



Third Party Requirements

In the Vicinity of Natural Gas Facilities

2015
V2.1

Revision History

Version	Date	Approved by:	Revisions
V2.1	2015-Sep-30	Gonzalo Juarez, Senior Engineering Construction & Maintenance	<p>2.2 NEB Pipelines & Vital Mains</p> <ul style="list-style-type: none"> Added requirement for new NPS 42 Vital Main for GTA project, EGD's approval is required for all work within 30 m of the pipeline <p>2.3 Pipeline Location Verification</p> <ul style="list-style-type: none"> Table 2-2, 2-3, 2-4 and 2-5. Added specific pipeline verification requirement for horizontal directional drilling <p>5.1 General</p> <ul style="list-style-type: none"> Added additional daylight hole requirement for horizontal directional drilling <p>5.2 Drilling Parallel to Pipelines</p> <ul style="list-style-type: none"> For drilling parallel to the pipeline, changed distance requirement to be measured from the side of the pipeline instead of locate marks <p>5.3 Drilling Across Pipelines</p> <ul style="list-style-type: none"> Added additional daylight hole requirement and diagram, for horizontal directional drilling
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INTRODUCTION

This document is intended for anyone involved in planning or carrying out work in the vicinity of Enbridge Gas Distribution's (EGD) network. It summarizes the requirements to be followed and specifies the technical requirements aimed at protecting EGD's facilities, and by extension, ensuring public and worker safety.

This document supersedes all previous versions of EGD's Third Party Requirements in the Vicinity of Natural Gas Facilities.

Constructors must follow the regulations and legislation applicable to their work, in addition to the requirements outlined in this document. It is understood that all legal provisions applicable to work carried out around natural gas pipelines take precedence over this document.

The terms "gas lines", "gas pipelines" and "mains" used throughout this document apply equally to natural gas mains and service lines, as well as any other component of the EGD's natural gas distribution system found on public or private land.

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1.0 DEFINITIONS

Terms used in the following document are defined as follows:

Applicant: The owner of the proposed work.

Blaster: The person or persons responsible for setting the charges and performing the blast.

Blasting, Surface: An operation involving the excavation of rock foundations for various types of structures, grade construction for highways or railroads, or canals (trenches) for water supply or collection purposes.

Blasting, Tunnel: Operations involving the piercing of below ground (generally horizontal) opening in rock.

Compaction: Any vibration generating operation which will result in a potential increase of the density of soils or controlled backfill materials. The means to increase the density may be static or dynamic.

Enbridge Gas Distribution (EGD): EGD refers to Enbridge Gas Distribution Inc., Enbridge Gas New Brunswick LP, Gazifère Inc., St. Lawrence Gas Company Inc., Niagara Gas Transmissions Limited, 2193914 Canada Limited.

Contractor or Excavator: Any individual, partnership, corporation, public agency or other entity that intends to dig, bore, trench, grade, excavate, hammer into or break ground with mechanical equipment or explosives in the vicinity of a gas pipeline or related facility.

Engineer, Independent Engineering Consultant: A Professional Engineer who is registered with the provincial or state Professional Engineering Association and a holder of Certificate of Authorization (C of A).

Facility: Any Enbridge Gas Distribution main, service, regulator station or storage facility and their related components.

Ground Disturbance: Activities associated with mechanical excavation, hydro excavation, directional drilling, blasting, piling, compaction, boring, ploughing, grading, backfilling and hand digging

Hand Dig: To excavate using either a shovel with a wooden or fiberglass handle, or using hydro vacuum excavation equipment. The use of picks, bars, stakes or other earth piercing devices are not considered hand digging.

Locate Service Provider: Any entity that performs locates under the terms of a Locate service agreement.

Mark-Ups: The formal review process used by infrastructure owners to evaluate and comment on proposed designs.

Pile: Any vertical or slightly slanted structural member introduced or constructed in the soil in order to transmit loads and forces from the superstructure to the subsoil; the structural member can also be used as a component of a retaining wall system.

Pile Driving: The placement of piles carried out by gravity hammer, vibratory hammer, auguring, pressing, screwing or any combinations of the above methods.

Temporary Support: The support of gas pipelines before or during an excavation to protect the pipeline from its own weight; minimize deflection stresses

Main, Vital: A subset of mains that consists of NEB (National Energy Board) pipelines, IMP (Integrity Management Program) pipelines, and select distribution pipelines.

2.0 GENERAL REQUIREMENTS

2.1 Work in the Vicinity of Pipelines

All work in the vicinity of gas pipelines must adhere to the requirements set forth in this document. Work includes, but not limited to, any ground disturbance in the vicinity of EGD's facilities or equipment crossing. Ground disturbance includes, but is not limited to, activities such as mechanical excavating, hand digging, hydro excavating, directional drilling, grading, blasting and pile installation.

A locate of the gas pipeline must be requested at least five (5) business days prior to beginning any work.

Table 2-1: Locate Contact Information

Area	Locates
Enbridge Gas Distribution Inc.	Ontario One Call: www.on1call.com
Gazifère	Info Excavation: www.info-ex.com
Enbridge Gas New Brunswick	EGNB: 1-800-994-2762
St. Lawrence Gas	Dig Safely New York: Dial 811

2.2 NEB Pipelines & Vital Mains

The NEB regulates natural gas, oil and commodity pipelines that extend beyond provincial, territorial or national boundaries. All work within 30 m (100 ft.) from each side of the right of way of a NEB-regulated pipeline must be approved by the applicable EGD NEB-regulated company prior to commencing. This is a regulatory requirement of the NEB.

Mains are designated as Vital Mains by EGD. The designation of pipelines as Vital Main may change at the discretion of EGD. For the NPS 42 Vital Main, all work within 30 m (100 ft.) from either side of the pipeline must be approved by EGD prior to commencing. For all other Vital Mains, all ground disturbance work within 3 m (10 ft.) from either side of the Vital Main, must be approved by EGD prior to commencing. Approval by EGD may include specific conditions that third parties must follow.

EGD may require representation on site for any ground disturbance work within the vicinity of Vital Main and NEB regulated pipelines.

NEB Vital Main

NEB pipelines and Vital Mains will be identified through locates and Mark-Ups process. In this document, special considerations for NEB pipelines and Vital Mains will be highlighted.

2.3 Pipeline Location Verification

Table 2-2: Pipeline Location Verification Requirements for NEB pipelines and Vital Mains indicates EGD’s minimum requirements for the verification of the pipeline location based on the nature of work. The frequency and location of verification holes may change at the discretion of EGD. Additional verification holes may be required to sufficiently confirm the location of the pipeline.

When using hydro excavation as an alternative to hand digging, refer to the *ESA/TSSA Guideline for Excavation in the Vicinity of Utility Lines, December 2008 edition* for safe operating practices.

Note: For all pipelines (including NEB, and Vital Mains), a minimum horizontal clearance of 1 m (3.3 ft.) is required when drilling parallel to the pipeline and a minimum vertical clearance of 1 m (3.3 ft.) is required when crossing perpendicular to the pipeline. See *Section 5.0 Horizontal Directional Drilling*.

Table 2-2: Pipeline Location Verification Requirements for NEB pipelines and Vital Mains

Location of work relative to Pipeline	Required Verification of Pipe Location by Hand Digging or Hydro Excavation
Work within 3 m (10 ft.) but not crossing main	Top and sides of pipeline
Crossing below pipeline (open excavation)	All sides of pipeline including 0.6 m (2 ft.) below pipeline
Crossing above pipeline (open excavation)	Top of pipeline and all sides or 0.6 m (2 ft.) below the proposed installation
Work parallel to pipe, within 1 m (3.3 ft.) of edge of pipe	Spacing of test holes must not exceed 4.5 m (15 ft.)
Work parallel to pipe, 1 m – 3 m (3.3 ft. – 10 ft.) from edge of pipe	Spacing of test holes must not exceed 10 m (33 ft.)

Table 2-3: Pipeline Location Verification Requirements for All Other Pipelines

Location of work relative to Pipeline	Required Verification of Pipe Location by Hand Digging or Hydro Excavation
Work within 3 m (10 ft.) but not crossing pipeline	Top and sides of pipeline
Crossing below pipeline (open excavation)	All sides of pipeline including 0.3 m (1 ft.) (for less than NPS 12) or 0.6 m (2 ft.) (for NPS 12 and larger) below pipeline
Crossing above pipeline (open excavation)	Top of pipeline and all sides or 0.3 m (1 ft.) (for less than NPS 12) or 0.6 m (2 ft.) (for NPS 12 and larger) below the proposed installation
Work parallel to pipe, within 1 m (3.3 ft.) of edge of pipe	Spacing of test holes must not exceed 4.5 m (15 ft.)
Work parallel to pipe, 1 m – 3 m (3.3 ft. – 10 ft.) from edge of pipe	Spacing of test holes must not exceed 10 m (33 ft.)

Table 2-4: Pipeline Location Verification and Clearance Requirements for HDD for all pipelines (including NEB and Vital Mains)

Location of work relative to Pipeline*	Required Verification of Pipe Location by Hand Digging or Hydro Excavation
Crossing below pipeline (HDD)	All sides of pipeline (including below pipeline) exposed to 1.0 m (3.3 ft.) from the pipeline's sidewalls Additional daylight hole at 2.0 to 4.0 m (6.6 to 13.1 ft) prior to the daylight hole at the crossing, to verify depth and trajectory of drill head and backreamer
Crossing above pipeline (HDD)	Top of pipeline and all sides exposed to 1.0 m (3.3 ft) or 1.0 m (3.3 ft.) below the proposed installation Additional daylight hole at 2.0 to 4.0 m (6.6 to 13.1 ft) prior to the daylight hole at the crossing, to verify depth and trajectory of drill head and backreamer

*See *Figure 5-2: Pipeline Location Verification and Clearance Requirements for HDD for all pipelines (including NEB and Vital Mains)*

2.4 Safe Excavation

NEB **Vital** **Main**

Mechanical excavation is not permitted within 3 m (10 ft.) of NEB-regulated pipelines or Vital Mains, unless verified visually. After the exact location of the main is verified visually, mechanical excavation is allowed up to 1 m (3.3 ft.) of the pipeline. Within 1 m (3.3 ft.) of the NEB or Vital Main, only hand digging or hydro excavation is allowed, unless otherwise approved by EGD.

Mechanical excavation is not allowed within 1 m (3.3 ft.) of the locate marks of the pipeline (excluding NEB and Vital Mains), until the exact location of the pipeline has been visually verified. The excavator must expose the pipeline by hand digging or hydro excavation. Once complete, mechanical excavation is then permitted up to 0.3 m (1 ft.) from the pipeline. Within 0.3 m (1 ft.) of any pipeline (excluding NEB and Vital Mains), only hand digging or hydro excavation is permitted.

Only hand held compaction equipment may be used within 1 m (3.3 ft.) of the sides or top of all gas pipelines.

Spoil from excavation must not be piled on the pipeline or its easement.

2.5 Points of Thrust

Additional precautions must be taken when working in the vicinity of points of thrust. Points of thrust occur at pipeline fittings such as elbows (45° or 90°), end caps, weld tees, reducers, closed valves and reduced port valves. In the event that the excavation involves exposing a point of thrust, or exposing an area near a point of thrust, specific instructions provided by EGD with a white sticker on the locate sheet must be followed. If a point of thrust is identified through the locate process, EGD may require additional time to review. Failure to follow these instructions can result in significant harm to persons, property and the environment.

2.6 Minimum Clearance from Other Structures

The following clearances must be maintained between the circumference of the gas pipeline and other underground structures:

Table 2-5: Gas Pipelines (Less than NPS 12)

Direction	Minimum Clearance m (ft.)
Horizontal	0.6 m (2 ft.)
Vertical	0.3 m (1 ft.)

Table 2-6: Gas Pipelines (NPS 12 and larger)

Direction	Minimum Clearance m (ft.)
Horizontal	0.6 m (2 ft.)
Vertical	0.6 m (2 ft.)

Table 2-7: NEB-regulated pipelines and Vital Mains

Direction	Minimum Clearance m (ft.)
Horizontal	1 m (3.3 ft.)
Vertical	0.6 m (2 ft.)

When crossing EGD's pipelines, all proposed installations must be installed as close to a 90° angle as possible.

Note: For all pipelines (including NEB and Vital Mains), a minimum horizontal clearance of 1 m (3.3 ft.) is required when drilling parallel to the pipeline and a minimum vertical clearance of 1 m (3.3 ft.) is required when crossing perpendicular to the pipeline. See to [Section 5.0 Horizontal Directional Drilling](#).

Table 2-8: Minimum Cover Requirements

	Location	Min. Cover m (ft.)
Mains	Under traveled surfaces (roads), Road Crossings	1.2 m (4 ft.)
	Right-of-way	1 m (3.3 ft.)
	Highways	1.5 m (5 ft.)
	Railways – Cased	1.7 m (5.5 ft.)
	Railways – Uncased	3.1 m (10 ft.)
	Below drainage and irrigation ditch	1 m (3.3 ft.)

	Location	Min. Cover m (ft.)
Services	Private property	0.5 m (1.6 ft.)
	Streets and Roads	0.9 m (2.9 ft.)

2.7 Blasting, Pile Installation and Compaction

Blasting, pile installation or compaction activities in the vicinity of natural gas pipelines require the prior approval of EGD.

Written notification from the owner of the proposed work must be submitted to EGD at the contact information listed in the [Appendix](#). The request must be submitted a minimum of four (4) weeks prior to beginning work to allow sufficient time for review. (See to [Section 7.0 Blasting Requirements](#), and [Section 8.0 Pile Installation Or Compaction Requirements](#), for specific responsibilities.)

NEB Vital Main

Piles within 3.0 m (10 ft.) of NEB-regulated pipelines and Vital Main must be installed by augering, unless otherwise approved by EGD. Vibration and displacement monitoring must be conducted, and communicated to EGD daily. Work must stop if the peak particle velocity exceeds 50 mm/sec (2 in/s) or displacement exceeds 50 mm (2 in.). Augering will not be permitted within 1 m of a NEB-regulated pipeline or Vital Main, unless approved by EGD.

2.8 Repair of Damaged Pipe and Pipe Coating

In all cases where the pipeline or the pipeline coating is damaged by construction activities, contact EGD immediately and leave the excavation open until EGD personnel have made the necessary repairs.

2.9 Encroachment

Permanent awnings and roof structures are prohibited above gas pipelines within the public right-of-way, or EGD's right-of-way. EGD will not accept responsibility for any damages resulting from maintenance or operation of its gas facilities to encroaching structures within the public or EGD right-of-ways. Example of encroaching structure may include: bus shelters, street benches or garbage bins.

EGD requires that all permanent structures be built a minimum of 7 m away from EGD's Vital and NEB mains, unless otherwise approved by EGD Engineering. This requirement is in place as to allow EGD sufficient access and working space should an inspection or repair be needed.

2.10 Tree Planting

When planting trees, the gas pipeline in and near the area of excavation must be located. This is to ensure sufficient clearance is maintained.

NEB Vital Main

For pipelines regulated by the NEB and Vital Mains, trees or large shrubs must have a minimum horizontal clearance between the edge of the root ball or open bottom container and adjacent edge of the existing pipeline of not less than 2.5 m (8 ft).

For all other pipelines (excluding NEB and Vital Mains), a minimum horizontal clearance of 1.2 m (4 ft.) is recommended between the edge of the root ball or open bottom container and adjacent edge of the existing gas pipeline.

In cases where the recommended clearance (2.5 m (8 ft.) for NEB pipelines and Vital Mains or 1.2 m (4 ft.) for all other gas pipelines) cannot be achieved, EGD may specify the installation of a root deflector.

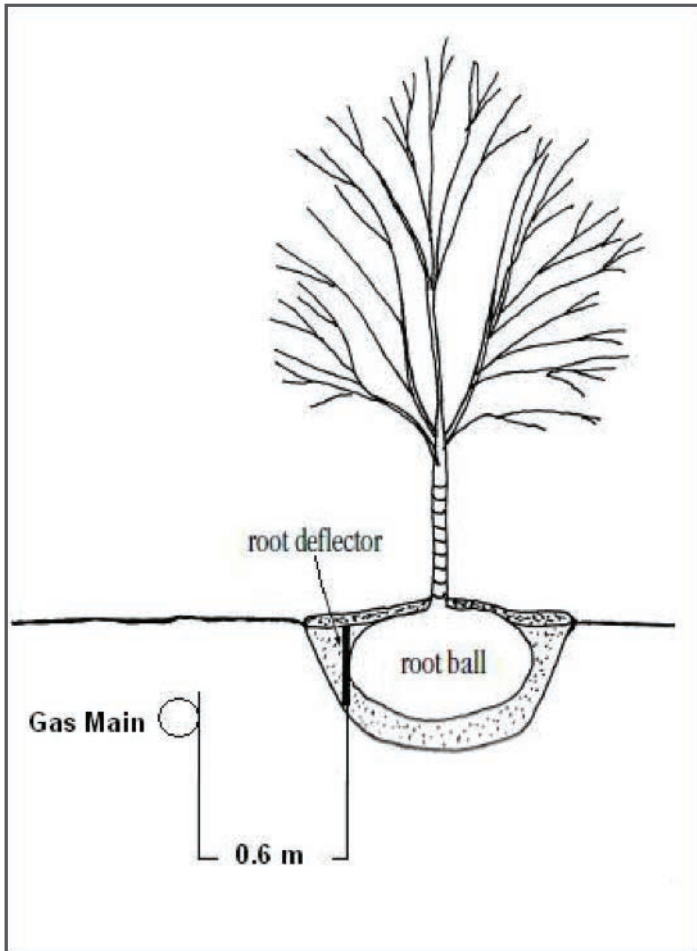
Root Deflectors

A root deflector is a physical barrier placed between tree roots and pipelines to prevent damage to the pipelines. A root deflector can be made from ¼ in. thick rigid plastic, fiberglass or other non-degradable material. The root deflector is intended to prevent the root tips from attaching to the gas main. Typically root deflectors are installed 0.6 m (2 ft.) from the pipeline on the tree-side of the pipeline and extend 1.2 m (4 ft.) from the center of the tree trunk, parallel to the pipeline, in both directions, or encircle the tree.

Root deflectors usually have a collar to keep the top of the deflector at ground level, and extend down to the bottom of the root-ball as shown in *Figure 2-1: Root Deflector*.

For further information regarding tree planting, refer to the Tree Planting information available on the Enbridge Gas Distribution's website (<https://www.enbridgegas.com/gas-safety/safety-tips/tree-planting.aspx>).

Figure 2-1: Root Deflector



3.0 OPERATION OF HEAVY EQUIPMENT

3.1 General

Additional precautions are necessary when equipment in excess of the weights listed in *Table 3-1: Vehicle Load Restrictions* is operated in the vicinity of buried pipelines where no pavement exists or where grading operations are taking place.

Table 3-1: Vehicle Load Restrictions

Pipe Material	Weight/Axle Maximum Allowable Load kg (lb)
Plastic	7,000 kg (15,400 lb)
Steel	10,000 kg (22,046 lb)

Prior to any crossing, the location of the gas main must first be staked out by an EGD representative.

The Excavator is responsible for confirming the location and depth of the main. Test hole spacing must not exceed 50 m (160 ft.).

3.2 Equipment Moving Across the Pipeline

Crossing locations for heavy equipment must be kept to a minimum.

The crossing locations must be determined by EGD after reviewing the nature of the construction operation, the types and number of equipment involved, as well as the line and depth of the existing gas main. The use of equipment is contingent upon the review of EGD's Engineering department.

Once the crossing locations have been established, heavy equipment is restricted to crossing at these locations only. It is the responsibility of the Constructor to inform their personnel of the crossing location restrictions.

Pipelines may require additional protection at crossing locations by constructing berms and/or installing steel plates over the pipeline.

Equipment must be operated at "dead-slow" speed when crossing pipelines in order to minimize loading impact. The pipeline must also be crossed at a 90°, angle.

3.3 Equipment Moving Along the Pipeline

Heavy equipment can be operated parallel to existing pipelines provided that a minimum offset of 1 m (3.3 ft.) is maintained on pipeline sizes less than NPS 12 and 2 m (6.6 ft.) on pipeline sizes NPS 12 and larger, unless otherwise directed by EGD.

Only lightweight, rubber-tired equipment may be operated directly over the existing gas pipelines, unless a minimum pipe cover of twice the pipe diameter or 1 m (3.3 ft.) (whichever is greater) can be verified. The use of all other equipment is contingent upon review and approval by EGD Engineering.

3.4 Damage to Enbridge Gas Distribution's Facilities

Damage to EGD's facilities must be reported immediately by calling the Emergency Contact numbers listed in the [Appendix](#). All work must stop immediately.

4.0 SUPPORT OF GAS PIPELINES

4.1 General

The support requirements specified in this section are the minimum requirements. EGD must be notified regarding the support of any main. EGD has complete discretion in the approval of any support system. Excavators must not depart from these unless a Professional Engineer working for or on behalf of the Excavator has designed an alternative method. Any alternative method must be comparable to these specifications and be, in the opinion of the Professional Engineer, consistent with good engineering practices. The alternative specification must be documented, approved by a Professional Engineer and provided to EGD for review.

The Excavator is responsible for the adequate support of the buried gas pipelines exposed during excavation according to this section.

Pipelines being exposed for extended periods of time (longer than one month) require the approval of EGD's Engineering department.

4.2 Support of Gas Pipelines Perpendicular to Excavation

Temporary support must remain in place until the backfill material underneath the pipeline is compacted adequately to restore support of the pipeline.

Before trenching beneath a main or service, temporary support must be erected for pipelines if the unsupported span of pipe in the trench exceeds the length indicated in Table 4-1: Maximum Span without Support Beam.

Note: For pipelines larger than NPS 8, contact EGD. Refer to the Appendix for contact information.

When temporary support is required, Table 4-2: Support Beam Sizes and Maximum Span Between Beam Supports indicates the required beam for a given span. The beam must be a continuous length grade No. 1 Spruce-Pine-Fir (S-P-F) or equivalent. For spans exceeding 4.5 m (15 ft.), a continuous length timber beam may not be available. In that case, steel I-beams (or equivalents) can be used as the support beam. Steel beam selection must be certified by a Professional Engineer.

Table 4-1: Maximum Span without Support Beam

Pipe Size (NPS)	Steel m (ft.)	PE (polyethylene) m (ft.)
½	2 m (6.6 ft.)	1 m (3.3 ft.)
¾ - 1¼	2.5 m (8.2 ft.)	1.25 m (4.1 ft.)
2	3 m (10 ft.)	1.5 m (5 ft.)
3 to 4	4.5 m (15 ft.)	1.75 m (6 ft.)
6	6 m (20 ft.)	2 m (7 ft.)
8	7 m (23 ft.)	2 m (7 ft.)

Table 4-2: Support Beam Sizes and Maximum Span Between Beam Supports

Pipe Size (NPS)	Steel		PE	
	≤ 2 m (≤ 6.6 ft.)	≤ 4.5 m (≤ 14.7 ft.)	≤ 2 m (≤ 6.6 ft.)	≤ 4.5 m (≤ 14.7 ft.)
½ - 2	Nil	4 x 6	4 x 4	4 x 6
3 - 6	Nil	Nil	4 x 4	6 x 6

The beam must be placed above the pipe with the ends of the beam resting on firm undisturbed soil. The beam must not bear directly on the gas line. The pipe must be supported from the beam with rope, canvas sling or equivalent in a manner that will prevent damage to the pipe or coating and eliminate sag. The spacing between the ropes must not exceed 1 m (3.3 ft.) (refer to *Figure 4-1: Support of Gas Pipelines Crossing Excavations*).

Backfill material underneath the exposed pipeline must be compacted to a minimum of 95% standard Proctor density. Sand padding must be placed to a level 150 mm (6 in.) below and above the main. See *Section 6.0 Backfilling* for additional details.

Perform compaction with the loose lift height not exceeding 200 mm (8 in.) or one-quarter of the trench width, whichever is less. Injecting water into the backfill beneath the pipe is not an acceptable method of compaction.

All temporary support on pipelines must be removed before backfilling. Adequate support must remain in place until the backfill material has restored support.

4.3 Support of Pipelines Parallel to Excavation

Trench wall support may not be required for excavations less than 1.2 m (4 ft.) deep. In this case support is not required if the pipeline is at least 0.6 m (2 ft.) from the edge of the excavation or outside the 45° line projected upward from the trench bottom (refer to Figure 4-2: Influence Lines for Gas Pipelines Adjacent to Excavations). If the pipe does not meet these requirements and the soil is soft clay or sand (soil types 3 and 4), the excavation must be suitably shored to prevent movement of the pipe. The shoring must remain in place until the backfill material has restored support.

Trench wall support is required for excavations with the following conditions: depth is equal or greater than 1.2 m (4 ft.), the pipeline is closer to the edge of the excavation than the minimum allowed distance indicated in Table 4-3: Minimum Allowed Distance from Main to Excavation, or the soil is unstable.

Table 4-3: Minimum Allowed Distance from Main to Excavation gives minimum distances from the edge of the trench to the pipeline in which the excavation influences pipelines. The pipeline must be supported if these minimum distances cannot be met.

Table 4-3: Minimum Allowed Distance from Main to Excavation

Minimum Allowed Distance from Main to Excavation		
Trench Depth (m)	Soils* Type 1 & 2	Soils* Type 3 & 4
≥ 1.2 m (3.9 ft.)	0.9 m (3 ft.)	0.9 m (3 ft.)
≥ 1.5 m (4.9 ft.)	0.9 m (3 ft.)	0.9 m (3 ft.)
≥ 1.8 m (5.9 ft.)	0.9 m (3 ft.)	0.9 m (3 ft.)
≥ 2.1 m (6.9 ft.)	0.9 m (3 ft.)	0.9 m (3 ft.)
≥ 2.4 m (7.9 ft.)	0.9 m (3 ft.)	0.9 m (3 ft.)
≥ 2.7 m (8.9 ft.)	0.9 m (3 ft.)	1 m (3.3 ft.)
≥ 3 m (9.8 ft.)	0.9 m (3 ft.)	1.5 m (4.9 ft.)
≥ 3.3 m (10.8 ft.)	0.9 m (3 ft.)	1.8 m (5.9 ft.)
≥ 3.6 m (11.8 ft.)	0.9 m (3 ft.)	2.2 m (7.2 ft.)
≥ 3.9 m (12.8 ft.)	0.9 m (3 ft.)	2.5 m (8.2 ft.)
≥ 4.2 m (13.8 ft.)	0.9 m (3 ft.)	3 m (9.8 ft.)
≥ 4.5 m (14.8 ft.)	1 m (3.3 ft.)	3.4 m (11.2 ft.)
≥ 4.8 m (15.7 ft.)	1.5 m (4.9 ft.)	3.8 m (12.5 ft.)
≥ 5.1 m (16.7 ft.)	2 m (6.6 ft.)	4.1 m (13.5 ft.)
≥ 5.4 m (17.7 ft.)	2.5 m (8.2 ft.)	4.6 m (15.1 ft.)
≥ 5.7 m (18.7 ft.)	3 m (9.8 ft.)	5 m (16.4 ft.)
≥ 6 m (19.7 ft.)	3.4 m (11.2 ft.)	5.5 m (18 ft.)
*as defined in the Occupational Health and Safety Act		

For pipelines where the trench bottom is below the water table, the trench must be suitably shored as required in Section 4.3 Support of Pipelines Parallel to Excavation.

For pipelines within the minimum distances given in Table 4-3: Minimum Allowed Distance from Main to Excavation, shoring must remain in place until backfill material restores support.

Any pipeline that is exposed for a length greater than indicated in Table 4-1: Maximum Span without Support Beam must require a field assessment.

Figure 4-1: Support of Gas Pipelines Crossing Excavations

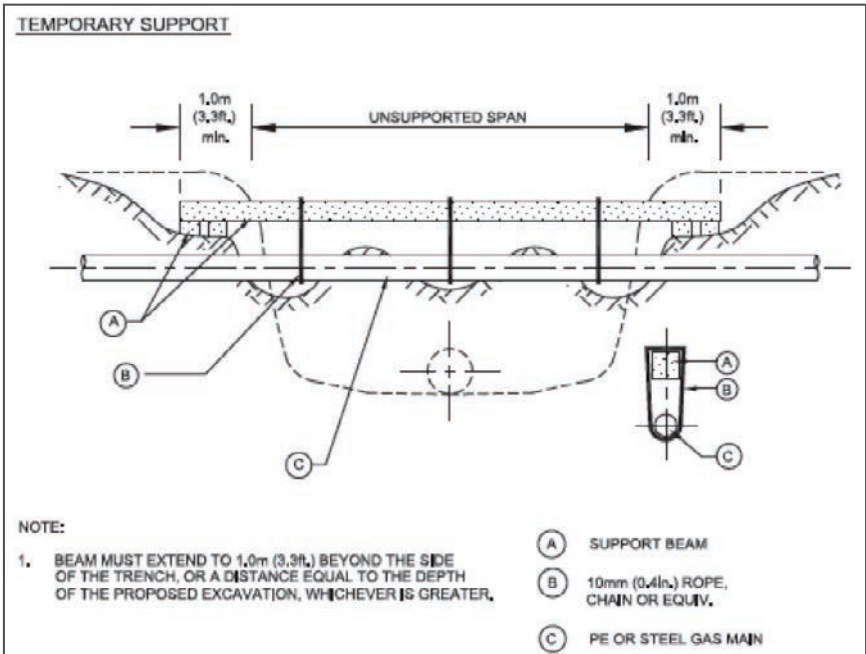
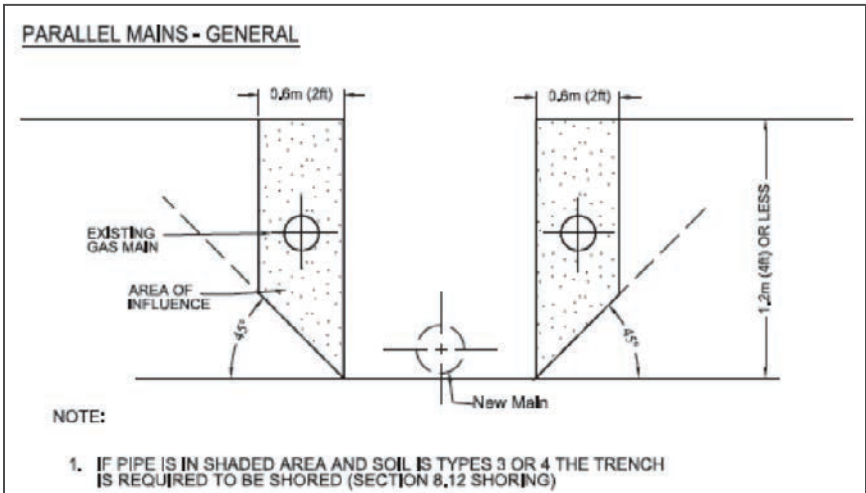


Figure 4-2: Influence Lines for Gas Pipelines Adjacent to Excavations



5.0 HORIZONTAL DIRECTIONAL DRILLING

5.1 General

Horizontal Directional Drilling (HDD) or Directional Boring is a steerable trenchless method of installing underground facilities.

For installations using any other type of drilling or augering equipment in the vicinity of the pipeline, contact EGD's Engineering Department.

In all cases, an additional daylight hole is required to visually verify the drill head's location (including depth) relative to the measurement of the tracking equipment. For daylight hole requirements, see Figure 5-2: Pipeline Location Verification and Clearance Requirements for HDD for all pipelines (including NEB and Vital Mains)

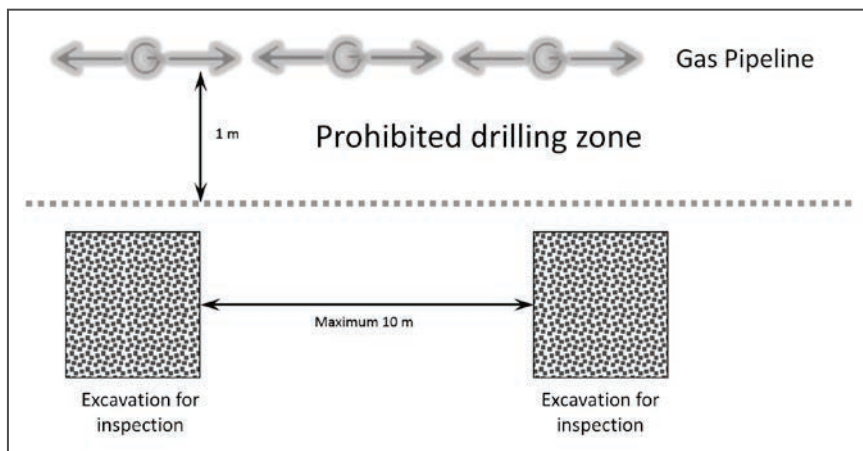
5.2 Drilling Parallel to Pipelines

When the proposed route is parallel to a natural gas pipeline at a perpendicular distance of 3 m (10 ft.) or less, daylighting must be performed at intervals of no more than 10 m (33 ft.) along the drilling path so that the precise location of the drilling head and backreamers (if any) can be verified visually. These excavations must be sufficiently wide to see the entire width of the drilling head, backreamers and structures from entry point to exit point.

The location of the pipeline must be visually confirmed as per the requirements set out in Table 2-2: Pipeline Location Verification Requirements for NEB pipelines and Vital Mains and Table 2-3: Pipeline Location Verification Requirements for All Other Pipelines.

No drilling installation is to be performed within a distance of 1 m (3.3 ft.) or less from either side of the pipeline. This prohibited zone may be widened in some cases.

Figure 5-1: Drilling Parallel to Pipelines



5.3 Drilling Across Pipelines

When the proposed drill path crosses an EGD pipeline, the pipeline must be exposed to the desired depth of the crossing to ensure that the natural gas pipeline is not affected and that the required clearance is maintained during all drilling operations.

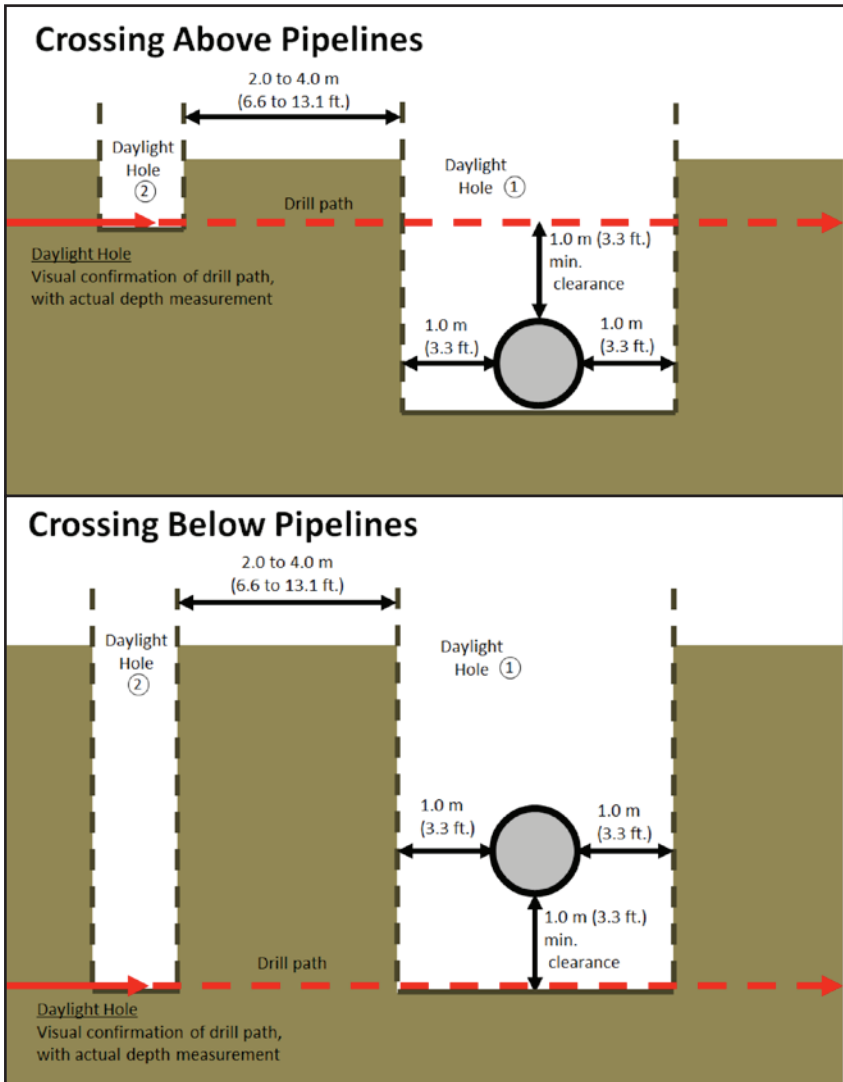
To assure that the directional drilling operation will not result in damage to the pipeline, the following daylight hole requirements must be followed:

- A pipeline daylight hole must be created that is sufficiently wide enough to see the drill head and backreamer entering the excavation at a minimum of 1 m (3.3 ft) before crossing the pipeline. See *Figure 5-2: Pipeline Location Verification and Clearance Requirements for HDD for all pipelines (including NEB and Vital Mains)* Daylight Hole 1.
- A second daylight hole must be created prior to reaching the pipeline such that the precise location of the drill head and backreamer (if any) can be verified visually. The daylight hole must be sufficiently wide to measure the depth and trajectory of the drill head and backreamer. See *Figure 5-2: Pipeline Location Verification and Clearance Requirements for HDD for all pipelines (including NEB and Vital Mains)* Daylight Hole 2.

See *Figure 5-2: Pipeline Location Verification and Clearance Requirements for HDD for all pipelines (including NEB and Vital Mains)*.

The location of the pipeline must be visually confirmed as per the requirements set out in *Table 2-2: Pipeline Location Verification Requirements for NEB pipelines and Vital Mains* and *Table 2-3: Pipeline Location Verification Requirements for All Other Pipelines*. See *Section 2.6 Minimum Clearance from Other Structures* for specified minimum clearances.

Figure 5-2: Pipeline Location Verification and Clearance Requirements for HDD for all pipelines (including NEB and Vital Mains)



6.0 BACKFILLING

6.1 General

The gas pipeline must be inspected by EGD for damages before backfilling the excavation. It is the Excavator's responsibility to ensure that the gas pipeline is not undermined or endangered in any way. If any damage occurs, contact EGD immediately at the Emergency phone numbers listed in the *Appendix*.

Backfilling must be done in such a manner as to prevent any rocks from being placed at or near the surface of the pipe. Native excavated material must be used as backfill unless otherwise directed by EGD. Where native material is unsuitable, 150 mm (6 in.) of approved earth or sand padding must be placed over the pipe for protection. Topsoil must not be used for backfilling.

Aggregate backfill must be replaced in 300 mm (12 in.) layers. Each layer must be thoroughly compacted by pneumatic tampers or an equivalent method acceptable to EGD to ensure no settlement.

The final layer must be smoothed down with a grader (or a rake for small scale projects) and must be tamped flush or slightly higher than the surrounding ground surface in order to prevent ponding of water and accommodate any future soil subsidence over the trench line.

Backfilling a flooded trench will not be allowed. The Constructor is responsible for the removal of water from the trench, before backfilling. If backfilling on a slope, backfill must be first placed from the bottom of the slope, working upwards. This will prevent large voids in the backfill which can occur when the backfill is dumped from the top of a slope.

Backfill and compaction within road allowances must be completed in accordance with the local governing authority. Any excess spoil must be removed as specified by EGD.

Unshrinkable fill or other engineered backfill material must be installed only when requested by the municipalities, local governing authority or as directed by EGD. The pipe and valve assemblies must be sand padded before placement of unshrinkable fill. The Construction must ensure that placement of the unshrinkable fill does not displace sand padding or directly contact the pipeline.

The final covering of gas pipelines must adhere to municipal requirements.

7.0 BLASTING REQUIREMENTS

7.1 General

Before any blasting operation in the vicinity of a gas pipeline can occur, the hazards to EGD's plant must be evaluated. Responsibility for the design of the blast and any resultant damage is borne entirely by the party using the explosives.

A recognized independent blasting consultant must be retained at the applicant's expense to perform an evaluation. The validation report of the blast must be submitted to EGD for review if the blasting will occur within 30 m (100 ft.) of EGD facilities.

The Independent Blasting Consultant must be a Registered Professional Engineer and a holder of a Certificate of Authorization (C of A) specializing in blasting.

A copy of the consultant's report must be forwarded to EGD's Engineering Department for review.

If in the opinion of EGD or an independent blasting consultant, blasting cannot be carried out without affecting the facility's integrity, alternatives must be considered, including the replacement or relocation of the affected facility at the applicant's expense. In these situations, additional time must be allowed to obtain the necessary permits and to complete the necessary construction work.

In the event a third party is affected as a result of the blasting operations, all expenses associated therewith incurred by EGD must also be at the applicant's expense.

Ontario: The applicant must comply with the Ontario Provincial Standard Specification (OPSS 120 - General Specification for the Use of Explosives) in addition to EGD's blasting requirements.

New Brunswick: The applicant must comply with the New Brunswick Provincial Standard Specification (NB Reg 89-108) in addition to EGD's blasting requirements.

Quebec: The applicant must comply with Quebec's Acts regarding explosives (CQLR c E-22 and CQLR c E-22, r 1) and Safety Code (CQLR c S-2.1, r 4), in addition to EGD's blasting requirements.

7.2 Notification Requirements

Surface Blasting Applications

For surface blasting, a letter must be obtained from the applicant, which includes:

- Name of the owner of the project, general contractor and design engineer
- Name of the blasting contractor and person in charge of the blast
- Proof of liability insurance in the minimum amount of \$2 million. Additional insurance requirements may be necessary.
 - Date for the blasting operation
 - A copy of a construction drawing drawn to scale indicating:
 - Details of the proposed drilling and loading pattern for explosives
 - Diameters of drilled holes, relative to EGD's facilities
 - Location of other public utilities (i.e. Bell, hydro, water)
 - Number and timing of delays
 - Total explosive weight to be detonated per delay
 - Specifications for the type of explosives to be used
 - Predicted vibration levels anticipated at any affected facilities
 - Controls to be used to confirm vibration levels (i.e. seismographs)
- Potential stabilization of rock face and type of potential stabilization techniques (i.e. rock anchors, shot crete, ribs, etc.).
- Geological parameters (borehole logs or geological reports) which indicate the design of the blast are acceptable
- Written confirmation that the blasting operation will be carried out by qualified workers with appropriate engineering supervision

Tunnel Blasting Applications

For tunnel blasting, the applicant's letter must contain all information required in the surface blasting application as set out above. In addition, the required independent blasting consultant's report must include:

- Location plan and profile views with construction drawing or sketch drawn to scale
- Evaluation of geotechnical data
- Exact stand-off distances, horizontal and direct (radial)
- Type of advancement proposed and type of tunnel method; full face, top-heading and bench, pilot tunnel
- Type of tunnel lining proposed
- Other pertinent information specific to tunneling techniques
- The use of preventative blasting techniques such as line drilling, cushion blasting, etc.

To assist with the preparation of the written request, locates to determine the location of the pipeline should be requested. Lists of regional addresses and phone numbers are outlined in the [Appendix](#)

7.3 Guidelines for Blasting

The information provided in this section is not to be construed as an exhaustive list of performance specifications, but rather a guide for conducting blasting in the vicinity of EGD's gas pipelines. The applicant is responsible for ensuring that all blasting work is performed in a good and workmanlike manner in accordance with all applicable laws, codes, by-laws, and regulations.

The contractor will be held liable for and indemnify EGD in relation to any and all damage directly or indirectly caused or arising as a result of blasting operations carried out by the applicant, its employees, contractors or those for whom the applicant is responsible at law.

Prior to blasting operations, a site meeting must be arranged with an authorized representative of the applicant and an EGD representative to confirm the location of EGD's facilities and details of the proposed blast.

EGD's pipelines must not be excavated prior to blasting. If excavation is unavoidable, then the pipeline must be properly supported according to EGD's requirements as referred to in [Section 4.0 Support Of Gas Pipelines](#). The Contractor must take suitable precautions to protect the exposed pipeline from fly-rock. Blasting mats must be used to minimize the risk of fly-rock.

Explosives must be of a type which must not propagate between holes or be desensitized due to compression pressures. Explosives must not be left in the drill hole overnight.

For surface blasts located at distances of 10 m (33 ft.) or less from a pipeline and when the excavation of the first blast hole has attained a depth equal to the top of the buried natural gas pipeline, when the vertical depth of subsequent blast holes exceeds one half of the horizontal distance to the closest portion of the natural gas pipeline, the required independent blasting consultant's report must specifically address the impact of these conditions. This condition is not applicable for tunnel blasting operations.

Monitoring of blasting vibrations with a portable seismograph capable of producing on site print outs in the vicinity of EGD's facilities is mandatory to confirm that predicted vibration levels are respected. On a daily basis, a copy of the seismographic report must be provided to EGD.

Peak Particle Velocity (PPV) must be limited to 50 mm/sec (2 in./s) and maximum amplitude must be limited to 0.15 mm (0.006 in.).

7.4 Post Blasting Operation

Upon completion of daily blasting operations and within 30 days after the final blasting, EGD will conduct a leak survey of the pipeline at the applicant's expense. Leak survey will also be completed at the end of each day of blasting. Damage that has resulted from the blasting will be repaired at the applicant's expense. A summary of all blasting operations including blasting logs, vibration control, seismograph reports and other pertinent information must be provided to EGD by the applicant daily and at the completion of blasting operations.

8.0 PILE INSTALLATION OR COMPACTION REQUIREMENTS

8.1 General

Pile installation or compaction activities in the vicinity of EGD's facilities must be evaluated by EGD prior to beginning. Any resultant damage as a result of these activities will be borne entirely by the Contractor undertaking the proposed work.

If in the opinion of EGD, the particular pile installation or compaction operation cannot be carried out without affecting the pipeline or facility integrity, the following must be considered:

- Risk analysis and/or mitigation program for the proposed operation
- Alternate construction methods
- Relocation or replacement of the pipeline/facility.

All costs incurred will be covered by the Contractor undertaking the proposed work with final approval being granted by EGD.

Piles installed via augering must satisfy the locating and clearance requirements listed in Section 2.3 Pipeline Location Verification and Section 2.6 Minimum Clearance from Other Structures, respectively. EGD must provide approval for the installation of pile within 3 m (10 ft.) of a NEB-regulated pipeline or Vital Main.

The Contractor will be responsible for all costs related to customer interruption as well as costs incurred because of work delays. In the event a third party is affected as a result of the pile installation and/or compaction operations, all expenses associated therewith incurred by EGD will be passed to the Contractor.

8.2 Pile Installation or Compaction Application

The application to pile drive or do compaction work must be sent to EGD. Refer to the Appendix for contact information. The application must include the following:

- Name of project owner, general contractor and applicable sub-contractors

- A copy of the permits, certificates or other forms that are municipal bylaw requirements
- Name of design engineer and a copy of the construction plans with drawings. These must detail the natural gas facilities that can be affected.
- The type of piles and equipment to be used. Also the control methods to prevent pile deviation.
- Geo-technical reports and other applicable information
- A copy of the location of other public utilities: telephone, cable TV, sewer and water mains, electrical services, etc.
- A technical report with appropriate analysis and prediction of the vibration levels according to the opinion of an independent Engineering Consultant specialized in vibration control and analysis

This work must be completed under the supervisor of qualified personnel. Vibration results must be provided to EGD on a daily basis.

8.3 Guidelines

The information provided in this section is to be viewed as a guideline only. The Contractor is responsible for ensuring that all pile installation and compaction work is performed in accordance with all applicable laws, codes, by-laws and regulations.

No operations must be permitted within a standoff distance of 1.5 m (5 ft.) from the pipeline or other natural gas facility, unless approved by EGD's Engineering Department.

Prior to pile installation and/or compaction work, a site meeting must be arranged with an authorized representative of the Contractor and an EGD representative to confirm the location of EGD's facilities and details of the proposed work.

The pipeline should not be excavated prior to the piling or compaction operation. If excavation of the pipeline is necessary, then it must be properly supported in accordance with Section 4.0 Support Of Gas Pipelines.

The following situations will require the opinion of an independent Engineer:

1. Compaction of soils or backfill rated at 10,000 ft-lbs (13,600 Nm) or higher at a stand-off distance of 6 m (20 ft.) or less from the pipeline

2. Pile driving at a stand-off distance of 10 m (33 ft.) or less from the pipeline or other natural gas facility.
3. High-energy dynamic compaction for the rehabilitation of soils at a stand-off distance of 30 m (100 ft.) or less from the pipeline.
4. Type 4 soil as defined in Article 226 of the Occupational Health and Safety Act and Regulations for Construction Projects (See to Section 8.5 Soil Types).

For these situations, the appropriate number of seismographs to monitor vibrations is mandatory. The seismographs must be the portable type with the capability of producing on site printouts. This control will confirm the intensity of the vibrations generated by the pile installation or compaction work as projected. Furthermore, reports of recorded intensities must be provided on a regular basis or at the request of EGD.

Should a situation with low energy compaction operations with a soil cover of less than 1.5 m (5 ft.) above the pipeline at a stand-off distance of 3 m (10 ft.) or less from a pipeline be encountered, EGD may require the opinion of an independent Engineering Consultant.

In addition, if a Type 3 soil (see Section 8.5 Soil Types) is present on site, EGD may require the opinion of an independent Engineering Consultant.

The Peak Particle Velocity (PPV) measured on the pipeline, or at the closest point of the related structure with respect to the work, must not exceed 50 mm/sec (2 in/s). Furthermore, the maximum displacement for the vertical and/or horizontal component corresponding to the above stated vibration intensity must not exceed 50 mm (2 in.) at any given length of the pipeline in question.

If the PPV or displacement limit are surpassed, all operations must stop notwithstanding any delays or costs incurred by the Contractor or owner of the proposed work. EGD will require that the cause of these higher vibrations or displacements be investigated. EGD may arrange for a leak survey to be conducted. EGD's Engineering Department must approve resumption of operations.

Auguring may be required in order to avoid the use piles.

All operations must comply with the Provincial Occupational Health and Safety Act and Regulations for Construction Projects as well as all applicable EGD specifications, standards and guidelines.

8.4 Post Piling or Compaction Operations

The Contractor must send EGD the items that follow within five (5) business days of the completion of the pile installation via pile driving or compaction operations:

- A summary of all operations
- Pile driving and compaction logs
- Vibration control records
- Seismograph records

On completion of each day's work, and approximately 30 days after all work is completed, EGD will arrange to conduct a leak survey of the facility. If damage to EGD's facilities is found, it will be repaired by the Contractor. An invoice will be sent to the Contractor responsible for the work.

Maximum Vibration Intensities Expected from Pile Driving

(E/D) ^{1/2}	Particle Velocity (in/s)			(E/D) ^{1/2}	Particle Velocity (mm/s)		
	Dry Sand	Wet Sand	Clay		Dry Sand	Wet Sand	Clay
0.10	0.020	0.030		0.10	0.43	0.74	
0.22	0.040	0.060	0.010	0.22	0.97	1.50	0.25
0.30	0.050	0.080	0.020	0.30	1.27	1.27	0.43
0.40	0.070	0.110	0.040	0.40	1.75	2.80	0.66
0.50	0.080	0.130	0.040	0.50	0.06	3.30	1.02
0.60	0.100	0.180	0.050	0.60	2.54	4.57	1.27
0.70	0.110	0.200	0.060	0.70	2.80	5.08	1.52
0.80	0.130	0.230	0.080	0.80	3.30	5.84	1.96
0.90	0.160	0.270	0.090	0.90	4.06	6.86	2.29
1	0.180	0.290	0.100	1	4.57	7.37	2.54
2	0.330	0.590	0.300	2	8.38	14.99	7.62
3	0.560	0.880	0.580	3	14.22	22.35	14.73
4	0.700	1.100	0.890	4	17.78	27.94	22.61
5	0.880	1.400	1.100	5	22.35	35.56	27.94
6	1.050	1.850	1.800	6	26.67	46.99	45.72
7	1.100	2.010	2.010	7	27.94	50.80	50.80
8	1.400	2.300	2.400	8	35.56	58.42	60.96
9	1.750	2.800	3.100	9	44.45	71.12	78.74
10	1.850	2.900	3.400	10	46.99	73.66	86.36

E is defined as rated energy of the pile hammer in ft-lbs.

D is defined as distance in inches.

Values highlighted in red indicate unacceptable vibration levels.

8.5 Soil Types

(Occupational Health and Safety Act and Regulations for Construction Projects)

1. For the purposes of this Part, soil must be classified as Type 1, 2, 3, or 4 in accordance with the descriptions set out in this section.
2. **Type 1 soil:**
 - a) is hard, very dense and only able to be penetrated with difficulty by a small sharp object;
 - b) has a low natural moisture content and a high degree of internal strength;
 - c) has no signs of water seepage; and
 - d) can be excavated only by mechanical equipment.
3. **Type 2 soil:**
 - a) is very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
 - b) has a low to medium natural moisture content and a medium degree of internal strength; and
 - c) has a damp appearance after it is excavated.
4. **Type 3 soil:**
 - a) is stiff to firm and compact to loose in consistency or is previously- excavated soil;
 - b) exhibits signs of surface cracking;
 - c) exhibits signs of water seepage;
 - d) if it is dry, may run easily into a well-defined conical pile; and
 - e) has a low degree of internal strength.
5. **Type 4 soil:**
 - a) is soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
 - b) runs easily or flows, unless it is completely supported before excavating procedures;
 - c) has almost no internal strength;
 - d) is wet or muddy, and
 - e) exerts substantial fluid pressure on its supporting system.

APPENDIX

Contact Information

ENBRIDGE GAS DISTRIBUTION 500 Consumers Road North York, ON M2J 1P8	Markups: Mark-Ups@enbridge.com Mail to: Distribution Asset Management Ontario One Call Locates: 1 (800) 400-2255 Damage Prevention: 1 (866) 922-3622 Emergency: 1 (866) 763-5427
ENBRIDGE GAS STORAGE 3595 Tecumseh Road Mooretown, ON N0N 1M0	Ontario One Call Locates: 1 (800) 400-2255 Engineering Dept.: 1 (519) 862-6027 Operations Dept.: 1 (519) 862-6017 Emergency: 1 (866) 763-5427
GAZIFÈRE 706 Boulevard Greber, Gatineau QC J8V 3P8	Locates: 1 (800) 663-9228 Planning Dept.: 1 (819) 771-8321 X-2449 Emergency: 1 (819) 771-8321, press 1
ST. LAWRENCE GAS COMPANY LTD. 33 Stearns Street, P.O. Box 270 Massena, NY. 13662	Dig Safely New York Locates: 811 or 1 (800) 962-7962 Damage Prevention: 1 (315) 842-3621 Emergency: 1 (800) 673-3301
ENBRIDGE GAS NEW BRUNSWICK INC 440 Wilsey Road Fredericton NB E3B 7G5	Locates: 1 (800) 994-2762 Locates (Saint John only): 1 (866) 344-5463 Planning and Technical Services: 1 (888) 642-2020 Emergency: 1 (800) 994-2762

