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Ground Disturbance

1.0 Introduction

1.1 Purpose

The purpose of this Code of Practice (COP) is to establish and maintain CPES standards and practices for work performed by workers who may be at risk of contacting and or damaging underground facilities. The COP provides guidance to any person(s) performing a ground disturbance and the minimum requirements necessary to ensure ground disturbance activities are performed safely.

This COP provides a process to plan and safely manage potentially hazardous energy sources related to conducting ground disturbance activities. Ground disturbance activities will be performed in conjunction with other CPES systems, such as Hazard Identification, Assessment and Control (HIAC), Hot Work, Confined Space Entry.

This COP provides the CPES site representative(s) with the minimum requirements to ensure that trained and competent workers are selected for the ground disturbance activities. It specifies the responsibilities of each ground disturber, ground disturbance Supervisor, facility owner, and project owner. The intent is to use all necessary resources to locate and identify all underground facilities.

The overall objective of the Ground Disturbance COP is to prevent injuries to workers, and contact/damage to buried facilities.

1.2 Application

This COP applies to:

- All CPES worksites where ground disturbance is to be performed such as but not limited to, pipeline right of ways, road crossings, lease sites, facility sites or other identified construction sites.
- To all CPES Employees, ISP's (Independent Service Providers), Sub-contractors, and other visiting personnel involved in ground disturbance on any CPES worksite.
- Sites where CPES is the Performing Authority (Contractor) or Authorizing Authority (Prime Contractor).

This COP may be applied in conjunction with a client's standards pertaining to ground disturbance.

1.3 Definitions

AER (Alberta Energy Regulator):

The AER regulates the safe, responsible, and efficient development of Alberta's energy resources including oil, natural gas, oil sands, coal, and pipelines.

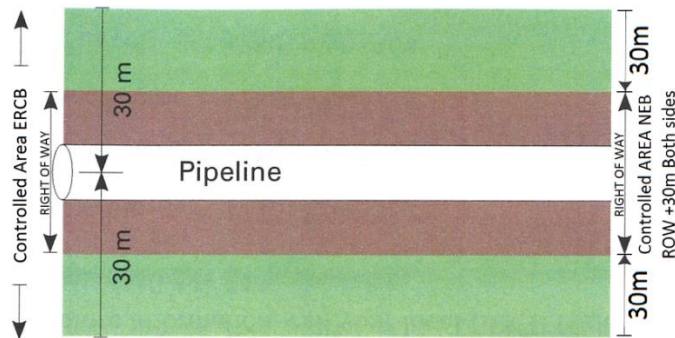
Buried Facility:

Anything buried or constructed below ground level respecting electricity, communications, water, sewage, oil, gas or other substances including, but not limited to, the pipes conduits, ducts, cables, wires, valves, manholes, catch basins, and any attachments to them.

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Controlled/Prescribed Area: Also Known as "Safety Zone." For pipelines this is Determined zone either side of the centerline of the pipeline as defined by Provincial authority or a 30m zone either side of the right of way as defined by the CER (Federal). The owner of the buried facility must be notified of the intent of any ground disturbance within this area.



Crossing Agreement: Also known as an approval, regarding regulations. A crossing agreement is a form of Joint Use Agreement used for the common usage of intersecting rights of way.

Direct Supervision: The ground disturbance supervisor is in the immediate vicinity of work being performed and intimately aware of the job scope and capable of stopping the task at any moment if required.

Ground Disturbance: A man-made cut, cavity, trench or depression in the earth's surface. Examples may include excavating, digging, trenching, plowing, drilling, tunnelling, auguring, backfilling, blasting, Hydro-Vac, topsoil stripping, land levelling, grading, clearing, fencing, soil sampling and installing rig anchors. Exemptions, low risk work not needing a ground disturbance permit:

1. Routine, minor road maintenance.
2. Agricultural cultivation to a depth of less than 450mm below the ground surface over a pipeline.
3. Hand-digging to a depth of 300mm or less below the ground surface as long as it doesn't permanently remove the cover over a buried facility.
4. Pounding in wooden surveyor's pegs.
5. Using Hydro-Vac at low pressure (<2200psi) to dig.

Ground Disturbance Supervisor: A competent worker verified by formal certification (i.e. Ground Disturbance trained to a Level 2 BC & Sask or 201 AB) and experience to supervise ground disturbance activities.

Ground Disturber: The person and/or persons directly involved in any ground disturbance activity (i.e. spotter, equipment operator, Hydro-Vac operator, etc.).

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Hand Expose Zone:	<p>Is the distance from the locate marks within which mechanical excavation equipment shall not be used until the buried facility has been hand exposed.</p> <ol style="list-style-type: none">1. The hand expose zone for high pressure pipelines is 5m.2. Federally regulated pipelines, the hand expose zone is 3m.3. Most all other types of buried facilities, the hand expose zone is 1m.
Hand Exposure:	<p>Non-destructive excavation techniques acceptable to the owner (such as Hydro-Vac, Air-Vac, or Hand-Digging) of the buried facility, to the extent that its identity, location, and alignment can be confirmed.</p>
Hand Tool:	<p>Handheld equipment that depends on the energy of the worker for its direct effect and does not use pneumatic, hydraulic, electrical, or chemical energy for its operation.</p> <p>*Note: A pick or axe cannot be used for hand exposure.</p>
Locates:	<p>Are used to identify, on the ground, the position of the buried facility based on records or electronic locating (Electromagnetic locating) equipment and includes provision of necessary documentation such as a locate sheets. 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.</p>
Locate Markers:	<p>Are markers that indicate the approximate center line of a buried facility. They are only good for 14 days (10 days British Columbia) but may be extended longer if owner deems them accurate and applies for an extension, to a maximum of 30 days.</p> <p>Examples are: Coloured wire pin flags Coloured tape attached to Stakes Stake chasers (Fiber Clusters) Coloured paint applied to the ground Coloured Chalk applied to the ground Lath Locate markers</p>
Operating Authority:	<p>The parties creating the ground disturbance and directing the work as defined in the Scope of Work on the Ground Disturbance Checklist/Agreement or Permit. The Operating Authority must ensure that individual company, industry, regulatory ground disturbance requirements are met. Typically, CPES's clients are the Operating Authority, however in certain situations CPES may be the Operating Authority.</p>
Owners Representative:	<p>The person most knowledgeable about the characteristics of the buried pipeline. Where the use of mechanical equipment is required to excavate within 60 cm (24 inches) of a buried pipeline, the activity can only be undertaken under the direct supervision of an owner's representative.</p>
CER (Canadian Energy Regulator):	<p>This is primarily pipeline systems that cross provincial or international boundaries are regulated by the federal government.</p>

Performing Authority: The parties in charge of performing the work as defined in the Scope of Work on the Ground Disturbance Checklist/Agreement or Permit. The Performing Authority must ensure the terms and conditions specified in the Ground Disturbance Checklist/Agreement or Permit are acceptable and understood. Typically, CPES is the Performing Authority, however in certain situations CPES may be directing the activities of the Performing Authority.

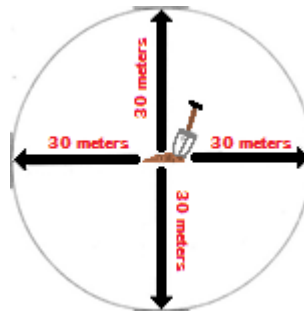
Proximity Notification or Agreement: This notification allows a party to create a ground disturbance within the 30m proximity of the owner’s buried facility. In some instances, an agreement may be required by the buried facility owner. This agreement is very similar to a crossing agreement but removes the confusion of the term “crossing”. This notification and/or agreement is also utilized for providing direction and specifications for ground disturbances that are not related to installing a buried facility.

Reciprocal Agreement: A written approval that provides specifications that both parties will mutually adhere to when creating a ground disturbance; these agreements are completed by facility owners that are commonly working back and forth on each other’s rights-of-way.

Right-of-access Agreement: A written approval that provides the terms and conditions for entry into property not owned by the party creating the ground disturbance; could apply to land, a right-of-way owned by a company, a county road ditch, etc. It is common to have several right-of-access agreements.

Right-of-entry Agreement: A written approval that provides specific directions as to when, where, and how the party creating the ground disturbance can access the ground disturbance site; in many companies, right of entry and right of access are addressed in a single document.

Search Area: Is a 30m distance from the perimeter of the area which a proposed ground disturbance will be undertaken. Within this area all reasonable precautions necessary to ascertain whether a buried facility exists must be taken.



Spotter (Ground Disturbance): A spotter is to be a delegated person and be deemed competent by the Ground Disturbance Supervisor. They must be in direct visual contact with the operator of any mechanical excavation equipment being used within the hand exposure zone. They must ensure that the equipment does not come within 60cm of the facility.

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Utility Rights-of-way (URWS): Is a right-of-way adjacent to a street or road which may contain shallow utilities (telephone, cable, electric, gas, etc.). These ROW are property of the municipality, not the owners of the utilities. Therefore, approvals must also be granted by the municipality.

2.0 Potential Hazard Sources and Hazards

The five (5) primary Hazard Sources related to ground disturbance are Flammable/Explosive, Pressure/Energized, Gravity, Motion and Electrical. Additionally, Human Factors must be considered when planning ground disturbance activities.

2.1 Hazard Sources and Hazards



Specific hazards related to ground disturbance may include:

Electrical – Underground power lines/utilities, overhead power lines, lightening

Flammable /Explosive – Hydrocarbons (fluids, gas) in lines

Gravity – Trench wall collapse, falls into trenches and cuts, overhead equipment

Motion – Moving pipe and equipment

Pressure/Energized – Pressurized lines

Other Hazard Sources that may be identified through the HIAC process are Toxic/Carcinogenic (H2S, Asbestos) and Noise (equipment operation, hydro vac). Some specific hazards may not be visible; therefore, consideration must be given to hazards that may cause injury due to the unintended motion, energizing, start-up, or contact of such stored or residual energy in machinery, equipment, piping, pipelines, process systems, electrical or other underground utilities.

Key Human Factors to consider and manage are:

- Communication – Confirm hand signals or radio communication between ground disturbance team.
- State of Mind – Ground disturbance is a critical task that demands focused ground disturbance teams.

2.2 Hazard Identification, Assessment and Control (HIAC)

The CPES hazard identification, assessment and control program follow a five-step process to ensure the safety of its employees, independent service providers, contractors, the public and protecting the environment, and property from an incident. The HIAC process must identify the key points in relation to the hazard sources, including location of the hazard; frequency of worker exposure and potential consequences; Upon completion of the assessment, the appropriate controls must be implemented as per this COP.

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The first concept to be incorporated into all hazard assessments is the practice of identifying hazard source(s). Regardless of whether hazard assessments are for pre-project evaluation where CPES is prime, or when workers are about to perform a ground disturbance activity, this practice involves a staged structure, namely identifying the hazard source(s), then identifying specific hazards relating to each source. For example: "electrical" source = overhead power lines, buried power lines, power lines in walls or structures, energized panels, switches, power cords, etc.

Hazards identified through the assessment process, are required to be communicated, documented, and appropriate controls implemented prior to proceeding with the task/job at hand. As with any other tasks/jobs, there is a requirement to re-assess the work environment and complete ongoing observations

3.0 Responsibilities

An important element in ground disturbance is a clear understanding by all persons about their responsibilities in relation to Ground Disturbance.

3.1 Senior Management

It is the responsibility of Senior Management to:

1. Ensure the Code of Practice for ground disturbance is reviewed and approved.
2. Ensure the effectiveness of the Code of Practice is assessed.
3. Provide guidance on the implementation of the Code of Practice.

3.2 Managers/ Superintendents

Managers/Superintendents are responsible to ensure:

1. The CPES Ground Disturbance COP is available, understood and implemented.
2. Adequate systems are in place to identify workers who require ground disturbance training.
3. Workers receive training before performing ground disturbance activities as per this COP.
4. Appropriate resources (equipment, locaters, hydro-vac contractors, training, standards, etc.) are available at each work site.

3.3 Foremen/Site Supervisors

Foremen/Site Supervisors are responsible to:

1. Ensure that the site HIAC process identifies the hazard sources and potential hazards that may be encountered during the ground disturbance. A documented HIAC has been completed (CF-S-01).
2. Engage our clients in identifying hazard sources and specific ground disturbance hazards.
3. Facilitate and/or participate in the HIAC process to understand the hazard sources, hazards and control methods identified.
4. Facilitate and/or participate in Tailgate Safety meetings and Task Hazard Analysis reviews prior to starting work.
5. Complete and maintain Ground Disturbance training and certifications as specified in this COP.

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6. Select trained/competent workers for ground disturbance tasks performed and monitor for compliance to controls selected. Ensure all workers conform to this COP.
7. Specific workers designated as Ground Disturbance Supervisors (Foreman/Superintendent/Site Supervisor), must ensure:
 - a. They complete and maintain their required training and certifications (Level 2 SK or 201 AB, BC, MB).
 - b. Written permission is obtained for work within the right of way or control zone.
 - c. That the facility owner and the applicable one call center has been contacted at least 2 (3 days in British Columbia) and not more than 10 working days before ground disturbance is undertaken.
 - d. They do not proceed with any ground disturbance work within the controlled/prescribed zone until all buried facilities have been identified and their locations marked, with right of way boundaries clearly marked.
 - e. Agreements issued remain at the work site until work is completed (Crossing, Proximity, etc.).
 - f. The facility is hand exposed, visible and positively identified before the use of mechanical equipment in the right of way or the hand expose zone, is conducted.
 - g. The facility owner is on site to inspect while digging within the vicinity of a pipeline, direct bury trunk or toll fiber optic cable, or high voltage power cable.
 - h. That temporary fencing is erected and maintained to protect the right of way, and any buried facilities.
 - i. That owner approved ramps are constructed and are in place for crossing over any buried facilities. (Ensure all crossing agreements are in place).
 - j. That an Emergency Response Plan is in place.
 - k. That heavy vibrating equipment is prevented from operating over buried facility unless adequate cover exists.
 - l. That exploration activity does not impact any buried facility.
 - m. All agreements are reviewed, and the requirements are understood and followed.
 - n. All Warning signs and markers are visible and legible for the duration of the ground disturbance and shall replace or relocate them if necessary.
 - o. That no Vehicle over $\frac{3}{4}$ ton shall be operated over or across a pipeline unless on a designated crossing point.
 - p. That all workers that are exposing the line are trained and understand the proper method to expose and dig around the facility.
 - q. That work is stopped immediately, and the site is secured in case of a facility and/or line contact.
 - r. To immediately report the event to the owner/client.
 - s. To restore the site to its original condition.

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- t. To complete CF-S-15 Ground Disturbance Checklist or owner equivalent.
8. Communicate this COP to all contractors and visitors that would be involved in the ground disturbance activity.

3.4 Workers

Workers are responsible to:

1. Participate in the HIAC process to understand the hazard sources, hazards and control methods identified.
2. Participate in Tailgate safety meetings and Task Hazard Analysis reviews prior to starting work (review Ground Disturbance permit or Ground Disturbance Checklist).
3. Complete and maintain Ground Disturbance training and certifications as specified in this COP.
4. Specific workers designated as Ground Disturbers (Equipment Operators, Spotter, Hydro Vac Operator, Labours-shovel) must ensure that.
 - a. They confirm expectations and “ask if they do not know” (including approved dig location, Ground Disturbance checklist or agreement limitations).
 - b. They know the material and thickness of the pipeline to be crossed.
 - c. They know the contents and pressure of the pipeline to be crossed.
 - d. Equipment operators have a plot plan in possession (line locate package).
5. Not proceed with any ground disturbance until all locating and marking has been completed and verified.
6. Ensure no mechanical equipment is used within 60cm of or any distance below the pipeline without direct supervision of the owner of that pipeline.
7. Ensure that no Vehicle over $\frac{3}{4}$ ton shall be operated over or across a pipeline unless on a designated crossing point.
8. Shall not excavate outside the area covered by the locate request without first obtaining a further locate.

3.5 Health, Safety and Environment (HS&E) Department

HSE Department is responsible to:

1. Evaluate the Ground Disturbance COP, including the effectiveness of the training and orientation program.
2. Review and approve the content and providers of ground disturbance training in order to promote consistent implementation of this standard.
3. Assist with site-specific HIAC process to ensure that hazard sources have been identified, assessed and adequately controlled.
4. Assist in training workers, visitors, and contractors in the requirements of this COP.
5. Provide coaching and guidance on the understanding and application of this COP.

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6. Monitor Ground Disturbance activities to ensure application and effectiveness of the Ground Disturbance program.

3.6 Client/Owner

Client/ Owners are responsible to:

1. Provide information regarding the facility, the right of way, hazard sources and specific hazards.
2. Provide crossing agreement and/or any other approval to the party crossing the facility (as required).
3. Ensure crossing agreement is in place before any work commences (as required).
4. Provide any reasonable assistance to party proposing the ground disturbance.
5. Ensure that a competent locator properly locates, identifies, and marks any buried facilities before any work commences within the right of way or control zone.
6. Ensure that the owner has accurately marked the surface of the ground with the horizontal position and alignment of their facility with clearly distinguishable warning signs and markers at adequate intervals (CER regulated lines are every 10m minimum) in accordance with the Uniform Color Code, and has provided documentation of these markings to the person proposing the ground disturbance no later than 2 days after they have been notified of the proposed ground disturbance, unless a longer time period is agreed to.
7. Ensure that an owner's representative inspects the Facility to make sure the identifying and marking has been properly done.
8. Ensure that the owner's representative has in their possession a copy of the written approval for the ground disturbance.
9. Ensure that the owner representative has completed a supervisory level training course meeting Ground Disturbance 201 Standards (AB, BC, MB) Level 2 in SK, in ground disturbance and is currently certified to supervise a ground disturbance.
10. Ensure the owner has a representative present while their pipeline is being exposed, unless otherwise agreed on between both parties.
11. Documents locate information and maintain a written record of the facility markers.
12. Ensure facility warning markers are always installed.
13. Ensure that facilities are hand exposed, with their facility representative present.
14. Supervise any mechanical excavation within the facility right of way or control zone.
15. Directly supervise mechanical excavation within the vicinity of a pipeline, direct bury trunk or toll fiber optic cable, or high voltage power cable.
16. Immediately stop work and secure the site in the case of a facility and or line contact.
17. As soon as possible report the event to the regulatory authority.
18. Inspect the facility; document any damage, following any crossing installation and prior to backfilling.

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19. Ensure adequate cover to allow heavy equipment to cross over vulnerable facilities. The owner may require other suitable protection, if ground conditions and facility size require a greater depth of cover.
20. Prevent heavy vibration from compactors over the facility.
21. Complete an "as built" facility crossing report, including photos of critical stages of work. Keep records of "as built" details of crossing.
22. Ensure proper installation of facility.
23. Ensure site is restored to original condition.

On certain projects CPES will agree to the role of Prime contractor and these situations will be responsible for a number of pre-determined responsibilities as agreed to with the owner/client.

3.7 Contractors

Independent Service Providers (ISP's)

ISP's must participate in CPES HIAC, pre-job processes and work under CPES's Ground Disturbance COP.

Sub-contractors

Sub-contractors are required to:

1. Participate in CPES HIAC and pre-job processes (i.e., tailgate meetings, THA's).
2. Ensure that they have Ground Disturbance program that meets or exceeds CPES's COP.
3. In absence of a standard, they must adhere to CPES's COP.

4.0 Ground Disturbance Considerations

4.1 Ground Disturbance Planning

For all ground disturbances that are being planned and or conducted, the initial and most critical step is to determine CPES's role and responsibilities – Are we the Performing Authority or the Operating Authority. Based on this determination.

The Operating Authority Site Representative proposing a ground disturbance is responsible to:

- Identify any buried facilities that exist within the search area in which the ground disturbance is proposed. This area may change dramatically depending on the scope of work and physical geographical area that is to be disturbed.
- Appoint a competent Ground Disturbance Supervisor.
- Ensure the Ground Disturbance Supervisor confirms that equipment operators and spotters are competent for ground disturbance activities.

The Performing Authority Site Representative requested to perform a ground disturbance is responsible to:

- Ensure that the work is conducted in a safe manner and in accordance with this COP and applicable federal or provincial legislation.
- Coordinate pre-job activities and ensure that critical ground disturbance activity is adequately supervised.

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- Reference all available sources of information as far as reasonable and practicable to determine the existence of all buried facilities in the proposed ground disturbance work area.
- Ensure that the site HIAC process identifies the hazard sources and potential hazards that may be encountered during the ground disturbance. A documented HIAC has been completed and reviewed during tailgate meeting.
- Review and signing off on any Safe Work Agreement and Ground Disturbance Checklist/Agreement/Permits in conjunction with the Operating Authority.
- Ensure that if the Ground Disturbance Supervisor leaves the site for any reason during any critical ground disturbance activity, this particular activity must STOP until the Supervisor returns to the site.

5.0 Practices and Guidelines

As the tasks and activities required to complete a Ground Disturbance are typically classified as critical, due to their inherent risk, the following practices and or guidelines must be addressed.

5.1 Complete both the Site HIAC and THA process to identify, assess and control the hazard sources.

- Take action to reduce and control these Hazards, using HIAC methodology.
- Ensure this information is communicated to all persons on the site.
- Ensure all persons are trained and deemed competent while working with buried facilities and the hazards associated with this task.
- Ensure workers have access to appropriate resources and equipment to undertake the job safely.
- Ensure use of CPESs SWP's for specific tasks, a few that may apply:
 - COP 03 Confined Space Entry
 - SWP 46 Excavating/Trenching
 - SWP 82 Trench Boxes
 - SJP XX Excavating Operating Pipelines

5.2 Identify Facilities and contact the facility owners

- Ensure all owners whose facilities are buried in the proposed ground disturbance location are identified. Use applicable One-Call system, or you may need to contact each Utility/facility owner independently.
- Ensure to give the owners the minimum number of days of notice according to the province you are in (Alberta 2 days, British Columbia 3 days, Saskatchewan 2 days, Manitoba 2 days, and Ontario 2 days).
- It is recommended that when locates are done that a representative meets the locator on site to ensure clear communications of locates.

5.3 Obtain all necessary information before disturbing the ground

- Ensure all buried facilities are located.

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- Ensure all paperwork and documents are on site at all times. Such as locate slips, One-Call ticket number, crossing and/or proximity agreement, Hazard assessment, tail gate, Permit, and any other applicable forms.
- Ensure locate markers are maintained and, if necessary, replaced and/or relocated with documentation.
- If size and scope of work changes, reassess and, if necessary, have new locates done.

5.4 Locating Buried Facilities

Locate accuracy is completely dependent on the degree of difficulty of the type of locates and experience of the locator. Correctly identifying the type of buried facilities can impact the ability of the locator to find them. Training for locators should be both practical and theoretical based. It is up to each company to ensure that their locators are competent as per National Utility Locating Contractors Association (NULCA-101 standard). No one standard is sufficient for all scenarios.

- The line locators must validate and document the functionality of their equipment prior to use each day. A copy of this documentation must be given to the Site Representative.
- All known buried facilities as noted on the plot plan, site drawing, maps or facility searches that pass within the controlled/search area must be located and staked to indicate location, alignment, line size and depth, if possible.

5.5 Locating in High Density Areas or Critical Ground Disturbances

For critical ground disturbances or in areas where there is a high density of buried facilities, employ the process of "accounting for all the lines in the area." This involves identifying any potential sources of buried facilities (wells, headers, compressors, electrical distribution, etc.) and positively verifying that none of the buried facilities are within the search area.

5.6 Locates and Marking Requirements

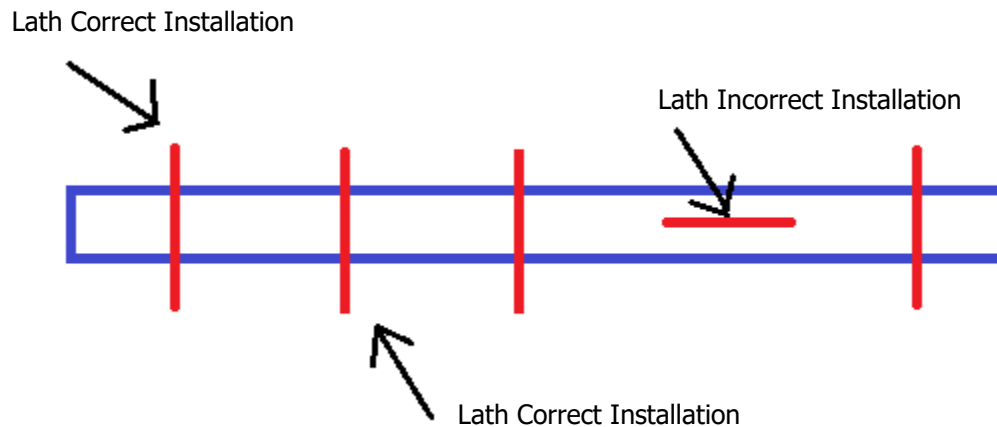
Due to locates being moved or altered because of potential changes to site conditions (extreme weather, moving equipment, etc.) industry and regulatory best practices provide regulated or suggested maximum time periods before locates for facilities become invalid or should be questioned and re-located. The standard of re-verifying locates after work stoppages is 14 days or 10 days for gas utilities in British Columbia. This standard is based on complying with the Industry Recommended Practice (IRP) 17, British Columbia guidelines and OHS regulations.

- Regardless of what is stated above, always refer to the local provincial legislation if more stringent.
- The line locating company must locate and mark all buried facilities within the search area.
- Where buried facilities are discovered, the area must be electronically swept using a minimum of a 4-pass grid to ensure maximum detection capabilities. A competent locating person (as per NULCA-101 standard) must conduct the line locating activity and possess a copy of the site drawing/plot plan or an as-built map, if available.
 - a) The line locator must locate all buried facilities using an industry-accepted method. In areas where there are multiple buried facilities or highly congested areas, or if there is uncertainty of the exact position of the buried facility two separate line locates must be performed by two independent line locate companies.

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- b) When the owner/operator of a buried facility inspects a facility prior to the ground disturbance for locating and marking purposes, the owner/operator must prepare a written record of this inspection and retain it for at least two years.
- c) The utility/facility operators or their agents locating the buried facility should install a series of markers that meet the following requirements or equivalent and conform to the Uniform Color Code (Appendix 1).
- d) In a congested facility, an alternate colour-code scheme may be utilized; however, all parties involved prior to the ground disturbance must understand it.
- e) Locates will be spaced not more than 5m apart or, where pipes follow a curve, spaced so that the curvature is clearly visible.
- f) Extend at least 30m beyond the proposed ground disturbance work area and be positioned directly above the centerline.
- g) Re-establish and maintain locate stakes following completion of topsoil stripping for the entire duration of mechanical excavation.
- h) If for any reason a locate stake becomes displaced (e.g., due to weather or mechanical traffic) you must maintain the position of the locate. This may involve re-locating prior to excavation taking place.
- i) Form a cross consisting of two stakes at the point where the two pipelines intersect on the right-of-way.
- j) Be marked with appropriate coloured surveyor's tape to a stake or wire flag driven to a depth of less than 30cm.
- k) Clearly mark the owner/operator name on each marker. This is critical at the point where the facility is to be exposed by hand.
- l) As an additional aid, some locating companies mark the approximate pipeline depth on markers if requested. Remember, depth accuracy is only an approximation and not to be solely relied upon.
- m) Lath to be installed in the direction of the pipeline. If it becomes dislodged, then it makes it easy to still know the direction the pipeline is going. Makes for a better visual identification when you're dealing with hundreds of laths marking dozens of lines.



5.7 Exposure and Mechanical Exposure

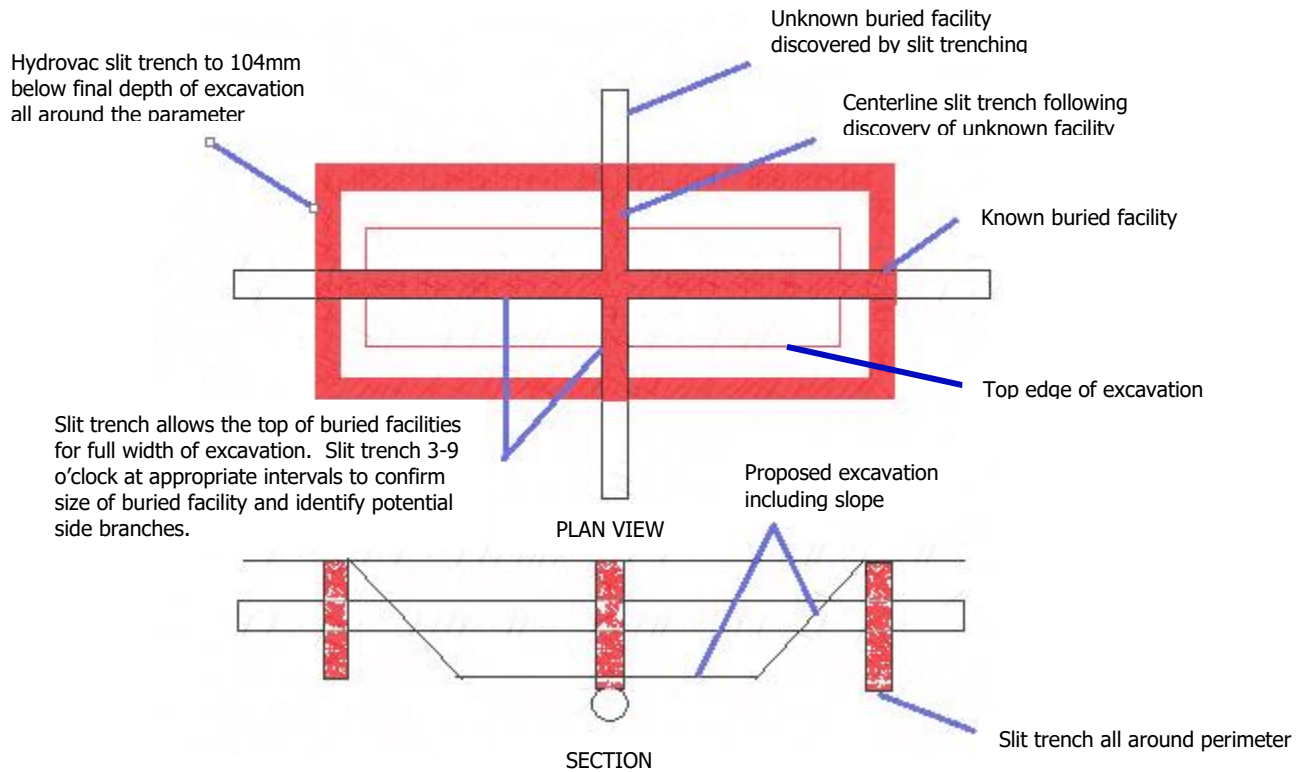
All underground pipelines within a 5m radius of the proposed ground disturbance work area or within a facility right-of-way must be hand exposed by techniques acceptable to the facility owner/operator. Hand exposure must be completed before mechanical excavation begins. Facilities other than pipelines must be exposed if the excavation will be within 1m.

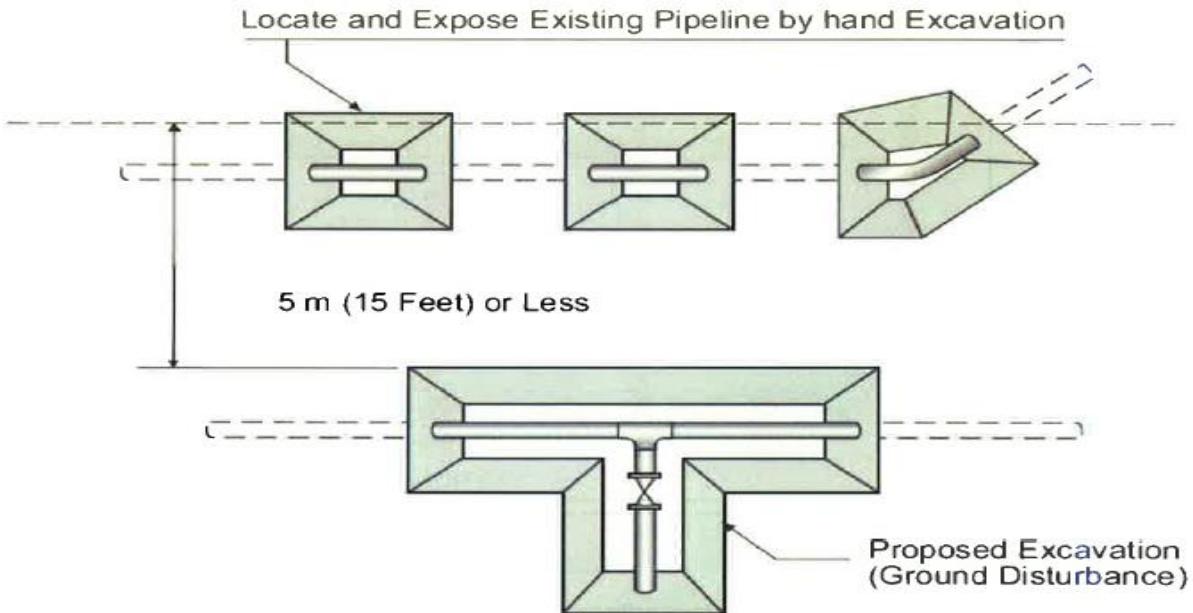
5.8 Hand Exposure or Hydrovac'ing

All existing buried facilities in the proposed ground disturbance work area shall be exposed at suitable intervals by hand or hydrovac and identified for size and alignment prior to mechanical excavation.

- a) For new pipelines that run parallel to and within 5m of an existing line, the existing line should be hand exposed or hydrovac at suitable intervals to accurately confirm line size and alignment.
- b) Hydrovac and/or hand-exposed trenches should be a minimum of 60cm deeper than the intended depth of excavation to confirm any lines situated below will not be contacted.
- c) Hydrovac and/or hand-exposed holes must be large enough and suitably spaced to confirm line size and alignment (watch for buried facilities that have 90° turns or field bends). If there are any concerns regarding alignment or soil debris covering underlying lines, an effective practice is to hydrovac multiple holes or increase the hand exposure hole size and depth e.g., 1m x 1m (on either side of facility) x required depth to minimize the chance of any mechanical equipment within 60cm. This will allow the operating authority a better view of the facilities, which should minimize the chance of accidental contact when the rest of the ground disturbance occurs.
- d) Hydrovac pilot holes are required for the installation of all pilings and rig anchors that will be installed with mechanical equipment within 5m of any underground pipelines (1m for any other type of buried facility).
- e) If at any time an exposed underground facility becomes covered due to soil subsidence, sloughing, water, snow, or any other debris, the facility must be re-exposed by hand exposure techniques acceptable to the facility owner/operator.
- f) Note: Exercise caution when using a hydrovac to locate cables or plastic pipes. Remember line locates prior to hydrovac and probe pressure must be regulated so cable coatings are not damaged or cause an electrical hazard. In addition, the hydrovac fluid pressure and temperature must be maintained at suitable thresholds to protect the integrity of the buried facility.

- g) When work and/or backfill inspections are complete, all hydrovac holes should be appropriately backfilled/covered as per compression expectations of the area and regulatory requirements regarding hole coverings and good housekeeping practices. (Refer to appendix 4).





5.9 Mechanical Excavation

When mechanical excavation equipment is used within 5m of any third-party underground pipeline, the responsible licensee for the pipeline will do everything reasonable to ensure the safety of the facility. The spotter must direct the equipment operator, and the Ground Disturbance Supervisor must **DIRECTLY** supervise the activity. The spotter must be always fully visible to the equipment operator. If CPES is conducting the ground disturbance, the supervision must be done in conjunction with the third-party Ground Disturbance supervisor.

Mechanical excavation equipment cannot be used within 60cm of the exposed underground facility, unless:

- a) A written approval is obtained from the owner's representative; and
- b) The excavation is done under the direct supervision of a representative of the owner/operator of the buried facility and a Ground Disturbance Supervisor. The owner must not guide our equipment operator.
- c) Ensure excavations are inspected throughout the day for cracking and sloughing. Frequency of checks depends on soil and weather conditions. Monitor and record changes in conditions using CF-S-01 (Hazard Assessment) or CF-S-68 (Daily Excavation Pre-Entry Checklist).

If the direct line of sight on the line is lost, all mechanical excavation must stop until the line has been exposed.

If a greater distance was specified in the Crossing Agreement, it must be followed, unless it stipulates otherwise.

5.10 Angle Crossings

Crossing of buried facilities should generally be undertaken at an angle of approximately 90°. If, in certain situations it may be required to cross at angles less than 90° then the following practices will apply:

- a) Locate the centerline of the buried facility on the right-of-way and hand expose the crossing point.
- b) The existing buried facility shall be hand exposed at two additional points. Markers and colour-coded survey tape shall be placed directly above the existing buried facility at 1m intervals for the extent of the proposed excavation.
- c) Measure 1m on either side of the existing buried facility and install markers with colour-coded survey tape at 1m intervals parallel to the existing buried facility to cover the extent of the proposed excavation.

5.11 Directional Drilling or Boring

If any buried facility is being crossed by means of horizontal directional drilling or boring operation, the facility being crossed must be fully located and exposed by hand exposure/hydrovac to verify the depth, position and alignment. Hand exposure holes must be in the bore path and a minimum of 60cm below and to either side of the facility (as per Alberta P/L Regulations 65(5)). A spacing distance of 30cm for pipelines must be maintained (as per CSA Z662, Table 4.9).

5.12 Protection of other facilities

- When the HIAC process is applied properly it will identify hazards prior to work commencing. This may require isolation and depressurization of other buried facilities.
- If proposed ground disturbance is going to run parallel to another buried facility temporary fencing or guards may need to be installed.
- Facilities that are stressed as a result of the ground disturbance must be supported or braced.

5.13 Ground Disturbance Checklists/Agreements/Permits (may differ depending on Client or work being performed)

The Ground Disturbance Checklist/Agreement/Permit are tools that CPES and industry utilize to help prevent the contact with buried facilities, follow this COP and comply with applicable regulations.

- Upon change of "Scope of Work" the Ground Disturbance Checklist/Agreement/Permit is considered VOID and all work must stop until a new Ground Disturbance Checklist/Agreement/Permit can be completed.
- The Ground Disturbance Checklist/Agreement/Permit is considered valid for the scope if work/time period identified.

5.14 Refill and Backfill

- Give minimum of 24hrs notice to pipeline owner prior to back filling. If owner/Client cannot be contacted, the applicable One-Call center may be contacted.
- Ensure care is taken while backfilling, certain back fill techniques may be required in certain circumstances, such as sifted sand or fine gravel.

5.15 If Contact Is Made

If contact is made with any buried facility work must stop, the owner must be notified. The following are key response requirements:

- a) Stop Task! Do not move any equipment (including the bucket), piping and or soil materials.
- b) Secure the site.
- c) Report all incidents. If owner/Client cannot be contacted, the applicable One-Call center may be contacted.
- d) Coordinate the investigation of incident.

Note: Refer to Section 10 of Health, Safety & Environment Management Systems (HSEMS) Management Investigation Follow-Up.

A contact could include or result in any of the following:

- a) Puncture or crack in the facility.
- b) Scratch, gouge, flattening, or dent of the surface.
- c) Damage to the protective coating.

In some cases, even if contact to a facility does not appear to have damaged it, the contact could eventually cause a release or compromise to the facility’s integrity through corrosion or other processes.

6.0 Information Sources

When planning and preparing for a ground disturbance, there are multiple sources of information to be reviewed to determine if and where buried facilities are located. The following are the primary information sources:

6.1 The One-Call System:

A free computerized service to advise any person’s information on which one-call member companies have buried facilities in or near the work area. The One-Call system will provide a listing of these member companies and will advise them of your inquiry. Manitoba does not have this service; they only have an information-based website with contact information to most utility companies and it is the responsibility of the ground disturber to contact all applicable utilities independently.

Utility Safety Partners (Alberta One Call)	1-800-242-3447	https://utilitiesafety.ca/
B.C. One-Call	1-800-474-6886	www.bconecall.com
Sask 1st Call	1-866-828-4888	www.sask1stcall.com
Manitoba Hydro	1-888-624-9376	www.callb4udig.mb.ca
Ontario One Call	1-800-400-2255	www.one1call.com

6.2 Maps:

Provide regularly updated baseline maps that show pipelines with operating pressures above 100psi (700kpa). These pipelines are registered and licensed through the AER. Some of the places you can get these maps are:

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- Most Customers (Oil and Gas, Utilities, Transmission) have Surface Land Departments or Surface Rights Group who provide maps and/or provides access through Provincial Online Systems or an Automated Surface system.
- Regulatory agencies (i.e. AER) can provide a map from their mapping system.
- Vendor purchased mapping systems.

6.3 On-site Signs:

These signs identify the presence of buried lines, but do not mark the location. They can also give you the name to cross reference with the contact list to ensure that they were contacted prior to any ground disturbance work.

6.4 Visible Indicators:

Any visible indication that another party has created a ground disturbance in the area, such as vegetation changes, scarring of the land, vehicle tracks, soil changes, buildings, above-ground facilities, etc.

6.5 As-Builts, Facility, and/or Plot Maps:

As-Builts, Facility, and/or Plot Maps are typically provided by the Owner Representative. Other sources could include Facility/Well files, Project Engineers, Land or surface rights groups, and other contracted resources (i.e. locators).

6.6 Area Operations Personnel:

Experienced Personnel familiar with the area that may have knowledge of pipelines or utilities not otherwise documented. They may also have access to:

- Facility Plot Plans
- Pipeline Surveys
- Line Lists

6.7 Local Landowners:

Long-time residents may be aware of utilities that have not been documented, or they may potentially have historical documents.

6.8 Land Titles Office can give you access to:

- Land Title Deeds
- Blanket description of the land
- Utility Rights of Way
- Pipeline easements
- A registered survey plan
- Metes and Bounds
- Written description of locations

7.0 Documentation

There are numerous ground disturbance documents that will be utilized by CPES supervisors and workers that may vary depending on our role as the Performing Authority or the Operating Authority.

Examples may include:

- Client - Ground Disturbance Checklists, Agreements and Permits.
- CPES - CF-S-15 Ground Disturbance Checklist.
- Any of the Client's required Permits (Hot Work, Crossing Agreements, Proximity, etc.). This may vary from client to client.
- Emergency response plan CPES form S-13

Notification of Other Parties

If a ground disturbance is going to be conducted within a controlled zone, the ground disturber will have to notify the pipeline owner and the Provincial one call system at least 2 (3 for federally regulated pipelines) working days and not more than 10 working days in advance, so they can mark and identify the location of the facility.

The One Call System will supply the Ground Disturber with a ticket # which must be recorded on the ground disturbance checklist.

8.0 Training

Ground Disturbance training is a formalized industry recognized program intended for Ground Disturbance Supervisors, equipment operators and spotters, with a written competency check. Refresher training must be provided as required to maintain certification, familiarity with the subject and regulatory changes. This training is designed to help manage a ground disturbance from the preplanning stage to the completion of the project and restoration of the site.

All workers who may sign off on a Ground Disturbance Checklist/Agreement/Permit must have Ground Disturbance Supervisor Training equivalent to a Ground Disturbance 201 Standards (AB, BC, MB) or Level 2 (SK) and must be familiar with this Ground Disturbance COP. Spotters must have training equivalent to Ground Disturbance 201 Standards (AB, BC, MB) training. It is also recommended that all workers involved in a Ground Disturbance Checklist/Agreement process are trained in the Ground Disturbance COP.

8.1 Formal Ground Disturbance Supervisor Training

Ground Disturbance training course must be equivalent to Ground Disturbance 201 Standards (AB, BC, MB) and conducted by a CPES pre-approved vendor. The training must include:

- a) Definition of a ground disturbance
- b) Provincial regulations for undertaking a ground disturbance
- c) Defining search and controlled areas
- d) Facility existence sources
- e) Licenses and approvals
- f) Notification to buried facility owner/operator and Crossing Agreements
- g) Maps and plot plans
- h) Line locating explanation
- i) Hand exposure processes and marking

- j) Permits and hazard assessment, pre-job meetings
- k) Backfill inspections
- l) Environmental awareness

REFERENCES

David K. Harder for Learn-Rite Courses. (2010). Ground Disturbance Advanced Level for Workers and Supervisors. Grande Prairie.

British Columbia Common Ground Alliance. Best Practices V3. 2018

Energy Resources Conservation Board. (2005). Pipeline Regulation Section 58 Part 5 Ground Disturbance.

Energy Resources Conservation Board. (2010). Safe Excavation Near Pipelines Fifth Edition. Calgary.

Energy Safety Canada Ground Disturbance and Damage Prevention August 28, 2018

Manitoba Hydro. (n.d.). Safe Excavation Guidelines. Retrieved September 12, 2012, from <http://www.hydro.mb.ca>:

http://www.hydro.mb.ca/customer_services/permits_and_inspections/line_location/safe_excavation.shtml

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Canadian Energy Regulator Pipeline Damage Prevention Regulations March 16, 2020

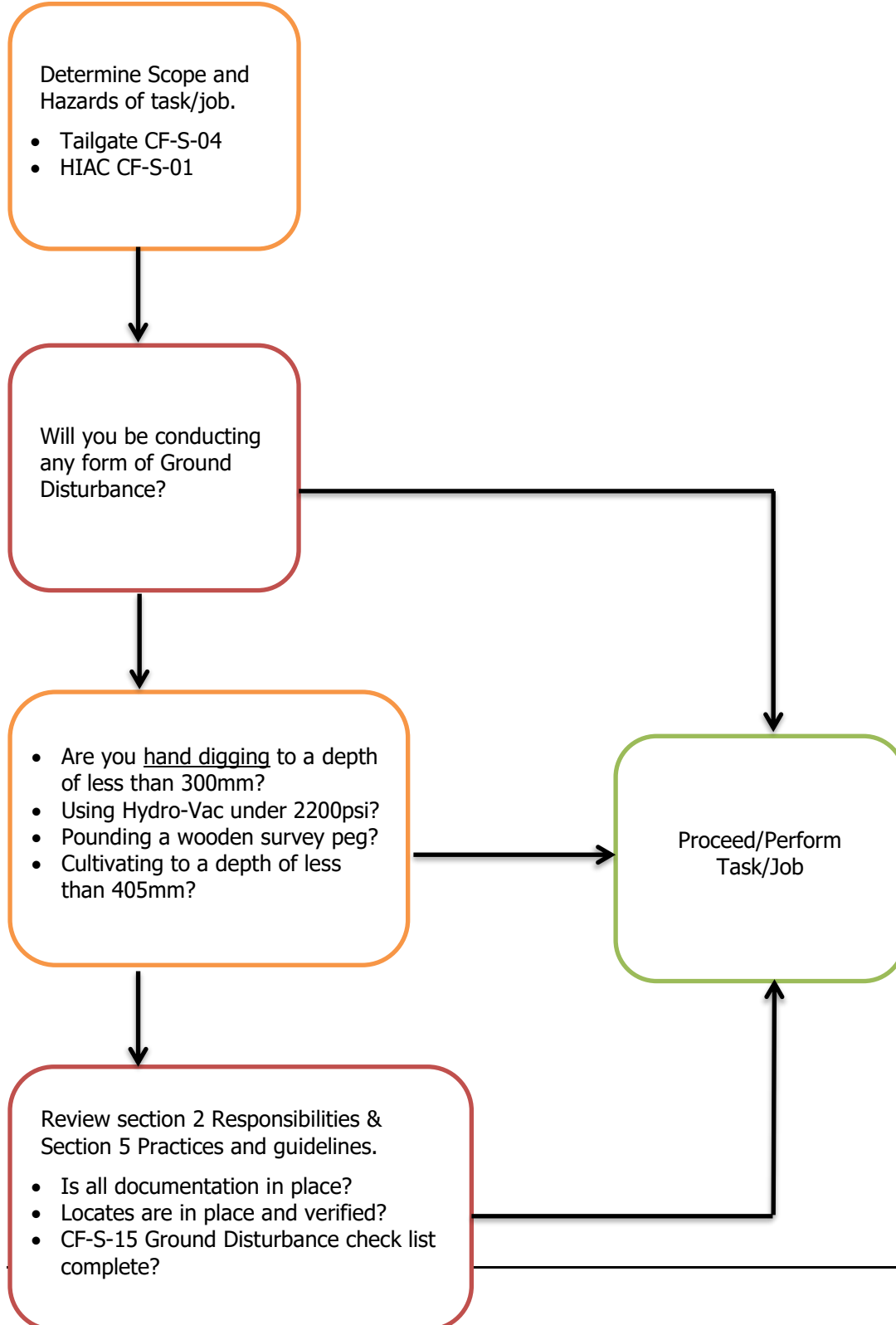
Province of Alberta. (2021). PIPELINE ACT

Developed by:	1. <u>HSE Team</u>	2. <u>Rhys Cooper</u>	Date: <u>July 10, 2013</u>
Reviewed by:	1. <u>Operations Committee</u>		<u>Q3 2013</u>
Revised by:	1. <u>HSE Team</u>		Date: <u>June 20, 2014</u>
Revised by:	1. <u>Todd Penney</u>		Date: <u>Aug. 5, 2020</u>
Reviewed by:	1. <u>NWJWH Committee</u>		Date: <u>June 16, 2022</u>
Approved by:	1. <u>HSE Committee</u>		Date: <u>June 24, 2022</u>

APPENDIX 1: UNIFORM COLOR CODE

Red	electric power lines, cables, conduit, and lighting cables
Orange	telecommunication, alarm or signal lines, cables, or conduit
Yellow	natural gas, oil, steam, petroleum, or other gaseous or flammable material
Green	sewers and drain lines
Blue	potable drinking water
Purple	reclaimed water, irrigation, and slurry lines
Pink	temporary survey markings, unknown/unidentified facilities
White	proposed excavation limits or route

APPENDIX 2: IS THIS A GROUND DISTURBANCE?



APPENDIX 3: STANDARD 101 AND 201

Standard 101- Ground Disturbance Hazard Awareness

Training Provider

Alberta Construction Safety Association
Astec Safety Inc.
Global Training Centre
Learn-Rite Courses Inc.
Wheels On Ltd.

Website

www.acsa-safety.org
www.astecsafety.com
www.globaltrainingcentre.com
www.learnrite.ca
www.wheelson.ca

Standard 201- Ground Disturbance Supervisory

Training Provider

Alberta Construction Safety Association
Astec Safety Inc.
Global Training Centre
Learn-Rite Courses Inc.
Wheels On Ltd.

Website

www.acsa-safety.org
www.astecsafety.com
www.globaltrainingcentre.com
www.learnrite.ca
www.wheelson.ca

APPENDIX 4: HAND EXPOSER RULES AND GUIDELINES

- Hand Expose all buried facilities before using any mechanical excavation equipment.
- Never probe for the facility with pointed tools such as pickaxes or pointed bars; it is preferred to use blunt or square ended shovels. If using a spade caution should be taken.
- Never jump on or use entire body weight on the shovel while digging (use a prying motion), it is also recommended that one would dig on an angle, so if contact is made it will be a glancing blow.
- Ensure that any exposed facilities are supported and protected, as this may allow the facility to sag which could cause breaks or damage.
- It is recommended that Hand exposures start at or near the locate marks and work on a downward and outward direction until located.
- No mechanically operated equipment will be operated within 5m of a pipeline unless the pipeline has been exposed and identified by hand exposure techniques.
- If a proposed ground disturbance will be running in parallel and within 5m of a pipeline the owner will designate the distance between exposures to ensure the location of the pipeline.