GrandBridge ENERGY

Energy+ ENERGY+ INC.

CLEARANCE STANDARDS

(Cambridge, North Dumfries, and Brant County Territories)

Issued By: Engineering Department

Effective: May 2, 2022

Approved by Shawn Jackson, P.Eng.

Table of Contents

List of Tables

List of Figures

General

These specifications apply to the lines and equipment of electric supply and communication utilities located outside of buildings and fenced supply stations in the City of Cambridge, the Township of North Dumfries, and the County of Brant. This manual covers the vertical clearances to grade, railway crossings, etc. as well as horizontal clearances to buildings, bridges and other structures. It covers the clearances required between overhead distribution circuits and communication circuits. The clearances are derived from CSA Standard CAN/CSA-C22.3 No. 1-15 Overhead Systems (latest revision), the Ontario Electrical Safety Code (latest revision), and the ESA's tree planting guidelines "Planting Under or Around Powerlines and Electrical Equipment".

The stated clearances for conductors are minimum values related to maximum loading and service conditions and represent design limits rather than clearances for construction or day-to-day operation. Consequently, clearances under day-to-day conditions will be greater than the stated minimum clearances when loading and service conditions are less severe. Vertical clearances shall apply under maximum sag, whether thermally loaded or physically loaded under wind and/or ice.

1. Maximum thermal loading
    a. 100°C for bare supply conductors
    b. 80°C for secondary insulated conductors
    c. 50° for bare neutral conductor*
2. Maximum ice and wind loadings
    a. Heavy loaded condition (-20°C/12.5mm ice/400Nm² horizontal wind loading)for communication cables and bare neutral conductor*

*Maximum sag of bare neutral conductor is the greater of these two conditions

All horizontal clearances specified are minimum clearances and do not take into consideration conductor swing. The conductor swing at maximum sag must be added to the minimum specifications specified in this document. If conductor swing is unknown, a value of 1.8m shall be used.

It is the responsibility of the individual using these clearance standards to check with GrandBridge Energy (formerly Energy+ Inc.) that they are using the latest edition before beginning any work. GrandBridge Energy shall not be responsible in any way for failure to do so.

Vertical Clearances of Conductors above Ground or Rails

The minimum vertical clearances of wires and conductors above ground or rails are specified in Table 1:

Conductors	Over or Alongside Land Likely to be Travelled by Road Vehicles (highways, streets) or Over Right-of-Way of U/G Pipelines	Over Driveways to Residences and Residence Garages	Alongside Roads and Highways in Areas Unlikely to be Travelled by Road Vehicles and Within 1.5m of Road Right-of-Way	Above Top of Rail at Railway Crossings
Guying	4.42m	3.7m	3.0m	7.3m
Communications				
0 to 750V			3.4m	
>750V to 27.6/16kV	4.75m	4.75m	4.15m	7.6m

Table 1: Minimum Vertical Clearances of Conductors above Ground or Rails

Notes:

1. Where oversize vehicles are expected, the clearances specified shall be increased by the amount by which the combined vehicle and load height exceeds 4.15m
2. Railway clearances must be increased by at least 0.3m for ballast changes. Ballast is crushed stone or gravel placed between and below the ties of railway tracks.
3. Where snow is not cleared away, these clearances must be increased by 0.4m.

Vertical Clearances Supply Equipment from Ground

The minimum vertical clearances above ground of pole mounted supply equipment such as transformers, capacitors, arresters, etc. are specified in Table 2:

Location of Equipment	Effectively Grounded Cases of Supply Equipment (Transformers, Capacitors, Regulators, etc.)	Live or Exposed Current Carrying Parts of Supply Equipment (Arrestors, Switches, etc.) and Ungrounded Cases of Supply Equipment (Transformers, Capacitors, Regulators, etc.)	
	0 to 27.6/16kV	0 to 750V	>750V to 27.6/16kV
Areas accessible to pedestrians only	3.0m	3.0m	3.4m
Areas likely to be traveled by vehicles	4.4m	4.4m	4.7m

Table 2: Minimum Vertical Clearances of Supply Equipment from Ground

Clearances of Supply Conductors Permanently Attached to Buildings

Where the permanent attachment of supply conductors to buildings is necessary (for example, a service conductor), the minimum clearances of supply conductors from the surface of buildings are specified in Table 3:

Supply Conductors	Horizontal Clearance
0 to 750V	1.0m
>750V to 27.6/16kV	3.0m

Table 3: Minimum Horizontal Clearances of Supply Conductors attached to Buildings

Notes:

1. The supply conductors shall not pass over the building to which they are attached.
2. The point of attachment of the supply conductors shall be on the same side as the customer's weather head and shall be located such that
    a. The weather head is a minimum of 0.15m and a maximum of 0.3m above the support for the attachment of the overhead supply conductors; and
    b. A minimum of 0.15m and a maximum of 0.3m horizontally from the customer's weather head.
3. The point of attachment shall not be less than 5.0m and not more than 9.0m above grade.
4. Supply conductors shall have a clearance of at least 0.3m from communication conductors at the point of attachment.

Clearances of Conductors Passing by or Over Buildings, Signs, Lamps, Traffic Signs, Standards, and Antennas (not attached)

The minimum clearances of conductors passing by or over buildings, signs, lamps, traffic signs, standards, and antennas are specified in Table 4:

Supply Conductors	Horizontal Clearance	Vertical Clearance	
	To Buildings, Signs, Billboards, Lamp and Traffic Sign Standards, and Similar Plant	Above Buildings, Signs, Billboards, and Similar Plant	Above Lamp and Traffic Sign Standards
Guys and Communications	1.0m	Not Allowed	0.08m
0 to 750V	2.0m		0.5m
>750V to 27.6/16kV	3.0m		2.5m

Table 4: Minimum Clearances of Conductors passing by or Over Buildings, Signs, Lamps, Traffic Signs, Standards, and Antennas (not attached)

Notes:

1. Clearances shall apply to any part of a building, including balconies, fire escapes, antennas and their supporting structures, and other permanent fixtures.
2. Where conductors pass in front of a barn window, barn door or entrance to hay mow, minimum horizontal clearance for conductors at all voltages shall be increased to 6.0m.
3. Where conductors pass in front of a window or other opening, the clearance should be increased by 1.5m. Where buildings exceed three storeys or 15.0m in height, the clearances should be increased by 3.0m so as to allow for the raising of ladders by the fire department.

4. Supply equipment containing flammable liquids (such as transformers) shall not be located within 6.0m, when measured in direct line of sight, from any door, window, combustible surface or material on the building unless a barrier wall satisfactory to GrandBridge Energy is installed.
5. Guy wires and communication cables shall not be allowed to rub against buildings or other plant.

Clearances of Conductors from Bridges

Conductors, other than insulated secondary service conductors (0 - 600V), shall not be attached to bridges. Clearances over or adjacent to portions of the bridge normally traversed by pedestrians or travelled by road vehicles or railways are covered by

>750V to 27.6/16kV	4.75m	4.75m	4.15m	7.6m

Table 1: Minimum Vertical Clearances of Conductors above Ground or Rails. Where conductors parallel the bridge, the following horizontal clearances are required:

System Voltage	Horizontal Clearance
0 to 750V	1.2m
>750V to 27.6/16kV	3.0m

Table 5: Minimum Horizontal Clearances of Conductors from Bridges

Clearances from Swimming Pools

Minimum vertical and horizontal clearances of conductors in the vicinity of below or above grade swimming pools shall be as shown below:

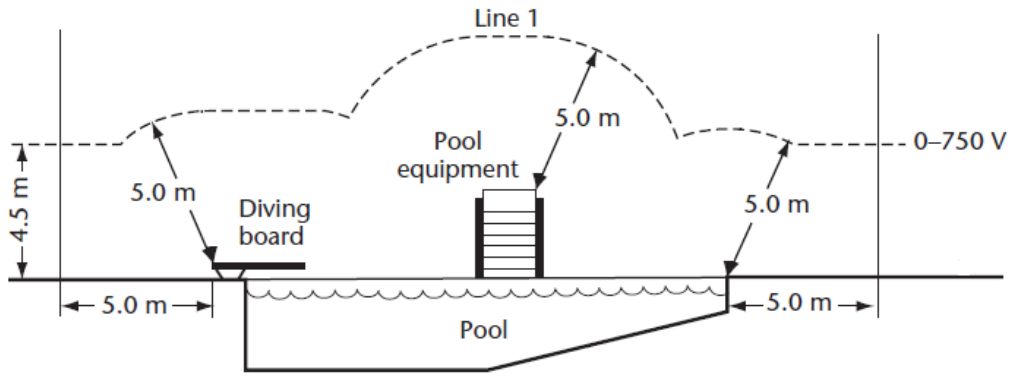

Figure 1: Minimum Clearances from Swimming Pools

Location of Conductors:

1. Conductors shall not be placed below Line 1, referred to as the Pool Area.
2. Neutral supported insulated cables operating at 600V or less and neutral conductors must be above Line 1.
3. Supply conductors operating at 4.16/2.4kV, 8.32/4.8kV, or 27.6/16kV are not permitted above Line 1.
4. Supply equipment such as transformers, capacitors, lightning arresters, etc. will not be placed within the Pool Area.

No swimming pool shall be located within 1.5m of any underground wiring except for conductors supplying electrical equipment associated with the pool and protected by a ground fault circuit interrupter.

Vertical Clearances of Conductors Crossing Each Other and Carried on Different Supporting Structures

Minimum vertical clearances of conductors crossing each other and carried on different supporting structures shall be as shown below:

Conductor Being Crossed Over	**Conductor at Upper Level**		
	Span Guys and Communication Cables	0 to 750V	>750V to 27.6/16kV
Span Guys	0.2m	0.2m	0.5m
Communication Cables	0.2m	0.3m	0.6m
0 to 750V	Not Allowed	0.3m	0.5m
>750 to 27.6/16kV	Not Allowed	Not Allowed	0.6m

Table 6: Minimum Vertical Clearances of Conductors Crossing Each Other and Carried on Different Supporting Structures

All vertical clearances apply with the upper conductor at maximum sag and the lower conductor assumed to form a straight line between its points of support.

Vertical Clearances between Supply Conductors and Communication Conductors Carried on Same Supporting Structure

Where supply conductors and communication conductors are located on the same structure the following clearances shall be maintained:

System Voltage	**Vertical Clearance to Communication at Attachment Points**	**Vertical Clearance to Communication In-Span**
0 to 750V	1.0m	10cm
>750V to 27.6/16kV	1.2m	40cm

Table 7: Minimum Vertical Clearances between Supply Conductors and Communication Conductors Carried on Same Supporting Structure

All vertical clearances apply with the upper conductor at maximum sag and the lower conductor assumed to form a straight line between its points of support:

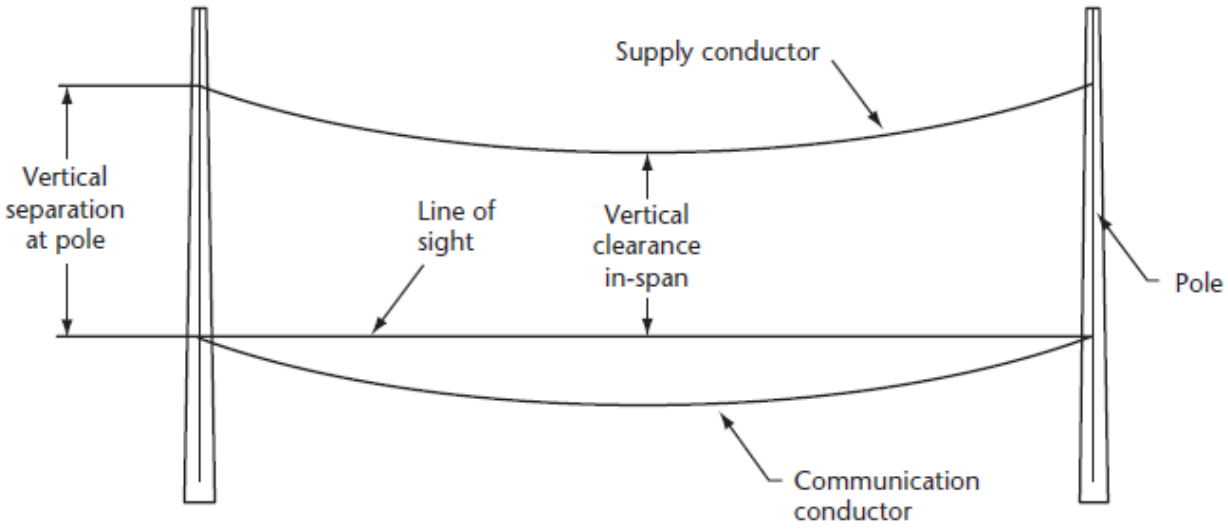

Figure 2: Minimum Vertical Clearance at Pole and In-Span

Miscellaneous Clearances

1. Hydrants
   Supporting structures (including guys or attachments) that are less than 2.0m above the top of a hydrant shall have a minimum horizontal separation from the hydrant of 1.0m.
2. Silos
   Overhead conductors shall not be closer than 12.0m measured horizontally from silos to the closest conductor, with the conductor at rest.
3. Wells
   Overhead conductors shall not be erected over wells from which pump rods may be lifted and come in contact with the conductors. In determining pole heights and conductor locations near wells, sufficient clearance should be allowed to permit the minimum length of pipe being lifted from the well and allowed to fall in an arc to the ground without contacting the conductors at rest.
4. Windmills
   Overhead conductors shall not be located within 6.0m, measured horizontally from any such types of structure, to the closest conductor at rest.

5. Flagpoles
   In determining pole heights and conductor locations near flagpoles, sufficient clearance should be allowed to permit the flagpole to fall in an arc without touching the conductors at rest.
6. Waterways
   Crossings of waterways must be approved by Transport Canada (both the Coast Guard and Air Services). All conductors should be located a minimum of 10.0m (at maximum conductor sag) above the Ordinary High Water Mark (O.H.W.M.).
7. Driveways
   All driveways must be located a minimum of 1.5m away from hydro poles, guy and anchors, padmount transformers, etc..
8. Trees
   Clearances to trees shall be as follows:
   a. **Underground Powerlines**
      The minimum clearance required from the edge of the root ball to the edge of the underground powerline corridor is 1.0m.
   b. **Electrical Equipment**
      When planting near pad mounted equipment:
      i. *Transformers*
         3.0m is required in front of door(s) and 1.5m on sides and back.
      ii. *Switchgear*
         3.0m is required in the front and back door(s) and 1.5m on the sides.
   c. **Overhead Powerlines**
      The required distances between powerlines and trees or shrubs are based on the species of the plant. The species of the plant corresponds to a zone in which it may be planted. Please refer to the Electrical Safety Authority's tree planting guidelines "Planting Under or Around Powerlines and Electrical Equipment" for tree species planting zones.
      i. *Low Zone*
         The area under the powerlines and extends 4.5m on either side. Trees and/or shrubs planted in this zone should have a maximum mature height and spread of 4.5m.
      ii. *Medium Zone*
         The area that extends from the outer edge of the Low Zone to a distance of 7.6m on either side of the powerline. The maximum mature height and spread of trees planted in this zone should be 7.6m.
      iii. *Tall Zone*
         The area that extends from the outer edge of the Medium Zone, extending greater than 7.6m from of the powerline. Any strong and healthy tree may be planted in this zone.
      iv. *Base Zone near Hydro Poles*
         Trees and/or shrubs shall not be placed closer than 3.0m from the base of a hydro pole.

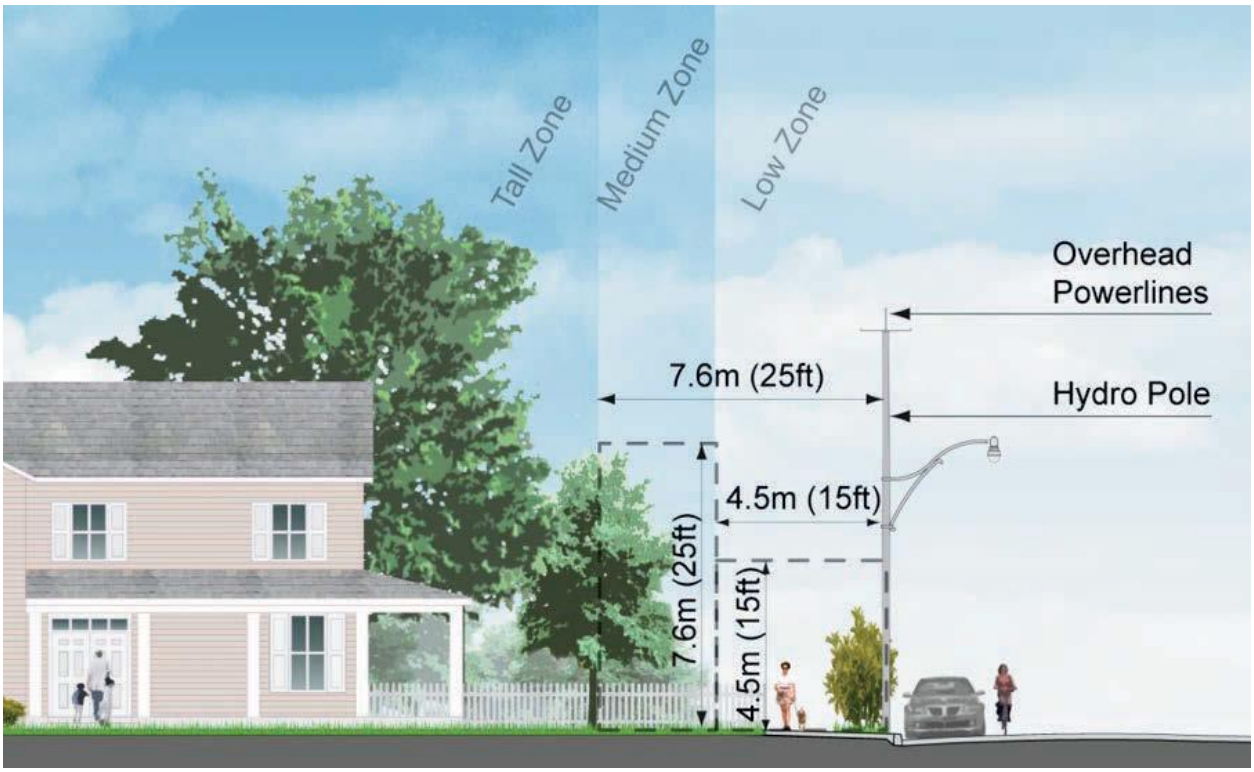

Figure 3: Tree Planting Zones

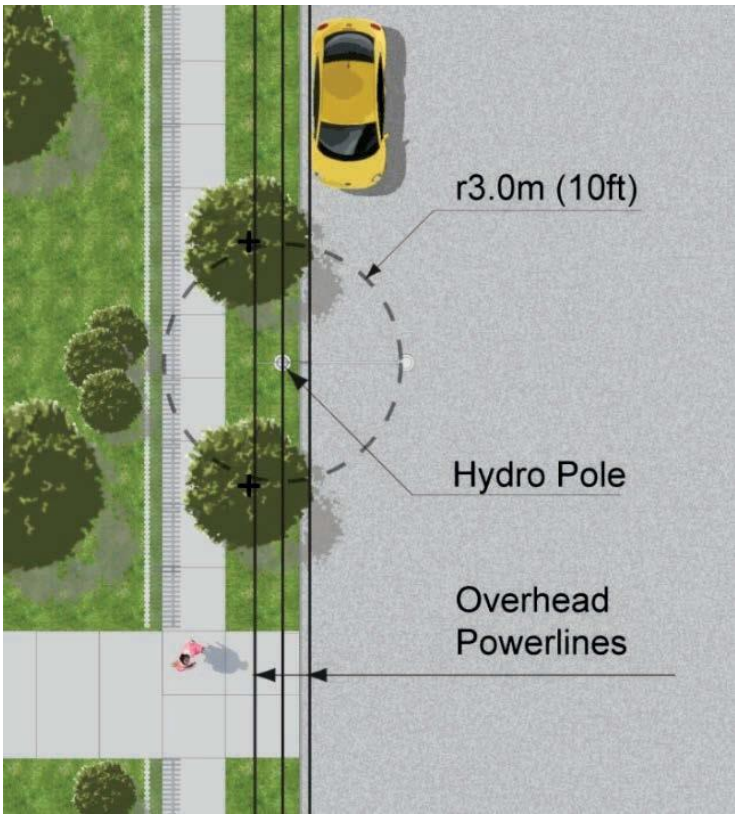

Figure 4: Base Zone near Hydro Poles

9. Propane Tanks
   Supply conductors shall not be installed over propane tanks of a capacity of 7600L or larger. All overhead supply conductors shall have a horizontal clearance at rest of 7.6m to propane tanks of a capacity of 7600L or larger.
10. Orchards
    Overhead conductors shall not normally be built over or routed immediately adjacent to orchards. If such routing is unavoidable, an agreement with the property owner shall be obtained specifying the maximum height of the trees in order to avoid problems during harvest.