

# Service and Metering Guide

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September 2023	11	Revised instrument metering requirements for single phase 201-400A customers. Added clarity and minor updates.	D. Gretchen W. Hillary	D. Walden
September 2021	10.1	Allow armoured cable for permanent install, updated instrument metering details, updated limits of approach table	D. Gretchen D. Power	D. Walden
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The latest version of this guide can be found at:

[fortisbc.com/services/electricity-services/request-or-change-your-electricity-service/](https://fortisbc.com/services/electricity-services/request-or-change-your-electricity-service/)

**Note:** Latest revisions and additions are highlighted: GREY

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## Disclaimer

**Users of FortisBC Engineering and Construction Standards, including this guide, acknowledge to the following:**

1. In accordance with FortisBC Engineering Practices and Policy, FortisBC Engineering and Construction Standards are developed and used only for FortisBC designs and construction and for FortisBC distribution facilities only.
2. Some of these standards may carry the name or logo of “Aquila”, “Aquila Networks Canada”, “UtiliCorp”, “UtiliCorp Networks Canada”, “UNC”, “West Kootenay Power” or “WKP”. Any such references are to be taken as a reference to FortisBC. By formal agreement between FortisBC, Aquila Networks Canada, UtiliCorp Networks Canada and West Kootenay Power, all standards with “Aquila Networks Canada”, “UtiliCorp Networks Canada” or “West Kootenay Power” references refer to FortisBC.
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4. At the 3<sup>rd</sup> Party’s request, FortisBC may provide copies of the FortisBC Engineering and Construction Standards to facilitate the awareness of minimum requirements to the 3<sup>rd</sup> Party. In the process of discussions with any 3<sup>rd</sup> Party, FortisBC may offer such information to illustrate this awareness.
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6. Any copies of FortisBC Engineering and Construction Standards so provided are copyright protected and no further copies for any other use, modifications, amendments or changes are permitted.
7. FortisBC recommends that any 3<sup>rd</sup> Party retain the use of a professional engineer to assess the completeness of the 3<sup>rd</sup> Party’s design and construction to meet the minimum requirements.
8. Review and/or comments by FortisBC on any 3<sup>rd</sup> Party design or construction does not relieve the 3<sup>rd</sup> Party from full responsibility and liability for the 3<sup>rd</sup> Party’s design and construction.
9. By requesting and/or accepting copies of any FortisBC Engineering and Construction Standards, the 3<sup>rd</sup> Party automatically accepts the terms and conditions of this letter.
10. All references to the Canadian Electrical Code (CEC) are made to the 25<sup>th</sup> edition of the Canadian Electrical Code, Part I, 2021: C22.1-21.
11. All references to the British Columbia Electrical Code (BCEC) are made to the “B.C. Electrical Code” per Electrical Safety Regulation, B.C. Reg. 100/2004. The BCEC is the CEC including any amending errata and schedules as adopted by the province. The B.C. electrical Code is the governing provincial legislation over customer installations and operation of electrical equipment and systems, enforced by Technical Safety British Columbia.

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## Introduction

This publication is for use by FortisBC's customers and various groups concerned with electrical installations within the FortisBC's electrical service area. The information within supersedes all information previously provided by FortisBC on the subject.

For more information with respect to the terms, conditions, rate schedules and specifications outlining customer and company responsibilities, please refer to the FortisBC Electric Tariff on our website at [fortisbc.com/ElectricityTariff](http://fortisbc.com/ElectricityTariff).

If you are planning an electrical installation, your earliest contact with FortisBC will help ensure that your installation will be satisfactory to both the Technical Safety BC and FortisBC. To arrange an inspection of an installation, please contact FortisBC at **1-866-4FORTIS** (1-866-436-7847).

All electrical installations must comply with the British Columbia Electrical Code and applicable CSA standards. Installations cannot be connected before FortisBC takes receipt of the "Supply Authority" copy of an approved *Electrical Contractor Authorization & Declaration of Compliance* form or an approved *Certificate of Electrical Inspection*.

### **Installations will not be connected before the following steps have occurred:**

- The customer taking responsibility for the service must notify FortisBC that the installation is ready for connection by calling **1-866-4FORTIS** (1-866-436-7847). At this time, the customer's billing information is to be provided.
- The "Supply Authority" copy of either the *Electrical Contractor Authorization & Declaration of Compliance* form or a *Certificate of Electrical Inspection* must be available to FortisBC crews and located at the job site (preferably in a waterproof envelope and placed inside the electrical meter socket) before connection will occur. FortisBC crews will take possession of the "Supply Authority" copy and retain it for our records.
- A "Job Site" copy of either the *Electrical Contractor Authorization & Declaration of Compliance* form or a *Certificate of Electrical Inspection* must also be on display at the work site. The "Job Site" copy of the form must be affixed to the structure receiving the electrical service. This form must be in plain view and will be left at the work site by FortisBC crews.

**FortisBC cannot energize a service entrance or any equipment until its design, construction, location and application are acceptable to both the Technical Safety BC and FortisBC.**



## 1 General Requirements

This section covers FortisBC's general requirements, which must be met before electrical service will be provided.

**Note:** FortisBC [Connected Load Form](#) is required for all commercial services, and all three phase services. Residential services greater than 200A shall require a Form.

### 1.1 Non-Standard Services

#### 1.1.1 Acceptance Procedures

Whenever the requirements of this guide cannot be met, drawings must be submitted to your local FortisBC Customer Designer for approval. The required drawings should be submitted as early as possible, and before ordering or installation of any service entrance equipment or other associated equipment has taken place.

**Note:** Any approval on behalf of FortisBC is only for the service in question and is not a general approval for future services.

#### 1.1.2 Drawings and Specifications

A copy of equipment drawings, specifications and site plans are required by FortisBC for non-standard services. In some cases, a hand drawn sketch that clearly shows the layout and dimensions is all that is needed.

Submitted drawings must clearly show all equipment related to the revenue metering, including service entrance equipment and revenue metering enclosures. These drawings must show elevations and enclosures sizes. Drawings are to be submitted to your local FortisBC Customer Designer for approval. You will receive written notice that your service has been approved.

In the case of a dispute, FortisBC will not honor verbal conversations. You must have written approval by FortisBC for all non-standard services. Non-standard services that do not have the correct approvals will not be connected.

### 1.2 Meeting the British Columbia Electrical Code, CSA Standards and Associated Regulations

**FortisBC shall not connect an electrical customer's service to the electrical utility system unless the following conditions are met:**

- Overhead Services - The conductor attachment point used to supply the customer's service is located so that the conductors maintain required clearances.
- The metering equipment and location is deemed acceptable.
- The customer's service panel covers are in place.

**Note:** All covers for an electrical service entrance box are to be in place such that there are no exposed conductors that could present a hazard.

- The customer's service is grounded.  
**Note:** Refer to Section 10 of the CEC for the requirements to ground a service.
- FortisBC has assurance from the customer that the installation is ready for connection and no obvious hazards should result.  
**Note:** FortisBC must, either verbally or in writing, receive assurance that the installation is ready for connection and no obvious hazards should result.
- FortisBC has received a copy of an approved *Contractor Authorization Form* or an approved *Certificate of Electrical Inspection*  
**Note:** These documents are required to have the permit number, Field Service Representative's name and telephone number, and the contractor's name and telephone number.

### 1.3 Customer Instrumentation and Fire Alarms

Customer instrumentation including energy management circuits, relays, fire alarms, surge arrestors and step-down transformers must be connected on the load side of FortisBC's revenue metering. These customer circuits cannot be connected into FortisBC's revenue metering circuits and all equipment must be mounted independent of the enclosures reserved for FortisBC's use.

### 1.4 Electrical Equipment Room Requirements

**All electrical rooms or areas must comply with the following:**

- Working Space - A minimum working space of 1 metre clear, even ground by 2.2 metres high is required in front of all electrical equipment and to the sides and back where access is required (additional requirements are listed in CEC Rule 2-308 and 2-312). Electrical rooms and equipment are not to be located in a bathroom, storage closet, or stairway as per CEC Rule 26-600.
- Entrance/Exit - A minimum passageway of 1 metre wide by 2.2 metres high must be maintained as an entrance or exit from all electrical areas. (Additional requirements are listed in CEC Rule 2-310)
- Access – Access to all metering rooms is required as per Section 1.10 – Access to Metering Equipment. (Additional requirements are listed in CEC Rule 2-314).
- Hazardous Locations - Electrical equipment cannot be located in areas that are hazardous to anyone working, or to the equipment itself. This includes any area where moving machinery, dust, vibration, fumes, falling debris, corrosive vapours, water, and/or moisture are present.
- Illumination and Ventilation - All electrical rooms or areas must have adequate illumination and ventilation to carry out all work safely (as per CEC Rules 2-320 and 2-324).
- Closet Door Style Electrical Room Requirements – Indoor meter closets are allowed off of a designated common space such as a lobby or hallway. A minimum of 370mm clearance must be provided between the meter socket and the closed door. When open, the doorway must not restrict required 1m working space and must follow all other electrical room measurements (see appendix).

## 1.5 Service Entrance Equipment Requirements

**All service entrance equipment must comply with the following:**

- **Conductors** - All service entrances must be designed and constructed such that metered and un-metered conductors are not run in the same conduit or raceway.
- **Equipment** - All service entrance equipment requires hinged doors or cover plates to cover all live electrical equipment. If hinged doors are used, they must open either left or right to not less than 110 degrees from the closed position for outer doors, and not less than 90 degrees from the closed position for inner doors. The only exception to the direction of opening is for horizontal mounted splitter boxes for which the doors must open downward. All cover plates shall be removable from the front. All hinged doors or cover plates that are ahead of the metering point require provisions for sealing. Barriers are required between all sections of the service entrance equipment, including metered and un-metered conductors and separate sections are to be reserved for the customer's use and for the use of FortisBC. Any equipment before the metering point must have provisions for sealing.

## 1.6 Sealing Requirements for Customer Equipment

Some customer-owned equipment may require a physical FortisBC seal. Every point of energized conductor that could be accessed before the meter point must be sealed. Sealing is required to show if a customer has tampered with or attempted to access the electricity service before the metering point. This is to prevent power theft.

Typical equipment that must be sealed are service entrances, main breaker cabinets, switchgear, and conduit fittings such as line and junction boxes. Wire seals or demand seals are the preferred method for sealing however stickers covering screws/joints may also be acceptable depending on what is available. FortisBC will complete the sealing process.

## 1.7 Modifications to Existing Services

If you are planning any modification or addition to your electrical system including increased load, please contact FortisBC by calling **1-866-4FORTIS** (1-866-436-7847). Early contact with FortisBC will help to ensure that any additions or changes are acceptable to both the Technical Safety British Columbia (TSBC) and FortisBC.

Customers must contact FortisBC if they are planning to install any type of back-up power supply or transfer switch to ensure the equipment will not pose any safety or reliability risks to the electric distribution system. Please contact FortisBC for specific criteria and required information regarding the proposed design.

**Note:** meter mounted transfer switches are not endorsed for use in FortisBC territory.

TSBC is the local electrical authority having jurisdiction over customer-owned equipment. Therefore, the design and installation of transfer switches and back up generators must comply with all local regulations, standards, and inspection processes mandated by TSBC.

To ensure accuracy of metering installations, only authorized contractors or FortisBC personnel trained pursuant to Industry Canada regulation S-A-01 (*Criteria for the Accreditation of Organizations to Perform Inspections Pursuant to the Electricity and Gas Inspection Act and the Weights and Measures Act*) are authorized to install, remove or handle revenue meters. Any or all costs and/or damages associated with removal, installation or handling of meters by unauthorized persons will be invoiced to the person(s) responsible.

## 1.8 Standard Supply Voltages

FortisBC offers the following overhead and underground service voltages:

**Table 1.1 Nominal Standard Secondary Voltage from Pole-mounted Transformers**

Service Voltage	Phase/Wire	Maximum Transformer Size
120/240	Single-phase, 3 wire	100kVA
120/208	Three-phase, 4 wire	300kVA (3 x 100kVA)
347/600	Three-phase, 4 wire	300kVA (3 x 100kVA)

**Table 1.2 Nominal Standard Secondary Voltage from Pad-mounted Transformers**

Service Voltage	Phase/Wire	Maximum Transformer Size
120/240	Single-phase, 3 wire	167kVA
120/208	Three-phase, 4 wire	750kVA
347/600	Three-phase, 4 wire	2000kVA

**Table 1.3 Maximum Breaker Size**

Service Voltage	Maximum Main Breaker Size	
	Underground Service	Overhead Service
120/240	600A	600A*
120/208	2000A	600A
347/600	2000A	300A

\*Connected load shall be no more than 480A for continuous load; 600A overcurrent breaker rated at 80% load.

The following table illustrates the Phase to Ground and Phase to Phase voltage ranges for single phase and three phase system voltages offered by FortisBC. Any request outside of this table must follow Section 1.1 Non-Standard Services.

**Table 1.4 Acceptable Voltage Levels**

Nominal System Voltages	Normal Operating Conditions For Circuits up to 1,000 Volts, Applicable at Service Entrance	
	Phase to Ground	Phase to Phase
Single Phase 120/240V	110 – 125V	220 – 250V
Three Phase 120/208	112 – 125V	194 – 216V
Three Phase 347/600V	318 – 360V	550 – 625V
Three Phase – 240V *Legacy Service	216 – 250V	
Three Phase - 480V *Legacy Service	432 – 500V	

## 1.9 Standard Three-Phase Configuration

All three-phase services provided are three-phase three-element four-wire grounded wye systems with the neutral forming part of the metering circuit unless otherwise arranged and approved by FortisBC.

For more information on the availability of three-phase services, please contact FortisBC at **1-866-4FORTIS** (1-866-436-7847).

## 1.10 Access to Metering Equipment

FortisBC staff must have access to all metering equipment for the purpose of changing, testing and reading. Where FortisBC is not given ready access to the metering equipment due to locked doors or gates a lock box and necessary keys must be installed. FortisBC will provide an on-site lock box to store the keys, FortisBC material number 519-1127. Table 1.5 outlines the basic description and dimension of the lock box. For new construction, the lock box must be flush mounted in the building wall in close proximity to the access door and/or an authorized secure location like the local fire department flush mounted lock box. There will be no connection of power until such time that a lock box has been installed and the access keys are provided. For existing buildings, the preferred method is to have the lock box flush mounted into the building. FortisBC is absolved of all liability if the lock box is damaged or stolen.

All instrument metering services must provide access to the Metering Cabinet for FortisBC staff. Safe and ready access to FortisBC owned facilities on customer property shall be available at all reasonable times as per Section 11 of the Electric Tariff.

**Table 1.5 Lock Box Specifications**

FortisBC Material Number	Description	Outer Dimension
519-1127	Supra Model S7 Lock Box. Provided by FortisBC	5.67"H x 3.49"W x 2.86"D ~144mm x 87mm x 73mm

## 1.11 Services That Do Not Require Metering Equipment

FortisBC requires that customer services be metered. However, services that draw less than 20 amps and have consistent power consumption may be eligible to be connected without metering equipment. For details, please see Section 2.4 Unmetered Services.

If you think that your installation might qualify for an unmetered service, please contact FortisBC at **1-866-4FORTIS** (1-866-436-7847) before any construction begins for more information.

## 1.12 Self-Contained Metering Versus Instrument Metering

**The maximum limits for a self-contained meter are:**

- 200 amps per phase and/or
- 347 volts phase-to-ground

Any service exceeding these requirements will need to employ instrument metering.

Refer to Section 4 Self-Contained Metering, and Section 5 Instrument Metering of this guide for further information.

Any requests for exceptions to these rules must follow the process outlined in Section 1.1 Non-Standard Services of this guide.

### 1.13 Net Metering

Net metering is permitted by FortisBC provided that installations meet the standards outlined in FortisBC's *Net Metering Interconnection Guidelines*. Prior to any work taking place, all customers wishing to become a part of FortisBC's net metering program must apply by submitting a completed *Application for Net Metering*. Once approved by FortisBC, a *Net Metering Interconnection Agreement* will be presented to the customer and the customer's service will be connected.

For more information on FortisBC's net metering program, please contact FortisBC at **1-866-4FORTIS** (1-866-436-7847) or visit [fortisbc.com/electricity/customerservice/netmeteringprogram](https://fortisbc.com/electricity/customerservice/netmeteringprogram).

### 1.14 Meter Sockets

Meter sockets are CSA approved devices. As such, any additions (isolated neutral blocks, additional lugs, etc.) to the meter socket must be made with CSA approved kits supplied by the manufacturer of the device. Meter sockets with customer disconnect or circuit breaker is acceptable. Additions or modifications utilizing parts from a different manufacturer are not approved and void the CSA approval of the device.

CSA approved kits that are supplied by the manufacturer can be field installed. The kits are to contain a decal, which must be affixed to the meter socket, stating that it has been modified by a CSA approved kit. The device is then approved and may be used.

When more than one FortisBC revenue meter is installed at a single location, all meter sockets must be labeled with their correct civic address, as recorded on the *Electrical Contractor Authorization & Declaration of Compliance*, prior to connection. Labels are to be made of engraved lamacoid, and permanently affixed to the front of the meter socket.

#### 1.14.1 Meter Socket Location and Mounting

**Meter sockets shall be located and mounted with respect to the following conditions:**

- Level on both the horizontal and vertical planes.
- Installed at a height of 1.4 to 1.7 metres (4.5 to 5.5 feet) above finished grade or floor height, measured from the meter socket's centre point.

**Note:** A mounting height of 1.5 metres (5 feet) is preferred.

- Located in a clean and readily accessible area, protected from vandalism and damage.

- Conduit must be installed on the exterior of the building, as per drawing M7.
- Located in a non-hazardous area.

**Note:** Meter sockets cannot be located in areas hazardous to anyone installing, working on, or reading the metering equipment. Hazardous locations are defined as any area involving moving machinery, dust, vibration, fumes, falling debris, corrosive vapours, water and/or moisture.

- In a location acceptable to Technical Safety BC and FortisBC.
- Conform to all of the applicable requirements outlined in this guide.

Under no circumstances are meters to be installed in carports, breezeways, or under sun decks or balconies. If the area is enclosed at a later date, the customer is responsible for all costs associated with relocating the meter to an accessible location.

On all new installations, meters and meter sockets must not be recessed into walls or obstructed in any way as to impede their removal, reading, testing and/or re-installation. Refer to drawing M7 for further detail.

On indoor installations where meters and electrical equipment are located in a meter room, these meter rooms shall have a door to the exterior of the building at ground level.

On indoor installations, where an electrical closet or room has been approved, it must be located at ground level with a door accessible only from the building's exterior. This room must not be accessible from other areas of the building. Each meter must be labeled with the correct civic address prior to connection.

In the event that a building expansion or renovation requires two or more services, please contact FortisBC at **1-866-4FORTIS** (1-866-436-7847) for supply service details.

## 1.15 Service Upgrades

Customers are required to apply for all service upgrades and to pay any applicable charges prior to construction. Connection fees are based on the size and type of connection and are usually applied to the customer's first bill. Additional charges will apply for line extensions and optional underground wiring. All service upgrades and service relocations are subject to approval by FortisBC. Please contact FortisBC at **1-866-4FORTIS** (1-866-436-7847) for more information.

**Note:** Underground services may be required in certain areas due to local bylaws.

**Note:** Customers are responsible for any additional costs involved in extending or upgrading existing FortisBC services. All extensions, upgrades, and changes must meet the current standards.

## 1.16 Multiple Meters

The FortisBC standard is one meter per property. Under certain circumstances FortisBC may approve additional meter(s), provided at least one of the following criteria is met:

- Multiple meters are allowed for commercial customers where multiple businesses share a building.
- Addition or connection of a defined living space such as a suite or carriage house. The living space must meet the requirements of the Canadian Electric Code and be clearly indicated on the electrician's electrical affidavit.
- Meters are at different tariff rates, such as one residential and one commercial.
- The main service is already at the maximum size FortisBC offers and has no capacity for additional load. For example a customer has a 120/240v 600A main panel and requires a 100A sub panel in their shop. Since FortisBC does not offer a single-phase 700A service, a second meter would be permitted.
- The distance to an outbuilding subpanel from the main panel is greater than the following:
  - 200A Subpanel – 45m away
  - 100A Subpanel – 55m away
  - 60A Subpanel – 45m away

If a second meter is allowed by one of the above criteria see Section 1.17 Meter Grouping

**Note:** All meters must be labelled as per Section 1.14 Meter Sockets of this document.



### 1.17 Meter Grouping

In the case where multiple meters are permitted at one property per Section 1.16 Multiple Meters, these meters shall be grouped together on the exterior of the building to accommodate a single FortisBC service connection with the exception of outbuildings meeting the distance criteria in 1.16.

For underground services, multiple meters must be installed in a duplex, triplex, fourplex, fiveplex, or sixplex meter base. The meter base shall have a maximum main rating of 400 amps with a maximum of 200 amps per position. The meter sockets must be connected via a wiring compartment at the service entrance that is separate from all customer compartments with a sealable and removable cover. The wiring compartment must be serviced through a single duct and capable of facilitating a 76mm (3 inch) conduit containing 4/0 aluminum service conductor.

For overhead services with an existing mast and meter base, one additional mast and meter base can be installed beside the existing service to maintain a single service drop supply from FortisBC. Twin masts may be approved by the Technical Safety BC and FortisBC for multiple meter base installations. Both masts must meet CEC requirements and the service conductors entering each mast shall be identified. A duplex meter base supplied in a single mast is also acceptable. For additional meter base requirements beyond two, a triplex, fourplex, fiveplex, or sixplex meter base must be used.

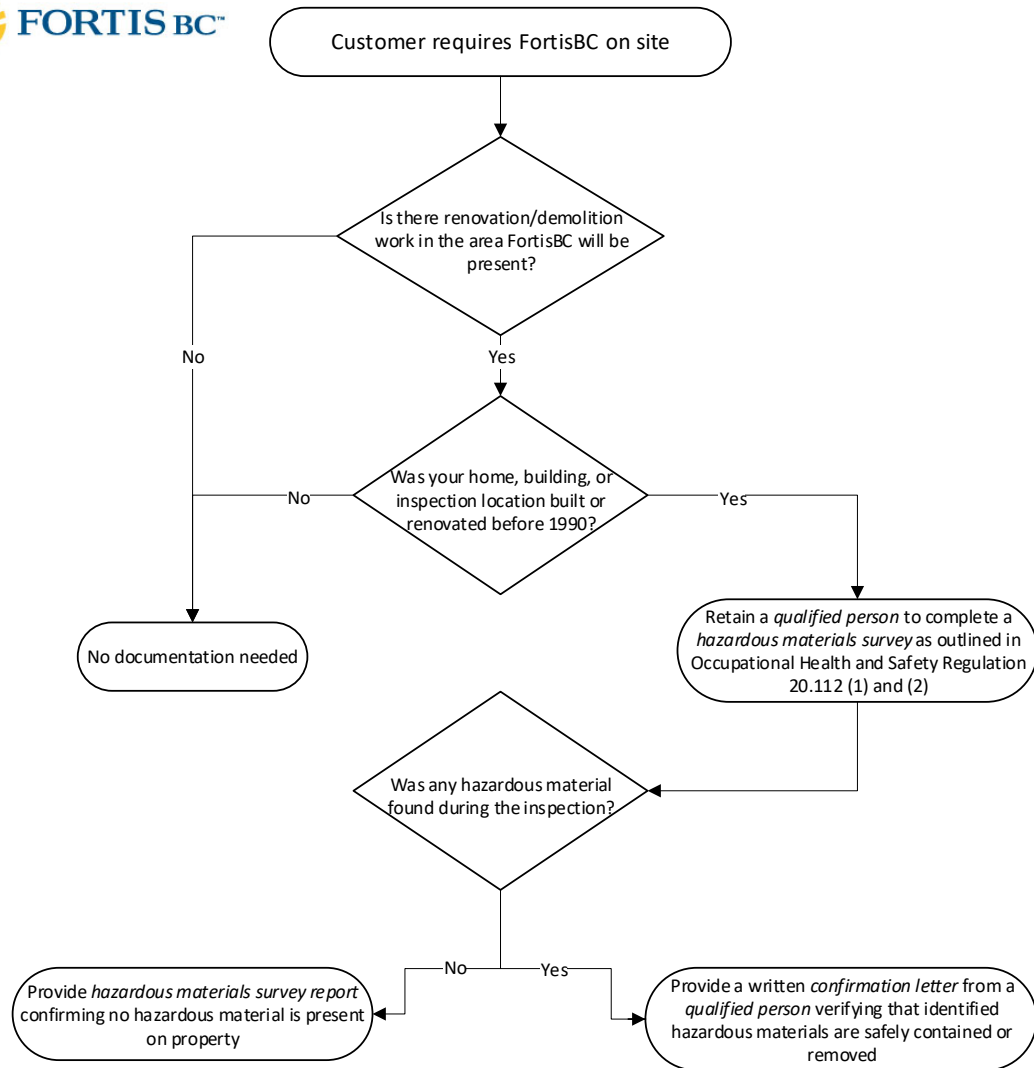
FortisBC will service Commercial and Industrial customers with one meter whenever possible. In the case where multiple meters are permitted on a Commercial / Industrial building per the CEC, these meters should be grouped together in the same location on the building. In the case where this is permitted, the areas of the building that are fed by these meters should be separated by a firewall.

When the outbuilding is greater than the distances defined in Section 1.16 Multiple Meters, the meters do not need to be grouped together and a new service connection from FortisBC infrastructure to the meter base will be installed.

### 1.18 Suspect Hazardous Material

Asbestos, lead, and other toxic, explosive, or flammable materials can often be found in older homes and buildings. Specifically, Asbestos Containing Material (ACM) is extremely hazardous to humans if fibres released into the air during renovation and demolition work are inhaled. Refer to Appendix B – WorkSafeBC: Asbestos Abatement Contractors' Checklist, July 2016 for more information.

The following flowchart should be used for customers to identify suspect hazardous materials on their property and the procedures to confirm it is safe for FortisBC to enter and work.



If renovation or demolition work is underway in a building/inspection location built before 1990, FortisBC requires an inspection performed by a “qualified person” as outlined in OHS Regulation 20.112 (1) prior to commencing work on the property.

We strongly recommend that all FortisBC work be completed prior to exposure of hazardous building materials or undertaking building renovation/demolition work.

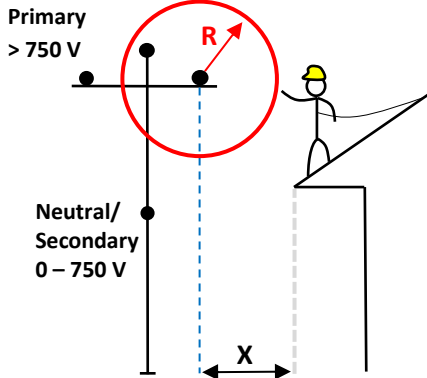
## 1.19 Limits of Approach

Clearance to electrical lines and equipment is imperative to the safety of members of the public, residential electricians, and utility employees. While a structure may meet the clearance requirements set forth in the CEC (Table 33: Horizontal Clearances from Adjacent Structures), additional allowance must be built into the design to account for the distance that must be maintained between a worker (including their tools) and energized electrical conductors or equipment, as per WorkSafeBC. Table 1.6 below outlines the dimensions of space that must be reserved for both buildings (BC Electrical Code) and personnel (WorkSafeBC).

**Table 1.6 Limits of Approach**

## WorkSafeBC: minimum distance to be maintained by workers from energized conductor

*BC Electrical Code: minimum distance to be maintained by buildings*



The diagram illustrates the minimum distance to be maintained by workers from energized conductors. It shows a worker on a roof approaching a power line. The power line has two main sections: a top section labeled 'Primary > 750 V' and a bottom section labeled 'Neutral/Secondary 0 - 750 V'. A red circle labeled 'R' is drawn around the primary line, indicating the minimum distance to be maintained by workers from energized conductors. A dashed blue line labeled 'X' extends from the primary line down to the ground, indicating the minimum distance to be maintained by buildings. The worker is shown on a roof, approaching the primary line.

Voltage (Line to Line)	Dimensions	
	X	R
0 – 750 V (Secondary)	3m	1m
750 V – 25 kV (Distribution)	3m	3m
63 kV (Transmission)	Contact FBC	3m
138 - 230kV (Transmission)	Contact FBC	4.5m

### Notes on Table 1.6:

1. Contact FortisBC for limits of approach measurements and voltage level of nearby electric lines at 1-866-4FORTIS (1-866-436-7847).
2. A worker (including hand held tools) shall not encroach within the specified limits “R”. If the circumstances may result in the limits of approach being breached, the individual or contractor must coordinate with FortisBC. This process will require a FortisBC representative to visit the building site and note all procedures the worker must follow to protect themselves from potential hazards if the powerline cannot be de-energized. These procedures must be noted on a 30M33 form, which is to be filed by the worker. A copy of this form found in Appendix A – WorkSafeBC 30M33 Form Example. A record of discussion will be filed by the FortisBC designer. Without this conversation the limits of approach must be met at all times, during construction and otherwise.
3. For power lines within road allowance, if any point of the proposed building (including projections) is within 3m of the property line adjacent to a distribution line OR is within 4.1m of the property line adjacent to a transmission line, a survey is required to determine the locations of adjacent poles and wires including heights of attachments.

## 1.20 Vegetation Clearances

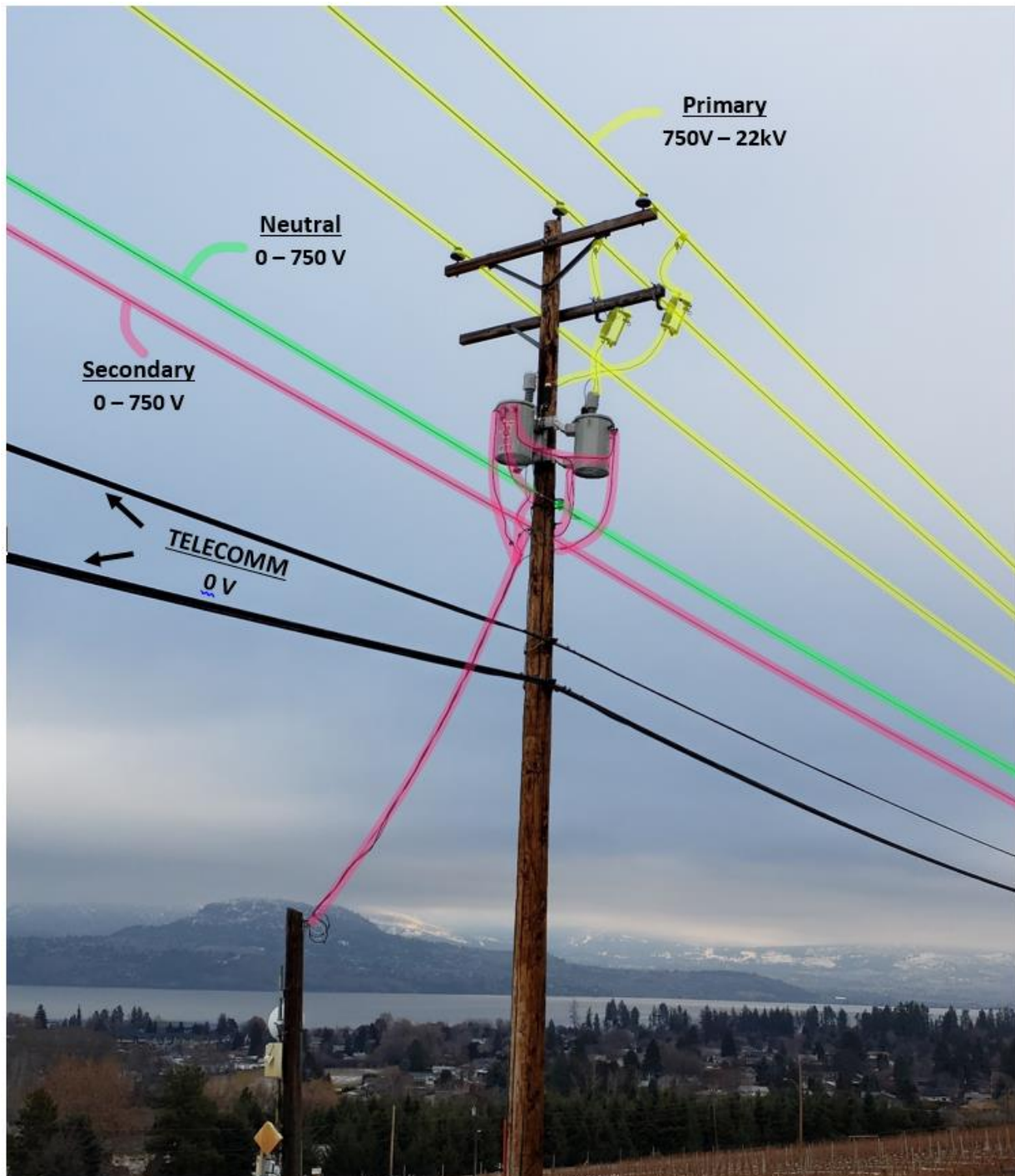
Vegetation management must be completed to ensure clearances to electrical lines and equipment are maintained for both structures and personnel. Brushing clearances are based on several factors including safety, established limits of approach, vegetation growth, and timing of clearance cycles. Environmental factors shall be considered before brushing takes place.

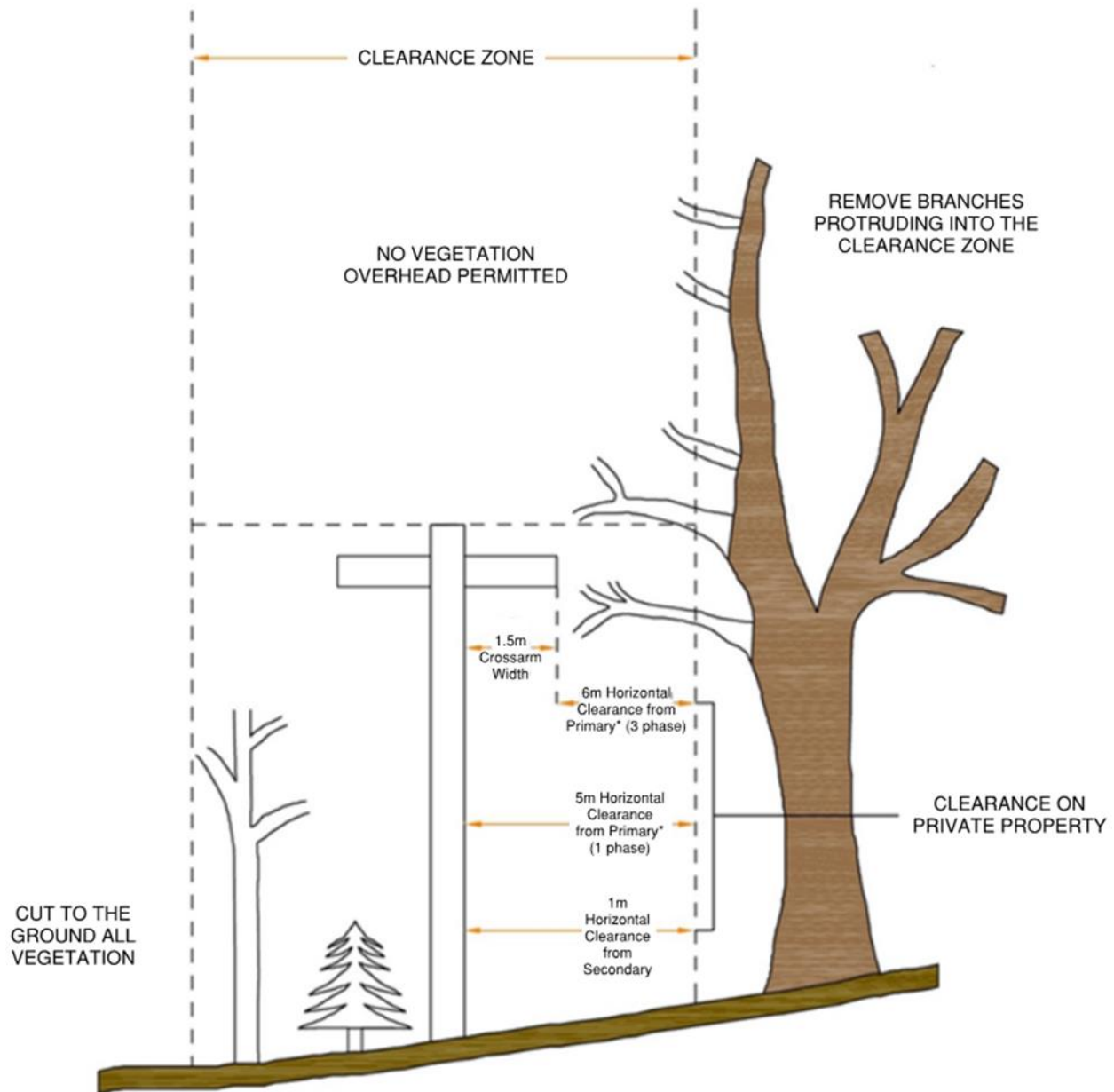
**Table 1.7 Vegetation Clearance for Distribution Lines**

Vegetation Clearance Distribution Lines (Up To and Including 25 kV)	
Overhead Clearance	No vegetation overhead is permitted
Side Clearance	Clear to the existing Right of Way*
Under Clearance	No vegetation under lines is permitted

**\*No vegetation is permitted within 6m of three-phase primary lines, 5m of single-phase primary lines, and 1m of secondary lines. If the Right of Way does not allow for this clearance, please contact FortisBC at 1-866-436-7847.**

Examples of voltage levels and brushing requirements can be seen below in Figure 1.1 and Figure 1.2, respectively.

**Figure 1.1 Voltage Level Examples**



**Figure 1.2 Brushing Requirements**



## 2 Service Requirements

### 2.1 Overhead Services

FortisBC is required to maintain overhead clearances of 5.5 metres (18 feet) over public and commercial driveways and 4.5 metres (15 feet) over residential driveways. A service mast must be installed on all overhead services to facilitate these requirements. The service mast must be installed as per CEC Rule 6-112 *Support for the attachment of overhead supply or consumer's service conductors or cables* and all components must meet the requirements of CSA C22.2 No. 82 - *Tubular Support Members and Associated Fittings for Domestic and Commercial Service Masts*. Except where snow loading poses a hazard, service masts must extend through the roofline with any exceptions approved by FortisBC. All service drops exceeding 30 metres (100 feet) require a service pole. Customers are responsible for the installation cost.

For overhead services FortisBC will supply and install the service conductors to the service mast.

#### 2.1.1 Pole-Mounted Services (Meter Pole)

FortisBC allows single phase, 240 volts, 3-wire services up to and including 400 amps to be mounted on a customer-owned meter pole. Refer to FortisBC Drawing M11 for the approved configuration. Self-contained meter bases are to be used for services up to 200 amps and must meet the requirements of Section 4 Self-Contained Metering. Instrument metering is to be used for services between 200 and 400 amps and must meet requirements of Section 5 Instrument Metering. Only meter bases listed in Section 5.3.1 Instrument Meter Socket Specifications are acceptable for these installations.

**Note:** All pole services require approval from the Technical Safety BC.

The customer will purchase and install a new utility pole that is commercially treated throughout the entire length of the pole. For 200A services, the pole shall be a minimum of Class 4. For 400A services, the pole shall be a minimum of Class 3. The 400A meter pole will require an anchor if the service drop exceeds 20m based on FortisBC's Pole Line Design Criteria. The pole for both services shall be a minimum of 9.15 metres (30 feet) in length, and in compliance with the British Columbia Electrical Code. The customer will own and maintain this pole. To this pole, the customer will mount a meter socket in accordance with Section 1.14 Meter Sockets of this guide.

FortisBC requires the customer to install the pole with a minimum set depth of 10% + 2 feet (30 feet pole would be set 5 feet deep). All line equipment on the meter pole shall be built with ¾" hardware. The customer shall test and treat the meter pole and shall retain a "Proof of Treatment" record that can be made available to the FortisBC representative upon request. If the meter pole is deemed unsafe to climb by FortisBC Operations, FortisBC reserves the right to disconnect the service until the customer pole is made safe at the customer's cost.

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Overhead services supplying a meter pole must first contact a FortisBC service pole for road crossings.

Under no circumstances will customer-owned equipment be allowed on a FortisBC service pole.

All customer-owned equipment (meter sockets, circuit breakers, service panels, meter pole, etc.) are to be a minimum of 5 metres perpendicular from any and all FortisBC facilities (poles, lines, transformers, etc.).

Services with higher capacities will be considered on a case-by-case basis, please contact FortisBC at **1-866-4FORTIS** (1-866-436-7847) for details.

**Note:** All wiring and equipment located on the customer's side of the meter is to be customer-owned, installed by the customer at the customer's expense, and in compliance with British Columbia Electrical Code.

## 2.2 Underground Services

Customers are responsible for all underground locates, permits, duct, trench digging and backfilling in addition to the supply of fine, clean sand for duct protection. Site preparation must be performed to finished grade prior to installation and conform to FortisBC and all other applicable municipal, regional and provincial standards.

**Note:** Electrical, telephone and cable television services can occupy the same trench; however, there must be a separation of 300mm as per British Columbia Electrical Code.

If a road crossing is required, FortisBC will apply for the necessary permits from the Ministry of Transportation and/or local municipality. The customer is required to obtain an excavation permit.

All meter sockets for underground services must have a minimum rating of 200 amps. The customer is responsible for supplying and installing 76mm (3 inch) duct, 900mm (35.4 inches) below final grade to the center of the conduit from the point of supply to the meter socket. Rigid PVC or steel conduit is to be installed between the meter socket and the bottom of the service trench. An expansion joint must be installed above finished grade to accommodate ground movement. This conduit and expansion joint shall be securely fastened to the serviced building's exterior and, above finished grade, must remain exposed and in plain sight until FortisBC has completed an inspection. Once inspected, the customer can install aesthetic covering over the conduit connected to the meter base on the exterior of the serviced building. Aesthetic covering must be non-combustible, not interfere with access to the meter and expansion joint, and be removable for future inspection. Refer to drawing M7 for further detail. Type DB2 conduit can be used for the remainder of the duct on private property. The duct layout shall have no more than three (3) 90° bends between the service connection point and the meter. This includes the 90° bend at the service box or transformer. Pulling tape (mule tape) must be placed in the duct for FortisBC to install the conductor at a later date, should it ever be necessary. Pull tape specifications are described in the *Specification for Installation of Underground Conduit Systems*.



Refer to the FortisBC *Specification for Installation of Underground Conduit Systems* for more information on civil work, available at <https://www.fortisbc.com/build-renovate/builder-services/connect-your-project-to-electricity>

For single-phase services up to 200 amps, FortisBC will supply and install the service conductors to the metering point. For single-phase services over 200 amps, and all three-phase installations, the customer supplies, installs, and owns the duct and conductor sized according to the CEC. See section 2.2.3 Customer Owned Cable Requirements for conductor specifications.

### 2.2.1 Underground Service with an Overhead Point of Supply

Where the point of supply is an overhead riser/dip pole, the customer is responsible for supplying and installing duct up to and including 90 degree bend at the base of the pole. The 90 degree bend should be 76mm (3 inch) Rigid PVC and must be 165mm from the base of the pole to accommodate for standoff brackets. Alternatively, a DB2 PVC bend may be used, provided it is encased with a minimum of 50mm (2 inches) of concrete. Installed duct must be orientated away from vehicle traffic and be clear of obstructions on the pole. Concrete encasement of the 90° bends may be required as referred to in Section 2.2 of this document. Refer to drawing F-21 for further information on the duct orientation and concrete encasement. A polyvinyl pull-string must be placed in the duct for FortisBC to install the conductor at a later date. A service charge for supplying and installing the remaining portion of the duct is the customer's responsibility.

### 2.2.2 Pedestal-Mounted Metering

Pedestal-mounted meter installations are permitted for no more than two separate services per pedestal. Meter pedestals are to be purchased, installed, owned and maintained by the customer. Each meter socket must be labeled with the correct civic address prior to connection. Pedestals are to be installed in a location that is readily accessible to FortisBC personnel and in accordance with the criteria outlined in Section 1.14 Meter Sockets of this guide.

**Only FortisBC approved meter pedestals are to be used. Please refer to the following list for details. After the FortisBC (FBC) Material number is an indication of direct buried (DB) or pad-mounted (PM)**

- **For installations composed of one single-phase 200A service without main breaker**
  - Valid Manufacturing Catalogue No. *FMP-DB-200* (FBC Material No. 9990800; DB)
  - Thomas & Betts Catalogue No. *PE2-cs* (FBC Material No. 9990801; PM)
  - A.C. Dandy Catalogue No. 5F0-DPP-2 (FBC Material No. 9990802; DB)
  - A.C. Dandy Catalogue No. 5G0-DPP-2-SP-60 (FBC Material No. 9990803; PM)
- **For installations composed of one single-phase 200A service with main breaker**
  - Valid Manufacturing Catalogue No. *MHPED-DB-BS2-200* (FortisBC Material No. 9990820; DB)
  - Valid Manufacturing Catalogue No. *MHPED-PM-BS2-200* (FortisBC Material No. 9990821; PM)
  - A.C. Dandy Catalogue No. 5F-DPP-4 (FBC Material No. 9990822; DB)
  - A.C. Dandy Catalogue No. 5G-DPP-4-SP-60 (FBC Material No. 9990823; PM)

- **For installations composed of one single-phase 200A service with main breaker and sub panel**
  - Valid Manufacturing Ltd. Catalogue No. *MHPED-BP-DB-BS2-200* (FortisBC Material No.9990830; DB)
  - Valid Manufacturing Ltd. Catalogue No. *MHPED-BP-PM-BS2-200* (FortisBC Material No.9990831; PM)
- **For installations composed of two single-phase 200A services**
  - Valid Manufacturing Ltd. Catalogue No. *FMP-DB-400* (FortisBC Material No. 9990810; DB)
- **For installations composed of one single-phase 400A service**
  - Contact FortisBC for review and approval
- **For installations composed of one three-phase 120/208V 200A service without main breaker**
  - A.C. Dandy Catalogue No. 5G0-DPP-3-SP-60 (FortisBC Material No. 9990850; PM)
- **For installations composed of one three-phase 120/208V 200A service with main breaker**
  - A.C. Dandy Catalogue No. 5F-DPP-5 (FortisBC Material No. 9990860; DB)
  - Valid Manufacturing Catalogue *MHPED-PM-PL27-200* (FortisBC Material No. 9990861; PM)

To complete the installation of the meter pedestal, please be aware of the following steps:

- For the above listed meter pedestals that are direct buried, a pour-in-place concrete collar surrounding the pedestal, measuring 150mm (6 inches) thick and 300mm (12 inches) deep, shall be poured at finished grade. Please see drawings M5 and M6 for details.
- FortisBC Material No. 9990801 meter pedestal is mounted on a pre-cast concrete base. The concrete base is supplied by Kon Kast, catalogue No. 1063 (FortisBC Material No. 7550550).
- For other pad-mounted pedestals, work with the manufacturer for details on size and shape. The pad must be at least 400mm (16 inches) deep.

Additionally, if deemed necessary by FortisBC, vehicle protection bollards are to be installed at the customer's expense and to FortisBC specifications.

**Note:** FortisBC must be notified in the customer's *Service Request* of all pedestal-mounted meter installations.

**Note:** All wiring and equipment located on the customer's side of the meter is to be customer-owned, installed by the customer at the customer's expense, and in compliance with British Columbia Electrical Code.

### 2.2.3 Customer Owned Cable Requirements

Section 2.2 lists the instances that require the customer to procure and install underground cable.

The following requirements apply to customer owned cables:

1. Both copper and aluminum cables are acceptable.
2. All requirements for underground cables (set depth, red warning tape, etc.) must be followed.
3. The customer is required to provide all necessary fittings for the termination to FBC equipment.

4. FortisBC shall complete the final transformer connection to the customer owned cable. **No person except FortisBC personnel shall climb the transformer pole or access the padmount transformer vault.**
5. Non-armoured cables are accepted for permanent installations.
6. Armoured cables (e.g. TECK, ACWU) are accepted for permanent installations, with the following provisions:
  - a. For underground services supplied by a padmount transformer:
    - i. Armoured cable must enter the padmount transformer through the vault via conduit sweep (not through the temporary side access hole).
    - ii. The armour must be bonded to ground and the customer will supply all of the required termination parts such as connectors and fittings. The customer will also supply ground bushings and a jumper wire to bond the armour to the 3/4" ground rod.
    - iii. If the cable is terminating in an existing energized transformer, the customer must arrange to work with FortisBC Powerline Technicians to complete the terminations and bonding. Otherwise, it is expected that the customer pulls the armoured cable to the transformer vault and installs all required connections and fittings prior to FortisBC Powerline Technicians arriving.
  - b. For underground services supplied by an overhead transformer:
    - i. **Warning** - the PVC colour coded insulation used for some armoured cables is not rated for UV exposure and will deteriorate over time, resulting in a breakdown of the insulation and possible exposure of the conductor. To mitigate this, the customer must strip the last 2m of cable armour, exposing the PVC inner jacket and separate the multiple conductors. The PVC jackets shall then be covered with colour coded heat shrink tubing.
    - ii. The neutral conductor shall be clearly identifiable via white heat shrink tubing or equivalent.
7. For direct-burial rated cables: Duct must be installed for the portion of the run on public property. Once on customer property, the cable may be direct buried or continue in conduit.
8. Sufficient spare cable must be provided as to allow FortisBC crews to connect to the transformer terminals (in most cases 2 metres is adequate). Spare cable should be protected from damage.

## 2.3 Temporary Services

An *Electrical Authorization Form* is required for temporary overhead service and shall only be used for the purpose of construction and emergency situations. This permit is valid for one year only and must be obtained from the Technical Safety BC.

### 2.3.1 Overhead

Customer-owned poles that are installed over 15 metres (50 feet) from the point of service must be guyed with a suitable downhaul, or properly braced. In most cases, FortisBC will install a conductor large enough to be transferred to the permanent service location on the building at a later date. The pole should be located as close as possible to the permanent service. See drawing M11 for a meter base on a customer-owned pole.

### 2.3.2 Underground

- Pad-mounted Transformers - The contractor will install Teck or ACWU cable up to the transformer temporary access hole on the transformer apron. Sufficient spare cable must be provided as to allow FortisBC crews to connect to the transformer terminals (in most cases 2 metres is adequate). Spare cable should be protected from damage.
- In-Ground Service Boxes - The contractor will install Teck or ACWU cable up to the service box leaving an open excavation at the service box no deeper than required to allow FortisBC personnel to enter service box from underneath. Contact FortisBC for an underground location where FortisBC will provide Ground Disturbance Guidelines for the excavation. Sufficient spare cable must be provided as to allow FortisBC crews to connect to the transformer terminals; in most cases, 2 metres (6.5 feet) is adequate. Spare cable should be protected from damage.

**Note:** Under no circumstances are contractors to access service boxes. This includes removing covers or feeding cable into service boxes.

### 2.3.3 Temporary Metering

The temporary meter will be installed on either the customer-owned pole or the pad-mounted transformer that feeds the temporary service. See drawing M11 which shows a meter on a customer-owned pole. The temporary meter will be removed after the first permanent downstream meter is installed. FortisBC will not operate 'master meters' (i.e. two meters in series with the downstream consumption subtracted from the upstream meter).

## 2.4 Unmetered Services

Applicants for unmetered services must submit a written request to FortisBC prior to any work taking place. The service must be connected to the source by FortisBC and must meet all requirements of the British Columbia Electrical Code.

Acceptable unmetered services:

- Non-decorative street lighting (not including traffic control light systems)
- Decorative street lighting
- Dusk to dawn lights
- MOTI highway flashing lights
- Municipal bus shelters
- Telecom equipment
- All existing unmetered services approved prior to December 2018
- Otherwise approved by FortisBC through Non-Standard Approval process

A facilities drawing must be provided which indicates the location of the customer-owned facilities relative to FortisBC facilities.

For an unmetered underground service, the customer is responsible for all civil work, duct and conductor up to the service connection point designated by FortisBC.

Please contact FortisBC at **1-866-4FORTIS** (1-866-436-7847) before any construction begins for more information.

**Note:** Standard connection fees apply for each service.

### 2.4.1 Unmetered Streetlights

In the case where streetlights are unmetered, each streetlight is seen as an unmetered service that will be billed at a fixed monthly amount per the agreement. Regardless of the ownership/maintenance type agreement, all materials must be approved per the FortisBC Material Item Catalogue and FortisBC Distribution Standards Manual. Streetlighting designs that do not follow these standards must be metered.

## 2.5 Other Service Types

Services supplying loads such as street lights, traffic lights, irrigation timers, water pumps or lift stations, may not have permanent structures on which to attach the meter socket. If customers prefer to attach a meter socket to anything other than a permanent structure (such as a meter pole or pedestal), the rules below will apply.

The meter must be installed on one of the following:

- Meter pedestal as per Section 2.2.2 Pedestal-Mounted Metering or
- Customer owned utility pole as per Section 2.1.1 Pole-Mounted Services or
- Self-supporting structure which meets all relevant sections in this guide. The structure requires engineered drawings, and must have received written approval from FortisBC as per the process laid out in Section 1.1 Non-Standard Services.

**Note:** All customer owned self supporting structures must meet the requirements of local building codes and standards to assure structural integrity as well as comply with the BC Electrical Code and receive approval from Technical Safety BC.

The customer is responsible for the cost of the support structure. Refer to FortisBC drawings M1, M2, M3, M4 and M11 for approved structures.

Meters may be attached directly to shipping containers (Sea-Cans) provided the shipping container is intended for use as a permanent installation. Evaluated on a case-by-case basis; contact FortisBC at **1-866-4FORTIS** (1-866-436-7847).

## 2.6 Location-Specific Requirements

### 2.6.1 Single-Family Residential

Meter sockets must be located within 1 metre (3.3 feet) of the corner nearest the point of supply and in accordance with the criteria outlined in Section 1.14 Meter Sockets of this guide. If a supply is not available at the front of the building, or if any structures near the point of supply impede service installation or restrict access to FortisBC equipment, an alternate meter location will be designated by FortisBC. Similarly, alternate meter locations may also be designated for services located in areas of extreme snow levels or where locations provide unreasonable access to FortisBC equipment.

### 2.6.2 Multi-Family Residential

Each residence in a duplex, triplex, fourplex, fiveplex, or sixplex is metered individually. This requires that the sockets be labeled with the correct civic address prior to connection. Engraved lamacoid labels must be used as per Section 1.14 Meter Sockets.

#### 2.6.2.1 Duplex, Triplex & Fourplex

**Duplexes, triplexes or fourplexes do not require meter rooms; however, meters must be installed according to the following:**

- The meters are installed at the same location and in accordance with the criteria outlined in Section 1.14 Meter Sockets of this guide.
- The meter base shall have a maximum main rating of 400 amps with a maximum of 200 amps per position.
- The meter location is at the corner nearest the point of supply.
- The meter socket is used and serviced with only one service conduit. Twin masts shall be approved by the Technical Safety BC and FortisBC. For twin mast installations, the service conductors entering each mast shall be identified.

**Meter sockets that are installed in conjunction with an underground service must:**

- Accept a 76 mm (3 inch) service entrance duct.
- Have a wiring compartment at the service entrance that is separate from all customer compartments, and that includes a sealable and removable cover.
- Accept a 4/0 aluminum service conductor.

Any approved duplex, triplex or fourplex meter socket may be used for an overhead connection.

In the event that one resident requires a service upgrade, all associated costs will be the sole responsibility of that resident.

### **2.6.2.2 Fiveplex & Sixplex**

**Fiveplexes and Sixplexes do not require meter rooms; however, meters must be installed according to the following:**

- Must adhere to all the requirements as listed in Section 2.6.2.1 Duplex, Triplex & Fourplex
- Must have signed approval from Technical Safety BC supplied to FortisBC
- Must complete and submit a FortisBC Connected Load Form to FortisBC

Fiveplex and sixplexes buildings that do not meet these requirements must install their meters as per Section 2.6.4 Apartments, Condominiums, and Similar Buildings .

### **2.6.3 Mobile Homes**

#### **2.6.3.1 Within Mobile Home Parks**

FortisBC will provide service to mobile home parks provided there is a centralized 600 amp maximum service location including individual disconnect switches and individual meters for each mobile home pad. The service size will not be increased unless the service is provided from such a centralized location.

#### **2.6.3.2 Other Locations**

FortisBC will provide service to independent mobile homes provided a structurally sound mast is installed directly on the mobile home. The mast must be situated within 1 metre (3.3 feet) of the corner of the mobile home nearest the point of supply.

An acceptable alternative to the mast is a new utility pole that is commercially treated, a minimum of Class 4, a minimum of 9.15 metres (30 feet) in length, and in compliance with the British Columbia Electrical Code. In order to connect the service, the customer must also equip the wood pole with a bolted clevis and insulator. In all cases, each meter must be labeled with the correct civic address prior to connection.

### **2.6.4 Apartments, Condominiums, and Similar Buildings**

This section applies to residential buildings having more than four meters. The exception is fiveplex and sixplex meter bases as per Section 2.6.2 Multi-Family Residential.

All meters must be in a meter room located at ground level and only accessible from the building's exterior. A meter room with access to other areas of the building will be considered if access is to common areas such as hallways. In these scenarios, refer to the rules in Section 2.6.5 FortisBC Requirements for Meter Rooms in Multistory Buildings. FortisBC will provide an on-site lock box to provide access to the meter room, as per Section 1.10 Access to Metering Equipment. FortisBC is absolved of all liability if the lock box is damaged or stolen.

The meter room must meet all criteria outlined in Section 1.4 Electrical Equipment Room Requirements of this guide.



**In compliance with Technical Safety BC, a specially constructed meter closet or meter room with outside access only is considered to be within the building if it meets the following criteria:**

- The room meets all conditions outlined in Section 1.4 Electrical Equipment Room Requirements.
- The room is architecturally part of the building being serviced.
- The door of the closet or room can be readily opened by authorized personnel at all times and under all weather conditions.
- A permanent sign stating “Electrical Equipment Within – Keep Clear At All Times” is permanently affixed to the room door. The lettering on the sign must be at least 50mm (2 inches) high, and is not to be hand written.
- The closet or room is heated to maintain a temperature of at least 10 degrees Celsius at all times.

### **2.6.5 FortisBC Requirements for Meter Rooms in Multistory Buildings**

FortisBC revenue meters must be able to transmit data to and from the FortisBC metering network. The data is transmitted by radio frequency (similar to cell phones). Radio frequency waves cannot transmit through concrete, metal, or earth; therefore some buildings will require a conduit to enable meter communication through wires. When additional conduit is required, the electrical conduit and Termination box(es) shall be supplied and installed by the customer to provide a meter communications pathway exclusively for use of FortisBC.

All material and connections from the Termination box to the meter will be the property of FortisBC.

#### **2.6.5.1 General Requirements**

- At least one meter inside a meter room shall be mounted facing the outside door as per drawing M20;
- In general, these requirements apply to concrete/steel construction multi-story buildings;
- For meter room(s) above grade, inside wood frame construction, where at least one wall is an exterior wall, no conduit arrangement is required for the purpose of meter communication;
- When a meter room is located below grade, conduit shall be installed from the meter room to the exterior junction box, to facilitate meter communications as per drawing M21, M22, and M23;
- When the meter room is at grade in locations with a non-exterior meter room door and one or more concrete or steel objects interrupt line of sight from the meter to the exterior of the building, then the conduits(s) shall be supplied and installed by the customer from the meter room to an exterior junction box to facilitate meter communications as per drawing M23;



**2.6.5.2 Conduit Applications for meter communication:**

- In all cases where conduit is required, a Termination box must also be installed;
- Meter room(s) below grade require conduit(s);
- Meter room(s) inside concrete and/or metal clad buildings require conduits(s);
- Meter rooms(s) inside mixed wood/concrete and any other structure not covered above, requires consultation with FortisBC Design prior to any design work;

**2.6.5.2.1 Conduit and Termination Box Requirements**

- i) In the cases wherein conduit is required, the Termination box shall be mounted on an exterior wall, as shown in drawings M21, M22, and M23. Determination of the exterior wall on which the conduit Termination box shall be mounted is as follows:
  - A. For buildings with neighbouring buildings on one or more sides, the Termination box shall be mounted on the exterior wall which has line of sight to its neighbour across the street or across the alley; if no neighbours are across the street or alley, then the Termination box shall be mounted on the exterior wall facing the closest neighbour on any side of the building;
  - B. For a building with an underground parkade, the exterior Termination box can be mounted under the parkade entrance if:
    - i. Termination box faces neighbours across the street or alley from the parkade entrance; and
    - ii. Termination box is within two metres of the parkade entrance opening; and
    - iii. Termination box is outside of the parkade entrance gate; and
    - iv. Termination box is a minimum of two metres from any planned parkade entrance gate controller or sensor
- ii) If the building contains more than one meter room on the same level, or meter room(s) below grade, conduits shall be run to connect each meter room in a star or daisy chain configuration to the main meter room as per drawing M22. The main meter room shall also include the conduit to the exterior of the building as per drawing M21.
- iii) The main meter room is the meter room closest to grade level containing one or more Transformer-Type Meter Sockets and/or house meter(s).
- iv) In addition to the requirements above, meter rooms on multiple levels shall be interconnected via a daisy chain of conduits run vertically from one meter room on one level to one meter room on the next level as per drawing M23, with the conduit terminating in each meter rooms.

- A. Any floor above grade with multiple meter rooms on that floor, each containing a meter rooms, conduit shall be run horizontally from the additional meter room to the meter room containing the vertical daisy chained conduits as per drawings M22 and M23.
- B. Conduits are not required beyond the 7<sup>th</sup> floor metering room. If there is no metering room on the 7<sup>th</sup> floor the conduits shall be run to the 6<sup>th</sup> floor metering room.
- v) Conduits entering the meter room shall be terminated in a Termination box. Maximum 4 conduits running into the room can be terminated into the same box as per drawing M21.
- vi) Soft copy, dimensioned PDF drawings(s) shall be provided by the customer to FortisBC prior to construction. PDF drawings shall show conduit configurations, terminations, and pull boxes. FortisBC conduits for the use of FortisBC Meter Communications shall be clearly labelled on the drawings(s)

*All material requirements for the installation of conduit and Terminations box(s) are the responsibility of the customer. Each Termination box and conduit shall be permanently marked/labelled for exclusive use of FortisBC Meter Communications.*

#### **2.6.5.2.2 Conduit Specifications**

- Conduits(s) shall be metallic, with an inside diameter not less than 35.00mm (or 1¼ inch trade size) installed per CEC and local Building Code. If the conduits will be run within a concrete slab, conduit may be non-metallic Coreline (ENT) or rigid PVC. The conduit from the meter room shall be run from a location within 2 m of a Transformer-Type Meter Socket (house meter preferred), or as close as practical.
  - i. Each Termination/pull box located inside the building and shall be securely fastened to the wall with sufficient room for an additional Termination box.
  - ii. If no Transformer-Type meter socket is present in the meter room, the conduit shall run from a location within 2 m of any FortisBC meter socket present at that location (house meter preferred). If multiple Transformer-Type meter sockets are present in the meter room, the conduit shall be run from a location within 2 m of the house meter (preferred).

- The conduit termination on the exterior of the building shall be not less than 2.75m or more than 3.5 m above finished grade, with the minimum number of bends. The maximum degree of bends between Termination/pull boxes shall not exceed 270°. If the conduit length between Termination boxes exceeds 100m, an additional pullbox is required. Each end of the conduit will terminate in a 356x305x203 mm (14"x12"x8") bonded (with min #10 Cu) fibreglass enclosure with a lockable cover. This enclosure will be for future use by FortisBC to install signaling cables. A maximum of 4 conduits can terminate in one Termination box, as per drawing M21. Each conduit shall be equipped with a continuous length of poly pull string. Conduit ends shall be identified and labelled as for use by "FortisBC Meter Communications". Each conduit label will also specify the location of the other end of the conduit.
- Per CEC, part I and local Building Codes, termination boxes shall be suitable for the environment in which they are placed.
- There must be a minimum of 0.3 m separation distance between the meter base and closest obstruction/equipment

## 2.7 Service Modifications and Upgrades

All meters must be installed and removed by FortisBC personnel. Customers should coordinate all service changes with FortisBC by making a local call to **1-866-4FORTIS** (1-866-436-7847) to avoid reconnection delays.

### **FortisBC will reconnect service to an existing building or installation under the following conditions:**

- There have been no alterations or additions since the most recent permit was issued.
- The occupancy classification has not changed.
- The existing circuits are in safe condition and are adequate for the new service.
- The service has not been disconnected for more than 90 days.
- An electrical inspector authorizes the reconnection.
- An electrical contractor authorizes the reconnection.
- The building is classified as a multi-family dwelling where one dwelling was disconnected, the main service is still connected and re-inspection is not required.
- Asbestos inspection completed if required as per Section 1.18 Suspect Hazardous Material.

## 3 Metering Signals

### 3.1 Availability of Metering Signals

FortisBC will provide metering signals to customers upon request. These signals are in the form of energy (kWh) or reactive energy (kVARh) pulses for use as an energy management tool. Incremental costs incurred by FortisBC for providing these signals will be the responsibility of the customer.

**Note:** FortisBC will not supply an End-of-Interval (EOI) pulse under any circumstances.

### 3.2 How the Process Works

To request a quote for a metering signal, please contact FortisBC at **1-866-4FORTIS** (1-866-436-7847). FortisBC will develop a cost breakdown and a list of available options for the *Metering Signal Service Offer*. The quote will clearly identify the technical issues, specifications and any other additional cost factors, which will be at the customer's expense and time to determine. All customer inquiries about their own equipment should be directed to the customer's own electrical or instrumentation personnel. FortisBC Metering Services does not provide technical assistance related to customer equipment or customer installation type of inquiries.

Once all the technical issues are covered off, FortisBC will forward the offer to the customer. This will include the quotation letter, a copy of *Technical Specifications - Schedule B*, a site schematic (if applicable), and a copy of *Conditions for Metering Signals - Schedule A*.

Upon receipt of the customer's acceptance, FortisBC will install the service as soon as possible.

The signal will be terminated in a PVC junction box to be attached to the meter socket. All equipment up to, and including this termination, will remain the property of FortisBC.

#### 3.2.1 Additional Costs for the Customer

In addition to the quote received from FortisBC, the customer can expect to have additional expenses related to their metering signal service.

**Some additional expenses are:**

- Landline connections - Trenching, cable and GPR protection expenses may be required.
- Non-landline connections - RF communication equipment (i.e. spread spectrum radio, AC power supplies, etc.) expenses will apply.

### ***3.2.1.1 Trenching and Other Costs***

FortisBC personnel do not do any trenching beyond FortisBC's premise perimeter.

A site schematic is to be included with any quote where trenching is required. The site schematic will show the approximate location of where the FortisBC trench will meet FortisBC's premise perimeter. It is the customer's responsibility to trench from their equipment to this location. The amount of spare cable the customer needs to supply from this point will also be included on the drawing. This spare cable is the amount required to reach the metering signal service termination block within the FortisBC premises.

### ***3.2.1.2 Ground Potential Rise Protection (If Applicable)***

Ground Potential Rise (GPR) is a momentary electrical hazard which occurs in the relatively rare event of a line-to-ground fault. Resultant high currents passing through finite local ground resistance cause a rise in local ground potential with respect to remote earth ground. Conductors, such as metering signal service cables, can provide opportunities for the momentary GPR to drive a significant portion of the fault current along them towards remote ground. Isolated incoming remote grounds present a hazard to human life such that persons may provide a path between them and a locally elevated ground potential. Under these conditions, connected incoming grounds can explosively burn open or overheat, posing a significant hazard.

As a result of the dangers which exist, a GPR estimate needs to be conducted for each installation site to determine if a GPR situation does exist and to determine the estimated level of the GPR. If the GPR is of sufficient magnitude, special isolation equipment may be required. If additional isolation or protection equipment is required, it will be included in the quote. Grounding of landline cable sheaths shall only occur at the customer's end. It is the customer's responsibility to ensure that this occurs. FortisBC will isolate all cable sheaths from the customer's equipment related to this offer from the ground at our metering equipment location. The customer shall make all necessary arrangements to protect their equipment from Ground Potential Rise. GPR levels can change with time, as electrical system loading and ground system values change.

GPR is not an issue if the metering equipment is located within the customer's premise. If the metering equipment is external to the customer's premises, a GPR estimate is required.

### ***3.2.1.3 Sites Utilizing Non-Landline Communication Options***

The customer will oversee the mounting of the communication device in an approved Type-3R outdoor enclosure provided by the customer to the customer's structure located a minimum of 5 metres away from FortisBC's structure. A power source will be provided to the communication device via the load side of the metering point. The customer is responsible for the costs associated with the communication circuit's electricity consumption.

FortisBC cannot guarantee that good reception via any cellular, point-to-point radio or non-landline communication device exists at any site. As such, the customer agrees to this potential limitation by accepting the offer. Any communication circuit troubleshooting time, requiring a FortisBC *Field Metering Technologist* to stay on site over and above the time accounted for in the installation of this offer, will be billed to the customer separately.

The above costs do not include any procurement, design, installation, maintenance, material, or communication equipment costs from the metering signal termination box to the customer's equipment (communication circuit) at the time of install or in the future. These additional costs and the arrangements to carry them out are at the customer's expense and time, and are not included in the quoted prices. The installation of any equipment or cabling on FortisBC premises will have to be done in conjunction with the FortisBC *Field Metering Technologist* installing the service. Otherwise, additional costs may be added to this quote.

The typical lead time required for the installation will be four to six weeks if GPR isolation is not required, or eight to twelve weeks if GPR isolation equipment is required, from the receipt of the signed agreement and schedules.

### 3.3 Basic Technical Specifications

#### 3.3.1 Basic Digital Pulse Signal Specifications

Output Signals	Watt-hour and/or VAR-hour
Type	Form C, 3-wire dry type contact per signal
Voltage Ratings	120 Volts DC or Peak AC
Current Ratings	50 milliamps
Maximum Capacity	0.5 VA AC or DC continuous
Maximum Pulse Rate	10 pulses per second per channel
Operating Temperature	-40 degrees Celsius to +85 degrees Celsius
Operating Humidity	5% to 95% relative humidity, non-condensing

**Note:** End-of-Interval (EOI) pulses are not available.

**Some of the following equipment and/or process compatibility issues can result with the use of digital pulse signals:**

- Too many or not enough Wh or VARh pulses to monitor or operate customer equipment from pulse delays resulting in load monitoring skew.
- Mismatched rating specifications (listed above).
- Compatibility with customer equipment.

**Note:** Investigation and correction of these issues are the responsibility of the customer, and not FortisBC.

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### **3.3.2 Communication Specifications**

The communication equipment enclosure is to be mounted directly to the customer's equipment enclosure. The communication circuit, equipment and enclosure are the responsibility of the customer. Any maintenance, repair, troubleshooting and modifications to the communication equipment will require a FortisBC representative to be on-site. The customer is required to pay for all incurred costs by FortisBC for this service.

### **3.3.3 Ground Potential Rise Protection Specifications**

GPR isolation will be assessed on a site-per-site basis. Ground Potential Rise is not an issue on circuits where isolation between the FortisBC metering signal service equipment and the customer's equipment is achieved via cellular, point-to-point radio or a common ground grid. Refer to Section 3.2.1.2 Ground Potential Rise Protection (If Applicable) of this guide for more information on GPR.

### **3.3.4 Basic Metering Signal Service Cable Specifications**

FortisBC recommends using minimum 5kV dielectric strength cable for isolation purposes on trenched cables. Use shielded cable specified for trenching applications, where applicable. All cable dielectric strength specifications must exceed the GPR level listed on the quote.

## 4 Self-Contained Metering

### 4.1 General

#### 4.1.1 Current, Voltage and Load Limits

The maximum limits for a self-contained meter are:

- 200 amps per phase and/or
- 347 volts phase-to-ground

Any service exceeding these requirements will need to employ instrument metering. Refer to Section 5 Instrument Metering of this guide for further information. Any existing service found to fall within the instrument metering requirement guidelines will need to be converted to instrument metering at the customer's expense, or the service will be disconnected for safety reasons. Any requests for exceptions to these rules must follow the procedures outlined in Section 1.1 Non-Standard Services of this guide.

#### 4.1.2 Standard Self-Contained Metering Supply Configurations

**Table 4.1 Self-Contained Meter Configurations (up to 200A)**

Voltage	Meter Forms	Phase/Wire	Connection	Socket	Drawing	Remarks
120	1S	Single-Phase, 2-Wire	-	4 JAW	Figure 4.1	For maintenance purposes only
120/240	2S	Single-Phase, 3-Wire	-	4 JAW	Figure 4.2	
120/208	12S	Two-Phase, 3-Wire	Network	5 JAW	Figure 4.3	Neutral 5th jaw at 9 o'clock
120/240Δ	16S	Three-Phase, 4-Wire	Delta	7 JAW	Figure 4.4	For maintenance purposes only
480Δ	12S	Three-Phase, 3-Wire	Delta	5 JAW	Figure 4.5	For maintenance purposes only
120/208Y	16S	Three-Phase, 4-Wire	Wye	7 JAW	Figure 4.6	
347/600Y	16S	Three-Phase, 4-Wire	Wye	7 JAW	Figure 4.6	



## 4.2 Equipment Location and Mounting

It is the customer's responsibility to supply a meter socket complete with a screw type sealing ring for FortisBC's use that conforms to the latest edition of CSA Standard C22.2 No. 115: *Meter Mounting Devices*. Sockets with current bypass switches will not be accepted.

### 4.2.1 General Requirements

The following requirements apply to all self-contained metering installations. Refer to Section 4.2.2 Service-Specific Requirements of this guide for further guidelines regarding specific installations.

**Meter sockets are to be located and mounted:**

- As close as possible to the service box.
- In a clean, readily accessible area.
- Free of severe or continual vibration.
- Level on both the horizontal and vertical planes (buildings with sloping sides require special provision).
- In a location acceptable to the Technical Safety BC and FortisBC.
- In a non-hazardous location – meter sockets cannot be located in areas hazardous to anyone installing, working on, or reading the metering equipment. Hazardous locations are defined as any area involving moving machinery, dust, vibration, fumes, falling debris, corrosive vapours, water and/or moisture.
- In accordance with all requirements of Section 1 General Requirements of this guide.
- In accordance with all applicable requirements of Section 4.2.2 Service-Specific Requirements of this guide.

### 4.2.2 Service-Specific Requirements

These requirements apply to the installation type listed and are in addition to the requirements listed under Section 4.2.1 General Requirements of this guide.

**Single meter installations operating at or less than 240 volts line-to-line and up to 200 amps are to be:**

- Self-contained and located outdoors.
- Connected on the line side of the service disconnect.
- Installed at a height of 1.4 to 1.7 metres (4.5 to 5.5 feet) above finished grade, measured from the meter socket's centre point. If the finished grade is to be completed at a future date, the customer must supply a platform to meet the height requirements prior to connection. The mounting height must be maintained within the specified range when a permanent structure such as a sundeck, patio or walkway is built in the clear access area of the meter.

**Note:** A mounting height of 1.5 metres (5 feet) is preferred.

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**Single meter installations operating at greater than 240 volts line-to-line and up to 200 amps are to be:**

- Self-contained and located indoors.
- Connected on the load side of the service disconnect.
- Installed at a height of 1.4 to 1.7 metres (4.5 to 5.5 feet) above floor height, measured from the meter socket's centre point.

**Note:** A mounting height of 1.5 metres (5 feet) is preferred.

- Equipped with provisions for FortisBC to seal all service entrance equipment ahead of the revenue metering point.

**Multiple meter installations (Figure 4.7 Multiple Meter Installation) are to be:**

- Located indoors.
- Grouped together.
- Connected on the load side of the sub-service disconnect for all voltages.
- Individually labeled with their civic address on all meter sockets and disconnects.
- Installed at a height of 1.4 to 1.7 metres (4.5 to 5.5 feet) above floor height, measured from the meter socket's centre point.

**Note:** A mounting height of 1.5 metres (5 feet) is preferred.

- Equipped with provisions for FortisBC to seal all service entrance equipment ahead of the metering point.

The only exception to the above is duplex, triplex and fourplex installations, in which the meters may be located outdoors at a height of 1.4 to 1.7 metres (4.5 to 5.5 feet) above the finished grade, and connected on the line side of the service disconnect.

### **4.3 Connection of Self-Contained Metering Equipment**

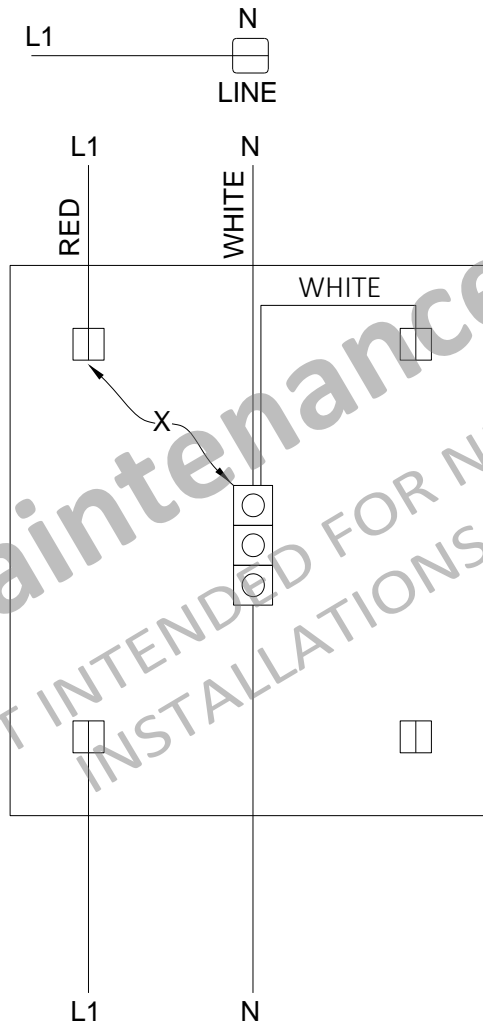
The customer is responsible to make all connections within the meter socket.

For all network and three-phase services, a neutral connection to the meter is required. Line side connectors must be tunnel style. Stud connections will not be accepted. The main service neutral shall be connected to the socket neutral lug from within the meter socket.

The only exception to this is when the meter socket is located on the load side of the service-disconnect. In this case, the neutral is not required for the customer's equipment; however, a tap, sized according to Table 16 of the CEC and colour-coded green, must be run from the bonding point in the main service disconnect to the meter socket's isolated neutral block. The customer is to ensure that a white #12 AWG tickler wire is installed from the block to the socket neutral jaw.

The neutral conductor shall be connected to a grounding conductor at one point only at the customer's service (CEC Rule 10-210). The grounding electrode shall either attach to the neutral bus at the meter mounting device or at the customer's panel. In the later case the neutral in the meter mounting device must be an isolated neutral bus (CEC Figures B10-4 and B10-5). FortisBC's preference is to ground at the meter base. In the case of meter sockets located after the main disconnect an isolated neutral block/connector must be used.

**Figure 4.1 Single-Phase, Two-Wire Circuit, 120 Volts**



Line Voltage	Measured Voltage
	X
120	120

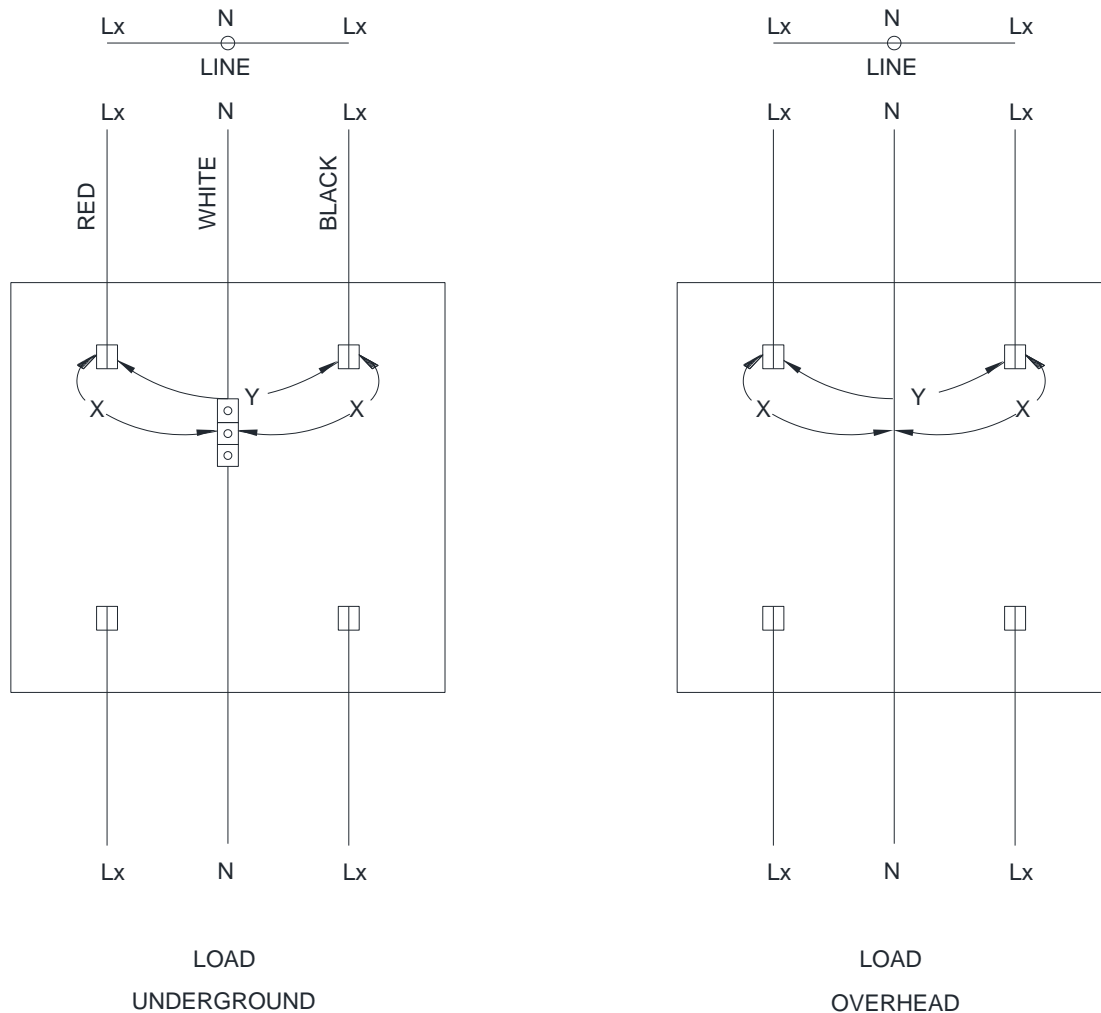
**Notes:**

1. This service is conditionally available
2. The “hot leg” must be in the top left terminal
3. See “Connection of Self-Contained Metering Equipment” section

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**Figure 4.2 Single-Phase, Three-Wire Circuit, 120/240 Volts**

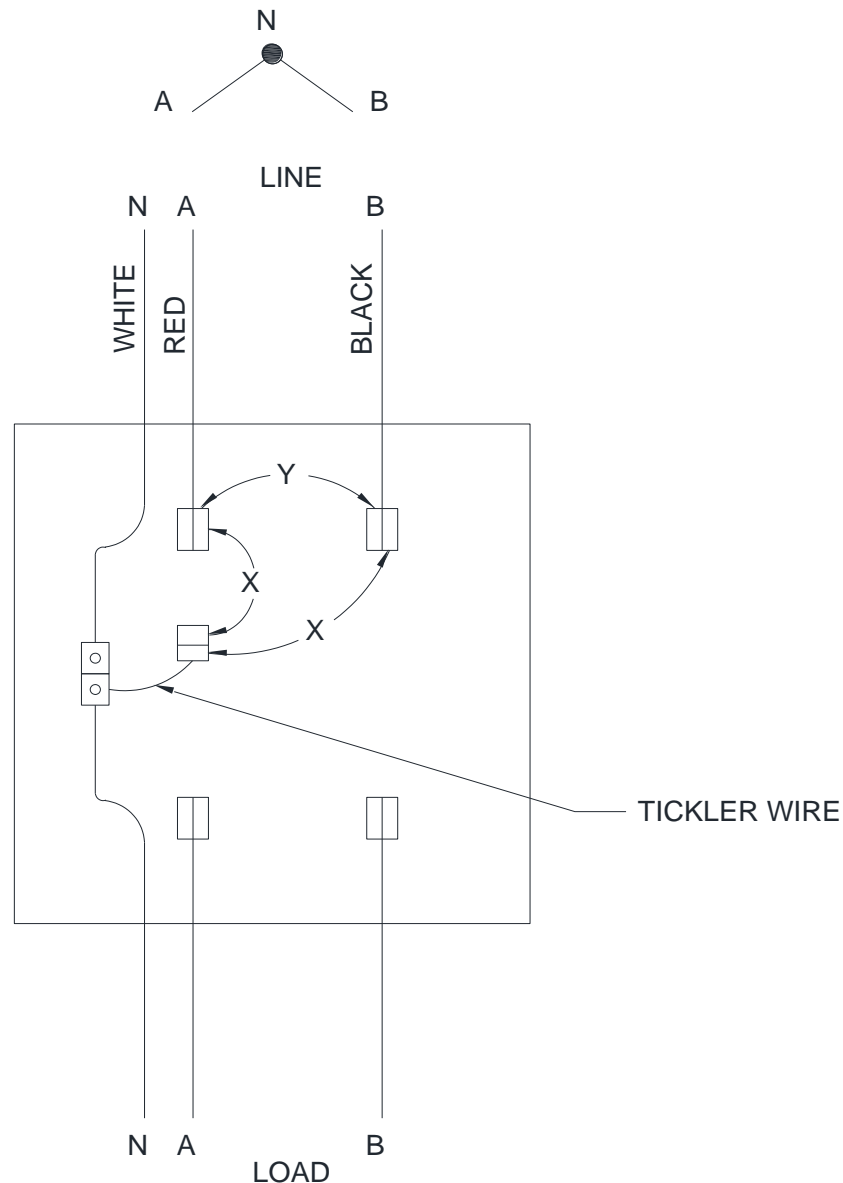


Line Voltage	Measured Voltage	
	X	Y
120 / 240	120	240

**Note:**

1. See "Connection of Self-Contained Metering Equipment" section

**Figure 4.3 Three-Wire Network Circuit, 120/208 Volts**



Line Voltage	Measured Voltage	
	X	Y
120 / 208	120	208

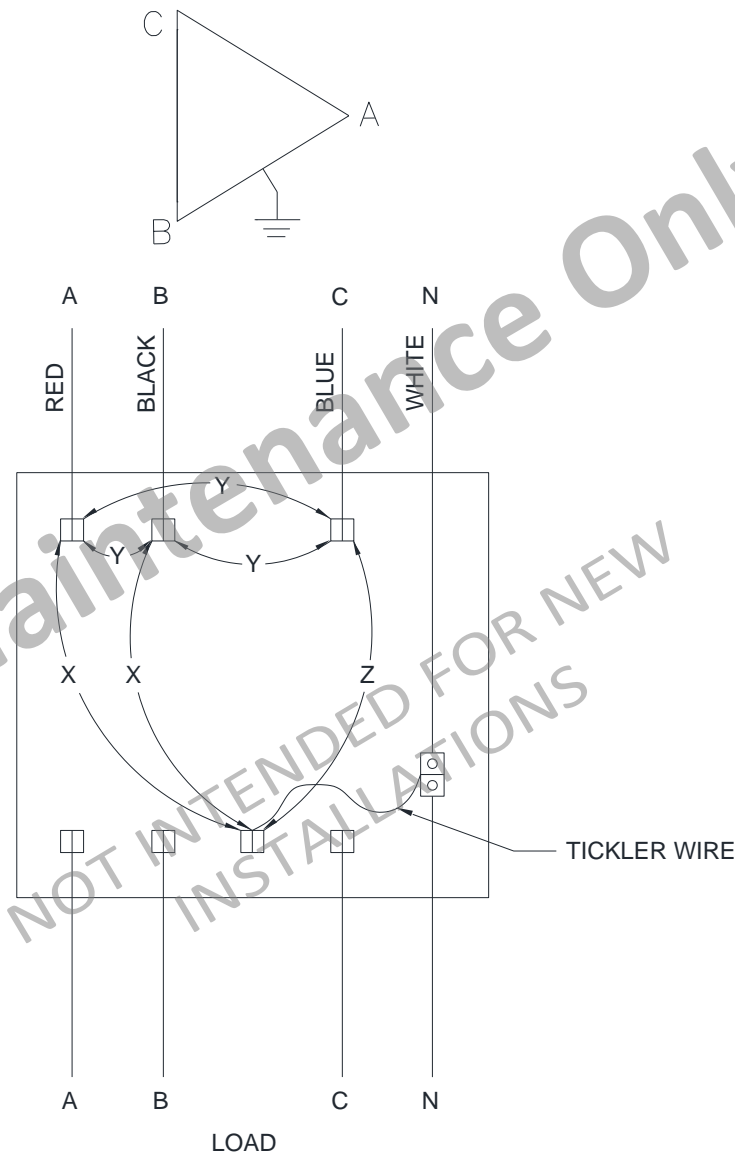
**Note:**

1. See "Connection of Self-Contained Metering Equipment" section
2. Typically utilized in the case of temporary services and multi-dwelling apartments/condominiums/commercial/etc.

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**Figure 4.4 Three-Phase Four-Wire Delta Circuit, 120/240 Volts**

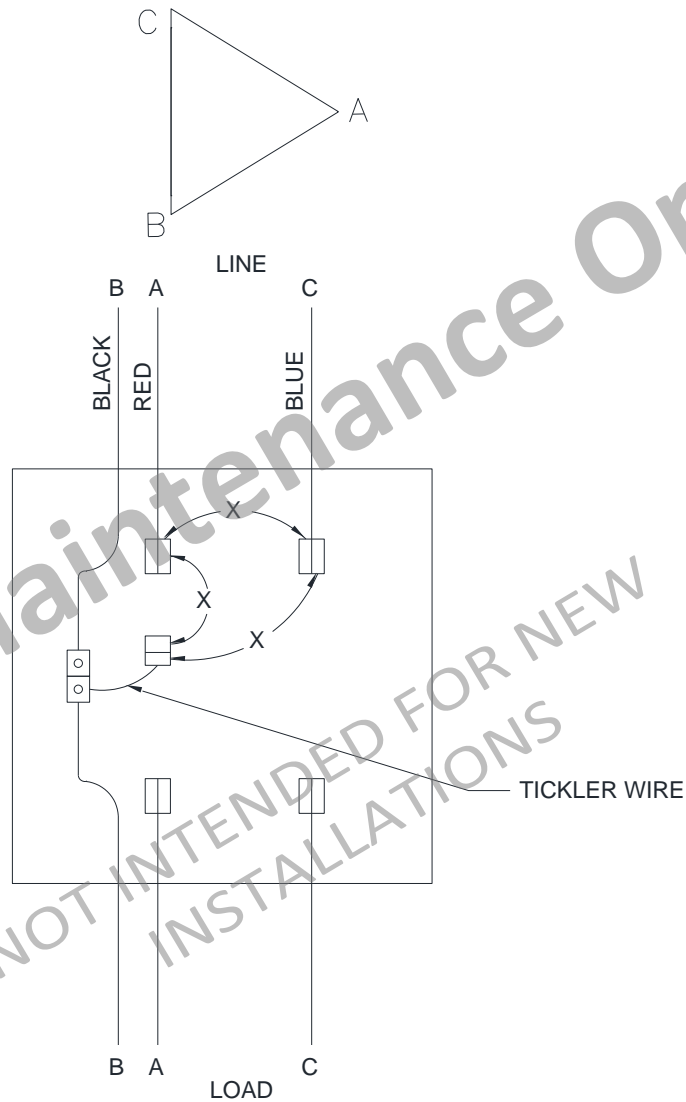


Line Voltage	Measured Voltage		
	X	Y	Z
120 / 240	120	240	208

**Notes:**

1. This service is conditionally available
2. The “high leg” must be in the top right terminal
3. See “Connection of Self-Contained Metering Equipment” section
4. Line phase sequence does not affect metering

**Figure 4.5 Three-Phase Three-Wire Delta Circuit, 480 Volts**



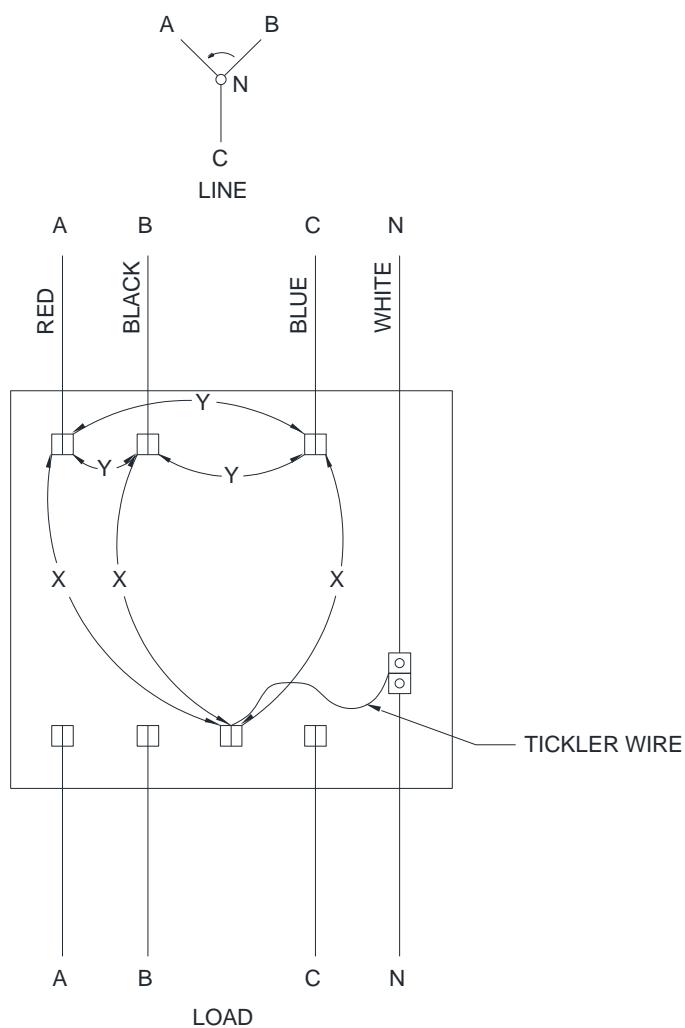
Line Voltage	Measured Voltage
	X
480	480

**Notes:**

1. Line phase sequence does not affect metering



### Figure 4.6 Three-Phase Four-Wire Wye Circuit, 120/208 Volts, 347/600 Volts



Line Voltage	Measured Voltage	
	X	Y
120 / 240	120	208
347 / 600	347	600

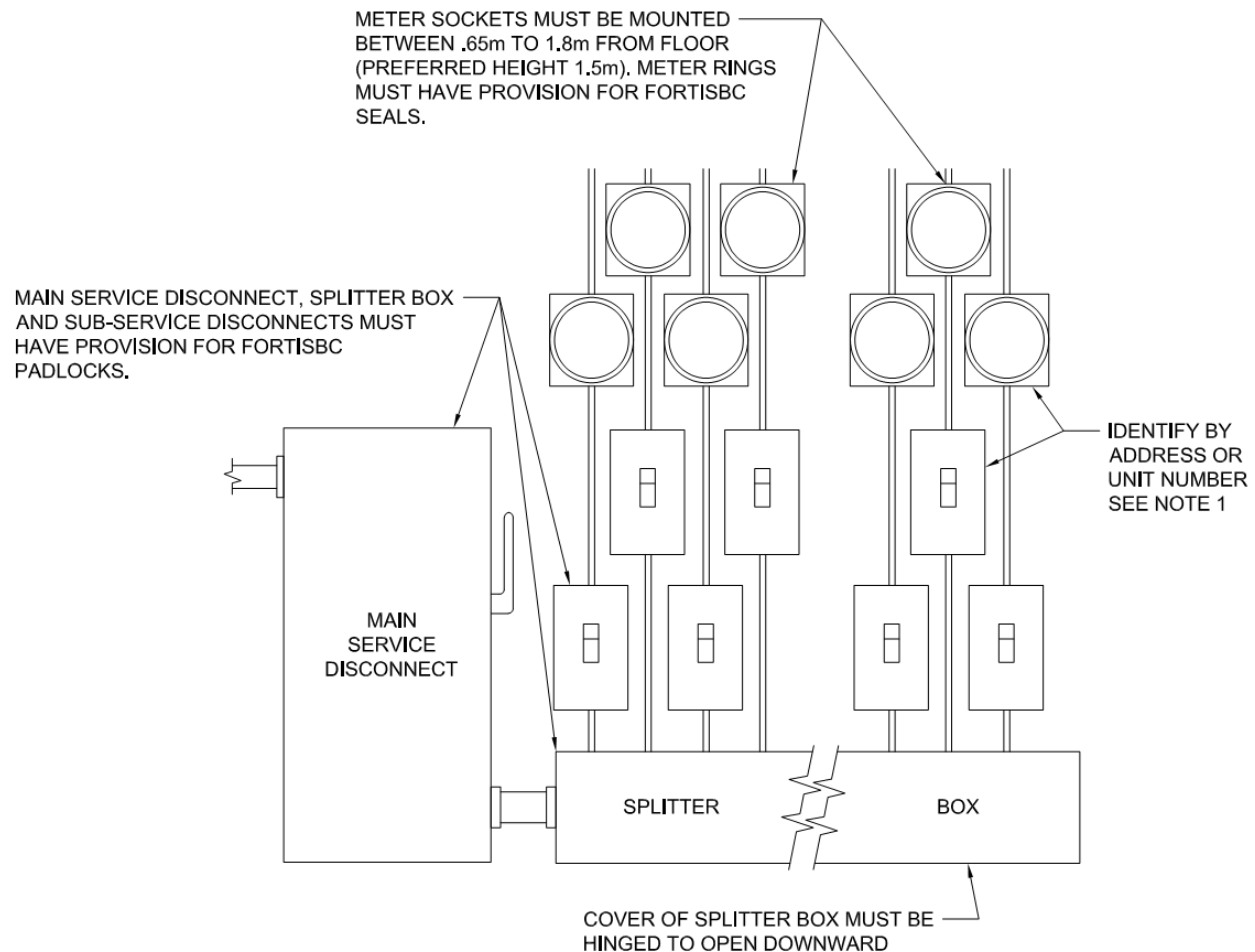
Notes:

1. See "Connection of Self-Contained Metering Equipment" section
2. Line phase sequence does not affect metering

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**Figure 4.7 Multiple Meter Installation**



**Note:**

1. All meter sockets and disconnects must be identified by address or unit number with a permanent legible label.

## 5 Instrument Metering

### 5.1 General

**Instrument metering is required on all services:**

- Exceeding 200 amps per phase and/or
- Where the nominal phase-to-ground voltage exceeds 347 volts

For all services that require instrument metering and are not metered at the supply transformer by FortisBC, the requirements in this section and Section 5.2 Instrument Metering Requirements must be met, unless written approval is given by FortisBC (refer to Section 1.1 Non-Standard Services of this guide).

**Instrument metering requires that:**

- The neutral conductor is present between the supply transformer or point of supply and the metering point for all three-phase four-wire wye systems.
- The neutral conductor must be grounded at the main service disconnect.
- After the main service disconnect, the neutral must always be isolated from ground.

**Note:** The use of an isolated neutral block helps perform this function when the neutral is wired to a metering installation on the load side of the main service disconnect. Refer to Figure 5.3 Three-Phase Instrument Transformer Service Entrance Connections Wiring Diagram of this guide.

#### 5.1.1 Single-Phase, 201–400A, 240V, Serving Only One Customer

The customer will supply and install an approved all-in-one instrument meter socket. The instrument meter socket is to be located outdoors. Refer to Sections 5.2 and 5.3.1 for further information on instrument metering requirements and instrument meter sockets specifications.

#### 5.1.2 Primary Voltage Service

Should the customer's service be considered primary voltage, FortisBC primary voltage revenue metering equipment must be installed on the line side of all customer-owned equipment.

Customers that require service sizes larger 1500 kVA and will have multiple Secondary Metering connections shall follow and comply with FortisBC's Connection Application for Medium Voltage Equipment (CAMVE). Please consult with a FortisBC Design Representative for more information on this process.

Contact FortisBC at **1-866-4FORTIS** (1-866-436-7847).

#### 5.1.3 Pad-Mounted Transformers

At the customer's request FortisBC will supply and install the metering at the service transformer under the following conditions:

- The transformer serves only one customer.
- The service requirement exceeds 200 amps.

**Note:** The additional expenses associated with these installations are to be paid by the customer. If the above two conditions are not met, the customer must supply and install the metering according to the requirements of this section and Section 5.2 Instrument Metering Requirements.

#### 5.1.4 Overhead Transformers

The customer must supply and install the metering according to the requirements of this section and Section 5.2 Instrument Metering Requirements.

## 5.2 Instrument Metering Requirements

### 5.2.1 Supply of Instrument Metering Equipment

**The customer is required to supply the following:**

- An approved instrument meter socket as specified in Section 5.3.1 Instrument Meter Socket Specifications of this guide.
- An instrument transformer enclosure according to the specifications listed in Section 5.3.2 Metering Cabinet Enclosure Specifications of this guide.
- An isolated neutral block drilled and tapped for a #10-32 screw or ¼-20 bolt within the metering enclosure.
- A 32mm (1.25 inch) PVC, EMT, or rigid conduit between the metering cabinet and the meter socket with pull string.
- All hardware, buswork, termination and/or cable required for primary connections to the instrument transformers.
  - LB fittings are permitted if they are sealable with a meter seal and not installed outdoors.
  - Combination type LB fittings are not acceptable. Use T&B category number CILBA-1-1/4 or equivalent.

**FortisBC will supply the following:**

- Revenue meters.
- Instrument metering transformers and wiring.
- Fuse blocks and fuses for the potential circuit.

The instrument transformers will be made available to the customer by contacting FortisBC at **1-866-4FORTIS** (1-866-436-7847). Instrument transformers will be shipped to the customer via courier or other arrangements will be made. The meter, fuses and fuse blocks will be installed by FortisBC personnel.

**Note:** Current transformers and revenue meters are the property of FortisBC and are supplied to the customer under the terms of FortisBC's *Electric Tariff*.

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### 5.2.2 Instrument Metering Equipment Location and Installation Requirements

**Instrument metering equipment is required to be installed according to the following criteria:**

- The instrument transformer enclosure is to be located indoors, with the exception of the all-in-one CT cabinet and meter sockets per section 5.1.1.
- The instrument meter socket is to be located outdoors with the following exceptions:
  - For installations where a meter room is present - the meter socket shall be installed within the meter room.
  - For switchgear instrument transformer installations - the meter socket shall be located in the same room as the customer owned switchgear and comply with section 5.2.3.
- Each metering enclosure must be bonded to the system ground.
- A maximum distance of 15 metres of 32mm (1.25 inch) PVC or metal conduit shall run between the meter socket and the instrument transformer enclosure.

**Note:** This conduit shall have no more than four 90 degree bends, and shall be terminated with lock nuts and bushings except where thread hubs are supplied. If LB or similar conduit fittings are used, they must be sealable and clearly visible. Two polyvinyl pull-string must also be placed in the duct.

**Note:** This conduit is for exclusive use of FortisBC. When it is necessary to route revenue metering secondary wires through compartments other than those reserved for FortisBC's use, a metal conduit or suitable metal raceway shall be installed through each compartment for the exclusive use of FortisBC.

- Securely mounted in a location protected from vandalism and damage, and that is satisfactory to both the Technical Safety BC and FortisBC.
- To conform to all requirements of Section 1 General Requirements.
- In a non-hazardous location – meter sockets and instrument transformer enclosures cannot be located in areas hazardous to anyone installing, working on, or reading the metering equipment. Hazardous locations are defined as any area involving moving machinery, dust, vibration, fumes, falling debris, corrosive vapours, water and/or moisture.
- Free of severe or continual vibration.

**Instrument meter sockets shall be mounted:**

- At a height of 1.4 to 1.7 metres (4.5 to 5.5 feet) above floor height, measured from the meter socket's centre point.

**Note:** A mounting height of 1.5 metres (5 feet) is preferred.

- Level on both the horizontal and vertical planes.

**The customer will:**

- Securely mount an instrument transformer enclosure (refer to Section 5.3.2 Metering Cabinet Enclosure Specifications of this guide) with a tapped backplane for instrument mounting.
- Securely mount an approved instrument metering socket (refer to Section 5.3.1 Instrument Meter Socket Specifications of this guide).
- Securely mount all current transformers to the tapped backplane. CTs must be removable by FortisBC personnel without removing the whole backplane.
- Securely install and bond conduit between the instrument transformer enclosure and meter socket enclosure.

**FortisBC will:**

- Mount the fuse block and fuses.
- Connect the instrument transformer secondary(s) to the meter and fuse blocks.
- Supply and install the meter.

**Instrument transformers are to be mounted in the following manner:**

- Securely screwed to the back panel of the instrument transformer enclosure. All mounting holes on the instrument transformer must be utilized.
- The nameplates must be clearly visible when the enclosure is open.
- Potential screws must be accessible and not covered by lugs.
- Current transformers shall be positioned with the primary polarity mark toward the source of supply and in an arrangement that will not obstruct access to the secondary terminals.
- The layout of the metering cabinet must be done as per Figure 5.2 with spacing made available for metering fuses.
- Current transformers must be installed in a manner that makes them accessible and easily removable.

### 5.2.3 Metering in Customer-Owned Switchgear

For services terminating into to customer owned switchgear, provisions must be made by the customer to accommodate FortisBC electricity revenue meters.

**The customer-owned switchgear design must include the following provisions:**

- Ensure unmetered conductors terminate to the meter(s) before connecting to any load
- Have hinged lockable door.
- Have provisions for sealing and/or locking the raceway upstream of the meter.
- Have proper working space as defined by British Columbia Electrical Code

The customer must allow provisions for all unmetered conductors leaving the switchgear. This could include conductors outside of the electrical room before it gets to the individual customer meters. Contact FortisBC at **1-866-4FORTIS** (1-866-436-7847) for any questions regarding the above.

---

### **5.2.4 Connecting Instrument Metering Equipment**

The customer is responsible for making all connections to the current transformer primaries. These connections should be properly secured and conductors are to be routed and supported so that no stress is applied to the current transformers.

Where FortisBC supplies a three-phase four-wire wye service, the neutral bus bar must be run into the metering enclosure from the main service disconnect, and a hole is to be drilled and tapped for a #10-32 screw or ¼-20 bolt. When insulated cable is used instead of a bus bar, an approved isolated neutral block must be provided on the neutral conductor (on one of parallel conductors) within the metering enclosure. The neutral block must also be drilled and tapped for a #10-32 screw or ¼-20 bolt to facilitate the connection of the potential wire for the meter.

Unless written approval has been granted by FortisBC, all three-phase services will be supplied as three-phase four-wire grounded wye. Because of this, the grounding conductor required by CEC Rule 10-206 shall be run from the X0 bushing of the supply transformer to the neutral terminal block in the main service disconnect, and also to the switchgear case ground. An insulated conductor of equivalent size (as per CEC Table 16) must also be run from the neutral terminal block to an isolated neutral block in the instrument transformer enclosure (refer to Figure 5.3 Three-Phase Instrument Transformer Service Entrance Connections Wiring Diagram). The grounding conductor to the instrument transformer enclosure shall be coded white to indicate the neutral reference for metering potential transformers.

FortisBC will make all connections to potential transformers, current transformer secondaries, fuse blocks and meters (refer to Figure 5.1, Figure 5.2, Figure 5.3).

## 5.3 Instrument Metering Equipment Specifications

### 5.3.1 Instrument Meter Socket Specifications

Only FortisBC approved instrument meter sockets are to be used. Please refer to the following list for details:

- **For single-phase services 201A - 400A All-In-One CT Cabinet and Meter Socket**

120/240 Volt, Single-Phase, 3-Wire, Overhead/Underground Service

Hydel 5 Jaw - Catalogue No. CT4-BC

Thomas & Betts 4 Jaw - Catalogue No. JS4B-4STW

120/240 Volt, Single-Phase, 3-Wire, c/w Breaker, Overhead Service

Hydel 5 Jaw - Catalogue No. CT4-WSOH-BC

120/240 Volt, Single-Phase, 3-Wire, c/w Breaker, Underground Service

Hydel 5 Jaw - Catalogue No. CT4-WS-BC

- **For single-phase services over 400A**

c/w Test Switch, 120/240 Volt, Single-Phase, 3-Wire

Thomas & Betts 4 Jaw - Catalogue No. CT104-SWL

Hydel 4 Jaw - Catalogue No. CTS400PW-TS

- **For three-phase services**

c/w Test Switch, 120/208, 347/600 Volt, Three-Phase Four-Wire Wye

Thomas & Betts 13 Jaw - Catalogue No. CT113-SWL

Hydel 13 Jaw - Catalogue No. CTS130PW-TS\*

*\*Cannot be used for primary-metered services due to the absence of instrument metering fuse slots*

### 5.3.2 Metering Cabinet Enclosure Specifications

Metering Cabinets must meet the following criteria:

- A separate metering cabinet must be installed for each instrument metering service utilizing current transformers, unless an all-in-one cabinet with meter socket is used (201A - 400A only).
- All metering cabinets are to meet the appropriate specifications listed in Table 5.1 Metering Cabinet Specifications.
- All metering cabinets must be equipped with a vertically hinged door, non-removable in the closed position, and with provisions for securing the door with a FortisBC 9mm-shackle padlock.



**Table 5.1 Metering Cabinet Specifications**

Service Information			Enclosure Specifications				Current Transformer Requirements
Voltage	Phase/Wire	Size	H	W	D	Material Gauge	
120/240	Single-Phase, 3-Wire	201A-400A	All-In-One Metering Cabinet – Refer to Section 5.3.1				
120/240	Single-Phase, 3-Wire	401A-600A	760mm 30"	760mm 30"	254mm 10"	16	One 3-Wire Current Transformer
120/208Y	Three-Phase, 4-Wire	201A-600A	760mm 30"	760mm 30"	254mm 10"	16	Three 2-Wire Current Transformers
120/208Y	Three-Phase, 4-Wire	601A-1200A	915mm 36"	915mm 36"	305mm 12"	14	Three 2-Wire Current Transformers
347/600Y	Three-Phase, 4-Wire	201A-1200A	915mm 36"	915mm 36"	305mm 12"	14	Three 2-Wire Current Transformers

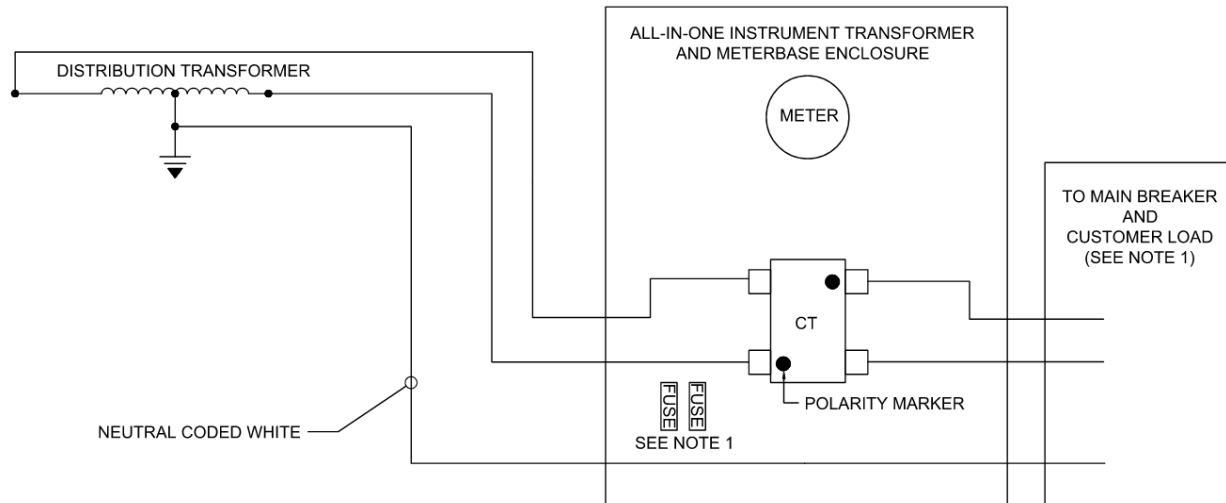
Note: Enclosure dimensions are minimum requirements.

**Table 5.2 Metering Cabinet Part Numbers**

Metering Cabinet Size			Hoffman Part Number	EXM Part Number	Hammond Part Number	Hydel Part Number	BEL Part Number	Code Part Number
120/240	Single-Phase, 3-Wire	201A-400A	All-In-One Metering Cabinet – Refer to Section 5.3.1					
120/240	Single-Phase, 3-Wire	401A-600A	AMC303010UG	1100 MC303010	CMC303010	MC303010	C303010 UG	MC-S-303010
120/208Y	Three-Phase, 4-Wire	201A-600A	AMC303010UG	1100 MC303010	CMC303010	MC303010	C303010 UG	MC-S-303010
120/208Y	Three-Phase, 4-Wire	601A-1200A	AMC363612UG	1100 MC363612	CMC363612	MC363612	C363612 UG	MC-S-363612
347/600Y	Three-Phase, 4-Wire	201A-1200A	AMC363612UG	1100 MC363612	CMC363612	MC363612	C363612 UG	MC-S-363612

Note: Metering Cabinets do not need to be ordered from the manufacturers above, but must meet the specifications set out in Table 5.1 and Section 5.3.2.

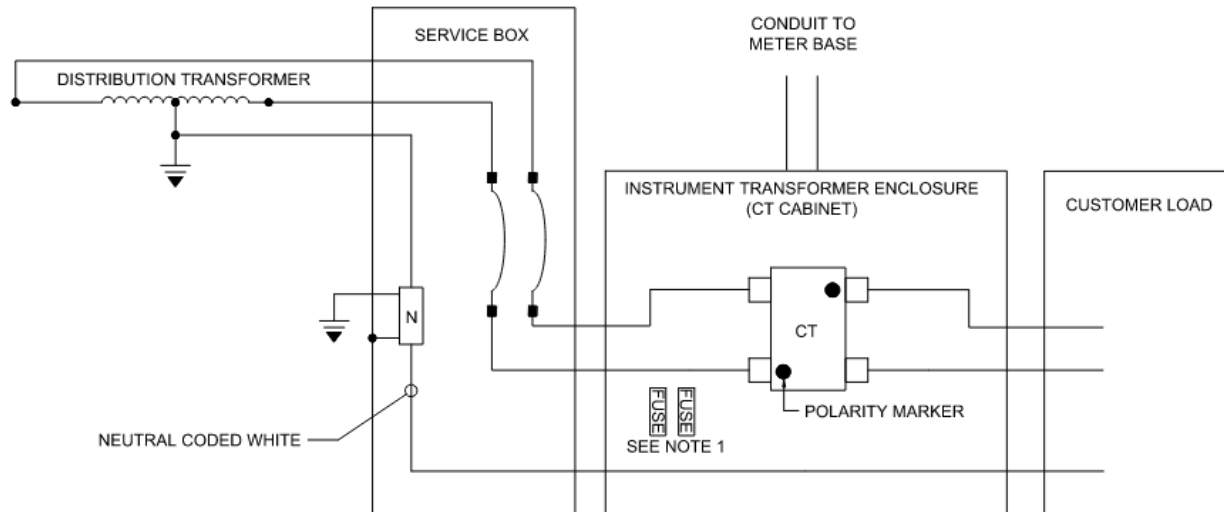
**Figure 5.1 Single-Phase Instrument Transformer Service Entrance Connections Wiring Diagram: 201A - 400A**



#### Notes:

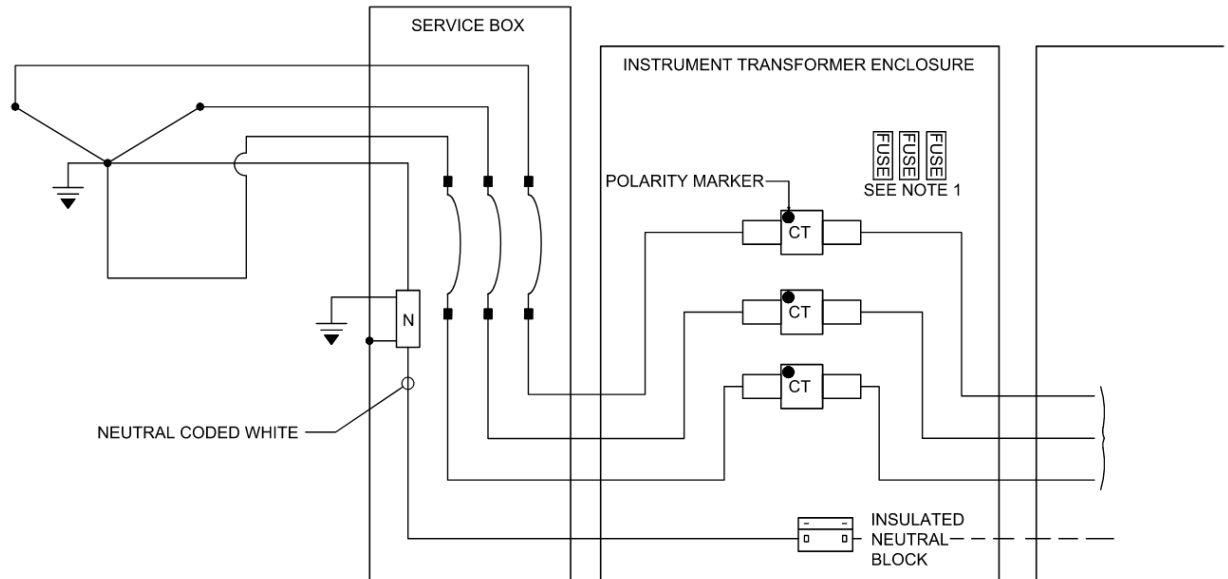
1. Metering equipment and associated protection will be supplied by FortisBC as per Section 5.2.1.
2. As per section 5.1.1, the main breaker must be downstream of the meter for services rated 400A or less. Some approved meter sockets from section 5.3.1 include a main breaker in the meter-base/instrument transformer enclosure and these will be accepted without additional downstream breakers.
3. Line conductors both connect to the same side of the C.T. marked "LINE" or equivalent.
4. Any provisions for mounting Fortis metering equipment, such as pre-tapped holes shall not be obstructed in any way.

**Figure 5.2 Single-Phase Instrument Transformer Service Entrance Connections Wiring Diagram 401A – 600A**



Notes:

1. Metering equipment and associated protection will be supplied by FortisBC as per Section 5.2.1.
2. Figure 5.2 is drawn assuming there is conduit run between the remote meter base and the C.T. cabinet (all services exceeding 400A).
3. Line conductors both connect to the same side of the C.T. marked "LINE" or equivalent.
4. See Figure 5.4 Instrument Transformer Metering Layout for meter base location requirements when C.T. cabinet is remote.
5. Any provisions for mounting Fortis metering equipment, such as pre-tapped holes shall not be obstructed in any way.

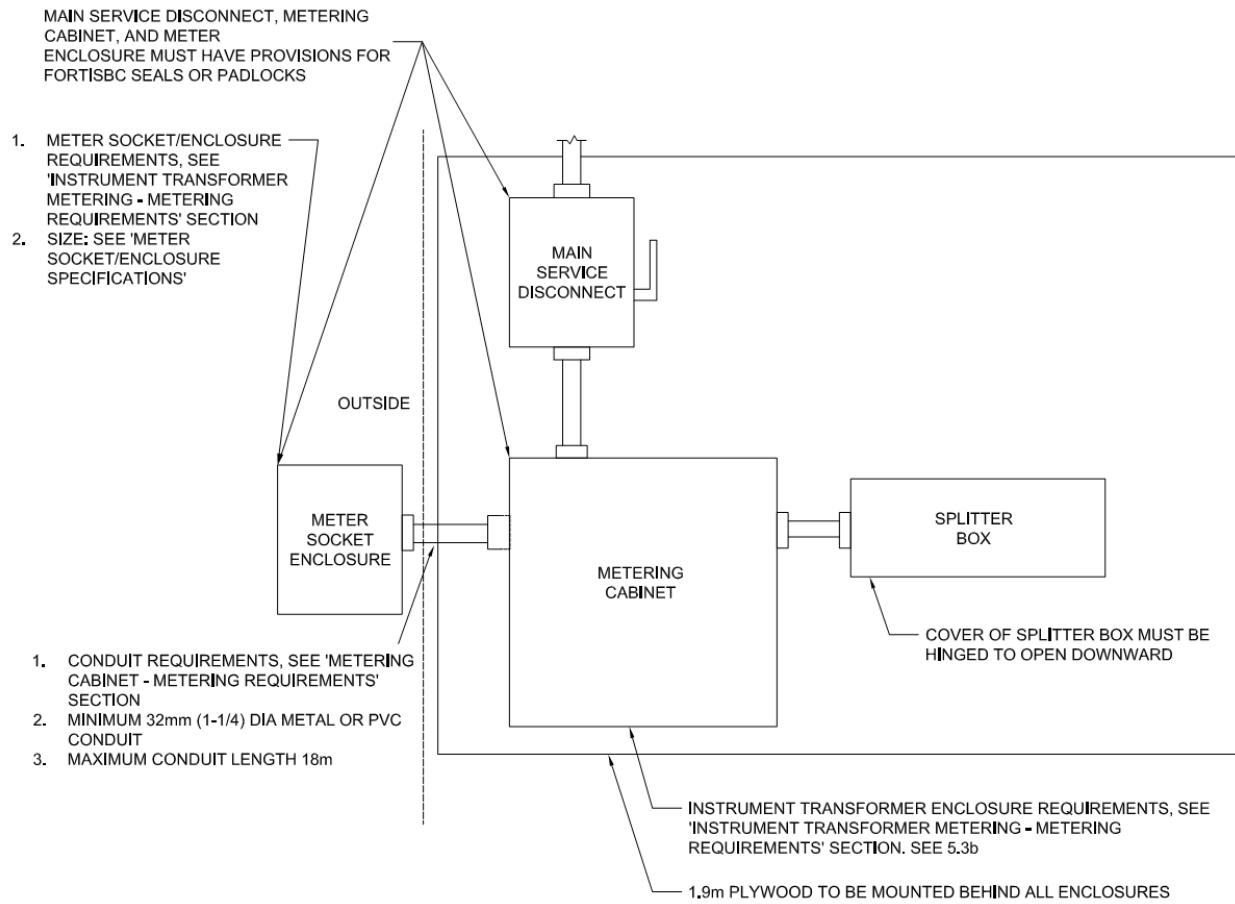
**Figure 5.3 Three-Phase Instrument Transformer Service Entrance Connections Wiring Diagram**

**Notes:**

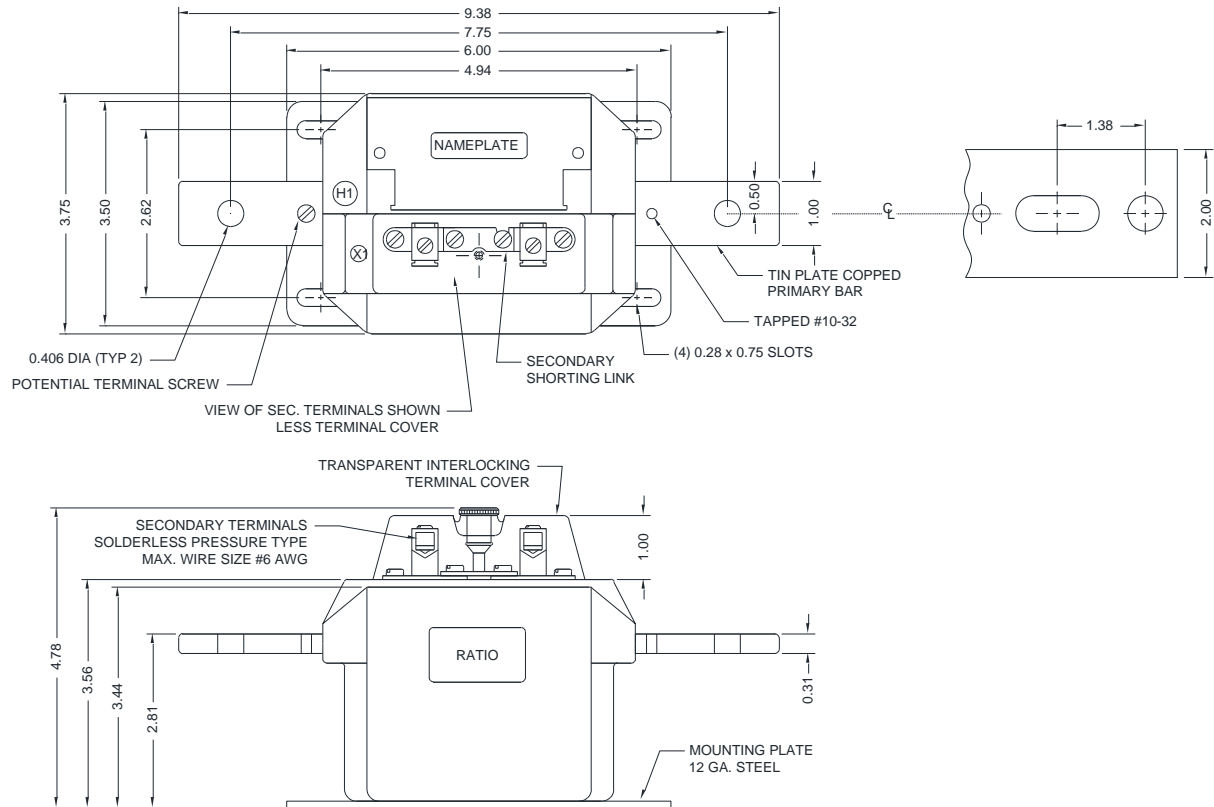
1. Metering equipment and associated protection will be supplied by FortisBC as per Section 5.2.1.
2. The neutral conductor must be run into the metering cabinet. The customer must install an isolated neutral block to facilitate connection of the potential wire for metering.
  - a. The isolated neutral block must be insulated from the enclosure and cannot be grounded.
  - b. The isolated neutral block must have provisions for #10-32 screw for metering connection.
3. Any provisions for mounting Fortis metering equipment, such as pre-tapped holes shall not be obstructed in any way.
4. If a neutral conductor is not required beyond the instrument enclosure neutral block, then the conductor from the service box (white) need only be sized according to Table 16 of the CEC.
5. Where parallel conductors are used for the greater ampacity, only one neutral conductor needs to be connected to the isolated neutral block.
6. If load and line are reversed the CT's must be reversed so that the polarity marks are always on the line side.
7. The neutral conductor from the service box neutral bar onward must be insulated from the enclosure and cannot be grounded.
8. See Figure 5.4 for meter base location requirements.

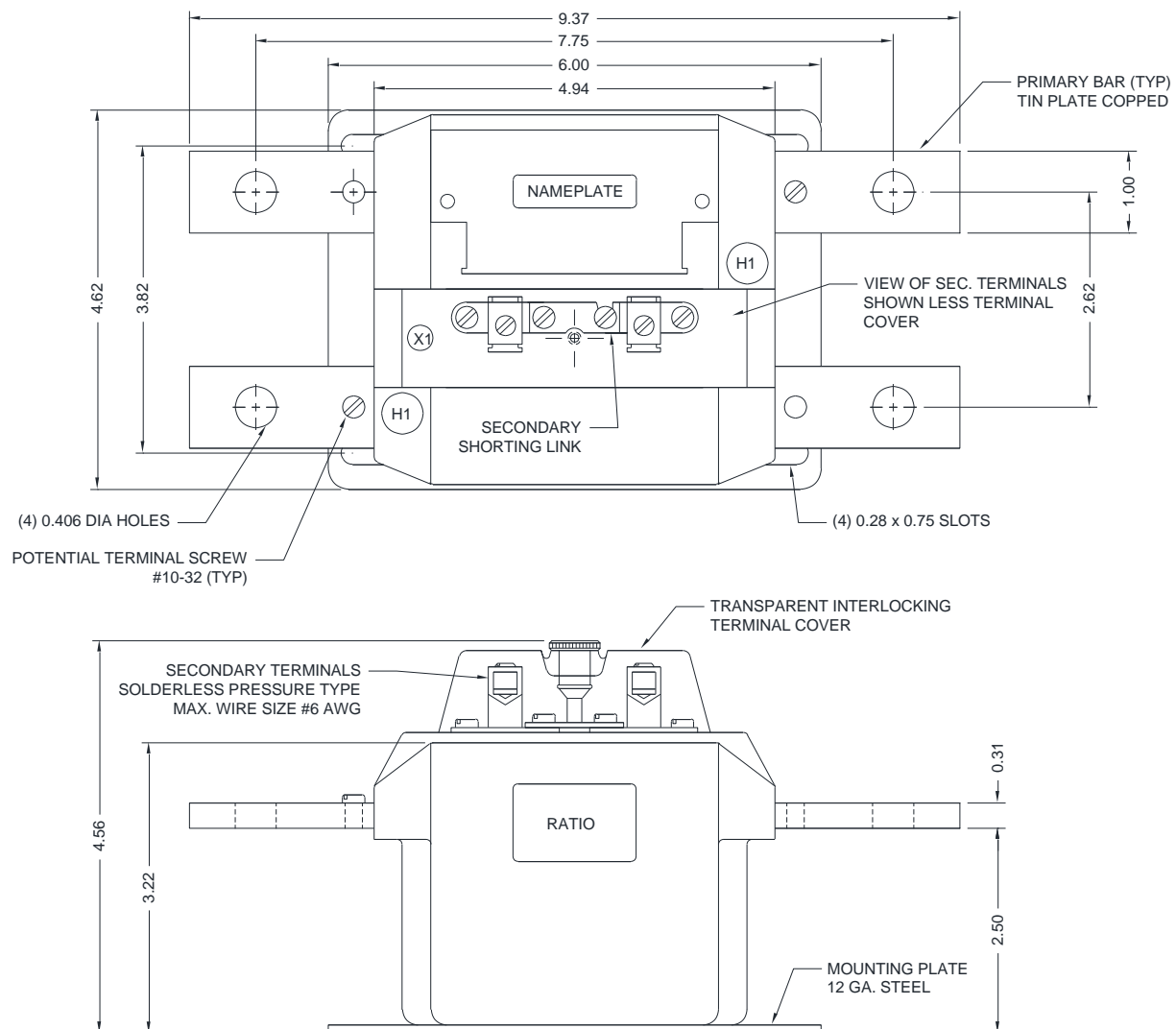
Revision Date: September, 2023

Revision No. 11

**Figure 5.4 Instrument Transformer Metering Layout**



**Figure 5.5 2-Wire Current Transformer Dimension Specifications**


**Figure 5.6 3-Wire Current Transformer (400A Maximum) Dimension Specifications**


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## 6 Glossary of Terms

**Asbestos Containing Material** – Products commonly used in construction pre-1990 which contain asbestos mineral fibre.

**British Columbia Electrical Code** – The Canadian Electrical Code including any amending errata and schedules as adopted by the province and referred to as the “B.C. Electrical Code” per Electrical Safety Regulation, B.C. Reg. 100/2004. The B.C. electrical Code is the governing provincial legislation over customer installations and operation of electrical equipment and systems, enforced by Technical Safety British Columbia.

**Canadian Electrical Code (CEC)** - Canadian Electrical Code, Part I – *Safety Standard for Electrical Installations*. CSA C22.1-21. The Electrical Safety Regulation currently appoints the 2021 edition of the CEC as legislation.

**CSA** - Canadian Standards Association

**Installed Capacity** - The rated capacity, in kilovolt-amperes (kVA), of the FortisBC transformer supplying the service.

**Instrument Meter Socket** - A meter socket for the purpose of installing FortisBC's instrument afmeter and test switch. See “Meter Socket.”

**Instrument Metering Transformers** - High accuracy current or potential (voltage) transformers approved by Measurement Canada for revenue metering.

**Instrument Metering Transformer Enclosure** - The enclosure supplied and installed by the customer for the housing of instrument metering transformers.

**Limits of Approach** - The distance that shall be maintained between workers (including their conductive tools, materials, and equipment) and energized electrical conductors or equipment.

**Meter, Network Type** - A two element meter designed for use on a three-wire network service obtained from two phase wires and a neutral from a three-phase 4-wire wye system.

**Meter, Self-Contained** - A meter rated for carrying the total current and full voltage of the circuit to be metered.

**Meter, Transformer Type** - A meter used in conjunction with instrument transformers.

**Meter Base** - See “Meter Socket.”

**Meter Pedestal** - A FortisBC approved meter mounting device that is self-supporting.

**Meter Pole** - A customer-owned utility pole, as per Section 2.1 Overhead Services of this guide, to which a pole-mounted service, and the associated FortisBC revenue metering equipment are installed.



**Meter Socket** - A meter mounting device, as per the British Columbia Electrical Code, used in conjunction with FortisBC's self-contained meter. Commonly referred to as a "Meter Base".

**Metering Cabinet** - An enclosure containing FortisBC supplied current transformers for instrument metering.

**Multiple Meter Installation** - Any installation where a building has several meters fed from one service entrance, such as apartment buildings, shopping centers, office buildings, warehouse or light industrial complexes.

**Net Metering** - When a customer wishes to install their own FortisBC-approved generation facilities, FortisBC will install a bi-directional meter permitting customers to only be billed for their net consumption. Net consumption is defined as a customer's total consumption less their total generation in a given billing cycle as shown by a positive meter reading when the customer-owned generation facilities produce more electricity than the customer requires.

**Service Disconnect** - An approved metal enclosure or cabinet that houses either a service switch and fuses or a circuit breaker. The assembly's design must permit manual operation of the service switch or circuit breaker when the enclosure is closed. This is sometimes referred to as the main panel.

**Service Drop** – FortisBC overhead secondary supply conductors.

**Service Entrance** - The point of entry and termination of FortisBC's supply conductors and the location of the customer's main service disconnect.

**Service Pole** – A FortisBC owned pole supporting a secondary cable extending to a customer's service.

**Service, Temporary** - Service for a limited time specifically for the purpose of construction or emergency. The duration of a Temporary Service permit is limited to one year and must be re-obtained through Technical Safety BC if construction exceeds that time.

**Service, Three-Phase Four-Wire Wye** - Any service in which FortisBC supplies three phase conductors and a grounded neutral conductor to the service entrance.

**Technical Safety British Columbia (TSBC)** - Independent, self-funded organization that has jurisdiction over the safe installation and operation of customer owned technical systems and equipment across British Columbia.

**Voltage, Primary** - A nominal potential of 751 to 35,000 volts measured phase-to-phase.

**Voltage, Secondary** - A nominal potential of 750 volts or less measured phase-to-phase.

## **Appendix A – WorkSafeBC 30M33 Form Example**


**WORK SAFE BC**
**Location**  
6951 Westminster Hwy  
Richmond BC  
604.276.3100

**Mailing address**  
PO Box 5350 Stn Terminal  
Vancouver BC V6B 5L5  
1.888.621.7233

**Assurance of Compliance with  
Occupational Health and Safety  
Regulation, Part 19**

This form **MUST** be completed by the contractor and the owner of the power system prior to commencement of work near energized high-voltage electrical equipment or conductors per Occupational Health and Safety Regulation (OHSR), Part 19.

**Contractor to complete this section (please print)**

Name of customer/contractor		Employer number	Number <b>918532</b>
Mailing address		City	
Phone number (include area code)	Fax number (include area code)	Email address	
Date that workers and/or equipment will be working in proximity to energized electrical equipment or conductors			
FROM: Date (yyyy-mm-dd) Time (hh:mm)		TO: Date (yyyy-mm-dd) Time (hh:mm)	
Nature of work <input type="checkbox"/> Construction <input type="checkbox"/> Roofing <input type="checkbox"/> Refacing <input type="checkbox"/> Washing <input type="checkbox"/> Painting <input type="checkbox"/> Other (specify)		Equipment on site <input type="checkbox"/> Crane <input type="checkbox"/> Ladder <input type="checkbox"/> Other (specify) <input type="checkbox"/> Scaffolding <input type="checkbox"/> Aerial device	
Work site address		City	
Name of the contact for customer/contractor		Contact phone number (include area code)	
Plan view 		Section view 	
Show power pole/tower locations related to site.		Show power pole/tower locations related to site.	

**Owner of the power system to complete this section (please print)**

Name of owner of the power system	Employer number	Voltage (phase to phase)	Circuit identifier
High-voltage electrical equipment or conductors identified above have been <input type="checkbox"/> Visually identified and guarded** <input type="checkbox"/> Re-routed <input type="checkbox"/> Isolated <input type="checkbox"/> De-energized and grounded <input type="checkbox"/> Discussion only ** The contractor must adhere to the precautions for guarding as outlined in OHSR section 19.25 as stated on the reverse side of this form. If the requirements of OHSR section 19.25 cannot be met, work <b>must not</b> be done until precautions are taken in accordance with OHSR section 19.26. Please see reverse side of this form.			
Notes/Discussion			
<input type="checkbox"/> Work is not to proceed without protective covering installed <input type="checkbox"/> Work may proceed as described subject to contractor maintaining the required clearance (per OHSR section 19.24.1, Table 19-1A, or having precautions in place per section 19.26)			
Name of contractor's representative (please print)		Name of power utility representative (please print)	
Phone number (include area code)	Date signed (yyyy-mm-dd)	Phone number (include area code)	Date signed (yyyy-mm-dd)
Signature of contractor's representative		Signature of power utility representative	

**WorkSafeBC use only**

Officer and number	Service centre	Area	Date received (yyyy-mm-dd)
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**This copy to be faxed immediately to the WorkSafeBC Richmond office — fax 604.276.3247.**


**30M33** (R13/11)

**WORKSAFE BC COPY**

## **Appendix B – WorkSafeBC: Asbestos Abatement Contractors' Checklist, July 2016**

**asbestos: be aware**

inspecting sites | protecting workers | preventing disease

## Abatement Contractors' Checklist

After you have **safely removed asbestos** from a house or building, you must provide the owner or developer with a **written confirmation letter** stating that the asbestos identified in the **hazardous materials survey** and **notice of project** has been removed.

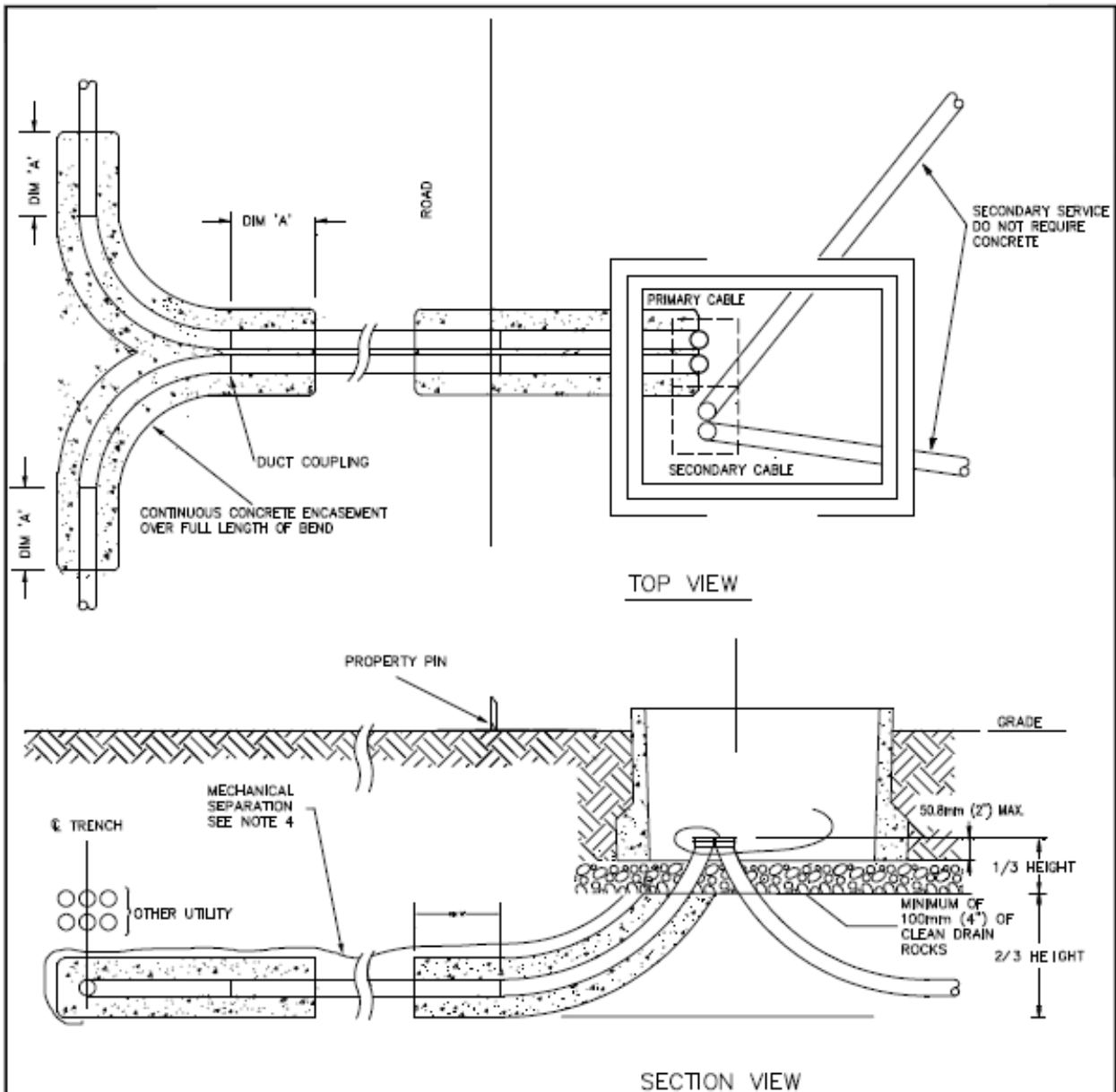
The written confirmation letter must include the following:

- ☐ Date the confirmation letter was issued
- ☐ Address of the asbestos removal project
- ☐ Name of the asbestos contractor who performed the removal
- ☐ Description of the scope of work that was performed (for example, what was removed and when)
- ☐ Reference to the hazardous material survey (name of the surveyor or company and when the survey was conducted)
- ☐ Reference to the WorkSafeBC Notice of Project number
- ☐ Name of the consultant or person who performed the final visual inspection
- ☐ Name of the consultant or contractor who collected the air clearance sample
- ☐ A statement indicating the asbestos removal was conducted in accordance with regulatory requirements (both the Occupational Health and Safety Regulation and the BC Ministry of Environment regulations)
- ☐ Proof of waste disposal (waste manifest)
- ☐ Name of the consultant or contractor who issued the written confirmation letter

For more information on the safe identification and removal of asbestos, please visit [worksafebc.com/asbestosbeaware](https://www.worksafebc.com/asbestosbeaware).

**WORK SAFE BC**

## **Appendix C – Drawings**





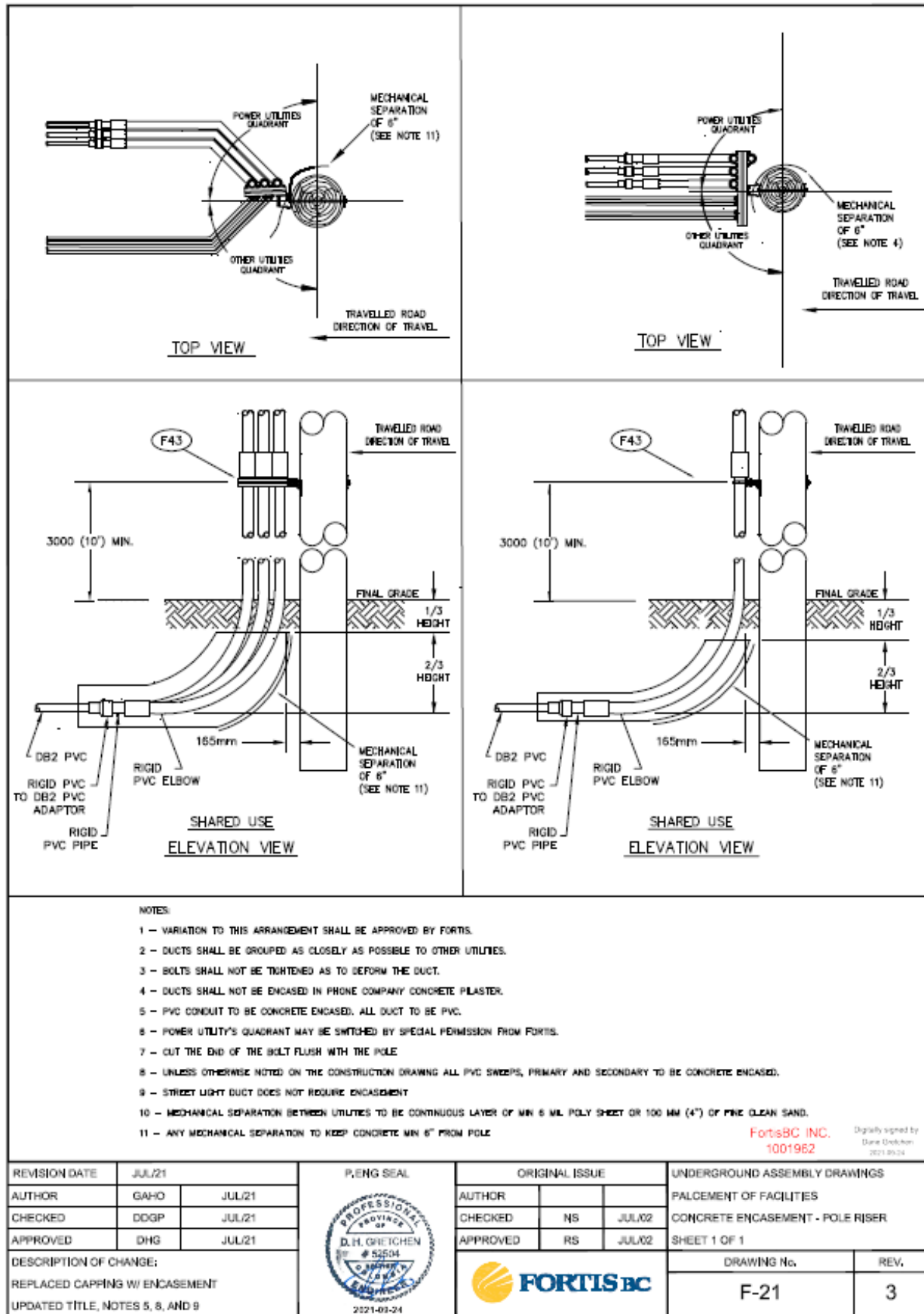
**NOTES:**

- 1 - UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWING ALL PVC SWEEPS, PRIMARY AND SECONDARY, EXCEPT SERVICE STUBS, TO BE CONCRETE ENCASED
- 2 - DIMENSION 'A' TO BE 4 TIMES NOMINAL PIPE DIAMETER.  
FOR 100mm (4") DUCT DIM 'A' = 400mm (16")
- 3 - STREET LIGHT DUCT DOES NOT REQUIRE CONCRETE ENCASEMENT
- 4 - MECHANICAL SEPARATION BETWEEN UTILITIES TO BE CONTINUOUS LAYER OF MINIMUM 6 MIL POLY SHEET OR 100mm (4") OF FINE CLEAN SAND
- 5 - CONCRETE REQUIRED ON ALL SWEEPS OR 90 DEGREE BENDS

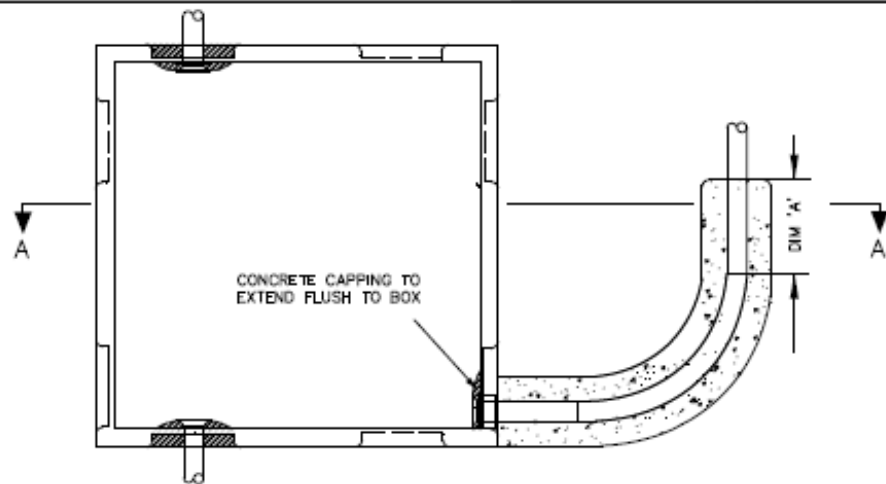
FortisBC INC  
1001962

Digitally signed by  
Dane Gretchen  
2021.09.24

REVISION DATE	JUL/21		ORIGINAL ISSUE		UNDERGROUND ASSEMBLY DRAWINGS		
AUTHOR	GAHO		JUL/21	AUTHOR		PALCEMENT OF FACILITIES	
CHECKED	DDGP		JUL/21	CHECKED	NS	JUN/04	CONCRETE ENCASEMENT - BENDS
APPROVED	DHG		JUL/21	APPROVED	RS	JUN/04	SHEET 1 OF 1
DESCRIPTION OF CHANGE:			 <b>FORTISBC</b>	DRAWING No.		REV.	
REMOVED REFERENCES TO CAPPING				F-20		4	
UPDATED NOTES 1 AND 3							

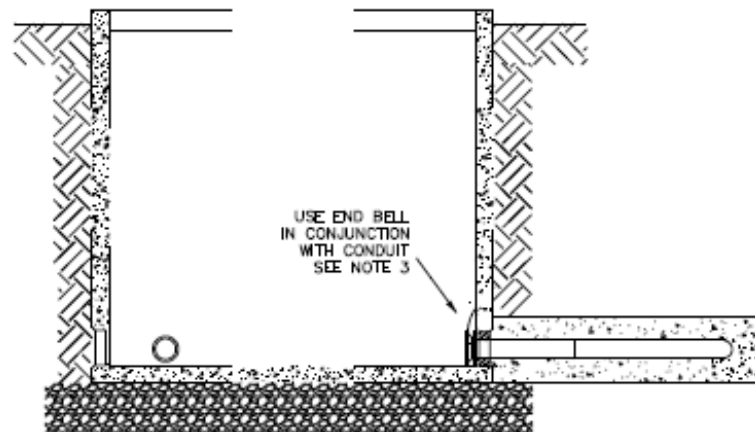
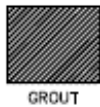






PLAN VIEW

HATCH DETAIL



SECTION 'A-A'

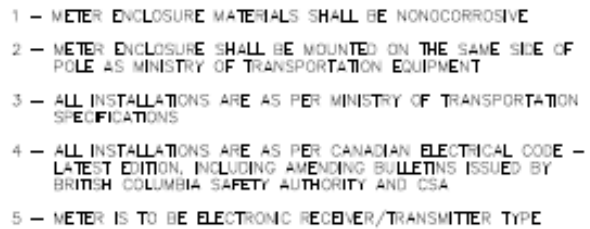
NOTES:


- 1 - UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWING ALL PVC SWEEPS, PRIMARY AND SECONDARY, TO BE CONCRETE ENCASED.
- 2 - MECHANICAL SEPARATION BETWEEN UTILITIES TO BE CONTINUOUS LAYER OF MINIMUM 6 MIL POLY SHEET OR 100mm (4") OF FINE CLEAN SAND.
- 3 - BELL END SHOULD BE FLUSH OR NOT EXCEED 2" PAST BOX WALL.
- 4 - DIMENSION 'A' TO BE 4 TIMES NOMINAL PIPE DIAMETER.  
FOR 100mm (4") DUCT DIM 'A' = 400mm (16")

FortisBC INC.  
1001962

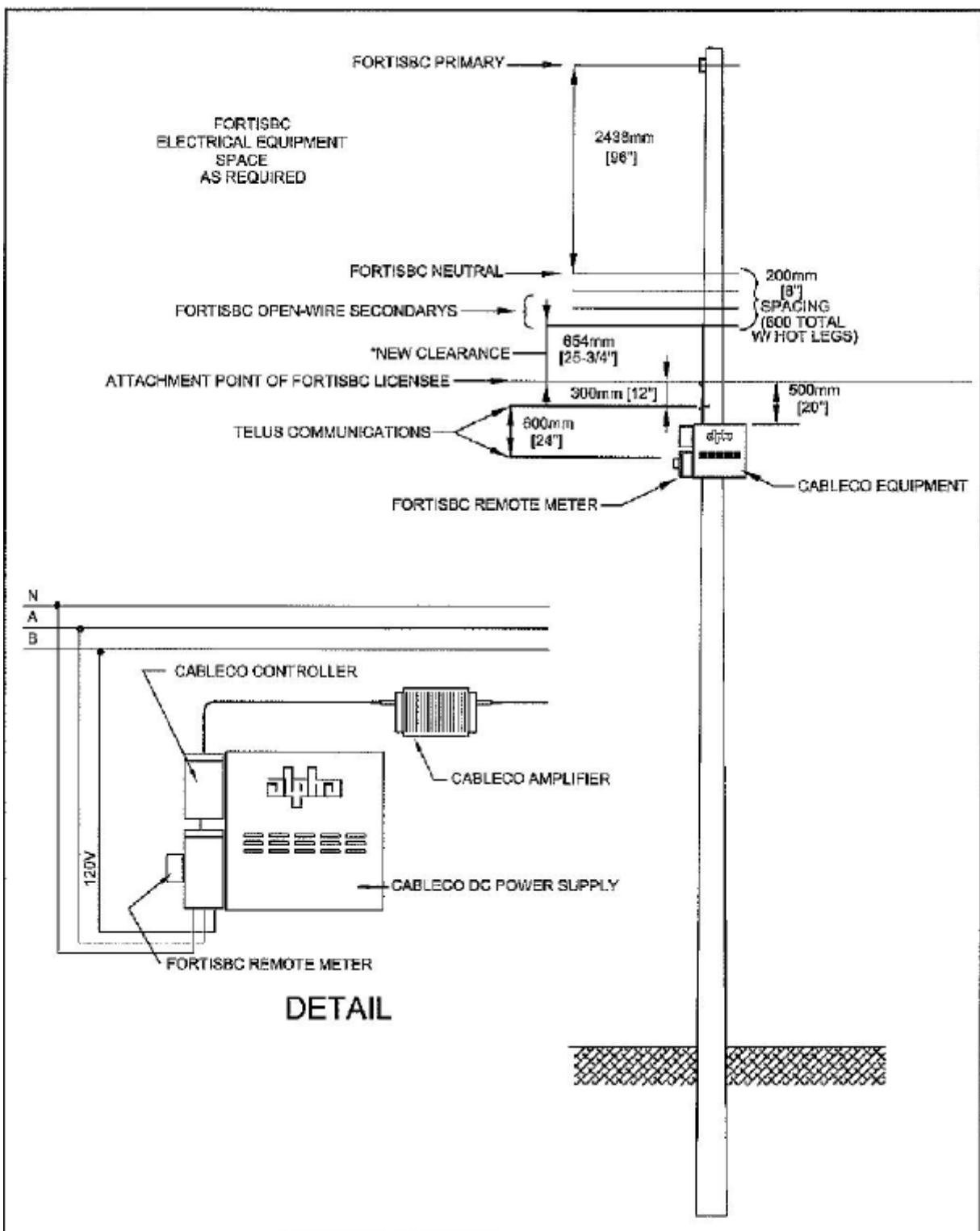
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Dana O'Neil  
2021-09-24

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APPROVED	DHG		JUL/21	APPROVED	RS	DEC/02	SHEET 1 OF 1
DESCRIPTION OF CHANGE:				DRAWING No.		REV.	
REPLACED CAPPING W/ ENCASEMENT				F-23		4	
UPDATED TITLE, NOTE 1							



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4							APPROVED BY	CK	OCT/08		
3											
2											
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REV	DATE	BY	DESIGNED	DESCRIPTION	APP.	DATE				M1	1

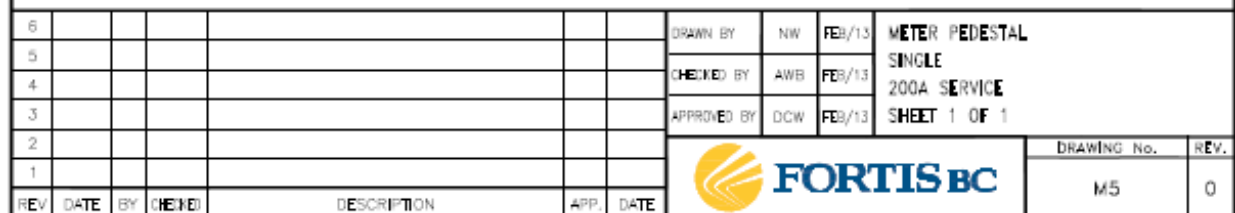


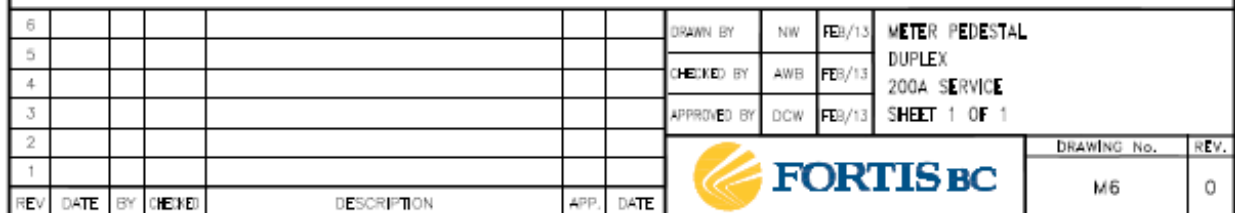


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4						APPROVED BY	<i>[Signature]</i>	<i>[Signature]</i>	
3									
2									
1									
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									0




**FORTIS BC**

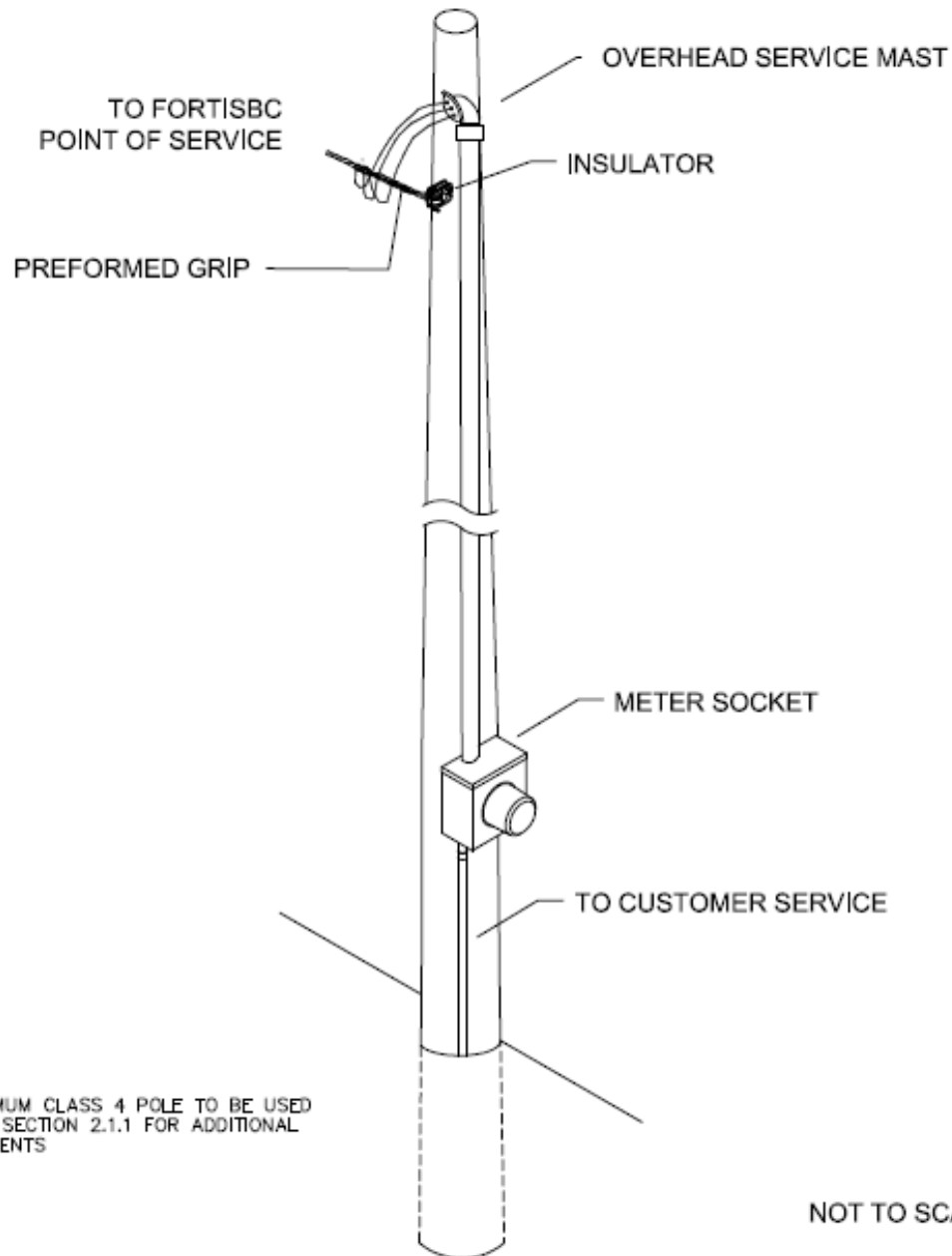








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CHECKED			CHECKED	NP	DEC/18		
APPROVED			APPROVED	KK	DEC/18		
DESCRIPTION OF CHANGE:			 <b>FORTIS BC</b>			DRAWING No.	REV.
						M10	0



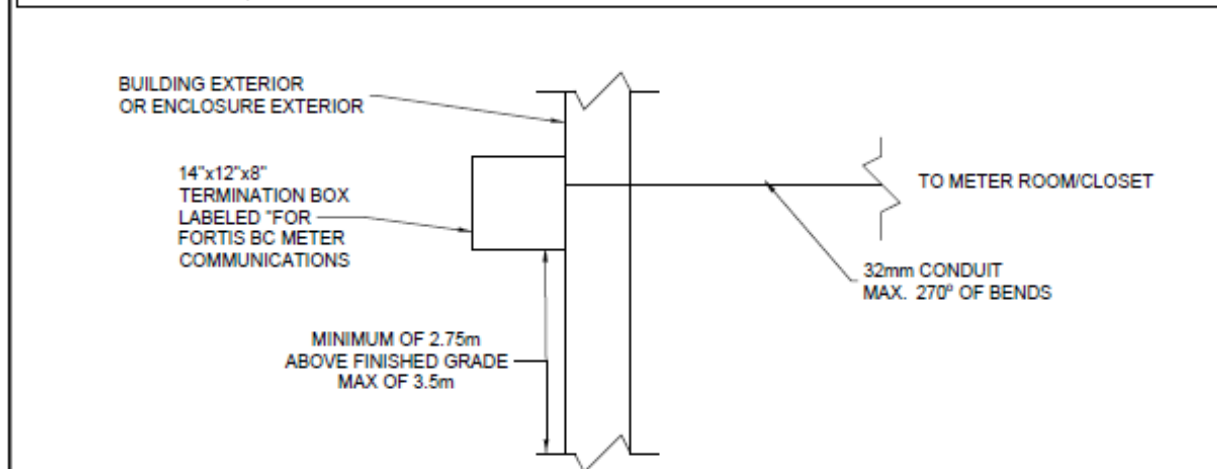
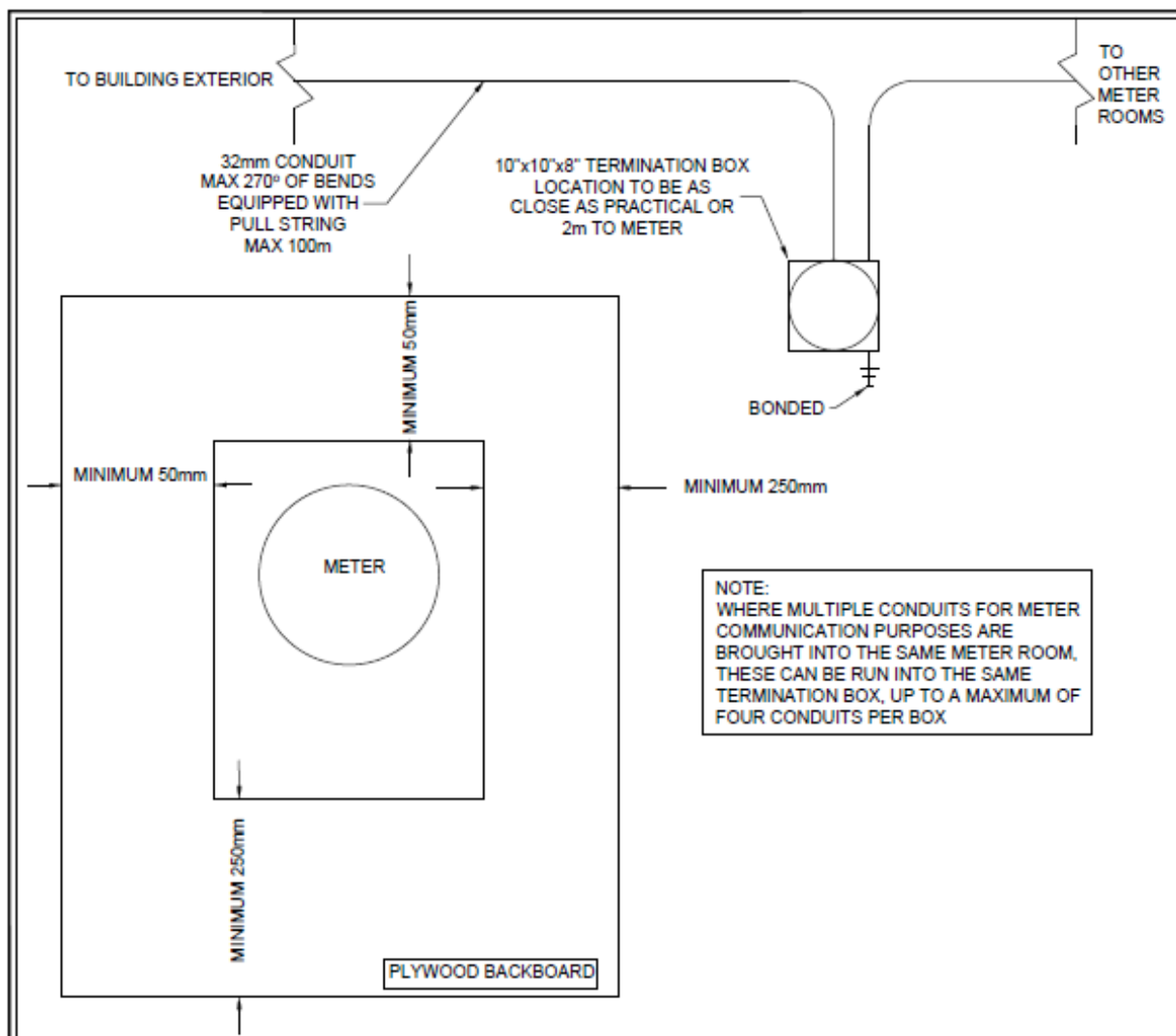
NOTES:


- 1 - MINIMUM CLASS 4 POLE TO BE USED
- 2 - SEE SECTION 2.1.1 FOR ADDITIONAL REQUIREMENTS

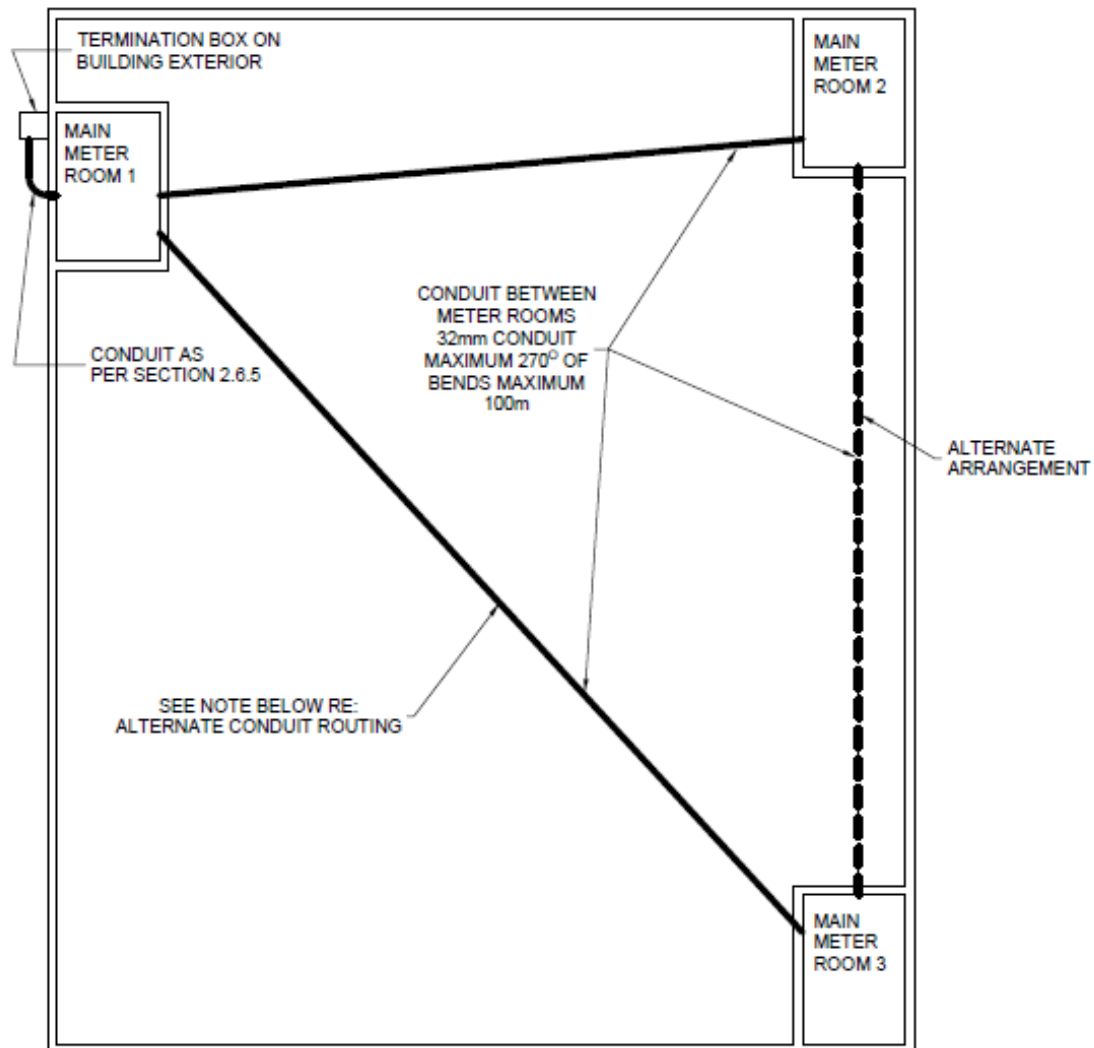
REVISION DATE		ORIGINAL ISSUE	TYPICAL METER SOCKET	
AUTHOR		AUTHOR	GAHO	APR/21
CHECKED		CHECKED		
APPROVED		APPROVED	DHG	APR/21
DESCRIPTION OF CHANGE:		CUSTOMER OWNED POLE		
		GENERAL ARRANGEMENT		
		SHEET 1 OF 1		
		DRAWING No.		REV.
		M11		0








REVISION DATE				ORIGINAL ISSUE			SINGLE METER ROOM CONDUIT ARRANGEMENT  SHEET 1 OF 1
AUTHOR	MM	AUG/23		AUTHOR	JG	JAN/17	
CHECKED	WH	AUG/23		CHECKED			
APPROVED	DG	AUG/23		APPROVED	DW		
DESCRIPTION OF CHANGE:				 FORTIS BC	DRAWING No.		REV.
CONDUIT SIZE HAS BEEN CHANGED TO 32mm					M21		1



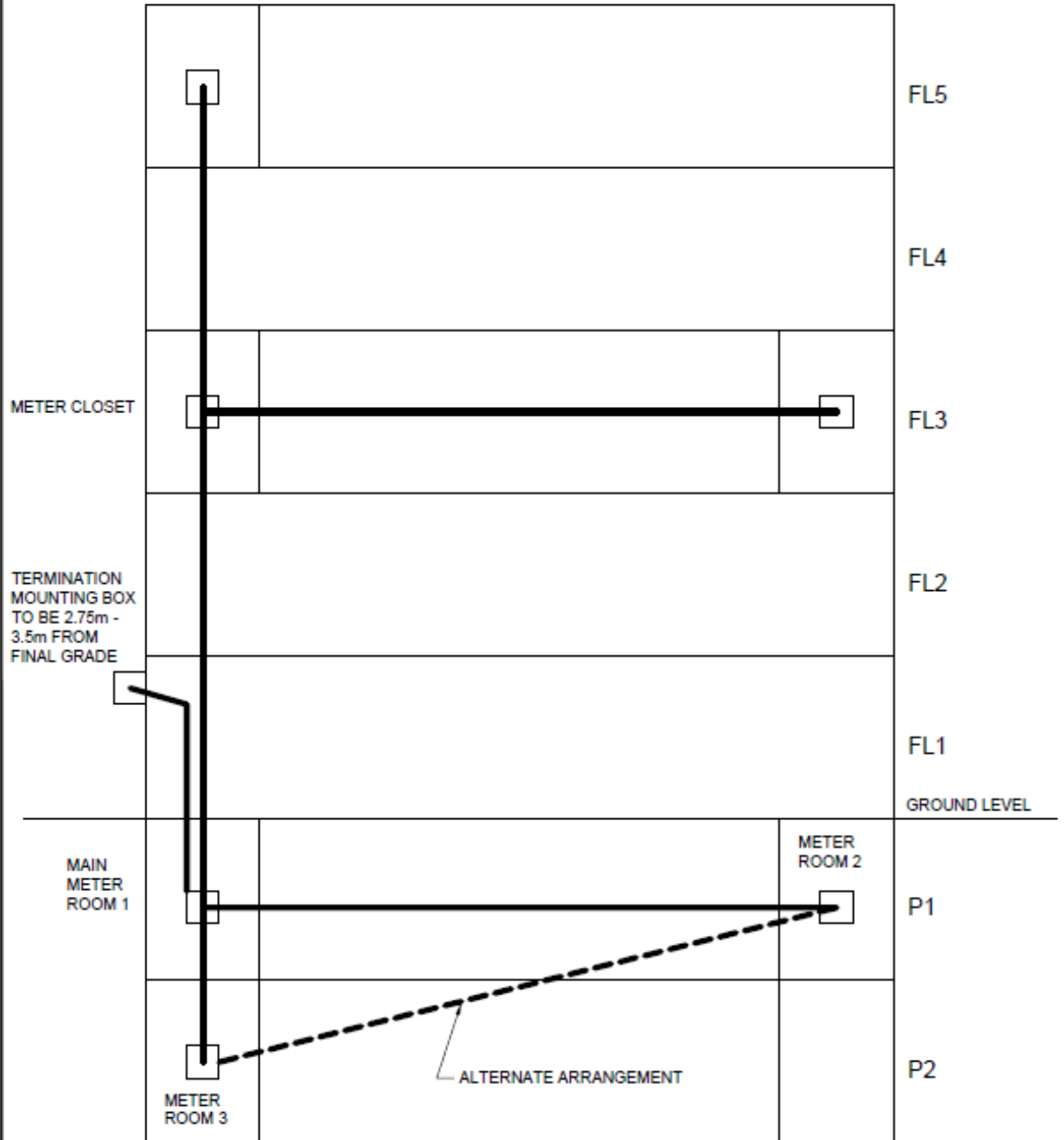
NOTES:


- ALTERNATE OPTION IS TO RUN CONDUIT FROM METER ROOM 2 TO METER ROOM 3 IN A DAISY CHAIN CONFIGURATION, INSTEAD OF METER ROOM 1 TO METER ROOM 3
- CONDUIT TO TERMINATE IN METER ROOMS/CLOSETS AS PER SECTION 2.6.5

REVISION DATE			ORIGINAL ISSUE			MULTIPLE METER ROOMS	
AUTHOR	MM	AUG/23	AUTHOR	JG	JAN/17	CONDUIT ARRANGEMENT	
CHECKED	WH	AUG/23	CHECKED				
APPROVED	DG	AUG/23	APPROVED	DW		SHEET 1 OF 1	
DESCRIPTION OF CHANGE:			 <b>FORTIS BC</b>			DRAWING No.	REV.
CONDUIT SIZE HAS BEEN CHANGED TO 32mm						M22	1

# KEY

- 32mm CONDUIT MAX 270° OF BENDS EQUIPPED WITH PULL STRING, MAX 100mm
- TERMINATION BOX IN METER ROOM OR BUILDING EXTERIOR AS PER SECTION 2.6.5



REVISION DATE				ORIGINAL ISSUE			MULTIPLE METER ROOMS ON MULTIPLE LEVELS CONDUIT ARRANGEMENT SHEET 1 OF 1	
AUTHOR	MM	AUG/23		AUTHOR	JG	JAN/17		
CHECKED	WH	AUG/23		CHECKED				
APPROVED	DG	AUG/23		APPROVED	DW			
DESCRIPTION OF CHANGE:							DRAWING No.	REV.
CONDUIT SIZE HAS BEEN CHANGED TO 32mm							M23	1