Locating Underground Utilities Before You Dig

WHAT’S AT STAKE?

Every year, underground infrastructures and utilities are unintentionally struck across Canada. Unsafe digging could result in serious injury or death, fines and repair costs, or interrupted services. Although many underground infrastructures and utilities are found in urban areas, rural areas also have a number of these services.

It is important to plan where to dig before starting any work. Whether it’s digging a trench or installing a fence, finding out where underground utilities are is essential.

Examples of activities that require a utility locate include:

- Ground levelling
- Sludge spreading
- Clearing / brushing
- Reducing or adding soil cover
- Deep tiling / sub-soiling
- Trenching
- Earth moving
- Drainage ditch clean out
- Controlled burning
- Drain tile installation
- Terracing
- Fencing and landscaping
- Excavation
- Augering
- Stockpiling / storage / parking
- Blasting activities
- Building construction

WHAT'S THE DANGER?

If you dig into the ground without first verifying the location of utility lines in that area, you may damage water, gas, electrical, communications or sewer lines. Digging blind is risky because it can cause utilities to be cut off, severe injury or expensive repairs. The good news is there are reliable utility locator services available with just a quick phone call.

Private utility locators are necessary to mark out electrical, gas, septic, water and drainage lines on private, residential, commercial, and municipal properties.

One point which isn't always clearly understood is the difference between public and private underground utility locators. Soft Dig wants to help clear up the confusion. Be safe – get informed before you dig!

What is 811 one-call?

You've probably heard the phrase, "call before you dig." All around the country, this campaign has been launched to inform people about the importance of locating underground utilities before digging. Whether you're putting in a pool, installing a fence or doing landscaping, you need to make sure the area is free of utility lines.

You, or the company you've hired to do the work, should call 811. Call before excavating on any piece of commercial or residential land, including your own private property. It's a free service. Technicians will be sent to the site to locate public utilities using electromagnetic equipment. Then, they mark any that run from the street to the service meter. **This will help homeowners and professionals prevent damage to public water, sewage, power and natural gas lines.**

But this doesn't mean that the area is clear and you're free to proceed with the digging. One-call location crews only locate public utility lines.

When do you need a private utility locator?

You will probably need to make a second call before starting your excavating project. You may require a private utility locator to find and demarcate underground electrical lines, gas pipes, and more, on private, residential, commercial, and municipal land.

Private utilities are the lines that run beyond the service meter. For example, electrical cables that go from the meter to a house or building would be considered private. For safety and liability reasons, it's important to have these lines accurately and properly marked before starting to dig, even on your own property. To have these marked, you will need to call in a private underground utility locator.

Private locator crews don't rely on utility maps because they are often missing, outdated, inaccurate or incomplete. Instead, they perform a thorough investigation of the area using a range of specialized tools. These include electromagnetic equipment, ground penetrating radar (GPR) and electronic or radio frequency (RF) pipe and cable locating tools. In the end, a private locator is able to produce complete, high-quality utility maps of where current and abandoned lines run.

WHAT ARE PRIVATE UTILITY LINES?

Most properties have unmarked private utility lines, but they present a real danger for anyone digging. It's important to have all lines located and marked. These are just a few examples of underground utilities that might be hidden on your property.

- Electricity for exterior lighting,
- Propane lines,
- Septic pipes,
- Sprinkler systems,
- Gas for heated pools,
- Power for a detached garage,
- Storm drains.

WHERE ARE PRIVATE UTILITY LINES?

Just to give you some examples, private utility locators often work on sites such as:

- Neighborhood communities,
- Apartment complexes,
- School grounds and college campuses,
- Medical facilities,
- Industrial areas,
- Commercial property including a parking lot,
- Government facility.
- The root cause category for damages in Figure 1 titled "Location Practices Not Sufficient" includes areas where no locating or marking of the utility was completed prior to excavation activities; areas where utility markings or locations were insufficient; the type of utility, its depth, or lack of records prevented locating the installation; and incorrect utility records and maps led to an incorrect location.
- Of the events that included utility damages and for which a locate request was made, the majority (68%) had visible but incorrect markings and 29% had markings that were not visible.
- The root cause category **"Excavation Practices Not Sufficient"** includes actions where clearances were not maintained while using power equipment; hand tools were not used where required; markings became deteriorated and not maintained; test holes were not used to verify exact location of buried lines; exposed utility lines were unsupported; and improper materials or compaction were used in backfilling

HOW TO PROTECT YOURSELF

PREVENT DAMAGE TO UNDERGROUND UTILITIES

A Plan is Needed to Avoid Accidents

The possibilities of damaging underground utilities exist at every drilling site. Inadvertently severing an underground power line.

Rupturing a natural gas line.

Doing damage to underground utilities can result in costly consequences—disrupting essential services, requiring repairs, downtime, and potentially serious injuries or death.

The number of incidents involving damage to underground utility lines submitted in 2014 reported in the D*amage Information Reporting Tool (DIRT)* was 273,599 for Canada and the United States.

To **prevent** such incidents, it is critical to first understand the possible causes and industry practices in place. The most common causes for incidents results in underground utility damages.

The Occupational Safety and Health Administration has specific requirements designed to protect employees and **prevent** accidental damage to underground installations. These include establishing the location of underground installations prior to beginning excavation activities.

According to the *DIRT Report* (CGA 2014), calling the national 811 call service before digging or drilling is the **most important precaution** professionals and homeowners can take. When an excavator or driller notifies a one-call center before digging—damage can be avoided more than 99% of the time!

Underground utilities can be located by many methods—owner records, other sources of information, and utility locating techniques.

White-Lining the Dig Site

White-lining is a best practice endorsed by the Common Ground Alliance (CGA 2015). Physical white-lining requires the excavator or drilling contractor to pre-mark the dig or drill site with white paint or an equivalent.

While this practice is known to reduce damages, it may add costs to a job. The product Virtual WhiteLine™ is a recent development allowing the landscape and boundaries of the dig area or drill

site to be viewed remotely through high resolution aerial imagery (PAPA 2010).

Utility Locating Techniques

As was mentioned, underground utilities can be found by looking at existing utility owner records or, when needed, using a utility locating service. The source of information and methods used to locate underground utilities could impact the reliability and accuracy of identifying and locating underground lines.

In addition to power lines, there are phone lines, gas lines, water lines, and sewer lines running underground. Different detection techniques need to be used for different types of buried lines. For instance, detection of metal cables and pipes can be done using electromagnetic devices consisting of a transmitter and a receiver. Radiolocation devices use radio waves to find a location and are used for detecting non-ferrous lines (plastic or concrete).

Since there are different types of materials used in underground utilities, not all types can be detected using conventional methods. Non-conventional utility locating techniques include acoustic locating, ground penetrating radar (GPR), and magnetic locators or metal detectors.

GPR detection is an electromagnetic method often used to enhance other locating techniques. It can generate 3D underground images of pipes, power lines, sewer lines, and water mains.

Magnetic locators or metal detectors and magnetometers are often used to locate buried metal objects other than pipes. An acoustic locator most often detects and traces nonmetal water lines and can also be used in identifying the locations of plastic gas lines.

Current utility locating technology cannot assure 100% detection of every underground utility line and pipe. There are limitations with each utility locating technique, which must be considered.

Understanding Locating and Marking Practices

Operator markings of utilities include the appropriate color for the type of facility, their company identifier (name, initials, abbreviation) when other companies are using the same color, the number and width of their installations, and a description of the underground utility.

A combination of paint and flags are used to identify the operator's installations at or near an excavation or drill site. Color code identifiers are summarized below:

Table1. Color Code Identifiers

White	Proposed excavation
Pink	Temporary survey markings
Red	Electric power lines, cables, conduit and lighting cables
Yellow	Gas, oil, steam petroleum, or gaseous materials
Orange	Communication alarm or signal lines, cables, or conduits
Blue	Potable water
Purple	Reclaimed water, irrigation, and slurry lines
Green	Sewers and drain lines

Additional Warning Signs

When an excavator arrives at a jobsite after contacting the local one-call center to get the jobsite located, the first step is to look for signs of underground utilities. **These signs should be obvious—look for marking flags, paint, pedestals, fire hydrants, and other above-ground indicators.**

Even though these indicators may signal there are no underground utilities within the dig area or drill site, be alert to additional warning signs as you start the excavation. If you see any visual signs of a buried utility while excavating or drilling, stop immediately and hand dig until the utility is exposed. Contact the utility owner as necessary and do not proceed until the utility is fully exposed and identified.

Excavator Responsibilities

- If you damage a utility, inform the owner so they can inspect the damage and make appropriate repairs.
- If the damage results in flammable, toxic, or corrosive gas or liquid escaping and endangering life, health, property, or the environment, notify the appropriate authorities and the owner immediately.
- Take reasonable measures to protect workers and the general public as well as property and the environment.
- Until help arrives, remain on site to help remedy the situation.

Employer Responsibilities

Before an excavation begins:

- The employer excavating shall ensure that all gas, electrical, and other services in and near the area to be excavated are located and marked.
- The employer and worker locating and marking the services shall ensure that they are accurately located and marked.
- The service shall be shut off and disconnected if it could pose a hazard.
- If the service cannot be shut off and disconnected, the owner of the service shall be requested to supervise the uncovering of the service.

Overview of preventative steps

Excavators and drilling contractors should come up with a detailed work plan: Train employees on the proper procedures for determining the locations of underground utilities. Contact and

coordinate with the local one-call agency and utility companies to establish locations of underground installations. Take necessary precautions to prevent damaging underground utility installations.

If an underground utility is damaged, you must notify the utility operator immediately. They are in the best position to determine the hazards associated with the damage and take appropriate countermeasures. If the damage results in the release of hazardous gases or liquids, both the utility operator and the appropriate emergency response officials should be notified immediately.

FINAL WORD

All the technology and expertise available in the world in dealing with underground utilities are rendered impotent if the phrase “ Call Before you Dig“ goes unheeded.