



# Kitchener Utilities DSIMP WORK PROCEDURE

Title: Excavation Near Gas Pipelines	Control Number: WI-5.6
Revision: 1	Effective Date: January 1 <sup>st</sup> , 2018

## 1 Purpose

The purpose of this procedure is to present the procedures required to be followed prior to and during an excavation in close proximity to a natural gas pipeline to ensure the long-term integrity of the gas services within the Kitchener Utilities (KU) natural gas distribution system.

## 2 Background

This procedure outlines KU requirements as they pertain to the excavation or exposing of gas infrastructure by excavators not performing work on the behalf of the Utility. The following scenarios are examples of situations applicable to the requirements in this document:

### Scenario 1.1

This scenario focuses on the homebuilding industry's ongoing practice of exposing significant portions of existing energized gas services while conducting excavation work adjacent to the gas service line. When builders initiate the process of constructing an "infill" new home they have an excavation company dig for a new foundation. During the process of digging the foundation they occasionally expose gas services of the adjacent property owners. The problem, in part is the limited space between residences in new subdivisions. This practice and the subsequent handling of the gas service, eventually backfilling around and over the gas service has generated significant safety concerns, especially when this practice is being done without Kitchener Utilities' prior knowledge or consent. In this case the Trench Wall Support (see Section 6) is the best means of ensuring public and worker safety and the integrity of the pipeline.

### Scenario 1.2

During reconstruction projects on municipal streets, where the deep underground services are being excavated and replaced, there will be the occasion that the gas pipeline will have to be exposed in order to install the other deeper utilities. This may include trenches being excavated parallel and/or perpendicular to the gas pipeline. In this case Pipeline Support (see Section 5) or Trench Wall Support (see Section 6) may apply.

### 3 Applicable Regulation(s)

The following regulations apply during the excavation in the vicinity of the gas pipelines:

Ontario Regulation 213/91, Construction Projects  
Under the Occupational Health and Safety Act:

Precautions Concerning Services

228. (1) Before an excavation is begun,
- (a) the employer excavating shall ensure that all gas, electrical and other services in and near the area to be excavated are located and marked;
  - (b) the employer and worker locating and marking the services described in clause (a) shall ensure that they are accurately located and marked; and
  - (c) if a service may pose a hazard, the service shall be shut off and disconnected. O. Reg. 213/91, s. 228 (1).
- (2) If a service may pose a hazard and cannot be shut off or disconnected, the owner of the service shall be requested to supervise the uncovering of the service during the excavation. O.Reg. 443/09, s.6.
- (3) Pipes, conduits and cables for gas, electrical and other services in an excavation shall be supported to prevent their failure or breakage. O. Reg. 443/09, s. 6.

Ontario Regulation 210/01, Oil and Gas Pipeline Systems  
Under the Technical Standards and Safety Act:

Ascertaining Pipeline Locations

9. (1) No person shall dig, bore, trench, grade, excavate or break ground with mechanical equipment or explosives without first ascertaining from the licence holder the location of any pipeline that may be interfered with. O. Reg 210/01, s. 9 (1).
- (2) The licence holder shall provide as accurate information as possible on the location of any pipeline within a reasonable time in all the circumstances. O. Reg. 210/01, s. 9 (2).

No interference with Pipeline

10. No person shall interfere with or damage any pipeline without authority to do so. O. Reg. 210/01, s. 10.

Under the current version of the CSA Standard Z662, as adopted by the TSSA, the following is the requirement for excavation work:

*“Excavation of piping suspected of containing defects and if required, the subsequent permanent or temporary repair of such piping shall be performed after the piping is depressurized as necessary to an operating pressure that is considered to be safe for the proposed work. Caution shall be exercised, when excavating, to avoid contacting other buried structures or facilities. Extra precautions shall be taken if the excavation is near equipment, tanks, or other structures.”*

## **4 General**

All excavation related work shall be carried out in accordance with:

1. Occupational Health and Safety Act (OH&S) and associated Regulations
2. Technical Standards and Safety Act (TSSA) and associated Regulations
3. CSA Code

Damage caused by inadequate support of gas pipelines in the vicinity of excavations by others, are not the responsibility of KU or the City of Kitchener and any such damage will be repaired at the contractor's expense.

## **5 Excavation Preparations**

Prior to any excavation activity the excavator/contractor is responsible to obtain locates from all underground infrastructure owners such as KU. KU is a member of the Ontario One Call and a locate request can be made at 1-800-400-2255.

It is recommended that the CSA Code "Z247-15 Damage Prevention for the Protection of Underground Infrastructure" approved by the TSSA be reviewed and applied.

Where other pipelines are under-crossed, the depth of the trench shall be such as to provide a minimum clearance of 300 mm between the top of the line being installed and the bottom of the pipeline under-crossed.

## **6 Pipeline Support**

If any portion of KU underground gas distribution piping is to be exposed or uncovered as a result of excavation activities, then the gas distribution piping must be supported at all times during construction. This support must remain in place until the compacted backfill material around the pipe is replaced. The cost associated with providing this support will be at the excavator's expense.

The following table outlines the span that the pipeline can be exposed before pipe support is required:

**Table 1: Maximum Span without Support**

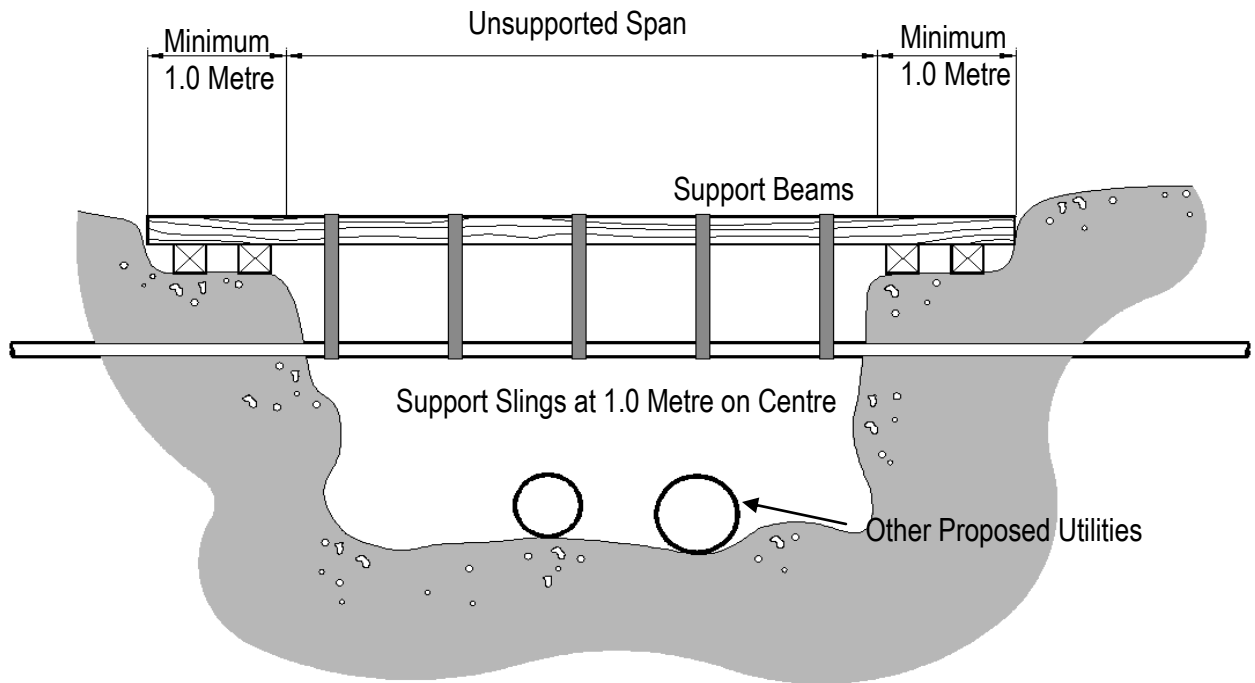
Pipe Size		Steel	Polyethylene (PE)
(NPS)	(mm dia.)	(metre)	(metre)
1/2	13	2.0	1.0
3/4 to 1 1/4	19 to 32	2.5	1.25
2	50	3.0	1.5
3 to 4	75 to 100	4.5	1.75
6	150	6.0	2.0
8	200	7.0	2.0
10	250	7.0	-
12	300	10.0	-

\*Source: Enbridge Gas Distribution, Construction Manual, January 2005  
NPS – Nominal Pipe Size

It is permissible to use an above ground beam support system that supports an exposed pipeline by use of slings encircling the beam and the pipe to eliminate sag and with the ends of the beam resting on firm undisturbed soil. See Figure 1 as a typical example. The beam shall not bear directly on the gas line and the spacing of the slings shall not exceed 1.0 metre.

Slings shall have a minimum width equal to the diameter of the pipe and shall be constructed in such a manner that they may be removed from under the pipe without bringing metal fasteners into contact with the pipe coating.

**Figure 1: EXAMPLE OF TEMPORARY SUPPORT OF A GAS PIPELINE**



The excavator must submit detailed design drawings of the support measures, certified by a Professional Engineer, for review prior to the start of construction. The proposal must show both temporary supports during construction and permanent measures to be taken to prevent settlement under the gas distribution infrastructure after construction is complete. Gas distribution infrastructure may not be left unsupported at any time, including during the installation of temporary or permanent support mechanisms.

Coated pipe shall be handled with suitable slings or cradles to minimize damage to the coating, and shall be treated at all times with extreme care and caution to avoid damage to the coating. It shall be handled with wide fabric nonabrasive slings of a type that can be disengaged without metal parts coming into contact with the coated line. Skids for coated pipe shall be of sufficient number and width, and shall be sufficiently padded with yielding pillow-like material so that resulting bearing pressure will cause minimum damage to the coating. Coated pipe shall under no circumstance be subjected to jolts or impacts.

Where coated pipe is blocked up or "crotched" with skids, suitable padding shall be placed between the skids and pipe to prevent damage to the coating.

All temporary support on Polyethylene pipes must be removed prior to final backfill, yet care must be taken to ensure that the pipeline has adequate support until the backfill material is installed and compacted.

## 7 Trench Wall Support

Trench wall support may be required if the gas pipeline is parallel to the excavation (as is usually the case in scenario 1.1). Trench wall support is required if the depth of the trench to be excavated measures 1.2 metres or greater and the pipeline is closer to the edge of the excavation than the minimum allowed in the following table:

**Table 2:** Minimum Allowed distance from Pipeline to Edge of Excavation, as prescribed by OH&S (Source: Enbridge Gas Distribution, Construction Manual, January 2005)

Trench Depth (metres)	Soils Type 1 & 2	Soils Type 3 & 4
≥ 1.2	0.9	0.9
≥ 1.5	0.9	0.9
≥ 1.8	0.9	0.9
≥ 2.1	0.9	0.9
≥ 2.4	0.9	0.9
≥ 2.7	0.9	1.0
≥ 3.0	0.9	1.5
≥ 3.3	0.9	1.8
≥ 3.6	0.9	2.2
≥ 3.9	0.9	2.5
≥ 4.2	0.9	3.0
≥ 4.5	1.0	3.4
≥ 4.8	1.5	3.8
≥ 5.1	2.0	4.1
≥ 5.4	2.5	4.6
≥ 5.7	3.0	5.0
≥ 6.0	3.4	5.5

**226.** (1) For the purposes of this Part, soil shall be classified as Type 1, 2, 3 or 4 in accordance with the descriptions set out in this section. O. Reg. 213/91, s. 226 (1).

(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. O. Reg. 213/91, s. 226 (2).

(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. O. Reg. 213/91, s. 226 (3).

(4) Type 3 soil is,

- (a) previously excavated soil; or
- (b) soil that is stiff to firm or compact to loose in consistency and has one or more of the following characteristics:
  - (i) It exhibits signs of surface cracking.
  - (ii) It exhibits signs of water seepage.
  - (iii) If it is dry, it may run easily into a well-defined conical pile.
  - (iv) It has a low degree of internal strength. O. Reg. 345/15, s. 24.

(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. O. Reg. 213/91, s. 226 (5).

The use of a trench wall support would also be required if the remaining soil wall in which the gas pipeline currently exists is or becomes unstable, or if the trench bottom is below the water table.

When shoring is required to be used, it shall be installed and maintained as per the requirements of the Occupational Health and Safety Act.

Any type of trench wall support shall remain in place until backfill material restores support of the trench wall.

## 8 Construction Activities around Exposed Gas Pipelines

The contractor that is performing work in and around all exposed gas pipelines must take all reasonable precautions to ensure the gas pipe and its coating remain undamaged from surrounding activities, such as falling debris or demolition materials. Failing to do so may result in repair cost being charged to the contractor.

### Excavation Adjacent to Dresser Coupling

If a dresser coupling is exposed during excavation activities, Kitchener Utilities needs to be contacted immediately as additional pipeline support may be required. Extreme caution is required if a dresser coupling is exposed at the dead end of a main.

## 9 Corrosion Control Inspection

As per CSA Z662-11 (Section 12.9.4), “*Where piping is exposed and operating company personnel are on site, it shall be visually inspected for the condition of the coating and evidence of corrosion. Where corrosion is found, corrosion in excess of the limits defined by the operating company shall be assessed and, where applicable, the piping shall be repaired ...*”

Kitchener Utilities’ Construction and Maintenance personnel should be notified if any portion of the gas main becomes exposed and especially if following examination of the pipeline it is determined that:

For steel mains:

- the yellow jacket covering is damaged in any way
- if there is any visible signs of corrosion
- cuts, scratches, gouges, and other imperfections and if anomalies are discovered
- existing anodes have been damaged or if soil around an anode has been disturbed

For polyethylene mains:

- there are any cuts, scratches, gouges, and other imperfections and if anomalies are visible in the pipe wall
- any damage to the coating or copper strands of the tracing wire

Within the limits of the construction zone, the contractor shall provide Kitchener Utilities ample space and time to complete corrosion related activities on the gas piping and/or appurtenances, be it either maintenance or repair related work, prior to final restoration of the surrounding area.



The contractor shall contact the Utilities Dispatch at (519)741-2529 then select 2 and ask to speak to a Construction and Maintenance Supervisor or the Supervisor On-Call when the gas piping is exposed and is in questionable condition.

## **10 Backfill and Compaction**

As per CSA Z662-11 (Section 12.6.1.1), *“Piping shall be properly supported on undisturbed or well-compacted soil, so that the piping is not subjected to excessive external loading by the backfill. Backfill materials shall be free of items, such as rocks and building materials, that can cause damage to the piping or its protective coating.”*

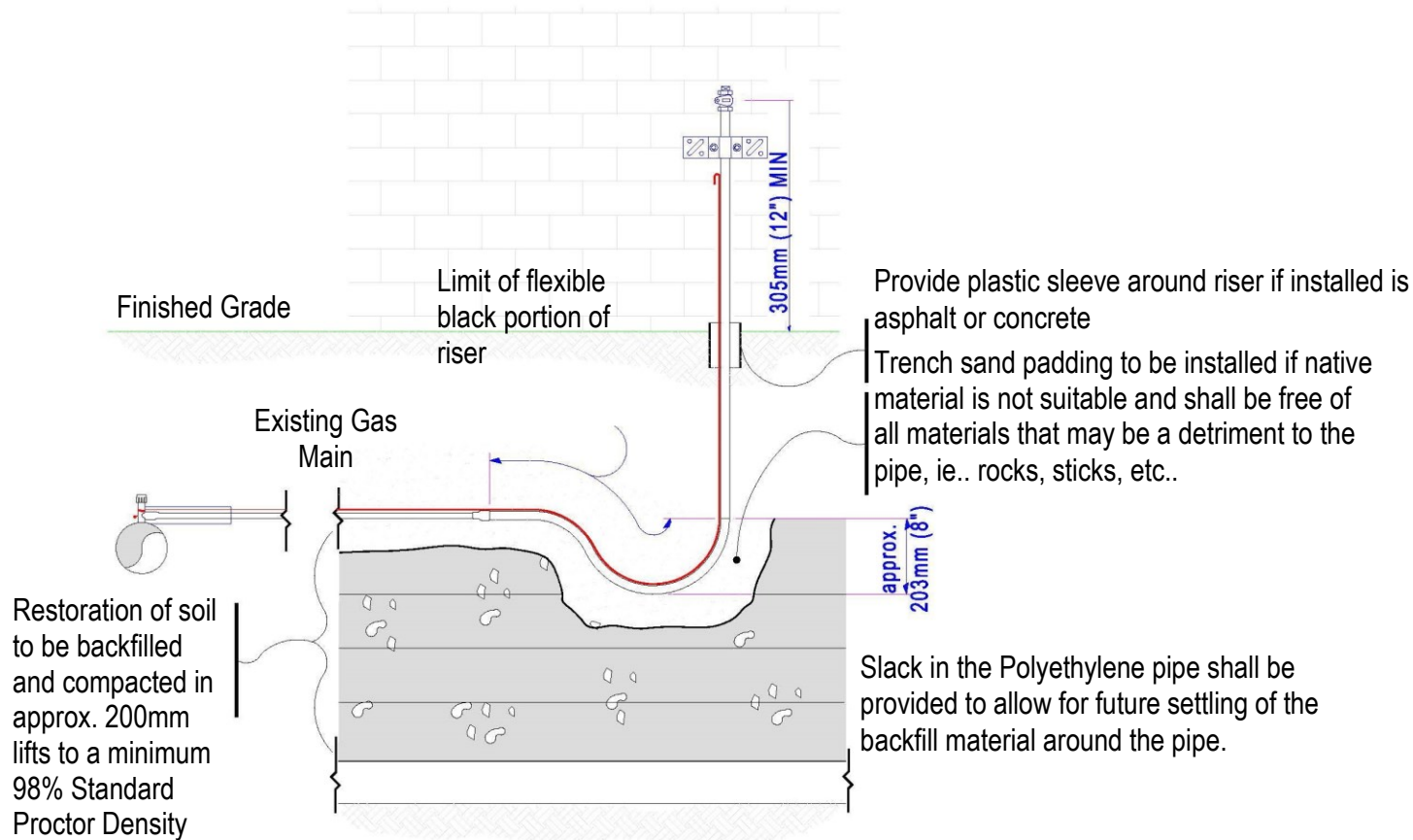
The special trench padding shall be placed manually (“by hand”) above the pipe to prevent damage to coating and around areas where mechanical equipment would damage adjacent buildings or other structures. This manual backfilling shall be used to cover all pipes for the first 150 mm (6”) to prevent damage to the pipe. This special trench padding shall be compacted to 100% Standard Proctor Density, with the loose lift height not exceeding 200 mm (8”) or one-quarter of the trench width, whichever is less. Injecting water in the backfill beneath the pipe is not an acceptable method of compaction.

The use of special trench padding shall be as directed by the Utilities Engineer. Special trench padding shall be approved sand, sandy loam, stone screenings or stone dust. Padding shall be placed to a depth of not less than 100 mm (4”) below the pipe and 200 mm (8”) above the pipe. Remove all loose rocks, debris, etc., from the trench bottom before placing the padding.

Upon completion of the backfill activity, the depth of cover above the gas pipeline should be close to the same depth of cover prior to the original excavation activity.

All lawns and driveways that are cut shall be backfilled in 200 mm (8”) layers, loose measurement, and each layer thoroughly tamped by hand or machine so that there will be no settling of the surface.

**Figure 1: PROPER RESOTRATION OF A GAS SERVICE WITH A STRAIGHT RISER (NEW INSTALLATION)**



## 11 Procedure When Damage or Incident Occurs

If a gas pipeline is severed and gas is blowing then all the equipment is to be shut down in the immediate area, the area shall be evacuated and the pipeline shall be left exposed. No one should attempt to pinch off or impede the flow of gas from a ruptured gas pipeline. KU should be contacted immediately to render the pipeline safe and conduct the repairs at (519) 741-2541. The Fire Department and Police shall also be immediately notified. If the damage occurs on a City of Kitchener or Region of Waterloo funded construction project, the respective construction manager shall also be advised.

If coating is damaged or if polyethylene pipe is cut, scratched, gouged or damaged in any way, but there is no gas escaping then the area shall be left exposed and KU shall be notified to inspect the pipeline and conduct repairs, if required.

If a pipeline is found exposed and not properly supported then the excavator will be asked to cease activities until the proper shoring and/or pipe support is in place, in accordance with this Procedure and all applicable Regulatory Standards. The excavator will be required to backfill around the pipeline as stipulated in section 8.0 once the construction activity is complete.

If it is suspected that the pipeline has been backfilled improperly, KU will excavate the pipeline and conduct an inspection of the affected pipe and perform repairs if required, at the contractor’s expense. The contractor may mitigate costs by assisting in the excavation and backfilling of the pipeline.

Kitchener Utilities reserves the right to have an inspector on site during any or all excavation and backfill activities performed by the excavator. All associated costs will be charged to the contractor.

All damages will be reported to the TSSA and a list of offences and/or fines are listed in the appendix of the “Guideline for Excavations in the Vicinity of Utility Lines” as published by the TSSA available at <http://www.tssa.org>.

**12 Other Referenced Material:**

CSA Code Z247-15 – Damage Prevention for the Protection of Underground Infrastructure.

Enbridge Gas Distribution, Construction Manual, January 2005.

Construction of Steel Gas Pipelines and Services Work Procedure.

Construction of Polyethylene Gas Pipelines and Services Work Procedure.

**13 History of Changes**

Revision	Date	Description	By
Initial	November 13, 2013	Original	Les Jones and Parmi Takk
1.0	January 6, 2016	Revised to include new Z code Z247-15	Parmi Takk