

GROUND DISTURBANCE AND DAMAGE PREVENTION

**AN INDUSTRY RECOMMENDED PRACTICE (IRP)
FOR THE CANADIAN OIL AND GAS INDUSTRY**

IRP VOLUME 17 – 2009

SANCTIONED



EDITION	2
SANCTION DATE	SEPTEMBER 2009

COPYRIGHT/RIGHT TO REPRODUCE

Copyright for this document is held by Enform, 2009. All rights reserved. No part of this document may be reproduced, republished, redistributed, stored in a retrieval system, or transmitted unless the user references the copyright ownership of Enform.

DISCLAIMER

This document is intended to provide advice and information to assist users in developing effective practices or procedures to ensure that ground disturbance activities in the vicinity of buried facilities are conducted in a safe manner. It remains the responsibility of the user of the document to judge its suitability for a particular application.

The information in this publication is intended as a guideline only, is not all-inclusive, and does not provide the only acceptable means of dealing with the issues of undertaking ground disturbances in the vicinity of buried facilities. Use of this document does not release readers from their responsibilities and obligations under applicable legislation.

If there is any inconsistency or conflict between any of the advice and information contained in this IRP and an applicable regulatory requirement, the regulatory requirement shall prevail.

Every effort has been made to ensure the accuracy and reliability of the data and information contained in this document. However, Enform, its subcommittees, and individual contributors make no representation, warranty, or guarantee in connection with the publication of the contents of any IRP recommendation, and hereby disclaim liability or responsibility for loss or damage resulting from the use of this IRP, or for any violation of any regulatory requirements.

AVAILABILITY

This document, as well as future revisions and additions, is available from

Enform
1538 - 25 Avenue NE
Calgary, AB T2E 8Y3
Phone: (403) 250-9606
Fax: (403) 291-9408
Website: www.enform.ca



Publication Correction Request form for: all Enform Safety Services published documents

Enform welcomes comments at any time on any of these documents. Comments are considered on the basis of clarity, intent, accuracy, or omissions. All comments are passed on to the committee chair or held until the next scheduled review, as appropriate. If you have any comments or suggestions on how we can improve this IRP, please let us know by filling out this form.

This form can be submitted by email or fax.

Contact

Contact	<input type="text"/>		Phone No (no spaces)	<input type="text"/>
Title	<input type="text"/>		Fax No (no spaces)	<input type="text"/>
Company	<input type="text"/>		email	<input type="text"/>
Address	If you belong to an Association, please select the appropriate Member Association			
City	<input type="text"/>		<input type="text"/>	
Province	<input type="text"/>	Postal Code	<input type="text"/>	
Country	<input type="text"/>			

Comments

Select document	<input type="text"/>
-----------------	----------------------

Correction type: ☐ Correction/administrative ☐ Technical ☐ Broken link

Page #, Section:	Description of suggested change:	Reasons/rationale for suggestion:
<input type="text"/>	<input type="text"/>	<input type="text"/>

TABLE OF CONTENTS

Table of Contents	i
List of Figures.....	iv
Preface	v
Purpose	v
Audience	v
Scope and Limitations	v
Framework for a Ground Disturbance Program.....	v
Details on Specific Tasks and Procedures.....	v
Specific Regulatory Requirements	v
Range of Obligation Specified in This IRP.....	vi
Revisions.....	vi
Sanction	vi
Acknowledgments	vii
Background	ix
Description of Ground Disturbance Operations.....	ix
Stakeholders Involved in Ground Disturbance Activities.....	ix
Ground Disturbance Issues and Challenges	x
Peak Workload	x
Seasonal Workload	x
Locating Practices.....	x
Unlocatable Buried Facilities	x
Abandoned or Unregistered Buried Facilities.....	x
Inaccurate Buried Facility Owner Records.....	xi
Emergency Ground Disturbance.....	xi
Urban Sprawl.....	xi
Conflicting and Inconsistent Regulatory Requirements.....	xi
Human Error.....	xi
Section 1: Ground Disturbance Damage Prevention	1
1.1 Key Elements of Damage Prevention.....	1
1.1.1 Overview of Key Elements of Damage Prevention.....	1
1.1.2 The “Dig Safely” Approach to Damage Prevention	1
1.2 Management Commitment to Damage Prevention.....	2
1.3 Code of Practice for Ground Disturbance	2
1.3.1 Purpose of a Code of Practice.....	2

1.3.2	Parties Requiring an Operations-Specific Code of Practice and Hierarchy Among Codes	2
-------	---	---

Section 2: Ground Disturbance Code of Practice Considerations5

2.1	Specifying Responsibilities and Accountabilities	5
2.2	Identifying Training and Competency Requirements.....	5
2.2.1	Evaluation of Competence	5
2.2.2	Required Competencies	6
2.2.3	Competency-Based Training	6
2.3	Prequalifying and Selecting Contractors	6
2.4	Assessing Planned Operations	7
2.5	Conducting Pre-Ground-Disturbance Search and Notification.....	7
2.5.1	Search.....	7
2.5.2	Notification.....	8
2.6	Securing Crossing Agreements and Approvals	11
2.6.1	Requirement for Written Approvals Before Work Begins	12
2.6.2	Contents of a Crossing Agreement/Approval	13
2.6.3	Cautions About Agreements	13
2.7	Locating and Marking Facilities	13
2.7.1	Buried Facilities Requiring Locates.....	14
2.7.2	Locator Qualifications and Role	14
2.7.3	Locate Lifespan	14
2.7.4	Marking Colour Codes.....	15
2.8	Conducting a Hazard Assessment.....	15
2.9	Preparing for Emergency/Incident Management	18
2.9.1	Pipeline Owner Emergency Response Plans	18
2.9.2	Contact With a Buried Facility	18
2.10	Arranging Work Permits	19
2.10.1	Work Permits Issued by Buried Facility Owners	19
2.10.2	Permit Requirements	19
2.11	Communicating Ground Disturbance Activities.....	20
2.11.1	Accurate and Timely Exchange of Information.....	20
2.11.2	Pre-Job Meetings	20
2.11.3	Tailgate Meetings	21
2.12	Exposing Facilities and Conducting Ground Disturbances After Exposure.....	21

2.12.1	Hand Expose Zones.....	21
2.12.2	Other Exposure/Ground Disturbance Requirements	22
2.12.3	Mechanical Equipment Use After Hand Exposure	23
2.13	Backfilling and Post-Ground-Disturbance Records	23
2.14	Monitoring and Review of Code of Practice	23
2.14.1	Maintaining Ground Disturbance Records.....	24
2.14.2	Reviewing and Updating Ground Disturbance Codes of Practice/Systems.....	24
Section 3: Ground Disturbance Responsibilities and Accountabilities.....		25
3.1	Regulatory Responsibilities	26
3.2	Project Owner Responsibilities.....	26
3.2.1	Ground Disturbance Supervisor Responsibilities	27
3.3	Ground Disturber Responsibilities	28
3.4	Buried Facility Owner Responsibilities	28
3.4.1	General Responsibilities.....	28
3.4.2	Buried Facility Owner as Ground Disturber.....	29
3.4.3	Ground Disturbance Inspector Responsibilities.....	29
3.5	Locator Responsibilities	30
Glossary		31
Appendix A: Contact Information for One-Call Centres		37
Appendix B: Uniform Colour-Code for Marking Buried Facilities (American Public Works Association – APWA)		39
Appendix C: CAGC Best Practice – Seismic Flagging		41

LIST OF FIGURES

Figure 1: Ground Disturbance Stakeholders	ix
Figure 2: Recommended Damage Prevention Process	2
Figure 3: Code of Practice Requirements and Precedence	4
Figure 4: Suggested Hazard Review Flowchart	17
Figure 5: Key Parties Involved in the Ground Disturbance Process	25

PREFACE

PURPOSE

The purpose of this document is to outline the industry recommended practice for conducting ground disturbance activities near buried facilities, with the intended goal of preventing damage to buried facilities.

AUDIENCE

This document is intended for use by the following:

1. buried facility owners who need to establish conditions for those working near their buried facilities to ensure the integrity of those facilities,
2. project owners who need to impose conditions on those who are undertaking ground disturbance activities on their behalf,
3. ground disturbers responsible for conducting ground disturbance activities and who wish to demonstrate due diligence, and
4. others involved in the ground disturbance process such as regulators, one-call centres, locators, and trainers whose practices support the ground disturbance process.

SCOPE AND LIMITATIONS

FRAMEWORK FOR A GROUND DISTURBANCE PROGRAM

IRP 17 provides a framework for an overall ground disturbance program. This IRP describes the actions required to manage ground disturbance activities consistent with accepted ground disturbance practices.

DETAILS ON SPECIFIC TASKS AND PROCEDURES

This IRP does not provide complete detail on the specific tasks and procedures required to execute a ground disturbance. These are better addressed through existing training and procedural documents applicable to ground disturbance and damage prevention. Specific details may vary according to jurisdiction and users shall ensure that procedures are appropriate for their work locations. Members of the ground disturbance community need to be aware of their responsibilities under occupational health and safety legislation. This includes the responsibilities of owners, prime contractors, employers, and workers.

SPECIFIC REGULATORY REQUIREMENTS

Ground disturbance activities near petroleum pipelines and other buried facilities have specific regulatory requirements. An outline of federal and provincial regulations and industry guidelines and standards can be found at www.enform.ca, by following the links to IRP 17. Note that these regulatory requirements are *minimum* standards. Many facility owners impose stricter requirements on ground disturbance activities near their buried



facilities. Ground disturbers must be familiar with and follow regulatory requirements as well as the specific requirements of buried facility owners.

Any specific numbers included in this IRP (e.g. search areas, hand expose zones, etc.), are provided for information purposes only. Specific details may vary according to jurisdiction, type of facility, and owner requirements. Companies preparing a ground disturbance code of practice as recommended by this IRP must confirm the specific requirements for each jurisdiction in which their company operates. They shall always ensure that procedures are appropriate for the work area.

RANGE OF OBLIGATION SPECIFIED IN THIS IRP

This IRP uses the following terms to identify the various levels of obligation or requirement related to ground disturbance and damage prevention:

Term	Usage
Must	A specific or general regulatory and /or legal requirement
Shall	An accepted industry practice or provision that the reader is obliged to satisfy to comply with this IRP
Should	A recommendation or action that is advised
May	An option or action that is permissible within the limits of the IRP
Can	Possibility or capability

REVISIONS

This industry recommended practice has been developed by Enform with the involvement of representatives from the Canadian oil and gas industry, utilities, the ground disturbance community, the locating industry, one-call centres, and regulatory agencies. IRPs are unique resources that combine identified and validated best practices with regulatory requirements.

This is the second edition of IRP 17, which was previously titled "Ground Disturbance in the Vicinity of Buried Facilities." Those who have been familiar with the previous version should take the time to review this edition in detail, as it has been redeveloped to be consistent with a management system approach to health and safety.

Technical issues brought forward to Enform as well as scheduled review dates may trigger a re-evaluation and review of this IRP, in whole or in part. For details on the specific process for the creation and revision of IRPs, visit the Enform website at www.enform.ca.



SANCTION

The following organizations have sanctioned this document:

- Alberta Employment, Immigration and Industry
- British Columbia Safety Association Advisory Committee

- British Columbia Workers Compensation Board (WorkSafeBC)
- Canadian Association of Geophysical Contractors
- Canadian Association of Oilwell Drilling Contractors
- Canadian Association of Petroleum Producers
- Canadian Energy Pipeline Association
- Energy Resources Conservation Board (Alberta)
- Petroleum Services Association of Canada
- Saskatchewan Labour
- Small Explorers and Producers Association of Canada
- Worker's Compensation Board of Alberta
- Worker's Compensation Board of Saskatchewan

ACKNOWLEDGMENTS

The following individuals were members of the 2008 IRP Development Committee and helped to develop this IRP. They represent a wide cross-section of knowledge and experience in all aspects of ground disturbance activity. We are grateful for each participant's efforts. We also wish to acknowledge the support of the employers of individual committee members.

Name	Company	Organization represented
David Grzyb (Co-chair)	Alberta Energy Resources Conservation Board	ERCB
Martin Hulme (Co-chair)	Husky Energy	CAPP
Don Allibone	Petrowest Energy Services	PSAC
Brian Bertsch	Big Eagle	CAGC
Bob Chisholm	Alberta One-Call	ADPC
Ted Currie	Alberta Employment and Immigration	WHS
Robin Kotyk	Alberta Construction Safety Association	ACSA
Rich Lamont	Imperial Oil	EAPUOC
Dwayne Mayr	3-D Line Locating Ltd.	CAPULC
Kent Rowden	National Energy Board	NEB
Marlita Schulz	Westmount Consulting	Project support
Carole Sterenberg	Enform	Project support
Walter Tersmette	Walter C. Tersmette & Associates	Project manager
Lee Travis	Global Training/TransCanada Pipelines	ADPC
Brad Watson	TransCanada Pipelines	CEPA

Name	Company	Organization represented
Jason Winsor	Enform	Project sponsor
Ian Whyte	Petro Canada	CAGC/CAPP

BACKGROUND

DESCRIPTION OF GROUND DISTURBANCE OPERATIONS

A ground disturbance is considered to be any work, operation, or activity that results in a disturbance of the earth or that result in a reduction of the initial installation cover over a buried facility. The term “ground disturbance” has been adopted by industry to replace “excavation” since there are many activities other than excavation that disturb the ground.

STAKEHOLDERS INVOLVED IN GROUND DISTURBANCE ACTIVITIES

As with most safety issues, there are shared responsibilities among the personnel involved and all parties must have a clear understanding of their responsibilities. The roles related to ground disturbance activities and broader roles identified by OHS legislation are represented in the summary diagram in Figure 1.

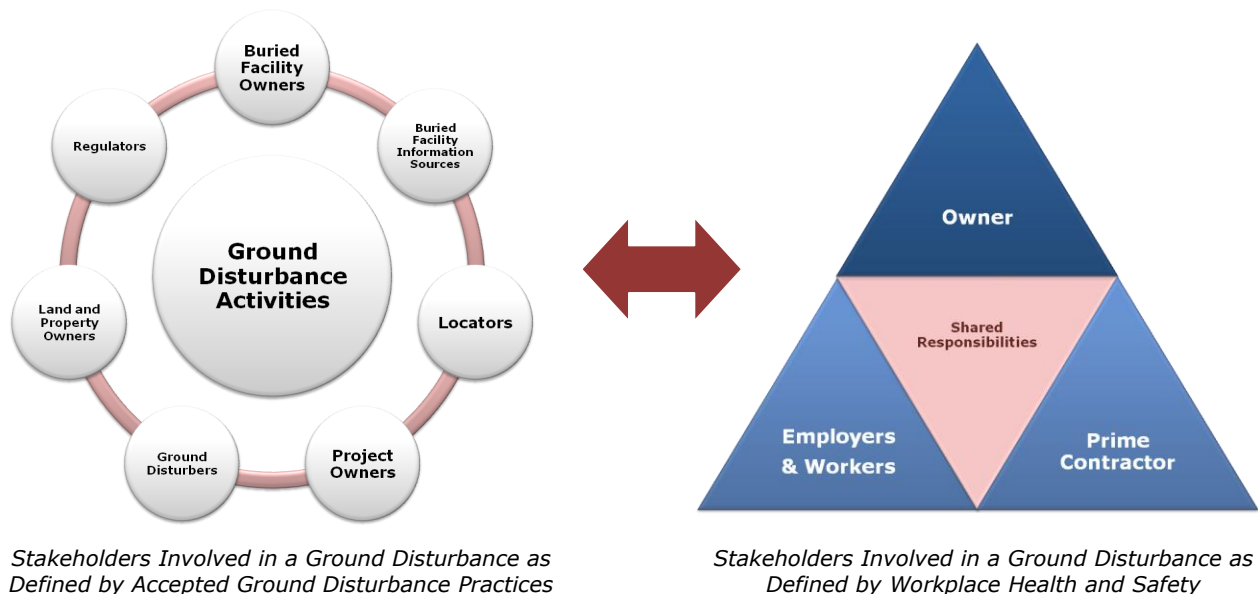


Figure 1: Ground Disturbance Stakeholders

GROUND DISTURBANCE ISSUES AND CHALLENGES

The following issues and challenges can affect buried facility damage prevention efforts and may contribute to injuries, fatalities, environmental damage, and loss of vital services. These are important considerations for project owners, ground disturbers, and buried facility owners when addressing the practices recommended in this document.

PEAK WORKLOAD

Ground disturbance notifications are often received on Mondays with a request to conduct work in the next few days. Lack of preplanning creates peak workloads for locators and buried facility owners that may result in rushed work. This increases the potential for human error and buried facility damage.

SEASONAL WORKLOAD

Ground disturbance activity levels follow annual weather patterns, with most work being scheduled to avoid frozen ground, crop damage, poor weather seasons, or other general periods of low construction efficiency. This impacts those who are required to have trained workers available to handle the periods of high ground disturbance activity.

LOCATING PRACTICES

The locator may have an impact on the quality of the locate itself. A successful locate requires the application of technical knowledge, multiple skill sets, appropriate resources and experience.

UNLOCATABLE BURIED FACILITIES

Critical to the damage prevention process is the ability to accurately locate the position of buried facilities. Limitations of current technology and types of buried facility materials sometimes make this difficult or even impossible to determine.

ABANDONED OR UNREGISTERED BURIED FACILITIES

In many cases, buried facility owners delete the records of abandoned facilities, making identification more difficult. Often this means that locating personnel are unlikely to be looking for facilities because they are unaware of them.

The presence of abandoned facilities may cause delays due to confusion (such as possible hits on adjacent live lines), and increased ground disturbance costs. Damage to abandoned or unregistered facilities has caused safety risks to ground disturbance personnel, environmental consequences, and unanticipated repair costs.

INACCURATE BURIED FACILITY OWNER RECORDS

Inaccurate or out-of-date buried facility owner records hamper the ability to locate buried facilities. Challenges to damage prevention efforts are caused by differing practices among facility owners and other industries regarding as-built drawings, mapping practices, and details of original construction configurations, as well as asset transfers and changes to facilities.

EMERGENCY GROUND DISTURBANCE

When circumstances require an emergency ground disturbance, the one-call centre and facility locating processes are sometimes bypassed, placing ground disturbers and emergency personnel at risk.

URBAN SPRAWL

Many buried facilities were installed years ago in rural or low-population areas. Although these facilities were suitable for original conditions, they are sometimes not ideal for new conditions due to higher population and increased surface activity. Protecting these existing facilities presents new challenges.

Ground disturbance practices in urban areas differ from those in rural areas due to the close proximity of other buried facilities, work space congestion, and nearby activity levels such as traffic. Each of these has impact on damage prevention practices.

CONFLICTING AND INCONSISTENT REGULATORY REQUIREMENTS

Each jurisdiction has its own requirements governing ground disturbance and damage prevention. The specific requirements may vary, and sometimes conflict, between municipal, provincial, and federal requirements related to buried facilities and ground disturbance practices. For buried facility owners, locators, and excavators, these variations may cause confusion and inefficiencies in safe performance of ground disturbance activities.

HUMAN ERROR

The entire damage prevention process depends on accurate handling and communication of ground disturbance information. Human errors at any step in reporting and receiving, analyzing, and responding to information related to these activities may result in buried facility damage.

SECTION 1: GROUND DISTURBANCE DAMAGE PREVENTION

1.1 KEY ELEMENTS OF DAMAGE PREVENTION

1.1.1 OVERVIEW OF KEY ELEMENTS OF DAMAGE PREVENTION

The following is an overview of the key elements necessary to have an effective buried facility damage prevention process:

1. Buried facility owners are members of one-call centres in the areas in which they have buried facilities (including active, out-of-service, and abandoned facilities).
2. One-call centres maintain accurate mapping data files that reflect which facility owners have buried facilities in the area of a proposed ground disturbance.
3. A notice of intent to excavate in an identified area is made to the appropriate one-call centre, in advance of a ground disturbance.
4. One-call centres analyze ground disturbance notifications to identify any members with facilities in the ground disturbance area.
5. One-call centres notify any potentially affected facility owners and advise ground disturbers of their responsibility to notify non-member companies.
6. Buried facilities are accurately located and marked before ground disturbance activities begin.
7. Formal agreements and approvals are obtained from buried facility owners.
8. Ground disturbers use proper and safe ground disturbance practices.

1.1.2 THE "DIG SAFELY" APPROACH TO DAMAGE PREVENTION

The "dig safely" approach, which began as a damage prevention education program sponsored by the Common Ground Alliance, is beneficial and includes the following components:

- Call before you dig!
- Wait the required amount of time for all locates to be done.
- Respect the marks.
- Manage the locates.
- Hand expose, where and as required.
- Support and protect exposed facilities.
- Report any damage caused or found.
- Dig safely!

1.2 MANAGEMENT COMMITMENT TO DAMAGE PREVENTION

The first vital step towards achieving safe and effective ground disturbance practices is for company management to demonstrate their clear commitment to the damage prevention process. This involves communicating their goals and expectations to staff and allocating the necessary resources to implement that commitment. Their commitment should show that safe working conditions and environmental protection are a corporate value. Part of this commitment includes developing a code of practice for ground disturbance.

1.3 CODE OF PRACTICE FOR GROUND DISTURBANCE

1.3.1 PURPOSE OF A CODE OF PRACTICE

The second step toward damage prevention is to implement a corporate policy for ground disturbance as well as safe work plans, practices, and procedures. Taken together, these form a “code of practice” for safe ground disturbance activities.

The purpose of a code a practice is to ensure that the policies, plans, practices, and procedures required to prevent damage to buried facilities are developed, implemented, and enforced.

The guidelines presented in this IRP are intended only to outline the minimum requirements for an effective code of practice. It is the responsibility of each company to develop its own operations-specific code of practice for undertaking ground disturbance activities.

Figure 2 outlines the recommended damage prevention process.



Figure 2: Recommended Damage Prevention Process

1.3.2 PARTIES REQUIRING AN OPERATIONS-SPECIFIC CODE OF PRACTICE AND HIERARCHY AMONG CODES

Buried facility owners, project owners, and ground disturbers require a code of practice for ground disturbance as follows:

- Buried facility owners require a detailed code of practice that addresses all ground disturbance activities near their buried facilities.

- Project owners require a detailed code of practice that addresses all ground disturbance activities within the scope of project activities.
- Ground disturbers require a code of practice that addresses and is specific to their ground disturbance responsibilities and activities near buried facilities.

Note: Geophysical exploration companies undertaking ground disturbances within the hand expose zones of buried facilities or that have the potential to damage buried facilities shall develop a code of practice for those activities. However, if the seismic source points are moved to avoid affecting buried facilities, a comprehensive code of practice may not be required.

The following hierarchy among codes should be followed:

1. First, the code of practice of the buried facility owner will take precedence within the right-of-way or property of the buried facility owner or the hand expose zone for the buried facility.
2. Second, the code of practice of the project owner will apply to all other areas within the remaining limits of the project site.
3. Third, the code of practice of the ground disturbers will be applied:
 - a. whenever a ground disturber's code of practice is more stringent than those of either the buried facility owner or project owner specific to the work of the ground disturber.
 - b. in the absence of a buried facility owner or project owner code of practice,

Note: If the ground disturber's code differs from the buried facility or project owner's code, it is important for a discussion to take place to ensure that the buried facility will not be adversely affected by any differences in requirements.

Figure 3 summarizes the requirements for parties involved in ground disturbances.

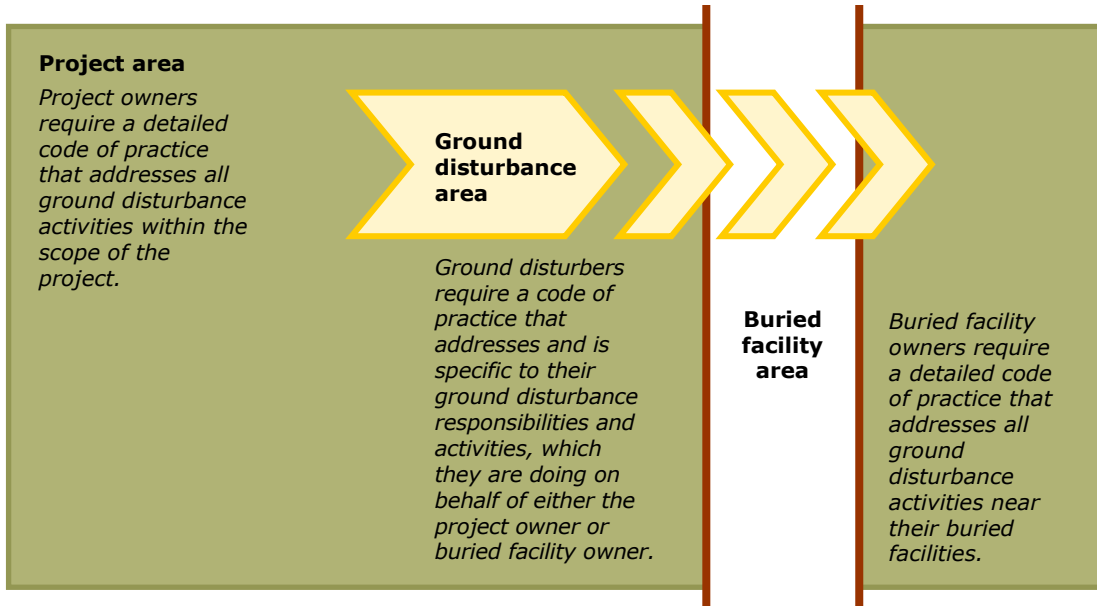


Figure 3: Code of Practice Requirements and Precedence

SECTION 2: GROUND DISTURBANCE CODE OF PRACTICE CONSIDERATIONS

When developing a code of practice, a company shall consider all the aspects of safe ground disturbance activities described below.

2.1 SPECIFYING RESPONSIBILITIES AND ACCOUNTABILITIES

Key stakeholders in ground disturbance activities have specific responsibilities that when recognized, accepted, and fulfilled, have a positive impact on worker safety, public safety, protection of the environment, and prevention of damage to buried facilities. Therefore, these responsibilities and the associated accountability shall be considered during development of a code of practice.

2.2 IDENTIFYING TRAINING AND COMPETENCY REQUIREMENTS

To be able to carry out their ground disturbance responsibilities properly and safely, stakeholders in the process must have the required competencies. Their level of competence shall be assessed and training provided to update their knowledge and skills as required. This assessment of competence and requirement for training shall be considered during development of a code of practice.

2.2.1 EVALUATION OF COMPETENCE

All workers involved in ground disturbance activities must be competent in performing the duties for which they are responsible. Competence is more than having taken a training program; it also means having a combination of knowledge *and* practical experience.

Employers shall be able to justify the basis on which they deem any worker to be competent using the following criteria:

- adequate qualifications—defined as some type of qualification, earned through a certified education program, training course, etc., or a combination of education and practical experience;
- suitable training—defined as training that is appropriate to the tasks, equipment, etc., that will be performed or used and which also includes minimum safety training as per OHS legislation;
- sufficient experience—defined as the experience required to perform work safely without supervision or with only minimal supervision.

2.2.2 REQUIRED COMPETENCIES

Personnel involved in a ground disturbance shall be trained on the code of practice and any other associated regulations, practices, and procedures. Ground disturbers shall have sufficient training to understand and follow any specific ground disturbance codes of practice, or related processes or procedures imposed by project owners or buried facility owners. Ground disturbance supervisors and inspectors will require an increased level of training to qualify them for their specific ground disturbance tasks (see Section 3 for their responsibilities).

An initial risk analysis should be done for each task in the ground disturbance process to determine that appropriate practices, procedures, training, and competency requirements are developed.

2.2.3 COMPETENCY-BASED TRAINING

Employers must provide training to a level appropriate to a worker's responsibilities. The training provided to workers involved in ground disturbances shall, as a minimum, cover the following:

1. the prevailing buried facility damage prevention practices that apply to the ground disturbance activities they will be doing, and
2. the minimum requirements of any corporate code of practice as outlined in this section the IRP.

Note: Pipeline regulators require buried facility and project owners to ensure that their representatives have completed an industry-endorsed supervisory level training course in ground disturbance practices and that they are currently certified to supervise a ground disturbance. While formal industry-endorsed training provides excellent background knowledge and general procedures, individual employers may require operations-specific training content, which is relevant to both their industry and their corporate ground disturbance code of practice.

2.3 PREQUALIFYING AND SELECTING CONTRACTORS

Project owners who hire contractors to undertake ground disturbances should have a contractor selection and management process, which may be included as part of their code of practice. Project owners should consider the following procedure when prequalifying and selecting contractors for ground disturbance activities:

1. Evaluate the contractor's capabilities, certifications, and qualifications. Does the contractor have a method to evaluate employee competence? Is the contractor able to demonstrate the competence of their employees to the buried facility owner?
2. Evaluate the contractor's practices and procedures for the activities they are undertaking. Does the contractor have an acceptable code of practice? Does the contractor have an understanding of the work requirements?

3. Evaluate the contractor's capabilities and controls to deal with the risks that are part of the job.
4. Decide if the contractor is suitable for the ground disturbance work based on these evaluations.

2.4 ASSESSING PLANNED OPERATIONS

Buried facilities at a worksite are a potential safety hazard. As such, buried facility owners, project owners, and ground disturbers shall co-operate to ensure that a plan is in place for managing site safety, ensuring ground disturbance activities on site are being co-ordinated, and ensuring responsibilities are clearly communicated to affected workers. This plan for operations shall also include a method for ensuring that applicable legislation and regulations are identified, stakeholders are aware of them, and procedures are followed to ensure compliance.



A process for assessment of this plan shall be considered for inclusion in the code of practice. For example, some companies use pre-ground-disturbance checklists to facilitate this assessment. Samples of pre-ground-disturbance checklists can be found at www.enform.ca, by following the links to IRP 17.

2.5 CONDUCTING PRE-GROUND-DISTURBANCE SEARCH AND NOTIFICATION

Pre-ground-disturbance search and notification shall be a key consideration in an effective ground disturbance code of practice.

2.5.1 SEARCH

Requirement to Search

Before beginning, anyone proposing to undertake a ground disturbance shall take all reasonable precautions to determine if there are buried facilities within the proposed work area. Specific to pipelines, regulations define the search area as 30 meters beyond the limits of the proposed ground disturbance. In the case of other types of buried facilities, recommended search areas shall include the limits of the proposed ground disturbance and a reasonable area beyond those limits.

Evidence of other active operations such as seismic operations, temporary surface facilities, road construction, or land owner activities must be investigated to determine the potential impact on the proposed ground disturbance.

Sources of Information

Many sources of information are available to determine if buried facilities are located in the area of a proposed ground disturbance, such as the following:

- one-call centres,

- easements or caveats registered against certificates of title,
- regulator maps (e.g. ERCB, B.C. OGC),
- commercial data / mapping services,
- municipal / rural utility companies,
- as-builts, facility plot-plan, or pipeline maps,
- survey plans,
- buried facility owner area-operations personnel,
- land owners or residents, and
- visual indicators.



Contact information and notice requirements for Canadian one-call centres are provided in [APPENDIX A](#) and can also be found at www.enform.ca, by following the links to IRP 17.

Multiple Buried Facilities

Both the project owner and the buried facility owner must ensure that, where multiple buried facilities exist, each buried facility is identified and clearly marked. For example, where there are multiple pipelines in the same right-of-way—especially for pipelines of the same diameter or for multiple buried facilities in a common trench—extra attention shall be applied to identify the owner of each facility.

2.5.2 NOTIFICATION

Timelines

If it has been established that buried facilities exist within the search areas, the party proposing to undertake the ground disturbance must notify the owners of those buried facilities and the one-call centre of their intent to disturb the ground. This notification shall occur at least two full working days and not more than ten working days before the ground disturbance takes place. This timeline may be altered by the terms and conditions of crossing agreements and may vary depending on the regulatory jurisdiction. For example, NEB regulations require three working days' notice.

Notifying Buried Facility Owners by Requesting Locates Via One-Call Centres (Step 1)

The provinces of British Columbia, Alberta, Saskatchewan, Ontario, and Quebec have provincial one-call centres. These one-call centres receive requests for locates for proposed ground disturbances from the ground disturber. They then notify those of their members whose buried facilities could be in conflict with the proposed ground disturbance.

Individuals placing a locate request with a one-call centre will be given a ticket number for future reference and advised of those members that will be notified on their behalf. If the information required for the processing of a locate request changes, the requesting individual shall contact the one-call centre and provide the changed information with the ticket number, and the one-call centre will forward the new or corrected information to its affected members.

One-call centres may also be used to advise members of damage to their buried facilities, although it remains the responsibility of the party who damaged the facility to notify the owner of the facility.



Typically, one-call centres prefer to receive locate requests using e-forms available on the one-call centre's website. Links to samples of these forms can be found at www.enform.ca, by following the links to IRP 17.

Notifying Buried Facility Owners Directly (Step 2)

Not all buried facilities are registered with one-call centres. Registration of buried facilities with one-call centres is sometimes voluntary. Even where legislation requires registration, unregistered buried facilities still exist. Never assume the one-call centre will be aware of all buried facilities present. For this reason, the ground disturber must identify all buried facilities and contact directly any owners of buried facilities that are found but not registered with the local one-call centre.

Owners of these unregistered buried facilities must be notified of the proposed ground disturbance and requested to identify and mark the approximate horizontal alignment of their facilities that may be in conflict with the proposed ground disturbance. The same information provided to the one-call centre shall be provided to non-members of the one-call centre.

Several additional steps shall be taken in communicating with non-members of one-call centres:

- Obtain documentation that the locate request has been placed and received.
- Obtain a contact name and phone number for the buried facility owner (and if different an emergency contact name and phone number).
- Establish the date and time that the facility owner's locator will be on site to identify and mark the locations of affected buried facilities.
- Determine whether or not the facility owner is required by the regulator or wishes to be on site during the exposure or crossing of that owner's facilities.
- In cases where the buried facility owner has not responded with the required timeframe, the ground disturber has the right to review the situation with the responsible regulator to determine a suitable course of action.

Required Information

The party proposing to undertake the ground disturbance must provide information relevant to the proposed ground disturbance and request that the owner of the buried facility identify and mark the locations of their facility.

The owner of a buried facility will typically require the following information about the proposed ground disturbance:

- the contact name, phone number, and company of the person that will be responsible for the ground disturbance;
- the identity of the person or company for whom the work will be done, if different from the buried facility owner or the subcontractor;
- the site location of the ground disturbance;
- the type of work that will be done;
- the approximate depth and extent of the ground disturbance;
- the type of property (public or private) and where on the property the ground disturbance will take place;
- the date by which locates need to be completed.

Response by Buried Facility Owners

Any owner of a buried facility who receives notification of a proposed ground disturbance shall provide any assistance required for the ground disturber to be able to comply with regulatory requirements and to undertake the ground disturbance safely.

IMPORTANT: A buried facility owner who receives an *emergency* locate request is expected to respond *within one hour in urban areas and within two hours in rural areas*. If this is impossible, then facility owners/locators shall at least contact the person placing the emergency locate request within these timelines, discuss the situation, and provide an estimated time of arrival at the site.

Upon receiving notification of a proposed ground disturbance, the owner of a buried facility shall do the following:

- provide to the ground disturber any information the ground disturber may require with respect to any buried facility within the area of the proposed ground disturbance and, for pipeline owners, within 30 m beyond the limits of the proposed ground disturbance;
- identify and accurately mark the approximate horizontal alignment of a pipeline using the APWA Uniform Colour Code (see [Appendix B](#) for a copy of this colour code, which is also available at www.apwa.net) with clearly



distinguishable marks or markers at adequate intervals, at no cost to the ground disturber, within two full working days' advance notice;

- provide documentation of the locate performed to the ground disturber;
- before the ground disturbance begins, pipeline owners are to inspect the site to ensure that the locating and marking has been properly carried out, if the locating and marking was done by someone other than the owner of the buried facility.

2.6 SECURING CROSSING AGREEMENTS AND APPROVALS

Crossing agreements and approvals are an important part of preparation for ground disturbance activities. Formal agreements and approvals shall be obtained as described in this section.

Regulated Pipelines

If a ground disturbance or above ground crossing occurs within the designated right-of-way of a pipeline or within 5 m of a pipeline that is not in a right-of-way (CAUTION: within 30 m for federally regulated pipelines), it is a regulatory requirement that written approval must be obtained from the pipeline owner. The approval shall specify the responsibilities of the parties and any conditions or limitations applicable to the ground disturbance. The signed agreement forms a contract between the two parties and must not be modified on site without the approval of the original signatories.

Depending on the type of work, the pipeline owner may also require the ground disturber to enter into encroachment agreements, which would identify the scope of the work and the responsibilities of the two parties. Encroachment or proximity agreements are not regulatory requirements. In some cases, companies may use them to verify that the two parties have agreed on specific terms related to a regulatory requirement (e.g. an agreement to infringe upon a prescribed setback). These types of agreements may also be used to provide specific legal protection between the parties.

Note: Some regulatory agencies require that approval be obtained from the pipeline owner to operate vehicles or equipment across a pipeline at any location that is not within the travelled portion of a highway or public road to ensure the pipeline is protected against heavy loads.

Non-Regulated Pipelines

For non-regulated pipelines, obtain formal agreements and approvals as per requirements of the buried facility owner.

Utility Rights-of-Way (URWs)

URWs are a very complex topic. The term is used to mean a right-of-way adjacent to a street or road within which the shallow utilities (electric, telephone, cable television, and gas) are installed. The interest in the land under a URW is held by the municipality, not the owners of the buried facilities. Therefore, approval for the installation of a facility within a URW must be obtained from the municipality, not the owners of the utilities.

In general, owners of the shallow utilities in a URW have agreements with the municipalities that allow them to undertake ground disturbances within the URW for maintenance and repair purposes without specific approval and subject only to having all buried facilities located before the ground disturbances begin.

However, individual utilities are sometimes installed in a right-of-way across private property, where the right-of-way is in favour of the utility owner. These rights-of-way may also be referred to as utility rights-of-way but they will appear on a certificate of title as a right-of-way in favour of a specific utility. In these situations, the right-of-way is similar to a pipeline right-of-way and approval shall be obtained from the affected utility owner.

Shallow utility service connections between the distribution systems and the consumer's building or meter are in what is sometimes referred to as an implied easement. Because the consumer wants the service or product, the utility has implied permission to install the service line on the consumer's property. There is no caveat on the certificate of title and no formal approval process. Due to no requirement for an implied easement to be documented there may be increased difficulties obtaining information for locates. This is one example whereby discussion with the landowner may be the only source for information.

Road Allowances

Every road, regardless of jurisdiction, lies within a surveyed right-of-way, often referred to as a road allowance. Road allowances may be under the control of the federal government, provincial government, municipalities, or private companies. Approval to install a facility or undertake a ground disturbance within a road allowance must be obtained from the entity that has control of the road allowance.

2.6.1 REQUIREMENT FOR WRITTEN APPROVALS BEFORE WORK BEGINS

Before the start of any ground disturbance activity—even on a registered right-of-way—all applicable permits, licenses, and approvals or consent must be obtained, copies provided to all parties involved, and be available on site. These permits, licenses, and approvals may vary by jurisdiction, buried facility regulator, type of facility being crossed, and the work being undertaken.

The project owner shall obtain any necessary written approvals as per jurisdictional requirements, which may include approvals for actual crossings, as well as proximity,

right of entry, right of access, and reciprocal agreements (including high or low pressure pipeline, road, rail, river, cable crossings, etc.). Regulations require that approvals be in writing. Verbal approval is not acceptable!

The form of that written approval is not specified in regulations. However, to ensure consistency, some industry sectors have developed standard "crossing agreement" protocols. The most common documents used to satisfy regulatory requirements are the crossing agreement and the ground disturbance permit/checklist. A link to the Canadian Association of Petroleum Producers' [Facility Crossing Agreement](#) forms can be found at www.enform.ca, by following the links to IRP 17.



2.6.2 CONTENTS OF A CROSSING AGREEMENT/APPROVAL

The crossing agreement/approval should include the following critical information:

- angle and direction for placement of facilities within the ground disturbance area in relation to any existing facilities;
- proper supporting of exposed facilities;
- horizontal and vertical separation to be maintained between buried facilities;
- notification time frames for locates, if different from the regulations;
- hand expose zone requirements;
- limits of approach distances for mechanical excavation equipment, if different from the regulations;
- backfill material requirements and cathodic test leads;
- notification time frame required for an inspection before backfilling.

2.6.3 CAUTIONS ABOUT AGREEMENTS

Each buried facility owner may have different specifications, technical requirements, and conditions in their crossing agreements. Crossing agreements must be understood by the ground disturbance supervisor.

Most facility crossing agreements do not provide for changes to be made by personnel at the site level. No dealings between the two parties shall change the agreement unless it is in writing and signed by the same parties that signed the original agreement.

2.7 LOCATING AND MARKING FACILITIES

The locating and marking of facilities is a key part of the damage prevention process and shall be considered in a ground disturbance code of practice.

2.7.1 BURIED FACILITIES REQUIRING LOCATES

All known buried facilities within the limits of, and for some distance beyond the limits of, a proposed ground disturbance must be located. (The distance beyond the limits of the proposed ground disturbance may be defined by regulation.)

2.7.2 LOCATOR QUALIFICATIONS AND ROLE



A qualified, competent locator shall be used to provide locates. Minimum competencies are specified in [Canadian Locator Technician Standards](#), published by the Canadian Association of Pipeline and Utility Locating Contractors (CAPULC). Locates shall be performed in accordance with CAPULC's [Locating Industry Recognized Practices \(LIRPs\)](#). These publications are available at www.capulc.ca.

Before providing a locate, a locator shall obtain all available information for the buried facilities to be located and should discuss the project with a knowledgeable representative of the ground disturber and/or facility owner. This discussion will help identify any site-specific hazards, emergency response plans, access restrictions, marking materials and standards, and extent of the ground disturbance.



When locators identify and mark the locations of buried facilities, they shall document the locates provided, give a copy to the ground disturber, and keep a copy for their records. This documentation may be referred to as a "locate plot plan," a "locate sketch/drawing," or a "locate slip." It is important that the ground disturber understand that it is the locate marks that are documented, **not** the actual location of the buried facility. A sample locate drawing can be found at www.enform.ca, by following the links to IRP 17.

As a general rule, locators will not provide the depth of a facility. However, it is reasonable to expect locators to advise ground disturbers if they suspect that a buried facility is deeper or shallower than might be expected, and about any identified discrepancies, limitations on, or concerns about, the locates provided. In addition, if locators are aware of the existence of non-metallic buried facilities (e.g. plastic pipes with no tracer wire), they shall bring this to the attention of the ground disturber.

2.7.3 LOCATE LIFESPAN

The ground disturber shall keep all warning signs or markers visible and legible for the duration of the ground disturbance and shall replace or relocate them if necessary to ensure successful and safe completion of the work. However, the following requirements and guidelines also need to be taken into consideration:



The WorkSafe BC document, [Prevention of Damage to Buried Facilities in British Columbia](#), states excavation activity must be started within 14 calendar days of the request. Markings are valid for the duration of the project as per the paragraph above. For underground gas facilities, location information must be reconfirmed if the excavation has not started within 10 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.

The Alberta Damage Prevention Council guideline, [*The Damage Prevention Process in Alberta*](#): Roles, Responsibilities and Expectations of the Stakeholders in the Prevention of Damage to Buried Facilities, states locate marks are valid for as long as they are visible but not more than 14 calendar days. If a project does begin within 14 days of the date a locate was done or the work is interrupted during the 14 day period, the ground disturber should request another locate or determine in consultation with buried facility owner, if the existing locate can be extended. Document available online as a resource at www.albertadamageprevention.com.



2.7.4 MARKING COLOUR CODES

The American Public Works Association (APWA) developed a uniform colour code for the temporary marking of buried facilities (see [APPENDIX B](#) for a copy of this colour code, which is also available at www.apwa.net). This colour coding system enhances worker safety and minimizes damage during ground disturbances.



The CAGC has developed a best practice for seismic operations flagging to avoid confusion with the APWA Uniform Colour Code. Refer to [APPENDIX C](#) for a copy of this CAGC best practice or visit their website at www.cagc.ca.



In situations where a contract locator has been retained by a member of a geophysical exploration program team member to locate all buried facilities within the area of the program, the locator will mark all buried facilities with yellow flagging (preferably high visibility, lemon, or fluorescent colours) that is a distinctly different colour from any in the APWA Uniform Colour Code. When the owners of the marked buried facilities confirm the locates done by the contract locator they may add their own locate marks in accordance with the APWA Uniform Colour Code or they may confirm the locates done by the contract locator in writing.

Locate documentation shall identify any site-specific deviations from the APWA Uniform Colour Code and this information is to be communicated to all parties involved in the ground disturbance. Any time a different colour system is used to mark buried facilities, those colours are to be communicated to all workers on site.

2.8 CONDUCTING A HAZARD ASSESSMENT

Assessing hazards is vital to pre-job planning and hazard control shall be considered within the code of practice. A pre-job risk assessment must be done before ground disturbance activities begin. This process shall be completed in accordance with the ground disturber's hazard assessment practices. A suggested hazard review flowchart is shown in Figure 4, which provides guidance for addressing identified hazards and serves as a reminder of an employer's obligations under OHS legislation.

Typical hazards for ground disturbances include, but are not limited to:

- excavation stability;
- shoring
- entering and leaving;
- fall hazards;
- confined spaces;
- presence of hydrocarbon vapours or fumes, or other gases (e.g. H₂S);
- presence of buried electrical facilities or overhead power lines;
- potential for unknown obstructions or buried facilities not located;
- interaction between workers and machinery;
- changing conditions such as job scope, personnel, weather, etc.;
- human behaviour;
- areas of historical, archaeological, or environmental significance.

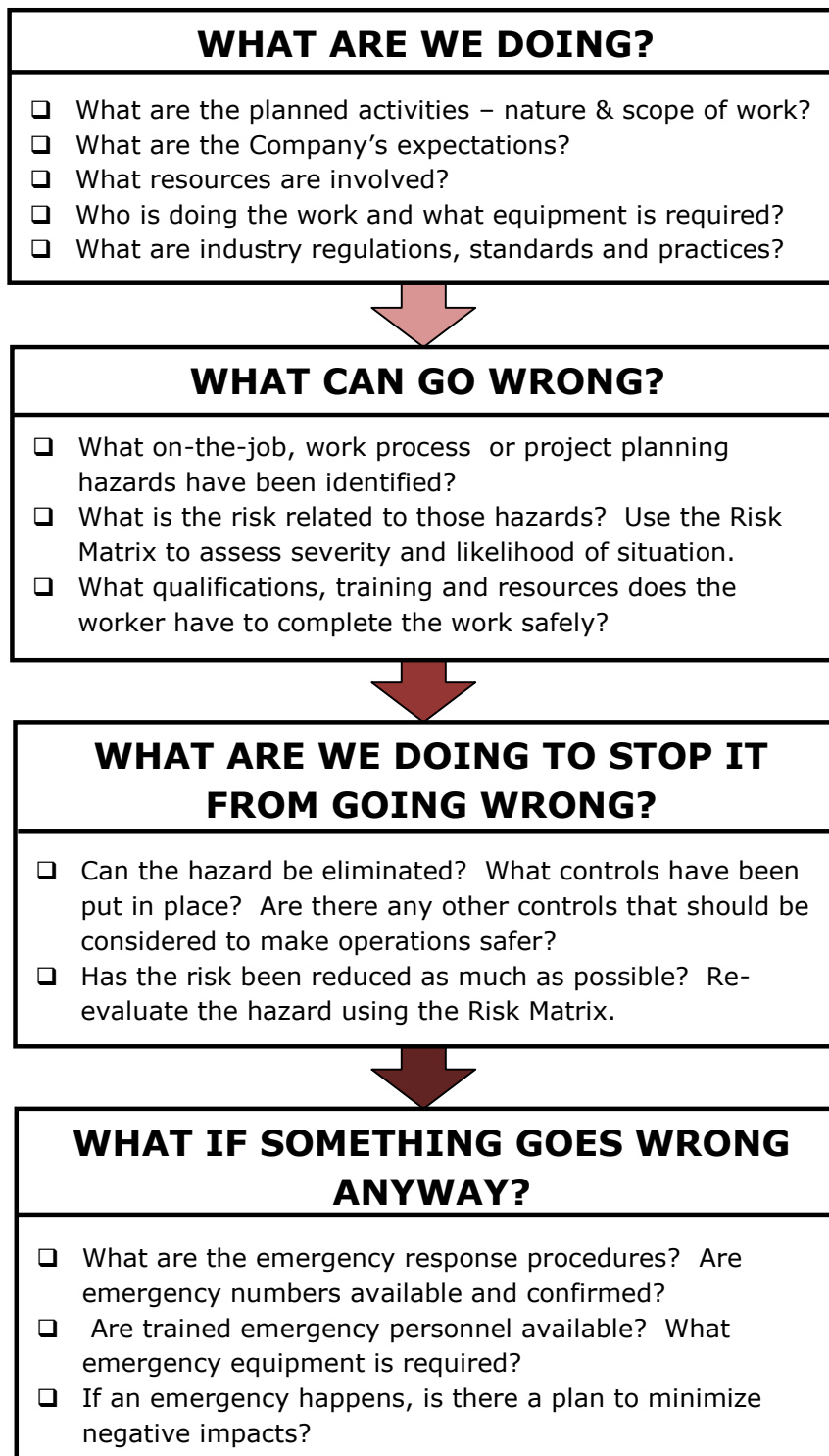


Figure 4: Suggested Hazard Review Flowchart

2.9 PREPARING FOR EMERGENCY/INCIDENT MANAGEMENT

2.9.1 PIPELINE OWNER EMERGENCY RESPONSE PLANS

Pipeline owners may be required to prepare, maintain, and submit for approval, a corporate or site-specific emergency response plan (ERP) by the responsible regulator. In such cases, pipeline owners shall ensure the following:

1. that their organization is capable of responding to emergency situations, and
2. that workers are aware of emergency notification and response procedures.

2.9.2 CONTACT WITH A BURIED FACILITY

Potential Consequences of Contact With a Buried Facility

Unwanted contact with a buried facility has the potential for the following negative consequences:

- injury or death to workers or the public,
- environmental consequences,
- interruption of critical services,
- buried facility and other equipment damage,
- production loss, and
- corporate image losses.

Emergency Response Procedure for Contact With a Buried Facility

The ground disturber must have an effective emergency response procedure for contact with a buried facility and ensure that it is communicated to all parties on the worksite. This emergency response procedure shall guide actions and provide contact information for all types of emergencies related to the type and location of the buried facility involved in the emergency.

The emergency response procedure must meet all regulatory requirements and shall take into account that most regulations clearly require ground disturbance activities to be stopped immediately when contact is made with a buried facility during a ground disturbance that results in any of the following:

- a puncture or crack in the facility;
- a scratch, gouge, flattening, dent, or damage of the surface of the facility;
- in the case of fibre-optic cables, severing, bending, or kinking;
- damage to the protective coating.

Reporting Contact With a Buried Facility



In case of unwanted contact with a buried facility, the ground disturber must immediately stop work and report the incident to the buried facility owner, including the contact location and the kind of damage that resulted. This reporting is required so that the buried facility owner can assess any damage and suspend the operation of the buried facility if required. Links to sample one-call facility damage reports can be found at www.enform.ca, by following the links to IRP 17.

If a ground disturber is unable to contact the buried facility owners, they should notify the applicable one-call centre rather than taking no action.

Regulations may require buried facility owners to immediately notify the appropriate regulator of contact and damage to their buried facility.

Note: In cases where a ground disturbance has been stopped due to contact, the ground disturbance must not begin again until approved by the buried facility owner. Depending on the type and severity of the incident, approval from regulators may also be required before start-up. If the ground must be further disturbed to repair a damaged facility, an emergency locate request shall be placed through the one-call centre to notify other potentially affected buried facility owners.

2.10 ARRANGING WORK PERMITS

An important aspect of the code of practice is the development of a site tool to ensure that the requirements of written approvals are met and to ensure hazard management for ground disturbance activities is in place.

2.10.1 WORK PERMITS ISSUED BY BURIED FACILITY OWNERS

Buried facility owners shall use one of two alternatives for permitting ground disturbance activities:

1. issue a stand-alone ground disturbance permit, or
2. use an existing work permit system in conjunction with specific ground disturbance information.

2.10.2 PERMIT REQUIREMENTS

Before the buried facility owner or their representative issues a permit, they shall confirm that all pre-ground-disturbance activities are complete and crossing agreements or approvals are in place as described in this IRP in the following sections:

- Section 2.4: Assessing Planned Operations,
- Section 2.5: Conducting Pre-Ground-Disturbance Search and Notification, and
- Section 2.6: Securing Crossing Agreements and Approvals.



The permit can then be issued and shall include the following:

- a review of the requirements as outlined in the crossing agreements/approvals;
- a review of hazard identification, assessment, and controls;
- a confirmation that the content of the permit has been communicated to all affected workers on site.

This permit may be in the form of a checklist and can also be used as a due diligence/quality control mechanism for the ground disturbance supervisor and ground disturbers. A sample [ground disturbance permit/checklist](#) can be found at www.enform.ca, by following the links to IRP 17.

Note: Often, a ground disturbance occurs where the buried facility owner is the ground disturber. In this case, the pipeline regulations still require that written approval be provided by the facility owner to the workers conducting ground disturbance activities. The ground disturbance permit often serves this purpose.

2.11 COMMUNICATING GROUND DISTURBANCE ACTIVITIES

2.11.1 ACCURATE AND TIMELY EXCHANGE OF INFORMATION

Buried facility damage prevention requires the involvement of many people who depend on each other to take a genuine interest in ensuring a successful outcome. The accurate and timely exchange of information among all affected parties is an important factor to successful application of ground disturbance practices.

2.11.2 PRE-JOB MEETINGS

A pre-job meeting covering all safety and procedure aspects of the ground disturbance job shall be conducted with all parties on site. Meeting topics should include, but are not limited to, the following:

- the identity of the prime contractor;
- the appropriate chain of command to follow;
- orientation requirements (particularly reminding workers of their right and obligation to refuse unsafe work);
- a review of potential hazards, safe work practices and procedures, work permit requirements, etc.;
- land access restrictions;
- an explanation of the construction sequence;
- personal protective equipment requirements;

- emergency procedures including contact numbers, evacuation and muster protocols, first aid/injured worker planning, etc.;
- incident reporting procedures, including notification and action to be carried out if damage occurs.

New workers or crews who arrive at the worksite after the initial pre-job meeting must also be given an orientation.

2.11.3 TAILGATE MEETINGS

Tailgate meetings should be held daily and to address issues such as the following:

- buried facilities that will be encountered that day,
- ongoing hazard assessments, and
- changes in work procedures or scope of job activities.

2.12 EXPOSING FACILITIES AND CONDUCTING GROUND DISTURBANCES AFTER EXPOSURE

Integral to ground disturbance is the initial hand exposure and identification of facilities followed by the subsequent ground disturbances. Therefore, these topics shall be considered in the ground disturbance code of practice.

2.12.1 HAND EXPOSE ZONES

Buried facilities shall be exposed using non-destructive ground disturbance techniques acceptable to the owner of the buried facility before mechanical excavation equipment is used within the hand expose zones. Hand expose zones vary based on jurisdiction and regulator, as well as type of facility.

In addition, the requirements for hand expose zones based on jurisdiction and type of facility may be augmented by more stringent requirements of the buried facility owner as per the conditions of the crossing agreement. Therefore, conflicting requirements are not uncommon, such as the following examples:

- The hand expose zone for provincially regulated pipelines is 5 m versus 3 m for federally regulated pipelines.
- The hand expose zone for other types of buried facilities is typically 1 m.
- Most written approvals for ground disturbances near pipelines impose stricter limits of approach for mechanical excavation equipment than the regulations. Many require hand exposure before mechanical excavation equipment enters the right-of-way.

- Some owners of buried electrical facilities have instituted a 2 m or 3 m hand expose zone for different types of cables (e.g. oil filled, high voltage). Locate documentation should identify these situations.

Where there are conflicts, the most stringent standards shall be followed.

2.12.2 OTHER EXPOSURE/GROUND DISTURBANCE REQUIREMENTS

Ground disturbers must also identify and follow other related OHS regulatory requirements including the following:

- shoring trenches and excavations against cave-in;
- ensuring safe entry and exit by ladder;
- monitoring for the presence of toxic flammable gases, as required;
- ensuring the proper slope of walls (within limits);
- keeping edges of excavations free of loose soil, debris, spoil piles, and material stockpiles;
- obtaining work permits, as required;
- taking care when the machine approaches the outer limits of the hand expose zone or the limits of approach.

There are no maximum limits on the extent of hand exposure required. Buried facilities shall be exposed as needed to confirm their identification, number, and alignment. Care needs to be taken not to damage facilities when hand exposing. Probes are not recommended for use and shall be used only with the written permission of the buried facility owner.

Where a proposed ground disturbance will be parallel to an existing buried facility and within the hand expose zone, the buried facility shall be exposed at intervals that will be set by the owner of the buried facility. The required exposure intervals should be included in the buried facility owner's approval or locate documentation.

Where a proposed ground disturbance will take place in a buried facility right-of-way, the buried facility should be hand exposed before the ground in the right-of-way is disturbed. Additional exposures should be made any time there may be a change in direction of the ground disturbance or the buried facility, and at any location the locator has advised the disturber of locate limitations.

Notes:

1. Probing deeper than 300 mm is considered to be a ground disturbance.
2. Hand exposure requirements should be extended to the proposed depth of the excavation or directional drilling path.

2.12.3 MECHANICAL EQUIPMENT USE AFTER HAND EXPOSURE

A spotter should be used whenever mechanical equipment is working near a buried facility. After the buried facility has been exposed, mechanical equipment must not be used within 600 mm of an exposed pipeline or the distance specified in the crossing agreement (whichever is greater), except under the direct supervision of a representative of and with permission of the buried facility owner.

Soil in an excavation must be stabilized to prevent cave-ins as per OHS legislation.

2.13 BACKFILLING AND POST-GROUND-DISTURBANCE RECORDS

Backfilling and the completion of post-ground-disturbance records occur at the end of the ground disturbance process but are nevertheless important activities that must be considered in the ground disturbance code of practice.

A ground disturber exposing any part of a pipeline as required by the regulations **must notify the owner at least 24 hours before** backfilling the pipeline. Where specified by the crossing agreement or regulator, the backfill of an exposed buried facility must be inspected by the buried facility owner. All written records of such inspections shall be maintained for the useful life of the buried facility.

When inspection by the buried facility owner cannot be obtained, ground disturbers must be able to demonstrate that they have made all reasonable efforts to do so. In these cases, the excavation may be backfilled provided the condition of the facility is documented with a backfill inspection report and photographs. However, such action shall only be taken after consulting with the regulator.



For other types of buried facilities, the locate documentation will advise ground disturbers if they are to contact the facility owner for a backfill inspection before backfilling. A sample of a [backfill inspection report](#) can be found at www.enform.ca, by following the links to IRP 17.

2.14 MONITORING AND REVIEW OF CODE OF PRACTICE

The management of a company that undertakes ground disturbances shall provide leadership and ensure compliance with the corporate ground disturbance code of practice. To do so they shall ensure that all components of the code of practice (e.g. policies, practices, procedures, etc.) are adequate and are communicated to and implemented by all parties involved in ground disturbances. In particular, they shall ensure that all workers involved in ground disturbance activities know the related potential hazards and the controls in place to mitigate them.

To help ensure that the ground disturbance code of practice is effective as developed and implemented, monitoring and review should be considered as part of the code itself.

2.14.1 MAINTAINING GROUND DISTURBANCE RECORDS

For companies to demonstrate due diligence regarding ground disturbances, they require documented evidence verifying the implementation of the code of practice. Therefore, companies must maintain records for regulated facilities and shall consider keeping records of the activities in the vicinity of non-regulated facilities. The records have the following purposes:

- to help manage an effective program,
- to demonstrate compliance with regulatory standards,
- to allow for consistent measurement against corporate operating standards, and
- to provide documentation in case of legal proceedings.

The facility owner, project owner, or their representative may audit or request copies of ground disturbers' documentation including, but not limited to, the following:

- hazard assessments of the worksite,
- tailgate or toolbox meeting minutes,
- locate requests and locate documentation, and
- worker training records for verification of competency.

2.14.2 REVIEWING AND UPDATING GROUND DISTURBANCE CODES OF PRACTICE/SYSTEMS

A code of practice is meant to be a living document and as such, companies should have a process in place for updating it. It shall be reviewed and modified as necessary to ensure that it takes into account any changes in regulatory requirements, company policy or governance, or new technological development. Companies may benefit from assigning the revision process to a person or department to ensure that revisions are completed without undue delay.

At a minimum, safe work practices and procedures shall be monitored and reviewed to check that they comply with legislation and are compatible with the code of practice. Tasks that require site-specific procedures shall be reviewed and the most current information shall be available to those involved in ground disturbance activities. Any deficiencies or opportunities for improvement shall be addressed as soon as possible and communicated to all affected personnel.



Companies involved in ground disturbance activities also benefit from a regular corporate evaluation or audit to identify and address any deficiencies in their systems. A sample of a basic corporate evaluation of a ground disturbance code of practice can be found at www.enform.ca, by following the links to IRP 17.

SECTION 3: GROUND DISTURBANCE RESPONSIBILITIES AND ACCOUNTABILITIES

There are a number of parties that may be involved or impacted by a ground disturbance. These are highlighted in the diagram below (Figure 5).



Figure 5: Key Parties Involved in the Ground Disturbance Process

The primary parties involved in the ground disturbance process are as follows:

1. project owners—can include agents of owners, ground disturbance supervisors and inspectors, buried facility owners, land owners, and private individuals;
2. ground disturbers—can include contractors, workers, buried facility owners, land owners, and private individuals;
3. buried facility owners—can include owners' inspectors and supervisors;
4. locators (company or third party).

Secondary parties involved in the ground disturbance process are as follows:

5. regulators—can include the following:
 - OHS agencies such as Alberta Employment and Immigration, WorkSafe BC, Saskatchewan Labour, National Energy Board (NEB);
 - energy regulators such as Alberta Energy Resources Conservation Board (ERCB), B.C. Oil and Gas Commission (OGC), Saskatchewan Energy and Resources (SER), National Energy Board (NEB);
 - other agencies such as forestry, environment, municipalities, and Department of Fisheries and Oceans (DFO).
6. buried facility information sources—can include one-call centres, land titles, maps, operators, private information sources, utility companies, and visual inspections; (See discussion in Sections 2.5.1 and 2.5.2)
7. land and property owners—are those who may be impacted by a ground disturbance and can include land owners, right-of-way holders, and other surface development owners.

3.1 REGULATORY RESPONSIBILITIES

Depending on the type of buried facility, project owners, ground disturbers and buried facility owners have well defined regulatory responsibilities and shall ensure that their codes of practice identify and address those responsibilities specific to their operations. For example, in the case of pipelines, the ERCB and the NEB have regulations for licensed pipelines related to damage prevention and public awareness programs.

Equally important are the minimum requirements defined by OHS legislation on the management of worksites for worker safety. In addition, other entities also impose obligations on buried facility owners, project owners, and ground disturbers, such as federal and provincial departments and municipalities.



A summary of legislation, regulations, and industry guidelines/standards relevant to buried facilities can be found at www.enform.ca, by following the links to IRP 17.

3.2 PROJECT OWNER RESPONSIBILITIES

Owners of projects involving ground disturbance activities have the following general responsibilities:

- ensuring that project design is done by qualified, competent consultants or employees;
- ensuring that the project design minimizes the potential conflict with existing buried facilities;

- ensuring that prevention of future damage to any new buried facilities is a design criterion;
- ensuring that all required written approvals and permissions are in place;
- designating a prime contractor, if necessary;
- ensuring that contract documents include an appropriate ground disturbance code of practice;
- ensuring that accurate as-built records are created.

3.2.1 GROUND DISTURBANCE SUPERVISOR RESPONSIBILITIES

Individuals overseeing ground disturbances are called ground disturbance supervisors, who are employees or contractors deemed to be competent by the project owner. They are responsible for ensuring that the ground disturbance is done as per the governing code of practice, applicable regulations, and the terms and conditions of all project-specific agreements and approvals.

Ground disturbance supervisors are responsible for the following:

- completing and maintaining their required training and certifications;
- reviewing pre-ground disturbance documentation, including the written approvals, and addressing deficiencies;
- ensuring that all buried facility locate requests have been made, including those to non-members of one-call centres;
- maintaining and managing the locates provided;
- initiating and managing the hand exposure of buried facilities;
- reviewing and communicating hazard assessments and work procedures before and during the ground disturbance process with all affected workers;
- issuing required permits/checklists;
- facilitating pre-job and tailgate meetings;
- supervising all ground disturbance activities as per defined scope of work, applicable code of practice, and written approvals/permissions;
- ensuring that contractors are not subject to the pressure to conduct work below acceptable standards when completing their assigned work responsibilities;
- ensuring required notifications for backfill inspection are completed;
- completing and submitting required documentation.

3.3 GROUND DISTURBER RESPONSIBILITIES

Ground disturber responsibilities include the following:

- complying with all regulatory requirements;
- complying with the terms and conditions of all written approvals, permissions, permits, and checklists;
- ensuring that workers are competent in ground disturbance procedures;
- confirming that all required buried facility locates have been requested;
- understanding the locates provided and their documentation;
- managing the locates;
- hand exposing buried facilities as required by regulations and that may be in conflict with a ground disturbance;
- conducting pre-job and tailgate meetings;
- supporting exposed buried facilities;
- backfilling exposed buried facilities with care;
- reporting any damage caused or found.



A supplementary sample list of *detailed* ground disturbance responsibilities and engineering and design responsibilities can be found at www.enform.ca, by following the links to IRP 17.

3.4 BURIED FACILITY OWNER RESPONSIBILITIES

3.4.1 GENERAL RESPONSIBILITIES

Buried facility owners' general responsibilities include the following:

- maintaining buried facility rights-of-way and signage, as per regulations;
- having a system in place to receive and respond to notifications of intent to disturb the ground near their buried facilities (e.g. one-call registration);
- ensuring that the one-call database and mapping are up to date and correctly identify the location of the owner's buried facilities;
- providing any help the ground disturber may require to comply with regulatory requirements, to ensure the safety of workers conducting ground disturbance activities, and to prevent any damage to buried facilities;
- ensuring that a competent locator identifies and marks the location and approximate horizontal alignment of the buried facilities;

- ensuring that locates are documented, that the ground disturber has a copy of locate documentation, and that locate documentation is kept on file for a minimum of two years or the life of the pipe for federally regulated pipelines.

In the case of regulated pipelines, the buried facility owner is required to have a ground disturbance supervisor present at the time a pipeline is being exposed and must be contacted before backfilling an exposed pipeline. The crossing agreement or locate documentation will identify this requirement for other types of buried facilities.



A supplementary sample list of *detailed* ground disturbance responsibilities for buried facility owners and ground disturbers as well as a list of sample ground disturbance engineering and design responsibilities can be found at www.enform.ca, by following the links to IRP 17.

3.4.2 BURIED FACILITY OWNER AS GROUND DISTURBER

Where a buried facility owner is the ground disturber and is undertaking a ground disturbance near their own buried facility with their own personnel, the facility owner must also fulfil the responsibilities of the ground disturber.

In these cases, the buried facility owner must establish the required processes to ensure worker safety and protection of the buried facility from damage. This may include the following:

- issuing an approval in writing, which may include a ground disturbance permit or checklist that outlines the terms and conditions under which the ground disturbance will be done;
- ensuring that employees who are to undertake the ground disturbance are familiar with the applicable regulations, the owner's policies and procedures, and are competent to fulfil their responsibilities as a ground disturber.

3.4.3 GROUND DISTURBANCE INSPECTOR RESPONSIBILITIES

Ground disturbance inspectors are responsible for the following:

- completing and maintaining their required training and certifications as a ground disturbance supervisor;
- ensuring locates have been done as required by buried facility locating protocols;
- ensuring that the ground disturber complies with the terms and conditions of any written approvals/permissions or agreements;
- witnessing hand exposure, if required;
- inspecting backfill, if required;
- supervising the use of mechanical excavation equipment within the specific limits of approach to buried facilities, if required;

- ensuring ground disturbance projects are completed as per contract documents.

Note: Buried facility owners may choose to have an inspector on site throughout the course of a ground disturbance.

3.5 LOCATOR RESPONSIBILITIES

Buried facility owners are responsible for locating their buried facilities when notified of a proposed ground disturbance. They may choose to use their own locators or hire a contract locator to provide locates. In the geophysical exploration industry, a contract locator may be hired by a member of the geophysical exploration team to locate all buried facilities within the area of proposed exploration. In that situation, the owners of affected buried facilities shall be requested to confirm the locates.

In all cases, locators are responsible for the following:

- completing and maintaining their required training and certifications;
- ensuring they are qualified and competent to perform required locates;
- recognizing when a locate is beyond their expertise and asking for help;
- doing their tasks in a timely and safe manner, as per governing legislation, acceptable locating practices (LIRPs), buried facility owner requirements, and client requirements;
- ensuring the quality of the locate is not compromised by disregarding the accepted standards and practices of locating;
- identifying and marking the approximate horizontal alignment of all buried facilities within the search area of the proposed ground disturbance;
- documenting the locate provided and ensuring the ground disturber understands the locate and its documentation;
- advising the ground disturber of any limitations, identified discrepancies or concerns with respect to the locate provided and any specific action the ground disturber should take regarding the located facilities.

GLOSSARY

ADPC: Alberta Damage Prevention Council.

APWA: American Public Works Association.

Buried facility: anything below ground used in the collection, storage, transmission, or distribution of water, storm water, or sewage; electronic, telephonic, or telegraphic communications; cable television; electrical energy; oil, natural gas, steam, petroleum products, chemicals, and other substances; and includes, but is not limited to, pipes, conduits, ducts, cables, wires, manholes, catch basins, and attachments to these items.

Buried facility owner: the physical or registered owner.

CAPULC: Canadian Association of Pipeline and Utility Locating Contractors.

Common Ground Alliance (CGA): furthers the work begun by the Common Ground Task Force established by the United States Department of Transportation (DOT) in 1998; the Task Force's work product, entitled the Common Ground Study, provided a guide to underground utility damage prevention best practices in use throughout the United States and Canada.

Competent: for the purpose of this IRP, "competent" is defined in Section 2 of this IRP.

Controlled Area or Safety Zone: the area within 30 m either side of a provincially regulated pipeline is a controlled area. The area within 30 m of the right of way of a federally regulated pipeline is a safety zone. The pipeline operator must be notified of any intent to disturb the ground within the controlled area or safety zone and the ground disturber must request locates.

Code of Practice: specific to this IRP, Code of Practice means a document giving methods developed to assist compliance with acts and regulations in the performance of work. To accomplish this, the code of practice may include both voluntary measures and those required by law with the intent of providing practical guidance on ways to achieve compliance with OHS and energy legislation.

Crossing agreement: in the buried facility industry, an approval is known as a crossing agreement; a crossing agreement is issued any time a third party proposes to undertake a ground disturbance within a buried facility right-of-way or within 5 m of a pipeline that is not in a right-of-way (CAUTION: within 30 m for federally regulated pipelines) to define the terms and conditions under which the ground disturbance may take place. Crossing agreements are also used internally between different operating divisions of the same organization. The agreement must at least follow the laws of the jurisdiction, but can and will set out even more stringent standards that must be complied with by the party wishing to create the ground disturbance. Note that a crossing agreement is referred to in regulations as an approval and does not mean physically crossing one facility over/under another. This applies whenever working within the distance described in the regulations. This glossary also contains definitions of internal, external, and written approvals as well as proximity, reciprocal, right-of-access, and right-of-entry agreements for other types of executed documents.

Damage notification: notification of any damage to a buried facility, either caused or found, regardless of severity, reported to the owner of the buried facility, who shall investigate the damage, take remedial action as required, and report the damage to appropriate regulatory agencies as required.

Emergency locate request: a locate request placed before the start 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.

Emergency response plan (ERP): a plan that prepares for all emergencies and details the appropriate response to each type of incident.

Employer: an “employer” is typically defined in OHS legislation as

- (a) a person who is self-employed in an occupation,
- (b) a person who employs one or more workers,
- (c) a person designated by an employer as the employer’s representative, or
- (d) a director or officer of a corporation who oversees the occupational health and safety of the workers employed by the corporation.

Encroachment: a use (e.g. human activity such as temporary workspace), structure, facility or other physical improvement that intrudes onto a right-of-way or in proximity thereto.

Encroachment Agreement: a written approval that allows a party to create a ground disturbance within the buried facility owner’s right-of-way.

ERCB: Alberta’s Energy Resources Conservation Board.

Ground disturbance: any work, operation, or activity that results in a disturbance of the earth including excavating, digging, trenching, plowing, drilling, tunnelling, augering, backfilling, blasting, topsoil stripping, land levelling, peat removing, quarrying, clearing, and grading, but does not include the following:

- (a) except as otherwise provided in subclause (b), a disturbance of the earth to a depth of less than 300 mm that does not result in a reduction of the earth cover over the pipeline to a depth that is less than the cover provided when the pipeline was installed;
- (b) agricultural cultivation to a depth of less than 45 cm below the surface of the ground;
- (c) any work, operation, or activity that is specified in the regulations not to be a ground disturbance.

The above definition is from the Alberta Pipeline Act. Given that some buried facilities may not have 300 mm cover, it would be prudent to consider any disturbance of the ground, regardless of depth, as a ground disturbance.

Ground disturbance supervisor: an employee, a consultant, or a contractor the company has deemed competent by formal examination or certification and has sufficient knowledge and experience to competently serve as the ground disturbance supervisor for ground disturbance activities.

Ground disturber: the person or company proposing to undertake a ground disturbance.

Hand exposure: non-destructive excavation techniques acceptable to the owner of the buried facility, to the extent that its identity, location, and alignment can be confirmed.

Hand expose zone: the distance from the locate marks within which mechanical excavation equipment shall not be used until the buried facility has been hand exposed. Under the Alberta Pipeline Act and Regulation, the hand expose zone for pipelines is 5 m. For federally regulated pipelines, the hand expose zone is 3 m. For all other types of buried facilities, the hand expose zone is 1 m.

Land owner: person or company in whose name a certificate of title has been issued pursuant to the Land Titles Act, or, if no certificate has been issued, the Crown or other body administering the land.

LIRPs: Locating Industry Recognized Practices.

Markers: wooden stakes or laths, wire or biodegradable pin flags, paint, chalk, stake chasers (fibre clusters), or other materials used to indicate the approximate horizontal alignment of a buried facility.

NEB: National Energy Board.

OGC: British Columbia Oil and Gas Commission.

OHS: occupational health and safety.

Pipeline: a pipe used to convey a substance or combination of substances but does not include the following:

- (a) a pipe used to convey water other than water used in connection with an oilfield facility, or other matter authorized under provincial or federal pipeline regulations;
- (b) a pipe used to convey gas, if the pipe is operated at a maximum pressure of 700 kilopascals or less, and is not used to convey gas in connection with a facility, scheme, or other matter authorized under provincial or federal pipeline regulations;
- (c) a pipe used to convey sewage.

Prime Contractor: when defined by provincial OHS legislation, worksites are required to have a prime contractor if there are two or more employers involved in work at the worksite at the same time. The prime contractor for a work site is

(a) the contractor, employer, or other person who enters into an agreement with the owner of the worksite to be the prime contractor, or

(b) if no agreement has been made or no agreement is in force, the owner of the work site.

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: the Alberta Pipeline Act and Regulation require that anyone proposing to undertake a ground disturbance take all precautions necessary to determine whether or not a pipeline exists within the limits of the proposed ground disturbance and for an additional 30 m area surrounding the limits of the proposed ground disturbance. If, during the course of a ground disturbance, the limits of the ground disturbance increase, the 30 m area will also expand to match that increase and maintain a 30 m undisturbed area beyond the ground disturbance that has been searched for the presence of pipelines. For other types of buried facilities, there are no specific search area requirements, but the prudent ground disturber would request locates for an area larger than the limits of the proposed ground disturbance.

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.

Written approval: a document provided to a ground disturber by the owner of a buried facility that establishes the terms and conditions under which the ground disturbance will take place. There are many situations where written approval before a ground disturbance is required:

(a) any time a ground disturbance is proposed within a pipeline right-of-way or within 5 m of a pipeline that is not in a right-of-way,

(b) any time a ground disturbance is proposed within the right-of-way of any other type of buried facility where that right-of-way is in favour of the owner of the facility,

(c) any time a ground disturbance is proposed within a highway right-of-way, and

(d) any time a ground disturbance is proposed within a municipal road allowance or utility right-of-way.

Written approvals may take many forms depending on the industry and the owner of the buried facility. Municipalities may use a ground disturbance permit process in conjunction with a right-of-access agreement.

APPENDIX A: CONTACT INFORMATION FOR ONE-CALL CENTRES

One-call centre	Phone number	Fax number	Website	Notice required
B.C. One Call	1-800-474-6886	604-451-0344	www.bconecall.bc.ca	3 full working days
Alberta One-Call	1-800-242-3447	1-800-940-3447	www.alberta1call.com	2 full working days
Sask 1st Call	1-866-828-4888	1-866-455-5559	www.sask1stcall.com	2 full working days
Ontario One Call	1-800-400-2255	1-800-400-8876	www.on1call.com	1 week
Info-Excavation (Quebec One-Call)	1-800-663-9228	1-800-441-3323	www.info-ex.com	3 full working days
Dig Line (St. John, NB) Operated by Info-Excavation	1-866-344-5463	1-800-441-3323	www.info-ex.com	2 full working days

APPENDIX B: UNIFORM COLOUR-CODE FOR MARKING BURIED FACILITIES (AMERICAN PUBLIC WORKS ASSOCIATION – APWA)

Limits of proposed excavation*	White
Temporary survey markings	Pink
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
Irrigation, reclaimed water, slurry lines or pipes	Purple

*The person proposing the ground disturbance is encouraged to mark the limits of job sites 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. In winter conditions, black may be used rather than white.

APPENDIX C: CAGC BEST PRACTICE – SEISMIC FLAGGING

SEISMIC FLAGGING COLORS

Designed to avoid confusion with International Color Code



ORANGE GLOW diagonal stripes 2x ORANGE or 50/50
Seismic Line location 2D or 3D receiver includes access arrows etc.



PINK GLOW diagonal stripes 2x PINK or 50/50
Seismic Line location 3D source includes access arrows etc.



YELLOW GLOW diagonal stripes 2x YELLOW or 50/50
Seismic hazard location



Red Glow
Seismic Source Point location
Pin Flag



Lime Glow
Seismic Receiver Point location
Pin Flag



INTERNATIONAL COLOR CODE FOR MARKING BURIED FACILITIES

	WHITE	Proposed Excavation
	PINK	Temporary Survey Markings
	RED	Electric Power Lines, Cable Conduit and Lighting Cables
	YELLOW	Gas, Oil, Petroleum and Gaseous Materials
	ORANGE	Telephone, Cable TV, Communication, Alarm and Signal
	BLUE	Potable Water
	GREEN	Sanitary Sewers, Storm Sewers and Drain Lines
	PURPLE	Reclaimed Water, Irrigation and Slurry Lines

NOTE:

To avoid conflicts flagging with "SEISMIC" may be used as alternative to striped flagging for marking line location if other local users have used striped flagging.

