Guideline for

Working near Overhead Electrical Powerlines & Equipment on Construction Projects

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Working near overhead powerlines can be dangerous—even deadly—if proper safety precautions are not taken. Being aware of the hazards and keeping a safe distance from electrical powerlines and equipment are the best means of protection.

Powerline Technicians need specialized training and equipment to protect themselves when working on or near powerlines. Construction workers may also have to work near powerlines. However, they may not know the hazards of working around powerlines or have the knowledge, training, and experience to protect themselves.

This guideline can help construction workers protect themselves and their co-workers from electrical hazards when working near powerlines.

STEP 1 Identify Electrical Hazards

The first step is to recognize where electrical hazards exist and identify the precautions that need to be taken to avoid contact. Ideally, this should be done at the planning stage before work begins.

Look around the work area to see if powerlines are close by. Then, consider whether the type of work being done or the type of equipment being used may come close enough to powerlines to present an electrical hazard. The minimum safe distances to powerlines is based on their voltage and is outlined in the Construction Projects regulation (O. Reg. 213/91) under the OHSA.

Table 1: Minimum Distances to Powerlines*

Voltage Rating	Minimum Distance
Less than 750 volts	1 metre (3.3 feet)†
750 to 150,000 volts	3 metres (10 feet)
More than 150,000 volts, but no more than 250,000 volts	4.5 metres (15 feet)
More than 250,000 volts	6 metres (20 feet)

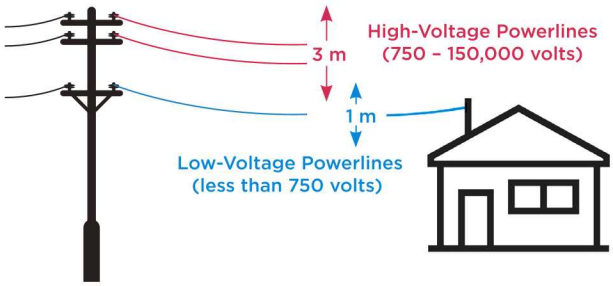
*Source: O. Reg. 213/91, s. 188 (2)

†Recommendation from the Working Group

Employers must take every reasonable precaution to prevent hazards to workers from energized electrical equipment, installations, and conductors (O. Reg. 213/91, s. 183). This means keeping the minimum distance as required by Table 1.

Powerlines or electrical equipment rated at less than 750 volts are considered **low voltage**, while those rated at 750 volts or above are considered **high voltage**. Workers must keep a safe distance of at least 1 metre (3.3 feet) from low-voltage powerlines to be protected from exposure to electrical shock or arc flash burn. For high-voltage powerlines, the distance is 3 metres (10 feet) or more, depending on the voltage (Figure 1).

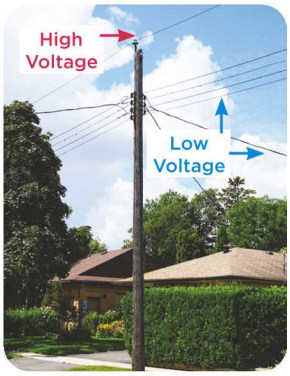
Figure 1



Maintain a safe distance from powerlines in all directions

High-voltage powerlines are usually located higher on a pole than low-voltage powerlines (Figure 2). However, some high-voltage lines can look like low-voltage lines and can be located below low-voltage lines on a pole.

Figure 2



Misidentifying the voltage of powerlines can cause workers to go beyond the minimum safe distance and lead to an electrical incident. In addition, workers have been known to focus on maintaining their distance from low-voltage lines, only to make contact with high-voltage lines.

If you are uncertain of the voltage, get help from an electrically qualified person or contact the owner.

Respect Electricity!

Every wire that brings ELECTRICITY to a business, home, or area CAN KILL YOU. No matter the voltage, keep a safe distance from powerlines to avoid electrical contact, shock, and burns.

The type of equipment being used when working near overhead powerlines may indicate that precautions need to be taken to prevent electrical injury. This includes tall or long-reach equipment such as:

- Cement trucks, concrete pumps, hydro-vac trucks (Figure 3)
- Excavators, backhoes, front-end loaders
- Cranes, drill rigs, boom trucks, bucket trucks
- Ladders, scaffolds
- Dump trucks, waste material/recycling trucks, material delivery trucks
- Swing stages, scissor lifts, forklifts, zoom booms
- Snow-removal equipment, paving machines, farm machinery (including augers).

Figure 3

In addition to the type of equipment being used, the type of work being done near overhead powerlines may indicate that electrical hazards need to be identified and assessed. This type of work can include:

- Siding and painting (Figure 4)
- Roofing and eavestroughing
- Framing
- Stucco and brick work
- Window cleaning and balcony work
- Tree pruning, tree removal, and landscaping.

Figure 4

STEP 2 Complete a Hazard Assessment

Electrical incidents can result in serious injuries or fatalities caused by:

- direct contact from touching energized equipment
- contact with an electrical arc
- exposure to an arc flash.

Completing a **Job Safety Analysis** (JSA) or a **Hazard Risk Assessment** (HRA) is a good way to ensure that hazards have been identified and safe work procedures have been put in place to prevent electrical incidents.

Keep the following points in mind when doing a hazard assessment on overhead powerlines:

- Electrical hazards can sometimes be hard to identify. Electricity is invisible in its usual state and any wire that contains electricity looks exactly the same as a wire without electricity.
- Electricity can jump through the air and into objects and people nearby. Direct contact is not required to make it an electrical hazard.
- Wind and weather can cause wires to swing and heat, ice, or changing electrical demand can cause them to sag. Higher-voltage wires have been known to sag as much as three metres in one hour from heating up during high-demand conditions.
- Long building materials and equipment such as ladders, boards, poles, or scaffold members can be extended or repositioned to the point where they may contact or come near enough to electrical equipment to cause an electrical arc.
- A slip or a fall can move a worker or their tools, equipment, and materials closer than the recommended distance to an electrical hazard.
- Electricity is not only carried by the wires on an electric pole but also by other electrical equipment such as transformers, which can be shaped like a box (Figure 5) or a steel barrel (Figure 6).

Figure 5

Figure 6

A JSA or HRA can also help when estimating the costs associated with a project. Early detection of the hazards and pre-planning control options to prevent these hazards can affect the quote because health and safety concerns must always be taken into consideration. Before work begins, consideration should be given to questions such as:

- How will materials be brought in or removed from the site?
- How will workers access the work location?
- Will wires have to be moved or disconnected for work to be completed safely?
- Are workers knowledgeable/qualified or will assistance be needed to determine voltage/proper clearance distances, etc.?

Don't Guess. Do it Right!

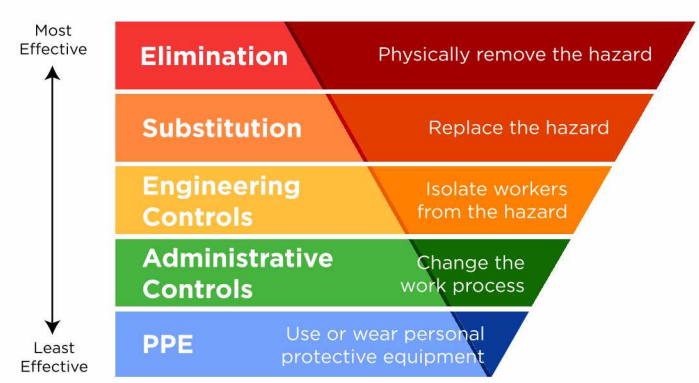
Always contact the owner of the overhead powerline to verify the correct voltage.

STEP 3 Eliminate or Control the Hazards

Once the electrical hazards have been identified and the workers have been made aware of them, the hazards need to be eliminated. If this is not possible, the hazards should be controlled. This means using barriers or other controls to reduce the possibility of a hazard or lessen its severity as much as possible.

Before putting controls in place to address health and safety hazards, consideration should also be given to their effectiveness. Figure 7 below shows the **hierarchy of controls**, which ranks control options from most effective to least effective.

Figure 7



Hierarchy of Controls

Eliminating the hazards of working near overhead powerlines is most effective because the hazard no longer exists. This can be done by:

- Relocating the work to another location that is farther away from overhead powerlines.
- Having a **qualified** person (e.g., a Powerline Technician) who has been **authorized** by the owner of the powerline shut the electricity off, verify that it is off, and ensure that all stored energy is removed.

If the hazard cannot be eliminated, **engineering controls** may be put in place to isolate the worker from the hazard. This can include asking the owner of the powerline to raise or move them, making it more difficult to go beyond the minimum safe work distance.

The utility owner may provide additional assistance, such as installing powerline coverups to protect workers from accidental contact with energized components (Figure 8).

Figure 8

If engineering controls are not practicable, the next best option is putting **administrative controls** in place to change the work process. This may include the following:

- Taking additional precautions to ensure workers keep a safe distance away from powerlines (i.e., the minimum distance shown in Table 1 and Figure 1).
- Designating a signaller (Figure 9) to make sure that workers, loads, and equipment do not go beyond the minimum safe distance from powerlines. (Refer to the requirements of a signaller in O. Reg. 213/91, s. 188(8)).

Figure 9

- Ensuring that all workers are aware of the location of overhead electrical hazards, know how to protect themselves, and are familiar with the safe work procedures.
- Installing warning signs (Figure 10) or flags to remind workers about the dangers of working near powerlines.

Figure 10

- Ensuring that the emergency response plan deals with treating electrical injuries and that proper first aid supplies are available.

Although using or wearing **PPE** (personal protective equipment) is not the most effective method of injury prevention according to the Hierarchy of Controls (Figure 7), it can still minimize exposure to a hazard or reduce its severity.

Some PPE is required by law. Depending on the possible hazards workers may encounter, this can include:

- A Class E hard hat
- Grade 1 work boots with dielectric protection (i.e., an Omega tag)
- CSA-approved safety glasses with side shields
- A high-visibility safety vest
- Protective work gloves
- Hearing protection devices.

As best practice, always consider electricity to be on and electrical wires to be live unless a qualified electrical worker who is authorized by the owner of the electrical equipment confirms that it is off.

STEP 4 Ensure that All Legal Requirements Are Met

Under Ontario's *Occupational Health and Safety Act* (OHSA) and its associated regulations, employers and supervisors have a legal duty to identify hazards (including electrical hazards), inform workers about these hazards, and protect workers from them.

Employers and supervisors must ensure that their legal duties under the OHSA and the requirements of the Construction Projects regulation (213/91) are met

Duties of Employers and Supervisors under the OHSA

Section 25 of the OHSA requires the **employer** to:

- Acquaint a worker or a person in authority with any hazard in the work
- Provide information, instruction, and supervision to workers to protect their health or safety
- Ensure the equipment, materials, and protective devices prescribed by law are provided, are used as prescribed, and are maintained in good condition
- Ensure the measures and procedures prescribed by law are carried out
- Take every reasonable precaution to protect workers.

Section 27 requires the **supervisor** to:

- Advise workers if they are aware of potential or actual danger to their health or safety
- Where prescribed by the health and safety legislation, provide workers with written instructions on protective measures and procedures
- Ensure that workers follow protective measures and procedures and use the required protective devices.

Regulatory Requirements for Employers and Supervisors

Additional requirements are found in the Construction Projects regulation (O. Reg. 213/91):

- The **supervisor** will inspect all machinery and equipment, including electrical installations, at least once a week (s. 14).
- The **employer** will ensure that workers wear and use protective clothing, equipment, and devices, and be trained in their care and use (s. 21). This includes protective headwear (s. 22), protective footwear (s. 23), and eye protection when there is a risk of eye injury to the worker (s. 24).
- Do not store material or equipment moved by a crane or hoisting device near an energized overhead electrical conductor (s. 37 (2)).
- Post a sign where there is a potential hazard from an energized overhead electrical conductor at more than 750 volts (s. 44 (3)).
- The **employer** will ensure that the site-specific work plan for a suspended work platform system or boatswain's chair includes identification of electrical hazards (s. 141.5).
- The **constructor** and **employer** will take every reasonable precaution to prevent hazards from energized electrical equipment (s. 183).
- The **supervisor** will authorize any person who is permitted to enter a room or enclosure containing exposed energized electrical parts (s. 184 (1)).
- Do not store tools, equipment, or materials capable of conducting electricity so close to energized electrical equipment that they can make electrical contact (s. 187).
- Do not bring any object closer to an energized overhead electrical conductor than the minimum distances in Table 1 (s. 188 (2)).
- Designate a competent worker as a signaller to warn the equipment operator if part of the equipment or its load may encroach on the minimum distance to powerlines (s. 188 (8)).

***NOTE**: This is not a complete list of relevant legislation. Always consult a current version of the OHSA and its associated regulations.*

Developed by a collaborative working group from IHSA's Labour-Management Network in partnership with IHSA

Labour Management NETWORK