

## Application

This standard provides general notes for ES54 S1 and S2 secondary underground service connections.

## Revision Notes

Changed 1600 A to 800 A in note 3.3.c. Expanded on minimum clearance in note 4.1.b. Changes are marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2025-060 *Revised ES54 S0-04 Secondary Services General Notes*.

## References

### BC Hydro Distribution Standards

|            |                                                                                                                               |
|------------|-------------------------------------------------------------------------------------------------------------------------------|
| ES53 S1-01 | Secondary Services Single-Phase up to 600 A 120/240 V Wiring and Revenue Metering Connections                                 |
| ES54 S0-02 | Services General Notes                                                                                                        |
| ES54 S0-05 | Service Ducts and Trenches General Notes                                                                                      |
| ES54 S1-01 | Secondary Single-Phase Services 200 A Single and 400 A Multiple Self-Contained Meter Installation                             |
| ES54 S1-03 | Secondary Single-Phase Services 400 A and 600 A CT-Based Meter Installation                                                   |
| ES54 S1-04 | Secondary Single-Phase Services 200 A to 600 A Pad-Mounted Kiosk and Pedestal, Self-Contained and CT-Based Meter Installation |
| ES54 S2-01 | Secondary Three-Phase Services 120/208 V and 347/600 V up to 1600 A Private Property Installation                             |

### Other BC Hydro Documents

|                    |                                                                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Primary Guide      | Requirements for Customer-Owned Primary Services Supplied at 4 kV to 35 kV                                                                                              |
| Secondary Metering | Requirements for Secondary Voltage Revenue Metering (750 V and less)                                                                                                    |
| DI S10-4           | Electric Service Connections – Voltages                                                                                                                                 |
| EA2021-003         | Distribution Standards and Equipment Advisory Information Bulletin: Interim Guide for Acceptance of Secondary Service Equipment per Standards ES54 S1-01 and ES54 S2-01 |

### External Documents

|                    |                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------|
| BCEC               | Canadian Electrical Code, Part 1 (CSA C22.1) adopted for BC and endorsed by Technical Safety BC (TSBC) |
| TSBC IB-EL 2016-03 | Information Bulletin: Temporary and Permanent Services for Construction Power                          |

|                                  |                                                                                     |                                                                                     |                                                                                      |               |
|----------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------|
| Designed:<br>B. Linforth         |  | Professional of Record<br>2025-12-16                                                | Secondary Services General Notes                                                     |               |
| Checked:<br>T. Ismagilov, P. Eng |  |  |                                                                                      |               |
| Reviewed:<br>M. Stevens, P. Eng  |  |                                                                                     | DISTRIBUTION<br>STANDARDS                                                            | ES54 S0-04 R4 |
| Approved:<br>M. Stevens, P. Eng  |  | Issued: 2025-12-16<br>Effective: 2025-12-16                                         |  |               |

## Notes

### 1. Typical Service Configurations

Following is a summary of typical BC Hydro secondary voltage customer services.

#### 1.1 Single 200 A 120/240 V Single-Phase

This is the most common type of secondary underground service for residential dwellings. The meter socket in this configuration is mounted on the outside wall and separated from the service main panel. See ES54 S1-01.

#### 1.2 Multiple Main up to 400 A 120/240 V Single-Phase

This combination panel may facilitate up to four 200 A 120/240 V meter sockets for supplying small duplex, triplex and fourplex residential buildings. See ES54 S1-01.

#### 1.3 Single 400 A or 600 A 120/240 V Single-Phase

This secondary service is a combination panel comprising a service main breaker and CT-based revenue meter. These combination panels are suitable for small commercial buildings and large single-family dwellings or acreage homes. These combination panels may be rated up to 600 A 120/240 V and are available as surface-mounted panels. See ES54 S1-01.

#### 1.4 Single 200 A to 600 A 120/240 V Single-Phase Pad-Mounted

This secondary service is an outdoor-type free-standing pad-mounted service pedestal or kiosk. Service pedestals are suitable for residential dwelling where the owner wants to restrict utility personnel access. Service kiosks are suitable for large residential dwellings, golf courses, small commercial buildings, service upgrades for additional electric vehicle chargers or laneway houses, and other multiple service connections. See ES54 S1-04.

#### 1.5 Multiple Main 600 A Splitter 120/240 V Single-Phase

This is a common field-assembled service for smaller commercial and industrial installations with relatively small 120/240 V single-phase loads. This customer service is fed from a large CSA-certified splitter box up to 600 A 120/240 V. See ES54 S1-03.

#### 1.6 Single up to 1200 A 120/240 V Single-Phase

This is a service with customer-owned transformation. The BC Hydro designer shall review and accept these services, subject to Revenue Metering's acceptance, for the installation of a bar-type CT up to 1200 A. BC Hydro requirements regarding customer-owned transformation can be found in the Secondary Metering guide.

#### 1.7 Single 200 A 120/208 V Three-Phase

This is a relatively common type of hot-style secondary underground service for residential and small commercial services and temporary construction power. The available fault current shall be less than 10 kA. Meter sockets do not require separate pull boxes, subject to the enclosure minimum dimensions in ES54 S2-01. BC Hydro terminates the utility supply conductors into the meter socket, which is ahead of the customer service main panel. BC Hydro also offers 200 A three-phase / 3W revenue meters for 240 V and 480 V special customer services with customer-owned transformation. Supply service ducts to customer-owned three-phase meter bases shall be 100 mm (4") diameter minimum. See the Secondary Metering guide.

#### 1.8 Multiple Main Splitter up to 1600 A 120/208 V and 347/600 V Three-Phase / 4W

These are common field-assembled large services for commercial and industrial installations. These customer services are fed from a large CSA-certified splitter box up to 1600 A and may supply multiple metered services for separate buildings and diverse customer loads, such as fire pumps and essential services panels. See ES54 S2-01 and EA2021-003.

**1.9 Multiple Main Switchgear up to 1600 A 120/208 V and 347/600 V Three-Phase / 4W**

These are the most common large factory-assembled and CSA-certified residential, commercial, and industrial secondary services up to 1600 A. This type of switchgear assembly has an integral utility cable cubicle with bus extensions and cable clamps for the safe connection of BC Hydro service supply cables. Integral to the assembly is the customer service main, as well as a sealed revenue metering CT compartment located immediately after the service main. See ES54 S2-01. Further information on BC Hydro rules and requirements for customer service connections can be found in DI S10-4.

**2. Customer Service Main****2.1 Interrupting Capacity**

The main service protective device for the underground services listed in note 1 shall be capable of interrupting the available fault current as follows:

- a. Single-phase 120/240 V up to 600A, available fault-current up to 22 kA;
- b. Three-phase 120/208 V, wye-connected, grounded neutral, up to 1600 A, available fault current up to 45 kA;
- c. Three-phase 347/600 V, wye-connected, grounded neutral, up to 1600 A, available fault current up to 45 kA; and
- d. Fuses ahead of revenue metering devices are not acceptable.

**2.2 Temporary Construction Power**

- a. BC Hydro will accept customer-owned temporary construction service assemblies and structures fabricated in compliance with TSBC IB-EL 2016-03 and accepted by the local inspection authority.
- b. Customer service mains are exempt from note 2.1.1(d). A fused loadbreak switch as service main is acceptable for temporary construction power.
- c. Support structures for temporary construction services (see Figure 1) may be constructed from treated lumber, plywood, power poles, and galvanized steel channels.

**2.3 Service Upgrade and Duct Sizes**

Civil upgrades, including concrete encasement, are not necessary if the existing duct size meets the minimum requirements for the upgraded service cables.

**2.4 Customer-Owned Auxiliary Devices**

Customer-owned auxiliary devices shall not be connected on the line side of the service main except for electrically connected fire pumps. Customer-owned auxiliary devices shall be connected on the load side of the BC Hydro revenue meter.

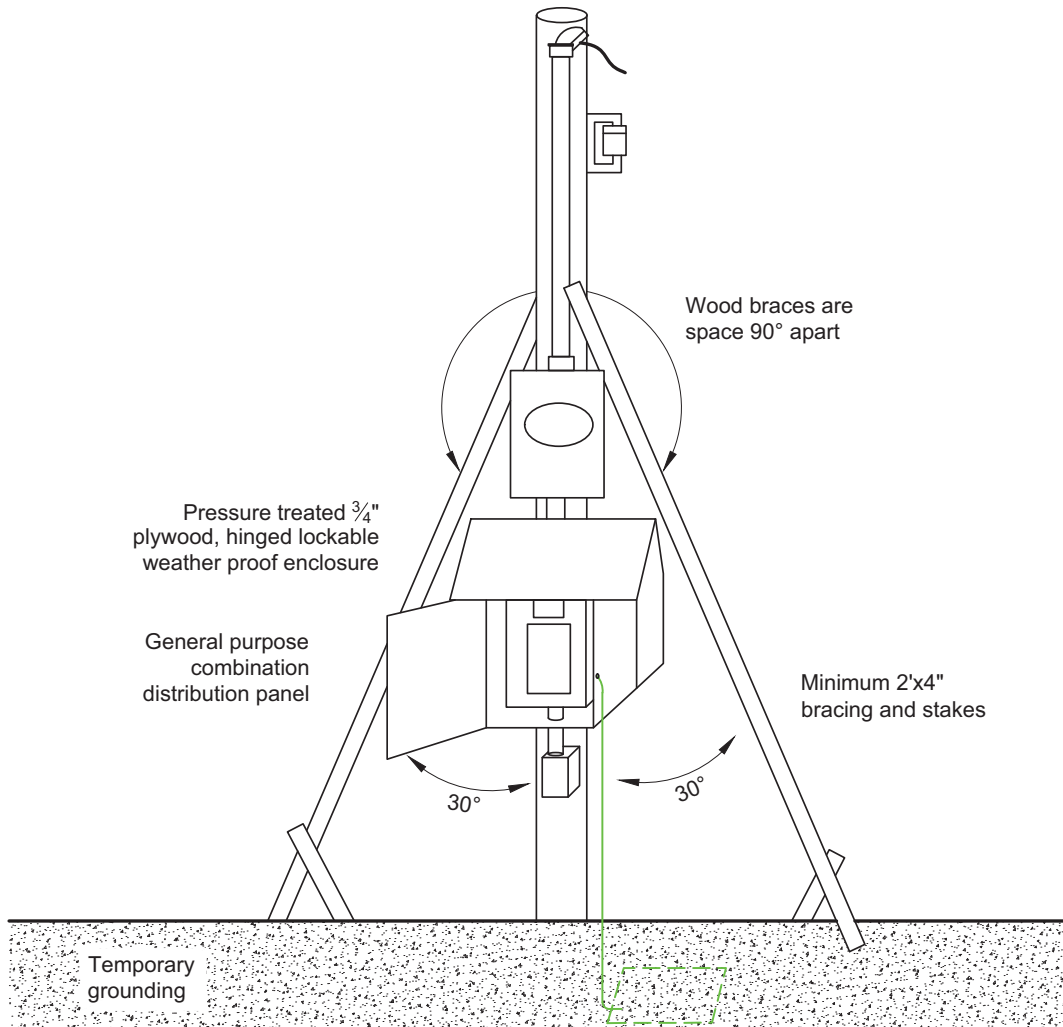
Customer-owned instrument transformers may be connected on the line side of the BC Hydro revenue meter provided no control power is unmetered and:

- a. Where using the embedded metering equipment as part of the main circuit breaker; or
- b. Where a single supply service feeds multiple consumer services and there is no BC Hydro main service revenue meter, provided:
  - i. Toroidal (donut-style) or window-type current transformers (CTs) are used; and
  - ii. The compartment or enclosure containing the instrument transformers includes provisions for BC Hydro seals or locks to prevent unauthorized access to the unmetered portion of the electrical service.

BC Hydro must be notified prior to the removal of any seals to maintain or troubleshoot such devices. Resealing fees may apply.

### 2.5 Service Main Protective Device Trip Unit Rating Plug

BC Hydro will accept a larger frame for main service protective devices with a lower trip unit rating plug if access to the trip unit rating plug is sealable and restricted to BC Hydro personnel only.



**Figure 1 – Temporary construction service**

## 3. Customer-Owned Transformation

The maximum available secondary customer service connection size depends on the BC Hydro primary distribution system (12.5 kV, 25 kV, or 34.5 kV) available at the customer's location. If the customer requires larger service than the maximum available secondary service for the location, the customer shall provide customer-owned transformation and become a primary service customer. See the Primary Guide for more information or contact a BC Hydro designer for the area.

### 3.1 12.5 kV Primary Service

In areas where the primary service voltage is 12.5 kV (may include areas designated for 25 kV), the maximum customer service sizes rated for 80% continuous operation are:

- 600 A at single-phase three-wire 120/240 V;
- 1600 A at three-phase four-wire 120/208 V; and
- 600 A at three-phase four-wire 347/600 V.

### 3.2 25 kV Primary Service

In areas where the primary service voltage is 25 kV, the maximum customer service sizes rated for 80% continuous operation are:

- a. 600 A at single-phase three-wire 120/240 V;
- b. 1600 A at three-phase four-wire 120/208 V; and
- c. 1600 A at three-phase four-wire 347/600 V.

### 3.3 Up to 34.5 kV Primary Service

In some rural applications where the primary service voltage is 19,920 V / 34,500 V grounded wye, the maximum consumer service sizes rated for 80% continuous operation to be supplied by BC Hydro at the secondary distribution voltage are:

- a. 600 A at single-phase three-wire 120/240 V;
- b. 1600 A at three-phase three-wire 120/208 V; and
- c. 800 A at three-phase four-wire 347/600 V.

## 4. Wireways and Pull Boxes

### 4.1 Utility Wireway

- a. BC Hydro no longer terminates utility supply cables directly onto a customer-owned service main switch or breaker lugs due to liability and restricted access.
- b. Customer-owned three-phase services, except for the 200 A 120/208 V meter socket, require a separate utility compartment for securing and terminating BC Hydro supply cables. Supply lugs within the BC Hydro utility wireway shall be tunnel-type, clearly visible, and vertically oriented to permit direct conductor access for termination unless otherwise noted. 1.5 m minimum clearance shall be provided in front of wireways and pull boxes rated above 600 A. Minimum clearance for wireways and pull boxes rated 600 A or less shall comply with the BCEC, local authority having jurisdiction requirements, and local bylaws.
- c. A BC Hydro designer determines the size and number of supply service cables as follows:
  - i. Single-phase 120/240 V hot style single meter socket based on meter socket rating;
  - ii. Single-phase 120/240 V hot style multiple main meter socket based on main bus rating;
  - iii. Single-phase 120/240 V cold style service based on service main rating;
  - iv. Three-phase 120/208 V hot style single meter socket based on meter socket rating; and
  - v. Three-phase 120/208 V and 347/600 V cold style services based on customer service main rating.

### 4.2 Pull Boxes General

- a. A pull box is the compartment necessary for cable installation crews to pull in the required cable safely and effectively. Pull boxes are required at service entrance equipment locations except for meter bases and switchgear rated 200 A and less.
- b. Mid-run pull boxes located outside a building shall be a BC Hydro equivalent 632 or 332 box, as determined by the BC Hydro designer and approved by the local field manager.
- c. Mid-run pull boxes, wall-mounted inside a building, shall be minimum 900 mm W x 1800 mm H x 800 mm D.
- d. Pull boxes shall be located in consultation with a BC Hydro designer and accepted by the local field manager. A minimum 1.5 m clearance shall be provided for working space in front of the box to accommodate pulling equipment and BC Hydro crews.

- e. Concrete pull boxes on private property and ducts entering customer-owned pull boxes and wireways shall be terminated into bell ends to eliminate the possibility of service cable damage.

#### 4.3 Pull Boxes Located at the Service Entrance of Wireways

- a. Wireways can be either top, bottom, back, or side entry, and have either a wireway or integral pull box. The requirements outlined herein apply to service entry assemblies except where noted.
- b. Suitable cable supports shall be provided in wireways and pull boxes per note 6 *Cable Clamps*.
- c. Bus bars shall be extended into the wireway and be staggered and separated horizontally or vertically as shown in the ES54 S1 and S2 standards.
- d. Service entry ducts shall be placed within the wireway, pull box, or cable entrance compartment.
- e. Wireway and pull box dimensions shall be in accordance with applicable tables in the ES54 S1 and S2 standards.

### 5. Cable Pulling

- a. Customer-owned service switchgear, wireways, and pull boxes are not rated for direct attachment of BC Hydro cable pulling gear. The BC Hydro designer shall advise the customer about installing necessary pulling irons, which are supplied by BC Hydro and installed by the customer. The BC Hydro designer in consultation with a local field manager shall review rear and side cable entry services and customer-owned pull boxes and provide the necessary acceptance.
- b. Service cables may be installed by hand if the BC Hydro structure or customer pull box is close to the utility point of connection and the expected maximum pulling tension is less than 450 N, excluding reel back tension. Hand feed installation assumes one installer pushing and one installer pulling the cables. There is no reel back tension in the pulling calculation. Pulling irons are not required for hand feed installation. The BC Hydro designer shall obtain acceptance for hand feed installation from the local field manager.
- c. Portable pulling equipment may be used to pull cable into a utility cable compartment located in the customer's building. Pulling irons are typically required if hand feed is not possible but may be omitted through consultation and agreement with a field operations manager or delegate.
- d. Threaded inserts for attaching BC Hydro pulling irons, if required, shall be engineered by the customer's consultant and connected to the building structure. The customer is responsible for determining the pulling iron holding strength based on the BC Hydro-provided maximum pulling line tension, location of the pulling iron, and pulling equipment and rigging.
- e. The customer shall provide engineered threaded inserts or attachments to the building structure for BC Hydro removable pulling irons as determined by BC Hydro designer. The customer shall supply and install bolts and hardware deemed necessary by the customer's engineer and shall be left threaded in place for use by BC Hydro crews during cable pulling.
- f. Cable positioning sheaves for side entry utility pull boxes and wireways may be large (400 mm to 675 mm) for large service cable bending radii. The wireway or pull box for such installations shall be large enough to rig a suitable cable guide sheave for each of the cable runs without requiring removal of or other conflict with a previously installed existing service supply cable.

### 6. Cable Clamps

- a. Cable clamps shall be installed in a 1 $\frac{5}{8}$ " x 1 $\frac{5}{8}$ " C-channel mounted on a slotted adjustable angle bracket, suitable for facing either outward or upward. Slotted angles shall provide back and forth adjustment of the C-channel within 100 mm of the enclosure front or the back.
- b. See ES53 S1-01 for service cable sizes and applicable BC Hydro-supplied cable clamps.



### 7. Concrete Encasement of Supply Service Ducts

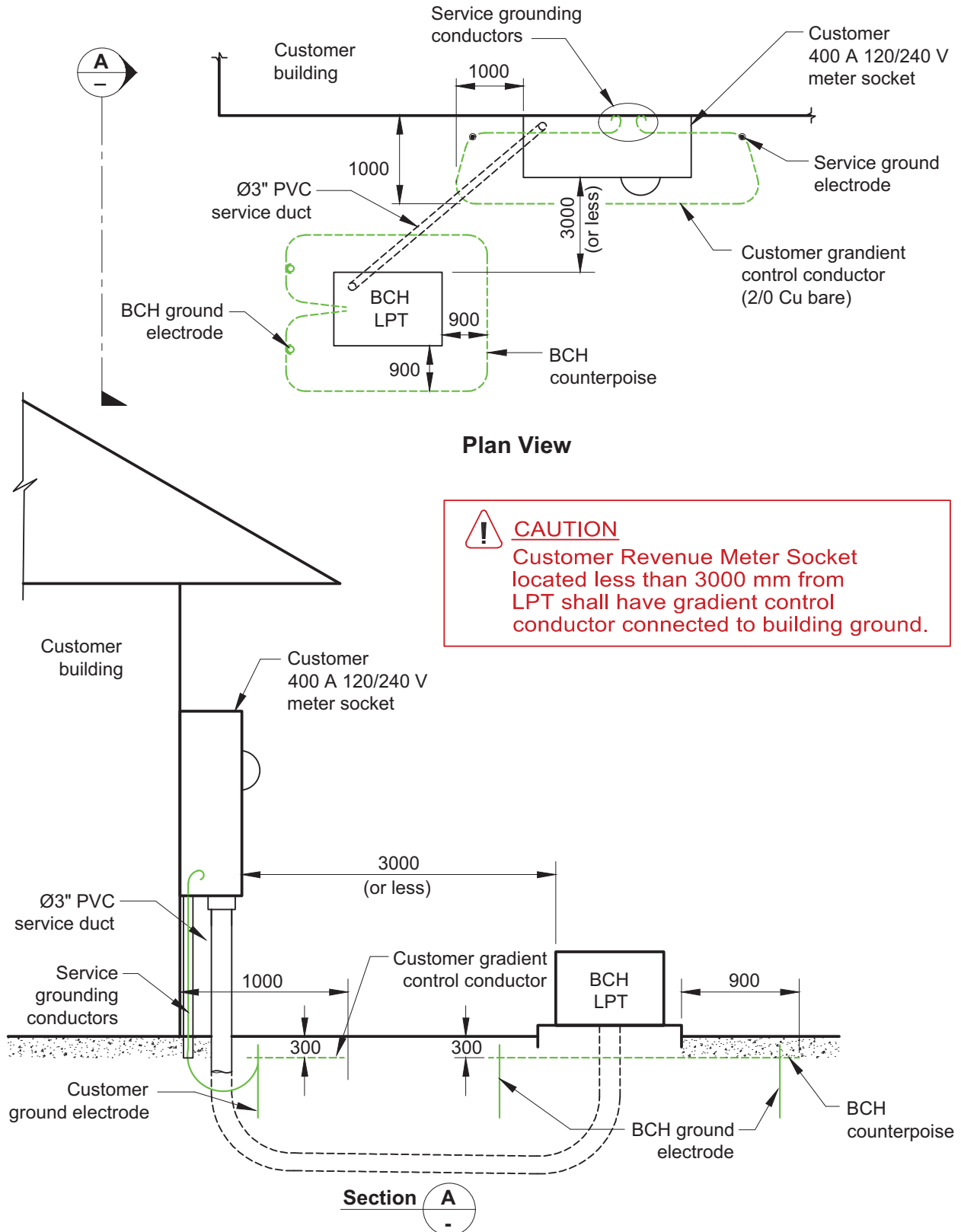
BC Hydro does not provide adequate overcurrent protection for supply service cables. Service ducts shall be installed on the outside of the building unless they are encased in concrete (see BCEC Rule 6-208). The portion of the service ducts running inside the building shall be embedded in and enveloped by a concrete cover a minimum 75 mm thick for three-phase services and 50 mm thick for single-phase services.

### 8. Grounding

- a. A customer service box or meter socket located less than 3000 mm from a BC Hydro pad-mounted transformer shall have gradient control conductor installed below the service box and bonded to the service ground (see Figure 3).
- b. BC Hydro accepts customer-owned service ground wiring installations per applicable BCEC rules, based on a contractor's declaration or evidence of a final inspection certificate. BC Hydro does not inspect customer-owned grounding and bonding for compliance with BCEC rules. Customer grounding and bonding connections shall be completed and inspected by the local authority having jurisdiction's electrical inspector before calling for energization by BC Hydro.
- c. The customer building or service grounding conductor connection to the neutral bus shall be done outside the utility compartment. Switchgear manufacturers typically designate the customer ground connection inside the service main and provide  $\frac{3}{4}$ " duct as a feed-through barrier inside the BC Hydro revenue metering compartment.
- d. A grounding stud (Figure 2) is not required inside the utility wireway as work method rules do not require the use of personnel safety grounds when working on low voltage equipment including 120/240 V, 120/208 V, and 347/600 V customer-owned services.



**Figure 2** – Grounding stud



**Figure 3** – Customer service in proximity to BC Hydro low-profile transformer



### 9. Standby Power and Transfer Switches

- a. Customer-owned standby generation is classified as either open-transition ("break-before-make") or closed-transition ("make-before-break").
- b. A customer may operate an open-transition standby generator at secondary voltage as an emergency power supply, independent and disconnected from BC Hydro service. The generator must never operate in parallel with BC Hydro service.
- c. Compliance and installation verifications and inspections of customer-owned open-transition transfer switches for secondary voltage customers with an open-transition standby generator are performed by TSBC and the local electrical authority having jurisdiction. BC Hydro only accepts CSA-certified utility transfer switches built specifically for this function per applicable CSA C22.2 standards. BC Hydro does not accept custom-built mechanical or electrical interlock schemes replicating the function of a CSA-certified utility supply transfer switch.
- d. BC Hydro does not accept sleeve-type transfers switch-mounted on 120/240 V 200 A CSA certified meter sockets. See ES54 S1-01.