

Corporate Policy and Procedure



POLICY	Working in Proximity to Power Lines
CATEGORY	Health & Safety
AUTHORITY	All Workers
RELATED POLICIES	Contractor Safety Management Program Energized Electrical Work Policy Personal Protective Equipment Policy Working at Heights Policy Working Alone Policy
APPROVED BY	Executive Team
EFFECTIVE DATE	June 1, 2019
REVISION DATE	May 31, 2020

Policy Statement

Guided by our corporate values, the City of Guelph is committed to ensuring workers required to work in proximity to energized electrical power lines are provided with the appropriate tools, equipment and training to keep them safe from harm and maintain their health and safety.

Purpose

This policy is intended to reduce and remove as many risks and hazards that are associated with work that is to be conducted within close proximity to energized power lines.

Scope

This policy applies to all workers employed by or on behalf of the City of Guelph, including contractors, who may be required to perform work that puts them in areas that expose them to the risks and hazards of power lines.

Background

Due to the nature of the industry, City of Guelph workers are often required to perform work in areas that may expose them to the dangers of power lines, whether energized or not. The intent of this policy is to establish safe work instructions for workers who are exposed to this hazard. For more information around a typical power generation and distribution model see [Appendix B](#).

Definitions

Arc Flash

The light and heat produced as part of an arc fault, a type of electrical explosion or discharge that results from a low-impedance connection through air to ground or another voltage phase in an electrical system.

Authorized Worker

A worker who has been given formal permission by the owner and employer and is competent to perform work in proximity to energized apparatus.

Contractor

Any person or entity contracted or engaged to provide services to the City of Guelph, including outside maintenance and service providers.

Dedicated Observer

A worker competent in the tasks being performed and having no other duties while monitoring the work continuously.

De-Energized

Means the current-carrying parts of electrical equipment are free from any electrical connection to a source of voltage and from electrical charge and do not have a voltage different from that of the earth.

Dielectric Testing

The process of applying high voltage to the insulated end of the aerial device and its components while measuring the amount of current leaking out the part close to ground.

Electrical Safety Authority

An administrative authority mandated by the Government of Ontario to enhance public electrical safety in the province.

Flame Resistant (FR)

The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source.

Ground

A connection to earth obtained by a grounding electrode.

Hazard

A source of possible injury or damage to health.

Job Plan

A work plan agreed to by all workers involved that identifies all known hazards, eliminates the hazards where practical, controls the hazards that cannot be

eliminated, protects against injury if a hazard gets out of control, minimizes the severity of an injury if one takes place and identifies each worker's responsibilities in the performance of the work.

Lines

All conductors used for transmitting or distributing electrical energy.

Non-Insulated Boom

An articulated or extendable lifting device with no tested electrical insulating qualities.

Personal Protective Equipment (PPE)

Approved safety equipment worn and used to reduce the risk of personal injury.

Proximity

Nearness or distance to something or someone.

Rescue Procedures

Plan established prior to the start of work that details specific directions in the event of an emergency, taking into account as many possible scenarios based on the work situation.

Risk

A combination of the likelihood of occurrence of injury or damage to health and the severity of injury or damage to health that results from a hazard.

Safe Limits of Approach

A procedural barrier system for authorized workers or workers under the continuous direction of an authorized worker, intended to minimize the risk associated with working in proximity to exposed energized apparatus.

Safety Zone

An area established prior to the commencement of work to restrict access to areas of the work zone.

Step Potential

When a worker is standing on the ground and electricity enters through one foot and exits the other.

Supervisor

A person who has charge over a workplace or authority over a worker.

Tailgate Meeting

A pre-work conversation that takes place on the work-site to discuss the work and hazards that are present at the job site.

Utility Arborist 444B

A designation recognized by the Ministry of Training, Colleges and Universities as an individual who has completed an apprenticeship program which authorizes them in the work of pruning, clearing vegetation, felling or removing trees within the OH&S Act defined "Limits of Approach".

Worker

Means any of the following, but does not include an inmate of a correctional institution or like institution or facility who participates inside the institution or facility in a work project or rehabilitation program:

1. A person who performs work or supplies services for monetary compensation.
2. A secondary school student who performs work or supplies services for no monetary compensation under a work experience program authorized by the school board that operates the school in which the student is enrolled.
3. A person who performs work or supplies services for no monetary compensation under a program approved by a college of applied arts and technology, university, private career college or other post-secondary institution.
4. Such other persons as may be prescribed who perform work or supply services to an employer for no monetary compensation;

Workplace

Any land, premises, location or thing at, upon, in or near which a worker works.

Work-zone

Any area away from the home location where work is to be performed.

Responsibilities**Health & Safety**

- Facilitate training on appropriate electrical safety procedures and practices
- Work with Managers/Supervisors to identify appropriate personnel protective equipment
- Review and update this procedure as required, ensuring it is done at least annually.
- Ensure appropriate revisions are made to training and this policy where required by changes in standards and legislation, or from audit findings of the electrical safety program.

Manager

- Ensure provision of clear direction and guidance to workers on the contents of this policy
- Appoint competent and knowledgeable supervisors
- Ensure relevant Electrical Safety training is provided to workers and Supervisors

Supervisor

- Shall have training and knowledge relevant to Electrical Safety and the work to be performed
- Ensure that all workers under their direction remain current on the appropriate Electrical Safety training
- Work with the Utility Provider to obtain voltage mapping for the municipality
- Provide clear and proper direction to workers when working in proximity to power lines, whether energized or de-energized
- Ensure all appropriate Personal Protective Equipment (PPE) is provided to workers
- Ensure sufficient members of a work crew are adequately trained to perform First Aid, including CPR and the use of Automated External Defibrillator (AED)
- Inform workers of all actual and potential hazards that may be encountered in the workplace or work-zone
- Perform and document random workplace or work-zone inspections of workers to ensure they are working within the parameters specified in this policy.
- Evaluate and audit worksite hazard and job plans on a regular basis to ensure compliance with this policy
- Ensure that rescue procedures are documented, implemented and practiced at least every six (6) months, or whenever a change is made to the existing procedure
- Ensure that Workers conducting work in proximity to exposed apparatus of an electrical distribution or transmission system have a copy of the **Electrical Utility Safety Rules**. Workers shall be trained in the application of the rules

Workers

- Understand and follow the contents of this policy
- Wear all required personal protective equipment during the work
- If working in proximity to electrical power lines, whether energized or de-energized, attend all required training associated with this policy as required.

Procedure

1. Work and roles shall be delegated at the start of the shift, unless it is an emergency situation
2. Workers shall have an opportunity to review the work and request clarification if there are questions or concerns
3. Workers shall inspect all equipment and PPE prior to leaving the yard
4. Any equipment or PPE found to be defective shall be repaired, replaced or put out of service until repaired. Repaired equipment shall not be put back into service until a competent person can verify it is no longer defective.
5. Prior to conducting any work around live power lines, Guelph Hydro/Alectra must be notified to advise of the need to perform the work. Work shall not commence until approval to go ahead has been received.

6. Upon arrival at the work-zone, a tailgate meeting shall be held and documented with all workers on site to advise of the scope of work, responsibilities and actual and potential hazards associated with the work
7. A job plan shall be devised, documented on the Job Plan Form and tasks delegated appropriately
8. If work intrudes into traffic, a Traffic Plan that is in compliance with **MTO Book 7** shall be created and documented
9. If the work involves working in proximity to live power lines, one worker will be designated the role of Dedicated Observer
10. If Arborist work encroaches inside safe limits of approach, it shall not be performed unless the arborist has obtained the Utility Arborist Certification 444B from the Colleges of Trades
11. A Safety Zone shall be established to prevent unnecessary access from unqualified persons
12. Aerial equipment is to be grounded if working around hydro lines
13. When dielectric rated trucks and aerial equipment are used near energized circuits, workers on the ground shall not contact the vehicle until the aerial lift operator has ceased operation and given authorization to do so
14. If voltage of power lines is unknown, minimum **Safe Limit of Approach** shall be set at 4m (12')
15. If line voltage is known, refer to [Appendix A](#) for specific Safe Limit of Approach distances
16. All effort must be made to prevent branches and cuttings from coming into contact with power lines during tree trimming operations
17. Workers will not attempt to retrieve anything that may become hung up in the power lines
18. Workers will not work alone when working at heights or around energized power lines
19. All hand held equipment to be used in the areas of concern are to be of a non-conducting nature and material.

Hazards and Controls

Electrocution

- Direct Contact – when working around trees where power lines are hidden by foliage. Always inspect work zone for hazards prior to starting work.
- Energized Objects – branches and limbs caught in the power lines may unexpectedly become conductive. Insulated equipment must always be used when removing hung branches or limbs.
- Contact with power lines – during tree maintenance, trimming or removal, including direct contact by unqualified individuals and contact through tree trimming tools. This type of work must never be done without the use of a dedicated observer.
- Downed power lines – when energized power lines are pulled to the ground by broken branches and limbs. Workers must always remain clear of downed lines until hydro disconnect has been confirmed.

- Step Potential Shock – when the ground has become electrically charged due to a downed live line or inadvertent contact with equipment. Workers must always confirm hydro disconnect prior to start of work.
- Vehicle/Equipment contact – raised or over height equipment stand a greater risk of accidental contact with energized power lines. A dedicated observer is always required where this hazard exists or may potentially exist.

Injuries or Fires

- Tools, ladders and other conductive equipment can create an electrical arc when in close proximity to power lines, resulting in potential injury or fire. Always use non-conductive tools and equipment, such as fiberglass ladders.

Power Interruptions

- May result from incidental contact of equipment with lines
- Falling articles may get hung up in power lines and cause a short circuit

Personal Protective Equipment

Arc Flash, Flame Resistant Protective Equipment

When workers are required to perform work in proximity to energized power lines or where exposure to an arc flash hazard exists, all practical measures shall be taken to protect workers against the effects of electric arc flash. PPE required must be determined by the highest energy that the worker can be exposed to while doing the work regardless of the voltage of the actual testing location.

- a) The **arc flash, flame resistant** clothing and approved protective equipment selected must provide an adequate level of protection to protect the worker
- b) The outer layer of clothing must be made of **arc flash, flame resistant** material
- c) Clothing worn in conjunction with arc flash, flame resistant clothing must not contribute to increased worker injury.
- d) **Arc flash, flame resistant** clothing, foul-weather clothing and **protective equipment** must be manufactured, tested and maintained to current recognized industry standards
- e) **Workers** shall wear **approved** eye protection in all circumstances where there is a possibility of an electrical flash or arc

Voltage-rated Gloves

- a) Only Type-II voltage rated gloves, which are ozone-resistant and made of an elastomer or combination of elastomeric compounds, and with a minimum class of "0", will be used.
- b) Prior to every use of the voltage-rated gloves they must be visually inspected for any cuts, punctures, holes or damage that may affect their rating or effectiveness.
- c) Leather protectors must be inspected before each use and determined to be free of holes, tears, and contamination. Insides of the leather protector gloves shall also be inspected for sharp or pointed objects that may damage voltage-rated rubber gloves.

- d) Cleaning and maintenance of the voltage-rated gloves and leather protectors must be done as instructed by the manufacturer.
- e) Only powder approved by the manufacturer is recommended for use on voltage-rated rubber products to prevent deterioration of the rubber.
- f) Every in-service voltage-rated rubber glove and leather protector combination must be tested every **90 days** by a qualified outside vendor in accordance with ASTM F-496.
- g) Employees issued voltage-rated gloves must be provided with a second pair while the first pair of gloves is out for testing.
- h) Voltage-rated gloves returned from testing must be held in storage until the pair in use requires testing.
- i) Voltage-rated gloves must:
 - i. Be stored in a dry cool place
 - ii. Not exposed to sunlight or ozone
 - iii. Not be stored folded creased, inside out, compressed or in any manner that will cause stretching or compression
 - iv. Be stored away from exposure to solvents, oils, greases or vapours from these materials.
- j) Leather protectors for voltage rated-rubber gloves must be worn over the rubber gloves for protection from abrasion, cuts or punctures. The leather protectors shall not be used alone for shock protection at any time.
- k) Protectors that have been used for other purposes must not be used to protect voltage-rated rubber gloves.
- l) All voltage-rated rubber products that have been rejected by testing or found to be damaged during inspections must be defaced, cut up, or otherwise marked and identified to indicate that they are not to be used for electrical service, and then disposed of from the workplace.

Head Protection

- a) Type 1 - protection from impact and penetration at the crown (top)
- b) Type 2 - protection from impact, penetration at the crown (top) and laterally (sides and back)
- c) Class "E" or "G" CSA rated
- d) Any accessories to be added must not interfere with the dielectric protection factor of the helmet
- e) All head protection shall meet CSA standard **Z94.1-15 - Industrial protective headwear - Performance, selection, care, and use**, or most current standard if one is applicable

Eye Protection

- Safety glasses shall be worn at all times in areas it has been determined there is a hazard to the eyes
- Additional eye and face protection i.e. face shields and goggles shall be worn as required to prevent injury
- All safety glasses shall meet the CSA standard **Z94.3.1-16 - Guideline for selection, use, and care of eye and face protectors**, or most current standard if one is applicable

Fall Protection Equipment

- All harnesses and other fall protection shall be Arc Flash/FR rated

Testing

- Dielectric rated trucks and aerial equipment shall be re-tested and re-certified **every 6 months** or as needed if major alterations occur to the vehicle.
- Vehicles failing dielectric testing or certification has expired, shall be deemed as uncertified and not fit for performing work within the scope of this policy.
- Testing of equipment shall be performed by an outside service provider that is qualified to perform testing that meets the requirements as set out by CSA Standard C225-10, Vehicle-mounted Aerial Devices.

Training

All workers who will, or may potentially be required to, work with the safe limits of approach to electrical power lines must receive training in the contents of the EUSA Rule Book and a minimum 2-day training course in Line Clearing – Safety and Awareness. Workers working routinely within safe limits of approach may require more intensive training, which will be determined by the worker’s manager in conjunction with Health & Safety.

All training is to be conducted upon hire and no later than every three years thereafter.

References

Occupational Health and Safety Act, R.S.O. 1990, c. O.1

R.R.O. 1990, Reg. 851: INDUSTRIAL ESTABLISHMENTS

O. Reg. 213/91: CONSTRUCTION PROJECTS

Electrical Utility Safety Rules (2014)

CSA Standard C225 Vehicle-mounted Aerial Devices

CSA standard Z94.3.1 - Guideline for selection, use, and care of eye and face protectors

CSA standard Z94.1 - Industrial protective headwear - Performance, selection, care, and use

Revision History

Document Owner	Issue / Revised Date	Reason For Changes
Health & Safety	September 1, 2019	Initial draft

Appendix A – Safe Limits of Approach

Safe Limits of Approach						
Maintain Maximum Clearance and Install Barriers Where Practical						
	Personnel Zones			Mobile Work Equipment		
Voltages	OHS Act Minimum	Authorized Worker	Restricted Zone	OHS Act	Non-Insulated Boom	Certified Insulated Aerial Device
750 V to 15kV	> 3.0 m (10 ft)	> 0.9m (3 ft.)	0.9 m to 0.3 m (3 ft to 1 ft)	> 3.0 m (10 ft)	> 0.9 m (3 ft)	> 0.3 m (1 ft)
> 15 kV to 35 kV	> 3.0 m (10 ft)	> 0.9m (3 ft.)	0.9 m to 0.3 m (3 ft to 1 ft)	> 3.0 m (10 ft)	> 0.9 m (3 ft)	> 0.45 m (1.5 ft)
> 35 kV to 50 kV	> 3.0 m (10 ft)	> 1.2 m (4 ft)	1.2 m to 0.6 m (4 ft to 2 ft)	> 3.0 m (10 ft)	> 1.2 m (4 ft)	> 0.45 m (1.5 ft)
> 50 kV to 150 kV	> 3.0 m (10 ft)	> 1.5 m (5 ft)	1.5 m to 0.9 m (5 ft to 3 ft)	> 3.0 m (10 ft)	2.4 m (8 ft)	> 0.9 m (3 ft)
> 150 kV to 250 kV	> 4.5 m (15 ft)	> 2.1 m (7 ft)	2.1 m to 1.2 m (7 ft to 4 ft)	> 4.5 m (15 ft)	> 3.0 m (10 ft)	> 1.2 m (4 ft)
> 250 kV to 550 kV	> 6.0 m (20 ft)	> 3.7 m (12 ft)	3.7 m to 2.75 m (12ft to 9 ft)	>6.0 m (20 ft)	> 4.6 m (15 ft)	> 2.75 m (9 ft)
Symbols						
> Greater Than						
< Less Than						
≤ Less Than or Equal To				Cranes, Power shovels, Backhoes, Mechanical brush cutter	RDB, Aerial ladder, Work platform, Uncertified aerial device	Certified and tested by certified laboratory

Source: Electrical Utility Safety Rules 2014

Appendix B - Typical Power Generation and Distribution Diagram

