

This Legal Acknowledgement Form shall be governed by the laws of the Province of British Columbia and the applicable federal laws of Canada. In the event of conflicts or inconsistencies, if any, between or among this Legal Acknowledgement Form and the terms and conditions of the Standard, the provisions set out in this Legal Acknowledgement Form take precedence.

Disclaimer

The Standard, and all information and referenced standards therein, is provided as a public service by the British Columbia Hydro and Power Authority ("BC Hydro"). Material contained within it carries no guarantee of any kind, express or implied.

Neither BC Hydro nor the Standard designer, recommender, or acceptor, are accountable for the manner in which the Standard is used, or in the way its content is applied. Persons using the Standard, including retained engineers and contractors, are responsible and assume full responsibility and liability for its application, including but not limited to ensuring that the application of its content is appropriate, and that its application does not compromise operability, safety, reliability or maintainability.

The Standards have been prepared for or by BC Hydro to meet specific purposes of BC Hydro. No person shall use or rely upon the Standard, in whole or in part, in any manner, except:

- a) for the purpose of providing services to BC Hydro;
- b) for the purpose of connecting equipment to BC Hydro equipment;
- c) with the prior written consent of BC Hydro, or
- d) as required by law.

Limitation of Liability

BC Hydro, its servants or agents, shall not be liable to any person for injury, loss or damage arising out of the use of or reliance upon this Standard, in whole or in part, except for those situations where the person uses the Standards to provide services to BC Hydro to the extent damages are not due to the fault of the person using the Standard, including but not limited to that person's misapplication of the Standard, negligence, or misconduct.

Any person using these Standards hereby agrees to release and indemnify BC Hydro, its servants or agents, from any injury, loss, damage or claim arising or alleged to be arising from use of or reliance upon the Standards, in whole or in part, except for those situations where the person directly uses the Standards to provide services to BC Hydro to the extent damages are not due to the fault of the person using the Standard, including but not limited to that person's misapplication of the Standard, negligence, or misconduct.

Copyright

BC Hydro holds all title and rights, including the copyright, in or to the Standard. Copying all or any part of this Standard is permitted provided copies are used in accordance with this Legal Acknowledgement Form, credit is given to BC Hydro, and copies of the Standard or parts thereof are not sold for profit. The Standard may be stored in any type of electronic retrieval system provided BC Hydro is clearly indicated as the source and provided no profit accrues from such storage.

BC Hydro notes that the Standard may be revised from time to time and recommends that any person using the Standard in accordance with this Legal Acknowledgement Form confirm it is using the most recent version.

BC Hydro is not liable for reliance on past versions of the Standard that may be stored electronically.

REVISIONS: UPDATED LEGAL ACKNOWLEDGEMENT FORM. FD MAR '16

DESIGNED J. AGNOLIN	RECOMMENDED  F. DENNERT	ACCEPTED  G. REIMER	ENGINEER OF RECORD 	NOTICE FROM THE EXECUTIVE VICE PRESIDENT TRANSMISSION AND DISTRIBUTION AND CUSTOMER SERVICE	
DISTRIBUTION STANDARDS 		ISSUED: MAR 2016 REPLACES: MAY 2004 ORIGINALLY ISSUED: NOV 1980		PAGE 1 OF 2	ES43/53/54/55/65 A1-01.01 ^R 4

Scope

This manual is one of a series containing standards for construction of the BC Hydro electrical distribution plant within the service area of BC Hydro. A new distribution plant shall be designed, constructed, owned, operated, maintained and repaired to these standards.

Purpose of Standards

BC Hydro objectives require standardization to:

- a) Ensure uniform safety requirements comply with BC statutes and regulations.
- b) Provide uniform system reliability.
- c) Provide uniform operating practices.
- d) Permit economic bulk purchasing of materials.
- e) Achieve optimum life cycle cost of plant construction.
- f) Effect efficient quality assurance.

Responsibility

The Distribution Standards Department prepares these standards and verifies that specified plant and procedures will perform adequately under all normally expected conditions encountered throughout the province of British Columbia. These standards are approved by Professional Engineers. It is the responsibility of BC Hydro Managers to ensure that the standards are followed unless abnormal conditions are encountered that require variations. These variations should be kept to a minimum and their performance shall be the responsibility of the Professional of Record in charge of the project, who will record and seal the variation based on satisfactory qualifications and experience to do so. As per the latest revision of the BC Hydro Distribution Owner's Engineer Guide, these variations must be accepted by BC Hydro's Owner's Engineer.

Use of Stock Materials

The electrical distribution plant covered by these standards is built using stock materials approved by a Professional Engineer as required by law. The use of non-stock materials for special and unusual situations must be approved by Distribution Standards or the BC Hydro Engineer responsible for the project.

Revisions to Manual

These standards are revised from time to time to improve the safety, performance, workability, cost effectiveness or appearance of the plant. The existing plant built to previous standards need not be updated unless so specifically advised by BC Hydro. When maintenance or other work, such as voltage conversion or conductor change is being done, updating plant to current standards is encouraged.

Mailing Addresses

The manual has been issued to a corporation or firm rather than to an individual. The corporation or firm is responsible for the safekeeping of the manual, and for keeping it current. Changes of address or in number of copies required must be reported promptly.

Suggestions for changes in the manual, or required changes of address may be made on the pre-addressed comment sheet included in the Manual and with each issue of revision.

REVISIONS: UPDATED LEGAL ACKNOWLEDGEMENT FORM. FD MAR '16

DESIGNED J. AGNOLIN	RECOMMENDED  F. DENNERT	ACCEPTED  S. REIMER	ENGINEER OF RECORD 	NOTICE FROM THE EXECUTIVE VICE PRESIDENT TRANSMISSION AND DISTRIBUTION AND CUSTOMER SERVICE		
DISTRIBUTION STANDARDS BC Hydro		ISSUED: MAR 2016 REPLACES: MAY 2004 ORIGINALLY ISSUED: NOV 1980		PAGE 2 OF 2	ES43/53/54/55/65 A1-01.02	R 4

Application

This standard describes BC Hydro requirements for customer-owned pad-mounted pedestals and kiosks for single-phase 120/240 V secondary voltage services. These service kiosks and pedestals are best suited for regular and large single-family dwellings, service upgrades for additional electric vehicle charging stations, separate laneway houses, and other multiple service connections.

Revision Notes

Updated note 6 and Figure 18 on hybrid installations to include an above-ground option and added description of concrete encasement as a protective barrier against power diversion. Changes are marked by green vertical revision lines in the left margin. This revision released concurrently with Standards and Equipment Advisory 2022-023 R1 Information Bulletin: *Release of ES54 S0-04 and S1 Standards for 120/240 V Single-Phase Secondary Services up to 600 A*.

References

BC Hydro Distribution Standards

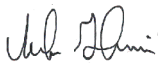
ES54 S0-02	Services General Notes
ES54 S0-04	Services General Notes Secondary Services
ES54 S0-05	Services General Notes Service Ducts and Trenches
ES54 S1-01	Secondary Single-Phase Services 200 A Single and 400 A Multiple Self-Contained Meter Installation
ES54 S1-01	Secondary Single-Phase Services 400 A and 600 A CT-Based Meter Installation

Other BC Hydro Documents

DI S10-1	Distribution Instruction, Electric Service Connections – General
DI S10-4	Distribution Instruction, Electric Service Connections – Voltages
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)
TSBC D-EI 2017-01	Directive: Exemptions to public utilities
TSBC IB-EL 2017-04	Information Bulletin: Electrical Safety Regulation application to public utilities

Designed: M. Kelvin, P. Eng		Professional of Record 2023-06-27  Permit To Practice-1002449	Secondary Single-Phase Services 200 A to 600 A Pad-Mounted Kiosk and Pedestal, Self-Contained and CT-Based Meter Installation	
Checked: M. Kelvin, P. Eng				
Reviewed: M. Stevens, P. Eng				
Approved: H. Giesbrecht, P. Eng		Issued: 2023-06-30 Effective: 2023-07-31	DISTRIBUTION STANDARDS 	ES54 S1-04 R1

Notes

1. Installation Types

- a. 200 A service pedestal with a self-contained plug-in loadbreak-type 200 A revenue meter.
- b. 200 A service kiosk, standard height enclosure for non-municipal installations based on self-contained 200 A revenue meters.
- c. 200 A service kiosk, reduced height municipal-owned metered and unmetered, based on self-contained revenue meters or no revenue meter.
- d. 400 A and 600 A service kiosk, CT-based with integral main breaker and separate 5 A revenue meter.
- e. Complex 120/240 V up to 600 A meter stack free-standing service kiosk with integral main breaker and a stack of several self-contained revenue meters.

2. General

- a. Pedestal-type and outdoor kiosk services rated up to 600 A 120/240 V shall provide 1.0 m minimum unrestricted and clear front access for BC Hydro personnel directly from the outside.
- b. Customer-owned service, bonding, and grounding conductors shall be installed and terminated on the load side before BC Hydro installs utility supply cables and seals the meter socket for BC Hydro access only.
- c. Civil work and grounding installations are the responsibility of the customer.
- d. BC Hydro accepts both grounding options of meter socket and customer service ground connections in compliance with BCEC Rule 10-210.
- e. Pedestals and kiosks shall have an adequate concrete pad and stability to withstand tipping resistance and seasonal weather changes. See note 3 for more information.
- f. BC Hydro may install larger pad-mounted transformers with higher available fault levels (above 10 kA) due to increased load demand for 120/240 V services. New construction and upgraded 120/240 V customer-owned service breaker panels shall have a minimum 22 kA interrupting capacity.
- g. Due to liability and restricted access, BC Hydro no longer terminates utility supply conductors directly onto a customer-owned service main. A circuit breaker only as service main is acceptable. A fused loadbreak switch is not permitted as the customer access requirement for fuse replacement precludes effective sealing of unmetered conductors and buses.
- h. Dimensions shown in this standard are the minimum for service entrance enclosures and BC Hydro requirements. Larger size enclosures may be used as required by the customer.

3. Concrete Pads and Service Ducts

- a. Figure 1 shows a vector diagram and construction details for concrete pads and service ducts for a typical free-standing 200 A 120/240 V pedestal. Figure 2 shows a vector diagram and construction details for a typical free-standing kiosk up to 600 A.
- b. The customer shall ensure the following BC Hydro requirements are met:
 - i. The kiosk or pedestal shall have an engineered base frame anchored to a concrete pad suitable for a 1200 N-m overturning moment to prevent damage caused by vandalism.
 - ii. BC Hydro service cables shall not be exposed to extraordinary stress caused by soil expansion and contraction due to seasonal weather changes.
- c. In general, BC Hydro will accept a certified engineering construction drawing for pedestals and kiosks that meet the above requirements.

3.1 200 A Pedestal

- a. If a service pedestal installation is performed by a contractor or owner without certified construction drawings, BC Hydro will accept pedestal base and duct installation in compliance with the requirements shown in Figure 1:
 - i. Concrete pads shall extend 50 mm past the pedestal base frame and shall be a minimum 600 mm deep to withstand overturning force.
 - ii. Concrete pads shall be placed on top of gravel fill extending 150 mm below the frost line to eliminate differential settlement stresses caused by freeze/thaw cycles.
 - iii. Concrete pads shall protrude 50 mm min above finished grade.

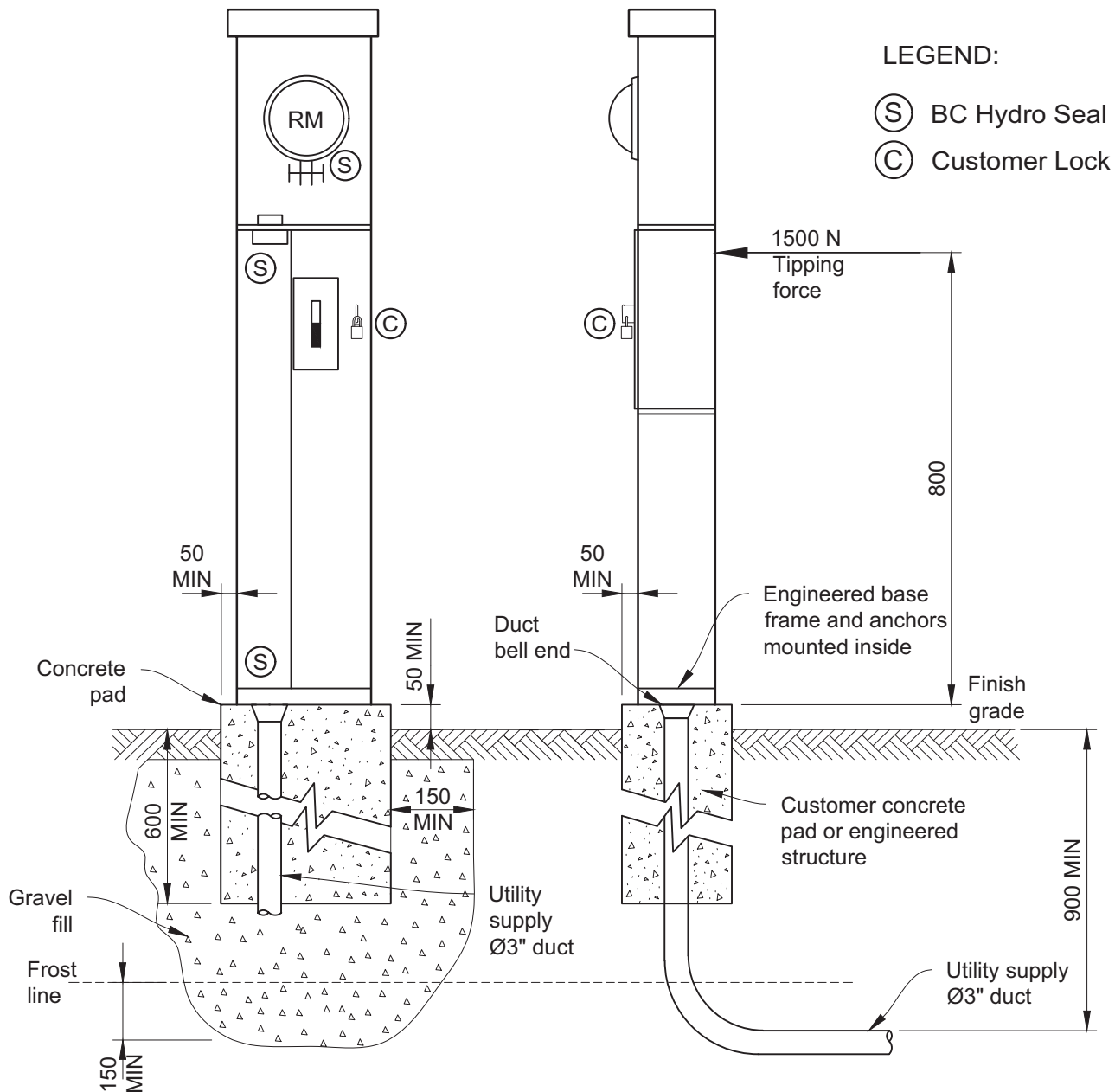


Figure 1 – 200 A pedestal concrete pad and duct installation

3.2 200 A to 600 A Kiosk

- a. If a service kiosk installation is performed by a contractor or owner without certified construction drawings, BC Hydro will accept kiosk concrete pad and duct installation in compliance with the requirements shown in Figure 2:
 - i. Concrete pads shall extend 50 mm past the kiosk mounting base frame and shall have a minimum 200 mm thickness.
 - ii. Concrete pads shall be reinforced with 12 mm ($\frac{1}{2}$ ") rebar rods equally spaced 200 mm on center and installed axially and radially.
 - iii. Concrete pads shall be installed on top of gravel fill or integrally connected with helical anchors or sono tubes with rebar, as a means of structural support to the hard pan or the ground, extending 150 mm below the frost line.
- b. These requirements shall be discussed with and accepted by a BC Hydro designer before the start of construction.

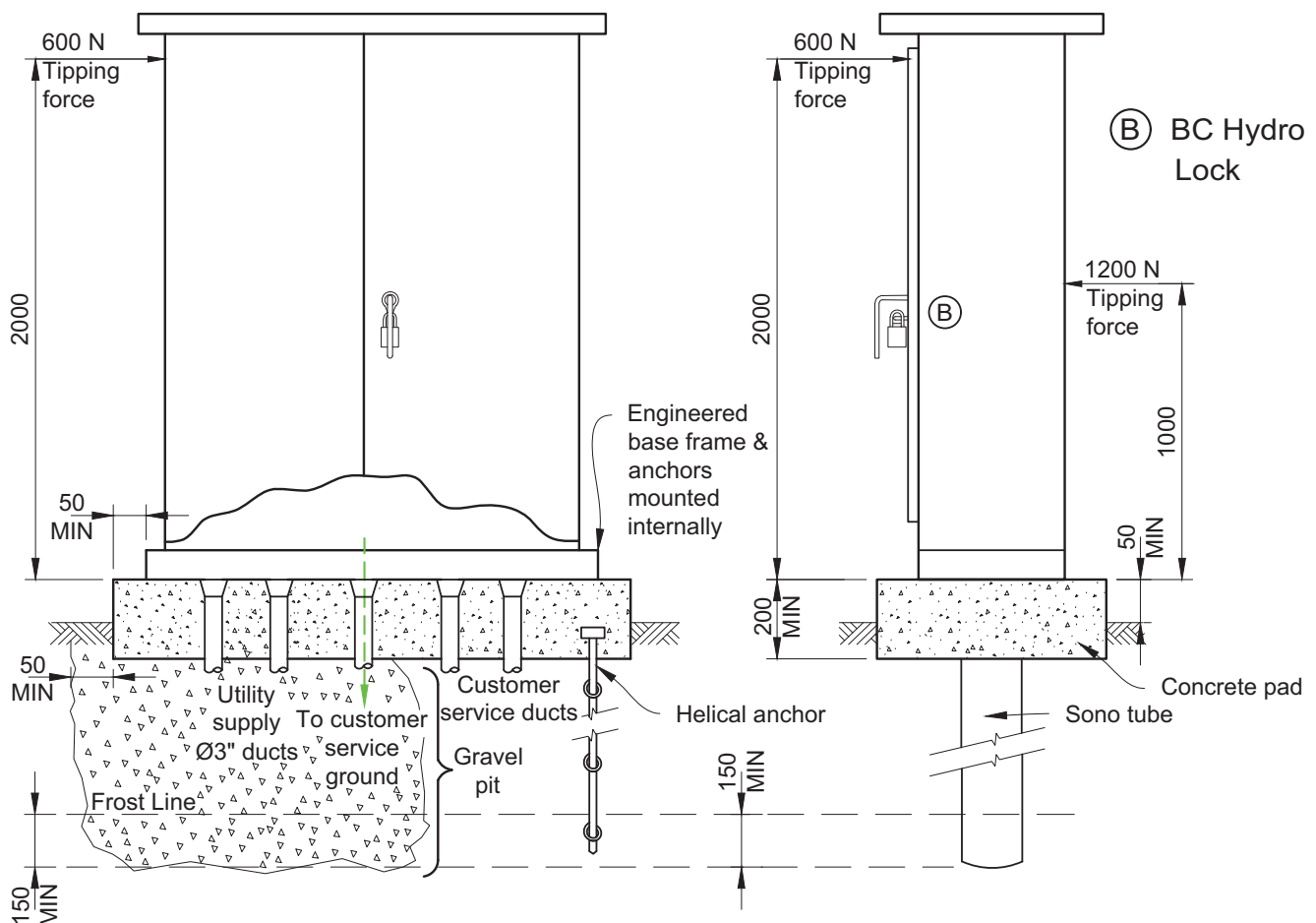


Figure 2 – 200 A to 600 A kiosk concrete pad and duct installation

4. Pedestal and Kiosk Enclosure and Base Frame

- a. Pedestals and kiosks shall be rated for outdoor installation and carry applicable CSA 22.2 standards certification as acceptable to TSBC and the local authority having jurisdiction.
 - i. Kiosks having one external hinged access door shall be equipped with a dual access hasp (or equivalent) as shown in Figure 3.

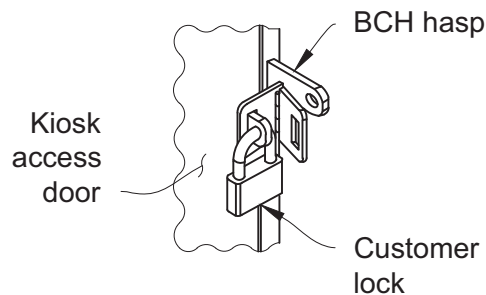


Figure 3 – Dual access hasp for single-door outdoor kiosk

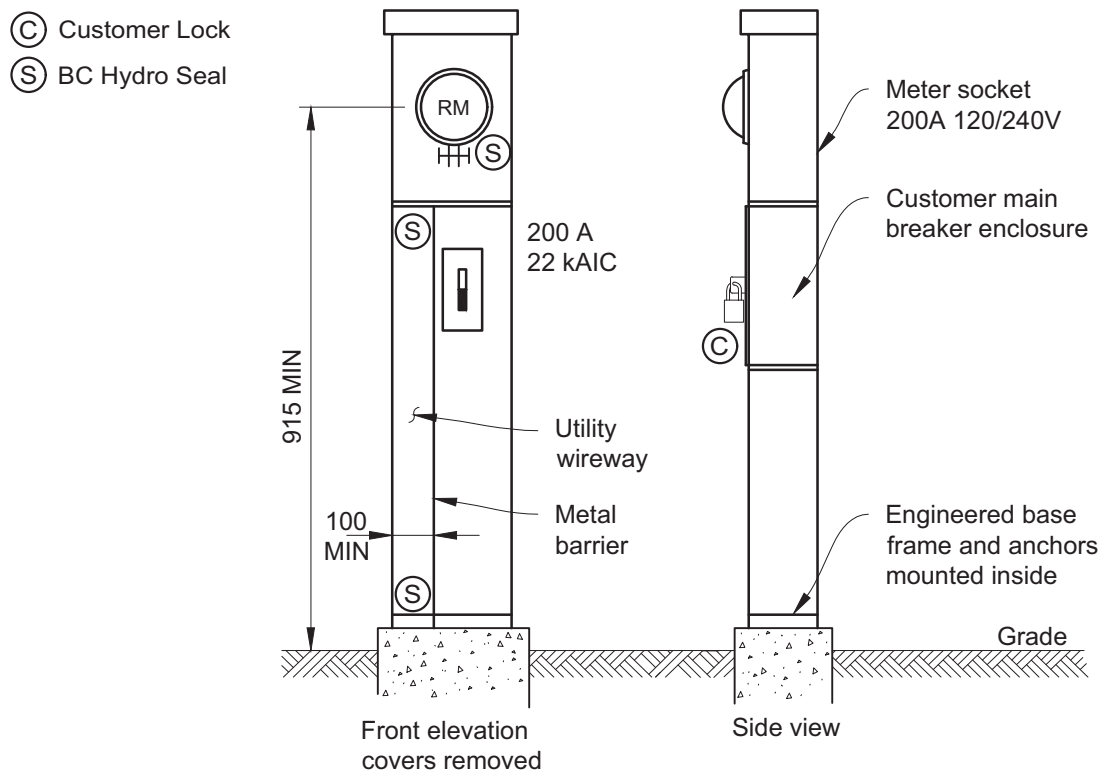
- ii. Kiosks having two external hinged access doors requires dual access and shall be equipped with two separate three-point latches and separate hasps for each door as shown in Figure 5.
- iii. Large revenue meter centre kiosks having two external hinged access doors require dual access as shown in Figure 16. The customer shall provide a dual lock hasp bracket as shown in Figure 17.

4.1 200 A Pedestal

- a. Figure 4 shows a typical customer-owned 200 A pedestal with the following BC Hydro requirements:
 - i. Pedestal height shall be minimum 1200 mm in response to customer requests for improved appearance.
 - ii. Revenue meter centerline elevation measured from the finished grade shall be minimum 915 mm.
 - iii. Pedestal shall contain a separate utility cable wireway barriered off from customer equipment and sealable by BC Hydro for restricted access to BC Hydro personnel.
 - iv. Utility supply cables and customer cables shall not cross.
 - v. Pedestal shall be equipped with a 200 A 22 kAIC breaker to protect customer-owned underground service conductors.

Note: BC Hydro has received numerous service calls to restore electrical services to customers supplied from the same low-profile transformer when one customer damages customer-owned underground service cables.

- vi. BC Hydro recommends that owners install a customer-owned lock for breaker compartment access to prevent unauthorized operation of the service main breaker.



Pedestal with cover installed

Figure 4 – 200 A pedestal design details

4.2 200 A Non-Municipal Kiosk

- a. Figure 5 shows free-standing 200 A kiosks having a self-contained revenue meter socket mounted inside the kiosk. The customer shall ensure the following BC Hydro requirements are met:
 - i. Kiosks shall have adequate concrete pad and service ducts installed in compliance with note 3.2.
 - ii. Kiosks shall have adequate height to facilitate the installation of a revenue meter with a centreline elevation between 1500 mm and 1800 mm measured from the finished grade.
 - iii. Kiosks shall have a separate utility compartment and access door and a hasp for a BC Hydro padlock. The access door shall have a centered viewing window a minimum 150 mm in diameter. See *Requirements for Secondary Voltage Revenue Metering (750 V and less)* for further BC Hydro requirements.
- b. Figure 6 shows construction and installation details for free-standing 200 A kiosks having a self-contained revenue meter socket mounted outside of the kiosk bolted onto the kiosk enclosure. The customer shall ensure the following BC Hydro requirements are met:
 - i. Kiosks shall have adequate concrete pad and service ducts installed in compliance with note 3.2.
 - ii. Kiosk shall have adequate height to facilitate the installation of a revenue meter with a centreline elevation between 1500 mm and 1800 mm measured from the finished grade.
 - iii. Utility access into the customer-owned service breaker compartment is not required.
 - iv. An externally mounted meter socket shall be permanently attached to the kiosk enclosure by means of 1½" channels bolted with tamperproof bolts to prevent vandalism.
- c. The customer may apply to BC Hydro for acceptance of a reduced height service kiosk if the kiosk poses a safety risk from visual obstruction or if improved appearance is justified.

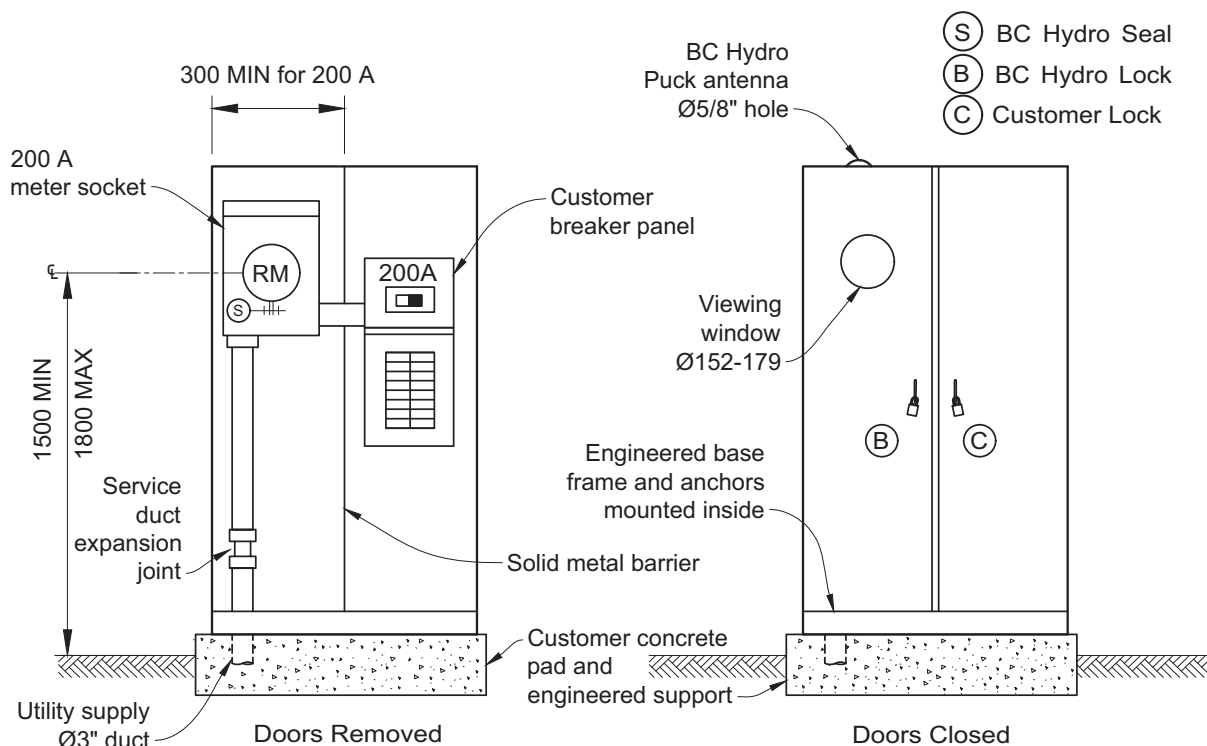


Figure 5 – Kiosk with revenue meter socket mounted inside enclosure

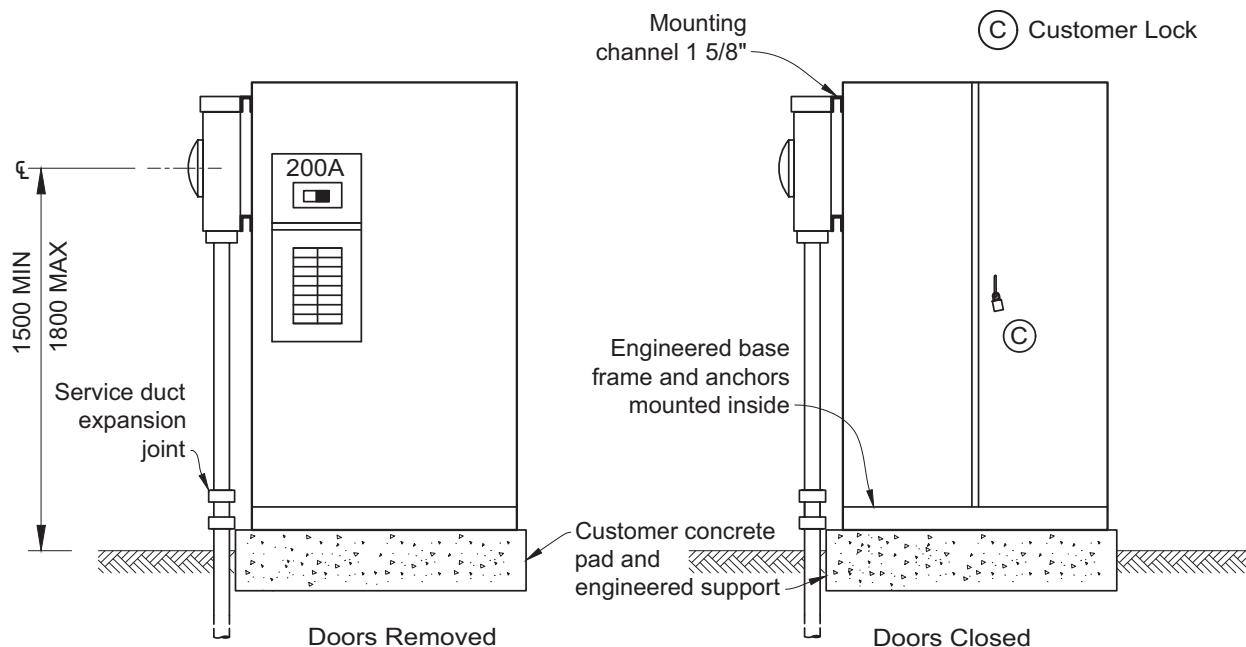


Figure 6 – Kiosk with revenue meter socket mounted outside enclosure

4.3 200 A Low-Profile Municipal Kiosk

- Requirements for metered municipal kiosks are the same as for non-municipal kiosks (see note 4.2 *200 A Non-Municipal Kiosk*) except municipal kiosks shall have a maximum enclosure height of 1200 mm for reduced visual obstruction when installed near street intersections.
- Figure 7 shows a typical free-standing 200 A unmetered municipal kiosk. 200 A terminal blocks are acceptable for terminating utility supply cables. Utility access is required if BC Hydro crews terminate the supply service cables.

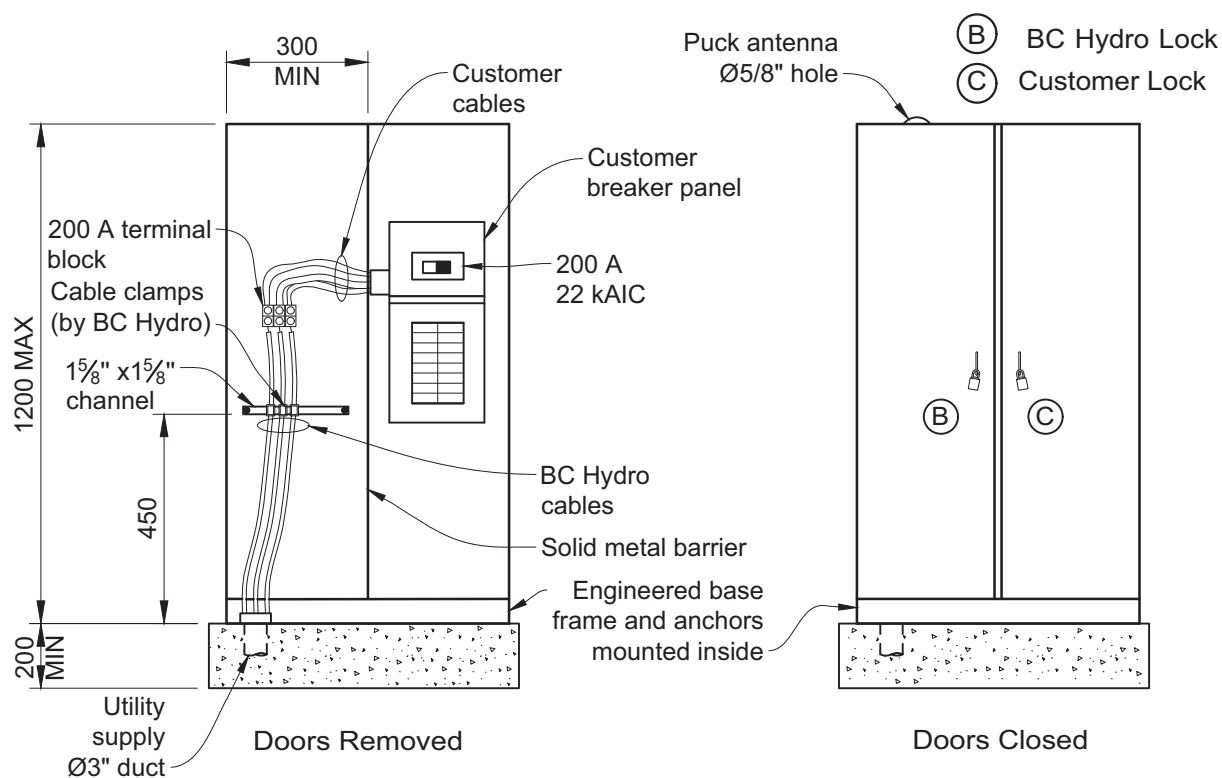


Figure 7 – Municipal kiosk unmetered up to 200 A

4.4 400 A and 600 A CT-Based Kiosk

- a. Figure 8 shows typical free-standing 400 A and 600 A kiosks having a CT-based revenue meter socket mounted on the side of the kiosk. The customer shall ensure the following BC Hydro requirements are met:
 - i. Kiosks shall have adequate concrete pad and service ducts installed in compliance with note 3.2.
 - ii. Kiosks shall have adequate height to facilitate the installation of a revenue meter with a centreline elevation between 1500 mm and 1800 mm measured from the finished grade.
 - iii. Kiosks shall be restricted to BC Hydro access only, including a three-point latch handle and a hasp for a BC Hydro padlock. The customer shall have access to the service main breaker handle via a lockable weatherproof cover (see Figure 9).
 - iv. The kiosk manufacturer may provide separate customer access to the customer service cable connection termination blocks by means of a lockable hinged door or a gasketed and bolted cover plate.
 - v. An externally mounted meter socket shall be permanently attached to the kiosk enclosure by means of 1 $\frac{5}{8}$ " channels bolted with tamperproof bolts to prevent vandalism.
 - vi. The customer may request BC Hydro to install a revenue meter inside the kiosk. See *Requirements for Secondary Voltage Revenue Metering (750 V and less)* for further BC Hydro requirements.
 - vii. The CT compartment shall be located 300 mm above the enclosure base frame and connected to the revenue meter enclosure with $\frac{3}{4}$ " duct.
 - viii. The CT compartment shall be equipped with $\frac{3}{4}$ " diameter PVC duct for service ground and bonding conductor connection to the service neutral inside the service main compartment.
 - ix. Customer service splitter busbars shall extend into the utility cable compartment and be fitted with line-side tunnel-type lugs for terminating BC Hydro supply cables. BC Hydro will accept staggering of phase cables over neutral, as shown in Figures 10 and 11.
 - x. See Figure 12 for minimum dimensions and details on cable lug and busbar clearances, busbar staggering, and splitter portion insulator spacers. The dimensions shown in Figure 12 are BC Hydro requirements for working space. Clearances from conductive components to the metal enclosure shall comply with CSA 22.2 standards.
 - xi. A cable bus shall terminate on bus bar cable lugs with 100 mm spacing as shown in Figure 13. A cable bus from the service main breaker terminating into the terminal block inside the BC Hydro wireway is unacceptable.

- Ⓑ BC Hydro Lock
- Ⓒ Customer Lock

(*) Customer could apply for special permission to mount revenue meter inside kiosk enclosure, see Revenue Metering guide.

(**) 1-5/8" x 1-5/8" channel mounted on slotted sliding angle as shown in ES54 S1-03 Figure 11.

(***) See Figure 12 for bus spacing and lug clearances.

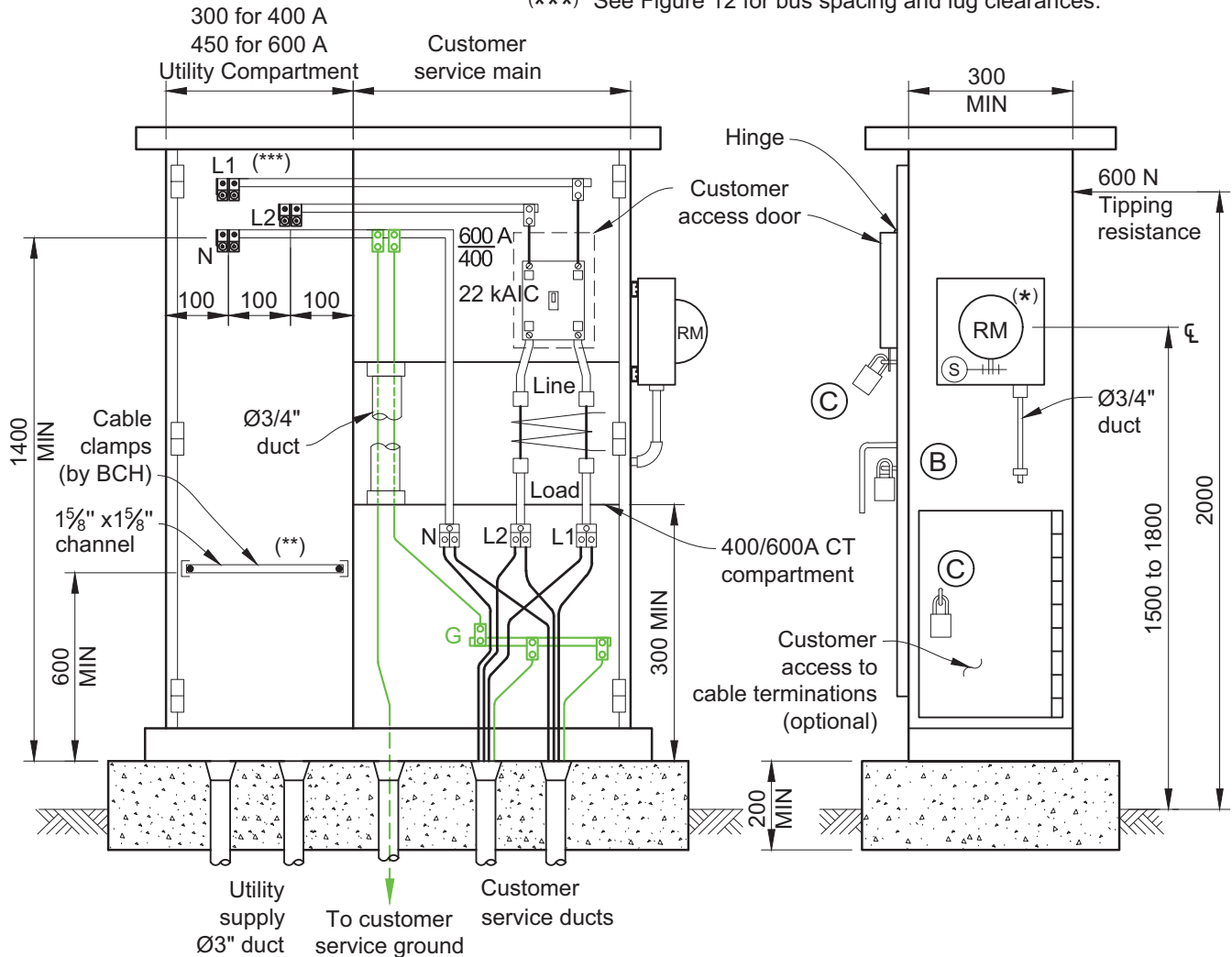


Figure 8 – 400/600 A service kiosk



Figure 9 – Customer breaker with lockable cover

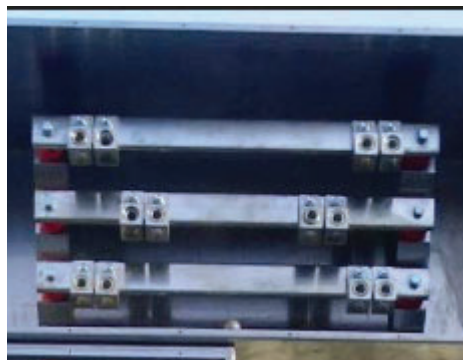


Figure 10 – Splitter bus layout and spacing



Figure 11 – Phase cables staggered over neutral

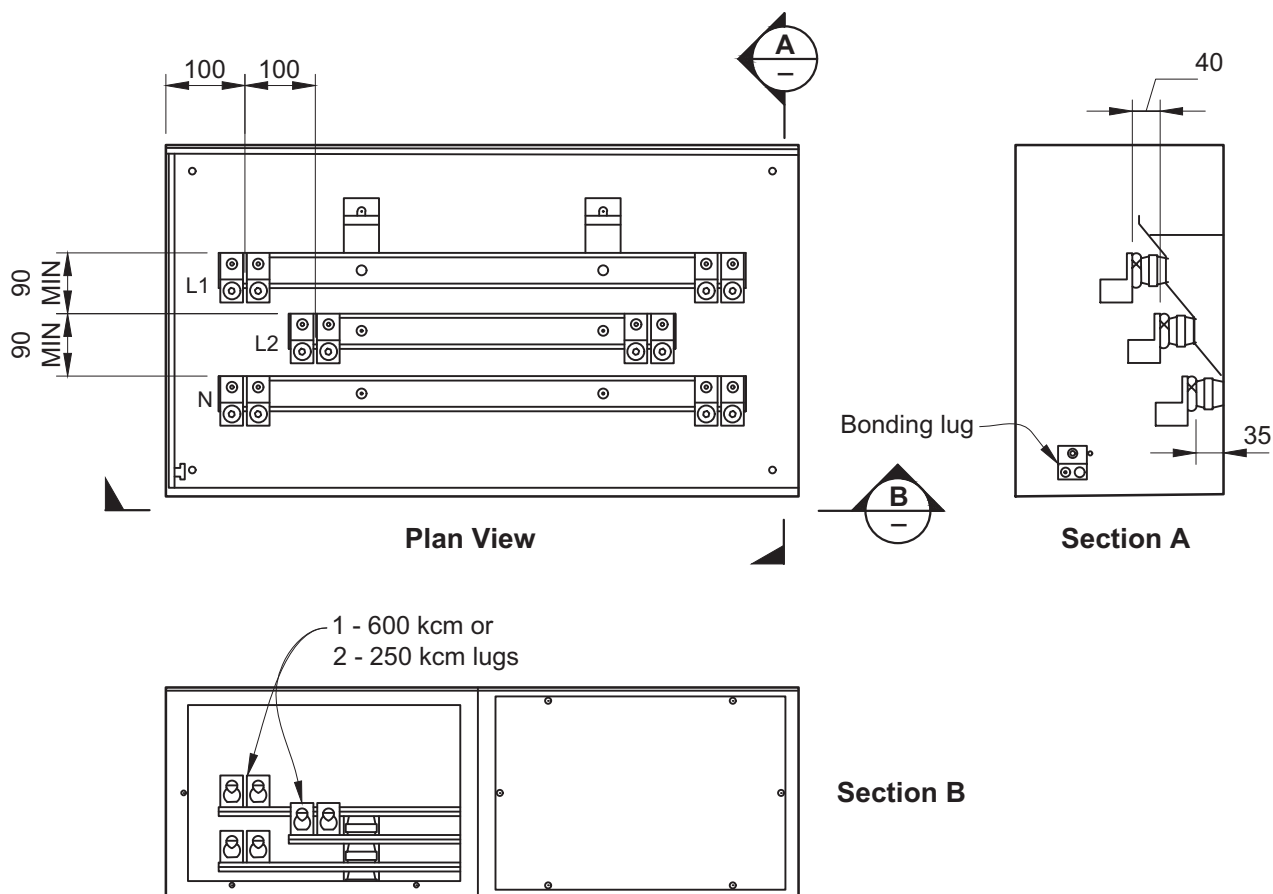


Figure 12 – Minimum requirement for service splitter

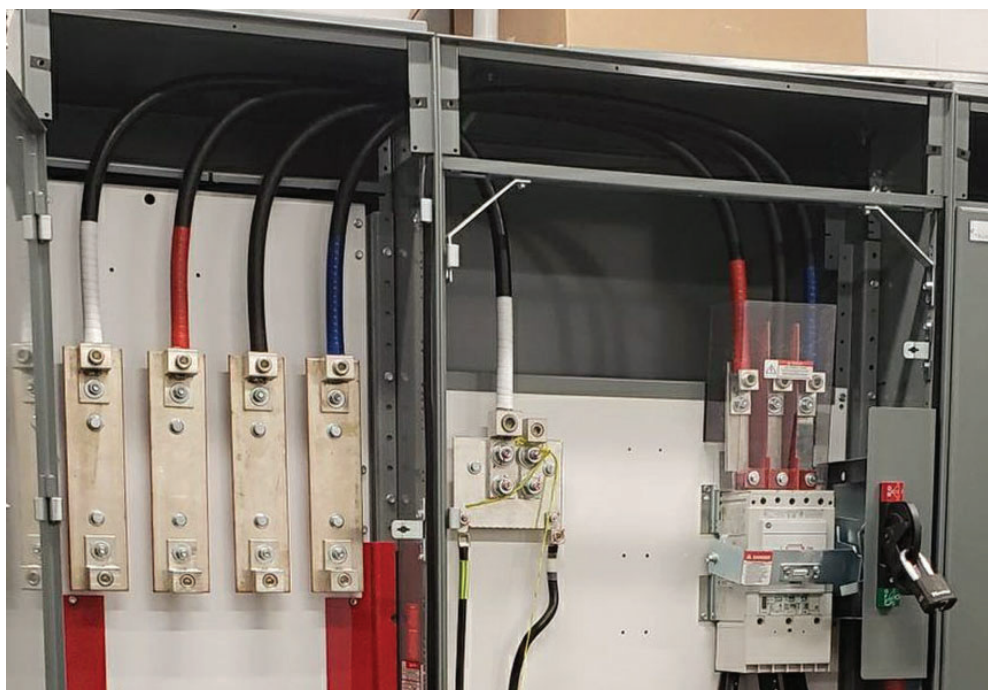


Figure 13 – Acceptable cable bus option for a splitter, 100 mm (4") on centre for bus spacing



Figure 14 – Unacceptable revenue meter centre kiosk with fused loadbreak switch

5. Revenue Meter Centre Kiosk

- a. Figure 15 shows a typical two-door large meter centre service installation with a 600 A breaker as service main. Each revenue meter socket is equipped with individual sub-service main breakers, which requires customer access. Such kiosks shall be equipped with dual access provision. A meter centre kiosk shall meet the following BC Hydro requirements:
 - i. Kiosks shall have adequate concrete pad and service ducts installed in compliance with note 3.2. See *Requirements for Secondary Voltage Revenue Metering (750 V and less)* for further BC Hydro requirements.
 - ii. Kiosks shall be equipped with dual access provision for the installation of separate BC Hydro and customer locks. Dual access for a single cover door shall comply with Figure 3. Dual access for a two-door kiosk shall comply with Figures 16 and 17.
 - iii. A fused loadbreak switch as service main as shown in Figure 14 is unacceptable

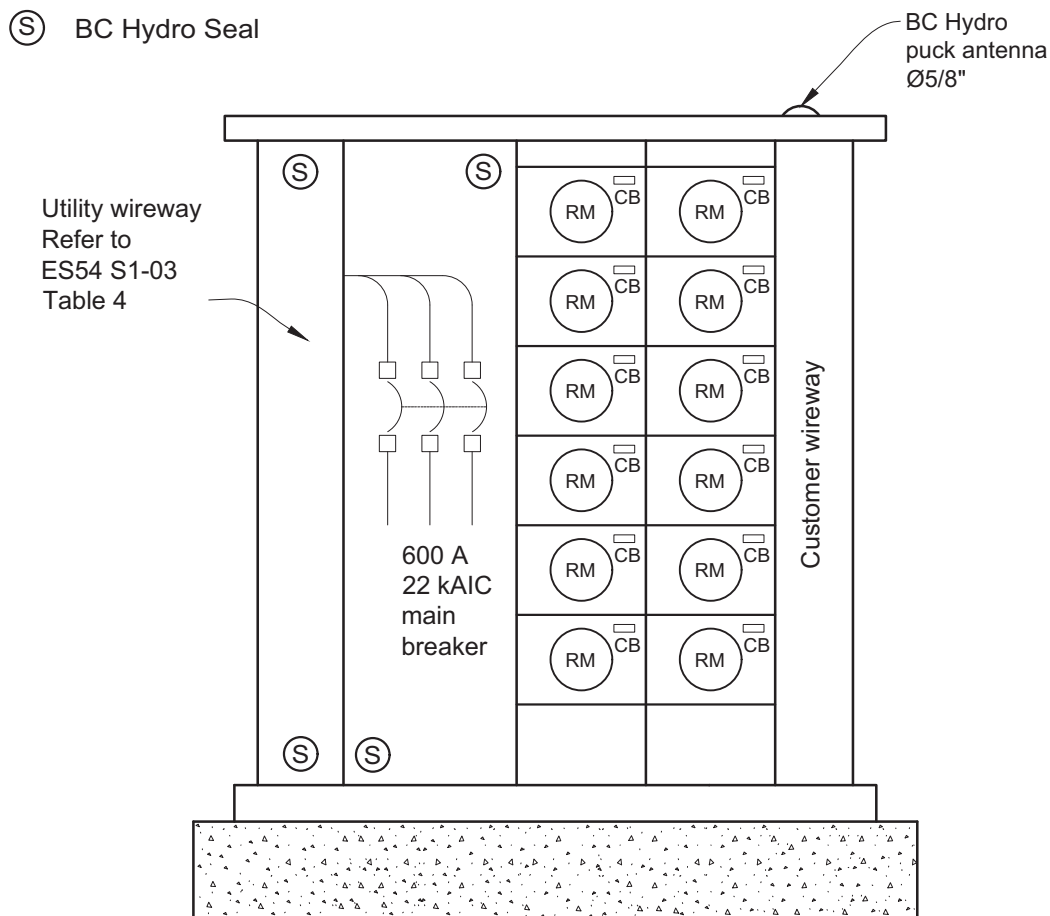


Figure 15 – Revenue meter centre kiosk doors removed

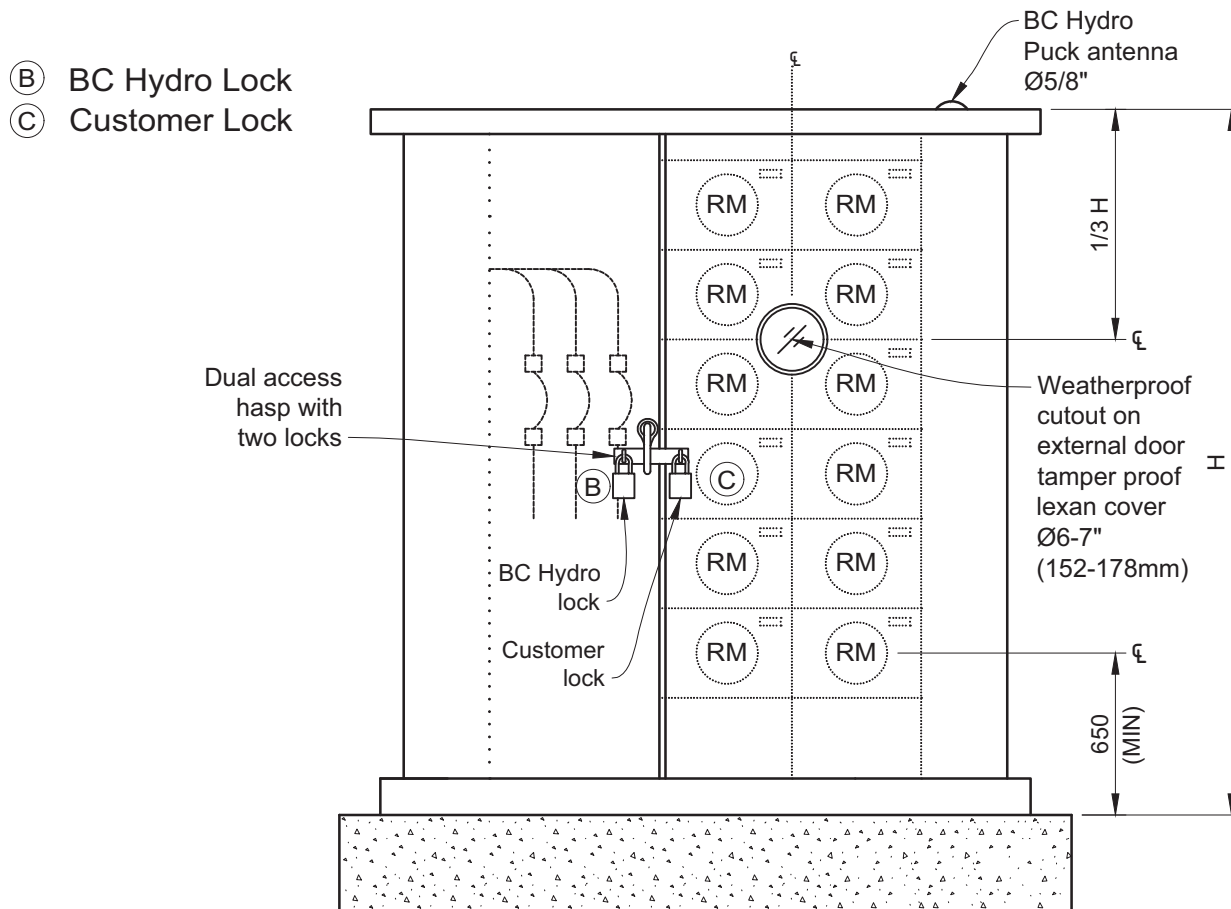


Figure 16 – Revenue meter centre kiosk communication cutout

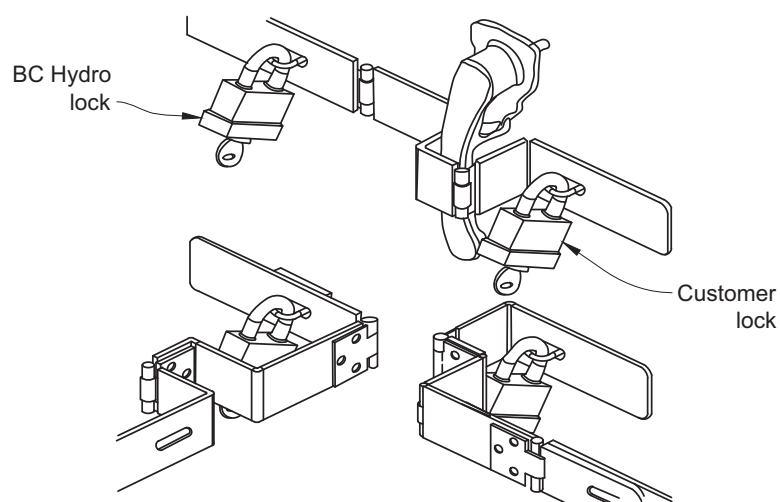


Figure 17 – Dual access hasp for two-door outdoor kiosk

6. Hybrid Installations

- a. Figure 18 shows an example of an overhead service supply terminating on a customer-owned pole on private property. Customer-owned ducting continues down the pole to provide two options:
 - i. Above-ground option, service duct terminating into the side or back of the service kiosk enclosure; or
 - ii. Underground option, service duct runs underground for bottom entry into the service kiosk.The customer service kiosk shall be installed less than 1200 mm away from the customer pole.
- b. BC Hydro overhead service spans shall be attached to a class 4 pole for 50-year service connection life expectancy. A 4" x 4" treated wood post is not an acceptable attachment structure.
- c. Free standing customer kiosks shall comply with BC Hydro requirements per note 4.3 and shall have access restricted to BC Hydro for the unmetered portion, including the service main. Customer access to the service main breaker handle shall comply with Figure 9.
- d. To prevent power diversion for the above-ground option, the customer-owned service duct shall be clearly visible for entire length of the run for BC Hydro ready inspection. To prevent power diversion for the underground option, the customer duct installed below ground shall be encased in a concrete barrier with a minimum thickness of 75 mm (3").

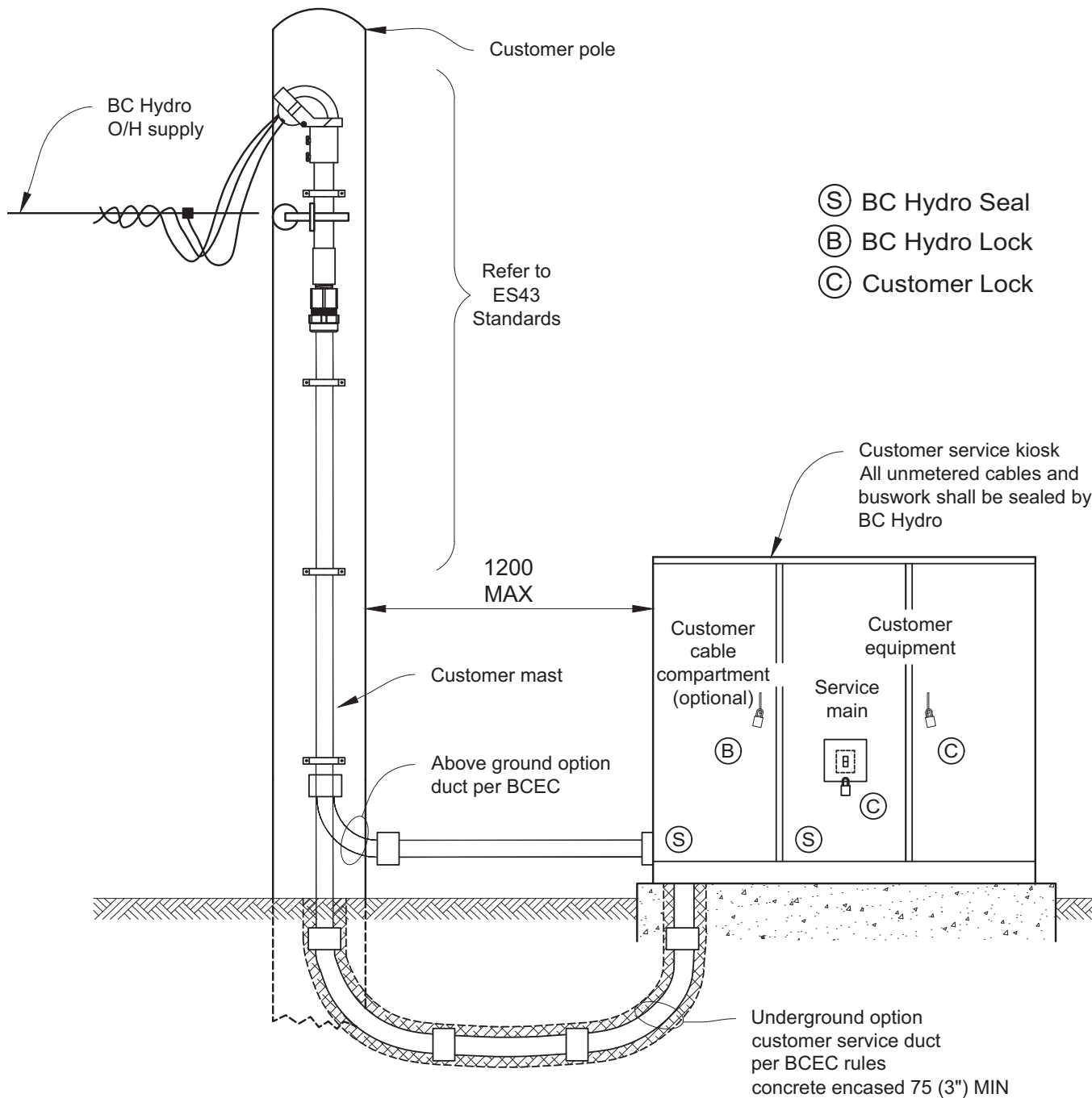


Figure 18 – Example of overhead supply to pad-mounted kiosk

- e. Figure 19 shows an example of an underground service connection on difficult sloped terrain. BC Hydro will accept a customer-owned pedestal or kiosk or service combo-type panel installed at the property line at the base of a slope subject to the terrain being stabilized by a retaining wall. The customer-owned service cables on the load side may be installed at a reduced depth in compliance with applicable BCEC rules. See ES54 S1-01 for more information.

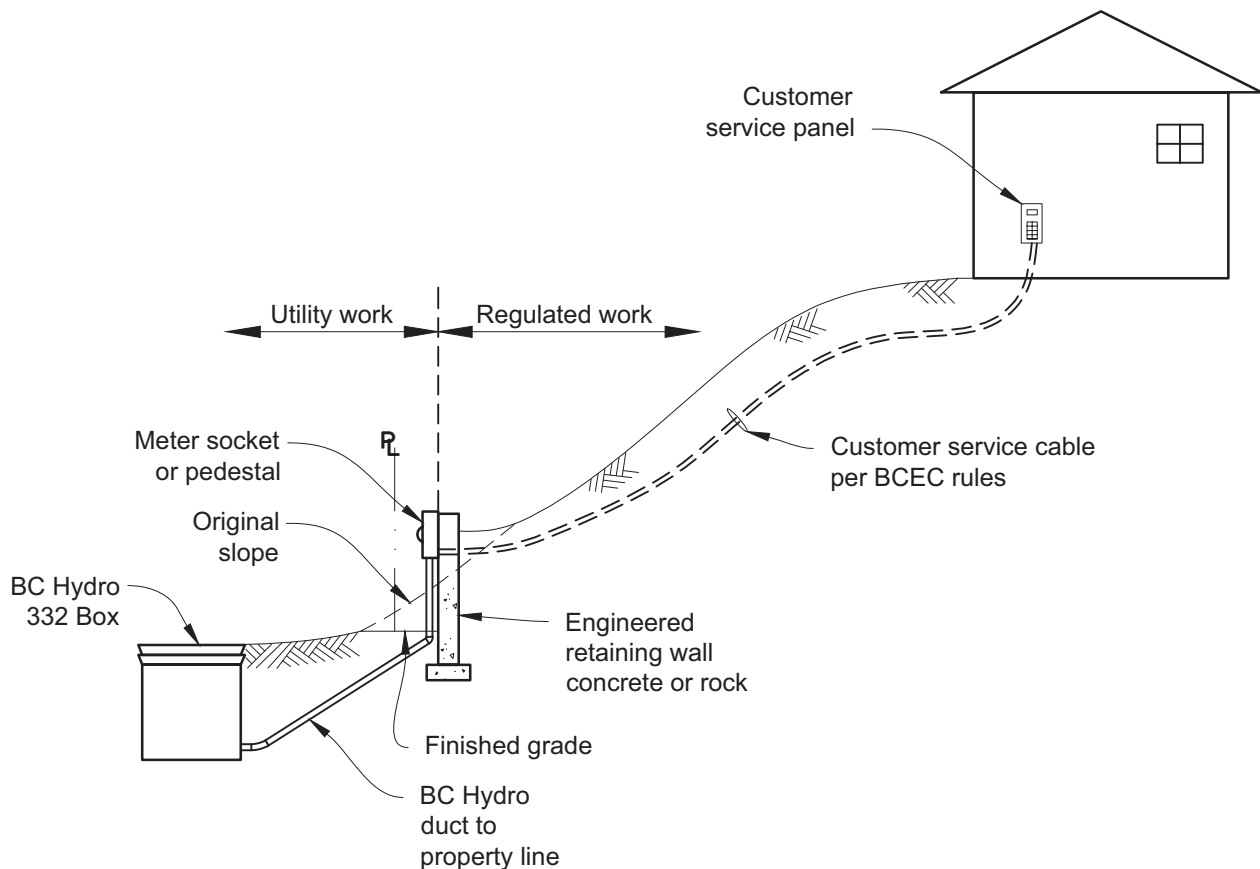


Figure 19 – Example of residential service on difficult terrain