



DESIGN OF PROJECTS

ON OR NEAR PORTLAND PIPE LINE CORPORATION RIGHTS-OF-WAY

Portland Pipe Line Corporation (PPLC) operates several high-pressure, welded steel pipelines transporting crude oil from a marine terminal in South Portland, Maine to refineries in Montreal, Province of Quebec, Canada. The pipelines are designed, maintained and operated to ensure the safety of the communities and the environment through which they pass.

Construction projects near the Portland Pipe Line Corporation pipelines have the potential to affect the integrity and safety of the lines, both directly and indirectly. Portland Pipe Line Corporation must ensure that the integrity and safety of the pipelines is maintained, from the standpoints of structural strength, hydraulic integrity, corrosion prevention, pipeline accessibility, and regulatory compliance. For this reason, PPLC requires that projects that affect our pipelines or rights of way be submitted for review and written approval by PPLC prior to construction.

This fact sheet has been prepared as a guide to those planning or designing projects near the PPLC rights-of-way. A companion fact sheet, *Construction Practices To Be Observed By Others When On Or Near Portland Pipe Line Corporation Rights-Of-Way*, is also available to land owners and contractors, and must be followed for construction practices near the pipelines. In addition, PPLC supports the use of the Best Practices for project planning, design, and construction developed by the Common Ground Alliance and available at www.commongroundalliance.com.

The design issues presented in this fact sheet are the focus of both PPLC and federal requirements (49 CFR Part 195) to protect the integrity and safety of the pipelines. Project designers are encouraged to contact PPLC early in the project planning stages to facilitate the development of plans that will be compatible with land owner needs, pipeline integrity, and the safety of the public. The basic design requirements are outlined below, followed by a discussion of the application of the requirements to typical projects.

Basic Design Guidelines

- no structures, paved areas, parking areas, trees or deep-rooted vegetation over the pipelines or within the pipeline rights-of-way; new structures should be located at least 50 feet away from the pipelines
- paved crossings of the rights-of-way limited to the least number and as near to perpendicular as possible, and in no case less than 45 degrees to the pipelines
- 4 feet of cover over the pipelines under roadways and near buildings
- 3 feet of cover over the pipelines elsewhere
- 18 inches minimum vertical separation between crossing utilities and the pipelines
- utility crossings of the pipelines limited to the least number and as near to perpendicular as possible, and in no case less than 45 degrees to the pipelines
- proper compacted bedding and support required for all piping and excavations
- non-conductive or electrically isolated piping materials for utility crossings of the pipeline
- non-corrosive fill materials near the pipeline
- controlled superimposed loads on the pipelines (dead load from fill and live load from traffic) to maintain the pipeline pressure rating, avoiding pipeline casings
- controlled construction equipment loads on the pipeline
- controlled induced settlement from superimposed loads to avoid excessive pipeline movements and stresses



Structures, Pavement, and Vegetation

Structures, paved parking areas, trees and deep-rooted vegetation are not permitted over PPLC pipelines or within the pipeline rights-of-way. Such facilities result in applied loads and settlements interfere with or prevent pipeline maintenance, repair and inspection (including aerial surveillance), and increase the safety exposure of the public. For safety and security reasons, PMPL strongly recommends that new buildings should be located at least 50 feet from the pipelines. Trees and deep-rooted plants are prohibited in order to prevent their roots from penetrating and damaging the pipeline protective coatings, increasing the risk of corrosion damage. Paved crossings are limited to the least number possible and as near to perpendicular to the pipelines as possible, and in no case less than 45 degrees to the pipelines.

Pipeline Cover / Depth of Burial

Federal rules specify minimum depths of cover and design loading requirements at various locations. PPLC requires 48 inches of cover under roads and near buildings and 36 inches elsewhere near projects. Where deep cover is proposed, loading and settlement analyses may be required.

Separation Distances for Crossing Utilities

Federal rules specify minimum separations to underground utilities and structures. PPLC requires that utility crossings maintain an 18-inch vertical separation from our pipelines to permit future excavation and welded repairs, and to reduce any repercussions of shifting or thermal movements of either our pipelines or the crossing utility. Where possible, it is requested that 24 inches of vertical separation be provided. Utility lines shall cross under the pipelines to minimize utility disruptions in the event of pipeline maintenance or emergencies, and to avoid interference with or prevention of pipeline maintenance, repair and inspection. Utility crossings are limited to the least number possible, and must be as near to perpendicular to the pipelines as possible, but in no case less than 45 degrees to the pipelines. Utility structures such as manholes, light pole bases and guy wire anchors are not permitted within the rights-of-way, and must be at least 10 feet from the pipelines.

Corrosion Protection

Utility Crossings: The PPLC pipelines are protected by an impressed-current cathodic protection system. Any crossing pipes or utilities that could offer a preferred path of current flow must be constructed of non-conductive materials or must be electrically isolated to protect both the PPLC pipelines and the crossing utility from electrically accelerated corrosion. Examples of crossing utilities include electrical conduits and water, gas, sewer and storm drain lines.

Pipe Casings: Petroleum pipeline companies and federal regulations discourage the practice of providing a steel casing around oil pipelines to protect them from superimposed loading, since the casing interrupts the cathodic protection of the lines and can accelerate corrosion.

Corrosive Fill: Certain fill materials can create a corrosive environment for the pipelines and must be avoided. For example, lightweight cinder fill can accelerate corrosion and is not acceptable. Lightweight tire-derived fill can be acceptable under certain circumstances, provided that the steel-belted tire chips are segregated from contact with the pipelines.

Superimposed Loading

Permanent Loads: The dead load and live load to be imposed on the pipelines must be controlled in order to maintain the rated pressure of the pipelines. As noted above, pipe casings are discouraged for corrosion reasons. If required, lower-density fills, cover slabs, or other approaches can be utilized to reduce the loading to acceptable levels. PPLC can assist in evaluating the acceptability of load-reducing design proposals.



Construction Loads: Construction equipment must not operate over the pipelines unless precautions are taken to control the loads on the pipelines. For example, crane mats and raised equipment crossings have been successfully designed and employed to address construction loads in a variety of soil conditions.

Induced Settlement: Settlement induced by superimposed loading must be controlled to a level that the pipelines can withstand. Geotechnical analysis must be provided for any significant superimposed loading to demonstrate that excessive settlement will not be induced at the pipeline crossing. Load- and settlement-reducing design approaches can be developed for these circumstances.

Accessibility

Utility Crossings: Accessibility of the pipelines must be maintained for both routine and emergency repairs and maintenance. For this reason, crossings by utility lines must be installed below the pipeline and limited to as few as possible, since such crossings can interfere with pipeline excavation and welded repairs. Where crossings are unavoidable, it is preferable that they be located outside of congested and paved areas that would complicate pipeline exhumation at the crossing, should it ever be required. Vertical and horizontal clearances to be maintained at pipeline crossings are discussed above, along with cathodic protection implications.

Paved Areas, Structures, and Vegetation: Federal regulations require that pipelines be accessible for routine and emergency inspection and maintenance. Required inspection include periodic aerial surveillance to monitor third-party impacts and to check for signs of damage, and cathodic protection surveys to verify the level of corrosion protection applied to the pipelines. In addition to their other impacts discussed above, pavement, structures, and trees interfere with or prevent both inspection and maintenance activities, and therefore are prohibited from the right-of-way. Limited paved crossings can usually be accommodated where necessary to allow access to property on opposite sides of the right-of-way, with prior approval and in concert with the considerations discussed above.

Contact Information:

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This document is provided for general technical guidance. All site and project specifics should be coordinated with a Portland Pipe Line Corporation Representative.



DESIGN OF PROJECTS

ON OR NEAR MONTREAL PIPE LINE LIMITED RIGHTS-OF-WAY

Montreal Pipe Line Limited (MPLL) operates several high-pressure, welded steel pipelines transporting crude oil from a marine terminal in South Portland, Maine to refineries in Montreal, Province of Quebec, Canada. The pipelines are designed, maintained and operated to ensure the safety of the communities and the environment through which they pass.

Construction projects near the Montreal Pipe Line Limited pipelines have the potential to affect the integrity and safety of the lines, both directly and indirectly. Montreal Pipe Line Limited must ensure that the integrity and safety of the pipelines is maintained, from the standpoints of structural strength, hydraulic integrity, corrosion prevention, pipeline accessibility, and regulatory compliance. For this reason, MPLL requires that projects that affect our pipelines or rights of way be submitted for review and written approval by MPLL prior to construction.

This fact sheet has been prepared as a guide to those planning or designing projects near the MPL rights-of-way. A companion fact sheet, *Construction Practices To Be Observed By Others When On Or Near Montreal Pipe Line Limited Rights-Of-Way*, is also available to land owners and contractors, and must be followed for construction practices near the pipelines. In addition, MPLL supports the use of the Best Practices for project planning, design, and construction developed by the Quebec Common Ground Alliance, and available at https://www.info-ex.com/wp-content/uploads/2018/11/CCGA-Best-practices_version3_October2018-site-internet.pdf

The design issues presented in this fact sheet are the focus of both MPLL and federal requirements of the Canada Energy Regulator for Excavation and Construction near Pipelines, to protect the integrity and safety of the pipelines. Project designers are encouraged to contact MPLL early in the project planning stages to facilitate the development of plans that will be compatible with land owner needs, pipeline integrity, and the safety of the public. The basic design requirements are outlined below, followed by a discussion of the application of the requirements to typical projects.

Basic Design Guidelines

- no structures, paved areas, parking areas, trees or deep-rooted vegetation over the pipelines or within the pipeline rights-of-way; new structures should be located at least 15 meters (50 feet) away from the pipelines
- paved crossings of the rights-of-way limited to the least number and as near to perpendicular as possible, and in no case less than 45 degrees to the pipelines
- 1.2 meters (4 feet) of cover over the pipelines under roadways and near buildings
- 0.9 meters (3 feet) of cover over the pipelines elsewhere
- 45 centimeters (18 inches) minimum vertical separation between crossing utilities and the pipelines
- utility crossings of the pipelines limited to the least number and as near to perpendicular as possible, and in no case less than 45 degrees to the pipelines
- proper compacted bedding and support required for all piping and excavations
- non-conductive or electrically isolated piping materials for utility crossings of the pipeline
- non-corrosive fill materials near the pipeline
- controlled superimposed loads on the pipelines (dead load from fill and live load from traffic) to maintain the pipeline pressure rating, avoiding pipeline casings
- controlled construction equipment loads on the pipeline



- controlled induced settlement from superimposed loads to avoid excessive pipeline movements and stresses

Structures, Pavement, and Vegetation

Structures, paved parking areas, trees and deep-rooted vegetation are not permitted over MPLL pipelines or within the pipeline rights-of-way. Such facilities result in applied loads and settlements interfere with or prevent pipeline maintenance, repair and inspection (including aerial surveillance), and increase the safety exposure of the public. For safety and security reasons, PMPL strongly recommends that new buildings should be located at least 15 meters (50 feet) from the pipelines. Trees and deep-rooted plants are prohibited in order to prevent their roots from penetrating and damaging the pipeline protective coatings, increasing the risk of corrosion damage. Paved crossings are limited to the least number possible and as near to perpendicular to the pipelines as possible, and in no case less than 45 degrees to the pipelines.

Pipeline Cover / Depth of Burial

Federal rules specify minimum depths of cover and design loading requirements at various locations. MPLL requires 1.2 meters (48 inches) of cover under roads and near buildings and 0.9 meters (36 inches) elsewhere near projects. Where deep cover is proposed, loading and settlement analyses may be required.

Separation Distances for Crossing Utilities

Federal rules specify minimum separations to underground utilities and structures. MPLL requires that utility crossings maintain 45 centimeters (18 inches) vertical separation from our pipelines to permit future excavation and welded repairs, and to reduce any repercussions of shifting or thermal movements of either our pipelines or the crossing utility. Where possible, it is requested that 60 centimeters (24 inches) of vertical separation be provided. Utility lines shall cross under the pipelines to minimize utility disruptions in the event of pipeline maintenance or emergencies, and to avoid interference with or prevention of pipeline maintenance, repair and inspection. Utility crossings are limited to the least number possible, and must be as near to perpendicular to the pipelines as possible, but in no case less than 45 degrees to the pipelines. Utility structures such as manholes, light pole bases and guy wire anchors are not permitted within the rights-of-way, and must be at least 3 meters (10 feet) from the pipelines.

Corrosion Protection

Utility Crossings: The MPLL pipelines are protected by an impressed-current cathodic protection system. Any crossing pipes or utilities that could offer a preferred path of current flow must be constructed of non-conductive materials or must be electrically isolated to protect both the MPLL pipelines and the crossing utility from electrically accelerated corrosion. Examples of crossing utilities include electrical conduits and water, gas, sewer and storm drain lines.

Pipe Casings: Petroleum pipeline companies and federal regulations discourage the practice of providing a steel casing around oil pipelines to protect them from superimposed loading, since the casing interrupts the cathodic protection of the lines and can accelerate corrosion.

Corrosive Fill: Certain fill materials can create a corrosive environment for the pipelines and must be avoided. For example, lightweight cinder fill can accelerate corrosion and is not acceptable. Lightweight tire-derived fill can be acceptable under certain circumstances, provided that the steel-belted tire chips are segregated from contact with the pipelines.

Superimposed Loading

Permanent Loads: The dead load and live load to be imposed on the pipelines must be controlled in order to maintain the rated pressure of the pipelines. As noted above, pipe casings are discouraged for



corrosion reasons. If required, lower-density fills, cover slabs, or other approaches can be utilized to reduce the loading to acceptable levels. MPL can assist in evaluating the acceptability of load-reducing design proposals.

Construction Loads: Construction equipment must not operate over the pipelines unless precautions are taken to control the loads on the pipelines. For example, crane mats and raised equipment crossings have been successfully designed and employed to address construction loads in a variety of soil conditions.

Induced Settlement: Settlement induced by superimposed loading must be controlled to a level that the pipelines can withstand. Geotechnical analysis must be provided for any significant superimposed loading to demonstrate that excessive settlement will not be induced at the pipeline crossing. Load- and settlement-reducing design approaches can be developed for these circumstances.

Accessibility

Utility Crossings: Accessibility of the pipelines must be maintained for both routine and emergency repairs and maintenance. For this reason, crossings by utility lines must be installed below the pipeline and limited to as few as possible, since such crossings can interfere with pipeline excavation and welded repairs. Where crossings are unavoidable, it is preferable that they be located outside of congested and paved areas that would complicate pipeline exhumation at the crossing, should it ever be required. Vertical and horizontal clearances to be maintained at pipeline crossings are discussed above, along with cathodic protection implications.

Paved Areas, Structures, and Vegetation: Federal regulations require that pipelines be accessible for routine and emergency inspection and maintenance. Required inspection include periodic aerial surveillance to monitor third-party impacts and to check for signs of damage, and cathodic protection surveys to verify the level of corrosion protection applied to the pipelines. In addition to their other impacts discussed above, pavement, structures, and trees interfere with or prevent both inspection and maintenance activities, and therefore are prohibited from the right-of-way. Limited paved crossings can usually be accommodated where necessary to allow access to property on opposite sides of the right-of-way, with prior approval and in concert with the considerations discussed above.

Contact Information:

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This document is provided for general technical guidance. All site and project specifics should be coordinated with a Montreal Pipe Line Limited representative.