Encroachment Application Technical Guidelines

EATG

Scope

This document provides guidelines for submission of encroachment requests and covers the requirements for different types of encroachments on pipelines and pipeline rights-of-way and easements owned or operated by Enterprise Products Company or its affiliates (Company).

All development and construction projects that are being planned in the vicinity of Company rights-of-way and easements are subject to review and approval by Company prior to performance of the work.

All encroachment requests by an Encroaching Entity should be made using the Encroachment Application form found at www.EnterpriseEncroachments.com.

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1.0 DEFINITIONS

Company – Enterprise Products Operating LLC, and any of its direct or indirect subsidiaries and joint venture entities.

Company Authorized Representative – A Company employee or third-party representative (where applicable) who has been designated by the local Operations Manager or their authorized designee, to represent the Company's interests during the execution of specific projects or project-related tasks.

Company Encroachment Engineer – A Company employee or third-party representative (where applicable) who works within the Company's Department of Encroachment Engineering.

Company Engineer – A Company employee or third-party representative (where applicable) who is an engineer.

Conditional Letter of No Objection (CLONO) – A document expressly stating the Company's conditions for approval of activity, crossing or construction within Company rights-of-way and easements.

Encroachment – Any activity, crossing or construction on or within the vicinity of Company owned and/or operated pipelines and/or Company rights-of-way and easements.

Encroachment Application – An application form, available at www.EnterpriseEncroachments.com, used to submit encroachment requests designed in compliance with these Technical Guidelines for review and approval by Company.

Encroachment Agreement (EA) – A legally-binding real estate document that outlines the Company's terms of permitted encroachment.

Encroaching Entity – Any landowner, third-party, or government agency (and their affiliates) performing an Encroachment, as defined above.

Requestor – An individual submitting a request on behalf of the Encroaching Entity.

HVL – Highly volatile liquid (e.g., ethane, butane, propane).

Mudline – The floor of a body of water such as a seabed, riverbed, or lake bottom. Mudline and flowline are often used interchangeably.

One-Call – Commonly referenced name for a state's or territory's underground utility notification agency whose purpose is to ensure operators mark the location of buried utility lines within their area of responsibility prior to any right-of-way or easement activity. Also known as a state's call 811 or call-before-you-dig system.

2.0 GENERAL

(1) No work shall be performed on a) Company-owned and/or operated pipeline(s), or b) Company rights-of-way and easements of any kind (collectively, "ROW") without the prior consent of Company. Company reserves the right to station representatives along the ROW when any work is being performed.

(2) To ensure timely completion of the encroachment evaluation, encroachment notifications, with complete construction/development plans, must be submitted by the Encroaching Entity using the Encroachment Application Form found online at www.EnterpriseEncroachments.com.

(3) Project plans to be submitted for consideration must contain the following information:

(a) Vicinity map and project location.

(b) The Company pipeline location, depth and ROW width clearly depicted in plan and profile.

(c) The plan and profile view of the encroachments and crossing locations with clearances depicted to/from the affected pipeline(s).

(d) A profile view of the existing surface elevations, the proposed surface elevations, and the elevation of the Company pipeline, including cross-sections and typical sections at the crossing / encroachment location.

(e) The pipeline labeled appropriately as "Enterprise Products Pipeline" including the pipe diameter size.

(f) Support detail drawings for pipeline(s) to be exposed during construction.

(g) Grading plan for locations with cut or fill over the pipeline(s).

(h) A standard warning statement shall be conspicuously displayed on all prints that depict the pipeline(s). The statement shall contain the following language:

WARNING

HIGH-PRESSURE PIPELINE(S)

Excavation and/or Construction Prohibited Without Written Permission From

Enterprise Products Company

(4) Incomplete drawing information or project plans will delay the encroachment evaluation.

(5) A CLONO, a fully executed EA, approval through Appendix A by Company Authorized Representative, or approval through Appendix B as stated within the appendix will need to be in place prior to any encroachment on existing Company ROW.

(6) If there is a conflict between applicable regulatory, industry, or Company standards or codes, the more stringent requirement will govern, at the discretion of the Company.

3.0 PIPELINE LOCATION AND DEPTH VERIFICATION

(1) The Encroaching Entity shall notify the appropriate state One-Call center of the location of their proposed encroachment activity.

(a) The Encroaching Entity should specify the precise location in GPS coordinates of the anticipated encroachment activity using the Encroachment Application.

(2) If possible, the Company will make reasonable efforts to determine pipeline depth of cover at the proposed encroachment location and provide that information to the Encroaching Entity upon receipt of a completed Encroachment Application.

(a) Under the following circumstances, unless otherwise stated within the applicable ROW document, the Encroaching Entity shall be responsible for verifying in-field the alignment and physical depth of the pipeline and shall provide that information to the Company:

(i) If the depth of cover of the pipeline cannot be obtained using Company standard methods.

(ii) If the pipeline depth of cover is more than six feet.

(iii) If the Encroaching Entity is acquiring additional ROW within the Company’s easement.

(b) Under all circumstances in which the Encroaching Entity is responsible for in-field verification of the alignment and physical depth of the pipeline:

(i) The method of pipeline verification will be at the discretion of Company Authorized Representative.

(ii) Such activity shall be monitored by Company Authorized Representative.

(iii) The Encroaching Entity shall provide the Company with the required design and construction drawings that include the updated pipeline location and depth information.

4.0 EXCAVATION, CONSTRUCTION AND RIGHT-OF-WAY RESTRICTIONS

(1) Prior to excavating within the ROW, the Encroaching Entity's excavator shall have a plate welded over the teeth of the bucket and the side cutters shall be removed to prevent pipeline damage.

(2) Excavation equipment used to remove material from above or around the pipeline shall maintain a minimum tolerance zone of 18 inches from the outer edge of the pipe in all directions, or as defined by state regulations, whichever is greater.

(3) Mechanical equipment is not allowed within the tolerance zone specified above.

(a) Excavating shall be performed by hand, or other non-mechanical means approved by a Company Authorized Representative, when within 18 inches plus one-half the outside wall diameter of the pipeline.

(b) Air cutting and vacuum excavation are permitted only with the approval of a Company Authorized Representative.

(4) Excavators must work/dig parallel to Company pipeline facilities as practically possible.

(5) If directed by a Company Authorized Representative, the Encroaching Entity shall install sandbags or other suitable insulating material to maintain proper vertical clearance from the pipeline.

(6) At any location where the pipeline is exposed, or where permanent pavement is proposed, the Encroaching Entity shall provide Company Authorized Representative the opportunity to inspect the pipeline condition, perform coating repair, install cathodic protection test leads, install underground warning tapes/mesh, or any other work as required. The Encroaching Entity must provide Company Authorized Representative with a means of safe ingress and egress for inspection.

5.0 STRUCTURES, FENCING AND LANDSCAPING

(1) No structures of any kind, whether permanent or temporary, shall be permitted on the ROW.

(2) The ROW shall be kept clear of all large debris that could interfere with maintenance or inspection.

(3) The Company must approve any fences crossing over its pipelines or associated ROWs prior to construction.

(a) Fences shall not be installed parallel to the pipeline within the associated ROW.

(b) Fence posts shall not be installed within 5 feet of the centerline of the pipeline.

(c) The landowner accepts full responsibility for all future damage to the fence if the Company or its designee must access the pipeline or the associated ROW to perform maintenance.

(d) No fences shall obstruct the line of sight between the pipeline markers.

(e) No fencing shall prevent access by pipeline personnel at any time.

(f) Fences shall include drive-through gates (14-foot-wide minimum) to provide access to the ROW.

(4) Trees are not permitted on the ROW.

(a) Mature shrubs with an untrimmed height exceeding 18 inches or that obstruct the line of sight between pipeline markers are not permitted on the ROW.

(5) Irrigation systems, field drain lines, and sidewalks must cross Company pipelines at an angle as close to 90 degrees as possible, but not less than 45 degrees.

(a) No septic system lateral lines are permitted on the ROW without approval by the Company.

(6) Retaining walls crossing Company pipelines may be permitted on a case-by-case basis provided calculated stress levels are within acceptable limits.

(7) Foundations and load-bearing underground structures may be permitted on a case-by-case basis provided calculated stress levels are within acceptable limits.

(a) Such structures shall maintain a minimum horizontal clearance of 5 feet from the edge of the structure to the edge of Company pipelines.

(8) Surface grade or elevation changes require review by Company, but in general, no cover may be removed from the ROW.

(9) No construction will be allowed that could result in the erosion of surface cover from the ROW.

6.0 RIGHT-OF-WAY CLEARING

(1) Company may at any time elect to remove obstructions, including but not limited to trees, brush, crops, and other vegetation from all or part of its ROW.

(2) Existing trees and/or shrubs may be cleared or side-trimmed by Company at the sole discretion of Company.

7.0 CHANGE OF LAND USE

(1) The landowner or tenant shall notify Company if land use will be changed from pasture to cultivation, or if tilling depth will increase, or if terraces will be cut or re-cut.

(2) Livestock ponds, lakes, detention ponds, retention ponds, or wetlands are not allowed on the pipeline ROW.

8.0 FOREIGN PIPELINE/UTILITY CROSSINGS AND PARALLELING

8.1. General Requirements

(1) Encroaching Entity proposing foreign pipelines or utilities crossing Company pipelines or ROW shall submit design plans that include the following information:

(a) The route of the proposed facility in plan and profile.

(b) The extent of anticipated excavation.

(c) The extent of bores or directional drills and their exit and entry points.

(2) Foreign pipelines and utility lines crossing Company's ROW shall be installed in accordance with all applicable regulations and codes governing such installations.

(3) Underground foreign lines shall cross as close to 90 degrees as possible, but not less than 45 degrees.

(4) Foreign lines shall be installed at a level depth across the ROW.

(5) Foreign lines should cross underneath Company pipelines.

(a) Foreign pipelines or utilities may cross above Company pipelines with Company review and approval.

(6) Foreign lines in proximity to Company lines shall be installed with clearances that allow for proper maintenance and provide protection against damage.

(a) Vertical clearance between a foreign line and Company pipelines shall be at least 24 inches.

Note: This vertical clearance requirement does not apply to trenchless technology construction. For details regarding those applications, refer to Section 8.3.

(7) During construction, if the Company's pipeline will be exposed, it shall be properly supported every 10 feet of exposed span in a manner that meets Company requirements and is approved by Company Authorized Representative.

(a) No voids shall remain beneath the pipeline after completion of the backfill.

(8) If the Company pipeline is not clearly depicted in the project plans as required in Section 2.0, or if the existing pipeline is not physically or accurately located, the designed vertical clearance shall be increased subject to review and approval by Company.

(9) Warning tape, in accordance with American Public Works Association Uniform Color Code, shall be placed above the foreign pipeline/utility crossing over the Company pipeline, 12 inches below ground and shall extend at least 20 feet in such a manner that it would be unearthed before damage could result to the pipeline or utility.

(10) Marker posts shall be installed by the Encroaching Entity at the edges of the Company ROW when foreign pipeline/utility is crossing Company pipeline with vertical separation of 4 feet or less.

(11) For field approvals that do not require a full engineering review, follow requirements of Appendix A within this document.

8.2. Metallic and Non-Metallic Utilities

(1) Metallic pipe or structures crossing Company pipelines will be subject to a cathodic protection interference study.

(a) If interference is detected, the Encroaching Entity shall work diligently towards remediation.

(b) Foreign metallic pipe crossings shall be coated with a non-conductive coating for the full width of Company's ROW.

(2) Non-metallic utility lines shall require tracer wire to be installed by the Encroaching Entity within the width of ROW to allow easy identification.

8.3. Trenchless Technology Construction

(1) A minimum vertical clearance of 36 inches from Company pipeline is required for trenchless construction methods.

(a) If the Company pipeline is not clearly depicted in the project plans as required in Section 2.0, or if the existing pipeline is not physically or accurately located, the designed vertical clearance shall be increased subject to review and approval by Company.

(2) For directional drilling operations, a surface wire tracking system is required to verify the exact location of the drill head. Blind directional drilling or boring is not permitted within the pipeline ROW.

(3) An inspection trench or viewing pothole before the crossing location is required prior to directional drilling unless otherwise waived by field Operations or Encroachment Engineering.

(a) Additional viewing pothole locations may be required by the Company Authorized Representative.

(b) The depth of viewing potholes shall be at least 24 inches below the Company pipeline before the point of intersection and shall provide visual verification that the drill stem/tool is below and clears the pipeline.

8.4. Electrical and Communication Cables (including Fiber-Optics)

(1) Buried electrical cables shall be installed in accordance with IEEE C2, NFPA 70, and local electrical code.

(2) Underground communication cables (telephone, cable TV, and other data lines) should cross below Company pipelines.

(3) Underground electrical and communication cables should cross below Company pipelines.

(a) Underground electrical and communication cables may cross above Company pipelines with Company review and approval.

(i) In the event the electrical cable crosses over a Company pipeline by open cut excavation, it shall be encased in a 6-inch envelope of red 2,500 psi concrete for the width of the ROW.

(b) Underground electrical cables shall cross Company pipelines with a minimum clearance of 24 inches for 0 – 600 volts and 36 inches for voltages greater than 600.

(i) If the electrical cables are encased, the minimum clearances shall be from the edge of the encasement to the edge of the Company pipeline.

(c) Underground communication cables shall cross Company pipelines with a minimum clearance of 24 inches by open trench installation or a minimum of 36 inches by trenchless installation.

(d) All electrical and communication cables shall be installed in rigid, non-metallic or high impact PVC conduit when crossing Company pipelines.

(e) All power cables should be marked with red warning signs indicating “buried power cable.”

(f) Trenchless construction shall follow requirements in Section 8.3.

(4) Utility poles and guy anchors shall not be placed within the pipeline ROW.

(a) Utility poles are permitted on the ROW edge if they do not interfere with future maintenance.

(b) In all cases, a minimum horizontal clearance of 3 feet shall be maintained between the pole base and Company pipelines, subject to interference study and approval by Company Authorized Representative.

(5) Overhead cable crossings shall be subject to the following stipulations:

(a) All overhead communication cable crossings shall maintain a minimum vertical sag of 18 feet above grade.

(b) All overhead power cable crossings shall maintain a minimum vertical sag of 25 feet above grade for voltage of 22kV and less, and a minimum vertical sag of 30 feet for voltage greater than 22kV, subject to interference study and approval by Company Authorized Representative.

(c) The vertical sag requirements should span 25 feet on each side of the pipeline for all cables, or at minimum, the width of Company ROW.

8.5. Parallel Construction

(1) Parallel construction is defined as any construction activities related to the development of new or modified facilities parallel or alongside existing Company underground pipeline facilities.

(2) Parallel occupancy of an existing ROW requires permission from Company regardless of type and width of easement.

(3) Parallel pipelines/utilities shall be installed outside of Company ROW but at minimum shall maintain a horizontal separation of 12 feet from nearest Company pipeline.

9.0 ROADWAYS, DRIVEWAYS, SIDEWALKS AND PARKING LOTS

(1) New roadways, driveways, sidewalks, or parking lots shall not be constructed across the ROW without written approval from Company.

(a) All plans for roadway, driveway, and sidewalk crossings shall be designed to be as close to perpendicular to the pipeline as possible, but no less than 45 degrees.

(2) Roadways and driveways will require stress analysis to be performed in accordance with API RP 1102. Stress analysis results that do not meet minimum requirements may require pipeline adjustment, modification, or mechanical protection.

(3) Roadways and driveways may not be permitted without a CLONO, or a fully executed EA releasing Company from all future damages to the improvement due to pipeline maintenance and repair.

(4) Resurfacing of existing roadways or driveways shall maintain elevation over Company pipelines.

(a) Changing elevation over Company pipelines or widening of roadways/driveways may require pipeline adjustment, modification, or mechanical protection.

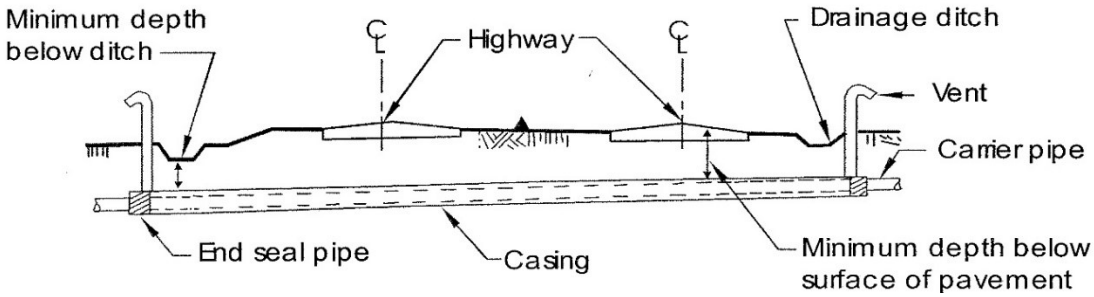
(5) Paved surfaces should not cross over pipeline bends.

(6) Roadways shall be installed with a minimum final cover over the pipeline in accordance with the requirements of 49 CFR 192 and 49 CFR 195, API RP 1102, applicable state requirements, or the Company requirements shown in Table 9-1, whichever is greater. Refer to Figures 9-1 and 9-2 when determining how minimum depths are measured.

Table 9-1: Minimum Final Cover Under Roadways and Ditches

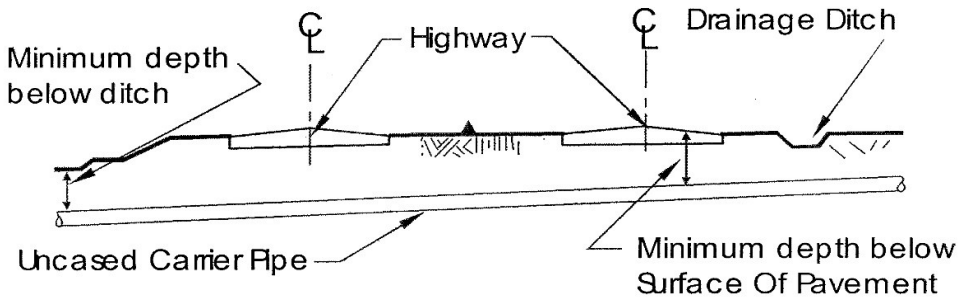
Location	Minimum Final Cover	
	Cased	Uncased
Under Roadway Surface Proper	4 feet*	4 feet* (Subject to Stress Analysis)
Under all other surfaces within the ROW or from the bottoms of ditches	3 feet (4 feet for HVL)*	3 feet (4 feet for HVL)*
*Cover requirements are subject to 9.0(6), whichever is greater.		

Figure 9-1: Cased Highway Crossing



Source: API RP 1102 Steel Pipelines Crossing Railroads and Highways, 7th Edition

Figure 9-2: Uncased Highway Crossing



Source: API RP 1102 Steel Pipelines Crossing Railroads and Highways, 7th Edition

(a) If the minimum coverage set forth in Section 9.0(6) cannot be provided or stress analysis results do not comply with API RP 1102, mechanical protection, subject to the approval of the Company, shall be installed along the entire width of the ROW. One example of mechanical protection is a 6-inch-thick min. steel-reinforced concrete slab.

(7) The casing of an existing pipeline crossing a roadway may be extended to accommodate additional road surface and/or roadside ditches or newly acquired ROW widths.

(8) Sidewalks and parking lots are not permitted across the ROW without written approval from Company.

(a) For sidewalks or shared use paths, a minimum cover of 3 feet from the top of the pipeline shall be maintained throughout pipeline ROW.

(b) For paved parking lots, a minimum cover of 3 feet from the top of the pipeline shall be maintained throughout pipeline ROW provided calculated stress levels are within acceptable limits.

(i) All parking lots planned within the Company's ROW should be asphalt pavement not to exceed 4 inches in thickness.

(ii) Concrete paved lots will be considered on a case-by-case basis and shall include expansion joints every 10 feet along the pipeline ROW.

(iii) All paved parking lots within the Company's ROW should incorporate green areas (areas where surface access is not impeded by improvements) over the pipeline at intervals of approximately 60 feet but no more than 100 feet, measured along the pipeline centerline.

(1) Green areas should extend a minimum of 9 feet along the pipeline and extend approximately 5 feet on each side of the pipeline’s centerline.

(2) In cases where green spaces are not provided, other means of leak detection shall be provided at intervals no less than 25 feet or as approved by Operations.

(iv) Stress analysis results that do not meet minimum requirements may require pipeline adjustment, modification, or mechanical protection.

(v) A close interval cathodic protection survey and a coating inspection may be performed prior to the parking lot being installed to evaluate the integrity of the pipeline coating.

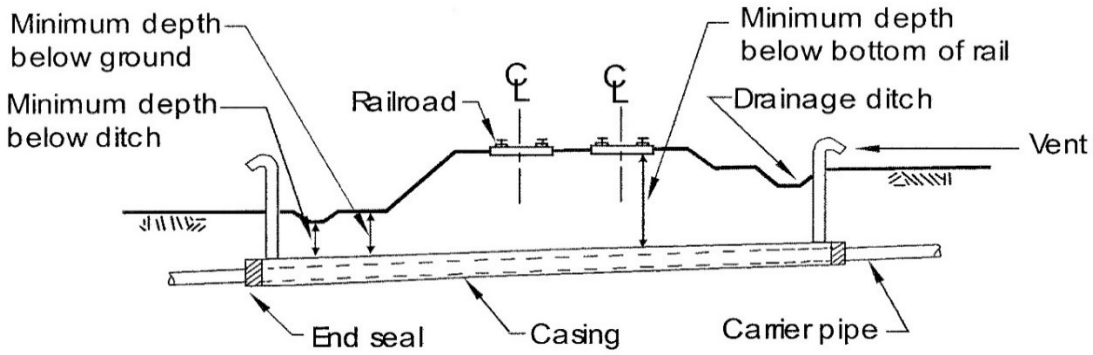
10.0 RAILROAD CROSSINGS

(1) Railroads shall be installed with a minimum final cover over the pipeline in accordance with AREMA requirements or Company requirements shown in Table 10-1, whichever is greater. Refer to Figures 10-1 and 10-2 when determining how minimum depths are measured.

Table 10-1: Minimum Final Cover Under Railroads

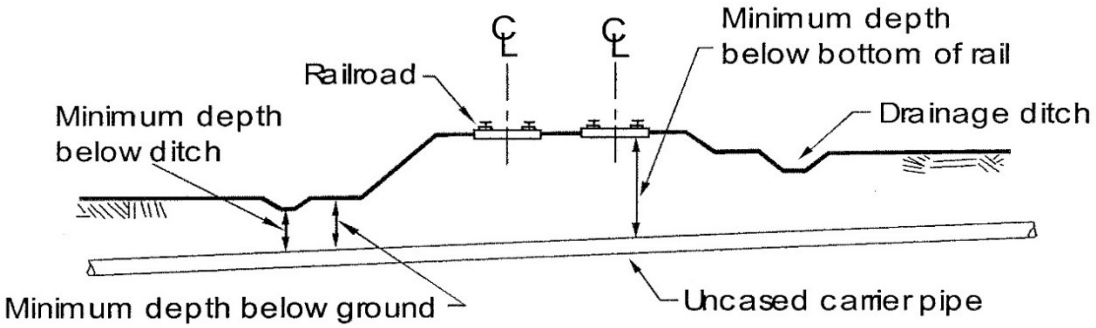
Location	Minimum Final Cover	
	Cased	Uncased
Under Track Structure Proper	6 feet*	10 feet*
Under all other surfaces within the ROW or from the bottoms of ditches	3 feet* (4 feet for HVL) *	6 feet*
*Cover requirements are subject to 10.0(1), whichever is greater.		

Figure 10-1: Cased Railroad Crossing



Source: API RP 1102 Steel Pipelines Crossing Railroads and Highways, 7th Edition

Figure 10-2: Uncased Railroad Crossing



Source: API RP 1102 Steel Pipelines Crossing Railroads and Highways, 7th Edition

(a) If the minimum coverage of uncased carrier pipe set forth in section 10.0(1) cannot be provided, mechanical protection shall be installed as needed within the ROW.

(i) Examples of mechanical protection include split casing or steel-reinforced concrete slab.

(ii) In this case, only Company-approved contractors shall be allowed to work over Company facilities.

(2) Depending on the design and intended use of the proposed railroad and the results of pipe stress analysis of the proposed crossings, additional measures may be required to adequately protect the pipeline and ensure that calculated stresses are within acceptable limits.

(3) Rail beds shall not be allowed to cross a pipeline bend.

(4) A close interval cathodic protection survey and a coating inspection may be performed prior to the installation of the railroad to evaluate the integrity of the pipeline coating.

(5) The project plans and stress analysis must satisfy the minimum requirements of AREMA Chapter 1, Part 5 and API RP 1102.

11.0 TEMPORARY ACCESS ROADS AND HEAVY EQUIPMENT CROSSINGS

11.1. Temporary Access Roads

(1) A minimum cover of 4 feet over the pipeline shall be provided for temporary access road or temporary crossings for heavy equipment unless the Company Engineer has provided written approval to the contrary per Appendix B.

(a) Additional cover may be required subject to pipeline stress calculation analysis result.

11.2. Heavy Equipment Crossings

(1) A Company Authorized Representative must approve the crossing at any location where heavy equipment will be crossing the pipeline.

(a) The Encroaching Entity should furnish the type, size, weight and maximum axle load for any vehicle or heavy equipment proposing to cross Company's ROW.

(b) The Encroaching Entity must notify the Company a minimum of three working days prior to any work commencing.

(c) Heavy equipment/trucks temporary crossings shall follow Appendix B.

(2) A Company Authorized Representative should be present during construction of a temporary access road or heavy equipment crossing.

(3) Construction equipment must cross the pipeline at Company-approved locations where the cover has been verified and determined to be safe.

(4) Additional cover and/or stabilization (timber mats, steel plate, crushed rock, concrete slab, etc.) may be required, depending on weather, line depth, and type of vehicles proposing to cross the pipeline.

(a) See Appendix C for minimum air bridge requirements for crossing one (1) Company pipeline for reference.

12.0 DREDGING, MARINE CONSTRUCTION AND WATERWAY CROSSINGS

(1) New drainage channels and irrigation canals must have a minimum of 5 feet of cover from the top of the pipe to the bottom of the channel or canal.

(a) Drainage channels and irrigation canals having less than 5 feet of cover must be lined or be protected from damage to withstand anticipated external loads and scour.

(2) Rivers, creeks, and streams shall have a minimum cover of 20 feet, as measured from the top of the pipeline to the waterway bottom/flow line.

(3) Crossings should be at an angle as close to 90 degrees to Company pipelines as possible, but not less than 45 degrees.

(4) Sufficient weight must be added to Company pipelines that are above mudline to create negative buoyancy before crossing.

(5) Company may require that erosion control measures be placed over the pipeline ROW to protect the pipeline and control erosion of the pipeline ROW.

(6) Navigable waterway dredging operations shall provide a minimum of 100 feet of horizontal clearance between the pipeline and the closest mechanical, vacuuming or spudding down operation.

(a) Dredging operations shall maintain a minimum of 20 feet of vertical cover between top of the pipe and the waterway bottom/flow line.

(b) The Encroaching Entity should submit post-dredge surveys upon completion of work.

(7) All capital dredging or marine construction, including but not limited to creating, deepening or widening navigable waterways, pile driving, new pipeline installation, mooring, etc., requires a full review by Company.

(a) Maintenance dredging, where proposed dredging activities will re-establish a required mudline elevation by removal of naturally recurring deposited bottom sediment such as silt and clays, may be approved by Company Authorized Representative.

(b) The Encroaching Entity should submit post-dredge surveys upon completion of work.

(8) Marsh vehicles shall not have contact with the mudline and/or Company pipeline within Company ROW or permitted vicinity.

(a) Marsh vehicles must be used in such a way as to cause minimum disturbance to mudline within Company ROW.

(b) Usage of previously made tracks should be limited to avoid creating ruts or channels over Company ROW.

13.0 LOGGING OPERATIONS

(1) No trees shall be felled on, over, or across Company's ROW.

(a) No trees or timber shall be stored on Company's ROW.

(b) No trees shall be trucked or skidded over or down the ROW without first obtaining approval from Company.

(2) The same requirements for heavy equipment crossings as defined in Section 11.2 shall be followed for any proposed logging operations on Company ROW.

14.0 BLASTING OPERATIONS, SEISMIC SURVEYING AND CONSTRUCTION-INDUCED VIBRATIONS

(1) Blasting operations using explosive charges in shot holes within a quarter mile (1320 feet) of the pipeline ROW shall be reviewed by Company.

(a) The Encroaching Entity shall submit a comprehensive blasting plan for review and approval.

(b) Blasting operations shall be monitored by seismograph instruments located directly over the pipeline at its closest point to the explosive charge or shot hole.

(c) The Encroaching Entity shall provide, at their expense, the monitoring service contractor and equipment.

(d) The peak particle velocity results shall be provided to Company or Company Authorized Representative.

(2) Seismic surveying operations conducted within 300 feet of the pipeline ROW shall be reviewed by Company.

(a) The Encroaching Entity shall submit a comprehensive seismic survey plan for review and approval.

(b) When using vibroseis trucks, seismic survey plans must include a survey report indicating peak particle velocity results at incremental distances from seismic activity location.

(i) This survey report should include information on soil conditions, the anticipated number of vibrations, make and model of the vibroseis truck, anticipated peak particle velocity results, map layout of vibroseis truck locations with the anticipated closest horizontal distance to the

pipeline ROW, safety measures, and a copy of the permit approval to perform seismic operations.

(c) Seismic vibrations shall be monitored by seismograph instruments located directly over the pipeline at its closest point to the vibroseis truck.

(d) The Encroaching Entity shall provide, at their expense, the monitoring service contractor and equipment.

(e) The peak particle velocity results shall be provided to Company or Company Authorized Representative.

(f) At Company's request, the Encroaching Entity shall install sheet piling and/or open trench channels to protect the pipeline during seismic vibrating operations.

(3) Construction activities that generate ground vibrations within 100 feet of the Company ROW shall be reviewed by the Company.

(a) Examples of ground vibration-generating activities include but are not limited to, concrete pile driving, steel sheet driving, soil compaction, pavement material compaction, jack hammering, or any type of surface impact that induce vibrations.

(b) If the Encroaching Entity anticipates this type of activity within 100 feet of the pipeline, continuous testing monitored by a seismograph located directly over the pipeline at its closest point to the activity should be conducted.

(c) The Encroaching Entity shall provide, at their expense, the monitoring service contractor and equipment.

(d) The peak particle velocity results shall be provided to the Company or Company Authorized Representative.

(e) The Encroaching Entity shall provide the Company with the make and model of the vibratory or compaction equipment.

(f) The Encroaching Entity shall provide the Company with the specifications and the maximum anticipated energy of the pile driving or vibratory driving equipment.

(4) No construction, blasting or seismic activity that results in peak particle velocity greater than 5 inches per second shall be approved by Company.

(a) If results from seismographic monitoring equipment are 5 inches per second or greater, Company reserves the right to halt all construction, blasting or seismic activities to evaluate the integrity of the pipeline.

(b) If blasting could potentially affect an above ground pipeline facility, building or other above ground structure, peak particle velocity limit shall not exceed 1.25 inches per second.

(c) The maximum peak particle velocity for each encroachment shall be determined by the closest distance of the activity to the pipeline.

(5) If the calculated maximum peak particle velocity is less than 5 inches per second, Company reserves the right to perform leak detection surveys of the pipelines at or above the calculated maximum peak particle velocity.

Appendix A Operations Field-Approved Crossing Conditions

Conditions when local Operations can permit Encroaching Entity crossing Enterprise Pipeline (Company PL) without further review by Field Engineering Encroachments.

A. UNDERGROUND FOREIGN LINE AND UTILITY CROSSINGS

A.1. Crossings **UNDER** Company Pipeline: **(PREFERRED CROSSING)**
Note: Applicable for all pipe sizes for Foreign Lines and Company Lines

Installation Type:		**Conventional (Open-Cut)**	**Trenchless (Directional Drill, Bore, Tunneling)**
Minimum Vertical Clearance Required: (from Bottom of Company PL to top of Foreign Line)	Non-Electrical Crossing:	24 in.	60 in.
	Electrical Crossing*:	36 in.	60 in.
Requirements:	***Note: Refer to A.4.i below.**	Maximum unsupported length of Company PL shall not exceed 10 ft.	Viewing pothole 36 in. below Company PL and min. 60 in. before crossing point for visual inspection is required to confirm no impact to Company PL unless pothole is waived by Operations.
		Follow Section A.3 Requirements for ALL crossings. Follow Section A.4, if applicable.	

A.2. Crossings **OVER** Company Pipeline: **(REQUIRES OPERATIONS MANAGER APPROVAL)**
Note: Applicable for all pipe sizes for Foreign Lines and Company Lines

Installation Type:		**Conventional (Open-Cut)**	**Trenchless (Directional Drill, Bore, Tunneling)**
Minimum Vertical Clearance Required: (from Bottom of Foreign Line to top of Company PL)	Non-Electrical Crossing:	24 in.	60 in.
	Electrical Crossing*:	36 in.	60 in.
Requirements:	***Note: Refer to A.4.i below.**	Follow Section A.3 Requirements for ALL crossings. Follow Section A.4, if applicable.	

A.3. Requirements for **ALL** crossings:

i. Crossing shall be as close as 90° angle as possible and no less than 45° angle.
ii. Foreign metallic utility/pipe shall be coated with non-conductive coating within Company ROW.
iii. Utility marker shall be installed 12 in. below the ground within the pipeline ROW.
iv. Pothole(s) are required to confirm location of Company PL prior to construction and backfill, unless Company PL depth/location was confirmed by other method(s) approved by Operations.

A.4. Requirements for **ELECTRICAL / COMMUNICATION** crossings:

i. Electrical crossings are any crossings with power cables for transmission and/or distribution. Fiber optic and copper cables are communication lines and are not considered electrical crossings.
ii. All buried electrical / communication cables shall be installed in non-metallic or high impact PVC conduit.
iii. Corrosion Prevention shall be consulted for any electrical crossings of Company PL carrying Direct Current (DC) for any voltage and Alternating Current (AC) for 60kV and above.
iv. Electrical crossings installed using conventional (open cut) method crossing above Company PL shall be encased in a 6 in. envelope of red 2,500 psi concrete for the full width of the ROW and be marked with "Buried Power Cable" warning tape 2 in. – 3 in. above concrete envelope.

B. AERIAL COMMUNICATION / ELECTRICAL CABLE CROSSINGS

Cable Type:	Communication Cable	Power Cable	
		(Voltage: 0 – 22kV)	(Voltage: >22kV)
Minimum Vertical Clearance Required: (from Lowest sag point to top of ground surface above Company PL)	18 ft.	25 ft.	30 ft.* ***Note: Refer to A.4.iii.**
Requirements:	**Utility poles and guy anchors shall not be placed within the pipeline ROW.**		

C. FENCES AND LANDSCAPE

C.1. Requirements for Fences:

i. Fence posts should be installed outside of Company PL ROW, but at minimum shall not be allowed within 5-feet of the pipeline centerline.
ii. Hand digging required for posts installation within the Company PL ROW, unless waived by Company Authorized Representative.
iii. Fences paralleling Company PL are not allowed within PL ROW.
iv. Material that obstructs the line of sight across the PL ROW is not allowed.
v. Fences crossing Company PL shall have a minimum 14 ft. wide gate installed and Company Authorized Representative shall have authority to install lock and have full access at all times.

C.2. Requirements for Landscape:

i. Trees are not allowed within Company PL ROW.
ii. Shrubs are allowed up to 18 inches.
iii. Shrubs shall not obstruct the view of the pipeline marker posts.

Appendix B Heavy Equipment Temporary Crossings

Company approval is required for any crossing of Company pipeline(s) with heavy equipment.

(1) **WEIGHT-BASED APPROVAL REQUIREMENTS**

(a) Vehicle / Equipment weighing 10,000 lbs. or less: Company Authorized Representative can provide approval in the field without airbridge requirement.

(b) Vehicle / Equipment weighing 80,000 lbs. or less: Company Authorized Representative can provide approval in the field with air bridge requirement complying with Appendix C of this document.

(c) Vehicle / Equipment weighing less than 120,000 lbs.: Company Engineer review required to provide approval.

(d) Vehicle / Equipment weighing 120,000 lbs. or more: Company Encroachment Engineer review required to provide approval.

(2) **REQUIREMENTS FOR REVIEW** – (1)(c) and (1)(d)

(a) Wheeled Vehicles – List all equipment that will cross Enterprise pipeline(s)

(i) Vehicle / Equipment Type (Make / Model)

(ii) Total Operating / Loaded Weight (lbs.)

(iii) Maximum Weight Per Axle (lbs.)

(b) Tracked Vehicles – List all equipment that will cross Enterprise pipeline(s)

(i) Vehicle / Equipment Type (Make / Model)

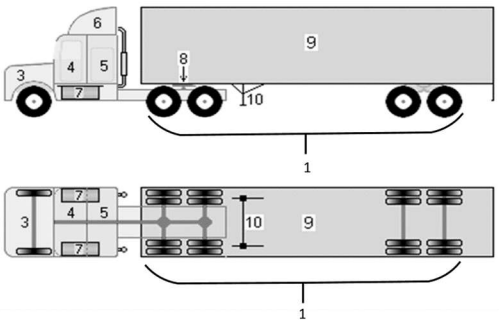
(ii) Total Operating / Loaded Weight (lbs.)

(iii) Width of Track Shoe (in.)

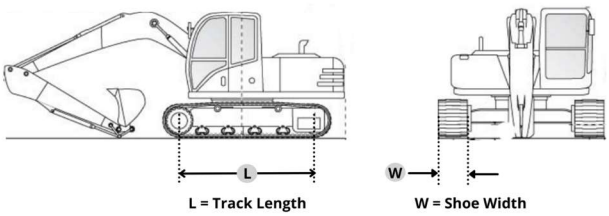
(iv) Length of Track on Ground (ft.)

NOTE: Information should be submitted by completing Section 8 of the Encroachment Application (found at www.EnterpriseEncroachments.com).

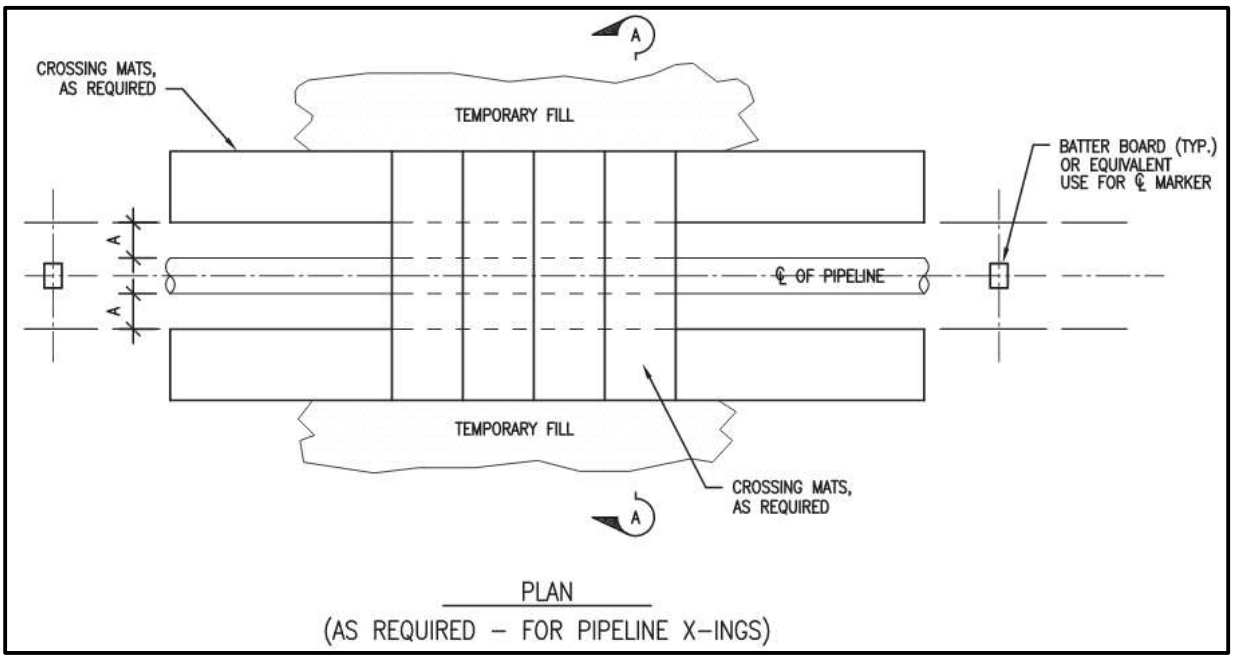
Wheeled Vehicle



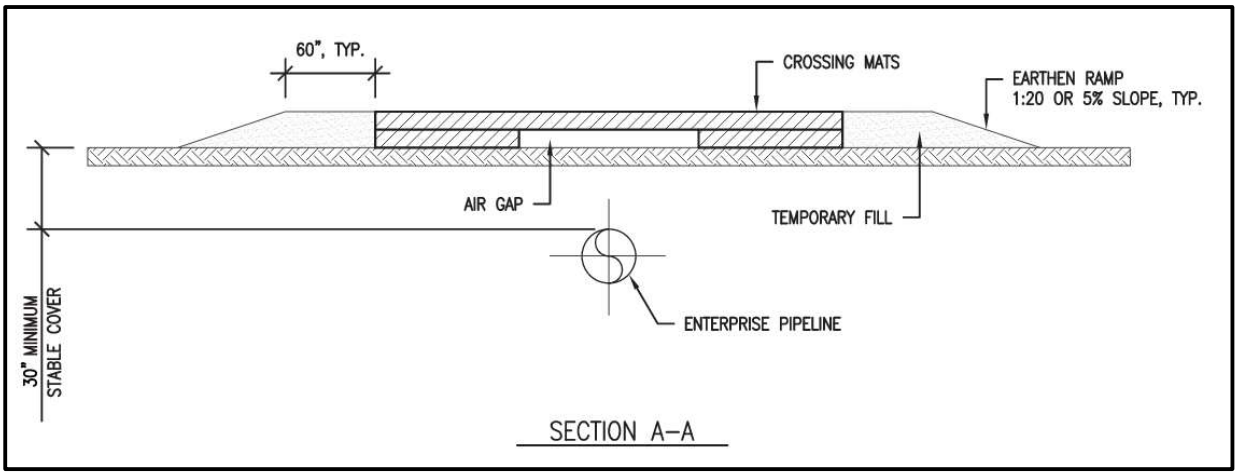
Tracked Vehicle



Appendix C Detail for Air Bridge Requirements



PLAN
(AS REQUIRED – FOR PIPELINE X-INGS)



SECTION A–A

PIPE DIAMETER, INCH	MINIMUM OFFSET 'A'
LESS THAN 20	24"
20 < DIA ≤ 30	30"
DIA > 30	36"

TYPICAL MATTING SPECIFICATION
USE 8" – 12" THICK X 4– WIDE X 16' RANDOM LENGTH TIMBER MAT (AS REQUIRED). CONTRACTOR SHALL RECONFIGURE MATTING LAYOUT AS NEEDED BASED ON SITE CONDITIONS AND PER APPROVAL BY COMPANY'S REPRESENTATIVE IN THE FIELD.

MULTIPLE PIPE NOTE
FOR 2 OR MORE PIPELINES, CONSULT FIELD ENGINEERING – ENCROACHMENTS.