



# **GUIDELINES**

## **FOR WORKING IN PROXIMITY TO CITY OF MEDICINE HAT POWERLINES**

**You don't have to touch a buried or overhead line to be electrocuted...**



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# INTRODUCTION

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Every day, two to three Albertans will come in contact with an overhead or underground power line. The potential for injury and even death is extremely high when safety is not placed as the priority on the job.

Many electrical incidents occur because workers are unaware of the safe limits of approach and get too close with equipment, tools and their own bodies. Another frequent incident cause is the result of utilizing the skills of an individual worker or operator as a safety barrier. These are incidents that can be prevented with education and by showing respect for the electrical infrastructure that makes our world what it is.

The City of Medicine Hat is a proud member of the Joint Utility Safety Team, working with AltaLink, Fortis Alberta, ATCO Electric, ENMAX Power, EPCOR, The City of Lethbridge and the Government of Alberta to spread awareness to power line safety. For more information on this initiative and how your employees can work safely around power lines visit JUST's website, ***wherestheline.ca***. You'll find industry-specific resources and training to keep power line safety a top priority on your work-site including what to do when you contact a power line, videos, newsletters and promotional materials for your workplace.

This document provides guidance to both workers and contractors regarding safe practices in relation to exposing and working in proximity to buried and overhead electric facilities within the City of Medicine Hat Electric Operations service area. This service area includes the City of Medicine Hat, Redcliff, Dunmore, Desert Blume and parts of Cypress County, please refer to the Map 1 on page 7.

This document is evergreen and will be updated as required. These guidelines are for information only and do not supersede legislation. All workers and employers must independently assess work requirements and implement their own safe work procedures to address all requirements of this guideline and all other legislative and regulatory requirements. They are intended to support the development of safe work procedures for working in proximity and exposing energized low, medium and high voltage electric cables and to assist in meeting the requirements of:

- Alberta Electrical Utility Code (AEUC) 5th Edition 2016,
- Alberta OH&S Act, Regulation and Code
- City of Medicine Hat, Electric Operations, Power System Work Standards. Rev. 2.0, 2019
- CSA, C22.3 No.7-10 "Underground Systems"
- CSA, C22.3 No. 1-15 "Overhead Systems"
- Canadian Electrical Code Part 1
- CAN/ULC-S801-14
- Alberta Electrical System Operator (AESO), ISO Rules 2018
- Canadian Common Ground Alliance

When working within the parameters of this document, keep in mind that Electric Operations business hours are between 8:00am and 4:00pm. Cutoff for requests is 2:00pm, no exceptions. Qualified Utility Employee's are available to be booked for agreements, meetings, reclosure blocks and other related work during business hours only.



**LOOK**

**LOCATE**

**LIVE**

**WHERE'S THE LINE?**  
POWER LINE SAFETY

# DEFINITIONS

Refer to the following definitions for this document:

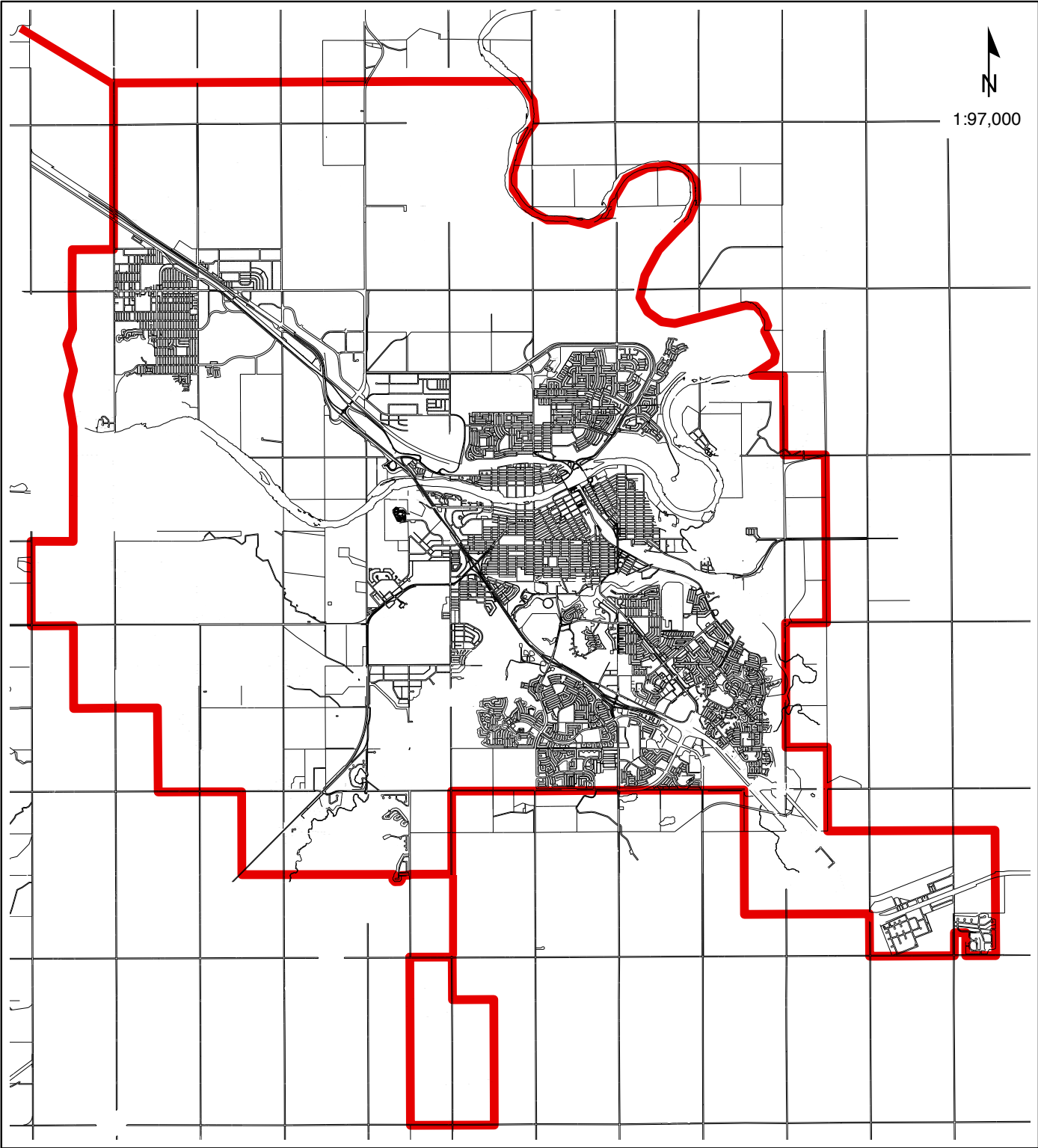
- AESO** . . . . . The Alberta Electric System Operator is responsible for the safe and reliable operation of the Alberta Interconnected Electric System (AIES).
- AEUC** . . . . . The Alberta Electric Utility Code.
- Contractor** . . . . . anyone disturbing the ground (including home owners)
- City of Medicine Hat QUE** . . . . Qualified Utility Employee deemed competent by the City of Medicine Hat Electric Utility
- City of Medicine Hat SCO** . . . . Qualified Safety Codes Officer recognized by the Alberta Safety Codes Council with designation of powers by the City of Medicine Hat Electric Utility.
- DE-ENERGIZED (DEAD)** . . . . . At a potential equal to or not significantly different from that of ground at the worksite. No cable or device is considered de-energized unless it is grounded.
- ENERGIZED (LIVE)** . . . . . At a potential significantly different from that of ground (earth) at the worksite and which presents an electrical hazard. NOTE: A part is energized when it is electrically connected to a source of electric energy. It can also be energized when it is electrically charged under the influence of an electric or magnetic field. Apparatus must be considered energized unless confirmed isolated and grounded.
- GROUNDING** . . . . . Electrically connected to earth through a grounding electrode or through an extended conducting body.
- Hand Dig** . . . . . No mechanical excavation work. The only tool allowed is a clean, non-conductive shovel until all buried facilities have been found or hydrovac.(See Part 32 Section 448-1 of AOH&S Explanation Guide)
- Hand Expose Zone** . . . . . distance from outside of locator marks that must be exposed by hand dig or non- destructive hydrovac methods (See 2.1)
- HIGH VOLTAGE (HV)** . . . . . Voltages equal to or greater than 50,001 Volts a.c. (line to line) or 50,001 Volts d.c. Or simply stated CMHE transmission voltages (69,000 Volts or 138,000 Volts a.c.). CMHE does not have any high voltage d.c.
- INSULATED** . . . . . Having sufficient insulating covering, dielectric separation and/or airspace to prevent a significant flow of current (i.e., current that can cause personal injury or harm to equipment) between objects at different potentials.
- LIMIT OF APPROACH** . . . . . See minimum approach distance.
- MINIMUM APPROACH**
- ❖ **DISTANCE (MAD)** . . . . . Also referred to as “Minimum Working Distance”. The minimum distance in air to be maintained between any part of the body of a worker, including any object being handled directly, and any part(s) at different potential(s). This distance will be referenced for contractors and non-electric personnel in a Electric Proximity Hazard Orientations.
- MECHANICAL EXCAVATION** . . Boring or open cut excavation by means of mechanical excavating equipment such as powered excavator, earth mover, earth piercing equipment including hand held augers and other mechanical equipment.



- MEDIUM VOLTAGE (MV)** . . . . . Voltages between 1,001 Volts a.c. (Line to line) to 50,000 Volts a.c. (Line to line) or 1,501 V d.c. to 50,000 V d.c. Or simply stated CMHE distribution primary voltages (8,000 V or 13,800 V a.c.). CMHE does not have any medium voltage d.c.
  
- NEAR** . . . . . Close to; or in such proximity so as to give rise to the possibility of encroaching on the Limits of Approach.
  
- Non-destructive** . . . . . See hand dig definition and Figure 1.
  
- Locate** . . . . . Identification on the ground of the position of the utility line(s) and related underground infrastructure based on records or electronic locating equipment and includes provision of necessary documentation such as a locate sheet.
  
- LOW VOLTAGE (LV)** . . . . . Voltages equal to or less than 1,000 Volts a.c. (Line to line) or 1,500 Volts d.c. Or simply stated CMHE distribution secondary a.c. voltages. All d.c. CMHE voltages are considered low voltage.
  
- PORTABLE BOND MAT** . . . . . A mat that creates an equipotential zone for the worker to stand during various energized and de-energized work practices.
  
- PROXIMITY** . . . . . For the purposes of electrical operations, distance at which there is a possibility of exposure to an adverse effect (e.g. arc flash hazard, radio frequencies, electromagnetic frequencies).
  
- STEP POTENTIAL** . . . . . The difference in voltage level from one foot of a person to the opposite foot. This can be felt when a person steps across an energized path of earth. The worker forms a parallel path to the earth and current flows through the worker as well as the earth. This can result in harmful current levels in some situations.
  
- TOUCH POTENTIAL** . . . . . The difference in voltage level between energized electric lines or equipment and the earth. This may be felt by a person standing on the ground when they contact the electric lines or equipment and complete a parallel path to earth. The voltage may be supplied by a power system element such as a portable generator, or by unintentional energization, or by induction. Touch potential can vary greatly, as it depends on the distance from where the worker is standing to the location of the source voltage.
  
- ❖ . . . . . Identifies and edit or change from the previous version of this document

# CITY OF MEDICINE HAT ELECTRIC SERVICE AREA MAP

Figure 1. CMHE Service Area Map







# **PART 2**

## **GROUND DISTURBANCE IN PROXIMITY TO BURIED ELECTRIC FACILITIES**



# 2.0 U/G WORK STANDARDS AND PLANNING CONSIDERATIONS

## 2.1 LOCATING BURIED ELECTRIC FACILITIES

Over 25% of direct power line contacts in Alberta involve excavators. The majority of incidents involving overhead power lines occur while the equipment is being operated or transported. Even if the equipment doesn't make direct contact, electricity can arc or "jump" from the power line to any conductive object. The chances of arcing increase with the voltage.

Failing to locate buried utilities prior to disturbing the ground and inexperience working around marked lines are two reasons why underground power line contacts are so common. Request a City of Medicine Hat Electric locate before you dig by contacting Alberta One-Call on-line or at 1-800-242-3447.

Prior to disturbing the ground, the ground disturber must ensure that underground utility locations for all buried facilities have been completed through Alberta-1-Call. **The locate process will indicate if a CMH Electric**

- ❖ **Proximity Hazard Orientation is required.** All location documentation must be current and on site with the person doing the excavating. The City of Medicine Hat Electric Operations locator's will use different types of marks to assist in identifying what steps are required.

A chevron with a closed top, or diamond shape, indicates transmission or high voltages (pictured below).

- ❖ These are rare in the service area, but they do exist. If there is buried transmission both a Proximity Hazard Orientation and Regulatory approval is required. See 2.4 for details.

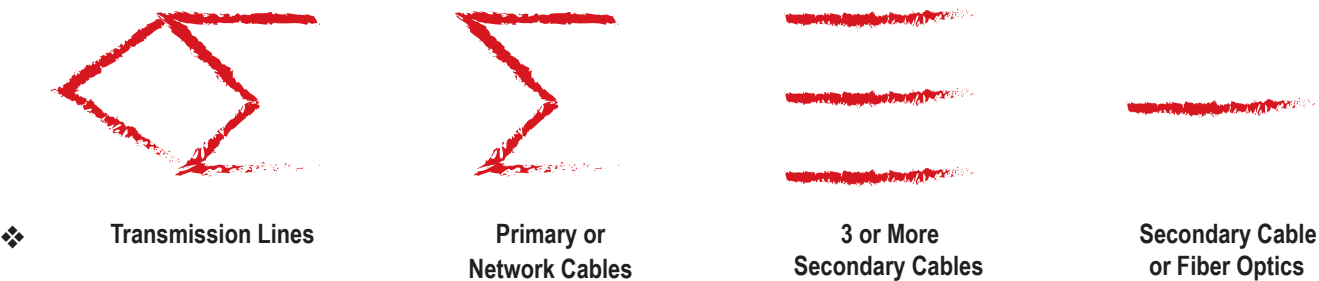
A chevron indicated primary voltages, can be either single or 3 phase (pictured below). If there is buried primary, a Proximity Hazard Orientation is required. See 2.4 for details.

- ❖ Dashed lines indicate secondary voltage. A Electric Proximity Hazard Orientation is not required at this time, excavators shall comply will all legislation in relation to excavating in proximity to buried electric lines utilizing safe work practices.

*Note: ALL ELECTRIC CABLES ARE TO BE TREATED AS ENERGIZED DURING THE EXCAVATING AND BACKFILLING PROCEDURES.*

*Note: For overhead electrical lines see part(s) 2.6 and all of 3.0 of this document.*

Figure 2. Legend for CMH Electric Locate Marks



## 2.2 PROTECTION OF CABLES AND EQUIPMENT IN OPEN EXCAVATIONS

The contractor and site personnel will ensure exposed energized equipment and cables are secured from public contact while they are unattended. During periods of inactivity all open excavations will be covered, barricaded and adequately fenced off with approved fencing to minimize access to the exposed facilities.

## 2.3 DAMAGE

If damage has occurred while exposing City of Medicine Hat Electric (CMHE) facilities:

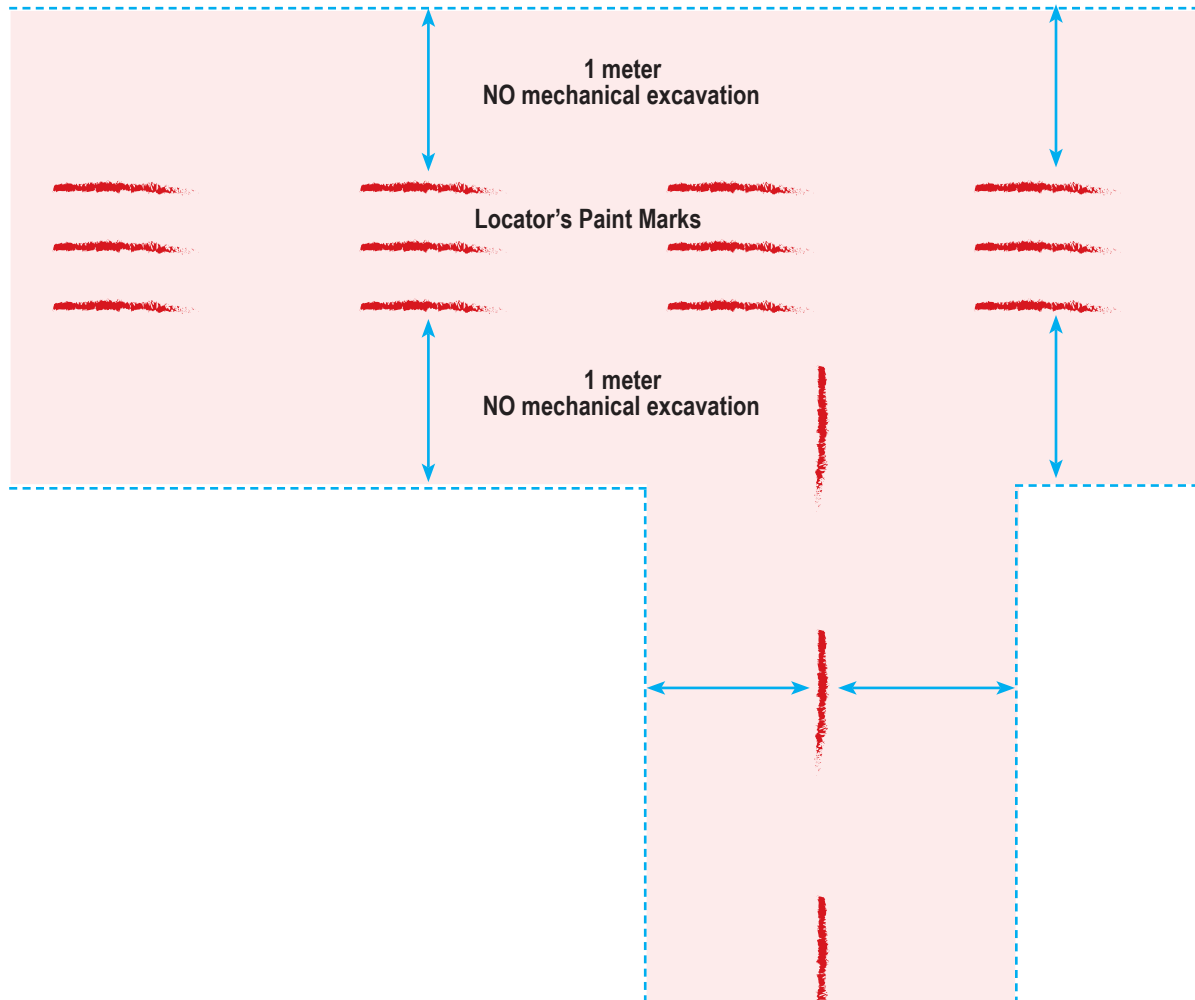
1. STOP WORK and don't move or touch anything, be conscious of step and touch potential.
2. Keep those outside the dig in back 10 meters and if possible secure the site.
- ❖ 3. Contact 911 if an injury has occurred. Notify City of Medicine Hat Electric Operations (403-529-8260). Do not re-enter the excavation until clearance has been given and repairs have been completed by a CMHE, Qualified electric employee.
- ❖ 4. In event of a line contact all CMHE work permissions will be suspended until an investigation is complete and submitted to CMHE SCO only a CMHE SCO may reinstate work permissions.

## 2.4 CLEARANCE STANDARDS NON MECHANICAL EXPOSE ZONE

❖ **Underground Secondary Cables** (Low Voltage: Less than 600 volts line to line).

No mechanical excavation work is to be undertaken in any circumstances within the no mechanical excavation zone, 1.0 meter on either side of the locate markers placed by Alberta One-Call. Only a non-destructive means of excavating is permitted within the one meter buffer zone. (hand-dig or hydrovac). See 2.12 for asphalt challenges.

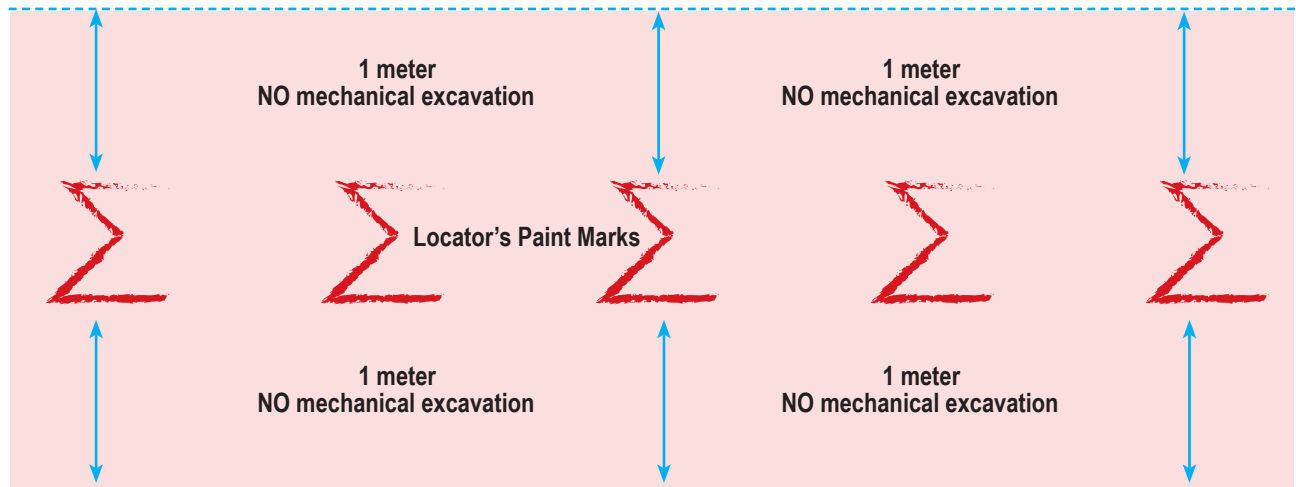
**Figure 3. Secondary Buffer Zone**



#### Underground Primary Cables (Medium Voltage: 8,000 or 13,800 volts)

When there is a "CONFLICT" stamp from City of Medicine Hat Electric on the locate slip, or marks on the ground indicating buried primary cables, then no mechanical excavation work is to be undertaken under any circumstances within 1 meter on either side of the location markers. Excavations outside this buffer zone may proceed, but should ❖ work be required within this zone a Electric Proximity Hazard Orientation is required. Contact the City of Medicine Hat Electric Operations at 403-529-8260, a City of Medicine Hat QUE shall meet on-site and provide formal guidance before excavation will be allowed within this area.

Figure 4. Primary Buffer Zone



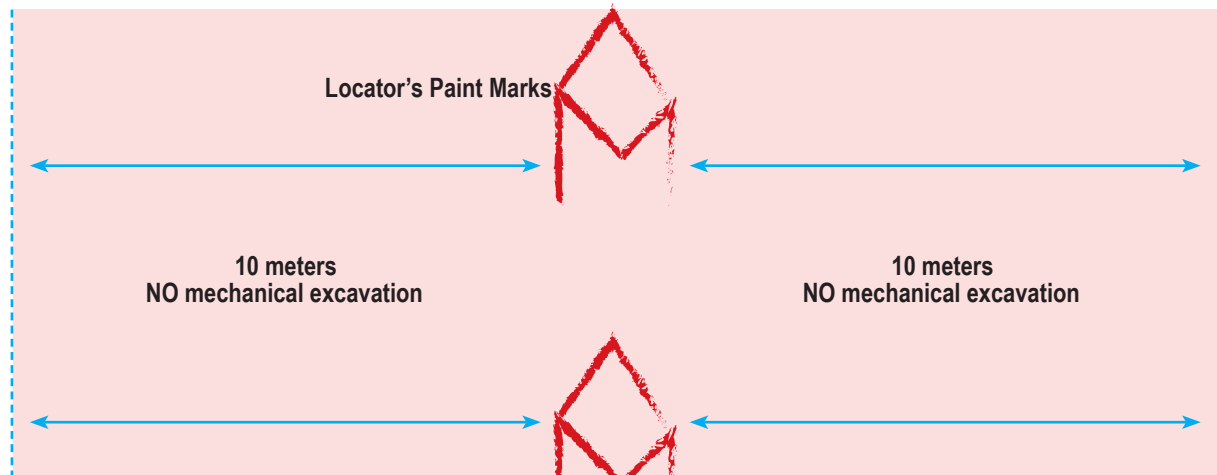
#### Underground Transmission Cables (High Voltage: 69,000 or 138,000 volts)

When there is a "CONFLICT" transmission indicated on the City of Medicine Hat Electric locate slip, or the marks on the ground indicating buried transmission cables, then no mechanical excavation work is to be undertaken under any circumstances within 10 meters on either side of the location markers.

In the event of digging is required within 10 meters of buried transmission cable, contact City of Medicine Hat Electric Operations (403-529-8260). **Under NO circumstances shall the cables be energized during excavation within this zone.** Provincial approval (in accordance with ISO rule 306.4) is required prior to de-energization of any transmission cable and any work will require excavators to submit the request with the City's Electric System Control Operators a minimum of **45 days in advance**.

A City of Medicine Hat QUE must be on-site during excavation and they will provide excavators with both ❖ a Electric Proximity Hazard Orientation and a G.O.I (Guarantee of Isolation).

Figure 4. Transmission Buffer Zone



## 2.5 TRANSFORMERS, SWITCHGEAR AND ENCLOSURES

- ❖ No mechanical excavation will be permitted that may result in damage to the protective ground grids associated with CMHE Transformers, Switchgears, or Enclosures. An Electric Proximity Hazard Orientation will be issued and only approved non-destructive hydrovacing or hand exposing will be permitted within 1 meters of the ground grid. See also 3.7 and 3.8.

CAUTION: System ground wires and ground rods are not locatable and are typically buried below the final grade and encompass an engineered area around or adjacent to City of Medicine Hat Electric Facilities. Contacting the ground system may cause damage to the adjacent structures or equipment and/or personal injury or death. No mechanical excavation work is to be undertaken in any circumstances when disturbing the ground within

- ❖ 1 meters of the locate marks that will be painted at a measured distance from the equipment. No one should handle, disturb, move or modify a ground grid. Placing ones self in series with an open ground can be fatal.

## 2.6 STRUCTURE SUPPORT

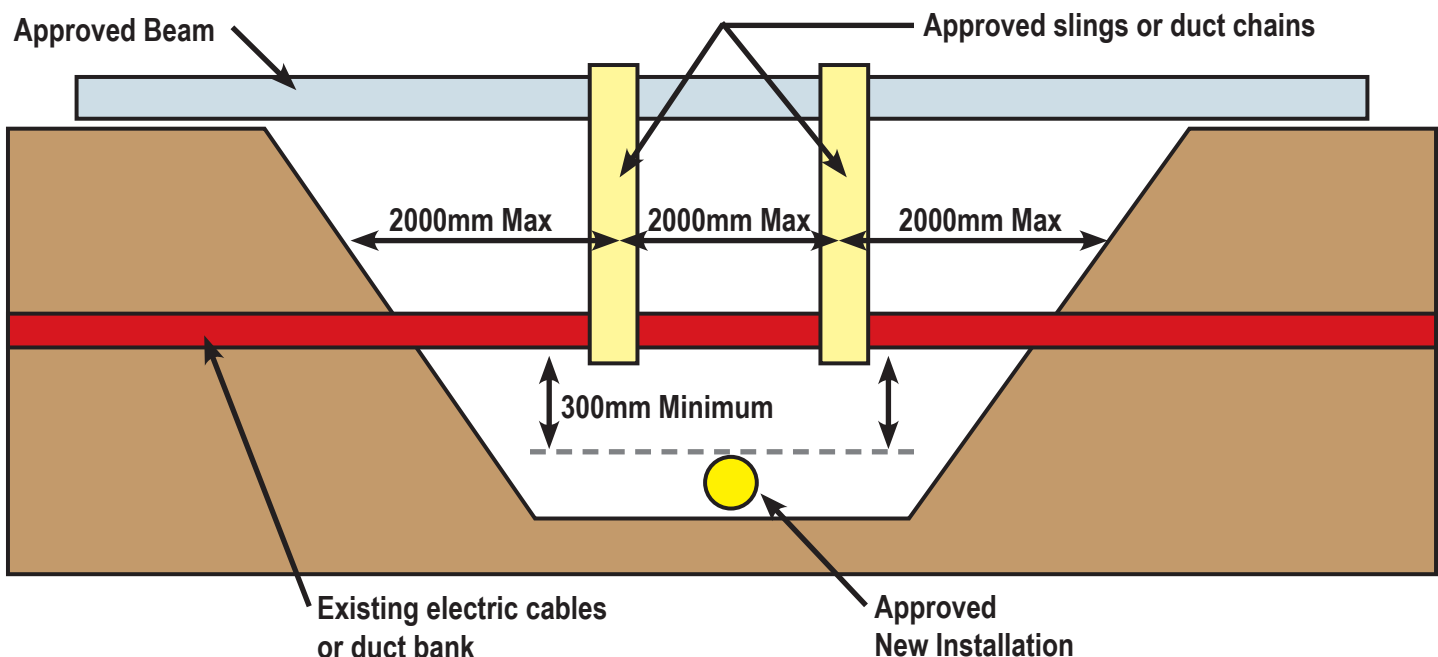
**Buried Systems:** The City of Medicine Hat Electric equipment, cables, ducts and concrete duct banks that may be undermined shall be supported. The Contractor must call City of Medicine Hat Electric Operations at 403-529-8260 prior to excavating near City of Medicine Hat Electric equipment, ducts, cables or concrete duct banks.

A support beam (or beams) for cables and duct banks shall be employed. The actual sizing and supply of the support beams, slings and/or chains will be determined by the contractor and approved by CMH UDS Engineering. The support system must be sufficient to prevent sag, bending, and deflection of duct, cables and/or duct banks. The support beam must be in the form of a steel "I" beam or wood pole set across the excavation running parallel with the undermined facility, and it must have sufficient span length to reach a minimum of 3 meters (on each side) beyond the edge of the excavation so that the supporting structure will not slough into the excavation due to unstable soil conditions.

City of Medicine Hat Electric facilities not encased in concrete (direct buried cable or ducts) must be supported by nylon slings. Cable or plastic duct chains may be used to support concrete encased duct banks.

The maximum distance between supports or slings is 2 meters.

**Figure 5: Cable, Duct and Duct Bank Support**



- ❖ **Overhead Systems:** Do not dig within 7 meters of a CMHE power pole without a Electric Proximity Hazard Orientation. Depending on the details of the excavation, you may need additional support to prevent poles collapsing. The orientation process will determine the safest way to do the work and if the pole will need to be held. Depending on the specific circumstances including pole construction and soil conditions unique to each excavation, The Electrical Engineering Superintendent may be required to review the plan. A CMHE SCO or QUE will make the determination at the site meeting if that is required. These types of excavations require more involved and advanced planning.

Poles and anchors that may be impacted by excavations shall be supported to safeguard the electric system, workers and the public. The contractor must call City of Medicine Hat Electric Operations (403-529-8260) and work with the utility to create a safe work plan. The cost to hold a pole is \$933.00 per day (up to A 24hr period) including the installation and the removal on the provision that it is done within the hours of 8:00am to 2:00pm. All removal requests must be in by 2:00pm one full working day in advance.

## 2.7 SPLICES

Use extreme caution when working within 1 meter of any cable splice. No one shall move, walk on, or disturb cable splices while exposing or working around electric cables. Contact City of Medicine Hat Electric Operations (403-529-8260) for inspection prior to backfilling any splice.

## 2.8 BACKFILL REQUIREMENTS

Upon completion of the work near City of Medicine Hat Electric facilities, all exposed direct buried primary cables and ducts must be padded with bedding sand at a depth of 300 mm. See figure 6. Bedding sand shall be well graded and free of ice, frozen material, loam, organic material and stones larger than 5 mm. The remaining common fill must be compacted to City of Medicine Hat compaction specifications.

The Contractor shall be prepared to provide compaction test results if requested by City of Medicine Hat Electric Operations SCO. Common fill may be the material removed from excavation but must be free of snow, ice, loam, organic material and boulders larger than 200 mm. If compaction cannot be obtained to allow proper support, CMHE may require fill crete under CMHE facilities.

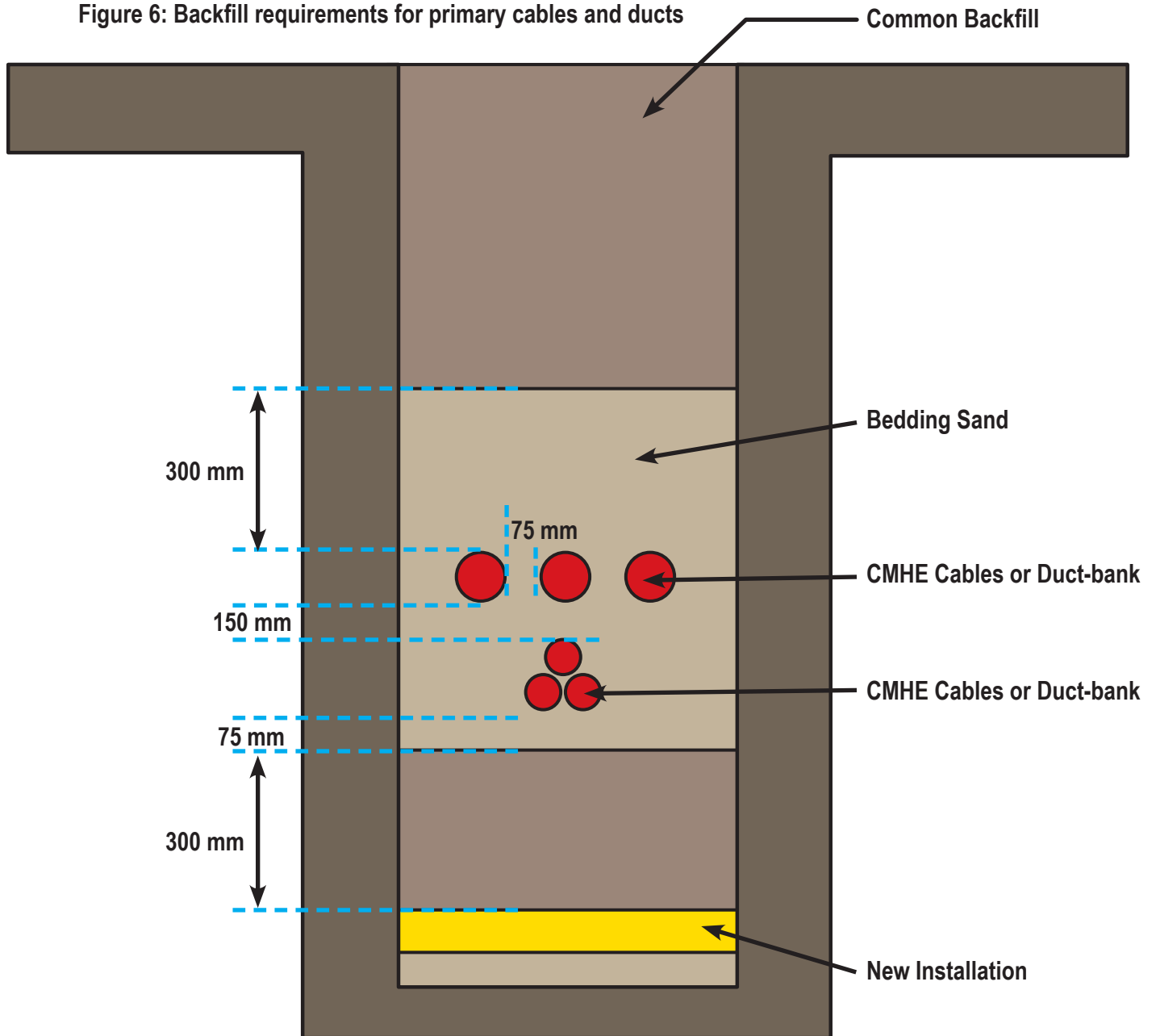
Final grade shall be restored to a level that ensures the burial depth of City of Medicine Hat Electric cables has not changed. If there is a rise or fall in the final grade, City of Medicine Hat Electric must be contacted prior to backfill so the new grade can be recorded.

Transmission circuits require specific instruction from City of Medicine Hat Electric for backfill requirements.

Notify City of Medicine Hat Electric Operations at 403-529-8260 prior to any back filling.

*Note: ALL POWER CABLES ARE TO BE CONSIDERED ENERGIZED DURING THE EXCAVATION AND BACKFILL PROCEDURES.*

Figure 6: Backfill requirements for primary cables and ducts



Note: All dimensions are minimum requirements



## 2.9 HAND DIGGING GUIDELINES FOR EXPOSING ELECTRIC FACILITIES

- ❖ The Contractor must call City of Medicine Hat Electric Operations at 403-529-8260 prior to excavating within the hand exposure buffer zone for a Electric Proximity Hazard Orientation.

At the work site the Contractors must have a functioning cell phone (or other approved means) of contacting 911 and the City of Medicine Hat Electric Operations at 403-529-8260.

Contractors must ensure that all personnel involved in hand exposing City of Medicine Hat Electric facilities are competent to safely excavate around underground facilities. Alberta Occupational Health and Safety defines competent as: adequately qualified, suitably trained and with sufficient experience to safely perform work without supervision or with only a minimal degree of supervision.

Contractors must also ensure that all personnel involved in hand exposing electric facilities are equipped and wearing appropriate personal protective equipment (PPE) at all times during while exposing any City of Medicine Hat Electric Plant or Equipment as outlined the Alberta Occupational Health & Safety Code.

When hand exposing cables in the no dig buffer zone, a shovel with a dry, non-conductive handle shall be used to remove materials away from all cables. (No pointed probe that could pierce the cables shall be used in the excavation process).

## 2.10❖ HYDROVAC GUIDELINES FOR EXPOSING ELECTRIC FACILITIES.

The Contractor must call the City of Medicine Hat Electric Operations (403-529-8260) for a Electric Proximity Hazard Orientation prior to excavating near City of Medicine Hat Electric equipment, ducts, cables or concrete duct banks. The CMHE QUE will reference safe work procedure ED-PRO-UND-004.2

Contractors must ensure that all personnel involved in hydrovacating procedures are competent, or are under the direct supervision of a competent employee, and are equipped and wearing personal protective equipment (PPE) as per part 18 of the Alberta Occupational Health & Safety Code at all times during and while exposing any City of Medicine Hat Electric plant or equipment.

When a Contractor is exposing energized or isolated cables, Electric Operations recommends that:

- The job site and the truck must have signage in accordance with the contractor's procedures and must be supervised to warn staff or public of site-related hazards and against entering the job site.
- Signs indicating "Danger" must be located a minimum of 3 meters from the truck to reduce the risk of injury from step and/or touch potential.

*Note: All water pressure and/or vacuum systems (hydrovacating) that use a combination of water temperature and pressure have the potential to damage underground cables and facilities. Cable damage may occur by too much water pressure and will appear as a slice into the cable sheath of an unknown depth or as though the outer sheath has been torn and pulled outward. If damage is suspected, exit the excavation immediately and secure the site. Notify City of Medicine Hat Electric Operations (403-529-8260). Do not re-enter the excavation until clearance has been given and repairs have been completed by an City of Medicine Hat Electric QUE.*

When exposing cables, the operator must direct the high-pressure nozzles (single head oscillating-type nozzle) in a circular motion and NOT allow the wand to become stationary when excavating. If a sweeping motion is being used, ensure that the direction is across the cables (perpendicular) and not following the cables length (parallel); this avoids any stationary contact with the cable at the end of each sweep which will prevent cable damage. Once the buried facility has been exposed, a distance of at least 175 mm (7 inches) should be maintained between it and the oscillating head of the water wand. Avoid positioning the vacuum tube directly over exposed facilities.

If there has been damage to the cables, notify Electric Operations Immediately (403-529-8260).



*Note: Under faulted conditions the water, wand and vacuum pipe may become energized.*

## HYDROVAC SPECIFICATIONS

The following specifications for the normal operation of the hydrovac equipment when exposing City of Medicine Hat Electric equipment and facilities SHALL be followed:

- Water pressure must not exceed 1500 psi (to be measured on the truck's gauge, not at the wand);
- Water temperature must not exceed 38° C (100° F);
- The water wand shall never be left unattended with the pressure on and water flowing
- Avoid positioning the vacuum tube directly over exposed facilities
- Vacuum pipe end must have a neoprene or equivalent lip to protect the cable or facilities;
- There must be a single oscillating tip nozzle unless it can be demonstrated a substitute head will produce less damage;
- The wand must be kept moving at all times.
- Where practical, buried facilities shall be exposed from the side and not directly from above. The excavation should begin beside the locate mark(s) and go to a depth below the expected depth of the buried facility.
- If a splice is encountered while hydro excavating, precautions shall be taken to ensure that the splice is not damaged. Work is allowed to continue if the water wand remain at least 1 m away from the discovered splice.

*Note: Hydrovac excavation operators are permitted to stand on portable bond mats and shall follow the manufacturer's instructions.*

*Note: ALL POWER CABLES ARE TO BE CONSIDERED AS ENERGIZED DURING EXCAVATION AND BACKFILLING.*

*Note: In some cases, an excavation is very large and a significant volume of soil must be removed. In such cases, the hydro excavation operator may increase the water pressure and temperature*

- ❖ *above the normal limit under the direction of a CMHE QUE and in accordance to the guidelines set forth in CMHE Procedure EO-SOP-OPS-001*
- ❖ For more detail on excavating in accordance with please refer to CMH Electric Operations Procedure: EO-SOP-OPS-001 , available from a CMHE QUE or refer to 7.15.6 Exposing Underground Cables,



## 2.11 DIRECTIONAL BORING GUIDELINES

- ❖ The contractor must call the City of Medicine Hat Electric Operations (403-529-8260) for a Electric Proximity Hazard Orientation prior to excavating near City of Medicine Hat Electric equipment, ducts, cables or concrete duct bank.

Safety Precautions. When a contractor is doing directional boring, CMHE makes the following recommendations:

- The job site and equipment must have signage in accordance with the contractor's procedures and must be supervised to warn staff or public of site related hazards and against entering the job site.
- Signs indicating "Danger" must be located a minimum of 3 meters from the equipment to reduce the risk of injury from step and/or touch potential. No person should touch the truck/equipment while the excavating is in progress to avoid touch potential.

All directional boring machines have the potential to damage underground City of Medicine Hat Electric cables and facilities. Extreme caution must be used when working near energized cables. At time of permit issue the City of Medicine Hat Electric QUE will determine if a QUE is required to supervise the site.

Before boring begins, all located City of Medicine Hat Electric cables and facilities in conflict must be exposed to sight. If coring parallel to the cable, the cable must be exposed at roughly 5 meter intervals to make sure the drill head will not impact the cable. The City of Medicine Hat Electric QUE will confirm based on work at time of permit issue.

The machine operator will not allow any persons within 3 meters of the machine while the boring operation is in progress. This is to prevent touch potential if the drill head contacts an energized cable.

The drill operator will remain on the machine if an energized cable is contacted until he has been given clearance from an City of Medicine Hat Electric QUE.

## 2.12 MANAGING SECONDARY POWER AND EXCAVATION CONFLICTS UNDER CEMENT

There are a number of buried power conductors with the City of Medicine Hat's Service Area that cannot be exposed using non-destructive means. Commonly street lighting cables can be found under sidewalks and asphalt. Street light cables in mature areas of the city were often installed directly under the sidewalk.

A photocell cannot be used as an isolation, also the street lights may be on a live circuit with the photocell on individual luminaires leaving the cables energized during the day. There is also the potential of pilot wires that would also always remain energized. As these cables cannot be exposed through the cement, the circuit needs to be de-energized before tearing out the concrete or asphalt.

Should the Alberta One-Call locate indicate there is street light cable directly under a sidewalk that needs to be excavated, permission to isolate the circuit and turn a section of lights off must be obtained by the facility owner (the owner of the road) first. Once permission is obtained, they will contact CMHE Operations Customer Service a minimum of 2 working days prior to starting work and crews will isolate the line. Temporary light plants or other strategies may be required at the discretion of the road owner. Once the work is complete and all men and equipment are clear, then contact Electric Operations Customer Service to reconnect the light and/or circuit.

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# **PART 3**

## **WORKING IN PROXIMITY TO OVERHEAD POWERLINES**

## 3.0 O/H WORK STANDARDS AND PLANNING CONSIDERATIONS

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### 3.1 OVERHEAD CONTACTS

Overhead powerlines or conductors have been a part of the Alberta skyline for more than a century now, and carry thousands of volts of electricity to our homes and businesses and at first glance look harmless. Electricity is often overlooked as it can't be seen and it can't often be heard, regardless of how it is portrayed on television. Assuming that the hazard is minimal has proven to be a dangerous assumption. Coming into contact with, or even in proximity to, live electrical parts can be fatal.

The majority of incidents involving overhead power lines occur while the equipment is being operated or transported. Even if the equipment doesn't make direct contact, electricity can arc or "jump" from the power line to any conductive object. The chances of arcing increase with the voltage of the line and the closer equipment gets.

When equipment makes contact with a power line, it puts both the operator and the workers standing in the surrounding area at risk. An electrical current may flow through the equipment and into the ground. The voltage will be highest close to the equipment and "ripples" outward, energizing anything touching it.

Carefully planning how equipment is used in proximity to power lines is key. Always keep your equipment at least 7 meters away from overhead lines.

Every day, two to three Albertans will come in contact with power lines. The potential for injury and even death is extremely high. Some of the most common activities that caused these incidents are:

- during the loading and unloading of dump trucks
- cement trucks and garbage trucks
- roofing and other exterior building work
- cranes, boom trucks
- road work
- tree trimming.



### 3.2 EQUIPMENT IN PROXIMITY TO OVERHEAD POWER LINES

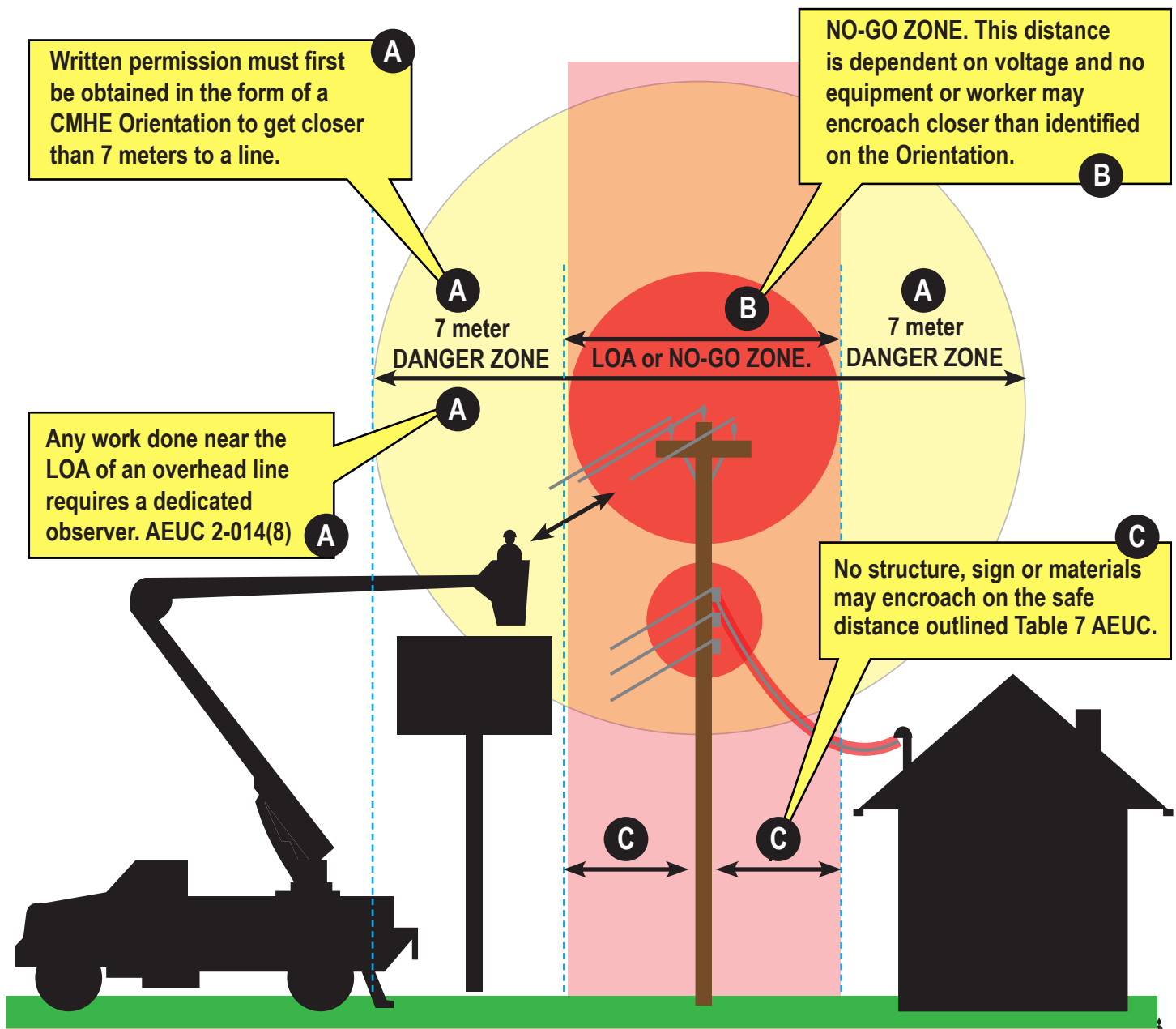
The limits of approach distances for overhead power lines are intended to prevent power line contacts resulting in injuries and fatalities. Limits of approach, are the safe distances that people or equipment must maintain from exposed energized power lines, or equipment, which vary depending on the system voltage and the training and experience of the individual.

If work is planned near energized high-voltage electrical conductors, Alberta OHS Code (Part 17, Overhead Power Lines) specifies the safe limits of approach that must be maintained by any worker, tool, machine, equipment or material. If work is done or equipment is operated within 7 meters of an overhead power line within the City of Medicine Hat Service area, the City of Medicine Hat, Electric Operations System Operator must be contacted.

The System Operator will indicate the voltage of the power line, the safe working distance and outline any special

- ❖ safety requirements. The CMHE Operations Group manages this communication with a Electric Proximity Hazard Orientation. This process to ensure all workers within 7 meters of an overhead line are aware of the hazards and expectations to work safely are understood by all workers.

- ❖ **Figure 8. Minimum requirement for unqualified workers and/or equipment operating near overhead powelines.**  
(As outlined in Alberta Occupational Health and Safety Code (Part 17, Overhead Powerlines).



When working in proximity to powerlines workers and equipment should adhere to the following guidelines:

- Know the voltages and safe limits of approach for equipment and workers.
- Know the normal operating circuit or feeder identification name/number, in case of emergency. Understand electricity distribution is dynamic and these may change to facilitate system needs.
- Mark the location of all overhead power lines and/or exposed underground cables on work plans.
- If your project might result in workers or equipment encroaching on minimum distances, you must contact Electric Operations at the City of Medicine Hat before beginning any work.
- ❖ ● Call CMHE Operations (403-529-8260) for a Electric Proximity Hazard Orientation and clearance requirements specific to your area and the job if required to be within 7 meters of a line.
- ❖ ● As per the Electric Proximity Hazard Orientation, a dedicated spotter will be required when equipment is within 7 meters of a line.

**Figure 9. Limits of approach for non-QUE within CMHE Operations Service Area if the Voltage has been confirmed.** Taken from AB Electric Utility Code, Table 1. Ref.: Rule 2-014

Type	Voltage	L.O.A.
Secondary	0 - 750 Volts	1 m
Primary	8,000 or 13,800 Volts	3 m
Transmission	69,000 Volts	3.5 m
Transmission	138,000 Volts	4 m

Situations may arise in which work must be done or equipment operated near a power line at distances less than the safe limit of approach distance for that particular voltage. In such cases, the City of Medicine Hat System Operator(s) and Safety Codes officer(s) will provide assistance to protect workers.

This could involve de-energizing the power line, relocating it, or performing some other equally effective action. This work is more involved, can have a monetary cost and will require planning. The City of Medicine Hat Electric Operations Group **will not** install dielectric protective cover up on power lines for third parties.

- ❖ Any work plan involving reducing the limits of approach must be approved in writing in conjunction with a Electric Proximity Hazard Orientation. A site visit with a CMHE SCO or QUE is required prior to issuing a Orientation.

### 3.3 HIGH LOADS

Alberta Transportation has designated several high load corridors in Alberta. These corridors allow for loads up to nine meters tall and are the recommended route for high loads in the province. Outside these corridors, the City of Medicine Hat has powerlines with a variety of voltages and varying clearance heights where roads and highways are crossed. Also there may be third party communications, such as TELUS, Shaw, Bell etc., on the poles with reduced clearances that may be within the CMHE service area.

No high loads (> 4.15 meters) shall be moved under the overhead power line(s) without assistance from the Operator of the Utility System as per the Alberta Electric Utility Code. If a load higher than 4.15 meters is required to be moved under the power line(s) within CMHE supply area please Contact the City of Medicine Hat, Electric Operations, Customer Service Department (403-529-8260) as soon as possible for scheduling prior to crossing under a line.

Please be aware that we typically require at least 10 business days notice to schedule a high load move and the move will need to be coordinated with other stakeholders such as communications, police or RCMP. In addition, if your move requires a transmission line outage, ninety days notice may be required as per the Alberta Electric System Operator.

### 3.4 GRADES AND EXCAVATION NEAR OVERHEAD POWER LINES

Should any work involve adding or removing the surface under a power line, the finished grade at any power line crossing shall maintain the original “As-Found” clearance to the overhead power line(s) and shall meet or exceed the minimum clearance (Table 5, AEUC) of:

- 5.7 meters for 0-750 V circuits
- 6.0 meters for 13.8 kV circuits
- 6.4 meters for 69 kV circuits
- 6.7 meters for 138 kV circuits.

During and/or after construction, the safe limits of approach can not be reduced in any way. No spill piles, materials or equipment may be stored underneath or adjacent to a power line as it will reduce the distance to the conductors and could become an uncontrolled hazard to workers or the public. Keep spill piles and materials well outside the limits of approach from the line. This distance will be outlined in the Electric Proximity Hazard Orientation.

### 3.5 SHEDS, SIGNS AND BUILDINGS

Any shed or building greater than 107 square feet requires a building permit. No structure shall encroach into the utility right of way, add a hazard to workers or prevent the safe operation of electrical devices.

No person shall construct or place buildings, signs or other objects within the minimum clearances from overhead power lines unless authorized in writing by an CMHE Operations Safety Codes Officer in accordance with the tables located in the Alberta Electric Utility Code.

### 3.6 SYSTEM INTERFERENCE

Electrical utility system poles and structures shall be kept free of all materials and equipment not required for the system. No person shall make permanent or temporary attachments to electrical utility poles unless authorization has been received from the operator of the utility system.

No person shall climb City of Medicine Hat electric system poles or make connections or disconnections to electrical utility system equipment unless the person has been authorized to do so by an authorized CMHE Operations representative and in constant communication with the System Control Room.

No person shall enter an electrical utility system generating station, substation, subsurface chamber, equipment room, or similar location without an authorized and qualified escort unless that person is authorized to enter by an authorized CMHE Operations representative.



### 3.7 PAD-MOUNT TRANSFORMERS AND ENCLOSURES

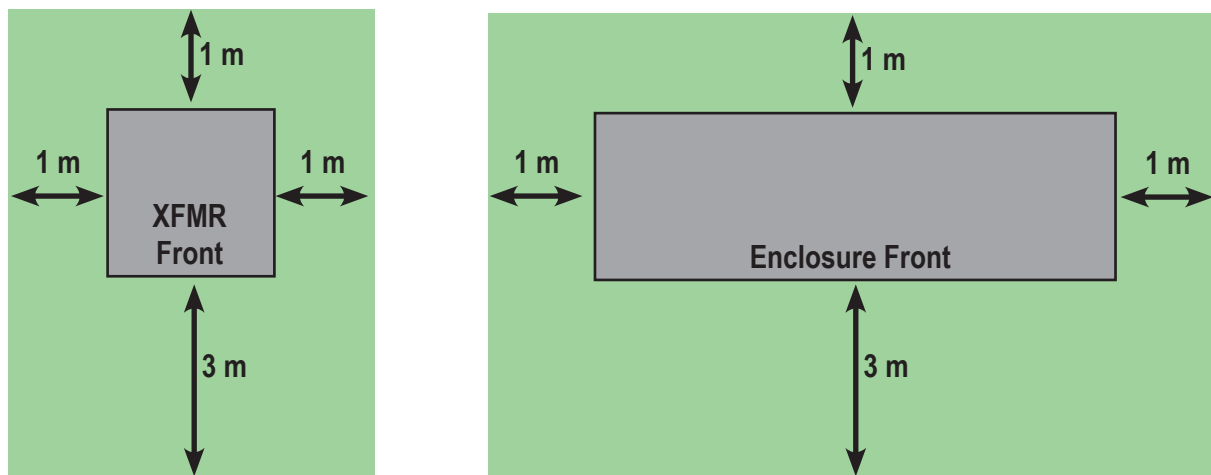
Green or gray boxes often found in front of homes or businesses next to the sidewalk. Transformers change primary voltage power into the secondary voltage power used in homes and businesses. Underground primary voltage cables feed into the transformer, and smaller secondary voltage cables run to each home or business power meter.

Crews need room around the transformers so they can inspect and maintain them, and make any necessary repairs. Pad-mounted transformers shall not be blocked or obstructed by spill piles, construction fencing, stored materials, equipment, decorative rocks, shrubs or any other obstruction or tripping hazard. A three (3) meter work zone shall remain clear in front (lock side) of any pad-mounted transformer at all times. The sides and back of such equipment shall be kept clear one (1) meter.

An enclosure is green, brown, gray or stainless cabinet. Enclosures help to route power between neighborhoods. Underground primary voltage cables feed into and out of the enclosure allowing circuits to loop to minimize outage times and provide a more robust system.

The same as transformers, crews need room around the transformers so they can inspect, maintain and make any necessary repairs. Enclosures shall not be blocked or obstructed by spill piles, construction fencing, stored materials, equipment, decorative rocks, shrubs or any other obstruction or tripping hazard. A three (3) meter work zone shall remain clear in front (lock side) of any enclosure at all times. The sides and back of such equipment shall be kept clear one (1) meter.

**Figure 10. Device Clearance, Open 1 Side**





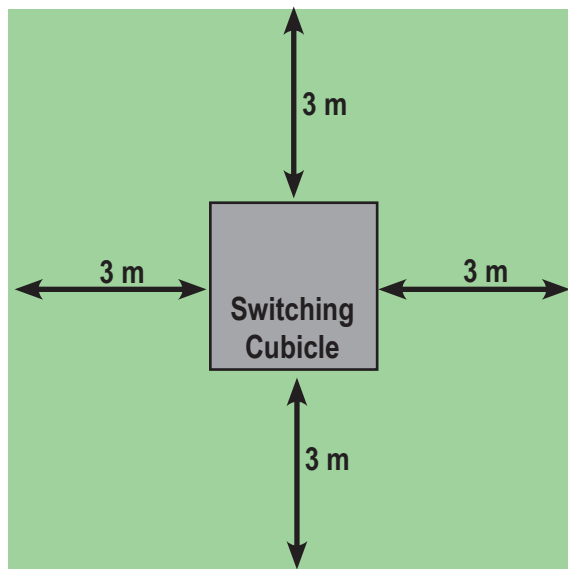
### 3.8 SWITCHING CUBICLES

These can look similar to transformers. They help to route power between neighborhoods, and also help protect the system using switches that turn off in the case of a fault, and protect the rest of the system.

When crews are doing maintenance work or emergency repairs during an outage, switching cubicles allow them to bypass the area where they are working. Once the location of a problem is identified, switching cubicles are usually the first place crews will go to restore as many customers as possible, and make the work site safe so crews can complete repairs or maintenance.

Similar to transformers and enclosures, crews need room around the switching cubicle so they can inspect and maintain them, and make any necessary repairs. Switch cubicles shall not be blocked or obstructed by spill piles, construction fencing, stored materials, equipment, decorative rocks, shrubs or any other obstruction or tripping hazard. There are access points on all four sides, a three (3) meter work zone shall remain clear on all sides at all times.

**Figure 11. 10. Device Clearance, Open Multiple Sides**



### 3.9 LOCKS

Only an authorized CMHE Qualified Utility Employee may remove an access lock from any CMHE device. If an unattended device is open or unlocked please contact Electric Operations at: 403-529-8260.

- ❖ In the event CMHE is required to isolate a circuit, a GOI (Guarantee of Isolation) will be provided with a GIS drawing or single line outlining the isolation and responsibilities. The recipient of the GOI will be required to participate in the lock out practice. These details will be addressed within the GOI.



### 3.1 CMHE ASSETS, PHOTO REFERENCE TO COMMON DEVICES



Vault



URD Box



3 Phase Transformer



Single Phase Transformer



Padmount Switchgear



Padmount Switchgear



Enclosure



Enclosure



Padmount Capacitor Bank

**Revision List**

Jan 2020      Figure 8, page 21 - Formatting of Graphic







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