## Application

This standard provides installation requirements for outdoor above-ground over-pad BC Hydro-owned equipment located on private property. See ES55 B2-05 for more on BC Hydro-owned switchgear access, placement, and general requirements for space allocation.

## Revision Notes

New standard, released concurrently with Standards and Equipment Advisory Information Bulletin 2026-025 *Released ES54 Section S Service Standards for BC Hydro-Owned Switchgear on Private Property*.

## References

### BC Hydro Distribution Standards

| | |
|---|---|
| ES54 F3-06 | BC Hydro Transformer Pad on Top of Soil on Private Property Inside Building Alcove |
| ES54 F3-07 | BC Hydro Pad-Mounted Transformer on Private Property Next to Customer Building |
| ES54 F3-08 | BC Hydro Transformer on Top of Building Slab or Inside Building Alcove on Private Property |
| ES54 R1-02 | Grounding Pad-Mounted Equipment on Private Property |
| ES54 S0-05 | General Notes Service Ducts and Trenches |
| ES54 S0-06 | BC Hydro-Owned Equipment on Private Property General Notes |
| ES54 U2-02 | Concrete Pad Protection Bollards |
| ES55 B2-05 | Customer Guide: BC Hydro-Owned Switchgear Placement and Requirements |

### Other BC Hydro Documents

Requirements for Customer-Owned Primary Services Supplied at 4 kV to 35 kV

### External Documents

| | |
|---|---|
| BCEC | Canadian Electrical Code, Part 1 (CSA C22.1) adopted for BC and endorsed by Technical Safety BC (TSBC) |

## Notes

### 1. General Requirements

#### 1.1 Use Case and Installation Types

BC Hydro's over-pad switchgear design is the typical configuration for switchgear installations on private property. The available installation options are:

a. BC Hydro-owned switchgear on suitable backfill outside a building footprint; and

b. BC Hydro-owned switchgear on top of building sublevels or inside an alcove within a building envelope.

Installation requirements are provided in notes 2 and 3. Typical general arrangements for BC Hydro-owned over-pad switchgear are illustrated in Figure 1.

| | | | | |
|---|---|---|---|---|
| Designed: T. Ismagilov, P. Eng | | Professional of Record 2026-04-01 PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA T. ISMAGILOV # 61519 Permit to Practice 1002449 | Over-Pad Above-Ground Outdoor Switchgear Installation | |
| Checked: M. Kelvin, P. Eng | | | | |
| Reviewed: M. Stevens, P. Eng | | | DISTRIBUTION STANDARDS BC Hydro | ES54 S6-01 R0 |
| Approved: H. Giesbrecht, P. Eng | | Issued: 2026-04-02 Effective: 2026-06-01 | | |

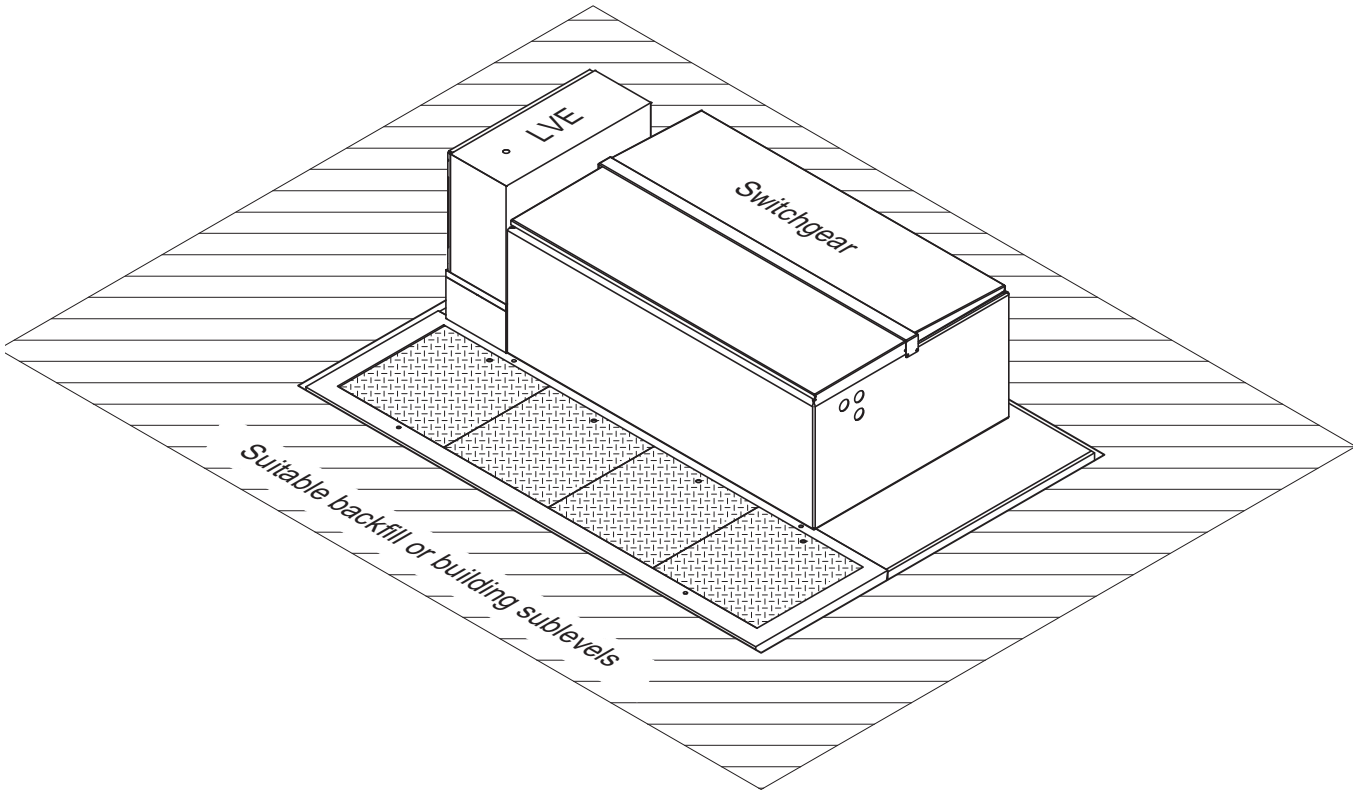


**Figure 1** – General arrangements

### 1.2 Duct and Equipment Arrangement

The general duct and equipment arrangements are shown in Figure 2. The BC Hydro designer will advise the customer on the required size, quantity, and configuration of BC Hydro feeder and customer service ducts and duct drainage connection, subject to approval by the local building department.

The customer shall provide a copy of the site plan showing the location of the building essential loads electrical panel supplying a low-voltage enclosure (LVE). The plan shall be stored inside the LVE. Supply circuits for the LVE shall provide 24/7 power year-round. See ES54 S0-06 for details and duct and trench requirements.

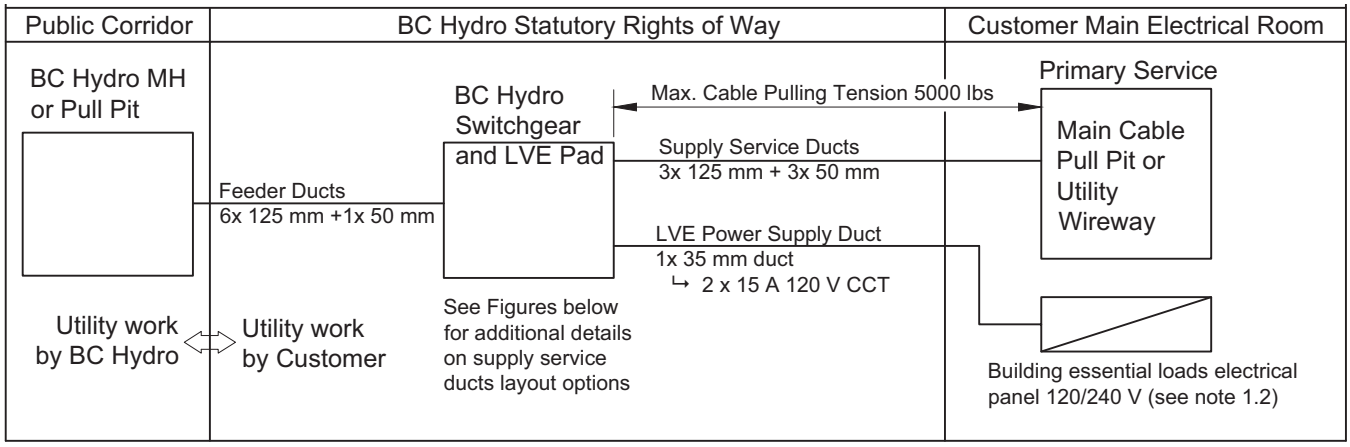


**Figure 2** – BC Hydro switchgear over-pad duct block diagram and equipment arrangement

### 1.3 Typical Supply Service Duct Configuration and Clearance

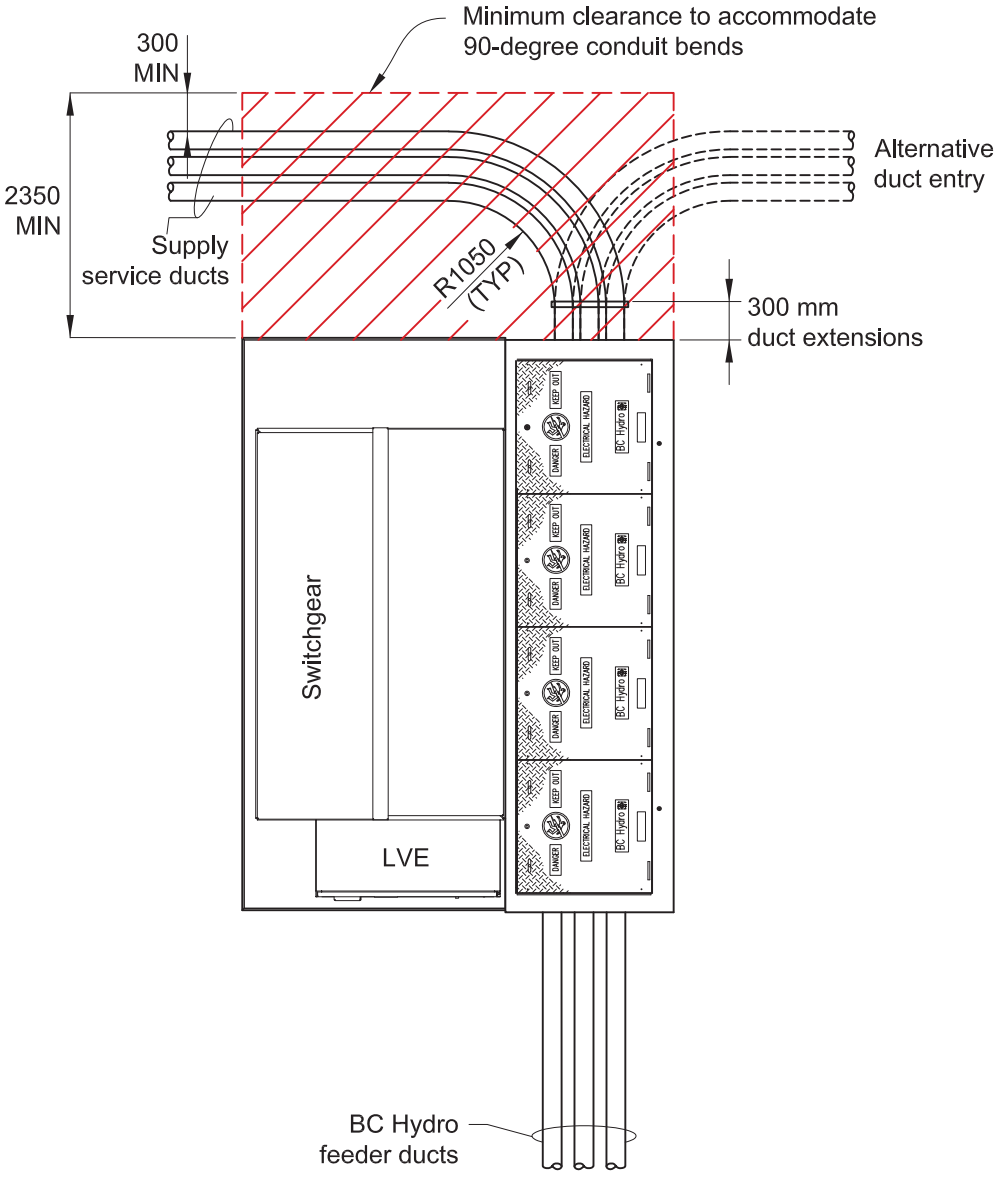


**Figure 3** – Supply service duct configuration and clearances

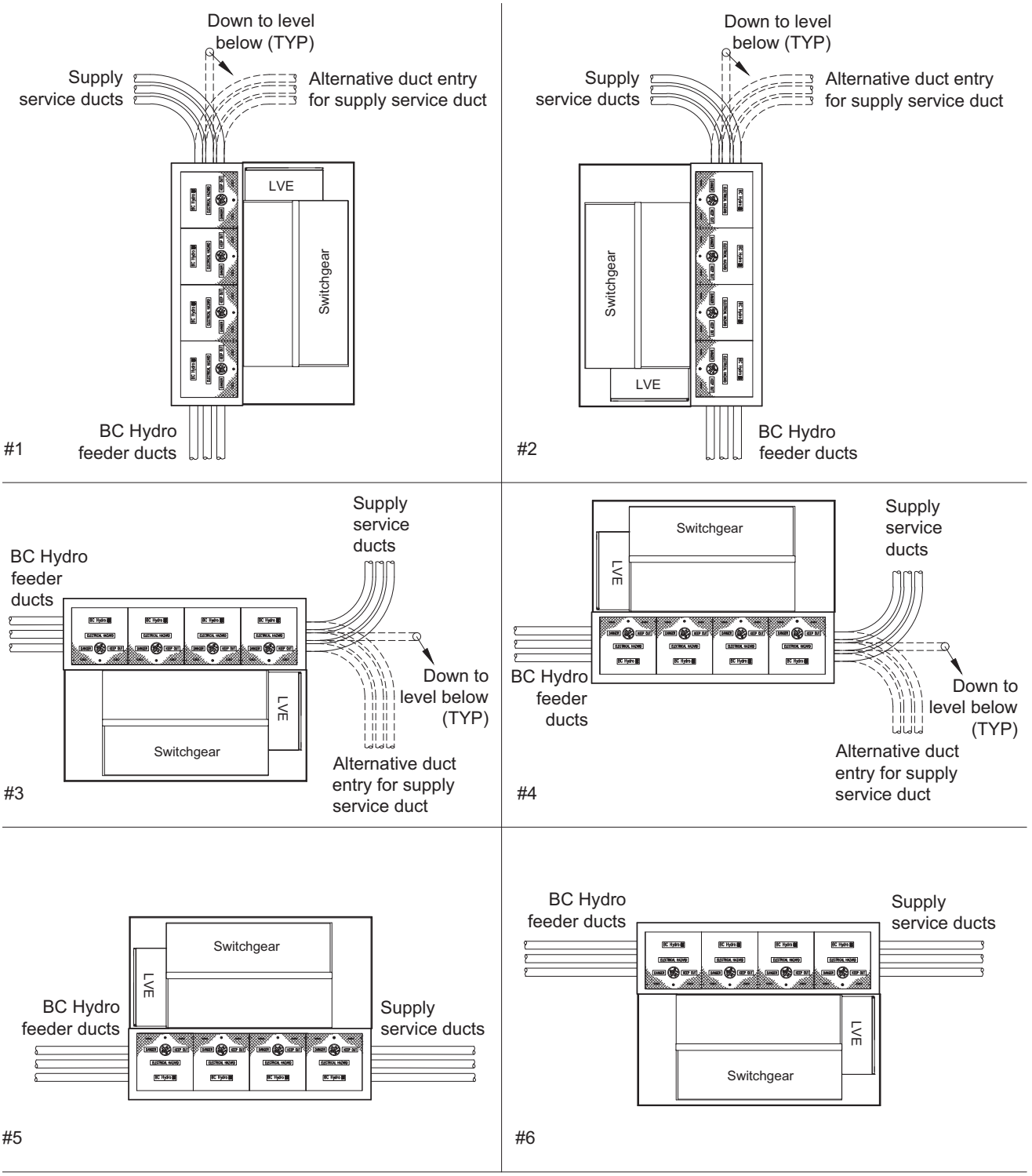


**Figure 4** – Alternative duct entry options

### 1.4 Clearance Requirements

Figure 5 shows the minimum unobstructed clearance requirements around the over-pad design. It is recommended that additional clearance be added to accommodate field variations and construction tolerances. See ES54 S0-06 for unobstructed overhead clearance requirements.

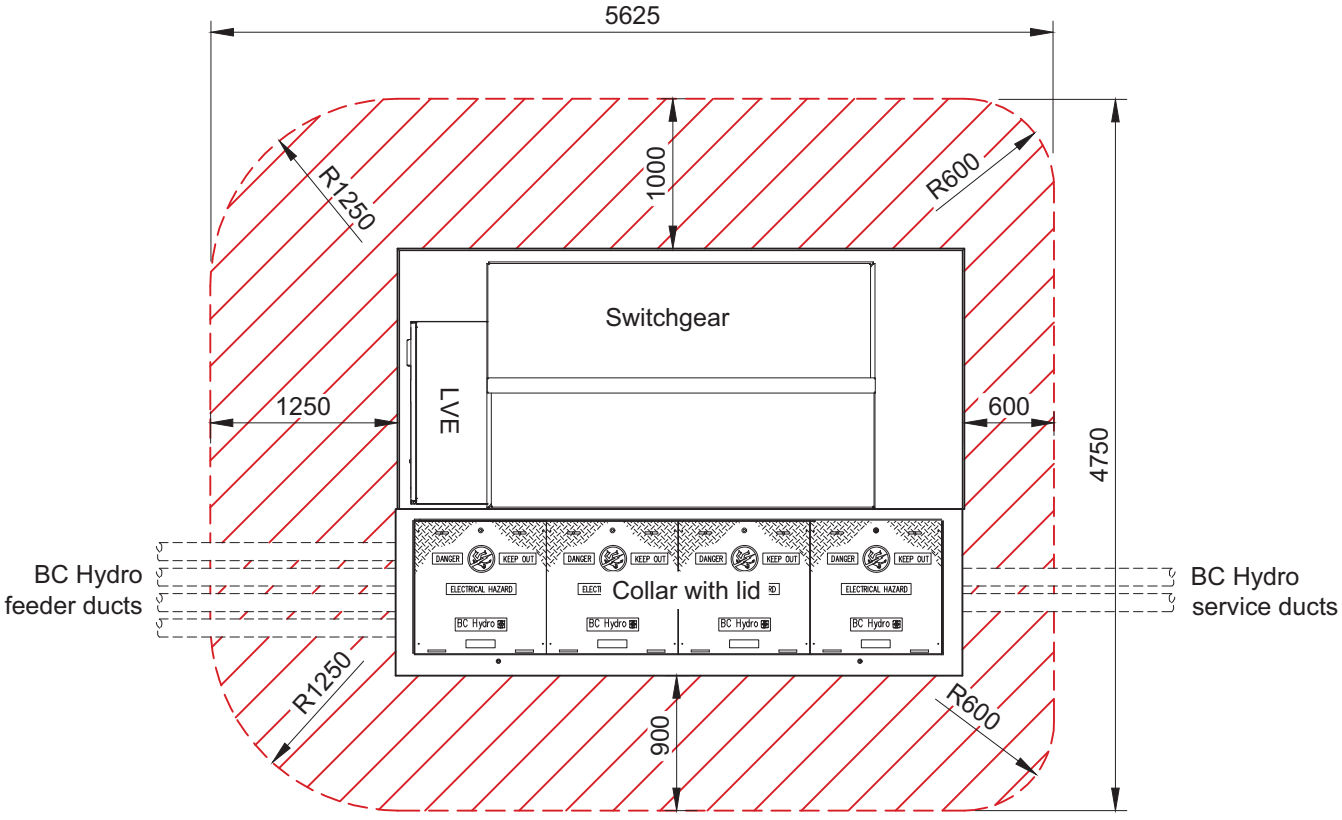


**Figure 5** – Minimum unobstructed clearance requirements

### 1.5 Grounding Requirements

Grounding and bonding shall meet the minimum requirements shown in Figures 6 and 7 and the provisions in Tables 1 and 2. These requirements ensure equipotential grounding and bonding, mitigate touch-potential hazards, and comply with BC Hydro standards.

High-voltage safety grounding inside the building and around the BC Hydro-owned switchgear area shall be constructed according to BC Hydro standards, ensuring equipotential grounding and mitigating hazardous touch potential. This standard provides the minimum BC Hydro grounding requirements for equipotential grounding. The customer could install additional grounding and bonding conductors and connections in compliance with BCEC section 36.

BC Hydro does not supply grounding materials unless explicitly noted. Customer-installed grounding components shall be rated for direct burial and be supplied, installed, and maintained by the customer.

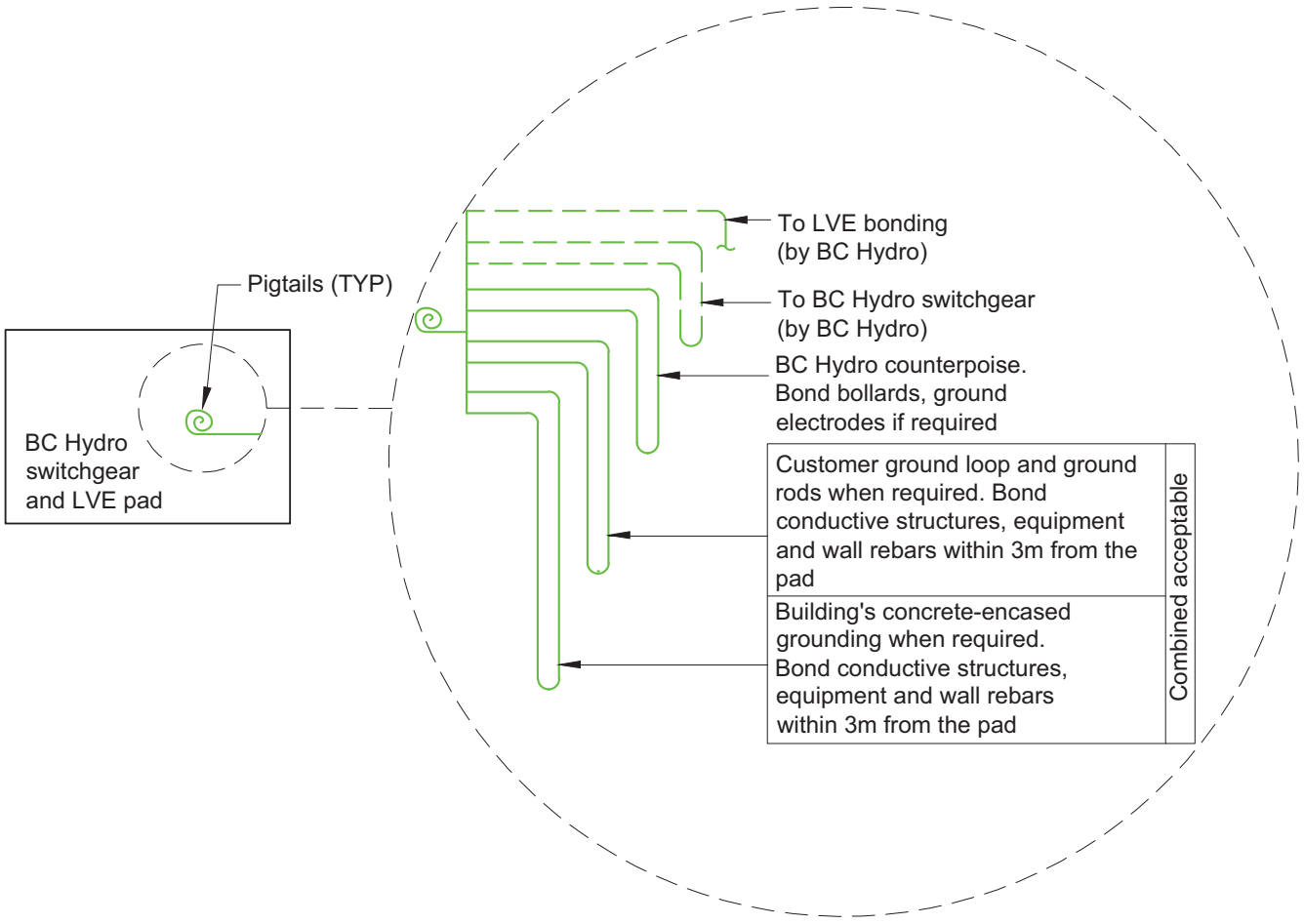


**Figure 6** – Grounding and bonding schematics for installation on suitable backfill outside building footprint on private property

**Table 1** – Key requirements for grounding and bonding pad-mounted equipment for installation on suitable backfill outside building footprint on private property

| Item | Key requirements | Special case | ES54 reference standards |
|---|---|---|---|
| BC Hydro counterpoise | BC Hydro will provide a grounding kit with a wire rope to be used as the counterpoise for pad-mounted equipment. Install 300 mm below grade and 900 mm from the pad. | 900 mm clearance from the pad may be reduced up to half the distance between the pad and above-ground wall or fence when in proximity to the structure such as an alcove installation and 900 mm clearance requirements cannot be met due to construction constraints and site-specific conditions. Subject to review and acceptance by a BC Hydro designer. | F3-06<br>F3-07<br>R1-02 |
| Customer ground loop | Maintain 300 mm minimum and 900 mm maximum separation from BC Hydro counterpoise. Customer ground loop shall not be connected to BC Hydro ground rods or counterpoise. | The building concrete-encased grounding may be used as part of a customer ground loop in areas where the minimum clearance between the BC Hydro counterpoise and customer ground loop cannot be maintained. | F3-06<br>F3-07<br>R1-02 |
| Pigtail provision | Pigtails at least 600 mm in length inside pad window or box. Grounding termination by BC Hydro crew. | | F3-06<br>F3-07<br>R1-02 |
| Bonding of nearby structures | Exposed conductive structures within 3 m of the pad shall be bonded to the customer ground loop or the customer concrete-encased building ground with a minimum of two conductors. Bollards, if installed, shall be bonded to the BC Hydro counterpoise. | For rebar grounding and exceptions, remote connections and bollard bonding details refer to details outlined in referenced standards. | F3-06<br>F3-07<br>R1-02<br>U2-02 |
| Ground test plug | Ground test plug, if required, shall be direct burial Burndy YGF29-2N or equivalent and installed 300 mm above finished grade | | F3-06<br>F3-07 |
| Customer grounding components and materials | Materials and components shall be CSA (or equivalent) certified for direct burial | | F3-06<br>F3-07<br>R1-02 |
| Requirements for customer grounding and bonding conductors | Minimum 2/0 AWG Cu bare stranded for customer ground loop. 2/0 AWG Cu insulated 1 kV green stranded for pigtails. | | F3-06<br>F3-07<br>R1-02 |

| Item | Key requirements | Special case | ES54 reference standards |
|---|---|---|---|
| Installer declaration | Grounding and ducting installations shall be inspected by a BC Hydro civil inspector before pouring concrete or placing backfill. The contractor shall complete an installer's declaration (see referenced standards) before the inspection and provide it to the BC Hydro civil inspector | | F3-06<br>F3-07<br>R1-02 |

See referenced standards in Table 1 for full lists of items required (bill of materials) to complete grounding and bonding installation.

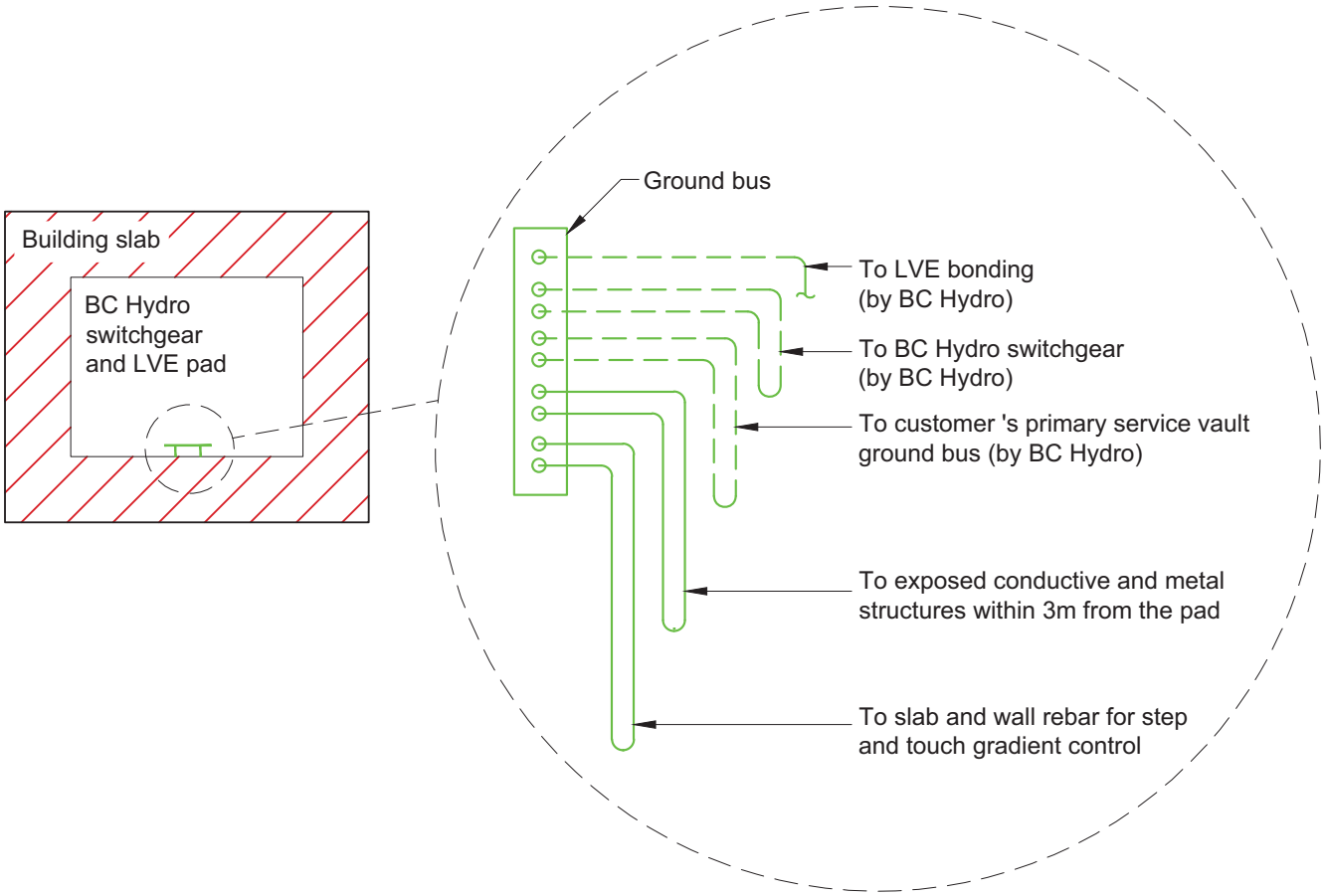


**Figure 7** – Grounding and bonding schematics for installation on top of building sub-levels or inside an alcove within the building envelope on private property

**Table 2** – Key requirements for grounding and bonding pad-mounted equipment for installation on top of building sublevels or inside an alcove within the building envelope on private property

| Item | Key requirements | Special case | ES54 reference standards |
|---|---|---|---|
| Ground bus | Ground bus 24" x 4" x ¼" NEMA spacing, comes with support insulators, wall mount Burndy BBB424UD, Erico EGBA14424 or BC Hydro approved equivalent. Install inside the cable pull box 450 mm above the box floor. Position on the wall opposite the cable riser going through the pad window to the switchgear (see Figure 14). | | |
| Ground test plug | See Table 1 | | F3-08 |
| Bonding nearby structures | Exposed conductive structures within 3 m of the pad shall be bonded to the ground bus with a minimum of two conductors | For rebar grounding, remote connections and bollard bonding details refer to details outlined in referenced standards | F3-08 |
| Customer grounding components and materials | See Table 1 | | F3-08 |
| Requirements for customer grounding and bonding conductors | Minimum 2/0 AWG Cu bare stranded | | F3-08 |
| Installer declaration | See Table 1 | | F3-08 |

See referenced standards in Table 2 for full lists of items required (bill of materials) to complete grounding and bonding installation.

### 1.6 Bollard Requirements

Protective bollards shall be installed in accordance with ES54 U2-02. Bollards are required when the equipment is located within 3 m of a roadway, driveway, or parking area. The number and placement of bollards shall be sufficient to prevent vehicle contact with the equipment. Bollards are typically spaced 1.2 m apart and placed just outside the unobstructed area.

### 1.7 Alcove Requirements

Figure 8 illustrates typical general arrangements for BC Hydro-owned over-pad switchgear inside an alcove in a customer-owned building. A removable gate or removable bollards shall be installed on the access side and shall comply with ES54 S0-06 equipment location and access requirements. See ES54 F3-06 and ES54 F3-08 for removable gate or removable bollards lists of items required (bill of materials) and minimum installation requirements.

The alcove shall have a minimum height of 4600 mm. If an I-beam lift trolley is installed to place the switchgear and LVE, the alcove height may be reduced so the bottom of the I-beam lift trolley hook is 2800 mm above grade. See ES54 S0-06 and notes 1 and 3 for additional clearance requirements and installation details.

A building canopy, balcony, or any other part of the building shall not project over the switchgear below if height above switchgear is less than 4600 mm.

The customer primary service vault shall be located close to the alcove to limit the service cable run and duct length to 10 m (see *Requirements for Customer-Owned Primary Services Supplied at 4 kV to 35 kV*.)

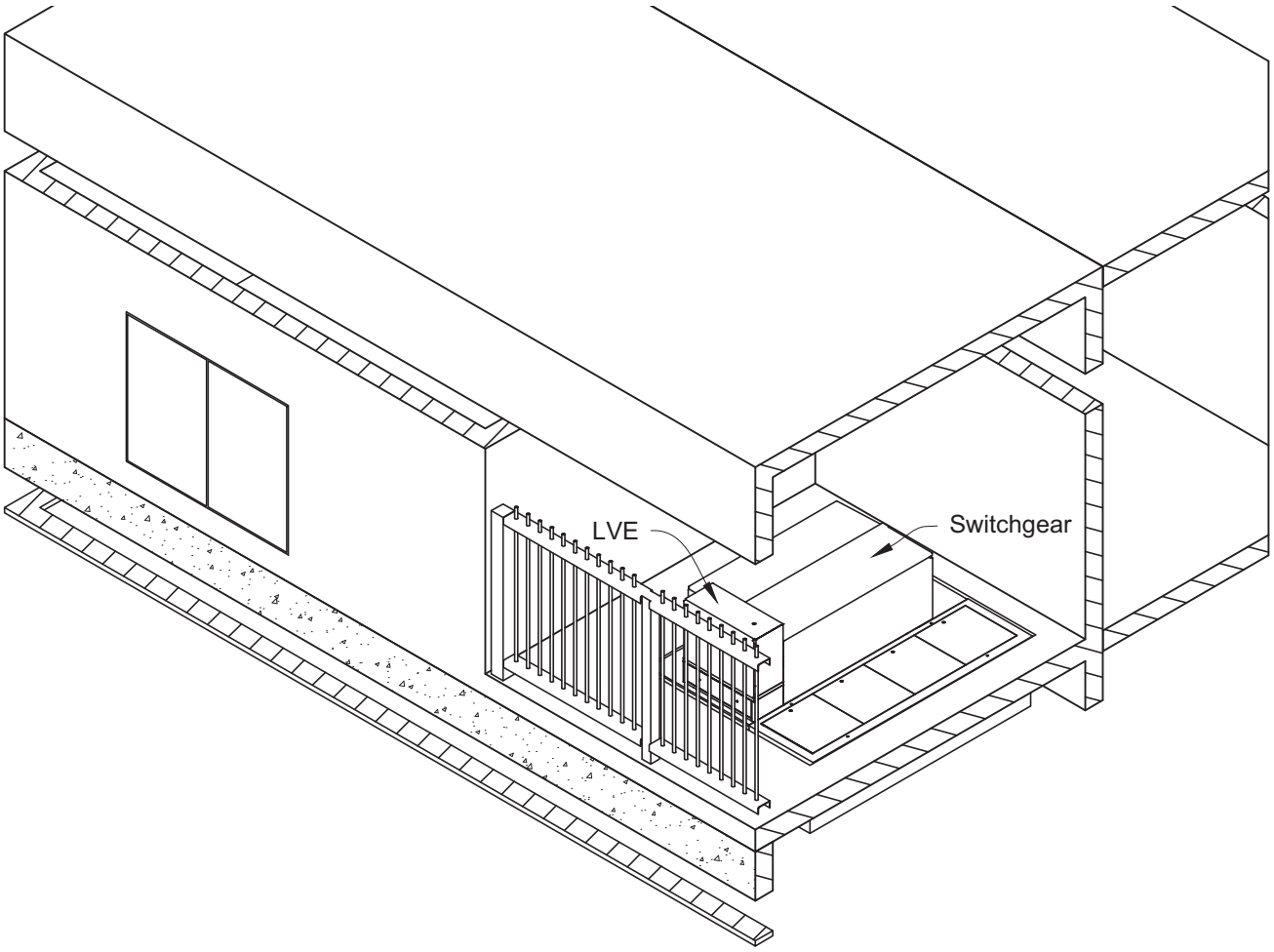


**Figure 8** – General arrangement for BC Hydro-owned over-pad switchgear inside an alcove in a customer-owned building

**2. Precast Component Assembly**

The over-pad design consists of four parts:

a. Box;

b. Riser;

c. Collar with lids; and

d. Pad.

BC Hydro precast components are recommended for all four parts of the installation. The box component may be cast in place by the customer. See note 3 for the cast-in-place option.

The riser and collar shall be properly aligned to ensure the final pad elevation is level and meets BC Hydro installation tolerances.

**Table 3** – Precast component items required (bill of materials)

| Item | Qty | Description | Material no. | Length (mm) | Width (mm) | Depth (mm) | Weight (kg) | Supplied by |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Box | 9700-7032 | 3700 | 1630 | 1090 | 8000 | BC Hydro |
| 2 | 1 | Riser | 9700-7033 | 1652 | 3742 | 150 | 1300 | BC Hydro |
| 3 | 1 | Pad, switchgear and LVE | 9700-7031 | 3790 | 1727 | 330 | 4000 | BC Hydro |
| 4 | 1 | Collar with lids | 9700-8895 | 3790 | 1114 | 181 | 650 | BC Hydro |
| 5 | 1 | Sump cover | 400-0426 | 600 | 600 | 25 | 44 | BC Hydro |

See referenced standards in Table 1 to find lists of items required (bill of materials) to complete grounding and bonding installation.

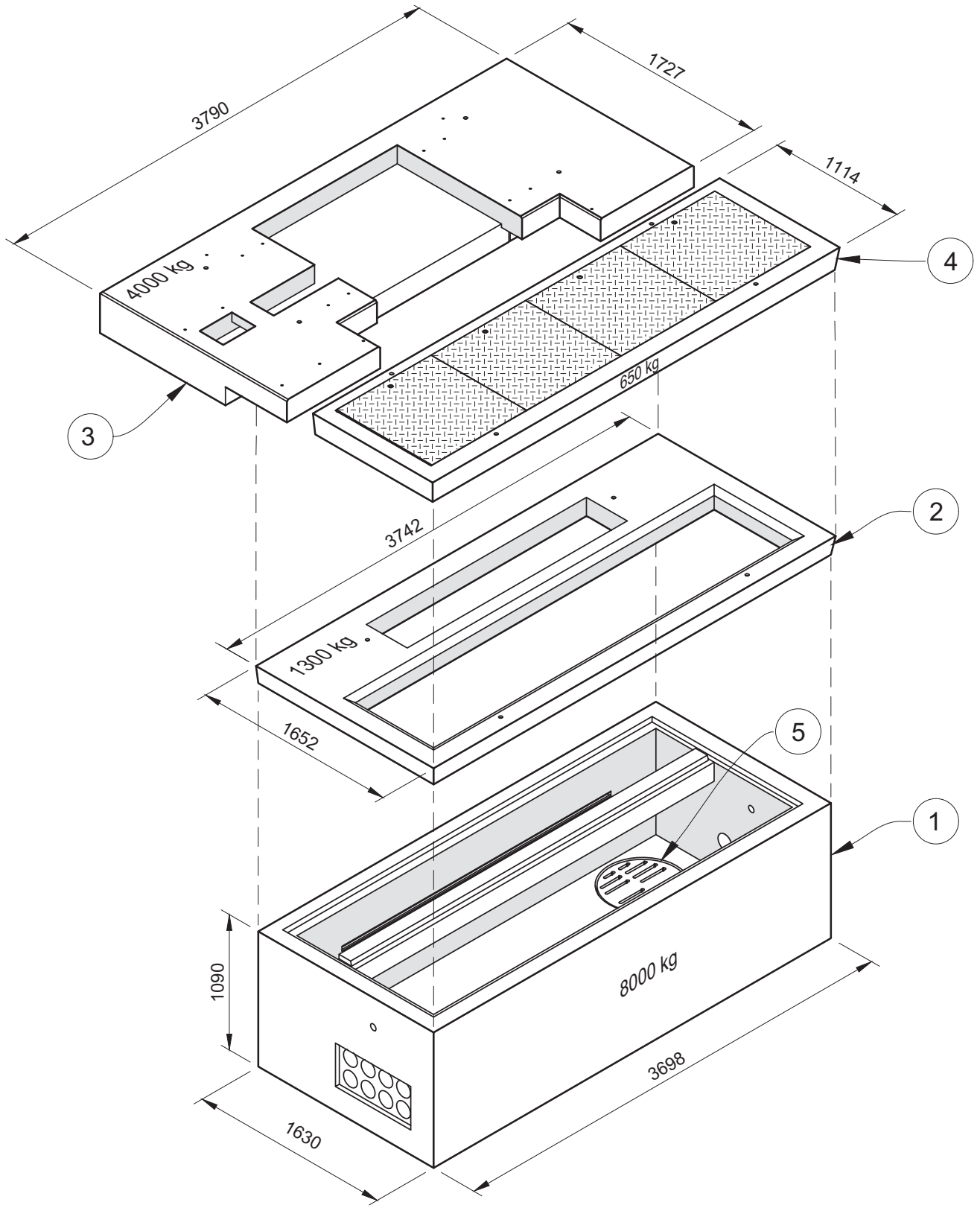


**Figure 9** – Precast over-pad components

### 2.1 BC Hydro-Owned Switchgear on Suitable Backfill Outside Building Footprint

#### 2.1.1 Installation on Native Soil More than 3m from Customer Building Structure

Figures 10 and 11 show minimum installation requirements for over-pad above-ground outdoor BC Hydro-owned switchgear with precast cable pull box located on private property on native soil outside the footprint of a building and more than 3 m from a customer building structure.

See ES55 B2-05, ES54 S0-06, and note 1 for minimum general requirements and typical assembly arrangements. See note 1 for minimum clearance and grounding requirements.

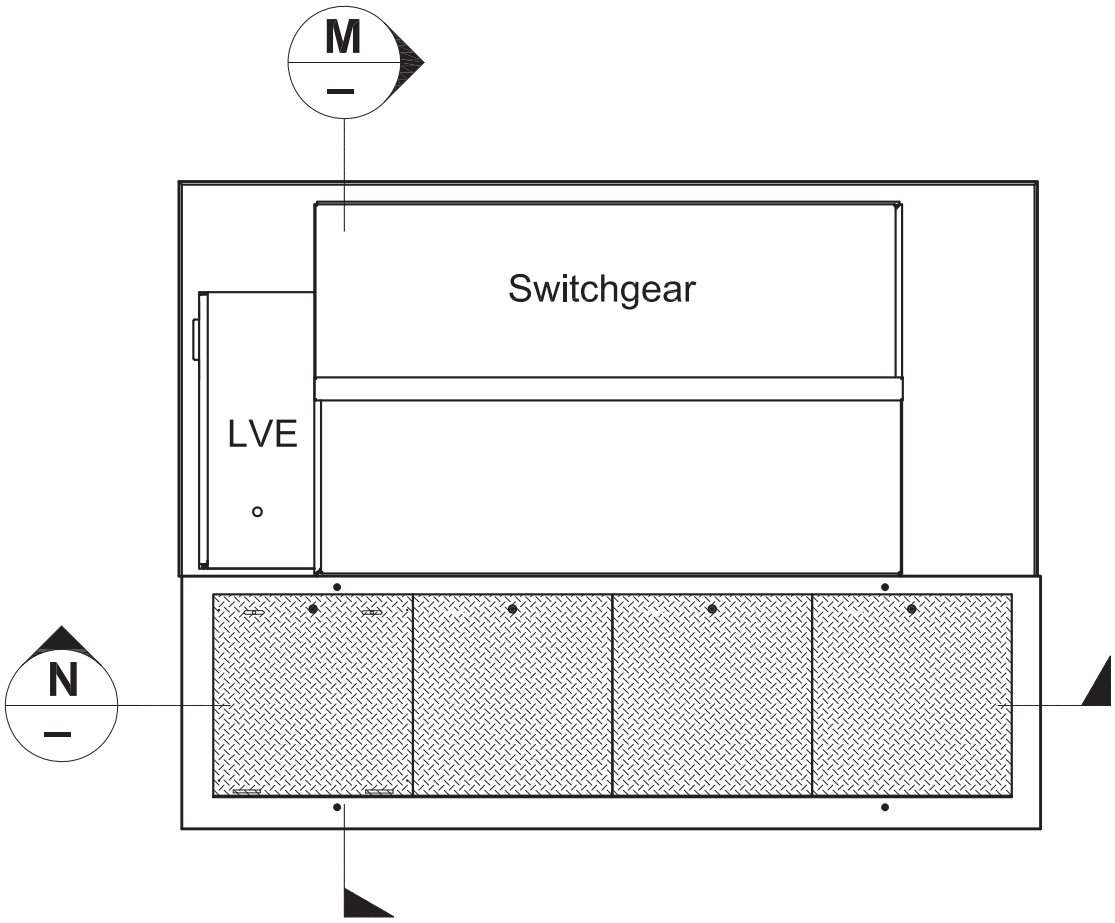


**Figure 10** – Above ground over-pad 4-way and 5-way switchgear

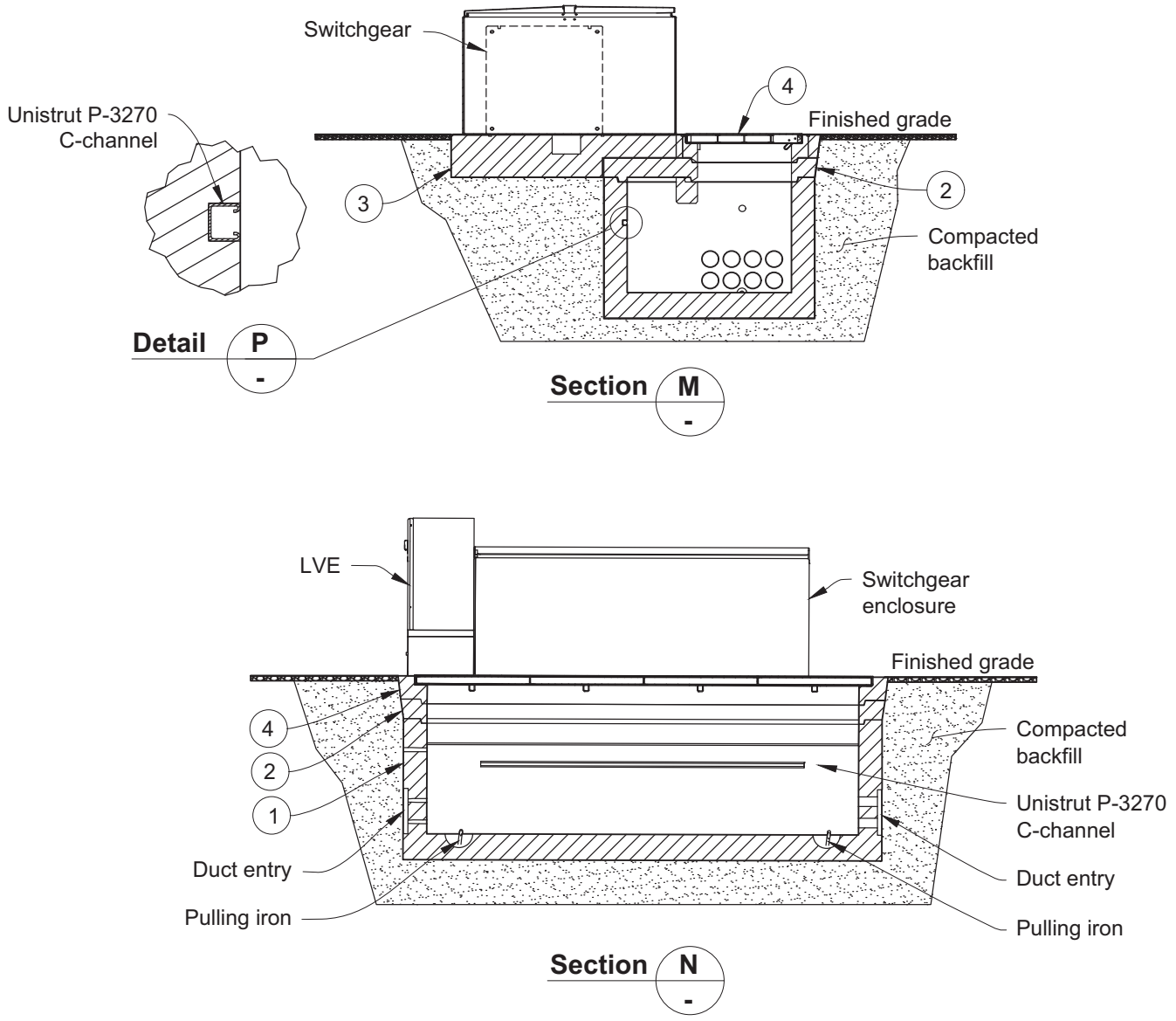


**Figure 11** – Above ground over-pad 4-way and 5-way switchgear section views

### 2.1.2 Installation on Native Soil Within 3 m of Customer Building Structure

Figure 12 shows a typical installation for over-pad above-ground outdoor BC Hydro-owned switchgear with precast cable pull box located on private property on native soil, outside the footprint of a building but within 3 m of a customer building structure.

A building canopy, balcony, or any other part of the building shall not project over the switchgear below if height above switchgear is less than 4.6 m.

See ES55 B2-05 and ES54 S0-06 for minimum general requirements and note 1 for typical assembly arrangements. See note 1 for general grounding and clearance requirements.

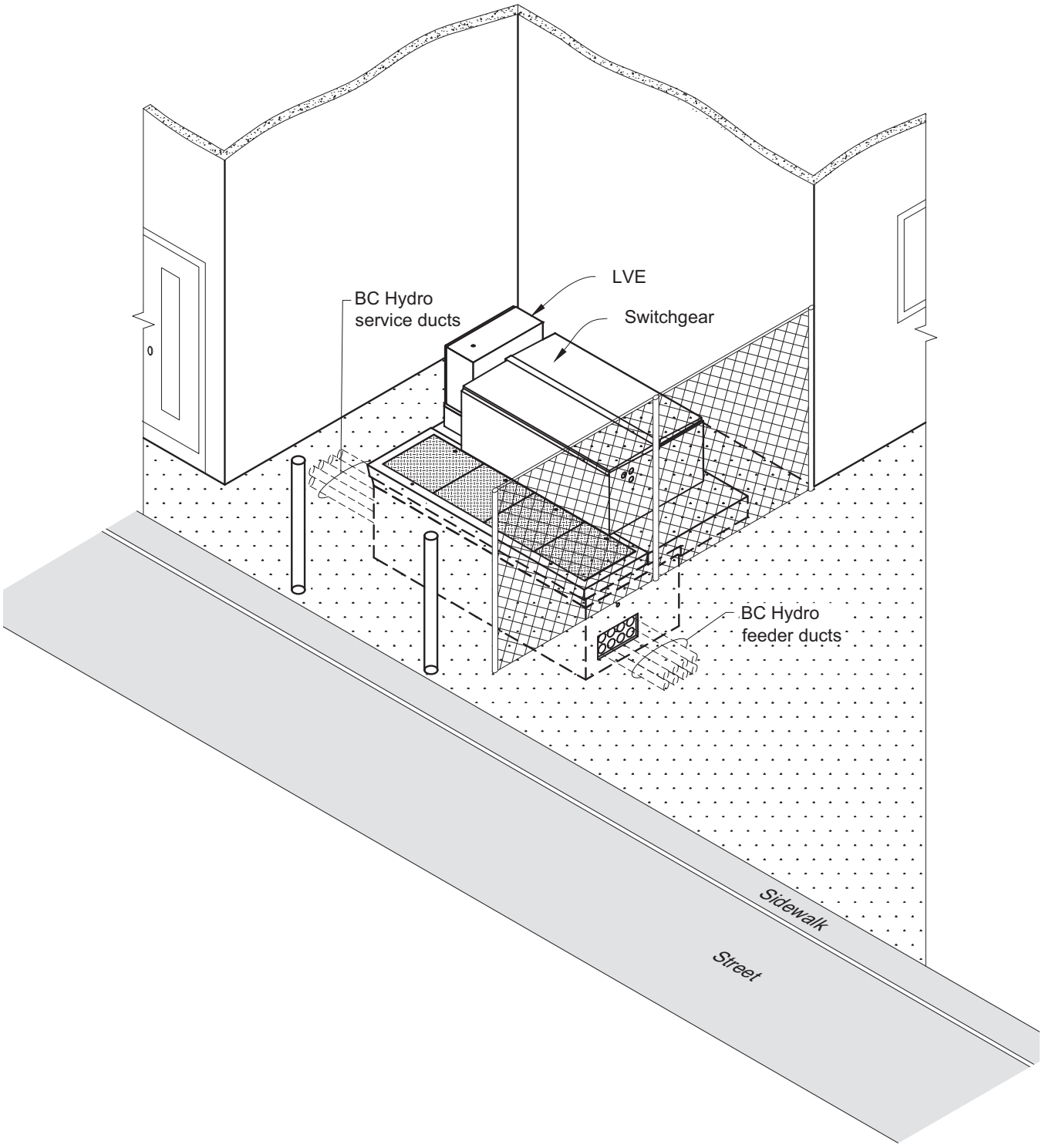


**Figure 12** – Pad-mounted switchgear on suitable backfill within 3 m of building structure

### 3. Cast-in-Place Box Requirements

The over-pad design for cast-in-place assembly consists of three parts:

a. Cast-in-place box;

b. Collar with lids; and

c. Pad.

The cast-in-place box and collar shall be properly aligned to ensure the final pad elevation is level and meets BC Hydro installation tolerances.

**Table 4** – Cast-in-place assembly items required (bill of materials)

| Item | Qty | Description | Material no. | Length (mm) | Width (mm) | Depth (mm) | Weight (kg) | Supplied by |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Cast-in-place box | | | | | | Contractor |
| 2 | 1 | Switchgear concrete pad | 9700-7031 | 3790 | 1727 | 330 | 4000 | BC Hydro |
| 3 | 1 | BC Hydro precast collar with lids | 9700-8895 | 3790 | 1114 | 181 | 650 | BC Hydro |
| 4 | 1 | I-beam | | | | | | Contractor |
| 5 | As req'd | Drain cover | | | | | | Contractor |
| 6 | 2 | Pulling iron | | | | | | Contractor |
| 7 | As req'd | Channel Unistrut P-3270 | | | | | | Contractor |
| 8 | As req'd | 75 mm bell ends | | | | | | Contractor |
| | | 125 mm bell ends | 9602-1454 | | | | | BC Hydro |

See referenced standards in Tables 1 and 2 for lists of items required (bill of materials) to complete grounding and bonding installation.

See ES54 F3-08 for removable gate and removable bollard items required (bill of materials).

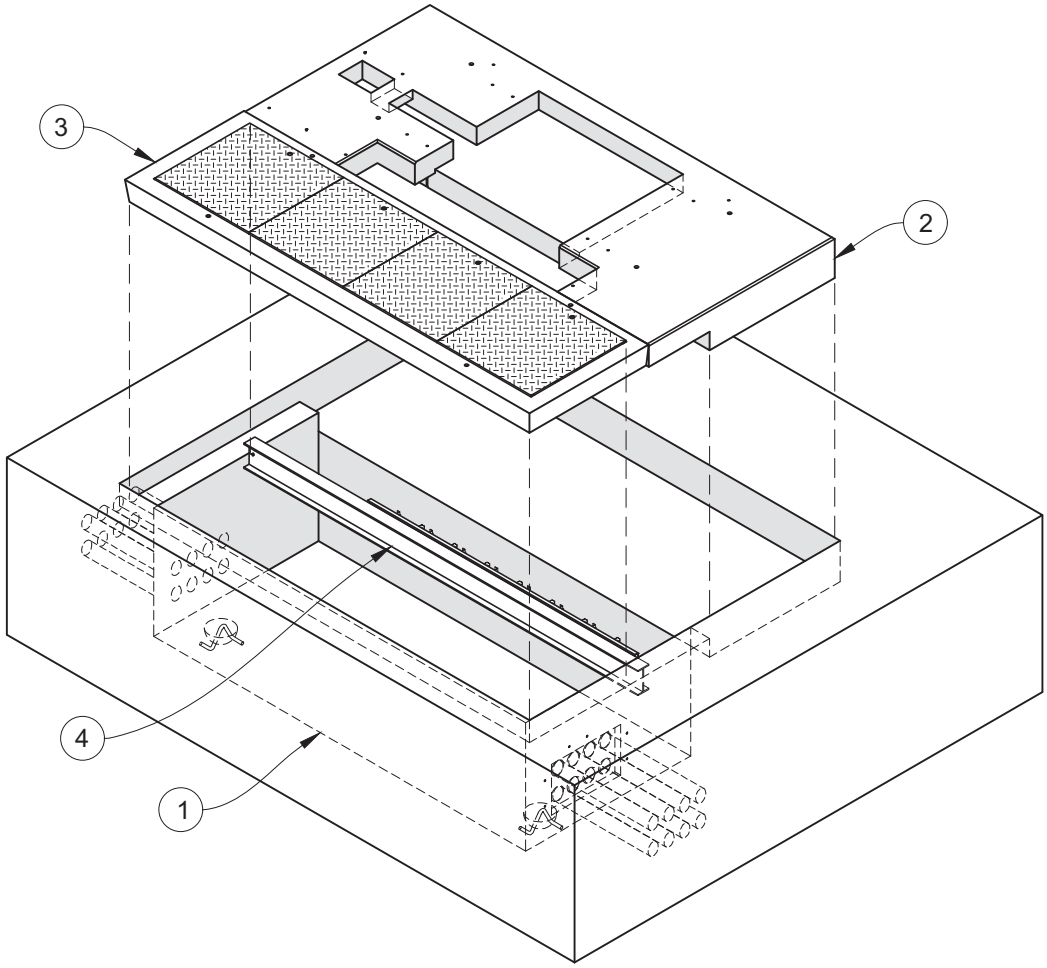


**Figure 13** – Cast-in-place assembly

### 3.1 BC Hydro-Owned Switchgear Above Building Sublevels or Inside Building Alcove

Figure 14 shows minimum installation requirements for over-pad above-ground outdoor BC Hydro-owned switchgear with cast-in-place pull box located on private property on top of building sublevels (parkade or storage) or inside an alcove in a customer-owned building.

See ES55 B2-05, ES54 S0-06, and note 1 for minimum general requirements and typical assembly arrangements.

The customer shall provide an engineered building structure inside the building to support the weight of the BC Hydro-owned switchgear and cables and account for pryout and pullout strength control requirements for BC Hydro pulling anchors. See ES54 S0-06 for BC Hydro equipment data information.

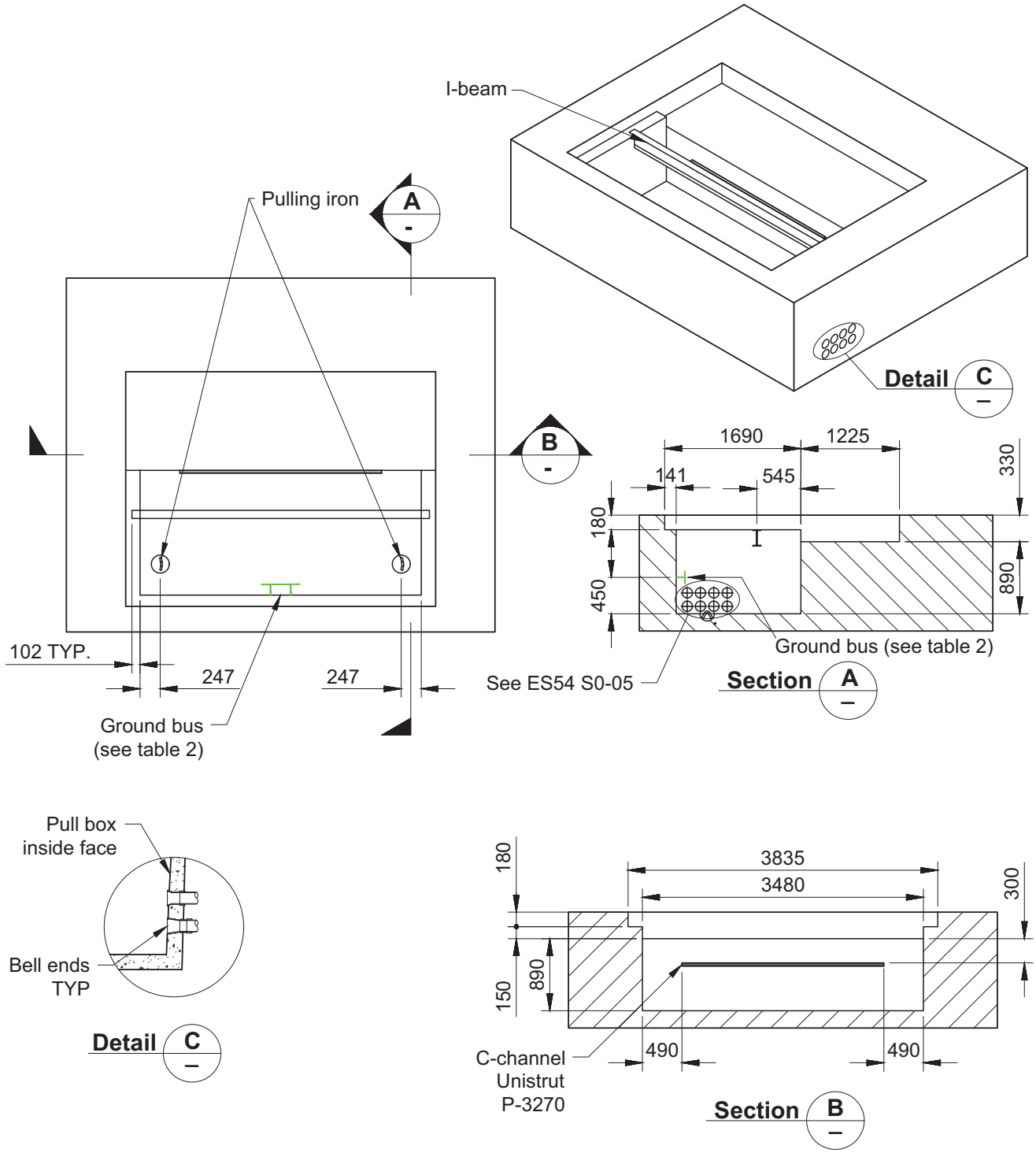


**Figure 14** – Cast-in-place box details