Guideline for Excavation in the Vicinity of Utility Lines

Ontario Regulation 210/01 Oil and Gas Pipeline Systems

Ontario Regulation 22/04 Electrical Distribution Safety

Nov 01, 2017
Legal Disclaimer

This document contains GUIDELINES ONLY to assist members of the industry in interpreting:

- Ontario Regulation 22/04 - Electrical Distribution Safety - made under subsection 113(1) of Part VIII of the Electricity Act, 1998
- Ontario Regulation 210/01 – Oil And Gas Pipeline Systems – made under the Technical Standards and Safety Act, 2000
- Ontario Regulation 92/14 – Governance of the Corporation – made under the Ontario Underground Infrastructure Notification System Act, 2012

These guidelines do not have the force of law. Where there is a conflict between these guidelines and any legislation or regulation, which may apply, the relevant law prevails.

Retention Periods stated in the guidelines set out the minimum period for which referenced documents are to be retained. Each distributor needs to make its own assessment of the appropriate retention period for specific documents based on its assessment of risk factors and potential liability.

TSSA and ESA legislation have their own requirements for locates, and Ontario One Call legislation has very expansive requirements to obtain locates before digging. TSSA and ESA therefore strongly recommend obtaining locates prior to engaging in any digging or groundbreaking activity.

Revisions

|   |  
|---|---|
| 1. | Numbering changed as adding **scope**  
| 2. | Definition alignment with Z247-15  
|   | Inclusion of “ground disturbance” into the guideline  
|   | Ontario One Call references included  
| 3 | 4.1 edited to only direct locate requests to Ontario One Call  
| 4 | 5.4 edited to require the written confirmation be provided  
| 5 | Appendix 2 update  

Guideline for Excavation in the Vicinity of Utility Lines
1. **Scope**

These guidelines are intended to be used as a plan to assist contractors, excavators, landscapers, homeowners, and any party creating ground disturbance, to prevent damage to oil, gas and electrical underground infrastructure. Underground infrastructure include:

a) Oil and Gas pipelines,

b) Electrical installation, cables or lines.

2. **Definitions**

**Abandoned** means underground infrastructure, taken out of service permanently but left in place.

**Alternate Locate Agreement ALA or Blanket Locate** means a legal agreement, between plant/facility owner and an excavator, outlining the conditions and terms, agreed to by both parties, whereby the indicated excavator can safely proceed without a traditional field locate, aka “paint on the ground”, when using a specific method of excavation (for instance hydro vac), for low risk work.

**Boundary Limits** means the volume of soil contained by vertical planes placed 1.0 metre each side of the centre line of the marked utility line or 1.0 metre on either side of the marked limits of the underground structure.

**Contractor or Excavator** means the individual, partnership, corporation, public agency, or other entity that digs, bores, trenches, grades, excavates or breaks ground with mechanical equipment or explosives in the vicinity of a utility line.

**Excavation**...see ground disturbance

**Ground disturbance** means dig, bore, trench, grade, excavate or break ground with mechanical equipment or explosives. For the purposes of this guideline, the definition of “ground disturbance” does not include agricultural cultivation to a depth less than 450 mm that does not reduce the cover over the underground infrastructure.

**Hand dig** means to excavate using a shovel with a wooden or insulated handle, not including picks, bars, stakes or other earth piercing devices. Please note that ESA Regulations requiring a locate include hand digging applications.

**Hydrovac** means the use of pressurized water or compressed air to loosen soil and a vacuum system to remove it.
**Live** means:
a) electrically connected to a source of voltage difference or electrically charged so as to have a voltage different from that of the earth, or
b) connected to a source of fuel under the *Technical Standards and Safety Act, 2000*.

**Locate (noun)** means information provided by the locator in the form of ground surface markings and underground infrastructure location documentation, such as drawings, mapping, numeric descriptions, or other written documentation.

**Locate (verb)** means the process by which locators uses electromagnetic fields, signals, or other acceptable industry best practice methods, together with the information provided by the owner of the underground infrastructure, to identify the location of that underground infrastructure.

**Locator** means a person authorized by the owner of the underground infrastructure to perform a locate and issue a locate form to the excavator.

**Locate service provider** means the corporation that provides locator.

**Underground infrastructure** — cables, ducts, equipment, pipes, and vaults buried in public property and/or rights-of-way.

*Note: There can be other underground infrastructure in these lands, such as tunnels, shoring, and/or encroaching structures, but these facilities are not typically located in the field as part of the locate process.*

**Utility** means the individual, partnership, corporation, public agency, or other entity that is licensed to operate an electric distribution system under the *Ontario Energy Board Act* or a pipeline under the *Technical Standards and Safety Act, 2000*.

**Utility line** means those facilities operated by a *utility* through which gas or electric energy is conveyed and includes pipe, cables, and other directly related equipment and components such as switches, valves, meters and supporting structures.
3. **General Conditions**

3.1 All work shall be carried out in accordance with:

(a) The *Occupational Health and Safety Act* (OH&S) and Regulations which apply under this Act including Regulations for Construction Projects; and

(b) as appropriate,

(i) the *Technical Standards and Safety Act, 2000* and Ontario Regulation 210/01 Oil and Gas Pipeline System and other regulations which apply under this Act; and/or

(ii) the *Electricity Act, 1998* and the Ontario Regulation 22/04 Electrical Distribution Safety Regulation and other regulations which apply under this Act; and/or

(iii) The Ontario Underground Infrastructure Notification System Act, 2012, and Ontario Regulation 92/14 which apply under this Act.

3.2 The guidelines, procedures and requirements described herein are prepared in the interest of safety to the general public, the workers carrying out the excavation or ground disturbance, and the prevention of damage to utility lines and property.

3.3 The Excavator shall assume that all utility lines are live unless otherwise expressly identified by the utility on the locate.

4. **Locate Request**

4.1 Prior to excavation or ground disturbance the person responsible for the work shall contact “Ontario One Call” via telephone or website www.ON1Call.com listed in Table 1 below, and request a locate of utility lines in the areas where excavation or ground disturbance will be taking place. The Excavator must receive the locate as described in Section 5.0 prior to commencing any excavation or ground disturbance.

| Table 1: |
|-----------------|------------------|
| **Ontario One Call** |                  |
| Telephone        | 1-800-400-2255   |
| Web              | www.on1call.com   |

**Note:** If you are planning to excavate in an area not serviced by Ontario One Call please contact the local municipality for information on utilities in that area and contact the utility directly for locate requests.
4.2 Subject to entering into an agreement between the utility and Excavator, Ontario One Call may provide that Excavator with clearance specific to that ALA.

4.3 If removing asphalt but not road base or underlying structure a locate is not required. 
   
   **Note:** Locates are required for sidewalk removal.

4.4 The Excavator, when requesting a locate, shall provide Ontario One Call with requested information describing the location where the work will take place, the expected time when the work will begin, the scope of the work, the nature of the work, the expected duration and depth of excavation, the name, address and telephone number of the Excavator, and the name of the Excavator’s site representative.

4.5 Except in emergency situations, requests for locate information should be made as early as possible, and at least 5 business days in advance.

4.6 Except in cases of emergency, or where a different timeline has been agreed upon with the Excavator for the response for the locate request, the utility shall make all reasonable attempts to provide locates within 5 business days.

4.7 In emergency situations, all reasonable steps to provide the locates shall be done by the utility within two hours.

5. **Locates**

5.1 The utility shall provide information using labeled stakes, flags, and/or highly visible paint marks (See section 13.0 for colour code) continuously or at regular intervals on the surface of the ground. The markings should clearly indicate the centre line of the utility line and the limits of underground infrastructure, where applicable, in the defined area of the proposed excavation or ground disturbance.

5.2 The utility shall also provide written records describing the locate information to the person who requested the locate or when requested to the Contractor’s site representative at the time of the locate. The records should indicate in clear legible terms the locate information including additional clarifications, warnings, dimensions from fixed objects, orientation, and any unusual depths, if known.

5.3 When requested by either party, the utility and the Excavator shall meet on site to confirm details of the excavation or ground disturbance, and the location of the utility line.

5.4 Where there are no utility lines in the defined area of the proposed excavation or ground disturbance the utility may provide verbal confirmation to the Excavator. Written confirmation shall be provided after verbal confirmation Note**
excavation cannot begin until the locate has been completed by the Locator or the utility and is in the possession of the Excavator. Locate paperwork or electronic version should be on site.

6. Locate Boundaries and Accuracy

6.1 The Excavator shall not excavate outside the area covered by the locate request without first obtaining a further locate.

6.2 Locate accuracy shall be considered to be 1 metre on either side of the surface centre line locate or 1 metre on either side of the marked limits of the underground structure, unless the locate instructions specifically indicate other boundary limits.

6.3 Irrespective of the depth of the utility line, the Excavator must not use mechanical excavating equipment to dig within the boundary limits to expose the utility line.

7. Locate Duration

7.1 The utility shall indicate the expiry date (normally 30 days) on the locate form or diagram and the utility contact phone number.

7.2 Stakes or markings may disappear or be displaced. Excavators shall not rely on expired locates. Where delays occur beyond the period specified in 7.1 or where the locate markings become unclear, a new locate must be requested by the Excavator before any further excavation can resume.

7.3 Where the utility has ascertained that no changes have taken place since releasing the locate information and the locate markings are still clear, the utility may provide a new expiry date in writing.

8. Hydrovac Excavation

8.1 With prior agreement of the utility through an alternative locate agreement; hydrovac may be used as an alternative to hand digging.

8.2 For detailed procedures for using hydrovac excavation in the vicinity of pipelines see Appendix 5.

8.3 For detailed procedures for using hydrovac excavation in the vicinity of electric distribution lines see the IHSA Safe Practice Guide “Excavating with Hydrovaes in the Vicinity of Underground Electrical Plant”. See the following link: https://www.ihsa.ca/PDFs/Products/Id/SPG4.pdf
9. **Initial Exposure**

9.1 At no time, with the exception of 4.3, should an Excavator use *mechanical excavation* within the *boundary limits* of the locate without first *hand digging* test holes to determine the exact centre line and depth of cover of the *utility line*.

9.2 Where the proposed excavation or *ground disturbance* is to be parallel and within the *boundary limits* of a *utility line*, the Excavator shall expose the *utility line* by *hand digging* a series of test holes along the entire route at regular intervals. The separation between test holes shall not exceed 4.5 metres.

9.3 Test holes may be excavated by one of the following methods:

9.3.1 *mechanical excavation* may be used to dig test holes immediately outside of the *boundary limits* and then *hand digging* used laterally until the *utility line* is found;

9.4

9.4.1 Concrete saws, jackhammers, hand tools or other similar equipment may be used to break concrete or asphalt on a road or sidewalk surface but shall not extend into the underlying base.

9.4.2 With the exception of 4.3 and 9.3, mechanical excavating equipment should only be used to remove broken asphalt or concrete.

9.4.3 Concrete below the road and sidewalk surface layers may have *utility lines* encased therein and should not be removed without consultation with the *utility*.

9.5 The *Excavator* shall dig additional test holes where the *utility* has identified changes in alignment or in elevation.

9.6 Where the *utility line* cannot be exposed or daylighted following the procedures described above, the *Excavator* shall contact the *utility* for assistance with exposing or daylighting the line.
10. **Excavating After Test Holes Are Completed**

10.1 Where test holes in an area have been completed and the utility line located, mechanical excavation may take place provided the following procedures are used:

10.1.1 wherever possible, mechanical excavating equipment should be operated parallel to the direction of the *utility line* when the excavation is within 1 metre of the *utility line*; and

10.1.2 mechanical excavation must not be used closer than 0.3 metre (1 foot) in any direction to the utility line;

10.1.3 excavation or ground disturbance within 0.3 metre (1 foot) in any direction of the utility line must be carried out by hand digging;

10.2 Prior to initiating any blasting activities in proximity of *utility lines* Excavators must obtain specific guidelines from the *utilities*.

10.3 Once the buried utility line has been exposed, specific instructions for *utility lines* needing support must be obtained from the *utilities*. The *Excavator* will install temporary support acceptable to the *utilities* that is adequate to prevent any deflection or damage to the *utility line* (for an electric utility example? see Appendix 4).

10.4 Temporary support shall remain in place until the backfill material underneath the structure has cured or it has been compacted adequately to restore support.

10.5 Under no circumstances shall an *Excavator* attempt to move *utility lines*. Where such a need arises during excavation, the *Excavator* shall contact the *utilities* to make the necessary arrangements.

11. **Backfilling Trenches**

11.1 Where trenches are to be backfilled, the following requirements should be followed:

11.1.1 backfilling should be performed in such a manner as to provide firm support under the *utility lines*; and

11.1.2 the trench must be backfilled with clean fill or granular material free of material injurious to the *utility lines*

11.1.3 where flooding of gas utility trenches is done to consolidate the backfill, care must be exercised so that the gas line is not floated from its firm bearing on the ditch bottom.

11.1.4 backfilling should be performed without using tamping equipment directly on exposed utility lines and using extra caution around electric cable splices.
12. **Unidentified and Abandoned Distribution Lines**

12.1 Where a *utility line* is found during excavation or *ground disturbance* that was not identified by the *utility*, but within the area covered by the *locate*, the *Excavator* shall never assume the line is an abandoned *utility line*. The *Excavator* shall immediately contact the *utility* as appropriate, to determine if the line is abandoned or *live*.

12.2 Excavations or ground disturbances in the vicinity of abandoned utility lines shall not be subject to the guidelines in Section 10.0.

**Note:** In circumstances where a *locate* shows an abandoned utility line, the *utility* should clearly state on the locate form that the *utility line* is abandoned.

13. **Colour Coding**

Markings on stakes, streets and sidewalks must be “Safety Yellow” for gas lines and highly visible “Safety Red” paint for electric distribution lines.

<table>
<thead>
<tr>
<th>COLOUR</th>
<th>TYPE OF FACILITY/INDICATOR</th>
<th>MUNSELL NOTATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Electric - Powerlines, Cables, Conduit &amp; Lighting cables</td>
<td>Safety Red 7.5R 4.0/14</td>
</tr>
<tr>
<td>Yellow</td>
<td>Gas, Oil, Steam, Petroleum, Compressed air, Gases and other hazardous liquid or gaseous materials</td>
<td>Safety Yellow 5.0Y 8.0/12</td>
</tr>
<tr>
<td>Blue</td>
<td>Potable water</td>
<td>Safety Blue 2.5PB 3.5/10</td>
</tr>
<tr>
<td>Orange</td>
<td>Communications - Alarm, Cable TV, Signal lines, Cables &amp; Conduit</td>
<td>Safety Orange 5.0YR 6.0/15</td>
</tr>
<tr>
<td>Green</td>
<td>Sewers &amp; Drain lines</td>
<td>Safety Green 7.5G 4.0/9</td>
</tr>
<tr>
<td>Purple</td>
<td>Reclaimed/treated water, Irrigation &amp; Slurry lines</td>
<td></td>
</tr>
<tr>
<td>Pink</td>
<td>Temporary survey markers</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>Proposed excavation</td>
<td></td>
</tr>
</tbody>
</table>
14. **Procedure When Damage Occurs**

14.1 If damage to the *utility line* occurs, including damage to the coating, the *Excavator* shall leave the *utility line* exposed, barricade the area and contact the *utility* immediately.

14.2 If gas is escaping from a gas pipeline, shut off vehicles or equipment, remove or extinguish all ignition sources, barricade the area off, and keep public and workers away. Call 911 and the Gas utility immediately. No attempt should be made to control the escaping gas.

14.3 If there are any flames or sparks originating from the exposed electric distribution line or other works, barricade the area off, and keep public and workers away. Call 911 and the Local Electric Distribution utility immediately.

Note: In no case shall the Excavator attempt to control or make repairs to the damaged utility line or equipment.

15. **Acts and Regulations**

A copy of the relevant sections of Acts and Regulations are attached as appendices.


Appendix 2: *Electricity Act, Section 113*

Appendix 3: *Ontario Regulation 22/04 “Electrical Distribution Safety”.*

Appendix 4: Guideline for Temporary Support of Electric Distribution Lines across the Trench

Appendix 5: Procedures for using hydro-excavation machines in the vicinity of Pipelines.

Appendix: Suggest ON1Call provide new appendix with excerpts from their Act and penalty section to be consistent with TSSA.
Appendix 1

Sections of the *Technical Standards and Safety Act*:

**Offences**

37. (1) Every person who,
    (a) contravenes or fails to comply with any provision of this Act, the regulations or a Minister’s order;
    (b) knowingly makes a false statement or furnishes false information under this Act, the regulations or a Minister’s order;
    (c) contravenes or fails to comply with a term or condition of an authorization;
    (d) contravenes or fails to comply with an order or requirement of an inspector or obstructs an inspector,

    is guilty of an offence and on conviction is liable to a fine of not more than $50,000 or to imprisonment for a term of not more than one year, or to both, or, if the person is a body corporate, to a fine of not more than $1,000,000. 2000, c. 16, s. 37 (1).

**Duty of director or officer**

(2) Every director or officer of a body corporate has a duty to take all reasonable care to prevent the body corporate from committing an offence under subsection (1). 2000, c. 16, s. 37 (2).

**Offence**

(3) Every director or officer of the body corporate who has a duty under subsection (2) and who fails to carry out that duty is guilty of an offence and on conviction is liable to a fine of not more than $50,000 or to imprisonment for a term of not more than one year, or to both. 2000, c. 16, s. 37 (3).

**Separate offence**

(4) Where a person contravenes any of the provisions of this Act, the regulations, a Minister’s order or any notice or order made under them on more than one day, the continuance of the contravention on each day shall be deemed to constitute a separate offence. 2000, c. 16, s. 37 (4).

**Administrative penalty**

(5) A person against whom an administrative penalty has been levied by a designated administrative authority or, in the absence of such authority, by the Minister does not preclude a person from being charged with, and convicted of, an offence under this Act for the same matter. 2000, c. 16, s. 37 (5).

**Time limit**
(6) No proceeding in respect of an alleged offence under this Act may be commenced after two years following the date on which the facts that gave rise to the alleged offence were discovered. 2000, c. 16, s. 37 (6).

41. Every contractor and employer shall take all reasonable precautions to ensure that they and their agents and employees comply with this Act, the regulations or a Minister’s order.

Sections of the Oil and Gas Pipeline Systems Regulation:

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.

(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.

No interference with pipeline

10. No person shall interfere with or damage any pipeline without authority to do so.

CAN/CSA-Z247-15 - Damage prevention for the protection of underground infrastructure. See following link to purchase this standard:
Appendix 2

Electricity Act, Section 113

Prohibitions

Causing damage

113.0.1 (1) No person shall damage or cause any damage to any work, matter or thing used or to be used in the generation, transmission, distribution, retail or use of electricity in Ontario. 2006, c. 34, s. 12 (3).

Interference

(2) No person shall interfere with any work, matter or thing used or to be used in the generation, transmission, distribution, retail or use of electricity in Ontario in the course of alterations or repairs to non-electrical equipment or structures except where it is necessary to disconnect or move components of an electrical installation, in which event it shall be the responsibility of the person carrying out the alterations or repairs to ensure that the electrical installation is restored to a safe operating condition as soon as the progress of the alterations or repairs permits. 2006, c. 34, s. 12 (3).
Appendix 3

Ontario Regulation 22/04, “Electrical Distribution Safety”

Section 10  Proximity to Distribution Lines

(1) Despite section 4 of CSA Standard C22.3, No. 1-01 Overhead Systems, a person may place an object closer to an energized conductor forming part of a system of overhead distribution lines than the required minimum separations from energized conductors forming part of such a system if the person first obtains an authorization from the distributor responsible for the energized conductor. O. Reg. 22/04, s. 10 (1).

(2) Despite sections 4 and 5 of CSA Standard C22.3, No. 7-94 Underground Systems (Reaffirmed 1999), a person may place an object closer to an energized conductor forming part of a system of distribution lines than the required minimum separations from energized conductors forming part of such system if the person first obtains an authorization from the distributor responsible for the energized conductor. O. Reg. 22/04, s. 10 (2).

(3) Before digging, boring, trenching, grading, excavating or breaking ground with tools, mechanical equipment or explosives, an excavator, owner or occupant of land, buildings or premises shall, in the interests of safety, ascertain from the distributor responsible for the distribution of electricity to the land, building or premises the location of any distribution line that may be interfered with in the course of such activities. O. Reg. 22/04, s. 10 (3).

(4) The distributor shall provide reasonable information with respect to the location of its distribution lines and associated plant within a reasonable time. O. Reg. 22/04, s. 10 (4).

Note: Section 10 came into force on November 11, 2004.
Appendix 4

Guideline for Temporary Support of Electric Distribution Lines across the Trench

1. When trenching beneath underground conduit systems a temporary support may be required to prevent deflection and damage to the electric distribution line.

2. Prior to trenching beneath the electric distribution line the Excavator is to install a temporary support if the unsupported span of conduit in the trench exceeds 1.0 meter in length. However, a support with closer spacing intervals may be required as identified below.

**TYPICAL TEMPORARY SUPPORT OF EXISTING ELECTRIC DISTRIBUTION LINE CROSSING EXCAVATION**

![Diagram of temporary support system](image)

Source: E&USA Handbook for Excavation near Electrical Cables

3. **Concrete Encased PVC, Transite, or Fibre Conduit** must not be underexposed without adequate support. When temporary support is required, support beams and posts shall be placed in a manner that will prevent damage to the conduit and eliminate sag. The maximum span that the conduit is permitted to be supported in this manner is 2.0 metres and the spacing between supports shall not exceed 1.0 metre. The Excavator is to contact the distributor for special instructions if the distribution line is to be underexposed by more than 2.0 metres or if the conduit cross-section dimensions exceed 1.5 metres by 1.5 metres.
4. **Concrete Encased Clay Tile Conduit** must be supported at short-spaced intervals. Since the conduit can be damaged very easily, exposed conduit should be inspected by the distributor’s representative when uncovered and again before backfilling. The maximum span that the conduit is permitted to be supported in this manner is 2.0 metres and the spacing between supports shall not exceed 0.6 metres. The Excavator is to contact the distributor for special instructions if the distribution line is to be underexposed by more than 2.0 metres or if the conduit cross-section dimensions exceed 1.5 metres by 1.5 metres.

5. **High Density Polyethylene (HDPE) and Direct Buried PVC Duct** are very flexible and must be continually supported with a set of pressure treated timbers consisting of 50 mm x 150 mm planks nailed together in a "V" formation. These timbers shall be placed under the cable and supported every 2.0 metres with vertical 100 mm x 100 mm timbers with a “V” notch at the top to hold the 50 mm x 150 mm planks in place. The conduit bundles must not be separated or displaced.

6. Support is required when a trench is parallel to a distribution line and soil rupture or lateral movement of the soil may undermine the distribution line.

7. Table #1 shows the maximum allowed horizontal distances from the edge of the trench to the distribution line affected by the excavation. Shoring may be already in place if workers are to enter a trench excavation that is deeper than 1.2 metres.

8. In case the distributor’s structure is closer than the maximum allowed distances given in Table 1, then the excavation shall be suitably shored to prevent movement of the conduit structure. The shoring shall remain in place until the backfill material has restored support. A sliding trench box does not provide adequate support.

9. Where the trench bottom is below the water table, the trench shall be suitably shored with close sheathing.

<table>
<thead>
<tr>
<th>Proposed Trench Depth (m)</th>
<th>Horizontal Distance Type 1 and 2 Soils Hard, Dry, Stiff (m)</th>
<th>Horizontal Distance Type 3 and 4 Soils Wet, Soft, Clay, or Sand (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1.2</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Up to 2.4</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Up to 3.6</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Up to 4.5</td>
<td>1.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Over 4.5</td>
<td>2.0</td>
<td>4.0</td>
</tr>
</tbody>
</table>
Appendix 5

Procedures for using hydro-excavation machines to locate and expose pipelines as an alternative to hand digging.

Please note that this applies to pipelines only.
For hydrovac excavation in the vicinity of electric distribution lines see the IHSA Safe Practice Guide “Excavating with Hydrovacs in the Vicinity of Underground Electrical Plant”.

The following procedures shall be followed at all times when excavating with hydro-excavation technology within 1 m of gas plants.

1. Obtain locates prior to commencement of work. Only a competent, qualified worker shall operate hydro-excavation equipment.

2. The maximum water pressure to be used at any time with a straight tip nozzle1 during excavation in public roads or easements shall be 17250 kPa (2500 psi). Below a depth of 45 cm (18”) the water pressure to be used at any time with a straight tip nozzle1 during excavation shall be reduced to a maximum of 10350 kPa (1500 psi). All pressure measurements are to be taken at the hydro-excavation machine (truck, pump).

3. The maximum water pressure to be used at any time with a spinning tip nozzle2 during excavation shall be 20684 kPa (3000 psi). When a spinning tip nozzle2 is used, pressure measurements are to be permanently monitored using a calibrated device mounted on either the hydro-excavation machine (truck, pump) or the wand.

4. The wand shall never remain motionless during excavation. Aiming directly at the plant shall be avoided at all times.

5. A distance of 20 cm (8”) shall be maintained between the end of the pressure wand nozzle and the plant and / or subsoil. The nozzle shall never be inserted into the subsoil while excavating above the plant.

6. Only use hydro-excavation equipment and nozzles that have been specifically designed for use above buried gas lines or other reasonably expected underground gas plant.

7. A device capable of stopping the excavation on demand, such as a dead man trigger or valve, shall be installed on the wand.
8. If heated water is used during excavation, the temperature and pressure of the water shall never exceed 115 °F (45 °C) and 17250 kPa (2500 psi) respectively.

9. If damage to gas plant occurs while using hydro-excavation technology or any other method of excavation, the excavator shall contact the gas utility.

Notes:

1) Straight Tip Nozzle – A straight tip nozzle is a single orifice fitting that can be inserted into the end of the wand used with a hydro-excavation machine such that there is a single concentrated jet of water exiting from the tip of the nozzle.

2) Spinning Tip Nozzles – A spinning tip nozzle consists of a conically shaped housing that contains a single exit port (to facilitate the flow of liquid) as well as a rotor insert. The rotor insert has a series of blades such that when liquid is flowing through the nozzle, the rotor is forced to spin around the longitudinal axis of the nozzle. The rotor insert also contains three or more channels that force liquid to flow in different pathways through the rotor insert to the tip of the rotor which, as a result of the high pressure liquid is forced into contact with the nozzle housing. The liquid flowing through the nozzle is dispersed through the tip of the nozzle housing in a conical shape, having an angle of not less than 20°.