open cut proposals.)

Best Practice

1. **Open Cuts on Private Road Approaches** – WSDOT does not consider open cuts on private road approaches a variance. However the needs and desires of the permitted road approach owner should be considered when a utility installation proposes an open cut of a private road approach. The utility must give prior reasonable notice to the approach user to ensure landowner access needs are met.

All open cuts of private road approaches shall be restored to WSDOT standards. Regions should use individual judgment when considering road approach open cut proposals. Nothing in these guidelines shall prevent the region from denying an open cut request of a private approach upon the operating highway right of way.

WAC 468-34-190(4)

2. **Open Cuts on Local Agency Roadways** – Generally, open cuts of public roads such as county road intersections are discouraged. Consideration should be given to traffic volumes and disruption to local traffic when an open cut is proposed on a local agency connecting roadway within the operating highway right of way.

(11) Trenched Crossings in Advance of Highway Construction

Best Practice

Open trench construction proposed in advance of highway improvement projects involving the placement of new Hot Mix Asphalt at the location of the open cut may be considered without variance approval. However, this should not be considered as blanket approval for all open cut proposals in advance of construction. Factors such as traffic disruption, construction schedule, and other factors should be considered before approval is granted.

Information describing the highway improvement project should be placed in the application file documenting the decision and approval process. Detailed inspection efforts should be undertaken while the utility is being installed to ensure pipe bedding and trench backfill material is placed in accordance with WSDOT standards.

(12) Pipe Bedding and Trench Backfill Considerations

When pipe trenching is proposed, the items that should be essential considerations include:

- Restoration of the structural integrity of the roadway prism.
- Security of the pipe during placement and backfill operations against deformation that might cause leakage.
- Assurance against the trench becoming a drainage channel.
- Assurance against blocking historic or intended subsurface drainage through porous materials by placement of impervious fill materials such as CDF within longitudinal trenches.

WAC 468-34-250(1)

WAC 468-34-250(1)(a)

WAC 468-34-250(1)(b)

WAC 468-34-250(1)(c)

(a) **Pipe Bedding and Trench Backfill Requirements** – The following items are required for all trenched construction or as directed by WSDOT:

WAC 468-34-250(2)

- All trenches shall be cut with vertical faces as much as may be permitted by soil and depth conditions.
- Maximum trench width shall be no more than the outside diameter of the pipe plus 2 feet.
- Shoring must meet the current Department of Labor and Industries minimum standards and as directed by WSDOT if increased shoring is needed to protect the paved roadway and/or the roadway prism.
- Unstable native materials shall be subexcavated from the trench and replaced with suitable material.
- Trench bottoms shall provide a uniform grade throughout the length of the installation.
- Pipe bedding shall be 6 inches deep or half the diameter of the pipe, whichever is less.
- Pipe bedding and backfill material and construction shall meet the requirements of the current edition of the *Standard Specifications*.
- Backfill methods shall be done to achieve prompt restoration of traffic.
- Roadway base and surfacing materials shall be cut back from the trench in a manner that eliminates roadway undermining. Base and surfacing material shall be replaced with like material as directed or defined by WSDOT.

WAC 468-34-250(2)(a)

WAC 468-34-250(2)(b)

WAC 468-34-250(2)(c)

(13) Pipe Cover

Pipeline cover, which is defined as the distance from the finish grade of the roadway or the existing grade line to the top of carrier pipe or top of casing, if used, shall be installed at the minimum depths shown in [Figure 120-2](#), Construction Zone Cover Description, and [Figure 120-3](#), Minimum Cover Detail. Utility accommodation applications proposing to install utilities at depths less than those listed below are a variance to WSDOT policy. (See [120.14](#), Variances: Types, Treatment, and Approval, for guidance on justification requirements for shallow depth proposals.)

WAC 468-34-200

Zone Description	Min. Depth
Zone A – The roadway structure, consisting of the area from top of shoulder to top of shoulder. Includes medians of less than 16 feet in width.	60 inches
Zone B – The area 10 feet beyond the bottom of ditch, toe of slope, or back of curb, or 15 feet beyond the top of shoulder, whichever is farther.	42 inches
Zone C – The area beyond Zone B to operating highway right of way line.	36 inches

Construction Zone Cover Description

Figure 120-2

If rerouting is not possible, the pipe should be protected appropriately. (See [120.04\(13\)](#) (a), Shallow Pipe Installation, for additional guidance.) Utility depths should also consider variations in topography for longitudinal installations. Likewise, the minimum depth when crossing should be measured from the lowest point of the entire roadway prism.

WAC 468-34-200(1)
WAC 468-34-200(2)
WAC 468-34-200(3)

(a) **Shallow Pipe Installation** – Utility accommodation applications proposing to install utilities at depths less than those in [Figure 120-3](#), Minimum Cover for Pipe Installation, are a variance to WSDOT policy. Where unavoidable obstacles do not allow minimum cover to be attained, a new route must first be considered for placement of the pipe. In the event shallow pipe installation cannot be avoided, bridging, reinforced concrete slabs, or other suitable means approved by the department should be used to protect the pipe from operational loading, construction, or maintenance operations. (See [120.14](#), Variances: Types, Treatment, and Approval, for guidance on justification requirements for shallow depth proposals.)

WAC 468-34-200(3)

(b) **Pipe Cover for Combustible or Unstable Transmittants** – Pipelines carrying material that is flammable, corrosive, expansive, energized, or unstable shall not be considered for reduced cover variance approval. In all cases, such pipelines must meet applicable industry and government codes, standards, and specifications.

(14) Trenchless Construction

WAC 468-34-250(3)

Trenchless construction should be encouraged whenever possible. The benefits include:

- Lower construction costs versus trenched construction.
- Shorter construction duration.
- Improves highway safety when compared to open cutting and trenching.
- Minimizes or eliminates traffic control costs, detours, and road closures.
- Avoids costly trench backfill and pavement repairs and associated long-term highway maintenance issues.

The requirements for trenchless construction are as follows:

Best Practice

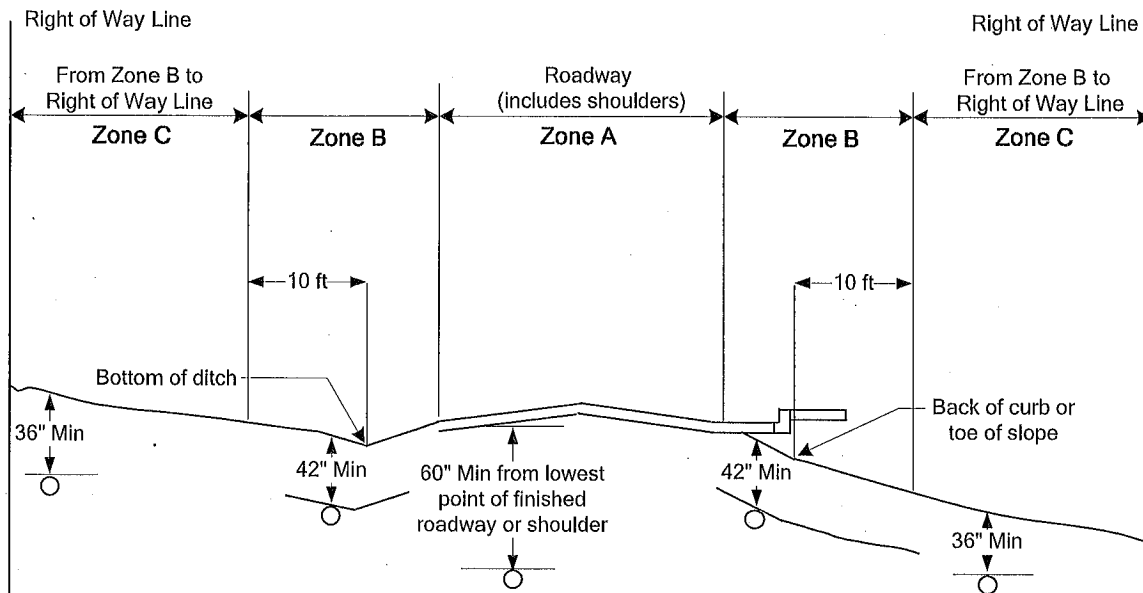
(a) **Trenchless Construction: Full Control Limited Access Right of Way** – Jack or bore pits necessary for trenchless construction within fully controlled limited access right of way must be placed outside the access control limits of the highway. Bore pits located within full control limited access are a variance and require appropriate justification explaining why work operations cannot be conducted from outside the limited access right of way. (See [120.14](#), Variances: Types, Treatment, and Approval, for detailed guidance on justification procedures.)

Casing is required the full width of the full control limited access right of way where required in [120.15](#), Casing, Conduit, Innerduct, and Encasement. Installations proposing other than full width casing when required are a variance from WSDOT policy. (See [120.14](#), Variances: Types, Treatment, and Approval, for detailed guidance on justification procedures.)

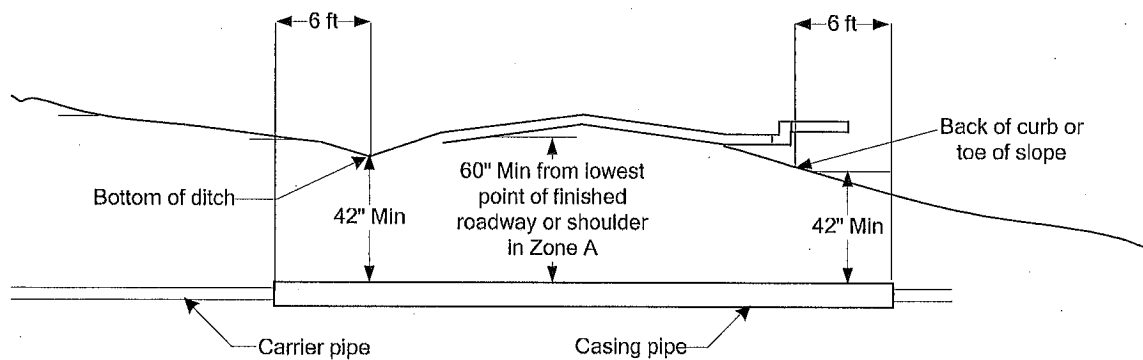
Best Practice

(b) **Trenchless Construction: Partial and Modified Limited Access Right of Way** – Jack or bore pits or other construction methods necessary for trenchless construction within partial or modified limited access right of way may be allowed without a variance.

Casing is required the full width of the partial or modified control limited access right of way where required in [120.15](#), Casing, Conduit, Innerduct, and Encasement. Installations proposing other than full width casing, when required, are a variance from WSDOT policy. (See [120.14](#), Variances: Types, Treatment, and Approval, for detailed guidance on justification procedures.)



Longitudinal Coverage Detail



Note:

Casing pipes shall extend a minimum of 6 feet beyond the toe of fill slopes, or bottom of ditch line, or outside curb.

Crossing Coverage Detail

Minimum Cover for Pipe Installation
Figure 120-3

Best Practice

- (c) **Trenchless Construction: Non-Limited Access Right of Way** – Jack or bore pits or other construction methods necessary for trenchless construction within non-limited access right of way may be allowed without a variance.

WAC 468-34-250(3)

- (d) **General Trenchless Construction Requirements** – When trenchless installation techniques are used, the following requirements must be met:

WAC 468-34-250(3)(a)
Best Practice

- Trenchless construction method shall be reviewed and approved by WSDOT before work begins.
- Trenchless pipe installation where the casing or carrier pipe diameter is 36 inches or greater shall require a review by the State Geotechnical Engineer.
- Casing shall extend 6 feet beyond the edge of the roadway prism or back of curb. (See 120.15, Casing, Conduit, Innerduct, and Encasement, and Figure 120-3, Minimum Cover Detail, for additional guidance.)
- Limits of bore pit excavation should not extend into any portion of the roadway prism. Pit excavation work encroaching within highway drainage systems should have preapproved protective measures in place at all times during construction. Bore pits that encroach within the roadway prism shall be preapproved by WSDOT. Shoring plans for approval shall adequately present the method of shoring. Utility work that fails to follow the shoring plan should be stopped until the shoring plan is adhered to.
- The size of the bore opening shall not exceed 5% oversize in diameter. Backfill of voids in a manner approved by WSDOT, such as pressure grouting, is required for all pipes 12 inches in diameter or greater.
- Unused or abandoned holes or casings shall be backfilled as directed by WSDOT using standard methods. (See 130.06, Abandoned, Deactivated, or Disconnected Utilities, for detailed guidance.)

WAC 468-34-250(3)(c)
WAC 468-34-250(3)(d)

(15) Pipeline Appurtenances

WAC 468-34-220

Pipeline appurtenances shall meet the requirements outlined below.

WAC 468-34-220(4)

- (a) **Manholes** – Whenever possible, manholes should be located outside the roadway prism and as close to the edge of right of way as possible. Placement of manholes should be at locations that minimize interruptions to highway operation and maintenance efforts during utility maintenance work. Manholes shall not be located within any limited access highway pavement or shoulder.

WAC 468-34-220(5)

- (b) **Automatic and Emergency Shut-Off Valves** – Automatic and emergency shut-off valves shall be located near the structure ends if attached to a structure and as may be required by WSDOT, industry standards, or governmental codes and regulations. Valves should be located in such a manner as to allow isolation of pipeline segments in the event of a hazardous condition. Shut-off valves shall not be located within any limited access highway pavement or shoulder.

(16) Pipeline Identification and Detection

WAC 468-34-220(3)

- (a) **Markers** – Post-type markers are required for all subsurface utility installations. Markers should be installed using conspicuous colors and contain the following relevant information:
- Pipeline identification and utility station location.
 - Owner of the pipeline.
 - Contact phone number and other contact information with a local utility office.

- Utility size and/or capacity.
- Pipe contents.
- Warnings that may be necessary for individual utilities.
- Double markers at subsurface vaults.

1. **Marker Locations** – Markers shall be located:

- At both ends of a roadway crossing.
- At 500-foot intervals on longitudinal installations, or greater if sight distance allows.
- At all angle points.

WAC 468-34-220(3)

(b) **Locate Wire** – All subsurface installations shall be detectable by a Locate Service by way of a locate wire or other means approved by WSDOT, to be installed at the time of installation or by wire integrated into the pipe itself during manufacture.

Best Practice

(c) **Detection Tape** – Detection tape should be used for all open trench pipeline installations. The detection tape should be placed in the pipe trench 12 to 18 inches above the pipe to avoid unintentional excavation of the pipe during highway maintenance or construction operations.

Best Practice

120.05 Storm Drainage and Hydraulics

A utility permit for stormwater discharge (DOT Form 224-693) is utilized to regulate constructed facilities that discharge stormwater onto state right of way and into a highway drainage system. WSDOT will consider issuing permits for constructed facilities such as pipes, ditches, storm sewers, or other drainage facilities intended to discharge stormwater into the highway drainage system, provided that the surface runoff naturally flowed toward and onto state right of way before any alteration of the terrain caused by development. For the purpose of this section, “utility” refers to any party seeking to discharge stormwater onto or through WSDOT right of way by means of a constructed facility, as described above. Further guidelines governing the acceptance of surface runoff exist in WSDOT’s *Development Services Manual* and *Highway Runoff Manual*. Acceptance of surface runoff is subject to the following conditions:

(1) Runoff Characteristics

(a) **Rate of Flow** – Development of property tends to increase the rate of surface runoff. WSDOT will require the rate of flow entering the highway drainage system from the utility (applicant for the permit) to meet the flow control standards required in the *Highway Runoff Manual* (HRM):

- If the flow control standards required by the local government are more restrictive than the standards contained in the HRM, the local government’s standards must be used.

In some instances, WSDOT may agree to accept unrestricted runoff from a utility. However, in those instances, the utility will remain liable for damages that occur as a result of any increased runoff. The increased runoff is that portion of the total rate of flow entering the highway drainage system that is in excess of the natural rate of surface runoff that flowed toward and onto the state right of way prior to development of the property.

120.15 Casing, Conduit, Innerduct, and Encasement

(1) General Requirements and Considerations

Encasement or casing of utilities within the roadway prism is necessary for a variety of reasons, including constructibility, code requirements, or other situations. When considering utility installations within the right of way, WSDOT's review should not focus strictly on the immediate construction impacts of the installation, such as with open cuts. Attention should also be paid to the preservation of the roadway and the long-term effects the proposed utility may have upon continued operation, maintenance, and improvement of the highway. Issues to consider include:

- Pressurized pipe rupture or leaking.
- Leaking of hazardous, caustic, or combustible materials.
- Utility maintenance or improvements that may require removal or replacement of carrier pipe or conduit.
- Utility relocation.

All pipeline installations shall meet the requirements outlined in this section. Any application for utility accommodation proposing to install a utility without casing as defined under [Required Casing Conditions](#) (below) is a variance to WSDOT policy. (See Section [120.14](#), Variances: Types, Treatment, and Approval, for detailed guidance on justification procedures.)

(2) Required Casing Conditions

Casing of utilities is required for the following situations and conditions:

- Utilities installed under completed limited access highways or freeways. Casing shall extend from right of way line to right of way line on all access controlled rights of way.
- Utility crossings where casing is required by appropriate industry code or special conditions.
- Pressurized carrier pipe installed within the roadway prism, including pipe installed longitudinally under the roadway.
- Pipelines carrying transmittants that are flammable, corrosive, expansive, energized, or unstable.
- Utility installations where local features, embankment materials, construction methods, or other conditions indicate any possibility of damage to the protective coating of carrier pipe during installation. It is the responsibility of the utility to provide evidence that the pipe coating will not be damaged during installation.
- Installations at locations such as freeways or other high-volume or controlled access highways where the current or future insertion, removal, replacement, or maintenance of utilities would avoid open trench construction.
- Protection of the utility from external loads or shocks both during and/or after construction.
- As a method of conveying leaking fluids or gasses away from the area directly under the roadway to a point of release at or near the right of way line or to an established highway drainage containment facility.

WAC 468-34-210

WAC 468-34-210

WAC 468-34-210
WAC 468-34-210(3)(a)
and (b)

WAC 468-34-210
WAC 468-34-210(1)(a)
AASHTO
WAC 468-34-210(1)(b)
WAC 468-34-210(1)(c)
WAC 468-34-210(1)(d)
WAC 468-34-210(2)(a)
WAC 468-34-210(2)(b)
WAC 468-34-210(2)(c)
WAC 468-34-210(2)(d)

WAC 468-34-100
WAC 468-34-210(3)
WAC 468-34-210(3)(a)

- (a) **Exceptions to Required Casing Conditions** – Casing is required for all conditions defined by this section. Except as outlined below, no exceptions to casing requirements should be allowed for utility installations that might otherwise be installed using open trench construction methods or in advance of highway construction. All utility installations that require encasement but are proposed to be installed without encasement must be justified as defined by this manual. (See 120.14, Variances: Types, Treatment, and Approval, for additional guidance regarding variance justification.)

WAC 468-34-210(3)(c)
WAC 468-34-210(3)(b)

The exceptions to casing are as follows:

- Uncased crossings for local service connections of 1-inch-diameter or less carrying natural or other gas across two-lane highways may be installed without casing.
- Pipelines conveying natural or other gas that meet the design, installation, and cathodic protection provisions of the Minimum Federal Safety Standards, 49 CFR, Part 192, and WAC 480-93, Gas companies – safety.

(3) Longitudinal Casing Installation

WAC 468-34-190

Longitudinal installations are typically not subject to casing requirements. In all cases, WSDOT should work with the utility to find alternative installation locations within the right of way that will avoid the need for longitudinal installations.

(4) Encasement Requirements: Materials and Construction

WAC 468-34-210(4)

- (a) **Crossing Length** – Casing shall extend a minimum of 6 feet beyond the edge of the roadway prism or back of curb (see Figure 120-9, Rural Casing Installation, and Figure 120-10, Urban Casing Installation).

WAC 468-34-210(5)
WAC 468-34-250(3)(c)

- (b) **Seals and Annular Fill** – Casings shall be sealed at both ends. Casings over 12 inches in diameter shall have the annular spaces between carrier pipe and the casings filled with pressurized grout or blown sand unless otherwise authorized by WSDOT.

WAC 468-34-220(1)

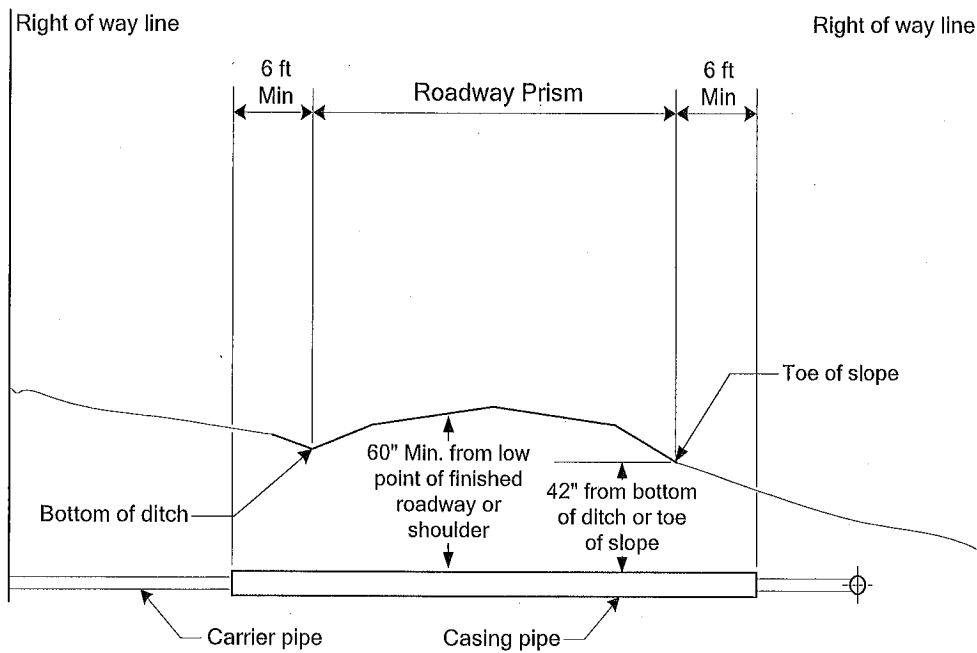
- (c) **Vents** – Vents are required for all casings holding carrier pipe transmitting fuel where required by 49 CFR, Part 192, Minimum Federal Safety Standards. Vents shall be located as close to the right of way line as possible and free from vegetated cover.

WAC 468-34-220(2)

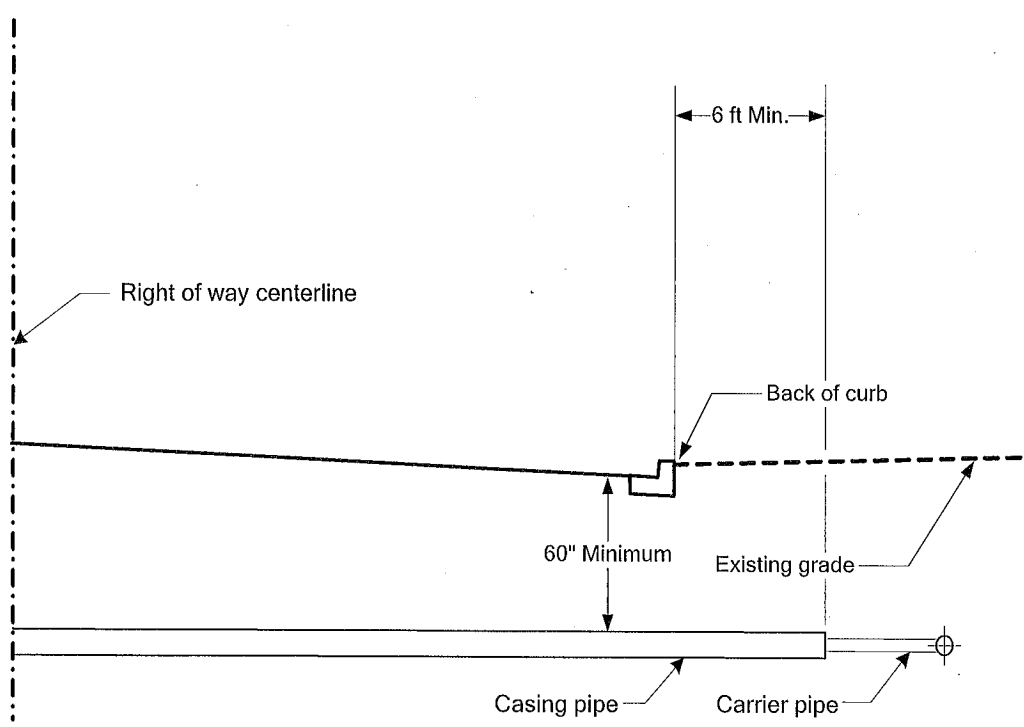
- (d) **Drains** – Drains are required for all casings holding carrier pipes that contain liquid, liquid gas, heavy gas, or other petroleum products. Drains should outfall to locations approved by WSDOT and where, if a rupture in the carrier pipe were to occur, it would not cause harm or damage to environmentally sensitive areas. Under no circumstances shall the drain or drain outfall be used as a wasteway for purging the carrier pipe unless specifically authorized by WSDOT.

WAC 468-34-210

- (e) **Installations on Highway Structures** – Encasements within, upon, or near any highway structure require the advance review and approval of the region Bridge Maintenance Office, HQ Bridge Preservation, or HQ Bridge and Structures Office. (See 120.07, Bridges and Structures, for detailed guidance on structure attachments.)



Rural Casing Installation
Figure 120-9



Urban Casing Installation
Figure 120-10

APPENDIX VII

**Oregon Department of
Transportation**



► **The Oregon Administrative Rules contain OARs filed through November 15, 2015** ◄

QUESTIONS ABOUT THE CONTENT OR MEANING OF THIS AGENCY'S RULES?
[CLICK HERE TO ACCESS RULES COORDINATOR CONTACT INFORMATION](#)

DEPARTMENT OF TRANSPORTATION, HIGHWAY DIVISION

DIVISION 55

POLE LINES, BURIED CABLES, PIPE LINES, SIGNS, MISCELLANEOUS FACILITIES AND MISCELLANEOUS OPERATION

734-055-0005

Scope

This rule shall apply to and govern the location, installation, construction, maintenance and use of pole lines, buried cables, pipe lines, signs, miscellaneous operations upon State Highway right-of-way and properties under the jurisdiction of the Department of Transportation.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81

734-055-0010

Definition of Terms

(1) "AASHTO" means American Association of State Highway and Transportation Officials.
Mailing address: AASHTO, Suite 225, 444 North Capitol Street, N.W., Washington D.C., 20001.

(2) "Access Control Line" means the control line that is defined somewhere between the right-of-way line and the edge of the roadway. When there is no defined access control line, access is controlled at the right-of-way lines.

(3) "Aesthetic Quality" means those desirable characteristics in the appearance of the highway and its environment, such as harmony between or blending of natural and manufactured objects in the environment, continuity of visual form without distracting interruptions, and simplicity of designs which are desirably functional in shape but without clutter.

(4) "Applicant" means the corporation, company, firm, business, partnership, individual or individuals named in and signing the permit and to whom the permit is issued.

(5) "Buried Cable" means any and all cables, wires, conduits, pedestals and/or related fixtures authorized in the permit placed beneath the ground.

(6) "Clear Zone Area" means that portion of the roadside, within the highway right-of-way, free of nontraversable hazards and fixed objects. The purpose of such areas is to provide drivers of errant vehicles which leave the traveled portion of the roadway a reasonable opportunity to stop safely or otherwise regain control of the vehicle. The clear zone area may vary with the type of highway, terrain traversed, and road geometric and operating conditions. AASHTO standards will be applied for establishing clear zone areas for various types of highways and operating conditions.

(7) "Commission" means the Oregon Transportation Commission.

(8) "Department" means the Department of Transportation of the State of Oregon.

(9) "D.M." means District Manager or his designated representative. There are 16 Highway Districts throughout the State of Oregon.

(10) "Engineer" means the Chief Engineer or such person as he shall designate in writing.

(11) "Facility" means pole line, buried cable, pipe line, sign or miscellaneous facilities as those terms are defined in this section.

(12) "FHWA" means Federal Highway Administration.

(13) "Freeway" means a divided arterial highway for through traffic with access allowed only at interchanges.

(14) "Hardship Case" means an extraordinary case or emergency situation that environmentally and economically prohibits a utility from being located on private property.

(15) "Highway" means the public way for vehicular related facilities which are under the jurisdiction and control of the Oregon Department of Transportation.

(16) "Miscellaneous Operations" means the performance of miscellaneous operations as described in the permit.

(17) "Miscellaneous Facility" means the facility authorized by the permit, other than pole line, buried cable, pipe line or sign.

(18) "M.U.T.C.D." means Manual on Uniform Traffic Control Devices for Streets and Highways.

(19) "Permit" means a fully executed form entitled, State of Oregon, Department of Transportation, application or permit to construct pole line, buried cable, pipe line, signs, and miscellaneous operations, miscellaneous facilities, all special permit provisions included in the permit as deemed necessary by the District Manager and all attached exhibits.

(20) "Pipe Line" means any and all pipe lines, hydrants, valve boxes, manholes, conduit and/or related fixtures authorized in the permit.

(21) "Pole Line" means any and all poles, wires, guys, anchors, and/or related fixtures authorized in the permit.

(22) "Right-of-Way" means the entire width between the exterior right-of-way lines including the paved surface, shoulder, ditches and other drainage facilities in the border area between the ditches or curves and the right-of-way line.

(23) "Roadway" means the portion of a highway, including shoulders, for vehicular use.

(24) "Signs" means non-commercial signs and related fixtures authorized in the permit.

(25) "Special Provisions" means those provisions shown under the heading "Special Provisions" in the permit. In all cases of conflict between the Special Provisions and General Provisions, the Special Provisions shall govern.

(26) "Utility Facility" means privately, publicly or cooperatively owned line, facility, or system for producing, transmitting, or distributing communications, cable television, power, electricity, light, heat, gas, oil, crude products, water, steam, waste, storm, water not connected with highway drainage, or any other similar commodity, including any fire or police signal system or street lighting system which directly or indirectly serves the public. The term utility shall also mean the utility company inclusive of any substantially owned or controlled subsidiary. For the purposes of these rules, the term includes those utility-type facilities which are owned or leased by a government agency for its own use, or otherwise dedicated solely to governmental use. The term utility includes those facilities used solely by the utility which are a part of its operating plant.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81; HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0015

Permit Application Procedure

(1) Application for a permit shall be made on the form described in OAR 734-055-0010(19) which may be obtained from the DM office. Applicant shall complete the application and furnish five copies of all necessary attachments. All permit attachments shall be 8 1/2 x 11 inches when possible.

(2) Each permit application will be reviewed by the DM and a site review may be required by the DM.

(3) To facilitate site review (if required by the DM), applicant shall place markers such as lath stakes, or other markings as required at the locations where the applicant proposes to work.

(4) In reviewing permit applications, the DM may consider the following objectives:

(a) Accommodation of utility facilities with no adverse affect on traffic safety, operation, maintenance and aesthetic quality of the highway system;

(b) Incorporation of the appropriate industry code standards and AASHTO publications;

(c) Placement of utility installations in locations where they shall be reasonable to construct and maintain;

(d) Safe and unimpaired use of the highway;

(e) Alternate routes of the utility facilities outside of highway right-of-way should be evaluated for the environmental and economic impact of any loss or impairment of productive agricultural land.

(5) No permit is valid until a copy, approved by the Engineer, has been furnished applicant. No work on highway right-of-way or other Department property is to be started until applicant obtains a valid permit. However, a permit may provide that for a facility, customer service drops or laterals may be placed after notice has been provided to the DM.

(6) An applicant to whom a permit has been issued may undertake emergency repairs upon verbal permission from the DM.

(7) The permit may be presented by an agent, employee or contractor of applicant but it must be signed by applicant.

(8) Applications that deviate from the prescribed rules and regulations must be accompanied by a Permit Variance Request.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81; HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0020

Allocation of Cost

(1) The entire cost of locating, constructing, installing, maintaining, repairing, operating or using the facility; or performing miscellaneous operations and of any other expense whatsoever incident to the facilities or operations authorized by the permit shall be paid by applicant.

(2) Applicant shall, in addition to section (1) of this rule reimburse the Department for any reasonable and necessary expenses that the Department may incur in connection with and related solely to the installation of the facility or conducting the operation authorized by the permit. Payment shall be made within 30 days after receipt of billing from the Department. When required by the permit, an advance deposit shall be filed with the DM before the permit work begins.

(3) Applicant shall pay the current market value for any existing forest products on any state land which are damaged or destroyed as a result of operations authorized by the permit. Payment shall be made within 30 days after receipt of billing from the Department.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81; HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0025

Liability and Control

(1) Applicant shall be responsible and liable for all damage or injury to any person or property resulting from the physical location, installation, construction, maintenance, operation or use of the facility or operation for which applicant has been granted a permit. Applicant shall indemnify and hold harmless the State of Oregon, the Commission, the Department against any and all damages, claims, demands, actions, causes of action, costs and expenses of whatsoever nature which they or any of them may sustain by reasons of the acts, conduct, or operation of applicant, its agents or employees in connection with the physical location, installation, construction, maintenance, repair, operation or use of said facility or in conducting an operation.

(2) Applicant shall be responsible for relocating or adjusting any other facilities located on highway right-of-way as required to accommodate the facility or operation applied for. Construction of the facility or conducting of an operation by applicant, its agent or contractor, will be permitted only after applicant has furnished the DM evidence that satisfactory arrangements for said relocation or adjustment have been made with the owner of the affected other facility.

(3) The Department, the Engineer, or employees shall not be responsible or liable for injury or damage that may occur to the facility covered by the permit by reason of Department maintenance and construction operations or resulting from motorist or road user operations, or Department contractor or permittee operations, except as to injury or damage caused by the negligence of the Engineer or employees of the Department.

(4) Applicant shall employ any and all methods in performing the operations authorized by the permit which the Engineer may require in order to properly protect the public from injury and the highway from damage.

(5) If the highway surface or highway facilities are damaged by applicant, applicant shall replace or restore the highway or highway facilities to a condition satisfactory to the DM, whether discovered at the time of installation or at a later date. The DM at his option may have applicant replace or restore the highway or highway facilities to a condition satisfactory to him or the DM may replace or restore the highway or highway facilities by contractor or state forces and the costs incurred to be paid by applicant under the terms outlined in OAR 734-055-0020(2).

(6) The work area during any construction or maintenance performed under the permit provisions

shall be protected in accordance with the current **"Manual on Uniform Traffic Control Devices for Streets and Highways"** as amended or supplemented by the Commission. Necessary signs shall be furnished by applicant unless otherwise specified in the permit. Applicant's traffic control plan shall be reviewed and approved by the DM before work begins.

(7) The stopping or parking of vehicles upon the state highway right-of-way for the servicing of such vehicles or the conducting of any business transaction or commercial activity upon state highway right-of-way is strictly prohibited.

(8) Applicant shall be solely responsible for providing correct and complete information as may be required by the permit or the DM. If the DM should determine that any fact required of applicant which is material to the assessment of the facility or operation's impact upon traffic safety, convenience and/or the legal or property rights of any person (including the State of Oregon) is false, incorrect or omitted, the DM may deny or revoke the permit and may require applicant to remove the facility or terminate the operation and restore the facility area to a condition acceptable to the DM at applicant's expense. In such cases the DM, in his judgment, may also require applicant to provide, at applicant's expense, any additional safeguards and/or facilities required to protect the safety, convenience and rights of the traveling public and persons (including the state), if such additional requirements are adequate to achieve those purposes, as a condition of the continued validity of the permit.

(9) To ensure compliance with the terms and conditions of the permit, the Department reserves the right to inspect the work during such periods as the DM deems necessary, to check compliance with the terms of the permit by applicant and to require applicant to correct all deviations from those terms and conditions. The cost of such inspection shall be paid by applicant under the terms outlined in OAR 734-055-0020(2).

(10) Any supervision and/or control exercised by the Department personnel shall in no way relieve applicant of any duty or responsibility to the general public nor shall such supervision and/or control relieve applicant from any liability for loss, damage or injury to persons or property as provided in section (1) of this rule.

(11) Facilities shall be located where they do not create undue interference or hazard to the free movement of normal highway or pedestrian traffic. Locations on sharp curves, steep grades, areas of restricted sight distance or at points which interfere with the placement and proper functioning of traffic control signs, signals, lighting or other devices that affect traffic operation will not be permitted. Any revisions to the facility location shall be approved by the DM prior to construction. Applicant shall furnish the DM two sets of "as constructed" drawings that show the facility location revisions.

[Publications: The publication(s) referred to or incorporated by reference in this rule are available from the agency.]

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81; HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0035

Insurance and Bond

(1) When requested in writing by the DM, applicant or its contractor shall obtain and carry, for the period that the facility is being located, installed or constructed or any operation conducted, in order to assume responsibility under OAR 734-055-0025(1) including the repair and restoration of the highway facilities, and also during such future period of time when activities are performed involving the repair, relocation or removal of said facilities or operations conducted which have been authorized by the permit, a certificate of self-insurance or liability and property damage insurance policy or policies providing the coverage against any claim, demand, suit or action for property damage, personal injury, or death resulting from any activities of applicant, its officers, employees, agents or contractors in connection with the location, installation, construction, repair, removal or use of the said facilities or operations being conducted as authorized by the permit and the repair and restoration of the highway facilities, and the said certificate of self-insurance or policy or policies, in addition, shall include as named insureds the State of Oregon, the Commission, the Department, and members thereof, its officers, agents and employees, except as to claims against applicant, for personal injury to any members of the Commission, the Department, or its officers, agents, and employees, or damage to any of its or their property. The said self-insurance certificate or policy shall provide proof of coverage of a combined single unit of \$500,000. The said insurance policy or policies shall be in an insurance company duly authorized and licensed to do business in the State of Oregon. A copy of the certificate of self-insurance or policy or policies, or a certificate evidencing the same, shall be submitted to the Department of Transportation, Maintenance and Operations Branch, 455 Airport Road SE, Building K, Salem OR 97301 and approved by this office before any work is commenced under the permit.

(2) When requested in writing by the DM, applicant or its contractor shall furnish for the period of time necessary to construct or install a facility or conduct an operation authorized by the permit, including the repair and restoration of the highway facilities, or the conducting of any operations and also during such future periods of time when activities are performed involving the repair, relocation or removal of said facilities authorized by the permit, a bond or cash deposit in the amount specified in the Special Provisions of the permit. If a bond is furnished, it must be written

by a surety company duly qualified and licensed to do business in the State of Oregon and in a form satisfactory to the Engineer. No work shall be commenced under the permit until the said bond has been submitted to and approved by, or the said cash deposit has been received by the Department of Transportation, Maintenance and Operations Branch, 455 Airport Road SE, Building K, Salem OR 97301.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81; HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0040

Construction and Location Details

(1) Applicant or its contractor shall advise the DM's office at least 48 hours in advance of commencing construction of a facility for which a permit has been issued.

(2) Applicant shall submit with the permit application prints of adequate drawings or sketches showing in detail the location of the proposed facility or operation as described in the permit application with respect to existing and/or planned highway improvement, the roadway, the right-of-way lines, and, where applicable, the access control lines and approved access points:

(a) When attachment to a highway structure is involved, details of the attachment method including type of support, spacing, size of pipe and location of the facility shall be included. The attachment method shall be designed by a professional engineer;

(b) When the proposed facility involves pressure pipe lines the following additional data is required:

(A) Design pressure of pipe;

(B) Normal operating pressure;

(C) Maximum operating pressure.

(3) Applicant's completed facility shall be in substantial conformance with the drawings or sketches referred to in section (2) of this rule unless special permission is obtained from the DM to vary from same during installation. When such permission is obtained, applicant shall furnish the DM two sets of "as constructed" drawings or sketches detailing any such variances.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81; HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0045

Removal, Relocation or Repair

(1) The permit is issued pursuant to the law of the State of Oregon which authorizes the Commission to subsequently require applicant to remove, relocate or repair the facility covered by the permit at the sole cost of applicant.

(2) Upon receiving written notice from the Engineer to remove, relocate or repair the said facility, applicant shall within 30 days or within the time frame contained in the notice, provide to the Engineer its time estimated requirements for accomplishing the directed action.

(3) The Engineer, after applicant has provided its estimated time requirement for removal, relocation or repair of said facility, may schedule a preconstruction meeting with all applicants and affected contractors to coordinate the requested activity.

(4) The Engineer in a second notice shall direct applicant, within a specified time frame and consistent with a coordination plan, to complete the removal, relocation or repair of said facility. The time frame outlined in the notice shall take into consideration the applicant's estimated time requirements to accomplish the directed action. Such removal, relocation, or repair shall be at applicant's sole cost in accordance with said second notice and instructions received from the Engineer. Before commencing said removal, relocation or repair, applicant shall furnish such insurance and post such bond as the Engineer may consider necessary at that time in the manner provided for in OAR 734-055-0035(1) and (2).

(5) Should applicant fail to remove, relocate or repair the facility as provided in section (4) of this rule, the DM may remove, relocate or repair same and submit a statement of total costs for this work to applicant. Applicant upon receiving said statement will immediately, or within a period of time agreed upon between applicant and Engineer, pay to the Department the full amount of said removal, relocation or repair costs.

(6) If the section of highway in which applicant is required by the Engineer to remove, relocate or repair a facility is or will be under construction or reconstruction or improvement under a contract entered into between the Department and an independent contractor and applicant's failure to remove, relocate or repair said pole line, buried cable, pipe line, sign or miscellaneous facility within the time specified in section (4) of this rule, or such other time as may be specified by the

Engineer, results in payment by Department to its contractor of any claim for extra compensation for any work under said contract, applicant shall be liable to the Department for payment of the amount paid to Department's contractor as a direct result of applicants failure to comply with the time requirements of the Engineer.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81; HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0050

Maintenance and Operation

(1) Applicant shall at all times keep facilities authorized by the permit in a good state of repair both structurally and, in the case of signs, a clean and neat appearance.

(2) In the event applicant plans to raise the operating pressure for existing pressure pipe lines covered by permit above the "maximum operating pressure" shown in said permit, application for a new permit or an amendment to the existing permit is required.

(3) In the event applicant plans to install additional conductors, or replacement conductors of a higher capacity, on an existing aerial pole line covered by permit, application for a new permit or an amendment to the existing permit is required.

(4) Prior to performing any maintenance work on the facility, applicant shall obtain prior approval from the DM.

(5) All abandoned facilities belonging to the applicant shall be removed from the right-of-way by the applicant, unless the DM allows the facilities to remain by permit.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81; HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0055

Other Agencies

(1) Nothing in this permit is intended to grant rights or imply approval in areas not falling within the authority and jurisdiction of the Oregon Department of Transportation. It is the responsibility of applicant to determine the need for and to obtain such licenses, permits or other form of approval which may be required by other state agencies, federal agencies, cities and/or counties of Oregon, utility companies or railroads.

(2) If the section of highway covered by the permit is located within a National Forest, because the Department does not generally have any further rights across National Forest land other than an easement for highway purposes, the permit extends only to such rights as the Department has acquired and may therefore properly give. For National Forest lands where the facility constitutes a servitude on the property of the United States, in addition to the rights of the Department, a permit from the Forest Service must be obtained before a highway occupancy permit will be issued. Unless applicant has evidence satisfactory to the Engineer that the rights of the United States in any National Forest land crossed by the highway right-of-way will not be impaired by the facility covered by this permit, application for a permit should be made to the supervisor of the National Forest in which the facility is to be located.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81

734-055-0060

Effective Period of Permit

(1) Unless otherwise provided in the Special Provision, the permit shall be in effect for an indefinite period of time from and after the date issued, unless sooner revoked by mutual consent, or by the Commission or Engineer for failure of the applicant to abide by the terms and conditions of the permit, or by operation of the law, or at the time the applicant to which the permit is issued ceases operation.

(2) Failure of applicant to comply with any of the terms and conditions of the permit shall be sufficient cause for cancellation of the permit.

(3) The permit and the privileges granted and the obligations of applicant created thereby shall be binding upon the successors and assigns of applicant. Applicant shall give the Engineer written notice of any such assignment or transfer within a reasonable time thereafter.

(4) If the applicant fails to commence installation of the facility covered by the permit within the period specified in the permit, the permit shall be deemed null and void and all privileges thereunder forfeited, unless a written extension of time is obtained from the DM.

(5) The construction, maintenance, operation and use of the facility is subject to the paramount control of the Legislature over the state highway system and no right or privilege granted by this rule or the permit issued in accordance with this rule shall be deemed or construed to be beyond the power or authority of the Legislature to control the state highway system. Applicant accepting the permit acknowledges that the rights and privileges granted thereby may at any time be changed or abrogated by Legislative action.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HC 1176, f. 9-24-68; 2HD 2-1981, f. & ef. 2-25-81; HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0070

Conformance with Regulations and Industry Codes

(1) All work in connection with the facility or operation authorized by the permit shall be done in a neat and workmanlike manner to the satisfaction of the DM, and the details of construction of the same shall conform to the established rules and regulations now in effect or which may hereafter be put in effect by the Public Utility Commissioner of the State of Oregon, the Oregon State Board of Health or other governmental agencies having regulatory authority over said facility. In the event the above agencies do not prescribe standards, then the appropriate industry codes shall apply.

(2) The DM may specify requirements in addition to those listed in these rules when it is deemed necessary to adequately protect the public.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0080

Freeways

(1) All permit applications that request the use of freeway rights-of-way shall reasonably comply with the current AASHTO policy on the Accommodation of Utilities Within the Freeway Right-of-Way. Installations that may be allowed on freeways are generally limited to crossings only, with all of the installation work and maintenance activities performed outside of the access control line. All permit applications must include detailed drawings that show the location of the proposed facility and the freeway access control lines and/or right-of-way lines.

(2) Consideration will be given for new longitudinal installations that can be located between the freeway access control line and the freeway right-of-way line.

(3) Only extreme hardship cases will be considered for new longitudinal installations that are inside the freeway access control lines. Applications of this nature must satisfy the AASHTO Policy requirements regarding the impact on the freeway traffic safety, operations and maintenance; the future freeway design and construction; and applicant must demonstrate that alternate locations are not available. Applicant shall address each of the above subjects on the form provided by the DM, titled Permit Variance Request. The Department will evaluate the Permit Variance Request by applying sound engineering principles and judgment to determine the approval or denial of the permit application.

(4) Ground-mounted facilities shall be located to comply with the current clear zone criteria established by AASHTO.

(5) The following activities and installations are prohibited on Interstate Freeway right-of-way:

(a) Open cutting of the roadway surface;

(b) Service connections.

(6) Generally, applicant shall not have or gain direct access, either ingress or egress, to any of the facilities authorized by the permit from the main traveled way of said freeway or its on or off ramps. Upon notice to the DM that an emergency exists

and repairs are needed for the immediate protection of property and prevention of personal injury, applicant may request direct access to said authorized facility except that no vehicular traffic movement will be permitted which would cross traffic or affect the normal traffic movement. A permit will only be granted during the actual time of the emergency when applicant can assure the safety of the freeway users.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0090

Specific Construction Details

- (1) Corrugated metal pipe and concrete pipe used as a conduit or casing pipe or a gravity flow carrier pipe shall as a minimum conform to requirement of the Department's current issue of **"Standard Specifications for Highway Construction"**. Smooth iron or steel pipe used as a conduit or casing pipe shall be the standard type used for pressure pipe.
- (2) No trench shall be excavated with a top width in excess of 18 inches more than the outside diameter of the pipe, conduit, or cable to be installed unless permission is first obtained from the DM.
- (3) All underground installations shall be buried a minimum of 30 inches unless permission is first obtained from the DM.
- (4) Aerial utilities crossing the roadway of the highway shall have a minimum vertical clearance of 18 feet.
- (5) The backfilling of all trenches and tunnels must be accomplished immediately after the facility authorized by the permit has been placed therein and must be fully compacted to produce a density in place of not less than 95 percent of relative maximum density.
- (6) All debris, refuse and waste of all kinds, which may have accumulated upon the highway right-of-way by reason of the activity of applicant shall be removed immediately upon completion of the said activity, and the said highway right-of-way must be restored to at least as good a condition as it was prior to such activity.
- (7) Unless special permission is first obtained from the DM, direct burial of cable placed by the plowing method shall be limited to areas outside the roadway of the highway.
- (8) Standard warning signs for buried power or communications cable and for pipe lines carrying gas or flammable liquids shall be placed at each crossing under the highway and at intervals along longitudinal installations as required by current Public Utility Commissioner's Order or as specified by the DM:
- (a) Signs shall be placed as near the right-of-way line as practical;
- (b) No signs shall be placed between the guardrail and the highway roadway.
- (9) Pedestals installed as part of a buried cable installation are to be located one foot from the right-of-way line unless special permission is obtained from the DM to locate elsewhere. In no case shall the pedestals be located within the highway maintenance operating area, including mowing operations, or nearer the pavement edge than any official, highway sign in the same general location.
- (10) The buried cable or pipe depth shown on the permit form represents the distance from the top of the surface or ground line to the top of the cable or pipe.
- (11) Applicant shall not spray with selective herbicides, cut or trim trees or shrubs growing on the highway right-of-way unless and until written permission and instructions to do so have first been obtained from the DM.
- (12) All material installed within highway right-of-way shall be durable and designed for long service life expectancy and shall be relatively free of routine servicing and maintenance requirements.

[Publications: The publication(s) referred to or incorporated by reference in this rule are available from the agency.]

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0100

Permit Allowing Open Cut of Road Surface

- (1) Unless special permission is first obtained from the DM to install by open cut, a pipe line or conduit which crosses under the roadway of the highway, including road or street connections, or road approaches or driveways shall either be tunneled, jacked or driven, or placed in a hole bored under the surface for that purpose in accordance with the following provisions:
- (a) Trenching in connection with any of these methods shall be no nearer the toe of the fill slope in fill sections or the point where the outer edges of the surfacing meets the subgrade in other sections than specified in the Special Provisions;
- (b) If the tunneling method is used it shall be by an approved method which supports the surrounding materials so as to prevent caving or settlement. Areas around the installed pipe or conduit shall be backfilled with moist sand, granular material or cement grout filling all voids and packed in place with mechanical tampers or other approved devices. Lagging, bulkheading and timbering shall be removed as the backfilling progresses;
- (c) When the jacking, driving, or boring method is used it shall be by approved means which will

hold disturbances of surrounding material to a minimum. Sluicing and jetting is not permitted. Voids or displacement around the outside perimeter of the pipe, conduit or cable shall be filled with sand or cement grout packed in place.

(2) When special permission is granted to open cut the surfaced portion of the highway the following provisions shall be adhered to:

(a) The trench edges in paved areas shall be sawed or cut to neat lines by methods satisfactory to the DM to a depth sufficient to permit removal of pavement without damage to pavement to be left in place. Pavement within the cutting limits together with all other excavated material shall be removed and disposed of outside the highway right-of-way;

(b) In trenching across the highway, no more than 1/2 of the traveled way is to be opened at one time. The opened half shall be completely backfilled before opening the other half;

(c) Closure of intersecting streets, road approaches or other access points will not be permitted. Upon trenching across such facilities, steel running plates, planks or other satisfactory methods shall be used to provide for traffic to enter or leave the highway of adjacent property.

(d) Unless approved by the DM, no more than 300 feet of trench longitudinally along the highway shall be open at one time and no trench shall be left in an open condition overnight;

(e) Immediately after the facility authorized by the permit has been placed in the trench, the trench shall be backfilled to the standard specified by the DM, producing a density in place of not less than 95 percent of relative maximum density. Granular backfill material shall be placed to an elevation which will allow placing the following foundation material and wearing surface:

(A) Where original surface was asphalt concrete or bituminous treatment of mix:

(i) Wearing surface -- Asphalt concrete placed to a compacted thickness of 4" or the thickness of the removed pavement, whichever is greater;

(ii) Foundation material -- Either 1" - 0" or 3/4" - 0" aggregate placed to a compacted thickness of 12" or the thickness of the removed stone base, whichever is greater.

(B) Where original surface was Portland cement concrete:

(i) Wearing surface -- Portland cement concrete placed to a thickness of 6" or the thickness of the removed pavement, whichever is greater;

(ii) Foundation material -- same as for asphalt concrete.

(C) Where original surface was crushed rock or gravel: Wearing surface and foundation material - Either 1" - 0" or 3/4" - 0" aggregate placed to a total compacted thickness of 4" or the thickness of the removed stone base and wearing surface, whichever is greater;

(D) Placement of all materials in subsections (a) through (e) of this section shall conform to the requirements of the current Oregon Department of Transportation Standard Specifications for Highway Construction.

(d) For a period of two years following the patching paved surface, applicant shall be responsible for the condition of said pavement patches, and during that time shall, upon request from the DM, repair to the DM's satisfaction any of the said patches which become settled, cracked, broken or otherwise faulty.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HWY 6-1989, f. & cert. ef. 10-25-89

734-055-0110

Special "X" Permits

Utility facilities that originally occupied a portion of the right-of-way in which the owner had a compensable interest or a prior right to occupy said right-of-way, will be issued a permit titled "X" Permit. Applicant will be responsible for furnishing the DM with the documentation of the prior rights. The special provisions of this permit will identify the obligations and responsibilities of applicant and the Department.

Stat. Auth.: ORS 184 & ORS 374

Stats. Implemented: ORS 374.305

Hist.: HWY 6-1989, f. & cert. ef. 10-25-89

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APPENDIX VIII

Massachusetts Department of Transportation

10- DESIGN REQUIREMENTS

A. General

1. Highway and utility facilities – by tradition, practice, and in some instances, laws – frequently co-exist within or along the same corridors. Therefore, it is essential that these public service facilities be compatibly designed and operated. Joint highway and utility planning and development efforts should be encouraged.
2. The potential impact on the highway and its use must be considered in the design and location of utility facilities on or along the highway. Consideration should also be given to the utility service needs of the area traversed where such service is to be provided from utility facilities on or near the highway.
3. All utility installations on, over, or under highway right of way and attachments to highway structures shall be of durable materials designed for a long service life expectancy and relatively free from routine servicing and maintenance.
4. Utility and highway facilities shall, to the extent possible, be separated to avoid damage during installation and to provide for reasonable success in locating facilities with electronic devices. Separation of the facilities from highway facilities or other utilities may require the acquisition of additional property by the utility owner. Utility facilities shall also be

separated from one another as required by appropriate codes and ordinances.

5. On new facility installations or adjustments of existing ones, provisions should be made for known or planned expansion of the utility facilities, particularly those located underground or attached to bridges. They should be planned to minimize hazards and interference with highway traffic when additional facilities are installed at some future date.

B. Responsibilities

1. MassDOT Responsibilities. MassDOT is responsible for the review and approval of proposals from utility owners in accordance with the provisions in this *Policy*.
2. Utility Owner Responsibilities. Utility owners are responsible for:
 - a. Designing the utility facility to be installed within the highway right of way and/or attached to a highway structure. Full consideration must be given to measures necessary to preserve and protect the maintenance, operation, safety, and aesthetic characteristics of the highway and/or structure. Depth, clearances, and separation between utility facilities and the work must be in accordance with the provisions in this document and any and all applicable codes, laws mandated by federal regulations, guidelines and policies, Massachusetts General Laws, OSHA, etc.
 - b. Collecting and depicting information in accordance with Massachusetts General Laws, 220 CMR - 101.00 (gas), 125.00 (electric transmission), and in accordance with procedures set forth in ASCE Standard 38-02, *Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data*, and/or most recent version of MassDOT policies, procedures, codes, etc. See Chapter 10.D below for more information.

C. Requirements

Utility installations on, over, or under highway right of way shall meet the following minimum requirements and any applicable industry standards:

MASSDOT UTILITY ACCOMMODATION POLICY

1. Electric power and communications facilities shall conform to the currently applicable National Electrical Safety Code. For configurations and circumstances not specifically identified in the Code, the minimum standards in that Code for the lowest voltage line shall apply. Utility owners or industry standards may prescribe more protection. Depending upon the installation, MassDOT may have more restrictive requirements (See Chapter 12 of this *Policy*).
2. Water lines shall conform to applicable standards by the American Water Works Association.
3. Pressure pipelines shall conform to currently applicable federal, State, local and industry codes. Federal codes are contained in 49 CFR Parts 192, 193 and 195.
4. Liquid petroleum pipelines shall conform to the currently applicable recommended practice of the American Petroleum Institute for pipeline crossings under highways.
5. Any pipeline carrying hazardous materials shall conform to the rules and regulations of the U.S. Department of Transportation governing the transportation of such materials.

D. Subsurface Utility Engineering (SUE)

1. Subsurface Utility Engineering (SUE) is defined as a branch of engineering practice that involves managing certain risks associated with the following: utility mapping at appropriate quality levels, utility coordination, utility relocation design and coordination, utility condition assessment, communication of utility data to concerned parties, utility relocation cost estimates, implementation of utility accommodation policies, and utility design.

2. The SUE process should be an integral part of the design for every new utility facility installation on highway right of way. Upon MassDOT review of the proposed scope of work, MassDOT shall decide on a case-by-case basis as to whether or not an SUE shall be required. The SUE process for collecting and depicting information about existing subsurface utility facilities is described in ASCE Standard 38-02, *Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data*. This standard provides a system of classifying quality levels of existing underground utility data that are placed on plans. Such classifications allow the project owner, the engineer, and the contractor to develop strategies to reduce the risk, or at a minimum, to allocate risk to existing underground utilities in a defined manner.
3. The SUE process involves systematically evaluating the need for accurate and comprehensive information. The SUE process typically works as follows:
 - a. SUE normally begins with the collection and correlation of existing utility records (Quality Level D) and survey of visible utility facilities (Quality Level C).
 - b. It may then proceed to the application of appropriate surface geophysical methods to determine the existence and horizontal position of utility facilities within the area of the proposed excavation (Quality Level B).
 - c. This information is surveyed to project control, correlated with previously obtained information, and analyzed for conflicts with the proposed installation.
 - d. It may then be determined that additional information is needed that involves physically exposing existing subsurface utility facilities (Quality Level A).
4. SUE is a step-by-step process. There are other steps in addition to those shown above, but the ones shown above establish the general framework for the process and utilize the basic technologies (surface geophysical methods for utility imaging and vacuum excavation for nondestructive excavation). Decisions are made at every step as to whether or not more information is needed.

5. The proper use of SUE during the development of highway projects will eliminate many of the utility problems typically encountered on highway projects including:
 - a. Delays to projects caused by waiting for utility relocation work to be completed so highway construction can begin;
 - b. Delays to projects caused by redesign when construction cannot follow the original design due to unexpected utility conflicts;
 - c. Delays to contractors during highway construction caused by cutting, damaging, or discovering utility lines that were not known to be there;
 - d. Claims by contractors for delays resulting from unexpected encounters with utilities;
 - e. Deaths, injuries, property damage, and releases of product into the environment caused by cutting utility lines that were not known to be there.

11 - CONSTRUCTION REQUIREMENTS

A. General

1. Construction requirements are included as an integral part of MassDOT permits. These requirements are not repeated verbatim in this *Policy*. It will be the permittee's responsibility to be aware of all the construction requirements contained in the approved permit and to comply with them.
2. In addition to any requirements specified in the highway access permits, all permittees will be required to comply with the following:
 - a. Permit at Job Site. When MassDOT issues a permit to a utility owner for its proposed work, a complete copy of the approved permit shall be in the possession of the utility owner's work force, consultant, contractor or subcontractor at all times when utility work is being performed within the highway right of way.
 - b. Use of Highway Median. Any use of a highway median is prohibited unless specifically authorized in the approved permit.

- c. Use of Temporary Guard Pole. No guard pole (i.e. pole used to prevent aerial lines from falling onto the traveled way) shall be set within the right of way unless specifically authorized in the approved permit.
- d. Unexpected Field Conditions. Any modifications of the terms of the approved permit to meet changed or unexpected field conditions shall require prior MassDOT approval before any work may proceed. A written request must be made to amend the permit to allow such changes under the approved permit.
- e. Blasting. Blasting on the right of way is prohibited unless specifically authorized in the approved permit, and in strict accordance with the terms and conditions stated therein.
- f. Survey Markers. Neither MassDOT survey markers (e.g. right of way marker, benchmark) nor any other survey markers (e.g. USGS, County) located on MassDOT right of way shall be disturbed unless prior approval has been obtained from MassDOT or their owners. MassDOT or the utility owner, at the expense of the permittee, shall restore any survey marker that is disturbed, removed or destroyed.
- g. Vegetation. No trees, shrubs, or other vegetation shall be sprayed, cut, trimmed, or damaged in any way to facilitate the installation of a utility facility unless specifically authorized in the approved permit, and in strict accordance with the terms and conditions stated therein.
- h. Rare or Endangered Species. Utility owners should be aware of rare or endangered species, or animal and insect species that feed off of native vegetation in the right of way that must be protected or avoided by law.
- i. Highway Signs. A utility owner shall not remove any highway sign unless approved to do so in its permit, and in strict accordance with the terms and conditions stated therein.

B. Temporary Traffic Control

1. Temporary traffic control for utility construction shall conform to the *Massachusetts Amendments to the Manual on Uniform Traffic Control Devices*, the most current edition of the *MUTCD* and the *MassDOT Work Zone Safety Guidelines for Massachusetts Municipalities and Contractors*. Any utility construction operation shall be planned with full regard to safety, and interference with roadway traffic shall be kept to an absolute minimum.
2. No utility work shall begin until all appropriate temporary traffic control devices are in place and fully functional. These temporary traffic control devices must be maintained until all utility work is complete.
3. For those operations that entirely close or encroach upon a traffic lane, shoulder or ramp, a proper temporary traffic control plan shall be submitted or made reference to with a utility owner's permit application. On heavily traveled highways, utility construction operations interfering with traffic will not be allowed during periods of peak traffic flow.
4. Based on the duration of field work, all utility work that takes longer than 15 minutes to perform should utilize appropriate typical diagrams contained in the *Massachusetts Amendments to the Manual on Uniform Traffic Control Devices*, the most current edition of the *MUTCD* and the *MassDOT Work Zone Safety Guidelines for Massachusetts Municipalities and Contractors*.
5. If desired, a utility owner may develop its own temporary traffic control plan contingent upon MassDOT approval. MassDOT may require a more extensive temporary traffic control plan if:
 - a. Utility work is to be performed during nighttime hours;
 - b. Temporary traffic control zones are to be left overnight or during other non-work times;
 - c. Utility work is to be performed in a continuously moving temporary traffic control zone;
 - d. Typical diagrams in the *Massachusetts Amendments to the Manual on Uniform Traffic Control Devices*, the most current edition of the *MUTCD* and the *MassDOT Work Zone Safety Guidelines for Massachusetts Municipalities and Contractors* do not adequately cover utility work.

6. Most utility operations fall into the category of short-term work. The work crew is present to maintain and monitor the temporary traffic control zone. Signs are mounted on portable stands and pavement markings are not removed.
7. Mobile temporary operations often involve frequent short stops for utility work during daylight hours that will be completed in 15 minutes or less. As compared to stationary operations, mobile operations are activities that might involve different treatments. Basic considerations for mobile temporary work are as follows:
 - a. Maintaining safe work and road user conditions is a paramount goal in carrying out mobile operations. During mobile work, it often takes longer to set up and remove temporary traffic control devices than to perform the work. Workers face hazards in setting up and taking down the temporary traffic control zone. Also, since time is short, delays affecting road users are significantly increased when additional devices are installed and removed. Considering these factors, simplified control procedures may be warranted for short-duration work. A reduction in the number of signs and channelizing devices may be offset by the use of some or all of the following safety devices: truck mounted attenuators, marked vehicles with rotating lights or strobe lights preferably augmented with signs or arrow boards, and flaggers/police.
 - b. Most mobile work activity usually does not require the use of a specific temporary traffic control plan. Even so, a utility owner is still responsible for providing temporary traffic control adequate to protect public safety. If a mobile operation does not move every 15 minutes, a long-term operation and the appropriate long-term layout should be considered. If sight distance is limited or traffic volumes are high, a long-term operation should be considered.

- c. Safety shall not be compromised by using fewer devices simply because the operation is only for a few minutes or will frequently change its location. Portable devices shall be used and flaggers/police may be used, but caution must be exercised so they are not exposed to unnecessary hazards. The temporary traffic control devices shall be moved periodically to keep them near the work space. If mobile operations are in effect on a high speed travel lane or shoulder lane of a multi-lane (high volume/high speed) highway, a truck mounted attenuator with an arrow board shall be used.

C. Work Safety

1. The utility owner is responsible for securing the work site against any hazard to workers, pedestrians, bicyclists, and the motoring public at all times until all of the work is completed. Vehicles, equipment, and materials that are in active use at the work site shall be regulated by the utility owner to assure consistently safe conditions.
2. Sheeting, shoring, bulkheads, and concrete barriers may be required by MassDOT, as may anything else deemed to comply with OSHA requirements for safeguarding work sites.
3. Utility hardware or equipment that is located at the work site, but not in immediate use, shall be stored in a safe location off of the right of way. If this is not practical, the hardware or equipment may be stored beyond the clear zones as close to the fence or right of way line as possible.
4. Vehicles and equipment shall have their high intensity flashing lights (strobe or revolving) and hazard warning lights operating during work operations when they are within the right of way.
5. All workers (utility, MassDOT, contractor, etc.) who are exposed to or working adjacent to moving motor vehicle traffic or mobile earth-moving equipment shall wear high visibility apparel meeting MassDOT standards (safety vest, shirt or jacket and a hardhat) at all times. High visibility pants are also required at all times for flag persons and during low light and night time conditions for all others. High visibility apparel shall comply with the requirements set forth in the *Massachusetts Amendments to the Manual on Uniform Traffic Control Devices*.

D. Trenching and Backfill

1. Trenchless Construction

- a. Every possible effort should be made to avoid disturbing the pavement surface when installing new utility facilities, especially where underground utility lines are crossing major highways, expressways, or freeways. Trenchless construction should always be considered as a means of doing this. Trenchless methods may include driving, coring, or boring.
- b. The size of the trenchless construction operation will be restricted and the conditions specified under which the void outside the carrier or casing must be backfilled with grout. Where soils are favorable and the carrier is four (4) feet or more deep, the diameter of the trenchless construction hole may be five (5) percent larger than the diameter of the carrier. Grout backfill will be considered for carriers or casings more than twelve (12) inches in diameter and for overbreaks, unused holes, or out-of-service carriers or casings.
- c. Portal limits (e.g. surface openings, bore pit limits) of pipeline crossings should be established beyond the clear zone of the highway so as to avoid impairing the roadway during installation of the pipeline. Where a bulkhead seals the pipeline portal, the portal should be suitably offset from the surfaced area of the highway. Where a bulkhead is not installed in the pipeline, the portal must be offset no less than the vertical difference in elevation between the surfaced area of the highway and the pipeline.

2. Trenched Construction

- a. At highway crossings, care must be taken to prevent the trench from becoming a drainage channel. On longitudinal lines, care must be taken to prevent the trench from interfering with surface or subsurface drainage.
- b. During construction, open trenches or other excavations within the clear zone shall not be permitted to remain beyond the workday unless backfilled, covered, delineated or shielded.
- c. The following minimum specifications for trenching and backfilling shall be applied:

- i. When the existing highway pavement must be cut to accommodate a utility facility installation, the opening shall be saw cut to a minimum depth of one and one-half (1.5) inches.
- ii. The width of pavement removal should be determined by the width of the required trench plus twelve (12) inches minimum on each side of the top of trench. In the event the distance of any adjacent longitudinal or transverse joint or crack is less than four (4) feet from the recommended width of cut, the pavement shall be removed and replaced to that joint or crack. The additional pavement removal is intended to minimize later development of a sag in the surface of pavement over the trench.
- iii. Trenches shall be cut to have vertical faces; soil shall be shored where necessary. Lateral and vertical support shall be provided for all existing facilities and structures. Short tunnel sections shall be used near adjacent facilities.
- iv. Bedding shall be provided to a depth of six (6) inches or half the diameter of the casing or carrier, whichever is less. Bedding shall consist of granular material, free of lumps, clods, stones, and frozen materials, and shall be graded to a firm but yielding surface without abrupt change in bearing value. Unstable soils and rock ledges shall be sub-excavated from the bedding zone and replaced by suitable material. The bottom of the trench shall be prepared to provide uniform bedding throughout the length of the installation.
- v. Controlled Density Fill (CDF) shall be the standard backfill material for work performed under a MassDOT permit. Gas Companies may seek a waiver due to corrosion of pipe and leak detection issues. All work shall conform to MassHighway's *Standard Specifications for Highways and Bridges*, 1988, as supplemented. CDF shall meet the requirements of Section M4.08.0 (Type 1E or 2E excavatable) of the referenced document. CDF is mandatory for trench cuts within paved surfaces that are four (4) feet or less.

- vi. Backfill under the roadway and foreslopes shall be placed in two (2) stages: first, fill to a level of the top carrier or casing; and second, fill to the former surface. Fill shall consist of suitable material placed in layers of appropriate thickness to permit consolidation by compaction according to current applicable specifications. Consolidation by flooding or jetting may be permitted only in specific warranted conditions. For backfill of trenched pavement, materials and methods of compaction shall be adapted to achieve prompt restoration of traffic service.
- vii. MassDOT may require that backfill and/or repaving to MassDOT standards be performed by its forces or under its direction at the expense of the utility owner. Where a utility owner can demonstrate that it is capable of acceptable and adequate repair, it may be authorized to perform its own restoration using specifications acceptable to MassDOT.
- viii. The utility shall be responsible for repairing all settlements for a period of one year following the project completion.
- ix. The option to require the utility applicant to resurface the roadway (either half or full width) shall be determined by MassDOT based on the amount of trench work.

E. Encasement

- 1. Casings should be considered for the following conditions:
 - a. As an expediency in the insertion, removal, replacement, or maintenance of carrier pipe crossings of freeways, expressways, and other controlled access highways, and at other locations where it is necessary to avoid trenched construction;
 - b. As protection for carrier pipe from external loads of shocks either during or after construction;

- c. As a means of conveying leaking fluids or gases away from the area directly beneath the roadway to a point of venting at or near the right of way line or to a point of drainage in the highway ditch or a natural drainage way;
 - d. For installation on highway structures.
- 2. The MassDOT Highway Administrator will determine the need for casings of pressurized carrier pipes and carriers of materials that are flammable, corrosive, expansive, energized, or unstable.
- 3. Jacked or bored installations of coated carrier pipes shall be cased. Exceptions may be made where assurance can be provided against damage to the protective coating.
- 4. Encasement or other suitable protection shall be provided for any pipeline with less than minimum cover, near footings of bridges or other highway structures or across unstable or subsiding ground, or near other locations where hazardous conditions may exist.
- 5. Rigid encasement or suitable bridging shall be used where support of pavement would be impaired by depression of flexible carrier pipe. Casings shall be designed to support the load of the highway and superimposed loads thereon and, as a minimum, shall equal the structural requirements for highway drainage facilities. Casings shall be composed of materials of satisfactory durability under conditions to which they may be exposed.
- 6. Casing pipe shall be sealed at the ends with a flexible material to prevent flowing water and debris from entering the annular space between the casing and the carrier. The installations should include necessary appurtenances, such as vents and markers.
- 7. See Chapter 12.C.3 for additional information pertaining to encasement of pipelines.

F. Mechanical Protection

- 1. For some conditions, pipeline crossings of the highway may be installed without encasement. Normally, such installations should be limited to trenched construction. The following controls are suggested for providing mechanical protection to encased pipeline crossings of the highway.

- a. On uncased construction the carrier shall conform to the material and design requirements of utility industry and governmental codes and standards. In addition, the carrier pipe shall be designed to support the load of the highway plus superimposed loads thereon when the pipe is operated under all ranges of pressure from maximum internal to zero pressure. Such installations shall employ a higher factor of safety in the design, construction, and testing than would normally be required for cased construction.
- b. Suitable bridging, concrete slabs, or other appropriate measures shall be used to protect existing uncased pipelines, which by reason of shallow cover or location make them vulnerable to damage from highway construction or maintenance operations. Such existing lines may remain in place without further protection measures if they are of adequate depth and do not conflict with the highway construction or maintenance operations, provided both highway and utility officials are satisfied that the lines are, and will remain, structurally sound and operationally safe.
- c. Uncased crossing of welded steel pipelines that carry flammable, corrosive, expansive, energized, or unstable materials, particularly if carried at high pressure or potential, may be permitted, provided additional protective measures are taken in lieu of encasement. Such measures would employ higher factor of safety in the design, construction, and testing of uncased carrier pipe, including such features as thicker wall pipe, radiograph testing of welds, hydrostatic testing, coating and wrapping, and cathodic protection.

G. Pavement Cuts

1. Open cutting of the pavement to install utility facilities is highly discouraged because it adversely affects the structural integrity of the roadway. If it is not possible to install a utility without disturbing the pavement, the utility owner must provide written documentation and justification for an open cut. Where a longitudinal open cut is proposed or where several cuts are proposed to cross the pavement in the same area, MassDOT representatives responsible for the affected section of roadway will inspect the roadway to determine the extent of road repair that will be required to incorporate multiple patches in close proximity into one (1) large patch. Pending the extent of the project area, the MassDOT representative shall determine whether to require the applicant to resurface the roadway half or full width. All sawcut edges of pavement cuts shall be treated with a MassDOT approved hot mix asphalt joint sealer.
2. The utility owner shall be required to use patch materials at least equal in type, quality and layer thickness to the original construction, and the patch must be placed in accordance with MassDOT specifications. The limits of the pavement patch must extend at least one (1) foot outside the perimeter of the trench. The edges of the trench must be beveled at least six (6) inches. The limits of the patch must have vertical faces and must be saw cut for a clean break. The restored surface must be flush with and sloped at the same rate as the existing surface (see Utility Trench Permanent Pavement Repair Standard Drawing <http://www.massdot.state.ma.us/highway/Departments/UtilitySection/FormsDocuments.aspx>).

H. Markers/Facility Protection

1. A trace wire, metallic tape, or other method to effectively locate and mark the underground lines shall accompany all non-metallic underground lines. Whenever feasible, such methods shall include devices incorporated into the utility line.

2. No underground line shall be permitted within the highway right of way unless the line owner contacts the Dig Safe System (888-DIG-SAFE). MassDOT, Massachusetts Water Resources Authority (MWRA), Massachusetts Bay Transportation Authority (MBTA), the Department of Conservation and Recreation (DCR) and most municipalities are not Dig Safe members and must be contacted individually. The utility owner shall provide MassDOT with both a copy of the associated Dig Safe ticket as proof of the Dig Safe notification, and a spreadsheet notification list of contacts made to non-Dig Safe members (contact name, date, action, and related details).
3. The utility owner shall place permanent markers identifying the location of underground utility facilities, whether they are crossing the highway or installed longitudinally along the highway, where appropriate. Markers shall be installed in such a manner as to not interfere with highway safety and maintenance operations. Preferably, the markers shall be located at the right of way line if that location will provide adequate warning. The telephone number for one-call notification services to request marking the line location prior to excavation and for emergency response shall appear on the marker.
4. When it is likely that highway construction or maintenance activities could involve existing underground facilities, it is desirable to locate and identify these facilities well in advance of the commencement of the work as an aid to work crews. The location of each underground utility facility shall be identified by the utility owner with stakes, paint, or other temporary on-the-surface markings coded with an identifying color by utility type. The recommended uniform color code system is shown in Table 3.

MASSDOT UTILITY ACCOMMODATION POLICY

**TABLE 3 -
UNIFORM
COLOR CODES**

Red	Electric power lines or conduits – distribution, transmission, and municipal electric systems.
Yellow	Gas or oil pipelines – distribution and transmission, all pipelines carrying hazardous or dangerous materials including petroleum products, steam, compressed air, or compressed gases.
Orange	Communication lines including telephone and telegraph systems, police and fire communications, and cable television.
Blue	Water systems, irrigation, reclaimed water, and slurry pipelines.
Green	Storm and sanitary sewers and drains.
Florescent Pink	Temporary survey markings.
White	Proposed excavation.

5. When it is likely that a highway construction or maintenance activity such as boring, tunneling, jacking, or other method could involve underground facilities in close proximity to a MassDOT drainage system, the applicant shall certify upon completion of the work that the utility installation has not damaged or reduced the capacity of the drainage structures or pipes. At the direction of MassDOT, a joint inspection of the facility may be required.

Chapter**12**

12 - SPECIFIC REQUIREMENTS

A. Overhead Power and Communication Lines

1. This *Policy* was developed with integrated sections. Thus, other sections may be applicable to overhead power and communication lines and need to also be read in order for the reader to fully understand this topic.
2. Location
 - a. In rural areas, new overhead power and communication pole lines shall be located on uniform alignment as far from the roadway as possible, preferably near the right of way line. Guy wires placed within the right of way shall be held to a minimum. They may be located as needed but in no case shall they be located within the clear zone. When practical, MassDOT prefers use of "un-guyed" utility poles.

- b. In urban areas, new overhead power and communication pole lines in uncurbed sections shall be located at or as near as practical to the right of way line. Where there are curbed sections, the utility facility shall be located as far as practical behind the face of the outer curbs and, where feasible, behind the sidewalks at such locations that will not interfere with adjacent property use. MassDOT's recommendation is that there shall be at least a two (2) foot clearance behind the face of the curb. When practical, MassDOT prefers use of "un-guyed" utility poles.
- c. The location of overhead utility facilities on highways with narrow right of way or on urban streets with closely abutting improvements requires special considerations. Such cases must be resolved in a manner consistent with the prevailing limitations and conditions. Before locating the utility facility at other than the right of way line, consideration should be given to designs employing self supporting, armless single-pole construction, with vertical alignment of wires or cables, or other techniques permitted by governmental or industry codes that are conducive to safe traffic environment. Exceptions to these clearances may be made where poles and guys can be shielded by existing traffic barriers or placed in areas that are inaccessible to vehicular traffic.
- d. New above ground facilities shall be located outside the clear zone. If the clear zone extends to the right of way line, then no installation shall be permitted unless approved through the exception process (see Chapter 1, Section H). Where there are no feasible alternatives, new facilities that project more than four (4) inches above the ground line shall be shielded by existing traffic barriers or placed in areas that are inaccessible to vehicular traffic.
- e. Longitudinal lines on highway right of way shall be limited to single pole construction. Transverse lines shall also be limited to single pole construction where practicable, but may also be approved to use the same type of supports that are used on the portion of the line immediately adjacent to the highway right of way provided all other requirements in this section are met.

- f. Where irregular shaped portions of the right of way extend beyond or do not reach the normal right of way limits, variances in the location of utility facilities should be allowed to maintain a reasonably uniform alignment for longitudinal installations. Such installations will reduce the need for guys and anchors between poles and roadway.
- g. Longitudinal installations of poles, guys, or other facilities shall not be located in a highway median. For crossings of a highway, poles should not be located in the highway median unless there is no feasible alternative, in which case, if located within the clear zone, they shall be shielded by existing traffic barriers or placed in areas that are inaccessible to vehicular traffic.
- h. The horizontal and vertical location of overhead power and communication lines relative to a highway bridge or other structure shall provide adequate clearance for construction and maintenance activities.

3. Design

- a. All overhead lines regardless of voltage or metallic content shall meet the requirements of the current *National Electrical Safety Code*.
- b. Designs employing self-supporting, armless, single-pole construction, with vertical alignment of wires, cables, or other techniques permitted by governmental or industry codes, should be considered whenever feasible. However, they must be conducive to safe traffic operations.
- c. Joint-use single pole construction shall be encouraged at locations where more than one utility or type of facility is involved.
- d. The distance between utility poles shall be the longest feasible span lengths consistent with geometric and design line loading considerations.

- e. Where practical and economically feasible, existing pole lines shall be replaced with buried cables when relocation is necessary within the highway right of way. Buried cable may not be practical where there will be multiple connections to overhead lines, to utility customers, or where line voltage is high.

4. Vertical Clearances

- a. The minimum vertical clearance for overhead power and communication lines above the highway and approaches to the highway shall conform to the current *National Electrical Safety Code and 220 CMR 125*.
- b. Lines crossing over highways shall at no time be less than 18 feet above the high point of the traveled way. Greater clearances shall be used when required by State law, regulation, or policy.

B. Underground Power and Communication Lines

- 1. This *Policy* was developed with integrated sections. Thus, other sections may be applicable to underground power and communication lines and need to also be read in order for the reader to fully understand this topic. Due to State legislation and legal arrangements that impact the Commonwealth's development of fiber optics facilities, separate guidelines for these installations are presented in Chapter 5 of this *Policy*. The installation of fiber optics on all other highways is subject to the provision contained herein.

2. Location

- a. Underground power and communication lines may be placed longitudinally by plowing or open trench method and must be located on uniform alignment as near as practical to the right of way line to provide a safe environment for traffic operations, preserve the integrity of the highway, and preserve space for future highway improvements or other utility facility installations. The distance from the right of way line will depend upon the terrain involved and obstructions such as trees and other existing underground or aerial utility lines. On highways with frontage roads, longitudinal installation will be located between the frontage roads and the right of way lines. Underground lines shall not be placed longitudinally beneath the median or beneath through traffic roadway including shoulders. Underground lines placed longitudinally along a connecting roadway shall not be placed under the median or beneath through traffic roadways, including shoulders, where the roadway connects with a State highway.
- b. Underground power and communication lines to be installed across any existing roadway shall be installed by boring, tunneling, or jacking in accordance with MassDOT specifications. When installed by jacking or boring, encasement may be required. Bore pits should generally be located at least thirty (30) feet from the edge of the nearest through traffic lane and at least twenty (20) feet from the edge of the pavement on ramps. On low-traffic roadways and frontage roads, bore pits should be at least ten (10) feet from the edge of pavement and at least five (5) feet from the face of the curb. Adequate warning devices, barricades, and protective devices must be used to prevent traffic hazards. Where circumstances necessitate the excavation of a bore pit closer to the edge of pavement than established above, concrete barrier or other approved devices must be installed for protection of traffic. Bore pits must be located and constructed to not interfere with highway structural footings. Shoring must be used if necessary.

- c. Utility crossings should be avoided in deep cuts; near footings of bridges, retaining, and noise walls; at highway cross drains where flow of water and drift of streambed load may be obstructed; in wet or rocky terrain where it is difficult to attain minimum cover; and through paved or unpaved slopes under structures.

3. Depth of Cover

- a. The critical controls for depth of cover for underground power and communication lines are the low points in the highway cross section. Usually these are the bottoms of the longitudinal ditches. The critical controls for cover are the depths of drainage facilities, bridge structures, and likely maintenance operations. The depth of cover shall be sufficient to withstand the greatly increased impact loads transmitted through frozen soil.
- b. Minimum depths for longitudinal power lines are as follows:
 - i. Lines that are not under the roadway shall have a minimum depth of cover of two and one-half (2.5) feet in soil and two and one-half (2.5) feet in rock for both cased lines and non-cased lines.
 - ii. Lines that are under the pavement surface shall have a minimum depth of cover of two and one-half (2.5) feet for both cased lines and non-cased lines.
- c. Minimum depths for longitudinal communication lines and low voltage power lines are as follows:
 - i. Lines that are not under the roadways shall have a minimum depth of cover of one and one-half (1.5) feet in soil and one and one-half (1.5) feet in rock for both cased lines and non-cased lines.
 - ii. Lines that are under the pavement surface shall have a minimum depth of cover of two (2) feet for both cased lines and non-cased lines.
 - iii. All lines shall have a minimum depth of cover of three (3) feet under ditches.

- d. The depth of bury for all underground facilities crossing the highway shall be a minimum of: three (3) feet under ditches and a minimum of five (5) feet under the pavement surface as measured from a straight line connecting the lowest points of the finished ground or pavement surface on each side of the right of way to the top of the facility at the time of the installation.
- e. Where minimum bury is not feasible, the facility shall be rerouted or protected with a casing, concrete slab, or other suitable measures. In solid rock, the depth of bury may be reduced if adequate protection is provided.
- f. Exceptions may be authorized for existing power and communication lines to remain in place with a reduction of six (6) inches in the depths of cover specified. Where less than minimum cover will result, the utility line shall be provided with additional mechanical protection by the utility owner. In such instances, the designer shall consider increasing wall thickness or encasing the utility facility when the depth of cover is less than desirable, taking into account the relative risk with respect to the product carried and engineering and safety factors.
- g. Further reductions may be permitted if the line is protected by a reinforced concrete slab that meets the requirements as follows:
 - i. Width: Three (3) times the facility diameter but not less than four (4) feet;
 - ii. Thickness: Minimum of six (6) inches;
 - iii. Reinforcing: Minimum of #4 bars on 12-inch centers or equivalent;
 - iv. Cover: Minimum of six (6) inches between the slab and top of line.
- h. All utility owners shall obtain prior approval from MassDOT before burying any utility facility less than the minimum depth required.

- i. More information concerning specific utilities can be found in Chapter 6.E of this *Policy*. Minimum depths for all utility facilities are summarized in Table 1, Chapter 6.

4. Encasement

- a. Underground power and communication lines may be cased or non-cased provided the installation complies with the depths of cover specified herein. Encasement, where used, may be metallic or nonmetallic. Such encasement shall be designed to support the load of the highway and superimposed loads thereon, including that of construction equipment. The strength of the encasement must equal or exceed structural requirements for drainage culverts, and it must be composed of materials of satisfactory durability under conditions to which it may be subjected.
 - b. Where used, encasement must be provided under center medians, from top of back slope to top of back slope for cut sections, five (5) feet beyond toes of slope and under fill sections, five (5) feet beyond face of curb in urban sections and all side streets, and five (5) feet beyond any structure where the line passes under or through. Encasement may be omitted under medians that are substantially wider than normal standards for such roadways.
 - c. See Chapter 11.E for additional information pertaining to encasement.
5. Appurtenances. See Chapter 6.D for information pertaining to appurtenances associated with underground power and communication lines.
6. Markers/Facility Protection. See Chapter 11.H for information pertaining to markers and facility protection.

C. Pipelines

1. This Policy was developed with integrated sections. Thus, other sections may be applicable to pipelines and need to also be read in order for the reader to fully understand this topic.

2. Codes

- a. Pressure pipelines carrying gas and liquid petroleum shall conform to the currently applicable sections of federal, State, local and industry codes. Federal codes are contained in 49 CFR , parts 192, 193, and 195.
- b. High pressure gas pipelines shall conform to the current applicable sections of the *Standard Code of Pressure Piping* of the American National Standards Institute and applicable industry codes.
- c. Liquid petroleum pipelines shall conform to the current applicable recommended practice of the American Petroleum Institute for pipeline crossing under highways.
- d. Water lines shall conform to the current applicable specifications of the American Water Works Association.
- e. Any pipeline carrying hazardous materials shall conform to the rules and regulations of the U.S. Department of Transportation governing the transportation of such materials, including Code of Federal Regulations, title 49, parts 192, 193, and 195.
- f. Pipeline installation permits shall specify the class of the materials being carried; the maximum working, test, or design pressures; and the design standards for the carrier.
- g. When it is anticipated that there will be a change in the class of materials being carried or an increase in the maximum design pressure specified in the permit, the utility owner shall give MassDOT advance notice and obtain approval for such changes. The notice shall specify the applicable codes to be used.

3. Encasement

- a. All high pressure pipelines less than six (6) inches in diameter and all low pressure pipelines crossing under the roadbed of trunk highways may be cased or non-cased. However, only welded steel lines with adequate corrosion protection may be used for non-cased highway crossings.
- b. All high pressure pipelines six (6) inches in diameter or greater carrying gases and all pipelines carrying hazardous liquids crossing under trunk highways shall be cased, unless the following conditions are met:
 - i. Open trenching method. Pipelines placed by an open trench method must be of sufficient inherent strength to withstand the forces imposed by highway and vehicular traffic and must be coated or of a non-corrosive material that meets industry standards.
 - ii. Trenchless Technology. Pipelines placed using trenchless technologies, such as jacking, boring, or horizontal directional drilling methods, may be placed under highways without a casing pipe if they meet specified requirements. All proposed crossings using this method of installation will be reviewed and approved on a case-by-case basis considering the soil conditions, locations of pipeline, pipeline size, other pipeline, other pertinent factors, and adherences to the following requirements:
 1. It is a welded steel pipeline;
 2. It is cathodically protected;
 3. It is coated in accordance with accepted industry standards;
 4. It complies with federal and State requirements and meets accepted industry standards regarding wall thickness and operating stress levels;
 5. The depth of the crossing is a minimum of three (3) feet below the original ditch grade;

6. The bores are continuous from the beginning of the installation until the leading edge of the pipeline is through the entire crossing;
 7. The completed pipeline crossings are all pressure tested;
 8. During pipeline installation, traffic on the highway will not be restricted and all MassDOT regulations will be applied;
 9. Grouting will be done along the top of the pipe to fill all voids;
 10. Large mains that are out of service in the highway right of way will be removed or filled with approved materials.
- c. All water lines shall be cased when crossing under the roadbed of trunk highways, except service lines of two inch diameter or less. Encasement may also be omitted under entrances, depending upon the type and amount of traffic and depth, condition, and maintenance responsibility.
 - d. Where pipelines are cased, the encasement should extend a suitable distance beyond the slope or ditch lines. On curbed sections, the encasement should extend outside the outer curbs. Where appropriate, the encasement should provide for future widening of the highway without the need for any utility adjustment.
 - e. See Chapter 11.E for additional information pertaining to encasement.
4. Crossings
- a. Pipeline crossings shall be avoided within basins of an underpass drained by a pump if the pipeline carries a liquid, liquefied gas, or other potentially hazardous materials.

- b. Installations crossing existing highways and made subsequent to highway construction may be placed by auguring from inside the pipe. Pre-auguring is not permissible. The leading edge of the auger head shall not protrude more than one inch from the end of the casing during boring operations.
- c. Carrier pipe six (6) inches in diameter and under may be installed by pushing or jacking it under an existing roadway.

5. Depth of Cover

- a. The critical controls for depth of cover for pipelines are the low points in the highway cross section. Usually these are bottoms of the longitudinal ditches. The critical controls for cover are the depths of drainage facilities, bridge structures, and likely highway maintenance operations. The depth of cover must be sufficient to withstand the greatly increased impact loads transmitted through frozen soil.
- b. Minimum depths for longitudinal pipelines, except water, are as follows:
 - i. Pipelines which are not under the roadway shall have a minimum depth of cover of three (3) feet for both cased and non-cased lines.
 - ii. Pipelines that are under the pavement surface shall have a minimum depth of cover of three (3) feet in soil and two (2) feet in rock for both cased and non-cased lines.
 - iii. Pipelines shall have a minimum depth of cover of three (3) feet under ditches.
- c. Minimum depths for longitudinal water pipelines are as follows:
 - i. Water mains shall be laid with a minimum cover of five and one-half (5 1/2) feet or to the grade of the existing pipe unless otherwise shown on the plan or directed by the Engineer.

- ii. If the minimum cover cannot be met and/or when a water pipe is to be hung within or on a bridge structure, or when placed within one foot of a drainage manhole or catch basin, proper insulating material must be installed on the water pipe as per the MassHighway *Standard Specifications for Highways and Bridges*.
- d. The depth of bury for all underground facilities crossings the highway shall be a minimum of three (3) feet under ditches and five (5) feet under the pavement surface as measured from a straight line connecting the lowest points of the finished ground or pavement surface on each side of the right of way to the top of the facility at the time of installation.
- e. Where minimum bury is not feasible, the facility shall be rerouted or protected with a casing, concrete slab, or other suitable measures. In solid rock, the depth of bury may be reduced if adequate protection is provided.
- f. Exceptions may be authorized for existing pipelines to remain in place with a reduction of six (6) inches in depths of cover specified. Further reductions may be permitted if the pipeline is protected by a reinforced concrete slab that meets the requirements as follows;
 - i. Width: Three times the pipe diameter but not less than four feet;
 - ii. Thickness: Minimum of six inches;
 - iii. Reinforcing: Minimum of #4 bars on 12 inch centers or equivalent;
 - iv. Cover: Minimum of six inches between the slab and top of pipe.
- g. All utilities shall obtain prior approval from MassDOT before burying any utility less than the minimum depth required.
- h. More information concerning specific utilities can be found in Chapter 6.E of this Policy.
- i. Minimum depths for all utilities are summarized in Table 1 in Chapter 6.

6. Boring Specifications

- a. Casing pipe shall be installed using equipment that encases the hole as the earth is removed. Boring without the concurrent installation of a casing pipe is not permissible. Casing pipe shall extend through the entire fill and be installed in a manner that will not disrupt traffic nor damage the roadway grade and surface. The introduction of water into an excavation is prohibited.
- b. Steel casing pipe shall be new material, the minimum yield strength of 35,000 psig (pounds per square inch gauge). All joints in steel casing pipe shall be welded. The minimum wall thicknesses presented in Table 4 below shall be used.

**TABLE 4 -
CASING PIPE
WALL
THICKNESS**

Outside Diameter	Under Highway
12" to 28"	0.250
30" to 34"	0.375
36" to 60"	0.500

- c. Reinforced concrete casing pipe must be properly classed based on the depth of cover over the pipe. A minimum of 5,000 pounds per square inch concrete pipe must be used when casing pipe is jacked. Bell type ends are not permitted.
- d. No boring is to be started under any portion of the roadway until an approved permit to do so has been received by the contractor.

7. Vents

- a. Vents shall be located at the high end of short casings and generally at both ends of casings longer than 150 feet.
- b. Vent standpipes shall be located and constructed so as not to interfere with maintenance or use of the highway. They should not be concealed by vegetation. They should preferably stand on a fence or right of way line.

- c. In urban areas, vents shall be permitted only where they do not affect pedestrian traffic.

8. Drains.

Drains shall be provided for casings and tunnels enclosing carriers of liquid, liquefied gas, or heavy gas. Drains shall empty outside the roadside area to a natural feature, a roadway ditch, or at other locations approved by MassDOT. Such outfall shall not be used as a wasteway for purging the carrier unless specifically authorized.

9. Shut-off Valves

Shut-off valves, preferably automatic, shall be installed in lines at or near ends of structure.

10. Appurtenances.

See Chapter 6.D for information pertaining to pipeline appurtenances.

11. Markers/Facility Protection

- a. The utility owner must place readily identifiable and suitable markers immediately above any underground pipelines it places within the right of way fence line.
- b. Signs shall identify the owner/operator name, the Dig Safe telephone number, the type of facility.
- c. Utility sign markers shall be placed at a maximum interval of one-quarter ($\frac{1}{4}$) mile and on each side of all public roads, streets, and trails the utility facility crosses.
- d. Where plastic pipe is installed without a metal casing, a metal wire must be installed concurrently or other means provided for detection purposes. See Chapter 11.H for additional information about markers and facilities protection.

12. Plastic Lines. The maximum size of plastic lines must not exceed industry standards.

D. Sanitary Sewers and Storm Drains

1. This Policy was developed with integrated sections. Thus, other sections may be applicable to sanitary sewers and storm drains and need to also be read in order for the reader to fully understand this topic.
2. Codes
 - a. Sanitary sewer shall be installed in accordance with industry standards.
 - b. Storm drains shall be installed in accordance with MassDOT standards.
3. Encasement
 - a. Gravity systems shall be cased when installed by jacking and/or boring, unless the carrier pipe is of such size and material that it would normally be installed without a casing.
 - b. Force mains larger than two (2) inches in diameter crossing a highway shall be cased under the roadbed.
 - c. Lines to be operated under pressure or which do not conform to the material, strength, or cover depths contained herein must be cased.
 - d. Encasement under entrances may be omitted, depending upon the type and amount of traffic and depth, condition, and maintenance responsibility.
 - e. See Chapter 11.E for additional encasement information.
4. Depth of Cover
 - a. The critical controls of depth of cover for sanitary sewers and storm drains are the low points in the highway cross section. Usually these are the bottoms of the longitudinal ditches, the depths of other drainage facilities, bridge structures, and likely highway maintenance operations.
 - b. The depth of cover should be sufficient to withstand the greatly increased impact loads transmitted through frozen soil.

MASSDOT UTILITY ACCOMMODATION POLICY

- c. Minimum depths for longitudinal sanitary sewers and storm drains shall be five and one-half (5 1/2) feet, or to the grade of the existing pipe unless otherwise shown on the plan or directed by the Engineer.
- d. Where minimum bury is not feasible, the facility shall be rerouted or protected with a casing, concrete slab, or other suitable measures. In solid rock, the depth of bury may be reduced if adequate protection is provided. Exceptions may be authorized for existing pipelines to remain in place with a reduction of six inches in depths of cover specified above.
- e. If the minimum cover cannot be met and/or when a sewer pipe is to be hung within/on a bridge structure, proper insulating material shall be installed on the sewer pipe as per the MassHighway Standard Specifications for Highways and Bridges.
- f. All utility owners shall obtain prior approval from MassDOT before burying any utility less than the minimum depth required.
- g. More information concerning specific utilities can be found in Chapter 6.E of this *Policy*.
- h. Minimum depths for all utility facilities are summarized in Table 1 in Chapter 6.

5. Separation Requirements.

- a. Drainage Pipe Separation: Sewer pipe shall be laid at a minimum of five (5) feet horizontally and eighteen (18) inches vertically from a drainage main.
- b. Water Pipe Separation:
 - i. Sewer pipe shall be laid a minimum of ten (10) feet horizontally from any existing or proposed water main.
 - ii. The elevation of the top (crown) of the sewer pipe shall be at least eighteen (18) inches below the bottom (invert) of the water main.

- iii. The sewer pipe shall be laid such that the pipe joints are equidistant and located as far as possible from the water main crossing.
 - c. Whenever any of these minimum separation distances cannot be met, a waiver must be granted by the District Permits Engineer and/or MassDOT District Highway Director.
- 6. Materials. New and relocated sewer lines may be of any material that has been proven to be of satisfactory strength and durability in local use, provided all other requirements are met and approved by MassDOT.
- 7. Markers/Facility Protection
 - a. The utility owner must place readily identifiable and suitable markers immediately above any sanitary sewer lines it places within the right of way line.
 - b. Signs shall identify the owner/operator name, the Dig Safe telephone number, and the type of facility.
 - c. Utility sign markers shall be placed at maximum intervals of one quarter ($\frac{1}{4}$) mile and on each side of all public roads, streets, and trails the utility facility crosses.
 - d. Where non-metallic lines are installed without a metallic casing, a durable metal wire must be installed concurrently or other means provided for detection purposes.
 - e. See Chapter 11.H for additional information about markers and facilities protection.

E. Irrigation and Drainage Pipes, Ditches, and Canals

- 1. Irrigation and drainage pipes installed across highway right of way should be designed and constructed in accordance with MassDOT standards for highway culverts and bridges.
- 2. Ditches and canals not required for highway drainage that closely parallel the highway shall generally not be constructed within the highway right of way unless approved by MassDOT.