





ENMAX CORPORATION

## GROUND DISTURBANCE GUIDELINES

Approved By:	Title	Date Approved
John Price	Director, Safety and Environment	January 15, 2021
Kevin Eckstadt	Safety Specialist	January 15, 2021



This document is reviewed a minimum of **every three years** or as required.

Rev No.	Date	Revision History
1	October 11, 2017	New document
2	March 30, 2020	Reviewed by stakeholders; updated format
3	January 15, 2021	Added reference to <a href="#">Primary Switch Disconnect Reconnect Form</a> Minor edits

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		<b>EFFECTIVE DATE: 15-JAN-2021</b>

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## 1.0 INTRODUCTION

### 1.1 PURPOSE

Ground disturbance, or excavations, poses significant hazards to workers, the public, and the environment. This document provides requirements companies and individuals MUST comply with when exposing buried ENMAX facilities. Other sources to comply with include provincial legislation, codes, bylaws and other utility requirements.



**WARNING:** Use extreme caution when working near energized cables; consider ALL power cables energized. Contact with cables may cause injury or death; therefore, excavators **MUST** contact their project inspector or access the [Primary Switch Disconnect Reconnect Form](#) to schedule switching and isolation of energized cables if cable support is needed.



**NOTE:** If energized cables cannot be isolated and grounded, companies must adhere to their own hand exposure and hydrovac safe work practices.

### 1.2 KEY CONTACTS

The following must be readily available when conducting ground disturbance near ENMAX facilities.



Key Contacts	Contact	Phone Number	Email
	Alberta One-Call	1-800-242-3447	<a href="http://www.AlbertaOneCall.com">www.AlbertaOneCall.com</a>
	ENMAX Customer Projects		<a href="mailto:getconnected@enmax.com">getconnected@enmax.com</a>
	ENMAX Hot Digs		<a href="mailto:HotDigs@enmax.com">HotDigs@enmax.com</a>
	ENMAX Transmission	403-514-3679	
	ENMAX Trouble Dispatch	403-514-6100	
	ENMAX Line Inspection	403-514-3117	<a href="mailto:lineinspection@enmax.com">lineinspection@enmax.com</a>

**NOTE** The [Primary Switch Disconnect Reconnect Form](#) must also be readily available

### 1.3 REFERENCES

All work must be carried out in accordance with the following:

Legislation	<a href="#">Alberta Occupational Health and Safety Code</a> <ul style="list-style-type: none"> <li>Part 17 Overhead Power Lines</li> <li>Part 18 Personal Protective Equipment</li> <li>Part 32 Excavating and Tunneling</li> </ul> Alberta Electrical Utility Code <ul style="list-style-type: none"> <li>Section 2- 014 Activities near Overhead Power Lines</li> <li>Section 2- 018 Moving Equipment or Buildings</li> <li>Section 2- 020 Excavation Activities in the Vicinity of Underground Power Lines</li> </ul> CAN/CSA Standard C22.3 No. 7-10 Underground Systems CAN/ULC-S801-(7.15.6) Standard on Electric Utility Workplace Electrical Safety
ENMAX form	<a href="#">Primary Switch Disconnect Reconnect Form</a>
ENMAX training	ENMAX Hazardous Electrical Awareness Tutorial Note: Available upon request at <a href="mailto:hotdigs@enmax.com">hotdigs@enmax.com</a> or <a href="mailto:safety@enmax.com">safety@enmax.com</a> .
Other resources	<ul style="list-style-type: none"> <li><a href="#">Alberta Common Ground Alliance</a></li> <li><a href="#">Canadian Common Ground Alliance</a></li> <li><a href="#">Where's the line? Power Line Safety</a></li> </ul>

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## 1.4 GLOSSARY

### Acronyms

AEUC	Alberta Electrical Utility Code	PPE	Personal protective equipment
LOA	Limits of Approach (Safety Code)	QUE	Qualified Utility Employee
HRC	Hazard Risk Category	SWP	Safe Work Practices

### Terms

Air excavation / Hydrovac equipment	A non-destructive process using pressurized water or air and a vacuum truck to remove earth cover (soil, gravel, stones, rubble, mud).
Competent worker	A worker who is adequately qualified, suitably trained, and with sufficient experience to safely perform work without supervision or with only a minimal degree of supervision.
Conflict zone	At risk locations within the work area for any of the following: <ul style="list-style-type: none"> <li>• Listed on the locate slip by the Locator</li> <li>• Within <b>1 m (3'-3")</b> of any locate marks</li> <li>• Within <b>2 m (6'-6")</b> of any ENMAX at-grade facility</li> <li>• As described in <a href="#">Attachment B - Conflict Zone</a>.</li> </ul>
Destructive excavation	An operation using equipment or explosives to move earth, rock or other material below existing grade.
ENMAX facilities	ENMAX facilities include: <ul style="list-style-type: none"> <li>• Cables</li> <li>• Concrete</li> <li>• Guy wire w/pole anchors</li> <li>• Manholes</li> <li>• Parallel lines</li> <li>• Poles</li> <li>• Pull boxes</li> <li>• Switches</li> <li>• Transformers</li> <li>• Transformer vault</li> </ul>
Excavator	Any contractor, developer, property owner, or other individual performing any work, operation or activity that results in a disturbance of the ground, regardless of depth.
Ground disturbance	Any work, operation, or activity that results in a disturbance of the ground, regardless of depth.
Hot dig	Process of exposing energized cables and facilities.
Locate marks	Temporary markings to identify the approximate location of underground infrastructure (buried facility). Examples include pin flags, coloured paint, stake chasers, coloured chalk, chevron.
Non-destructive buffer zone	One (1) metre (3'-3") from either side of the locate marks.
Non-destructive excavation	Hand exposure (provided there is a non-conductive handle on shovel), air vacuum or hydrovac equipment.
Qualified Utility Employee (QUE)	A power line or station utility employee trained and experienced to work safely on energized electrical equipment or lines.

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## 2.0 GROUND DISTURBANCE PROCESS

### 2.1 LOCATES

#### ENMAX underground facilities

**Submit** an online locate request at [Alberta One-Call](#) **PRIOR** to any ground disturbance near ENMAX facilities.

NOTE: Call Alberta One-Call directly at **1-800-242-3447** for the following:

- Request emergency locates
- Provide damage information

NOTE: Inside property-private owners (includes commercial lots, multi-dwelling) must obtain locates for secondary conductors via private utility locating service provider of choice.

#### At grade facilities

System ground wires and ground rods are not locatable. They are typically buried below the final grade and encompass a **1 m (3'-3")** area around or adjacent to ENMAX facilities.



**CAUTION:** Contacting the ground system may cause damage to the adjacent structures or equipment and/or personal injury or death. Only Non-destructive excavation in accordance with this Guideline may be performed when disturbing the ground within **2 m (6'-6")** of equipment.

#### Asphalt removal

Excavators must develop a procedure to ensure ENMAX facilities are not damaged.

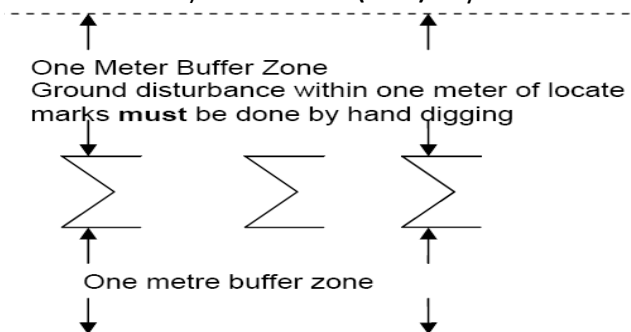


**CAUTION:** Locates do NOT determine depth or dimensions of manholes, vaults, or duct banks, increasing the risk of contact. Heavy equipment breakers, hammers and saw cutting asphalt/concrete can damage manhole roofs or shallow duct banks.

### 2.2 BUFFER ZONE

#### Within the buffer zone

Locate marks (chevron), shown below, depict the location of underground facilities. The buffer zone (non-destructive) extends **1 m (3'-3")** beyond the locate marks.





NOTE: Contact information for OTHER facility owners can be found on the back of the locate slip provided by the locate service provider.



**NOTE:** Locate marks are valid for **30 days** from the date provided.

#### Outside the buffer zone

If the ground disturbance occurs **OUTSIDE** the buffer zone, ENMAX has no restrictions on the ground disturbance. Excavation may proceed (subject to requirements of provincial legislation, codes, bylaws and other utilities).

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## 2.3 ENGINEERING SUPPORTS

**Supports**                      **Reference** [Attachment D Engineering Supports](#) to determine whether the planned ground disturbance will require engineering supports.

## 2.4 ENMAX PERMISSION LETTER

**Permission Letter**        **Obtain** an ENMAX Permission Letter PRIOR to performing ground disturbance near ENMAX facilities. The Letter MUST remain on site while exposing ENMAX facilities. **Email** [HotDigs@enmax.com](mailto:HotDigs@enmax.com) to obtain an ENMAX Permission Letter.

**Excavator requirements**                      Excavators MUST comply with the following requirements:

- Create and adhere to own SWPs for ground disturbance (reference [Attachment A – Safe Work Practices](#) for minimum requirements)
- Ensure all personnel involved in any ground disturbance are competent workers
- Ensure SWP and procedures comply with this guideline, legislation, bylaws, codes
- Ensure a cell phone or other means of contacting ENMAX Trouble Dispatch is always available while at the worksite
- Comply with all requirements contained in the ENMAX Permission Letter

## 2.5 NOTIFY ENMAX OF EXCAVATION ACTIVITIES

**ENMAX projects**                      Contact the ENMAX Project Inspector when performing work for ENMAX.



**All other work**                      Additional requirements include:

If...	Requirements
Cable inspection	Business hours – contact the senior line inspector After hours - Trouble Dispatch at 403-514-6100
Emergencies	Call 9-1-1
Emergency switching/isolation	Call Trouble Dispatch at 403-514-6100
Supports are required (See <a href="#">Attachment D</a> )	Submit stamped engineering drawings to <a href="mailto:hotdigs@enmax.com">hotdigs@enmax.com</a> a minimum of 14 days prior to planned excavation facility support approval.
Third-party contractor/ homeowner	Complete the ENMAX <a href="#">Primary Switch Disconnect Reconnect Form</a> .
Work is within <b>2 m (6'-6")</b> of ENMAX equipment	Complete the ENMAX <a href="#">Primary Switch Disconnect Reconnect Form</a> NOTE: The primary switching request must be completed a minimum of 5 days prior to planned excavation.
New projects	Email <a href="mailto:getconnected@enmax.com">getconnected@enmax.com</a> a minimum of 14 days prior to planned excavation.

## 2.6 COMPLETE GROUND DISTURBANCE

**Perform ground disturbance**                      **Complete** ground disturbance in accordance with this Guideline; requirements include:

- [Attachment A – Safe Work Practices](#)
- [Attachment B – Conflict Zone](#)
- [Attachment C – Excavation Methods](#)
- ENMAX Permission Letter - instructions and restrictions conveyed by ENMAX

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## 2.7 BACKFILL

### Notifications

Notify the following PRIOR to backfilling the site.

If work is for	Then contact the following PRIOR to backfilling...
ENMAX	Project Inspector to arrange for inspection
Other	During business hours –senior line inspector After hours - Trouble Dispatch at <b>403-514-6100</b> to arrange inspection

### Specifications

After the work is completed, pad exposed facilities with the following.

Material	Requirements
Bedding sand	Covers the facilities to a minimum depth of 200 mm (8”), and free from: <ul style="list-style-type: none"> <li>• Snow and ice</li> <li>• Organic material</li> <li>• Loam</li> <li>• Stones larger than 5 mm (1/5”)</li> </ul> NOTE: Excavators are required to provide compaction test results to ENMAX, if requested.
Common backfill	Placed on top of the bedding sand. Material to be used must be free from: <ul style="list-style-type: none"> <li>• Snow and ice</li> <li>• Organic material</li> <li>• Loam</li> <li>• Boulders larger than 200 mm (8”)</li> </ul> NOTE: Common backfill compaction must comply with The City of Calgary specifications to a minimum of 95% proctor dry density.

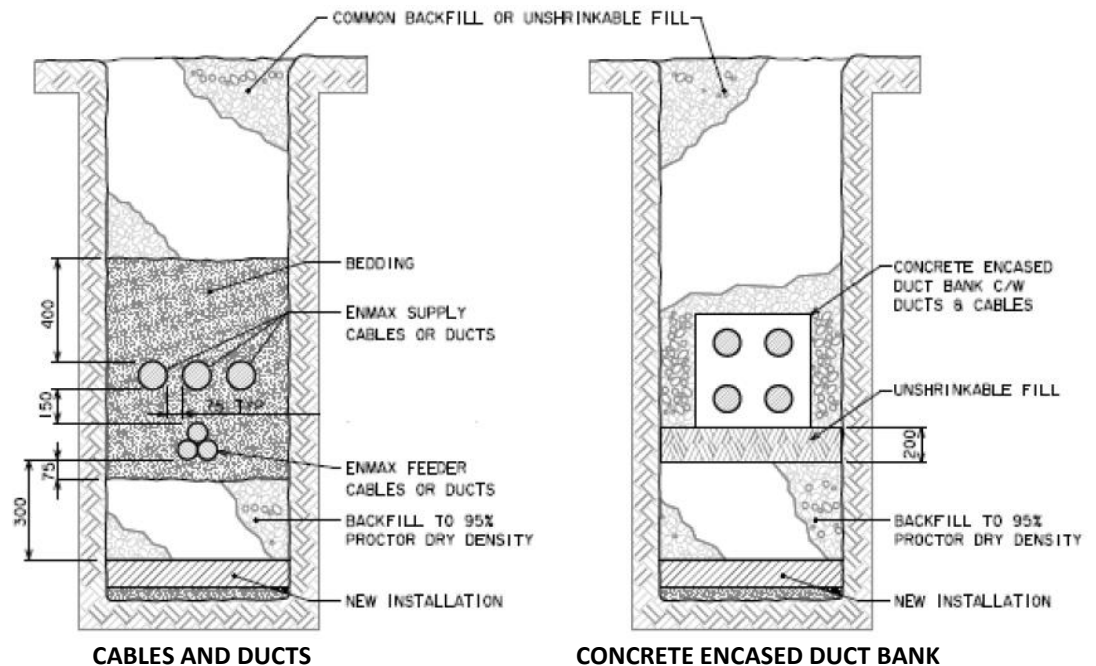




**NOTE:** Restore final grade to ensure the burial depth of ENMAX cables has not changed. Contact your ENMAX Inspector if a rise or fall in the final grade exists **PRIOR** to excavation and backfill to record the new grade. For all others, call 403-514-6100

### Spacing

Backfill requirements for cables and ducts are shown below.

NOTE: All dimensions are MINIMUM requirements.




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## 2.8 PROCEDURE – IF DAMAGE OCCURS

### Procedure

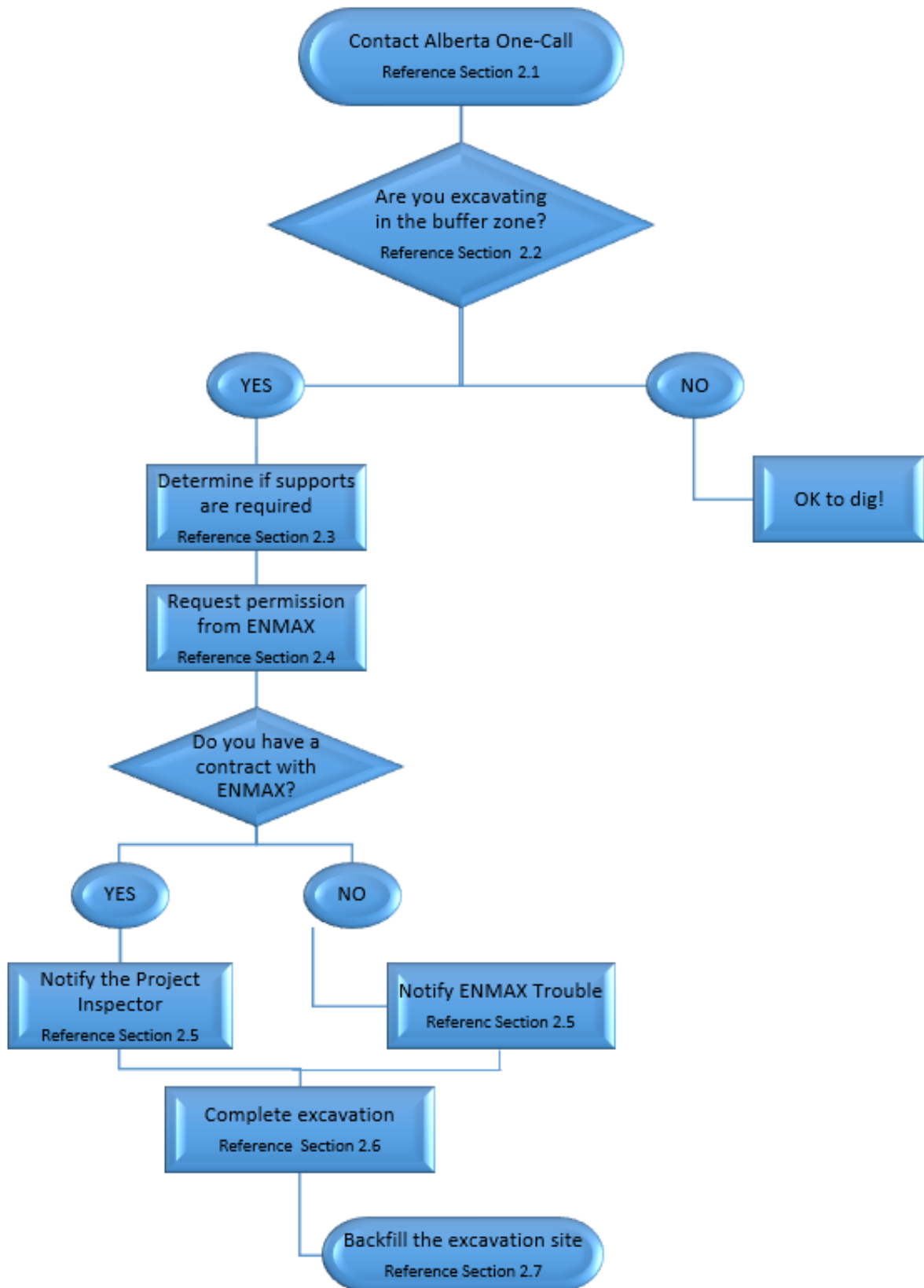
Excavators must complete the following steps if there is any damage to an ENMAX facility.



Step	Action
1.	<b>STOP WORK!</b>
2.	Exit the excavation immediately.
3.	Call <b>911</b> if an injury has occurred.
4.	Secure the site; use appropriate signs, barriers, or barricades.
5.	<p><b>Contact</b> ENMAX Trouble Dispatch at 403-514-6100 and the Project Inspector if required.</p> <div style="border: 2px solid red; padding: 5px;">  <p><b>WARNING:</b> Do <b>NOT</b> re-enter the excavation site until clearance has been given and repairs have been completed by an ENMAX QUE. Repairs can <b>ONLY</b> be completed by ENMAX personnel and approved ENMAX contractors.</p> </div>



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## 2.9 GROUND DISTURBANCE PROCESS FLOWCHART



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## ATTACHMENT A – SAFE WORK PRACTICES

### Barriers and barricades


Excavators are responsible for the following:

- **Prevent** exposed energized equipment and cables from public contact
- **Restrict** access to all open excavations during periods of inactivity (unsupervised); may include a cover, barricade, **1.8 m (6') rigid fence**

### Personal protective equipment (PPE)

A minimum of the following PPE is required for all ground disturbance activities within the buffer zone; for hand exposing only.

Reference AB OH&S Part 18.


Protective clothing	Fire resistant outer layer clothing, ankle to cuff <b>Note:</b> HRC 2 (8 Cal/ cm2) minimum
Safety glasses	CSA Z94.3 Eye and Face Protectors
Rubber gloves	Tested - Class 3 high voltage rubber insulated gloves (rated at 30,000 volts) with outside leather protectors.
Head protection	CSA Approved Class E Hard Hat
Hearing protection	CSA approved hearing protection (if required)
Footwear	CSA approved dielectric footwear with the following symbols:  



### Warning signs

If the job site and equipment are left unsupervised, signs in accordance with the excavator's procedures **MUST** be visible. Minimum information to include:

- Caution or Warning of open excavation
- Name of ground disturber
- Emergency contact number

“**DANGER HIGH VOLTAGE**” sign must be located a minimum of **3 m (9'-10")** from the truck to reduce the risk of injury from step and/or touch potential.

	<b>WARNING:</b> Do NOT touch any vehicles while excavating is in progress to avoid touch potential (electrocution may occur).
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## ATTACHMENT B – CONFLICT ZONE

### Primary and secondary cables

Mechanical excavation is **NOT** permitted within the **1 m (3'-3")** buffer zone until the underground facilities have been fully exposed to sight and a minimum of **600 mm (24")** separation above, below, and parallel to the facility or desired depth using non-destructive excavation techniques.



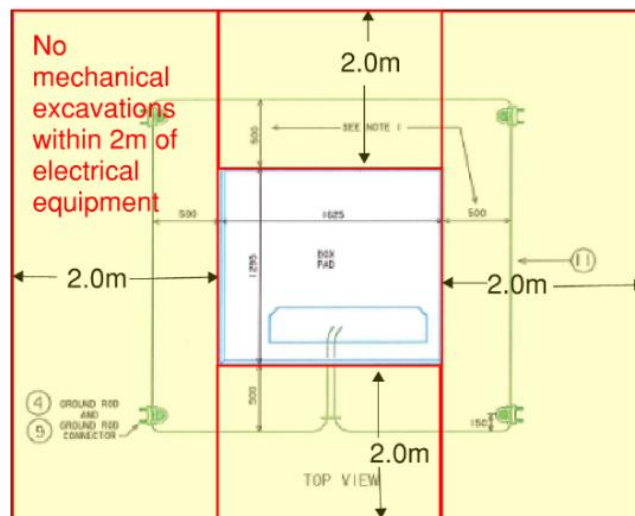
**NOTE:** The non-destructive buffer zone is **1 m (3'-3")** on either side of the locate mark.

### Underground transmission equipment and cables

If an ENMAX **"NO CLEARANCE TO DIG"** sticker exists on the locate slip, then mechanical excavation work is **NOT** permitted within **5 m (16'-5")** on either side of the locate mark. Contact ENMAX Transmission using the number provided on the locate sticker. See ENMAX note located on the back of the Alberta One-Call ticket for direction.

### Distribution equipment

Mechanical excavation is **NOT** permitted within **2 m (6'-6")** of any ENMAX Equipment; use non-destructive methods **ONLY**. See ENMAX note located on the back of the Alberta One-Call slip for direction and notification.



### Overhead electrical lines



Ground disturbance may occur near overhead electrical lines. The excavator must ensure safe distances to electrical lines and equipment are adhered to; reference AEUC Table 2.1 (Part 17 OH&S)



**NOTE:** Personnel and equipment must stay a minimum of **7 m (~23')** from all overhead lines.

Contact one of the following if work is required closer than **7 m (~23')**:

- ENMAX Project Inspector
- ENMAX Trouble Dispatch at **403-514-6100**
- ENMAX Alternate contact - 403-514-3117 for a Safety Codes Act Limits of Approach
- Email [lineinspection@enmax.com](mailto:lineinspection@enmax.com)

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## ATTACHMENT C – EXCAVATION METHODS

### 1. Air Excavation Method

#### Minimum equipment specifications

Air excavation uses pressurized air that is used to slough away soil and is subsequently collected by a vacuum tool such as an Air Spade.

At a minimum, when using air excavation ensure that:

- Air pressure does **not exceed 100 psi**
- Vacuum dig tube end has a neoprene lip or equivalent
- Non-conductive wand, tube and hose extensions



**CAUTION:** Any air pressure above the listed values is considered a destructive means of excavating.

#### Potential risks to facilities

Cable damage may occur if falling rocks or sloughing material contact exposed cables or ducts. If damage is suspected, reference section *2.8 Procedure – If Damage Occurs*.

#### Minimum safety precautions

Ensure the following minimum safety precautions when exposing cables using air excavation:

- Do **NOT** allow the wand to become stationary
- Make a sweeping motion during use perpendicular to the cables (vs. lengthways); this eliminates stationary contact with the cable at the end of each sweep
- After the buried facility is exposed, maintain a minimum distance of **175 mm (7")** between the cable and the wand nozzle
- Avoid positioning the vacuum tube directly over exposed facilities



**WARNING:** The air wand and vacuum pipe may become energized if faulted conditions exist.

### 2. Hand Exposure Method

#### Minimum equipment specifications

Ensure the following **minimum** requirements when using shovels to hand expose underground cables:

- Shovels have dry, non-conductive handle
- Pointed probes that may pierce the cables are not used

#### Potential risks to facilities

Cable damage may occur if the shovel hits the cable. If damage is suspected, reference section *2.8 Procedure – If Damage Occurs*.



#### Minimum safety precautions

Ensure the following minimum safety precautions when exposing cables with a shovel:

- Use PPE as per [ATTACHMENT A](#)
- Expose cables to sight at regular intervals (minimum of 5 m)
- No mechanical means within 600 mm once line is exposed.
- Use extreme caution when working within **1.5 m (≈5')** of any cable splices.
- Notify ENMAX Trouble Dispatch at 403-514-6100 or Project Inspector, to arrange for inspection prior to backfilling splices.



**WARNING:** Do not move, walk on, or disturb cable splices while hand exposing cables.


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### 3. Hydrovac Method

#### Minimum equipment specifications

At a minimum, when using hydrovac, ensure:

- Water pressure does **not exceed 1500 psi**
- Water temperature does **not exceed 37.8 °C (100 °F)**
- Vacuum pipe end has a neoprene lip or equivalent to protect the cable/facilities
- There is a single oscillating tip nozzle
- The wand is always moving



**CAUTION:** Any pressure or temperature variances above the listed values is considered a destructive means of excavating.


#### Potential risks to facilities

A combination of the water temperature and pressure may damage cables. Damage may appear as a slice in the cable sheath of an unknown depth, or as though the outer sheath has been torn and pulled outward. If damage is suspected, reference section 2.8 *Procedure – If Damage Occurs*

#### Minimum safety precautions

Ensure the following minimum safety precautions when exposing cables with hydrovac:

- Expose cables to sight at a minimum of **5 m (~16')** intervals
- Direct the high-pressure nozzles in a circular motion
- Do NOT allow the wand to become stationary
- Make a sweeping motion during use perpendicular to the cables (vs. lengthways); this eliminates stationary contact with the cable at the end of each sweep
- After the buried facility has been exposed, maintain a distance of at least **175 mm (7")** between the cable and the oscillating head of the water wand.
- Avoid positioning the vacuum tube directly over exposed facilities.



**WARNING:** The water, wand, and vacuum pipe may become energized if faulted conditions exist.

### 4. Destructive Excavation and Directional Coring


#### Equipment

Includes the following equipment after a facility has been exposed to sight:

- |                 |                                |                            |               |
|-----------------|--------------------------------|----------------------------|---------------|
| • Auger         | • Hammer (electric, hydraulic) | • Directional drills       | • Plows       |
| • Ditch witch   | • Pneumatic jack hammers       | • Track or rubber tire hoe | • Scrapers    |
| • Dozer, grader | • Saw (asphalt, concrete)      | • Post pounders            | • Skid steers |

#### Potential risks to facilities

Destructive excavation methods have the potential to damage underground equipment and buried facilities. If damage is suspected, reference 2.8 *Procedure – If Damage Occurs*.




**WARNING:** If any part of the equipment contacts an energized cable, the equipment operator **MUST** remain on the machine (if safe to do so) until given a clearance from an ENMAX QUE.



#### Minimum safety precautions

Ensure the following minimum safety precautions when directional coring or using other destructive excavation methods:

- Observe the payload when pulling back through the excavation
- Ensure there is ample clearance and separation above or below the facility
- Maintain **1 meter** of separation above, below and parallel to the cable
- Expose cables to sight at regular intervals (minimum of 5 m)
- Spotters **MUST** always be present when using excavation equipment



**CAUTION:** Expose all cables and facilities to sight **AND** a minimum of **1 m (3'-3")** exposed on the drill side **PRIOR** to mechanical excavation. This allows the operator time to stop the task if the drill head approaches the cable/duct.

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## ATTACHMENT D – ENGINEERED SUPPORTS

### Underground facilities

Excavators supply the following to support cables and duct banks in underground facilities subject to ENMAX’s approval.

Supports	Requirements
Beams and poles	<ul style="list-style-type: none"> <li>Steel “I” beam or wood pole (excavator to determine the size) NOTE: Submit stamped engineering drawings to <a href="mailto:Hotdigs@enmax.com">Hotdigs@enmax.com</a>.</li> <li>Place across the excavation parallel with the undermined facility</li> <li>Design to prevent sag, bending, and deflection</li> <li>Sufficient length to reach a minimum of <b>3 m (9’-10”)</b> beyond the edge of the excavation (on both sides)</li> <li>Supporting structure will not slough into the excavation due to unstable soil conditions</li> </ul>
Chains	Support concrete encased duct banks.
Slings	Direct buried cable or ducts must be supported by nylon slings
Transformers, switches, and pull boxes	<ul style="list-style-type: none"> <li>Must NOT be undermined and must be supported</li> <li>Complete the ENMAX <a href="#">Primary Switch Disconnect Reconnect Form</a> to determine next steps.</li> </ul>



**NOTE:** The maximum distance between supports (beams/chains/slings) is **1200 mm (~ 4’)**.

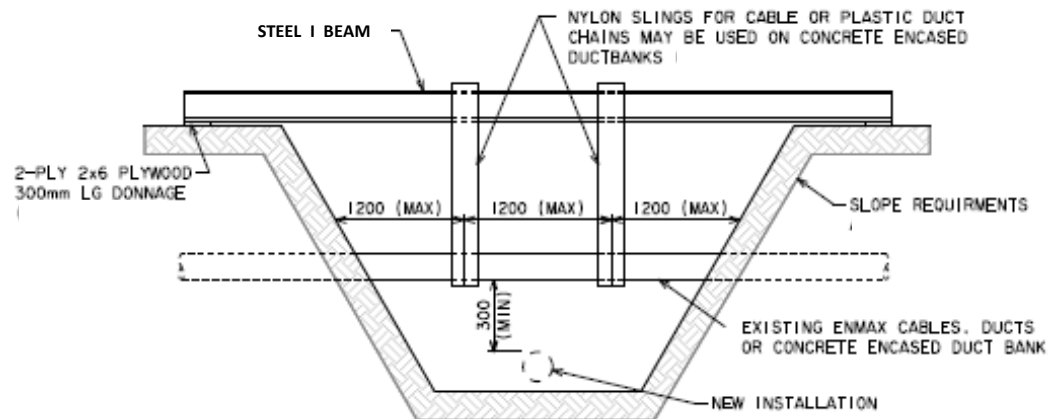





FIGURE I  
CABLE & DUCTBANK SUPPORT

NOTE: All dimensions are in millimetres.

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**Power poles**

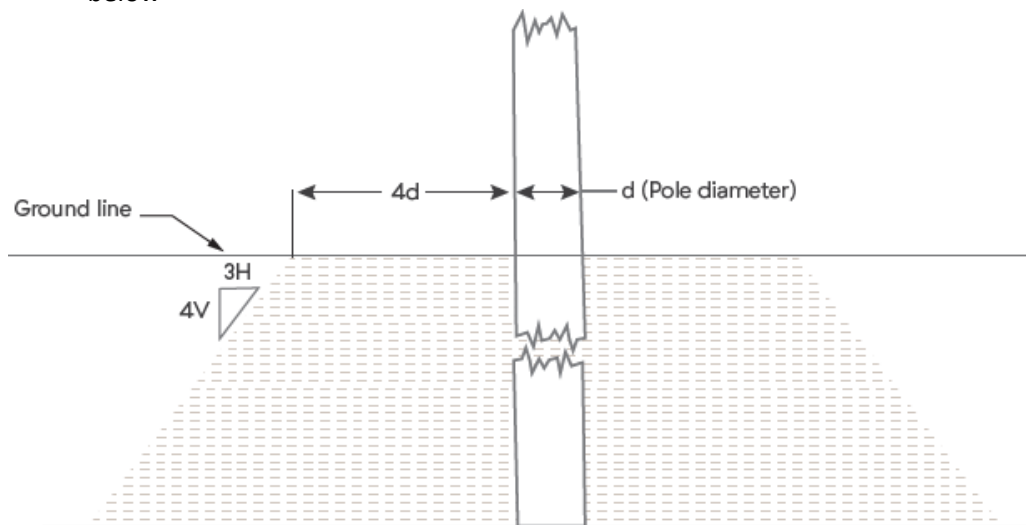
ENMAX requires excavators to stabilize poles and associated equipment, where required below, prior to any ground disturbance.




**WARNING:** The collapse of a power pole could expose individuals to a crush hazard or electrocution.

Poles must be supported if:

- The soil is not firm
- Excavation occurs within the **shaded protected zone** shown in the illustration below





**NOTE:** The **shaded protected zone** encompasses the following area:

- At grade: 4d (4 times the pole diameter) away from the pole
- Below grade (cut angle): **3 m (9'-10")** horizontal to every **4 m (~13')** depth

All excavations and slope cuts must be in accordance with the following AB OH&S Code:

- Part 17 Limits of Approach
- Part 32 Pole Support

**Pole tie back vendors**

Excavators must contact their ENMAX Project Inspector or ENMAX Trouble Dispatch at 403-514-6100 if questions arise regarding a pole tie back.

NOTE: A QUE must complete all pole tie backs.

Excavators must contact an approved pole tie back vendor for availability and cost. ENMAX approved pole tie back vendors with approved QUEs are listed below.

Tie-back Vendor	Phone Number	Email
Allteck	250-826-4503	
Primary Engineering	403-369-7280	
Proline Power	780-228-7479	corey@prolinepower.ca
Valard Construction	403-700-0982	