



Information Bulletin:

Revised ES54 S2-01 Secondary Three-Phase Services 120/208 V and 347/600 V up to 1600 A Private Property Installation

1.0 Items Covered

ES54 S2-01 R10 Secondary Three-Phase Services 120/208 V and 347/600 V up to 1600 A Private Property Installation

This advisory and above listed standard can be found at bchydro.com/distributionstandards.

2.0 Overview

This advisory is a continuation-in-part of EA2023-049 issued on February 5, 2024. ES54 S2-01 revision 10 contains further changes to the construction standard in response to feedback received from equipment manufacturers, contractors, and field operations. The intent of the latest changes is to further minimize the number of requests for variance BC Hydro designers receive in discrepancy with ES54 S2 standards. More extensive revisions to ES54 section S standards are forthcoming that will consolidate all secondary services standards and fully align with the BC Hydro document *Requirements for Secondary Voltage Revenue Metering (750 V and less)*.

This advisory describes the latest revisions to ES54 S2-01 R10:

- a. Substantive changed content in the revised standard is marked by green vertical revision lines in the left margin;
- b. This advisory is referenced by number in the Revision Notes section in the revised standard; and
- c. ES54 S2-01 R10 has been released and posted online. The previous revision of the standard (ES54 S2-01 R9) is appended to this advisory for reference to help make it easier to understand the changes.

Changes in ES54 S2-01 R10 are described in the following table:

Page	Section	Changes
3	Note 2.8 and 4.b	Revised note 2.8 to refer to ES53 S1-01 for BC Hydro cable clamps. Addition of wireway to note 4.b

Page	Section	Changes
5	Figure 2	Added 2350 mm maximum service enclosure height and revised bonding schematics.
6	Figure 3	Added 2350 mm maximum service enclosure height and revised bonding schematics.
7	Figure 4	Harmonized three-phase kiosk construction and installation details with ES54 S1-04 for single-phase kiosks.
8	Figure 5	Revised service enclosure dimensions and added reference to Figure 7 and 13.
9	Figure 6	Revised service enclosure dimensions and added dimensions for cable feed ports. Added reference to Figure 8 and 13.
10	Figure 7	Revised service enclosure dimensions and added details 1 and 2 as acceptable duct layout in floor slab. Added reference to Figure 10, 11 and 12. Deleted reference to ES53 Z8-03.
11	Figure 8	Revised service enclosure dimensions and added dimensions for cable feed ports. Revised Table 2. Added reference to Figure 10, 11 and 12.
12	Figure 9	Added 2350 mm maximum service enclosure height and revised internal construction clearance for revenue meter compartment. Added reference to Figure 10, 11 and 12.
12	Figure 10	Added new figure showing cable lugs on bus flags.
13	Figure 11	Added 75 mm cable lug spacing for 200/400 A wireways. Revised clearance dimensions to indicate spacing between cable lugs and enclosure.
13	Figure 12	Added new figure showing cable bus splitter.
14	Figure 13	Added new drawing of CSA three-phase splitter. Added new note for 75 mm lug spacing acceptable for 200/400 A service wireways.
15	Figure 14	Added mid-run pull box traffic rated inside building parkade. Service ducts and trench dimensions deleted and added reference to ES54 S0-05. Revised pulling iron locations and notes and added reference to ES54 S0-04.
16	Figure 15	Deleted reference to note 2.7. Added reference to ES54 S0-04 note 5.
17	Figure 16	Service ducts dimension deleted. Added note on traffic-rated mid-run pull box.

3.0 Action

The effective date for ES54 S2-01 R10 is July 30, 2024. Applications for work approved by the local BC Hydro design office on or after July 30, 2024, shall meet the requirements of ES54 S2-01 R10. Work approved prior to July 30, 2024, may comply with ES54 S2-01 R10 or may choose to comply with R9.

Designers, Engineers, and Civil Inspectors

Designers and engineers should familiarize themselves with the revisions in ES54 S2-01 R10.

Customers and Customer Representatives

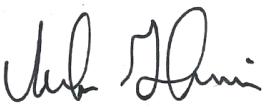
Customers and customer representatives, including electricians, project managers, consultants, and contractors, should familiarize themselves with the revisions in ES54 S2-01 R10. Please direct any questions or concerns to your local BC Hydro representative. The revised standard has been posted for information and awareness only. R10 become effective July 30, 2024.

4.0 Distribution Standards Contact

Customers and customer representatives please direct any questions or concerns to your local BC Hydro representative.

BC Hydro employees and contractors please direct any questions or concerns to distribution.standards@bchydro.com.

5.0 Approval

Recommended		Reviewed		Approved	
					
M. Kelvin		M. Stevens		H. Giesbrecht	
Date:	2024-06-10	Date:	2024-06-10	Date:	2024-06-10

Application

This standard describes requirements for installing secondary three-phase services up to 1600 A 120/208 V and 347/600 V supply on private property.

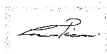
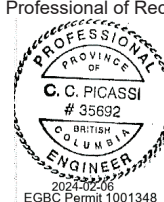
Revision Notes

Added *Application* and *Revision Notes* sections. Updated *References* section. Revised minimum heights in Table 1 to 1400 mm. Moved content from old note 1 to *Application* section. Removed note 1c on installing MacLean Power Systems grounding stud. Removed general installation requirements notes 2.1a through 2.1d. Edited notes 2.2 and 2.3 to replace service in duct and wall entry requirements with a reference to ES54 S0-05. Edited notes 2.4 through 2.8 to replace pull box, utility wireway, pulling iron, and cable clamp requirements with a reference to ES54 S0-04. Edited note 4e to add ES54 S0-02 reference and remove note on bonding between the pull box and wireway cubicles. Changed description of CSA-type cable clamps to cable channel in Figures 1 through 9. Removed reference to supply duct note in Figures 1, 2, and 3. Changed fuses to circuit breakers in Figures 2 and 3. Removed reference to note 1c in Figures 2 through 6 and 10. Changed dimension from 1500 mm to 1400 mm in Figure 4 and revised grounding details to align with ES54 S1-04 revenue metering compartment. Changed dimension from 1500 mm to 1400 mm and added detail 1 and a reference to note 2.5d in Figure 7. Updated Figure 8. Changed dimension from 1500 mm to 1400 mm in Figure 9. Changed 100 mm dimensions on side views to “CSA spacing” in Figure 10. Removed descriptions and dimensions of pad-mounted transformer and associated ducts from Figure 11 and removed note references. Removed duct depth dimension from Figure 13 and added reference to ES54 S0-04 to concrete duct encasement. Substantive changes are marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory Information Bulletin 2023-049 *Revised ES54 S2-01 Secondary Three-Phase Services 120/208 V and 347/600 V up to 1600 A Private Property Installation*.

References

BC Hydro Distribution Standards

ES53 S1-01	Secondary Services Single-Phase up to 600 A 120/240 V Wiring and Revenue Metering Connections
ES53 S2-01	Secondary Services Three-Phase to 1600 A
ES53 U1-01	Cable and Conductor Data, New Construction
ES53 Z8-03	Cable Grips, Ties, and Tie Mount
ES54 section B	Pull/Splice, Service, and Junction Boxes
ES54 section F	Transformer Pads and Vaults
ES54 S0-02	Services General Notes
ES54 S0-04	General Notes Secondary Services
ES54 S0-05	Services General Notes Service Ducts and Trenches
ES54 S3-04	Primary Services Service Duct to Rear Yard Narrow Side Yard Installation
ES55 section D3	Conductor Data, Cable Pulling

Designed: C. Picassi, P. Eng			Secondary Three-Phase Services 120/208 V and 347/600 V up to 1600 A Private Property Installation	
Checked: M. Kelvin, P. Eng				
Reviewed: M. Stevens, P. Eng			DISTRIBUTION STANDARDS BC Hydro	ES54 S2-01 R9
Approved: H. Giesbrecht, P. Eng				
		Issued: 2024-02-05 Effective: 2024-06-30		

Other BC Hydro Documents

DI S10-4	Electric Service Connections – Voltages
Secondary Metering	Requirements for Secondary Voltage Revenue Metering (750 V and less)

External Documents

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

Table 1 – Size of pull boxes and wireways installed in a building at service entrance equipment or mid-cable run

Main switch / breaker size, up to	Minimum pull box size (mm)					Minimum wireway bottom entry size (mm)		Minimum height (H) ³
	Duct size and qty ²	Side and top entry		Rear entry				
		Width (W)	Depth (D)	Width (W)	Depth (D)	Width (WW)	Depth (D)	
200A	1 x 4"	800	500	500	800	300 ¹	300	1400
400 A	1 x 4"	800	500	500	800	300 ¹	300	1400
600 A	2 x 4"	800	500	500	800	450	300	1400
800 A	2 x 4"	800	500	500	800	450	300	1400
1200 A	3 x 4"	800	500	500	800	600	450 ¹	1400
1600 A	4 x 4"	800	500	500	800	750	450 ¹	1400

Table notes

- 300 mm minimum wireway width acceptable for vertically staggered bus extensions.
450 mm minimum wireway width required for horizontally staggered bus extensions.
450 mm minimum wireway depth required for 1200 A and 1600 A services.
- 900 W x 1800 H x 800 D minimum size for any customer-owned mid-run pull boxes wall-mounted inside customer building.
632 box minimum size for mid-run pull boxes placed inside on building floor slab or in an outside yard, subject to BC Hydro field manager approval.
- Minimum height refers to the height of pullbox, wireway, or bottom of the lowest switchboard bus.

1. Materials

- All materials from the stub-off on private property shall be supplied and installed by the customer.
- Materials installed on private property, including meter socket, service panels, and switchgear, shall be CSA certified. Material and electrical equipment up to the utility's point of connection to customer-owned equipment, including grounding and duct work, is exempt from the BC Electrical Safety Regulation. This equipment is not within the jurisdiction of electrical inspection authorities and permits are not required for this work.

2. Installation Requirements

2.1 General

- Building parkade vehicle access shall be 2100 mm minimum.
- A customer building elevator cannot be the only point of access for BC Hydro crews performing utility work and carrying out their duty as the utility.

2.2 Service in Duct

See ES54 S0-05 for BC Hydro requirements for service in ducts on private property.

2.3 Wall Entry

The customer shall ensure a smooth transition to avoid service duct and cable damage caused by differential settlement wherever service ducts enter a building foundation wall or where differential settlements are expected to occur. See ES54 S0-05 for BC Hydro requirements for direct burial of supply service ducts on private property.

2.4 Pull Boxes

A pull box is required at service entrance equipment locations for cable installation crews to pull in the required service cable safely and effectively. See ES54 S0-04 for requirement details.

2.5 Pull Boxes in Wireway Service Entrance

Wireways can have top, bottom, back, or side entry, and either a wireway or integral pull box. Requirements apply to all service entry assemblies except where noted. See ES54 S0-04 for requirement details.

2.6 Utility Wireway

BC Hydro does not terminate utility supply cables directly onto a customer-owned service main switch or breaker lugs due to liability and restricted access. See ES54 S0-04 for requirement details.

2.7 Pulling Irons

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. See ES54 S0-04 for requirement details.

2.8 Cable Clamps

BC Hydro will supply and install the cable clamps required for service cables. The cable clamps shall be installed in customer-supplied 1 $\frac{5}{8}$ " x 1 $\frac{5}{8}$ " C-channels mounted on a slotted adjustable angle bracket, suitable for facing either outward or upward. See ES54 S0-04.

3. Information Supplied by Customer

- a. The customer shall submit copies of the proposed duct service run from the property line to the point of utility connection for approval by BC Hydro, containing the following information:
- b. Duct lengths and duct bend angles; and
- c. Location and size of pull boxes and the service entrance enclosure, and the position of incoming and outgoing service ducts at each pull box, in both plan view and profile.
- d. The customer shall submit information about other adjacent utilities, existing and proposed, located in the vicinity of the proposed BC Hydro service ducts.

4. Restrictions

- a. Service duct entry from the top and bottom, back or side.
- b. See Table 1 for pull box and other dimensions.
- c. The maximum installation capacity for a pole dip supply configuration is 800 A, consisting of two runs of 500 kcmil cables. Underground supply 1600 A services shall be limited to those installations that can be supplied from pad-mounted transformers.
- d. The maximum installation capacity for 1600 A underground secondary supply service comprises four runs of 500 kcmil cables.

- e. The customer shall provide a means for cable restraining grip support in the wireway compartment for upper-level installations. See Figure 7 and ES54 S0-02.
- f. Utility wireways and pull boxes shall be reserved for utility purposes only and have access restricted to utility personnel.

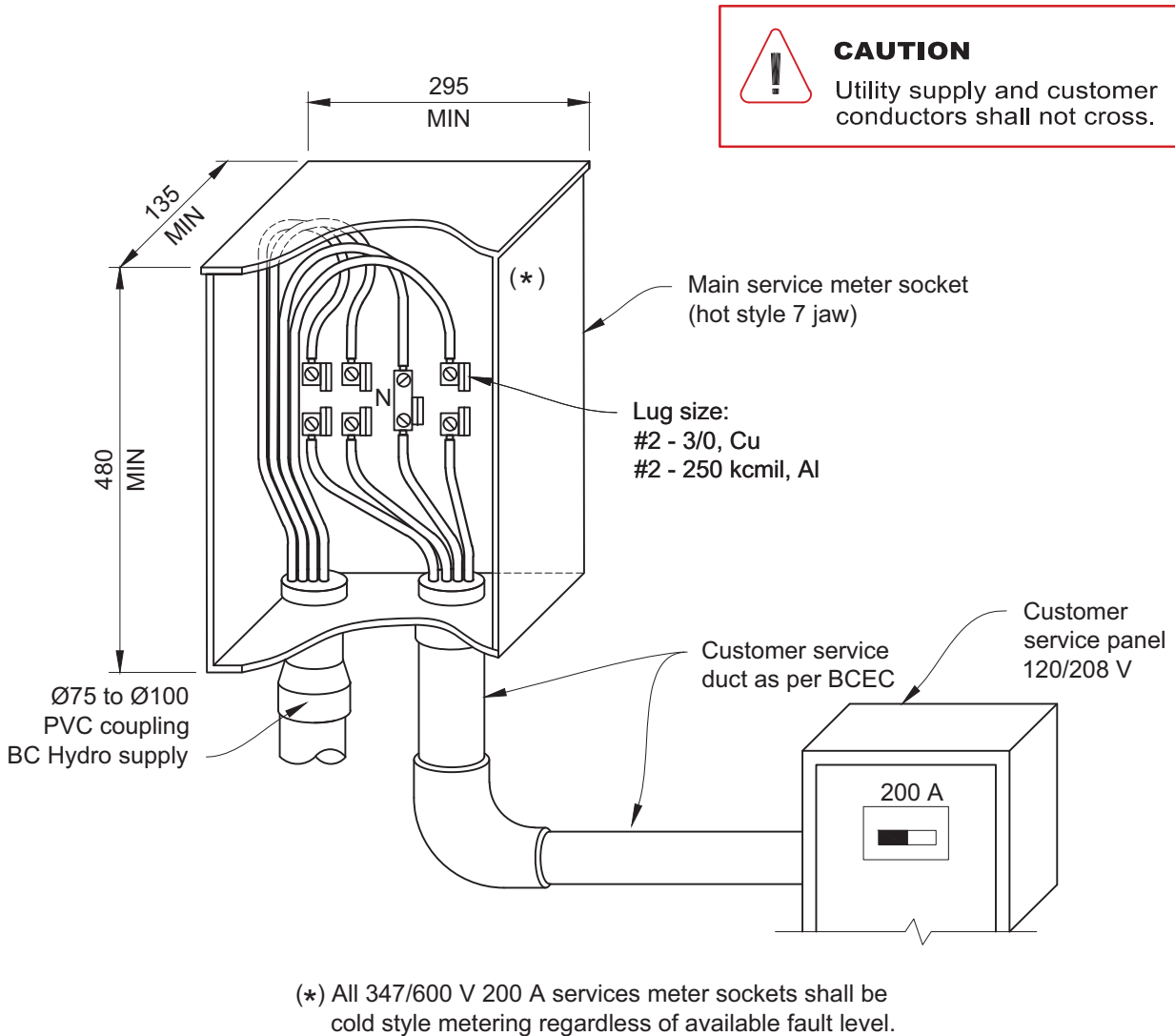


Figure 1 – Single 200 A three-phase service for 120/208 V, fault level <10 kA

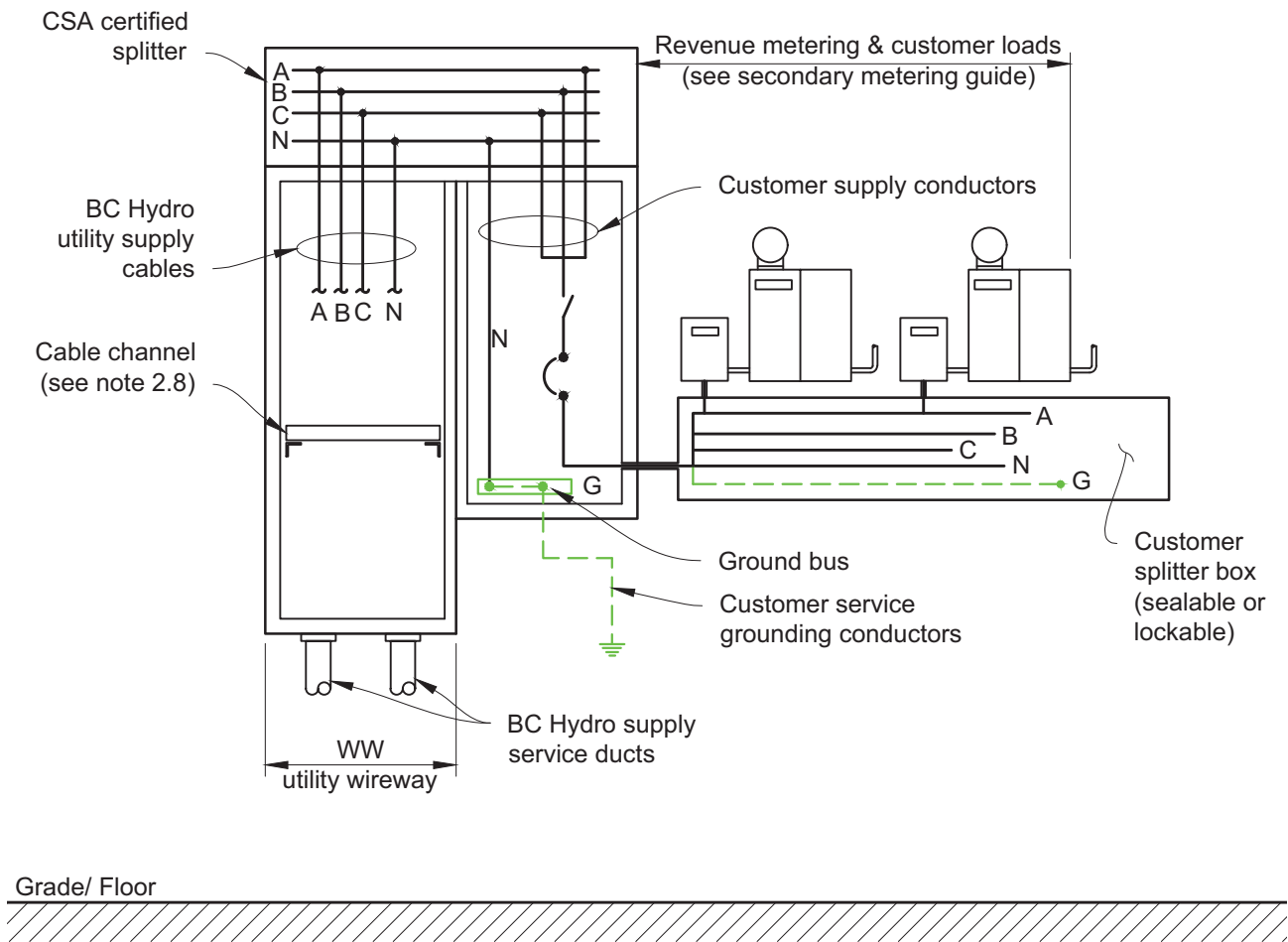


Figure 2 – Multiple main splitter box three-phase up to 1600 A schematic diagram, field assembled

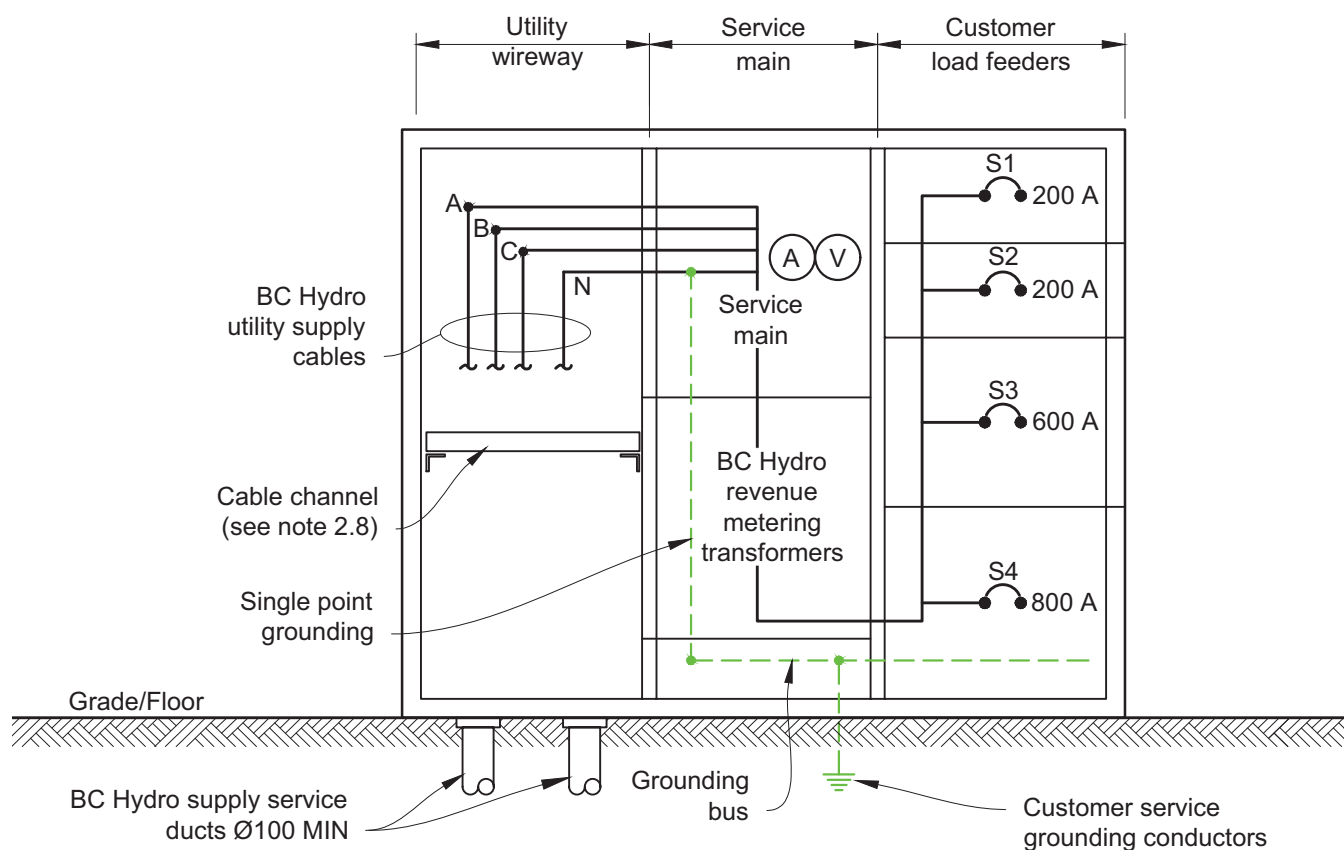


Figure 3 – Service switchboard up to 347/600 V 1600 A schematic diagram, field assembled

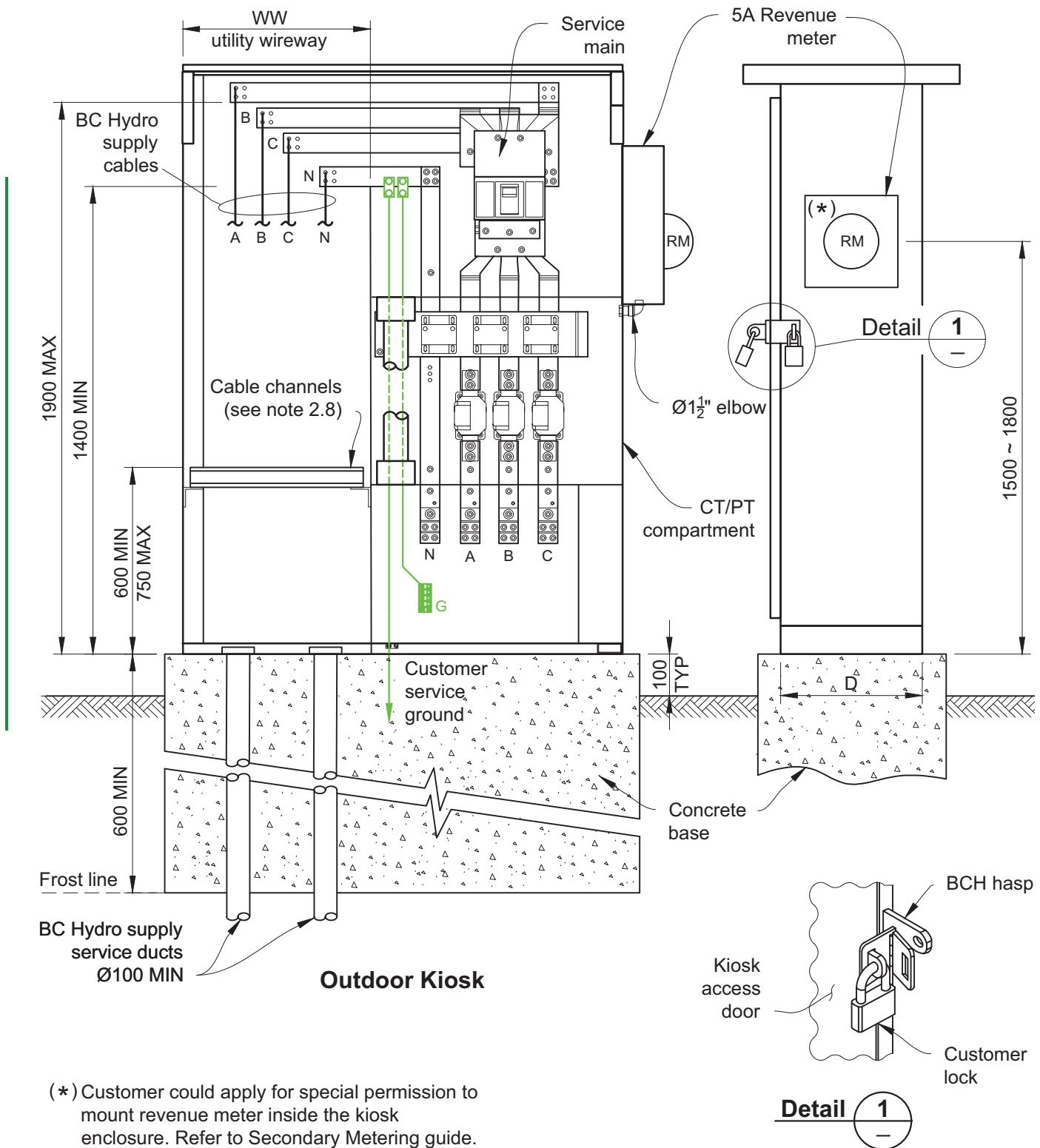


Figure 4 – Outdoor kiosk

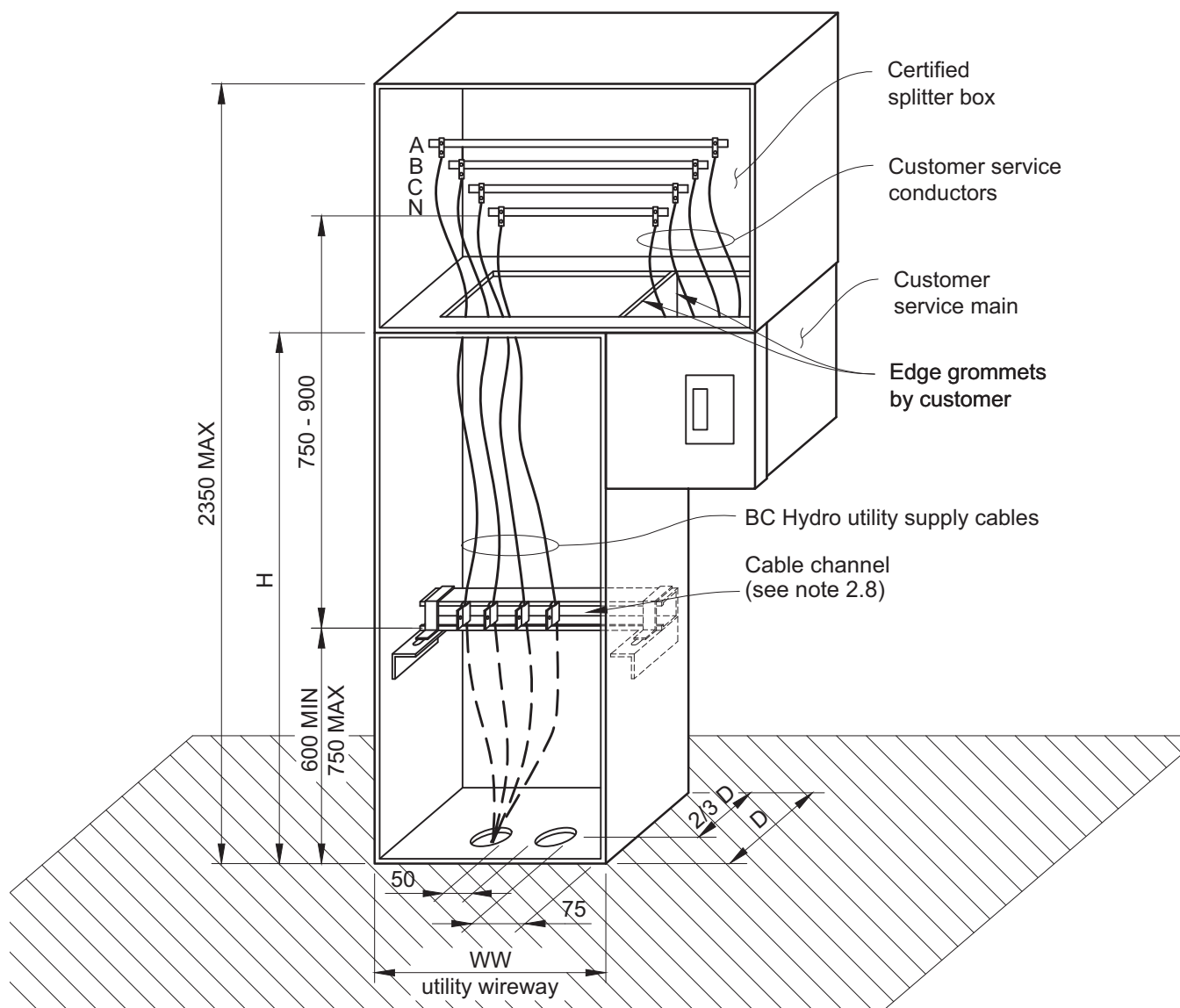


Figure 5 – Customer service main bottom entry

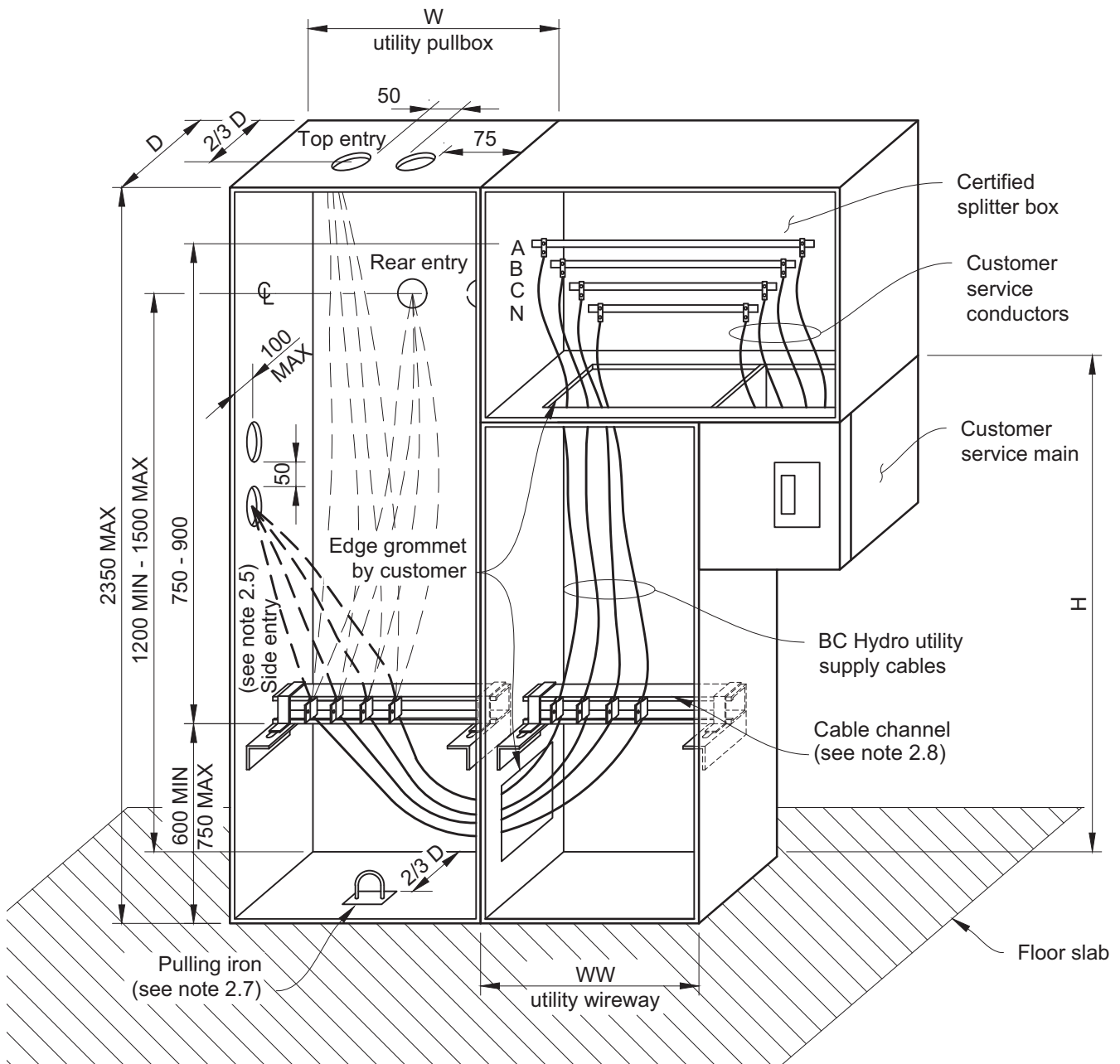


Figure 6 – Customer service main top, rear, or side entry

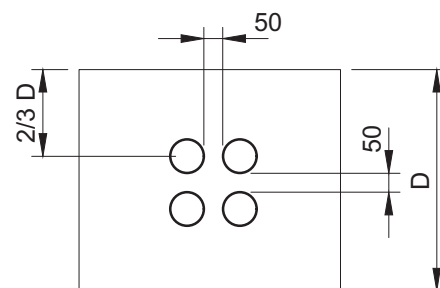
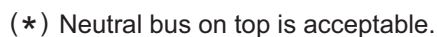


Figure 7 – Customer service switchboard bottom entry, field assembled

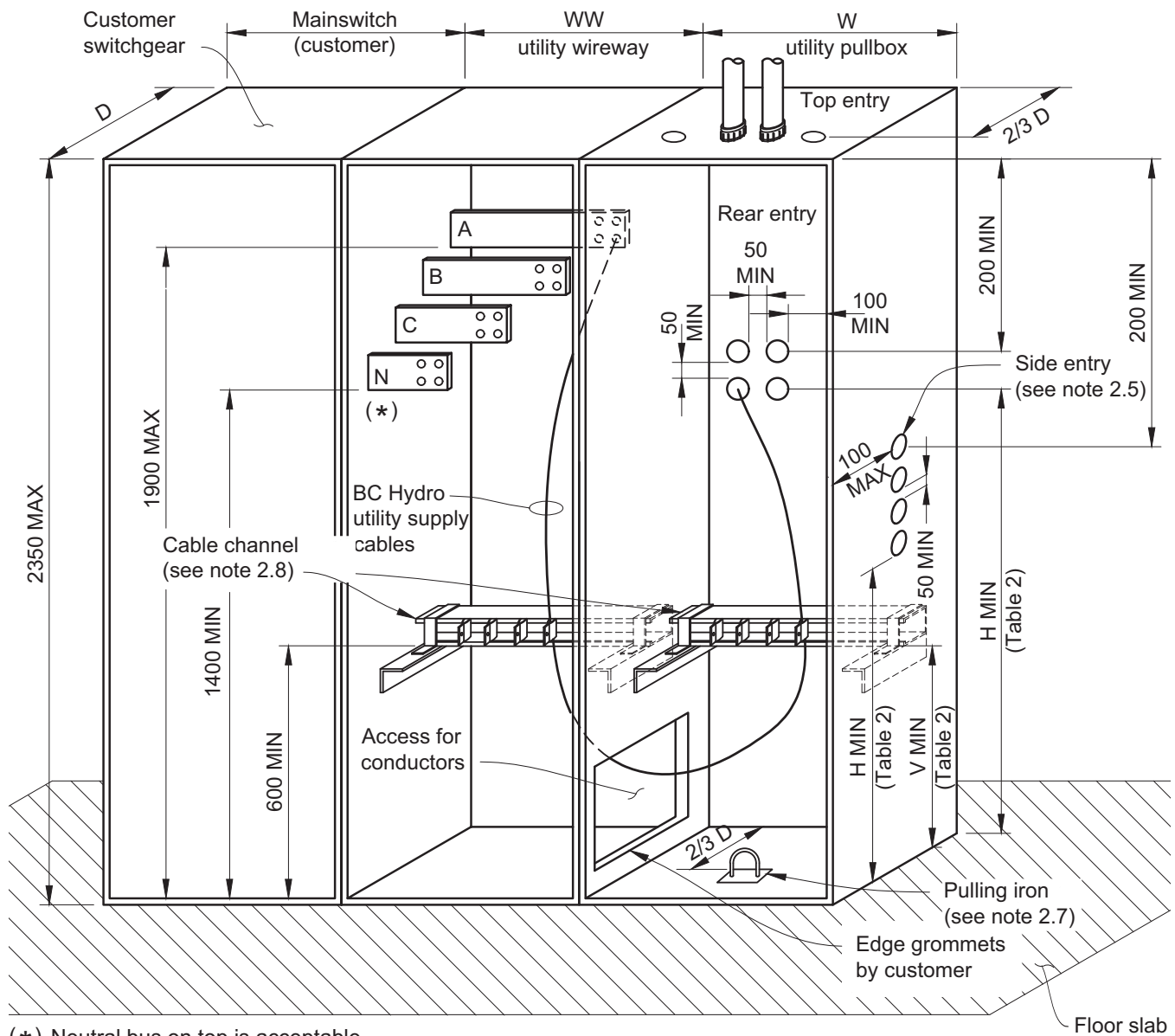


Table 2

Conductor size	H (mm)	V (mm)
#1 AWG-1/0 AWG	600	300
4/0-350 kcm	1000	500
500 kcm	1400	700

Figure 8 – Customer service switchboard top, rear, or side entry

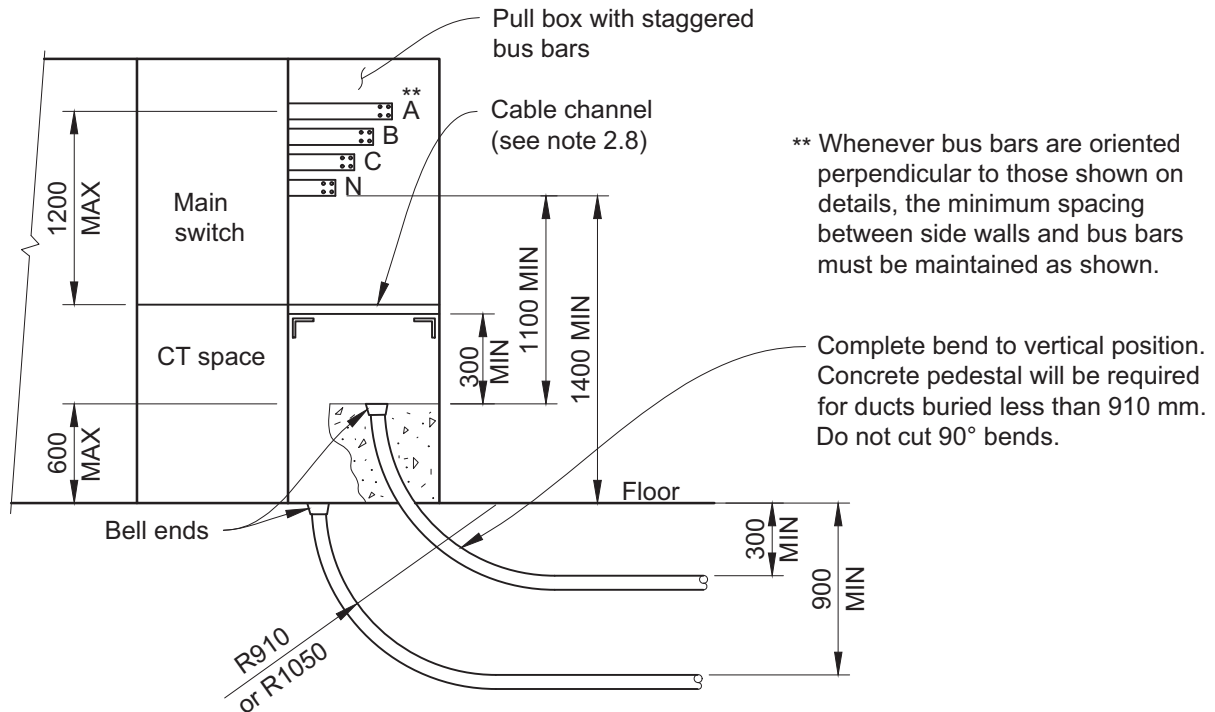


Figure 9 – Bottom entry duct details

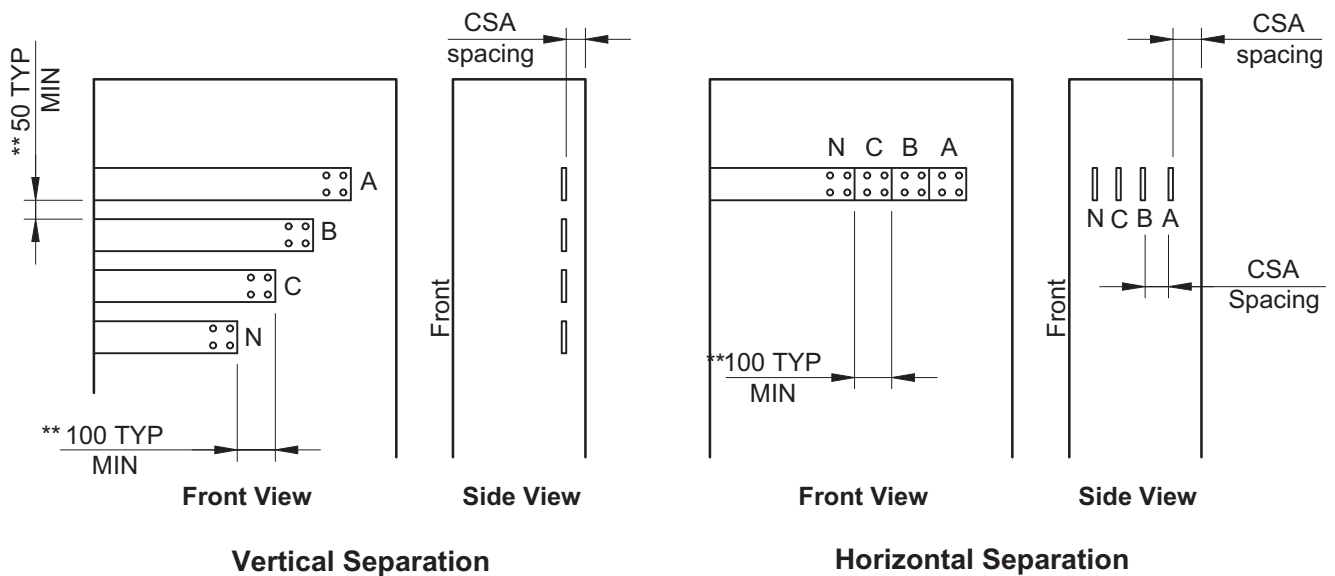


Figure 10 – Staggered bus bar details

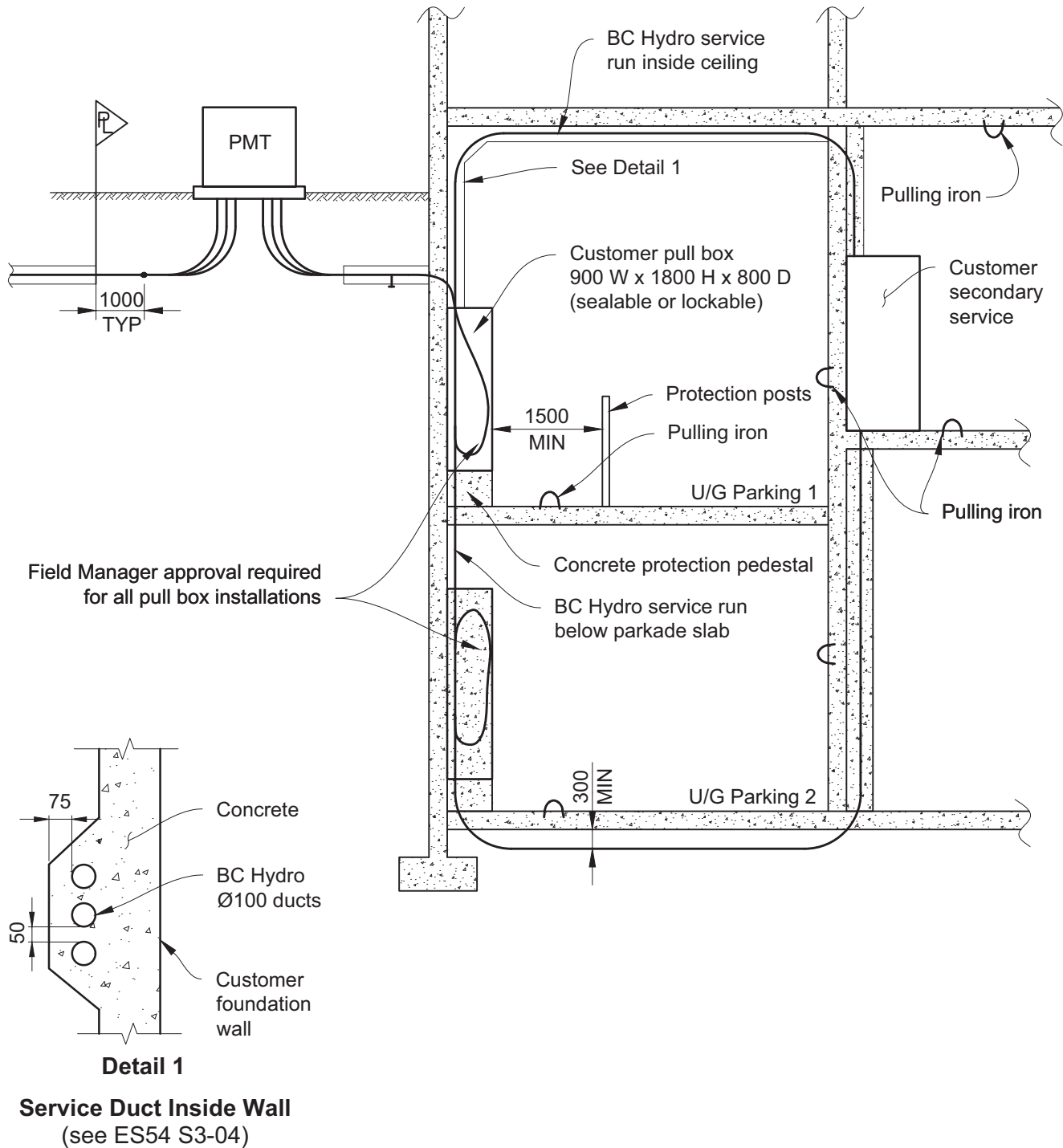


Figure 11 – Typical service duct profile

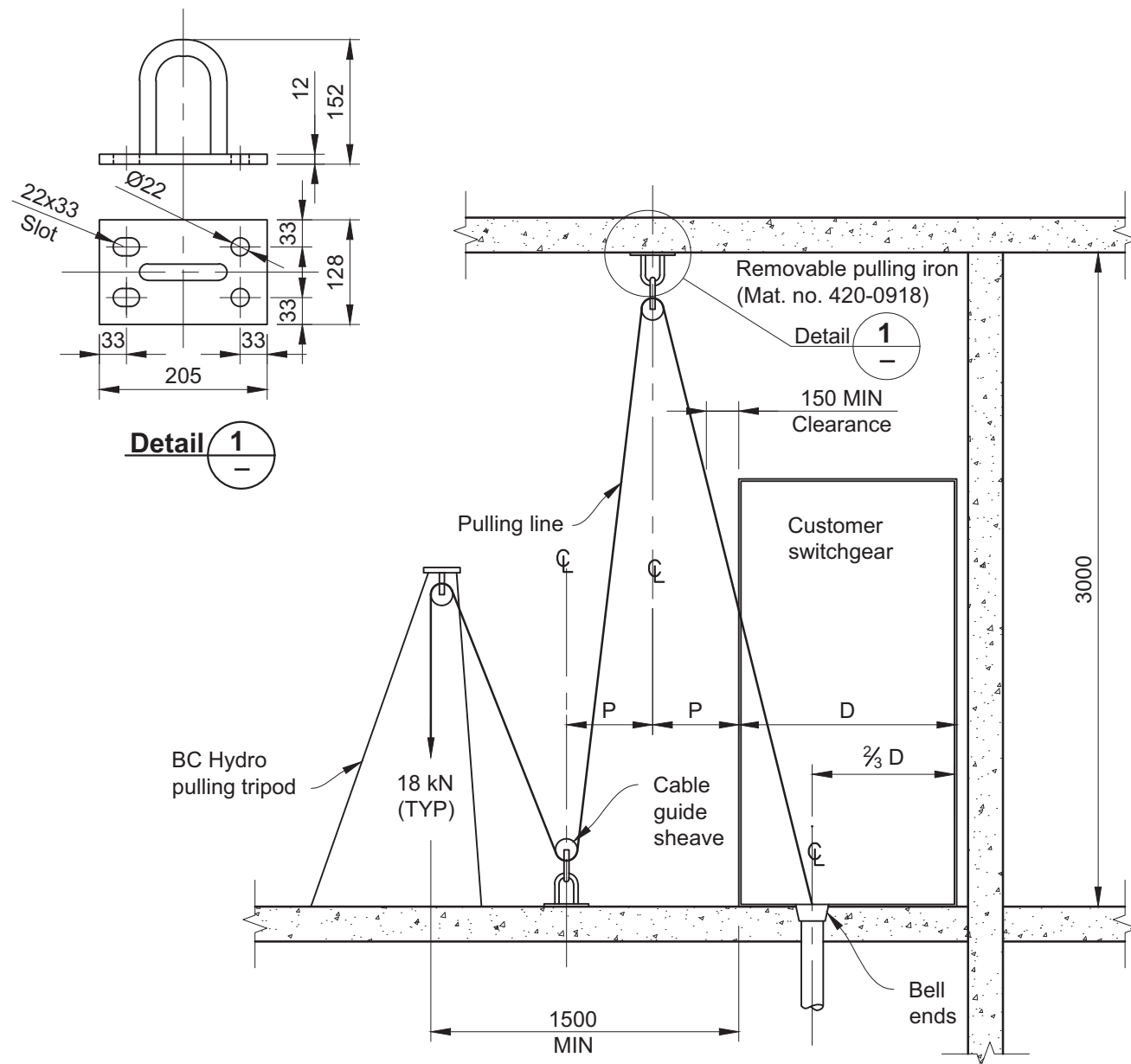


Figure 12 – Service cable pulling requirements (see note 2.7)

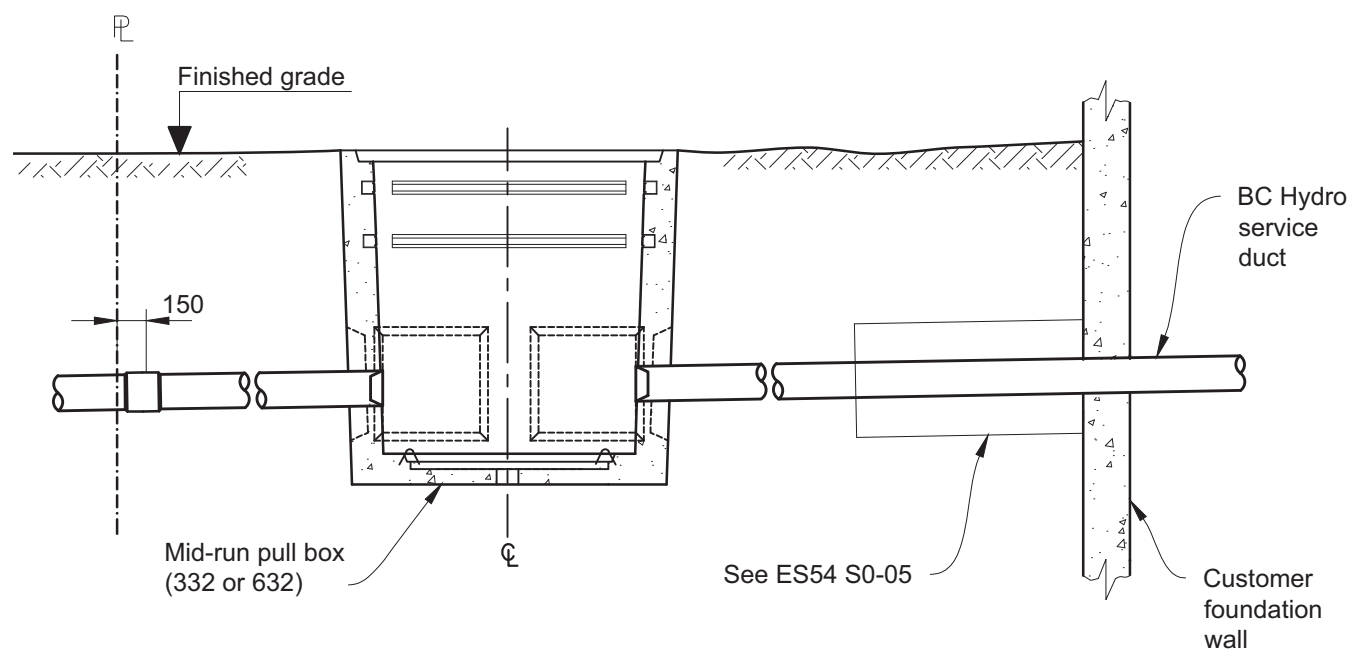


Figure 13 – Mid-run pull box inside or outside building