APPENDIX ‘B’

SAFE EXCAVATION AND SAFETY WATCH GUIDELINES

Safe Excavation & Safety Watch Guidelines

Manitoba Hydro

CALL BEFORE YOU DIG

Winnipeg	**(204) 480-5900**
Outside Winnipeg	**1-888-MBHYDRO**

Before you start to dig, contact Manitoba Hydro to locate the underground cables or natural gas pipelines in your area. With a minimum of 48 hours notice (excluding weekends and holidays), Manitoba Hydro will mark the underground electric and gas utilities for you. During construction season, please call at least 1 week ahead to get your choice of locate times.

A locate form signed by Manitoba Hydro's locator MUST be obtained prior to excavation, and specific instructions on the form must be followed. If work has not started within 10 days after the locate was completed by the utility, you must again notify the utility to re-mark the work area and provide an updated electric and/or natural gas facilities locate form. The locate form must be kept at the excavation site until the excavation and backfill are complete.

The location markings must be maintained and kept visible by the person or contractor doing the excavation. Be careful that site operators do not remove the line location markings.

PLAN TO LOCATE ALL UNDERGROUND UTILITIES.

Manitoba Hydro only locates facilities that it owns and has no knowledge of or responsibility for privately owned facilities. Electric conductors or gas pipes installed past the meter are owned privately by the property owner, and at times are installed below ground before it enters the building. Outbuildings that are heated or have electrical power, wells, septic system pumps and hot tubs are other examples where privately owned buried facilities may exist. In some instances there may be facilities before the meter that are owned by the customer such as: large ampacity, flat rate, or primary metered services.

TABLE OF CONTENTS

This booklet has been prepared by Manitoba Hydro for contractors and homeowners involved with excavation. Information on excavation and Safety Watch is included to inform excavators about basic requirements for excavation in the vicinity of buried electric power lines and gas pipelines.

Unless otherwise indicated, gas pipelines and underground power cables will be called "lines."

Manitoba Hydro

WHY YOU SHOULD PLAN AHEAD

By calling before you dig, you prevent damage and save the costs of unnecessary repairs. Most important, this call will help prevent the loss of life, injury, environmental pollution, equipment damage, product losses and service outages.

It is YOUR responsibility to contact all owners of buried underground services.

REGULATIONS

There are several federal and provincial agencies overseeing the operation of and around natural gas pipelines and electric cables. The following regulations and safe practice guides specify requirements for both the contractor and the utility:

- Manitoba Gas Pipeline Act, Regulation #140/92
- National Energy Board Pipeline Crossing Regulations
  Part I SOR/88-528
  Part II SOR/89-529 plus amendments
  For more details check Excavations and Construction Naw Pipalines National Energy Board, January 2000. www.neb.gc.ca
- Workplace Safety and Health Act W210 and Regulations #217/2006, Part 26
- Guideline for Excavation Work
  Manitoba Workplace Safety & Health Division
  (www.safemanitoba.ca)
- Manitoba Hydro "Hydro Vac" Guidelines
  Publication #0065/07R
- Excavation Work Publication #0002/05R
- Manitoba Hydro Directional Boring Guidelines
  Publication #0086/06R

Copies of these regulations and safe practice guidelines are available from Manitoba Hydro or the appropriate government agency.

BACKFILLING

Before backfilling, Manitoba Hydro requires an inspection of all exposed power cables and gas lines for damage.

To prevent settling or stress, the contractor is required to place clean fill under the power or gas line and compact the fill. The backfill material must be free of rocks, sharp objects or other material that could damage the line. If the backfill material is frozen, it should be free of large frozen lumps of soil. The backfill material must be gradually placed, not dumped, on the line. Alternatively, the line may be hand padded with 0.3 metre of sand or soft fill before backfilling.

If mechanical protection is required, or if the backfill contains rocks or debris, the cable or pipeline must be enclosed in a 0.15 metre envelope of screened sand.

HORIZONTAL DIRECTIONAL BORING

Directional Boring – Contractor Guidelines

This guideline is intended to provide direction when directional boring in the Province of Manitoba. The guideline applies to the crossing of Manitoba Hydro electrical conductors and natural gas pipelines only. When Manitoba Hydro fibre optic cables are present contractors will be referred by the Manitoba Hydro Facilities Locator to the Manitoba Hydro communications department for more information.

In extraordinary circumstances, consent to cross a gas pipeline without exposing the gas line may be granted provided it has been requested in writing. To ensure the safety of the gas line, the request must include a detailed work plan indicating the methods, techniques or measures that will be used. The contractor may only proceed with written authorization from a Manitoba Hydro supervisor.

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Definitions

Ground Disturbance - Any activity that disturbs more than the top 0.15 metre of the ground.

Safety Hold-Off - A Manitoba Hydro procedure which affects a precaution to prohibit re-energizing (by either automatic or manual means) an electrical conductor in case of a trip-out. This procedure includes the application of protective cards. Requirement for a Safety Hold-Off is determined by Manitoba Hydro personnel.

Sonde - A transmitter behind the bore head which registers angle, rotation, direction and temperature data.

Tolerance Zone - The space in which a line or facility is located, and in which special care is to be taken.

Consistency of Alignment - The uniformity of the alignment of the electrical conductor or natural gas pipeline as determined by the locate flags and marks and/or repeatability of the physical location of the facility to property lines.

General

As with all ground disturbance activity, the excavator must first obtain a facilities locate from Manitoba Hydro.

The distance measured to Manitoba Hydro electrical conductor or gas pipeline must always be measured from the outside diameter or wall of the Manitoba Hydro facility to the outside diameter of the back reamer. The same measuring methodology must be used when paralleling Manitoba Hydro facilities.

When boring within the tolerance zone of a high pressure gas pipeline or any critical distribution gas pipeline or electrical conductor, as identified by Manitoba Hydro's Facilities Locate personnel, qualified natural gas or electric Safety Watch personnel are required.

Electrical Conductors

Prior to directional boring across Manitoba Hydro electrical conductors, the buried depth must be confirmed. Acceptable practice to verify conductor depth is to:

- Expose the conductor by hand digging, or
- Expose the conductor by water pressure/vacuum excavation; or locating on the side wall of a trench that has been excavated 1 metre on either side of the surface locates; or by use of reference measurements that are known to be accurate, *for example: electrical duct lines*
- The drill head and/or back reamer must at all times maintain a minimum of 1 metre clearance from Manitoba Hydro electrical conductors.

Gas Pipeline

Prior to directional boring across a Manitoba Hydro natural gas pipeline the burial depth and location of all natural gas pipelines being crossed must be **visually** verified. Acceptable practice to verify pipeline depth is to:

- Expose the pipeline by hand digging; or
- Expose the pipeline by water pressure/vacuum excavation

NOTE: Mechanical excavating equipment cannot be used within 1 metre of a natural gas pipeline until the gas pipelines have been exposed. After visual confirmation of the pipelines location, mechanical excavating can be used to excavate no closer than 0.3 metre from a natural gas pipeline.

The drill head and/or back reamer must at all times maintain a minimum of 1 metre clearance from Manitoba Hydro natural gas pipelines. Where underground facility congestion does not effectively allow a 1 metre clearance/separation from Manitoba Hydro facilities, the contractor may consult with Manitoba Hydro Engineering for site specific direction. Any deviations in clearances/separations must be provided in writing and must be present on-site when the work is being performed.

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Observation Hole Requirements

Observation Hole Required When Crossing *Any* Manitoba Hydro Facility (See Figures 1, 2 & 3)

The accuracy of the drill head location and depth must be visually verified 1 metre prior to crossing Manitoba Hydro facilities. An observation or discovery hole is required. Acceptable practice for opening up the observation hole is using water pressure/vacuum or hand digging.

When boring head and/or back reamers path is crossing above a natural gas pipeline or electrical conductor the boring head and/or back reamer must be visually observed crossing the facility.

When boring head and/or back reamers path is crossing below a natural gas pipeline or electrical conductor an observer must verify that the bore head and/or reamer does not enter the observation hole.

The minimum dimensions of the observation/discovery hole **MUST BE** (see Figure 1):

- 1 metre beside the natural gas pipeline or electrical conductor on the near side of the bore path
- 0.3 metre on the far side of the bore path
- 0.3 metre on each side of the bore path
- 0.3 metre below natural gas pipeline or electrical conductor

Figure 1: Observation Hole - Plan View

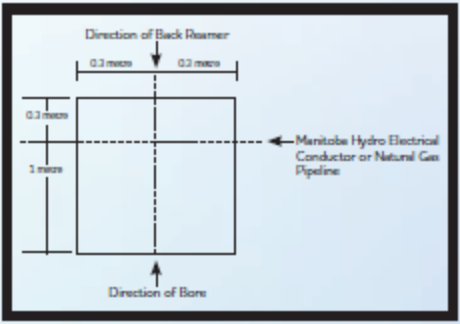
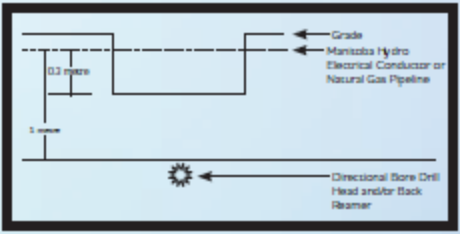


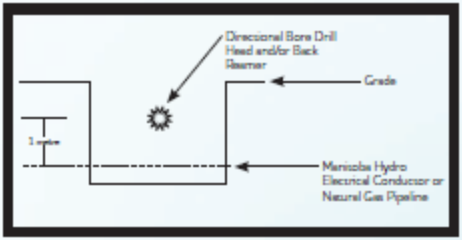
Figure 2: Observation Hole - Profile View



Drilling **below** a Manitoba Hydro electrical conductor or natural gas pipeline.

Manitoba Hydro

Figure 3: Observation Hole - Profile View



Drilling **above** a Manitoba Hydro electrical conductor or natural gas pipeline.

Drilling Parallel to Manitoba Hydro Facilities

Paralleling Electrical Conductors & Natural Gas Pipelines (Figures 4, 5 & 6)

There must be 1 metre of separation between the outside diameter of the back reamer assembly and the outside diameter of any Manitoba Hydro electrical conductors or natural gas pipelines.

NOTE: When drilling within 1 metre ***horizontally****, the drill must be kept at a depth either deeper or shallower than the existing electrical conductor or natural gas pipeline to maintain 1 metre separation when measured diagonally.*

If 1 metre **horizontal** separation cannot be maintained, the electrical conductor or natural gas pipeline adjacent to the bore path must be exposed. When it is not possible to de-energize electrical conductors, a Safety Hold-Off must be in place and qualified Safety Watch personnel must be on site.

When suspected of drilling within 1 metre of any electrical conductors or natural gas pipelines determined by the boring head (sonde) position readings and the proximity to the locate marks, the location of the conductor or pipeline shall be verified; the electrical conductor or natural gas pipeline adjacent to the bore path must be hand exposed or exposed by water pressure/vacuum excavation as determined by Manitoba Hydro. The frequency of exposures depends on the consistency of the alignment of the existing facility.

Manitoba Hydro facility must be exposed once for each lot, or a minimum of once every 15 metres, whichever is the shorter distance, to confirm alignment. Where there is an alignment change indicated by the locator marks, the Manitoba Hydro facility shall be visually confirmed at each alignment deviation.

Figure 4: Drilling Parallel to Manitoba Hydro Conductors and Natural Gas Pipelines - Plan View

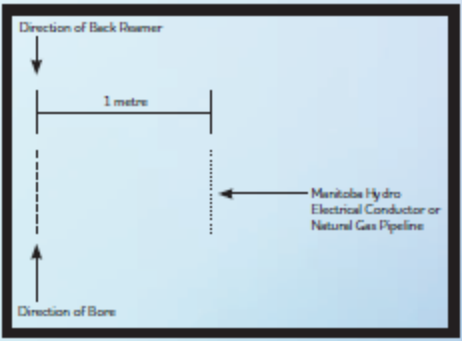


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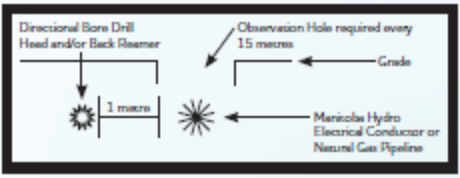
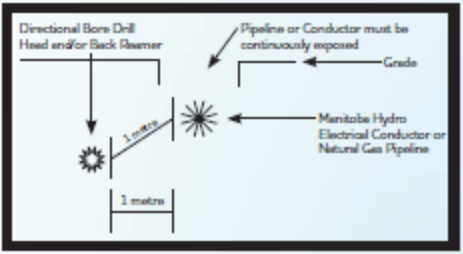
Figure 5: Drilling Parallel to Manitoba Hydro Conductors and Natural Gas Pipelines - Profile View



Observation hole required every 15 metres.

Figure 6: Drilling Parallel to Manitoba Hydro Conductors and Natural Gas Pipelines - Profile View



When the minimum 1 metre horizontal separation is not maintained, conductor or pipeline must be continuously exposed.

WHEN HYDRO LINES ARE DUG UP

This procedure guideline applies to people who come in contact with or simply expose a buried utility line while digging.

Excavation
Anyone who comes in contact with buried utility lines should contact the utility owner immediately. Although there may be no apparent external damage, the impact of striking a line can cause internal structural damage that can only be determined and repaired by qualified utility personnel. Generally, we do not charge for this inspection and coating repair.

Abrasions
Even if contact does not cause the utility line to stop working, a nick or cut to the outer, protective sheath of the utility line can allow ground water, laden with salts and other caustic substances, to corrode the line. Abrasions may compromise the sidewall strength of a plastic or aluminum gas line.

Aerial
Cables suspended along utility poles can easily be damaged if struck by a vehicle or a mechanical implement like a hydraulic lift. Cable clamps and other attachments can be pulled apart and component housings may hide damage to the electronic equipment inside.

Stop Work
Operations at the site should stop immediately. If any equipment is snared in the utility lines, it should be left in place. Trying to extract, flex or manipulate the line can compound the damage.

Manitoba Hydro

Call It In
The person involved in the incident should call the utility immediately and report the location of the hit to a maintenance supervisor. The exact address, or street intersection, along with what type of contact occurred, will help the utility respond in an appropriate manner.

RELEASE OF NATURAL GAS

In the event of any damage to a natural gas pipeline (regardless of whether it is steel, plastic or aluminum) or to its protective pipe coating or tracer wire, however minor, call Manitoba Hydro immediately.

In case of damage causing a release of natural gas:

- Call Manitoba Hydro immediately.
- Clear people from the vicinity and prevent people from approaching the area of the leak.
- Shut off all vehicles and equipment. Remove or extinguish all sources of ignition. **DO NOT** smoke or allow open flame in the presence of natural gas.
- If a gas line has been punctured, do not remove the tool or equipment that punctured the line. This could result in a larger gas leak and pose a greater hazard.
- **DO NOT** attempt to repair the leak or stop the flow of gas.
- Allow the gas to vent into the atmosphere.

ACCESS

Utility personnel shall have access to the excavation to inspect the underground line at any time during construction.

SAFETY WATCH

What is a Safety Watch?
Safety Watch is a program by Manitoba Hydro where an employee of Hydro observes the excavation work in progress and determines actions to be taken by the contractor to prevent injury.

Safety Watch personnel are responsible for:

- Ensuring the excavation is done safely
- Ensuring that rules and procedures related to the excavation are followed
- Being the recognized authority on site with the ability to shut the job down
- Providing undivided attention
- Ensuring all documentation is accurate and complete
- Ensuring compliance with Hydro Vac guidelines

When is a Safety Watch Required?
Any excavation within 3 metres of a cable or pipeline may require a Safety Watch. The need for a Safety Watch will be assessed during an on-site meeting held between an authorized employee of Manitoba Hydro and the contractor undertaking the work. The decision to provide a Safety Watch will be based on the excavation proposed, the type of cable or pipeline, and the proximity of the excavation to the cable or pipeline.

Manitoba Hydro

SAFETY WATCH (continued)

Why is a Safety Watch Done?
Safety Watch service is provided to ensure the safety of customers and their contractors when working in close proximity to either energized electrical or pressurized gas lines. In addition, this protects the integrity of the utility lines minimizing the chance of an outage.

Note: Typically, Safety Watch personnel are not provided for low voltage conductors (under 750 volts) or distribution pressure gas mains and services. However, Manitoba Hydro staff may assess the situation and choose to provide Safety Watch personnel where conditions warrant.

Who Pays for a Safety Watch?
Generally, Safety Watch service is provided at no cost to the homeowner for minor projects. For larger projects, the contractor may be charged at a cost shared rate. Contact the local district office for further information.

How to Get a Safety Watch
When an underground line is located in response to a "Call Before You Dig" call, the Manitoba Hydro employee will indicate whether a Safety Watch is required. A call to Manitoba Hydro is required to arrange for Safety Watch personnel to be present.

EXCAVATION GUIDELINES

General Approach

Electric Power Lines – Excavation may be done without exposing the power lines provided excavation is done with care and with Safety Watch if required by Manitoba Hydro.

Gas Pipelines – The gas line must first be exposed when excavating within 1 metre of the line prior to further excavation to confirm the location of the line.

Use of Mechanical Excavation Equipment

Electric Power Lines

Energized Line – Mechanical equipment may be used within 1 metre of the line provided Manitoba Hydro Safety Watch personnel are present. However, mechanical equipment cannot be used within 0.6 metre of the line under any circumstances.

De-energized Line – Mechanical equipment may be used within 1 metre of the line provided Manitoba Hydro Safety Watch personnel are present. However, mechanical equipment cannot be used within 0.3 metre of the line under any circumstances.

Gas Pipelines

After the line has been exposed, mechanical excavation equipment cannot be used within 0.3 metre of the line.

Position of Equipment

When digging within 1 metre, mechanical excavating equipment shall be operated parallel to the line, where possible.

Manitoba Hydro

Observer
In addition to the operator of mechanical equipment, the contractor shall position personnel to ensure that the equipment does not get closer than the specified limits.

Line Exposed
When a length of line is exposed consult the utility for proper handling procedures. The line may need to be supported to prevent settling or sagging.

No Relocation
The line shall not be moved or relocated. No operation or work shall be done that would put stress on the line.

Pipeline Attachments
Gas Pipelines - Fittings such as active or abandoned service tees may be present on gas pipelines, exercise care when excavating.

Inspect for Damage
Electric Power Lines - If a power cable has been exposed, contact Hydro to inspect the cable for damage.

Gas Pipelines - Thoroughly clean and inspect the exposed gas line for damage to the pipe, yellow plastic pipe covering or tracer wire (used on plastic pipe).

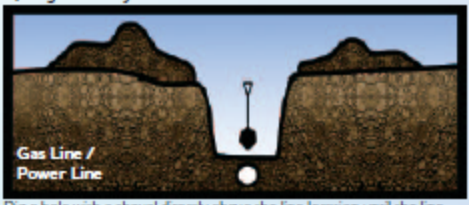
Report Contact or Damage - Any contact with or damage to any line or underground cable must be reported immediately to the utility.

EXCAVATION METHODS

Hand Expose

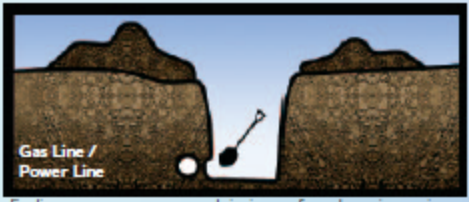
After establishing the locate, there are several acceptable excavating techniques for gas pipelines and electric power lines. The method selected depends upon the size of line, type of line, whether the soil is frozen and the particular situation.

A) Dig Vertically



Dig a hole with a shovel directly above the line location until the line is exposed. Take care not to damage the line or coating. Mechanical excavation equipment **MUST NOT** be used to widen or deepen the hole before exposing the line.

B) Lines on Customer Property



For lines on customer property bringing gas from the main gas pipe to a customer's meter, dig a hole beside the line with a shovel and chip away at the side of the hole to expose the pipe.

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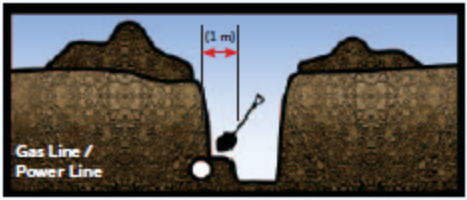
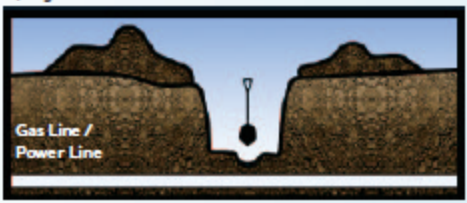
EXCAVATION METHODS

C) Dig Laterally



Dig a trench or bell hole 1 metre from the line location, parallel to the line, then hand dig laterally to expose the line.

D) Dig Trench and Excavate



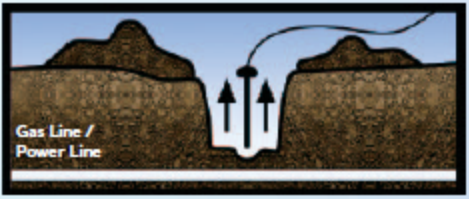
Dig a trench by hand across the full width of the excavation (perpendicular to or "across" the pipe). If the line is not uncovered, mechanically excavate to one half the depth of the trench. Repeat this process until the line is exposed.

EXCAVATION METHODS

Water Pressure/Vacuum System (Hydro Vac)

An alternative to exposing cables by "hand digging" is to use a water pressure/vacuum system capable of exposing Manitoba Hydro cables without damage. This service is available from a number of companies using the same basic operating concept with variations in the capabilities of each machine. All of the water pressure/vacuum systems presently available have a combination of water temperature and pressure that have the potential to damage Manitoba Hydro underground cables.

Using Pressurized Water/Vacuum System



Only oscillating head type nozzles are to be used for the water wand. When excavating within 1 metre horizontally of a marked line the maximum settings of 38°C water temperature and 10,340 Kpa (1,500 psi) must not be exceeded. The end of the vacuum tube shall be neoprene or equivalent. Expose the buried line by using a **SWEEPING MOTION ONLY**, perpendicular to the locate markings, until the line is sighted. After sighting, the line shall not be contacted by spray or vacuum.

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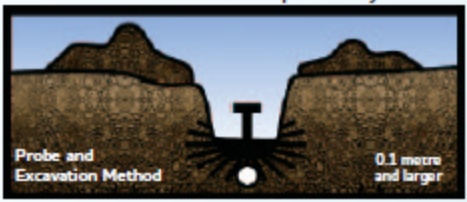
EXCAVATION METHODS

Thaw and Expose

To expose pipe in frozen ground, the ground may be thawed first. Then use conventional techniques to expose the line.

Probe and Excavate - For Gas Pipeline Only



In addition to other excavation methods previously mentioned, a probe and excavate technique can be used for gas pipelines 0.1 metre and larger in diameter.

Probe across the entire width of the excavation, including the sidewalls, with a hand held probe that has a **ROUNDED OR BLUNT END**. The probe **MUST** be blunt so it will not damage the pipe coating. If no contact is made, soil may be removed by mechanical excavating equipment to a depth of one half of the probed depth. When probing, if you come in contact with anything, it could be a gas line. Dig further by hand. No mechanical excavation equipment may be used within 0.3 metre of the gas pipeline.

Manitoba Hydro

CALL BEFORE YOU DIG

WINNIPEG	
Call Before You Dig	**(204) 480-5900**
Emergency	**(204) 480-5900**
OUTSIDE WINNIPEG	**1-888-MBHYDRO (1-888-624-9376)**

Please remember to call other utilities such as phone, water and cable companies. Consult directory assistance for the phone numbers in your area.

For more information www.hydro.mb.ca

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