

PREVENTION OF DAMAGE TO BURIED FACILITIES IN BRITISH COLUMBIA



About WorkSafeBC

WorkSafeBC (the Workers' Compensation Board) is an independent provincial statutory agency governed by a Board of Directors. It is funded by insurance premiums paid by registered employers and by investment returns. In administering the *Workers Compensation Act*, WorkSafeBC remains separate and distinct from government; however, it is accountable to the public through government in its role of protecting and maintaining the overall well-being of the workers' compensation system.

WorkSafeBC was born out of a compromise between B.C.'s workers and employers in 1917 where workers gave up the right to sue their employers or fellow workers for injuries on the job in return for a no-fault insurance program fully paid for by employers. WorkSafeBC is committed to a safe and healthy workplace, and to providing return-to-work rehabilitation and legislated compensation benefits to workers injured as a result of their employment.

WorkSafeBC Prevention Information Line

The WorkSafeBC Prevention Information Line can answer your questions about workplace health and safety, worker and employer responsibilities, and reporting a workplace accident or incident. The Prevention Information Line accepts anonymous calls.

Phone 604 276-3100 in the Lower Mainland, or call 1 888 621-7233 (621-SAFE) toll-free in British Columbia.

To report after-hours and weekend accidents and emergencies, call 604 273-7711 in the Lower Mainland, or call 1 866 922-4357 (WCB-HELP) toll-free in British Columbia.

**PREVENTION OF DAMAGE TO
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IN BRITISH COLUMBIA**

WORK SAFE BC

WorkSafeBC Publications

Many publications are available on the WorkSafeBC website. The Occupational Health and Safety Regulation and associated policies and guidelines, as well as excerpts and summaries of the *Workers Compensation Act*, are also available on the website: WorkSafeBC.com

Some publications are also available for purchase in print:

Phone: 604 232-9704

Toll-free phone: 1 866 319-9704

Fax: 604 232-9703

Toll-free fax: 1 888 232-9714

Online ordering: WorkSafeBC.com and click on Publications; follow the links for ordering

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Introduction

The province of British Columbia has an extensive and complex underground infrastructure of pipes and cables. Valued in the billions of dollars, these pipes and cables have been built over the last century. Anyone who disturbs the ground anywhere in B.C. runs the risk of contacting buried facilities.

The prevention of damage to buried facilities, like safety, is a shared responsibility. That is why it is critical that workers, employers, contractors, consultants, and owners are aware of the potential hazards, legislated requirements, and best practices associated with ground disturbances in the vicinity of buried facilities.

This document is a guideline and does not necessarily provide the only acceptable means of dealing with the issues of undertaking ground disturbances in the vicinity of buried facilities. The information in this document should be considered in conjunction with current legislation and regulations.

As improvements and changes occur, this document will be updated. Suggestions or comments on this document are welcome and should be addressed to:

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Ground disturber information

The digging community includes anyone who engages in or is responsible for a ground disturbance, and may include: homeowners, farmers, ranchers, equipment operators, contractors, homebuilders, landscapers, owners of buried facilities, consultants, developers, municipalities, provincial departments, federal departments, and railways.

Ground disturbance could include: excavation, digging, trenching, plowing, pipe or cable drilling, vertical and horizontal augering, tunnelling or boring, ditch shaping, grading, topsoil stripping, land levelling, tree planting, blasting, vibroseis, pipe pushing, rock picking, subsoil aeration, and driving bars, posts, or anchors.

Responsibilities of ground disturbers/digging community

1. Awareness of hazards

- Identify and assess all existing and potential hazards at the worksite.
- Take action to eliminate, reduce, or control the hazard(s).
- Ensure that workers are aware of all potential hazards at the worksite, and are trained and qualified when working near underground facilities.
- Ensure workers have appropriate and adequate resources, equipment, and tools to undertake the work activities in a safe manner.
- Have written safe work procedures when working in proximity to underground facilities and ensure that workers follow these procedures.

2. Identify and contact the facility owners

- Identify all owners whose facilities are buried in the proposed excavation site.
- Give potentially affected owners of buried facilities at least three (3) full working days notice of the intention to disturb the ground.
- Request that owners of buried facilities provide accurate locate information for their facilities. The owners may, in some cases, apply locate marks in the field. If so, the excavator should send someone who is knowledgeable about the project to meet the locator on site.

3. Obtain all necessary information before disturbing the ground

- Ensure that the locations of all buried facilities have been determined.
- Consider marking the limits of the job site with white flags. Stakes or paint may be used to provide the locators and project personnel with an accurate understanding of the proposed construction area. Avoid using the same colour or identifying marks being used by the facility locator.

Ensure that copies of locate documentation, including BC One Call ticket numbers, are on site at all times during the ground disturbance. **Note:** Maps and “as built” drawings may not always be accurate. They also may be hard to read because of the quality of the fax or photocopy.

- Maintain the buried facilities locate marks (if applicable).

-
- Request that owners perform a re-locate or provide accurate location information about their facilities if the extent of the ground disturbance increases beyond its initially proposed size and shape.

It is the responsibility of the ground disturber to ensure points 1, 2, and 3 are performed before any digging commences. The ground disturber is also responsible for ensuring that workers are trained in the proper method of digging around buried facilities.

4. Hand expose facilities

- Hand expose all buried facilities before using mechanical excavation equipment. Hand exposing means exposing a buried facility, whose location has been marked, using non-powered tools and equipment (for example, a shovel). There are several things to remember when exposing a facility:
 - Never probe for the facility with pointed tools such as pick axes or pointed bars.
 - If possible, blunt shovels should be used to expose the facility. If spade-shaped shovels are used, caution should be taken, especially with newer, sharper spade shovels.
 - Diggers should never jump on or use their entire body weight on the shovel when digging.
 - Use a prying (rather than striking) motion to loosen hard dirt.

- Recommended digging technique involves **digging on an angle** if possible, such that any contact with the facility is a glancing blow as opposed to a direct hit. Digging from the side to expose the facility also helps reduce the chance of damaging the facility.
- Normally, the hand exposure process would begin at or near the locate marks and work down and outward into the hand expose zone until the buried facility is found.
- If the excavator has made a reasonable attempt to hand expose a buried facility but cannot find it, the excavator must immediately contact the facility owner directly for help. Once all the buried facilities have been hand exposed and are clearly visible, the excavator may use mechanical equipment (but not within the distance specified by the facility owner).
- Support and protect exposed facilities. Unsupported exposed facilities may sag and cause breaks or damage.

Hand expose zone

For the purpose of this document, most facility owners have agreed to conform to the following hand dig exposure zone. This recommended hand expose zone applies to all buried facilities except high-pressure pipelines.

The hand expose zone is a distance 1 m either side of the locate marks within which excavation with mechanical equipment must not take place, until the buried facility has been hand exposed and is clearly visible. Once exposed and visible, equipment can be used based on facility owner guidelines. Due caution must be used at all times.

High-pressure pipelines are dealt with under special situations. Excavating within a right of way and around transmission and intermediate pipelines will require permits. Mechanical equipment may be used ONLY to remove surface cover (e.g., concrete, asphalt) or clear away loosened material down to the limits of the hand dig area before resuming hand digging.

5. Excavation parallel to a buried facility

Quite often, construction activities such as road construction or curb and gutter replacement require excavation parallel to a buried facility. In this situation, the excavator must contact the owner of the buried facility for advice on how to proceed. The excavator should note that buried facilities particularly shallow utilities (e.g., telephone, cable TV, electric and natural gas) are not necessarily installed in a straight alignment.

6. Consider hydrovacing

- If it is not practical to hand dig, hydrovacing or airvacing may be considered. Hydrovacing is the use of pressurized water to liquefy and loosen soil, which is then removed from the excavation by the use of on-truck vacuum systems and hoses. Facility owners may allow hydrovacing as a method of

exposing their buried facilities under specific conditions, such as maximum pressure, maximum temperature, or type of nozzle.

- Hydrovacing is faster and easier than hand digging and is helpful when the excavation is complex and involves multiple lines. Hydrovacing may not work in all situations and may be expensive. When assessing an excavation technique, ground disturbers must avoid damage to the coating of facilities as well as the methods of soil disposal.
- Hydrovacing in the vicinity of a buried facility without locates constitutes a ground disturbance with mechanical excavation equipment; therefore, locate information is required before commencing work.

7. Refill or backfill

- Return an exposed facility to its original position.
- Ensure care is taken to backfill or re-fill exposed facilities. Some facilities may require special fill such as fine gravel or sand.

8. Reporting if contact is made

Notify a facility owner if contact is made with that facility. Contact could include:

- Puncturing or cracking
- Flattening
- Scratching
- Denting the surface
- Gouging
- Damaging the protective coating

Stop ground disturbance work immediately and notify facility owner if any contact is made.

Assistance in obtaining locate information

BC One Call is the communication link between the excavating community and the owner/operator of underground facilities who are registered members of BC One Call. **Locate requests are a free service that is paid for by BC One Call members.** A complete list of members and membership information can be found on the BC One Call website (www.bconecall.bc.ca/).

BC One Call contact information:

Toll-free: 1 800 474-6886
Cellular: *6886 (free call)
Vancouver area: 604 257-1940

When you phone BC One Call, they will:

- Obtain information about the proposed activity
- Tell you which members may have underground facilities in the proposed excavation area
- Transmit the information about the proposed activity to the member companies
- Inform you about your liability, and provide you with a ticket number to confirm your request
- Advise you to contact any other parties who may have underground facilities in the excavation area, as all facility owners are not members of BC One Call. **The person proposing to undertake a ground disturbance must identify and contact directly the owners of buried facilities that are not members of BC One Call.**

The call will take about three to five minutes. Each member company will then contact you with information about where their facilities are buried in the proposed excavation area.

Always wait for a response from all facility owners in the proposed excavation site before digging.

Many accidents have occurred when digging began before the facility owner responded.

Give the facility owner a **minimum of three full working days** notice.

Homeowner

It is as important for homeowners to determine the location of underground facilities when planning for fencing, tree planting, or landscaping projects as it is for major contractors involved in sewer and water main installations. Some of the shallow residential facility services may be less than 300 mm (12 in.) below the ground.

Homeowners own the sewer and water services on their property. Municipalities, as a general rule, will not locate them. Homeowners or utilities may own the electrical services on their properties. Electrical utilities will typically provide locate information for the utilities they own. Gas lines such as propane may be buried on a homeowner's site but are not owned by the utility. In some areas of the province, cable TV and telephone facility owners may not locate residential services. Also, homeowners may not be aware of facilities buried in easements inside their property. Some facility owners may provide a clearance on private property residential, but request that you keep your BC One Call ticket in the event of a contact.

Facility owner information

Practices that a facility owner should follow:

- Provide to the person proposing to undertake ground disturbance all information and documentation they may reasonably require regarding the proposed excavation.
- Maintain accurate and up-to-date records of both active and abandoned facilities.
- Be proactive in damage prevention activities.
- Respond in a timely manner to requests for locates from the digging community.
- If field markings are conducted, you should identify and accurately mark the horizontal location and alignment of your facilities following the International Color Code introduced by the American Public Works Association and partially recognized in Canadian Standards Association C22.3 No. 7-94, Underground Systems.

Colour codes for marking underground utility lines (universal standards)	
Electrical power lines, cables, conduits and ducts, or lighting wires and cables	Red
Gas, oil, petroleum, steam, or gaseous material	Yellow
Telephone, communications, cable TV, alarm or signal lines, wires, cable, conduits, or ducts	Orange
Water lines or pipes	Blue
Sanitary sewer, storm sewer, culvert, or drain lines	Green
Temporary survey markings	Pink
Limits of proposed excavation	White
Irrigation, reclaimed water, or slurry lines or pipes	Purple

Information that a locator provides

It is reasonable to expect locators to advise the ground disturber of any limitations they experience or concerns they have while doing a locate. As a general rule, the owners of buried facilities will NOT provide the depth of a utility line when locates are performed. Where depth information is important to prevent contact with the facility, such as when an installation is particularly shallow and may be affected by the removal of hard surface covering for example, this information must be conveyed to the excavator.

When the owner of a buried facility or contract locator identifies and marks the locations of the buried facility, they should document the locate performed, provide the ground disturber with a copy of the locate documentation, and retain a copy of the locate documentation for at least two years. This documentation is commonly referred to as a locate plot plan or a locate slip. Gas owners need to identify the characteristics of the line, which would include size and material of construction (plastic or steel).

Locators should identify and mark the locations of abandoned facilities whenever possible. The facility owner should also be supplied with information on the abandoned facility. They should also identify the number of facilities the excavator can expect to find whenever that information can be determined.

Note: There are locations where a facility owner has abandoned their infrastructure and provided and/or transferred ownership to other facility owners as a conduit. These conduits may not show on drawings provided by the original facility owner.

Special training for locators

Locate accuracy is completely dependent on the degree of difficulty of the site and the experience of the locator. Correctly identifying the facilities that are buried on the site can have a big impact on the locator's ability to find them. Training for locators should include a practical as well as a theoretical component. It is up to each company to ensure that its locators are competent. No one standard is sufficient for all scenarios, and companies may consider developing their own written training standards.

A trained locator should:

- Understand the science of location (electromagnetic theory)
- Understand the different methods of locating
- Know the universal colours for marking
- Know and understand the local regulations
- Understand how to present documentation and mapping
- Demonstrate how to assess whether buried facilities are present
- Demonstrate a successful line locate
- Demonstrate how to properly mark a located line

Accidental contact with underground facilities

In the event of accidental contact with any underground facility, immediately contact the facility owner (if the facility can be identified); if not, contact BC One Call.

Contact WorkSafeBC immediately if the following situations arise as a result of a gas pipe strike (1 866 922-4357 toll-free):

- Gas seeped into sewers or drains
- Any worker with a serious injury or a fatality of a worker has occurred
- Major release of gas
- The gas leak ignited
- It was necessary to evacuate people from buildings

Gas facility contact	Response
<p>Gas line has been struck, jarred, pulled, or the wrapping or surface of a pipe has been damaged</p> <p>Note: Fire prevention and life safety are the primary concern related to this procedure.</p>	<ol style="list-style-type: none"> 1. Remove all sources of possible ignition such as cigarettes. 2. Turn off all mechanical equipment and vehicles. Do not operate electrical switches (“on” or “off”). 3. Stop all work and immediately call gas company. 4. Check for smell or sound of escaping gas in the area. 5. Do not backfill. The gas company must physically check the integrity of the piping system and repair any damage.
<p>Gas is escaping from a ruptured line</p> <p>Note: Fire Prevention and life safety are the primary concern related to this procedure.</p>	<ol style="list-style-type: none"> 1. Remove all possible sources of ignition (e.g., cigarettes). 2. Turn off machinery and mechanical equipment. Do not operate electrical switches (“on” or “off”). 3. Stop all work and immediately call gas company and fire department. 4. Evacuate the area. Move people upwind if possible, and prevent cars and bystanders from entering. 5. Do not attempt to make temporary repairs or operate any underground gas valves. 6. If the break or leak is underground, warn people in nearby buildings where gas might enter through drains, etc. If gas is entering into buildings, evacuate them, as well as neighbouring buildings.
<p>Warning</p> <ul style="list-style-type: none"> • Dead gas mains may contain residual natural gas concentrations in the explosive range for natural gas (5–15% methane in air). • Polyethylene gas lines generally have a static charge buildup, making it dangerous for unqualified workers to stop a gas leak in an excavation involving this type of pipe. 	

Electrical facility contact	Response
Accidental contact with underground electrical utility	<ol style="list-style-type: none"> 1. Immediately contact the facility owner (if the owner can be identified); if not, contact BC One Call. 2. Move the digger bucket clear of the cable to break contact and stay out of the trench. 3. If the machine cannot be moved, keep workers 10 m (33 ft.) away, and have the operator remain on the vehicle. 4. If there is an uncontrollable fire, jump off the machine keeping your feet together. Never contact the machine and the ground at the same time. 5. Once clear of the machine, shuffle away, never allowing the heel of one foot to move beyond the toe of the other, or hop with both feet together to a minimum distance of 10 m (33 ft.).
Communications facility contact	Response
Accidental contact with underground communications facility (copper cable or fibre optics line)	<ol style="list-style-type: none"> 1. If there is accidental contact with a communications cable, immediately contact the facility owner (if the owner can be identified); if not, contact BC One Call. 2. Move the equipment, exit the trench, and await response from the facility owner.

Consequences and hazards related to underground facilities

Damage to underground facilities can cause property damage and death or serious injury to a worker or member of the public and also lead to penalties and monetary costs. Every facility owner or excavator can experience some of the following consequences every time a facility is contacted.

- Evacuation of residential areas, explosion, fire, flood, or toxic gas escape
- Costs to rehabilitate injured workers, repair damaged facility, rehabilitate the environment, repair or replace construction equipment
- Disruption of essential services, inconvenience to the public
- Civil legal action, criminal charges, fines, jail terms, police/fire or ambulance costs, medical costs, legal costs, administration cost

- Down time charges, loss of business charges, increased insurance premiums, service interruptions costs for customers
- Equipment damage, contractor down time and loss of production, loss of product and revenue
- Business interruption costs, repair costs, environmental contamination
- Third-party property damage
- WorkSafeBC orders or penalties
- Increased WorkSafeBC assessments
- Reduced credibility with the public

Direct contact with an underground facility can cause serious injury. The following is a brief list of the dangers and hazards associated with particular facilities.

Underground services	Hazards/dangers
<p>Electrical cables</p> <ul style="list-style-type: none"> • Low/high voltage • Supervisory and signaling cables • Cathodic protection <ul style="list-style-type: none"> — Cabinets — Cables • Conduit systems <ul style="list-style-type: none"> — Asbestos-concrete — Concrete — PVC — Earthenware • Cable pits and chambers • Earthing rods and conductors 	<ul style="list-style-type: none"> • Fire, flame, arcing of current • Disruption of potential critical services (hospital) • Flash burns • Oil release (some electrical cables) • Electrocutation • Electric shock

Underground services	Hazards/dangers
<p>Gas</p> <ul style="list-style-type: none"> • Gas distribution lines <ul style="list-style-type: none"> — Low pressure (2.1–101.5 psi) — High pressure (over 101.6 psi) — Steel — Polyethylene • Mains/Services <ul style="list-style-type: none"> — Fittings — Valves — Service joints — Casings — Tracer wire — Cathodic protection — Stations with surface opening lids 	<ul style="list-style-type: none"> • Fire, explosions • Asphyxiation • Damage to pipe coating and wrapping creating long-term degradation • Disruption of potential critical services (e.g., hospital) • Underground migrating gas
<p>Communication cables</p> <ul style="list-style-type: none"> • Phone lines • Conduit systems <ul style="list-style-type: none"> — Asbestos-concrete — Concrete — PVC — Creosote wood duct — Black fibre duct — Rubber mastic styrene • Telephone cable types <ul style="list-style-type: none"> — Copper cable — Fibre optic cable • Coaxial cables <ul style="list-style-type: none"> — Signaling cables — Data cables 	<ul style="list-style-type: none"> • Disruption of critical services (911) • Penetration of fibre optic particles and exposure to laser light • Risk of exposure to materials that are a health and safety concern (conduit materials)
<p>Sewer/water mains and services</p> <ul style="list-style-type: none"> • Pits • Tunnels • Connections • Valves 	<ul style="list-style-type: none"> • Flooding • Public health • Cross contamination of water lines • Fire hydrant disruption • Confined space hazards • Excavation collapse, mud slides • Biohazard

Underground services	Hazards/dangers
Storm water and drainage trunk lines and services <ul style="list-style-type: none"> • Pits • Shafts • Tunnels 	<ul style="list-style-type: none"> • Flooding
Oil /Gas pipelines <ul style="list-style-type: none"> • Distribution • Transmission • LPG- kiosks, valves 	<ul style="list-style-type: none"> • Explosions • Fires
Traffic detection and signaling circuits <ul style="list-style-type: none"> • Low voltage • Street light ducting 	<ul style="list-style-type: none"> • Fire, flame, arcing of current • Flash burns • Disruption of traffic
Irrigation lines and systems	<ul style="list-style-type: none"> • Water hazards • Electrical hazards • Computer systems

Notice of Incidents (NIs)

The following selected “Notice of Incidents” (NIs) were received by the Worker and Employer Services Division of WorkSafeBC (total of 24 incidents for the period January–December 2005). NIs provide employers and workers with timely information about the type of accidents occurring in their industry, which may help prevent

similar incidents in your workplace. **Note:** This information is preliminary and subject to change.

Sign up for free email updates, such as the following listing of NI reports, by visiting www.healthandsafetycentre.org/s/SubscribeNow.asp.

Date of accident	Incidents
February 2005	<p>A skid-steer front end loader contacted an underground gas line.</p> <p>A worker was exposing an underground gas line using a high-pressure hot water gun. The worker slipped, lost control of the wand, and was struck by a direct stream of scalding hot water.</p>
March	<p>An excavator hit a 60-mm main gas line at a private residence.</p> <p>An excavator contacted an underground ¾-inch, low-pressure, high-volume natural gas line, pulling the pipe from the valve and causing a release of natural gas.</p>
April	<p>An excavator dug up a 12-kV electrical line.</p> <p>A backhoe contacted an underground service that was 30 m away from its location on the drawing.</p>
August	<p>A “hot tap” was being performed on a natural gas service line (1¼ inches diameter, 60 pounds of pressure) when gas started to escape from the fused T-fitting. Instead of clearing the site, workers tried to vent the escaping gas away from the leak. A gas explosion occurred, burning one worker.</p> <p>An excavator pulled an energized underground electrical conductor.</p> <p>An energized underground 12-kV power line was contacted by a drilling rig. The services were not in the location shown on the underground site service plan.</p> <p>During excavation to upgrade sections of a municipal water line, a natural gas line was ruptured.</p> <p>An excavator pulled up a 7200-volt underground electrical cable.</p> <p>A skid-steer front end loader pulled a 60-mm main gas line at a residential property. Without adequate checking of the line, the area was backfilled. Shortly thereafter it was discovered that bottom of the line had split open and gas was blowing underground.</p>

Date of accident	Incidents
September	<p>At separate locations, two residential natural gas lines (one 1/2-inch and the other 3/4-inch diameter) were ruptured during excavation work for the upgrading of municipal water mains.</p> <p>A backhoe broke through a conduit and pulled up an energized underground power line.</p> <p>A rubber-tired backhoe ruptured a 3/4-inch natural gas line while excavating to install a new water line to a residential site.</p> <p>While digging for the sewer line, an excavator contacted an energized high-voltage underground power line.</p> <p>An excavator ruptured a 3/4-inch natural gas line while digging.</p> <p>An excavator broke ground and contacted a gas line that was not located where the site drawings indicated.</p>
October	<p>A backhoe was excavating a soft spot in the street so repairs could be done. It hit and damaged a service nipple on a three-inch gas main.</p> <p>An excavator contacted a high-voltage underground conductor while preparing a site for the installation of a retaining wall.</p> <p>Workers were constructing a chain-link fence. The fence posts had been previously installed, using an excavator to push them into place. One post was contacting an underground low-voltage, energized power conductor. The top rail was being completed and was not in contact with all the fence posts. A fence installer received an electrical shock when he grasped the energized metallic fence post in one hand, then touched the grounded metallic top rail with the other hand.</p>
November	<p>An excavator exposed three underground high-voltage conductors. The protective plastic casing was cracked but the conductors were not damaged. The line had not been located by hand.</p> <p>During excavation to install a new electrical service, a two-inch gas main was ruptured. No underground utilities had been located prior to excavating.</p>
December	<p>While trying to locate an underground natural gas service, a utilities contractor ruptured the two-inch line, resulting in a release of gas.</p>

Contact and resource information

Name	Contact information	Emergency number
BC One Call: • FortisBC • TELUS • BC Hydro	Toll-free: 1 800 474-6886 Cellular: *6886 Vancouver: 604 257-1940 Fax: 604 451-0344	BC One Call: 1 800 474-6886 FortisBC: 1 800 663-9911 Telus Repair Service: 611 BC Hydro: 1 888 769-3766
Shaw	Toll-free: 1 866 344-7429 Fax: 604 629-3201	604 551-0419
City of Vancouver Sewer and Water	604 873-7357	311 (or 604 873-7000 outside city limits)
Metro Vancouver Sewer and Water	604 432-6200	604 444-8401
Central Heat Distribution Ltd. Hot water steam lines for downtown Vancouver	604 688-9584	604 688-9584

Other sources of information

- BC One Call website:
www.bconecall.bc.ca
- WorkSafeBC website:
www.worksafebc.com
- National Energy Board website:
www.neb-one.gc.ca/
- BC Common Ground Alliance website:
www.commongroundbc.ca
- Alberta Damage Prevention Council website:
www.albertadamageprevention.com
- BC Hydro and Power Authority website:
www.bchydro.com/
- FortisBC website: www.fortisbc.com/Safety/Pages/Call-before-you-dig.aspx
- Underground Focus Magazine (US) website:
www.underspace.com
- Electrical Industry Training Institute (EITI) website: www.eiti.bc.ca

EITI offers a half day underground utilities awareness workshop. The workshop's objective is to provide participants with industry best practices and the information necessary to make safe decisions prior to disturbing the ground in the vicinity of underground utilities in BC.

Electrical Industry Training Institute
 Unit C, 12330 – 88th Avenue
 Surrey BC V3W 3J6

Phone: 604 590-8911
 Toll-free: 1 866 590-8911
 Fax: 604 590-8912
 Email: info@eiti.bc.ca

-
- Government of BC Gas Safety Regulation:
www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/15_103_2004
 - Shaw Cable website: www.digshaw.ca
 - National Utility Locating Contractors Association website: www.nulca.org
 - Alberta One Call website:
www.alberta1call.com
 - Trenchless Technology website:
www.trenchlessonline.com

Related legislation

Workers Compensation Act

The following sections of the *Workers Compensation Act*, Occupational Health and Safety Regulation, and Guidelines apply to underground facilities. However, other sections of the *Workers Compensation Act*, Regulations, and Guidelines may also apply to your workplace because hazards and tasks vary from workplace to workplace within the same industry

Part 3, Division 10 — Accident Reporting and Investigation

Immediate notice of certain accidents 172

- (1) An employer must immediately notify the Board of the occurrence of any accident that
 - (a) resulted in serious injury to or the death of a worker,
 - (b) involved a major structural failure or collapse of a building, bridge, tower, crane, hoist, temporary construction support system or excavation,
 - (c) involved the major release of a hazardous substance, or
 - (d) was an incident required by regulation to be reported.
- (2) Except as otherwise directed by an officer of the Board or a peace officer, a person must not disturb the scene of an accident that is reportable under subsection (1) except so far as is necessary to
 - (a) attend to persons injured or killed,
 - (b) prevent further injuries or death, or
 - (c) protect property that is endangered as a result of the accident.

Incidents that must be investigated 173

- (1) An employer must immediately undertake an investigation into the cause of any accident or other incident that
 - (a) is required to be reported by section 172,
 - (b) resulted in injury to a worker requiring medical treatment,
 - (c) did not involve injury to a worker, or involved only minor injury not requiring medical treatment, but had a potential for causing serious injury to a worker, or
 - (d) was an incident required by regulation to be investigated.
- (2) Subsection (1) does not apply in the case of a vehicle accident occurring on a public street or highway.

Occupational Health and Safety Regulation

4.18 Notification of facilities

An employer whose work activities result in a hit or damage to a pipeline, buried electrical cable or other such facility must notify the owner of the facility without delay.

19.5 Informing workers

A worker must be informed of the potential electrical hazards before being permitted to do work in proximity to energized electrical conductors or equipment.

20.79 Underground facilities

- (1) Before excavating or drilling with powered tools and equipment, the location of all underground facility services in the area must be accurately determined, and any danger to workers from the services must be controlled.
- (2) Excavation or drilling work in proximity to an underground service must be undertaken in conformity with the requirements of the owner of the service.
- (3) Pointed tools must not be used to probe for underground gas and electrical services.
- (4) Powered equipment used for excavating must be operated so as to avoid damage to underground facility services, or danger to workers.

*** Statutes or regulations covered by other jurisdictions apply to excavation or drilling in proximity to an underground service.**

Sloping and Shoring Requirements

Requirements for sloping and shoring must be met for certain excavations. Refer to section 20.81 of the Occupational Health and Safety Regulation for further details.

Guidelines

Guidelines are intended to assist with providing ways of complying with the Regulation. For the most current Guideline on Gas Safety Regulation, visit the WorkSafeBC website at WorkSafeBC.com.

Ground disturbance checklist

Company name	Supervisor/planner
Site address/location	Date
Project activity	

		YES	NO	N/A
1	Company policy addresses ground disturbances			
2	Pre-job meeting			
3	Appropriate training of all workers on site			
4	Record of worker orientation			
5	Providing notification to BC One Call (at least three full working days notice)			
6	Providing notification to other facility owners (not members of BC One Call)			
7	Receiving notification from all facility owners			
8	Written safe work procedures as appropriate			
9	Emergency response plans			
10	Appropriate tools and equipment identified			
11	Hand exposure guidelines			
12	Permits required			
13	Appropriate first aid coverage			
14	Traffic control /flag person			
15	Location of underground facilities/site drawings on site			
16	Limits of job site marked with flags			
17	Sufficient quantity and clearly identified locate marks			
18	Overhead power lines (determining limits of approach)			
19	Sloping or shoring requirements (over 122 m)			
20	Trees, utility pole, rocks, etc. removed or secured as appropriate			
21	Support or protection of exposed facilities			
22	Backfill/refill procedures			
23				
24				

Additional Information	
Supervisor/planner's signature	Supervisor/planner's name (<i>please print</i>)

Glossary

The following definitions are intended to ensure consistent understanding of terms used throughout this document and industry.

Directional drilling

Directional drilling, or trenchless excavating, has been used for roadways, railroads, or river crossing. This method may be more cost effective or less disruptive than using open cut excavating method (e.g., drilling under a building). If this method is to be considered, the owner of underground facilities should be contacted to discuss procedures or requirements for drilling in proximity to their services.

Emergency locate requests

An emergency locate request is defined as “a locate request placed prior to the commencement of a ground disturbance to correct any abnormal condition that constitutes a clear and present danger to life, health, or property by reason of escaping gas or petroleum products, breaks or defects in a buried facility, including the disruption of essential services, or by reason of any disaster of natural or artificial causes.”

The expectation is that locators will respond to emergency locate requests in urban areas within 1 hour of the locate request being placed and within 2 hours in rural areas.

Excavator

Means a person, employer, owner, contractor, or “digger” disturbing the ground. In this document, it does not mean a hydraulic excavator machine.

Ground disturbance

Any work, operation, or activity that results in a disturbance of the earth, regardless of depth.

The term “ground disturbance” has been adopted by many people in this industry to replace “excavation” since there are many activities other than excavation that disturb the ground (e.g., horizontal or vertical drilling and blasting).

Hand exposure

In this document, the terms “hand digging” and “hand excavation” are considered to have the same meaning. Hand exposing means the locating of a buried facility, or the exposure of a buried facility that has already been located and marked, using non-destructive excavation techniques acceptable to the owner of the buried facility, to the extent that its identity, location, and alignment can be confirmed.

Hydrovacing/Airvacing

Hydrovacing (and less common airvacing) is another technique used to expose facilities. Hydrovacing is the use of pressurized water to liquefy and loosen soil, which then may be removed from the excavation by the use of on-truck vacuum systems and hoses.

Lifespan of markings/information provided

Excavation activity must be started within 14 calendar days of your request. The identification of underground facilities is valid for the duration of a project, provided the physical markings remain visible and are not disturbed. Some facility owners may advise of more frequent update requirements. For underground gas facilities, location records information must be reconfirmed if the excavation has not started within 10 working days of the identification of the underground gas facilities. If the physical markings have been disturbed, are no longer visible, or the ground disturber feels the

markings are not adequate for the successful and safe completion of the work, new markings should be requested.

Locate

To determine the position of underground facilities by identifying and marking the approximate horizontal alignment of a buried facility.

Locate markings

Markings, when used, can be paint, stakes, cones, pins, spikes, flags, or other means of marking, and should be in sufficient quantity and close enough together to clearly identify the route of the buried facilities. Although the Canadian Standards Association partially recognizes an international colour code, other practices may exist. While locating equipment has become increasingly sophisticated and accurate, parallel facilities, overhead facilities, and nearby reinforced concrete structures all affect their accuracy. Locating is thus an art rather than a science, and locate marks are only approximate.

Locator

A person or employer who undertakes to assist the excavator in determining the location of the buried facility. Locators provide a direct communication link between excavators and facility owners, and can advise and assist excavators in their approach to dealing with buried facilities at the site.

Private property

Private property includes more than residential lots. Examples could include: trailer parks, condominiums, townhouse developments,

shopping centres, airports, military bases, hospitals, schools, universities, and exhibition grounds. The owners of buried facilities may not own and may not be aware of buried facilities within some privately owned complexes. Some facilities owners may attempt to locate buried facilities, others may not. Secondary/branch services such as gas, electric, or telephone lines between a house and a garage would fall into this category.

Qualified

Qualified means being knowledgeable of the work, the hazards involved, and the means to control the hazards, by reason of education, training, experience, or a combination thereof.

Underground facility

An underground facility is anything below ground used in the collection, storage, transmission, or distribution of water, storm water, sewage, power, telecommunications, cable TV, electrical energy, oil, natural and propane gas, steam, petroleum products, chemical and other substances, and includes but is not limited to pipes, conduits, ducts, cables, wires, valves, manholes, catch basins, and attachments to these items.

Unmarked facility

Some government properties (military bases or school grounds), old or inactive/abandoned facilities, or inaccurately catalogued facility may not show up on a facility map. If you expose an unmarked facility, stop work and immediately contact the appropriate facility owner or BC One Call.

Utility Rights of Way

In many municipalities, it has become necessary to install shallow facilities in utility Rights of Way across residential properties. Unfortunately, most homeowners are not aware of the existence of utility Rights of Way on their properties and should check their certificates of title for utility Rights of Ways. They should also contact the local municipality or facility owner to determine what restrictions have been placed on their use of the land, because the owners of the facilities buried within the utility Rights of Way must have access to the right of way for maintenance and repair purposes. Accordingly, property owners are restricted as to what they can build and plant on utility Rights of Way. A permit may be required to put up a fence, install a driveway, or even park a vehicle.

WorkSafeBC Offices

Visit our website at WorkSafeBC.com.

Abbotsford

2774 Trethewey Street V2T 3R1
Phone 604 276-3100
1 800 292-2219
Fax 604 556-2077

Burnaby

450 – 6450 Roberts Street V5G 4E1
Phone 604 276-3100
1 888 621-7233
Fax 604 232-5950

Coquitlam

104 – 3020 Lincoln Avenue V3B 6B4
Phone 604 276-3100
1 888 967-5377
Fax 604 232-1946

Courtenay

801 30th Street V9N 8G6
Phone 250 334-8765
1 800 663-7921
Fax 250 334-8757

Kamloops

321 Battle Street V2C 6P1
Phone 250 371-6003
1 800 663-3935
Fax 250 371-6031

Kelowna

110 – 2045 Enterprise Way V1Y 9T5
Phone 250 717-4313
1 888 922-4466
Fax 250 717-4380

Nanaimo

4980 Wills Road V9T 6C6
Phone 250 751-8040
1 800 663-7382
Fax 250 751-8046

Nelson

524 Kootenay Street V1L 6B4
Phone 250 352-2824
1 800 663-4962
Fax 250 352-1816

North Vancouver

400 – 224 Esplanade Ave. W. V7M 1A4
Phone 604 276-3100
1 888 875-6999
Fax 604 232-1558

Prince George

1066 Vancouver Street V2L 5M4
Phone 250 561-3700
1 800 663-6623
Fax 250 561-3710

Surrey

100 – 5500 152 Street V3S 5J9
Phone 604 276-3100
1 888 621-7233
Fax 604 232-7077

Terrace

4450 Lakelse Avenue V8G 1P2
Phone 250 615-6605
1 800 663-3871
Fax 250 615-6633

Victoria

4514 Chatterton Way V8X 5H2
Phone 250 881-3418
1 800 663-7593
Fax 250 881-3482

Head Office / Richmond

Prevention Information Line:

Phone 604 276-3100
1 888 621-7233 (621-SAFE)

Administration:

6951 Westminster Highway
Phone 604 273-2266

Mailing Address:

PO Box 5350 Stn Terminal
Vancouver BC V6B 5L5

After Hours

Health & Safety Emergency

604 273-7711
1 866 922-4357 (WCB-HELP)

