



NEWFOUNDLAND POWER SERVICE AND METERING GUIDE

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1. Introduction

The purpose of this guide is to introduce and explain Newfoundland Power’s policies and procedures regarding service and metering standards. This guide outlines the technical requirements the customer must meet before Newfoundland Power can establish an electrical service connection.

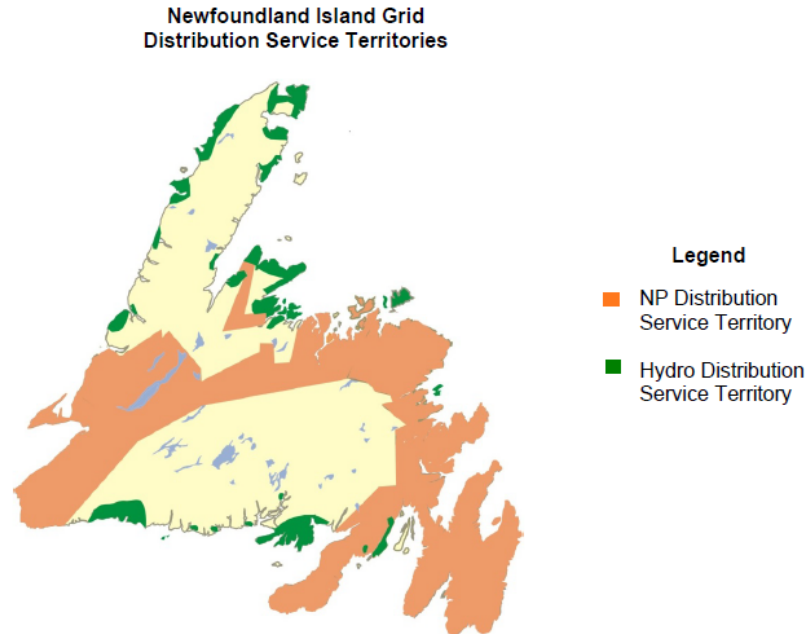


Figure 01: Map of Newfoundland Island Grid Distribution Service Territories

Newfoundland Power distributes power to the majority of the island portion of Newfoundland and Labrador. However some rural areas, indicated by green in the above figure, are supplied by Newfoundland and Labrador Hydro. This guideline applies to those locations indicated by orange in which Newfoundland Power is responsible for distribution services.

Throughout this document, the terms “Company” or “Utility” refer to Newfoundland Power, unless otherwise specified.

Any issues not discussed in this document must be referred to Newfoundland Power for specific approval prior to beginning construction.

Enlarged and complete standard Newfoundland Power drawings have been added to Appendix A for further clarification of the figures throughout this document.

The official copy of this document will be taken as the online copy posted through Newfoundland Power’s official website. Any printed copy of this document may be outdated and therefore incorrect.

2. General Information on Services

2.01 The Canadian Electrical Code (CEC)

The development of this document was primarily based on the CEC, Part 1. However, this document does not constitute a complete explanation nor is it meant to supplement CEC rules and regulations. All Customers are expected to review and comply with the CEC, Part 1.

Where the CEC refers to compliance with the requirements of the local Supply Authority¹, Newfoundland Power shall be contacted.

2.02 Acceptance Procedure of Non-Standard Services

Wherever the requirements of this guide cannot be met, customers must first contact Newfoundland Power toll free at 1-800-663-2802 to speak with a Company representative. The Company may request the customer submit detailed drawings, specifications and site plans for approval. The required documents should be submitted as early as possible, before the ordering and installation of service entrance or associated equipment.

Note: Any approval is only for the service in question and is not a general approval for future services.

2.03 Drawings and Specifications

All drawings and specifications shall clearly show all equipment related to the installation, including service entrance equipment and metering equipment. These drawings should clearly show all elevations and enclosure sizes. Under certain conditions, a hand drawn sketch that clearly shows the layout and dimensions will suffice.

In case of a dispute, verbal conversations will not be honoured by Newfoundland Power staff. Customers must have written evidence approved by the Company for non-standard services to be energized.

¹ Supply Authority or Utility refers to Newfoundland Power, who has the authority to supply electrical energy within its service area.

2.04 Requirements for Connection of New Services

Newfoundland Power will permit a connection of new electrical services when all of the following criteria have been met:

- a. The location, capacity and attachment point for metering equipment have been established and approved by Newfoundland Power.
- b. The electrical service contract has been completed and updated.
- c. The Customer's service panel covers are in place and the service has been grounded.
- d. The Utility has received a copy of a valid permit or authorization issued by the Inspection Authority² having jurisdiction.
- e. Compliance of the installation with all other requirements of this document and the CEC, Part 1.
- f. Clearance and right of way requirements have been met, including the acquisition of necessary easement rights, if required.
- g. If a "Contribution in Aid of Construction" is required, a signed quote acceptance form and applicable payment must be received.

Note: For additional information on specific time frames for new services and relocations, please contact Newfoundland Power's customer service contact number at 1-800-663-2802.

2.05 Requirements for Reconnection of Services

Newfoundland Power will permit the reconnection of services to an existing building or installation under the following conditions:

- a. Permit and Authorization have been issued by the Inspection Authority.
- b. There have been no alterations or additions since the most recent permit was approved.
- c. In the opinion of the Company, the customer's electrical system is not defective and does not represent a danger to life or property.
- d. The occupancy classification has not changed (i.e. single occupancy, double occupancy, etc.).
- e. The reconnection and/or relocation is authorized by the Company.
- f. Clearance requirements have been met based on current standards.
- g. The electrical service contract has been completed and updated.

² Inspection Authority refers to the Newfoundland and Labrador Provincial Electrical Inspection Department or City of St. John's Electrical Inspection Department who have responsibility for enforcing the Electrical Requirements of the CEC, Part 1 within Newfoundland Power's Service Area.

2.06 Electrical Equipment Rooms

All electrical rooms, in which Newfoundland Power metering is installed, shall be on ground level with outdoor access and shall comply with the following:

Working Space – A minimum of 1 m working space by 2.2 m 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; such as electrical rooms are not to be located in a bathroom, closet or stairway. In addition, a disconnect switch must be located in the same room, on the supply side, and adjacent to Newfoundland Power’s metering equipment to facilitate testing or maintenance on the equipment.

Entrance/Exit – A minimum passageway of 1 m wide by 2.2 m high must be maintained as an entrance or exit from all electrical areas. Access doors and covers on electrical compartments must be installed so as to not create a hazard or block the means of exit of a worker when opened. (Additional requirements are listed in CEC, Part 1 rule 2-310)

Hazardous Locations – Electrical equipment cannot be located in areas that are hazardous to anyone working on the electrical equipment or to the metering equipment itself. This would include moving machinery, dust, vibration, fumes, water and moisture.

Illumination and Ventilation – All electrical rooms or areas must have adequate illumination and ventilation to carry out work safely. (As per CEC, Part 1 rules 2-316 and 2-320)

Access/Egress- All access points to equipment (doors, gates and fencing) shall be locked and secured so as to deny access to unauthorized individuals.

2.07 CSA Approved Device/ Meter Socket Requirements

Meter sockets and service entrance equipment are CSA approved devices. Therefore any additions (i.e. isolated neutral blocks, additional lugs, etc.) to the meter socket or service entrance must be made with CSA approved kits, supplied by the manufacturer of the device/meter socket.

2.08 Meter Tampering and Seals

Unauthorized attempts to divert energy, tamper with metering equipment, or gain unauthorized access to Utility electric facilities can be very dangerous. Persons attempting these activities expose themselves to the risk of serious or fatal injury.

Unauthorized removal, tampering or damaging a meter or meter enclosure, breaking the seal, or the use of any method or device which permits the flow of unmetered or unauthorized electricity into a building is a criminal activity. Any individual or group involved with these activities are subject to prosecution.

If a customer needs access to a meter socket or metering equipment to make repairs or modifications, the customer must contact the Company in advance. The Company will then send a crew to remove the seal and allow the customer's qualified contractor to make any necessary changes. Alternatively, the Company may authorize the customer's qualified electrical contractor to remove the seal to make repairs. When the work has been completed, a Newfoundland Power line crew will replace the seal and re-establish the electrical connection.

Any damage caused by tampering with Company property will be paid for by those tampering with the metering equipment.

2.09 Easements and Right of Way Requirements

Newfoundland Power will work collectively with the customer, other land owners and the Provincial Government to obtain any necessary easements and right of way permits. Where the service route passes through the customer's private property, the customer will be responsible for supplying and clearing of the service route. Clearing of a right of way required for a primary line extension may be completed by the Company. Additionally, if requested, the Customer must be able to provide proof of property ownership and/or legal land surveys.

Any additional cost for obtaining any necessary easements and/or clearing of service routes beyond the distance of basic investment from the Company will be at the Customer's expense as determined by the Newfoundland Power Residential and General Service CIAC Policies document which can be found online at <http://www.newfoundlandpower.com/Content/ContentManagement/1384/File/CIAC-Policy.pdf>.

2.10 Newfoundland Power Standard Secondary Supply Voltages

Service shall normally be provided at one of the following nominal standard secondary voltages, depending on the requirements of the load to be served and the availability of a three phase supply:

- a. 120/240 volts, single phase, three wire
- b. 120/208 volts, three phase, four wire wye
- c. 347/600 volts, three phase, four wire wye

Service at any other supply voltage may be provided in special cases at the discretion of the Company.

If a service with different voltages (i.e. three phase and single phase) is requested for a single complex structure³, Newfoundland Power will determine whether or not the request is acceptable.

The Customer shall supply at their cost all transformation equipment necessary to serve loads utilizing voltages different from that which would normally be supplied by Newfoundland Power.

All supply voltages will be at 60 hertz with the exception of those premises which have been receiving 50 hertz power since May 13, 1977.

Existing non-standard installations must conform to these requirements when alterations are made to the service.

Services shall be supplied at single phase 120/240 volts where the maximum demand is estimated by the Company to be less than 75 kilowatts (kW). Where the maximum demand is estimated to be 75 kW or greater, service will normally be supplied at one of the standard three phase voltages.

2.11 Large Electrical Loads and Electric Motors

Operating large electrical loads such as motors, electric furnaces, electric welders, air conditioners, heat pumps, etc. can produce momentary voltage sag or 'flicker'. The customer will be responsible for implementing any equipment necessary to minimize or prevent any voltage sag and/or flicker at their cost.

The operation of large electrical loads should be considered when services are requested and being installed. It is the Customer's responsibility to provide the Company with information on the operation of large electrical loads prior to the connection of service. If the Utility is not contacted about the use of such equipment, the customer will be responsible for any charges associated with reworking newly installed Newfoundland Power equipment.

The Customer shall not use a service for full voltage starting of motors rated over 10 horsepower, except where specifically approved by the Company. The Customer shall also be responsible to provide all motor protection as per the CEC.

³ A single complex structure is any structure that would be difficult to supply with a single service entrance due to its physical characteristics or electrical requirements. The designation of a structure as 'complex' must be mutually agreed upon by the Newfoundland Power and Inspection Authorities.

2.12 Transfer Equipment for Standby Power Systems

Transfer switches for transferring the source of power from the Utility system to a standby power system must meet the requirements of CEC 14-612. The switch shall not allow the two sources to operate in parallel. This will prevent the energizing or back feeding of a de-energized Utility distribution line on which crews may be working.

Other devices such as purpose built meter base accessories that accommodate the connection of standby generators are also acceptable. Before these devices can be installed, Newfoundland Power must be notified and arrangements made to obtain a connection authorization from the respective inspection authority.

2.13 Service Capacity

2.13.1 Nominal Standard Secondary Voltages and Currents from Overhead Transformers

Service Voltage	Phase/Wire/Connection	Maximum Transformer Size	Maximum Main Breaker Size
120/240	Single Phase, 3 Wire	100 KVA	600 A
120/208	Three Phase, 4 Wire, Wye	300 KVA (3 x 100 KVA)	800 A
347/600	Three Phase, 4 Wire, Wye	300 KVA (3 x 100 KVA)	300 A

Table 1: Nominal Standard Secondary Voltages & Currents from Overhead Transformers

Larger currents may be available for the 120/208 and 347/600 voltages if a bank of 167 KVA platform mounted transformers is used. The maximum currents for the use of a platform mounted transformer would be 1200 A and 400 A for 120/208 and 347/600 respectively.

2.13.2 Nominal Standard Secondary Voltages and Currents from Pad-mounted Transformers

Service Voltage	Phase/Wire/Connection	Maximum Transformer Size	Maximum Main Breaker Size
120/240	Single Phase, 3 Wire	167 KVA	600 A
120/208	Three Phase, 4 Wire, Wye	1000 KVA	3000 A
347/600	Three Phase, 4 Wire, Wye	2500 KVA	2500 A

Table 2: Nominal Standard Secondary Voltages and Currents from Pad-mounted Transformers

A larger single phase service (800 Amps) may be permitted at the discretion of Newfoundland Power.

Note: For additional information on specific time frames for new services and relocations, please contact Newfoundland Power's customer service contact number at 1-800-663-2802.

All three phase services 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 Newfoundland Power.

2.14 Customer Service Conductors

Customer-owned service conductors shall be sized as per the CEC. However, the maximum size service conductor shall be 750 thousands of circular mill (kcmil) for residential services and 1000 kcmil for commercial services.

3. Single Phase Services

3.01 Service to Residential Buildings (Single/Multiple Occupancy)

- a. Only one supply service⁴ shall be run to a residential multi-occupancy building. The Company will allow a maximum of 4 services to be run off a single supply service. The multiple services will be metered via a ganged multiple meter socket arrangement.
- b. Where more than one supply service is run to a residential multiple occupancy building:
 - i. The occupancies shall be completely self-contained (i.e. no indoor access between occupancies); and
 - ii. The occupancies shall not be located one above another; and
 - iii. The occupancies shall have a separate entrance with direct access to ground level.
 - iv. The occupancies shall have an adequate fire separation barrier⁵ as defined in the CEC.

3.02 General Requirements for Service Entrance

Before commencing any service entrance work (installation, relocation or upgrades) the Customer must first contact Newfoundland Power for approval of the location of the service entrance equipment and service route. The location of the service head and location of the point of attachment shall be in accordance with the CEC and Newfoundland Power standards.

⁴ Supply service refers to one set of conductors installed by Newfoundland Power to a consumer's service.

⁵ For the purpose of electrical service, occupancies of a building separated by a fire separation barrier or firewall may be considered as separate buildings. The fire separation barrier or firewall must be constructed in compliance with the National Building Code.

Service entrances shall be in a location satisfactory to the Company and shall be wired for outdoor meters. A satisfactory location is one which is as close as possible to the point on the premise nearest to the distribution pole from which the service line is to be run. Indoor metering for a residential or commercial building requires special approval from the Company and will only be granted if no reasonable alternative is available.

3.03 Service Entrance Disconnect

The Customer service entrance disconnect (i.e. the main disconnect switch) shall be located within 3 meters (m) or 10 feet (ft) of the point where the Customer's service conductors enter the building. This applies to the section of conduit which enters the building before it enters the main switch.

If the Customer requires an alternate service location, the Customer shall pay any additional costs, if required, to provide service in that location.

If the service location is inconvenient for direct entrance into the building, a raceway around the outside of the building shall be used. The installation and cost of this raceway shall be the responsibility of the Customer. This installation shall be completed according to the CEC and inspection authority requirements.

3.04 Overhead Service Entrances

Customers are responsible for supplying and installing the meter socket and the service mast. The Customers are also responsible for installing the main switch, service panel and wiring inside the building. For services greater than 200 amps, the meter socket and Current Transformers (CTs) will be supplied by Newfoundland Power and installed by the Customer. However, for a 400 amp residential service utilizing a 400 amp meter socket with CTs as noted in Section 3.05.3 of this document, the meter socket and CTs shall be supplied and installed by the Customer. Any maintenance or replacement of this equipment, other than that supplied by Newfoundland Power, will be the responsibility of the Customer. This work must be completed by a certified electrician.

Newfoundland Power will supply the meter and, if required, a specific length of conductor as determined by the Newfoundland Power Residential and General Service CIAC Policies document which can be found online at <http://www.newfoundlandpower.com/Content/ContentManagement/1384/File/CIAC-Policy.pdf>. Any additional conductor and/or poles required will be charged to the Customer at the current rate as defined in the Residential and General Service CIAC Policies document.

Newfoundland Power personnel shall establish a connection from an overhead source to the service mast. However, before this connection can be completed, Newfoundland Power must receive notice that the service has been approved by the Inspection Authority with jurisdiction in that area.

3.05 Underground Service Entrances - Residential Customers

3.05.1 General Requirements

An underground residential service entrance shall be supplied by Newfoundland Power if requested by the Customer. However, the Customer may be responsible for paying a capital contribution for the additional cost of supplying an underground service versus an overhead service.

In lieu of the extra charge, the Customer has an option to complete all underground locates and permits, duct and trench digging and backfilling. If the Customer chooses to complete this work, he/she will be responsible for providing any necessary material for backfilling purposes. There may also be an additional charge for the conductor should the Customer choose to complete the trenching and duct work.

Before any backfilling is completed, a Newfoundland Power employee will complete a thorough inspection of the duct and cable installation. If the installation is inadequate, the employee will specify any changes required to pass the installation.

The Customer shall not commence work on an underground service without prior approval from Newfoundland Power. Additionally, the Customer should contact Bell Aliant's "Call Before You Dig" contact line at 1-844-224-8344 if a communications cable is suspected of being buried in the area and any other utility or municipalities which may have underground infrastructure in the area.

On a service pole, the Customer shall be responsible for installing the conduit and Newfoundland Power supplied triplex conductor up to the top of the pole for final connection by Newfoundland Power crew. On poles containing additional conductors, other than service drops, the conduit shall be installed to at least the height of the neutral conductor. Under no circumstances will the Customer or its representatives be permitted to work within 3 m (10 ft) of Newfoundland Power conductors.

3.05.2 Installation Details

Should both electrical and communications services be required, the services may occupy the same trench. Generally, when installing both communications and electrical services in the same trench, communications shall be installed on one side of the trench and the electrical cables on the opposite side of the trench as per standard drawing STD No. 21-5 (see Appendix A).

All underground cables shall be buried within a duct or concrete encased duct. Under no circumstances will cables be direct buried without the installation of a Polyvinyl Chloride (PVC) duct.

Direct buried conduits (ducts) shall be buried in 300 millimetres (mm) of fine washed sand (i.e. 150 mm beneath the conduit and 150 mm above) and then covered with a select backfilling material up to finished grade.

Warning tape advising of the presence of electrical cables shall be installed above the cables at 225 mm beneath the finished grade.

If crossing beneath a road, parking lot, or area accessible to heavy equipment, a concrete encased duct shall be used so as to provide additional protection to the conductors. Concrete used in such installations shall have a 28-day specified strength of 20 MPa with a maximum aggregate size of 20 mm and maximum slump of 75 mm.

For each 90 degree bend, a rigid PVC conduit is required. For the remainder, rigid PVC duct type DB-2 will be satisfactory. Rigid PVC duct type DB-2 shall not be installed above ground.

The conductor cable shall be installed so as to not exceed the maximum pulling tension for that conductor. It is the responsibility of Newfoundland Power to complete these calculations and ensure they are accurate.

3.05.3 Termination of Underground Service Equipment

A 200 amp service shall be terminated inside the Customer-owned meter socket and shall be completed by the Customer's electrical contractor.

Once the 200 amp installation is complete, Newfoundland Power will own and maintain all components up to the point indicated by “CUSTOMER-OWNED PLANT” on the following diagram:

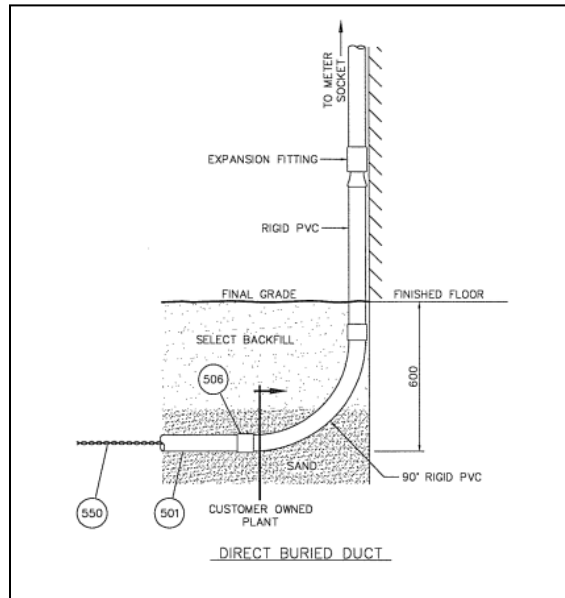


Figure 02: Underground service entrance for up to 200 amps

For 400 and 600 amp services, the conductors may terminate inside a buried splice box located at minimum of 3 m outside the Customer’s residence. Once the splice box termination is complete, Newfoundland Power shall own and maintain all components up to the point indicated by “CUSTOMER-OWNED PLANT” on the following diagram:

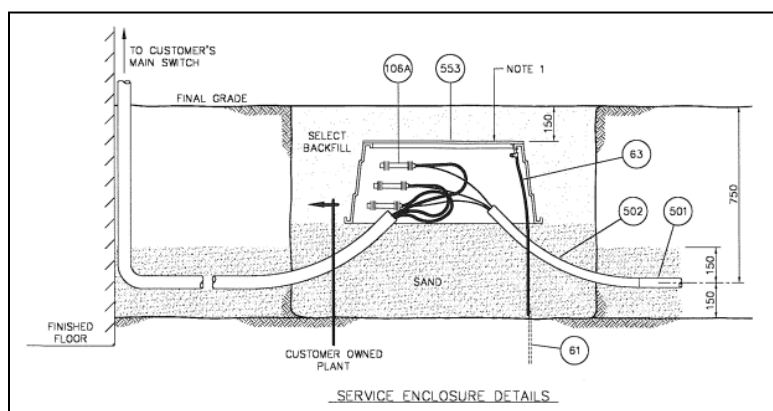


Figure 03: 400 amp service underground conductor termination details

Figure 04 shows an alternate method of termination for a 400 amp residential service that makes use of a meter socket with all necessary current and voltage transformers included. In this configuration, the

service shall be terminated within the meter enclosure on the exterior wall of the customer's residence. Connections within the meter socket shall be completed by the customer's electrical contractor. This service arrangement may use a single 400 amp residential service entrance panel or two 200 amp panels as detailed in Figure 04 below.

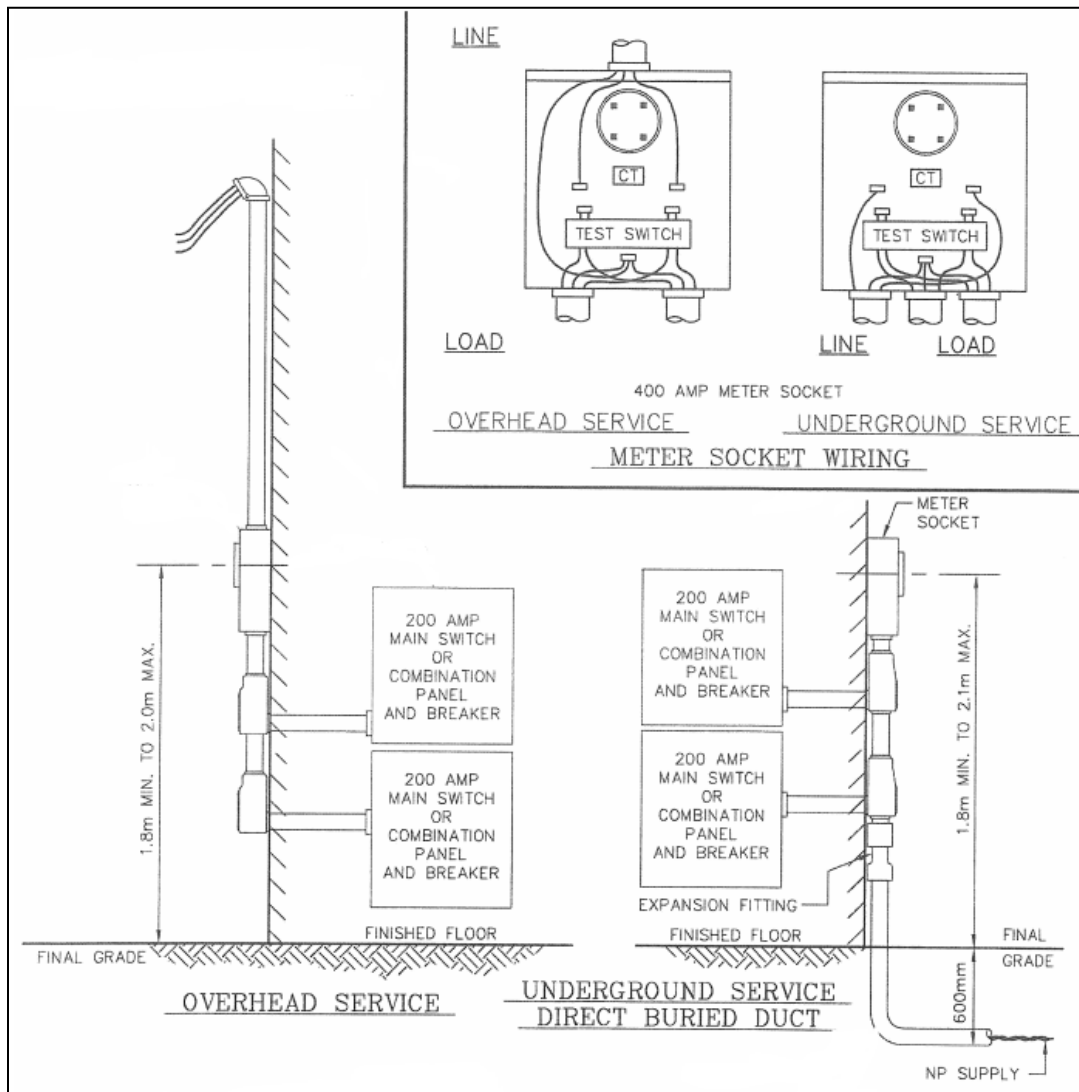


Figure 04: 120/240 volt, 1 Phase, 3 wire single occupancy 400 amp service

3.06 Underground Service Entrance - General Service Customers

A general service Customer may have an underground service entrance supplied from either an aerial or underground supply where the Customer owns and maintains the secondary system consisting of the service conductors and raceway from the Customer's disconnect to the Newfoundland Power

transformer secondary terminals. All work must be completed as per the CEC and inspected by the appropriate inspection authority.

3.07 Single Phase Services Supplied by a Pad-Mounted Transformer

The standard single phase pad-mounted transformer base used by Newfoundland Power consists of a pre-cast fibreglass cavity type box. This box will be provided and installed by Newfoundland Power.

The fibreglass transformer pad must be installed in a truly horizontal position on a base of 13 mm of crushed stone. The pad must then be backfilled using material which does not contain any rocks over 70 mm in diameter.

A ground loop must be installed surrounding the pad using 2/0 bare copper. This copper wire must then enter the pad for connection to the transformer. The following figure shows this configuration in further detail.

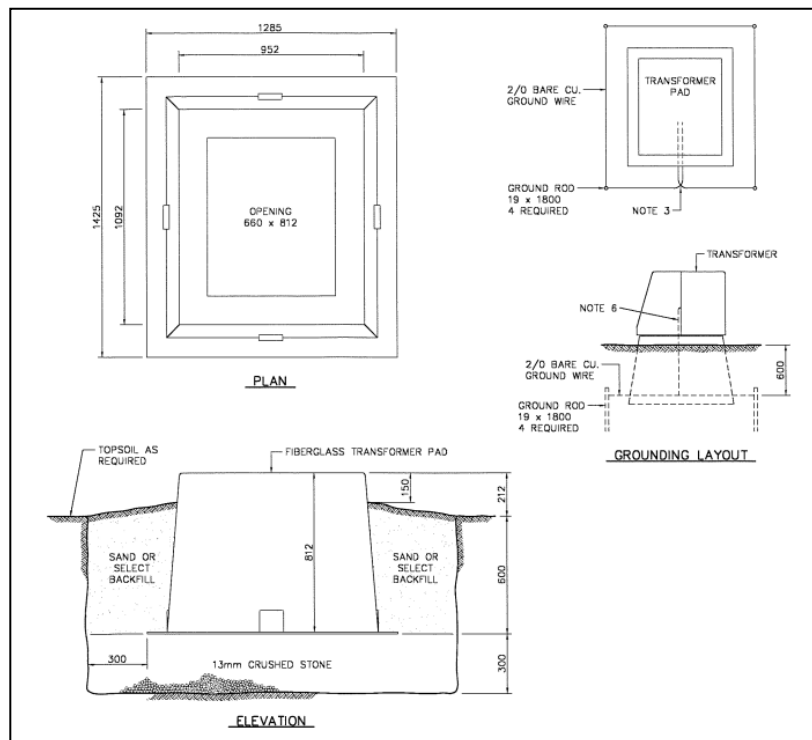


Figure 05: Fiberglass transformer pad installation details and grounding grid

Newfoundland Power will specify the location of the transformer and establish all necessary connections.

When installing conductor cables, the bending radius shall not be less than eight times the outside diameter of the cable.

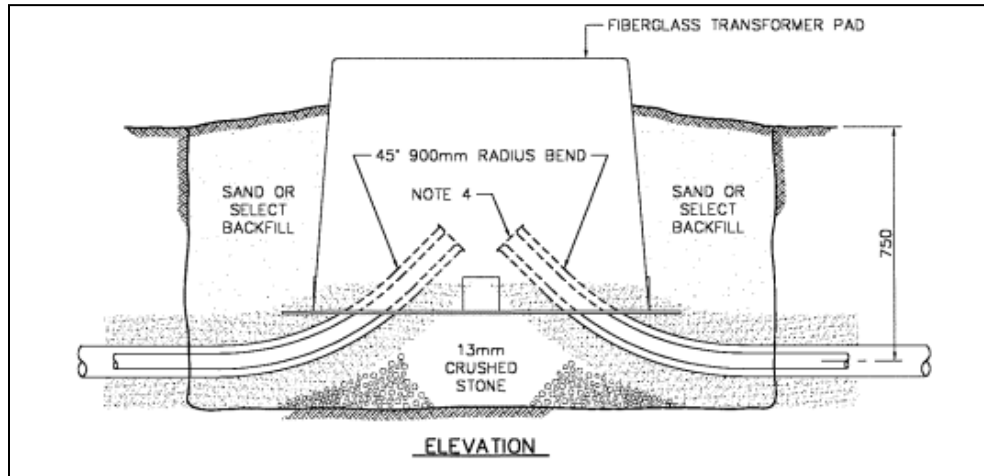


Figure 06: Mini-Padmout Transformer Duct Entrance Details

3.08 Temporary Service Entrances

A temporary service is defined as one which is intended for non-permanent, short-term or construction power applications. A temporary service may be used for a maximum of 3 years.

Overhead temporary services shall be mounted on one of the following structures:

- a. Construction shacks or trailers with a service mast; or
- b. A Customer-owned pole or post

Note: Other configurations may be acceptable under the discretion of the Company. For more information contact Newfoundland Power toll free at 1-800-663-2802.

Temporary services connecting to an underground supply point may use a pad-mounted transformer or in ground service boxes.

3.09 Mobile Homes, Recreational Vehicles and Street Side Vendors

The Utility will allow for an overhead supply in which the service mast and other equipment are connected to a Customer-owned terminal support and then run underground into the mobile home. The Utility will also permit an underground connection in which the meter installation and connections are completed on the pedestal support. See Appendix A for more information on these connection details.

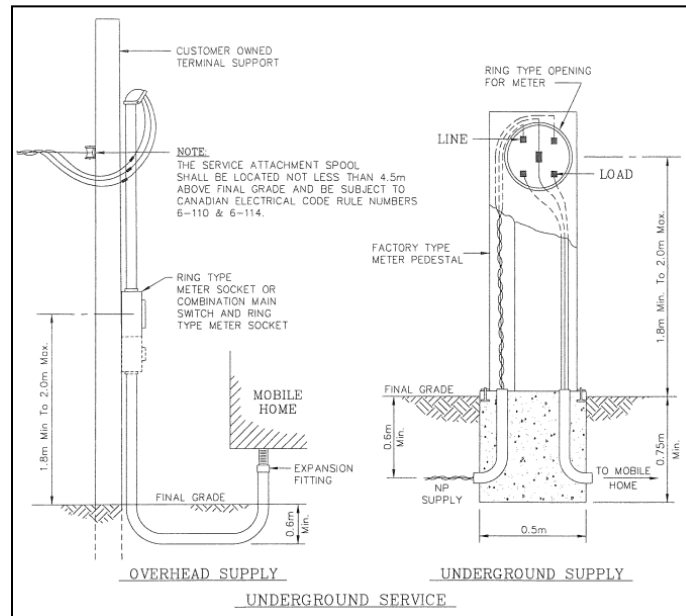


Figure 07: Mobile home installation

Mobile homes that have all wheels removed and are placed on permanent foundations may have service mast and meter base installed directly on the mobile home.

Recreational vehicles and Street Side Vendors shall be considered to be mobile installations and will require a service and metering arrangement as detailed in STD No. 30-5. The Customer will be responsible for any costs associated with the installation of an approved pole or suitable structure.

3.10 Utility Supply Conductors Point of Attachment

The attachment point from supply to service mast must be a minimum of 4.5 m and a maximum of 6 m above final grade. In the event the Customer wishes to install the service attachment point within the range of 6 to 9 m, prior permission must be obtained from Newfoundland Power. For more information contact Newfoundland Power toll free at 1-800-663-2802.

The supply conductors shall be connected such that the following clearances, measured at maximum sag, are not exceeded:

- 5.5 m across highways, streets, lanes and alleys
- 4 m above driveways and residential garages
- 5 m above driveways to commercial and industrial premises
- 3.5 m above ground that is normally accessible to pedestrians

The point of attachment shall maintain a minimum conductor clearance of 1.0 m from windows, doors, fire escapes and porches.

The point of attachment shall be such that it allows the Utility a minimum clearance of 1.0 m horizontal (plus the horizontal swing) or 2.5 m vertical with the conductor at maximum sag. This clearance shall be between the Utility secondary supply conductors and building surfaces that are readily accessible.

The service mast shall be guyed if the service mast head exceeds 1.1 m above the roof line.

3.11 Parallel Service Connection Details

Newfoundland Power may provide service to multiple masts connected in parallel. Typically a maximum of two service masts in parallel shall be installed on a single building. If more than two are required, a special request must be made via contact with the Company.

Multiple service masts for a single Customer on a building shall be located within 300 mm of each other to allow for connection to a single set of Utility supply conductors.

3.12 Service Entrances and Metering Equipment on Utility Poles

Customer's metering equipment shall not be installed on any Utility pole.

Service entrances, unless owned by Newfoundland Power, will normally be allowed on service poles that carry Newfoundland Power secondary conductors.

Service entrances shall not be installed on a pole that contains Newfoundland Power primary conductors which service more than a single Customer.

Note: Any installations discussed above require prior approval from the Utility to ensure safe clearances are maintained.

4. Three Phase Services

4.01 General Information

Three phase services shall be provided to the Customer upon request if three phase voltages are readily available. Three phase power shall be supplied to the Customer if they intend on powering a motor load or their power requirements are such that a single phase service would be overloaded.

If three phase power is not readily available, Newfoundland Power may permit an alternate configuration to provide power to a small motor load. This is not a typical configuration and shall only be provided on a case by case basis.

Newfoundland Power may supply and install a length of commercial three phase conductor free of charge as discussed in the Newfoundland Power Residential and General Service CIAC Policies document which can be found online at the following link: <http://www.newfoundlandpower.com/Content/ContentManagement/1384/File/CIAC-Policy.pdf>. Any additional conductor and/or poles required will be charged to the Customer based on the current rate. The payment of this fee shall be received before the connection of electrical service is established.

All equipment installed must be CSA approved and the installation must be approved by an electrical inspection authority with jurisdiction in that area.

Newfoundland Power will establish connection from an overhead source to the service mast. To complete this connection, the following conditions must be met:

- a. A building permit must be obtained from the applicable municipal authority.
- b. Authorization must be given by the electrical inspection authority.
- c. An electrical service contract must be completed and up to date. This service contract must be completed by the party accepting responsibility for the electric service account.
- d. Service including metering equipment must be installed as per Newfoundland Power's metering standards.
- e. If a contribution in the form of a CIAC is required, the required quote acceptance form must be returned, signed by the party accepting responsibility for the service, and the applicable payment must be received.
- f. If required, any easements for the service line must be finalized.

4.02 Site Preparation

The Customer shall provide Newfoundland Power with site drawings and an estimated electrical load at the earliest stage of planning. This will permit the Utility to determine an acceptable method of servicing and point of supply. It will also provide the Company with time to order any necessary equipment.

The Customer shall provide Newfoundland Power with any necessary easements pertaining to the proposed service line, duct bank and transformer installations. These easements will allow the Company to install and maintain all necessary three phase equipment.

4.03 Installation Responsibilities

4.03.1 Overhead Service Entrances

The Customer shall be responsible for supplying and installing the meter socket⁶ and the service mast. The Customer shall also be responsible for installing the main switch, service panel and wiring inside the building. Any maintenance or replacement of this equipment shall be the responsibility of the Customer. This work must be completed by a certified electrician.

The Customer shall be responsible for the additional expense of any temporary service required for construction power. The Customer must contact Newfoundland Power before any arrangement is made for a temporary service and to establish a connection.

Newfoundland Power will be responsible for establishing the electrical connection from the pole-mounted transformer bank to the service mast.

4.03.2 Underground Service Entrances

The Customer shall provide, own and maintain all secondary voltage electrical equipment. This includes all electrical conductors from the main disconnect switch to the aerial transformer bank or pad-mounted transformer. All secondary equipment, including secondary conductors, shall be installed by a qualified electrical contractor. Connections at the transformer will be made by Newfoundland Power.

The Customer shall provide, own and maintain all pad-mounted transformer bases and duct banks. The transformer base is generally composed of concrete and is explained in greater detail later in this guide. Both the duct banks and transformer base must be inspected by Newfoundland Power before the transformer is installed.

⁶ For transformer-rated metering the CTs and meter socket will be supplied by Newfoundland Power and installed by the Customer.

Newfoundland Power will supply, own, and maintain the high voltage conductors, including the terminations, and the pad-mounted transformer.

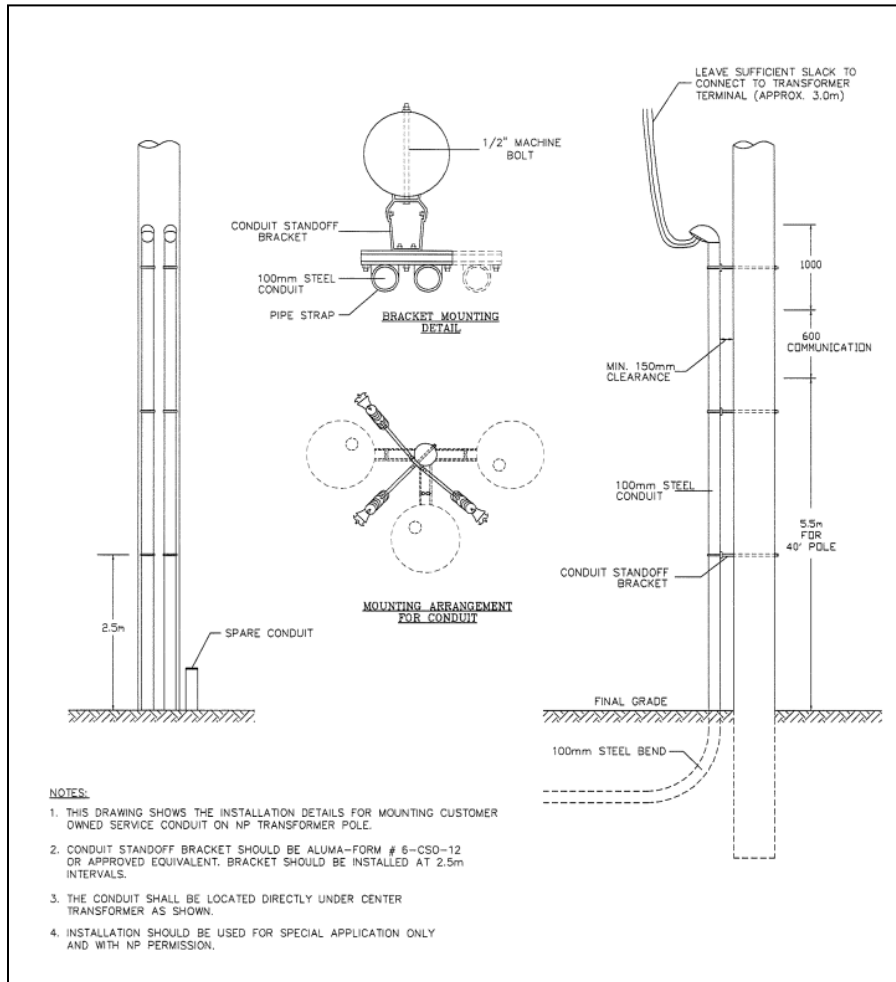


Figure 08: Underground secondary termination

4.04 Duct Banks

All ducts in Newfoundland Power's system shall be CSA approved. Duct banks containing primary and secondary conductors may be either concrete encased or direct buried. Under no circumstances shall primary or secondary cables be direct buried without the installation of a duct bank.

When passing beneath a high traffic area, both primary and secondary ducts shall be concrete encased to provide protection to the conductors.

Concrete encased ducts shall be supported by approved spacers placed at 1200 mm intervals. No wire or metal ties are to be used.

Duct risers on the pole shall face away from any roads and/or sidewalks to provide adequate protection for persons in the vicinity.

All 90 degree bends in a duct shall use rigid PVC conduit and for the remainder of the duct run, PVC type DB-2 shall be used. Also, long sweep 90 degree rigid PVC conduit bends shall be used at both the pole and the concrete pad.

A 100 mm diameter duct shall be used for each run of primary cable and a 50 mm duct for each run of secondary cable. Customer-owned secondary duct banks shall be sized as per CEC guidelines.

A minimum of #12 fish wire shall be installed in each duct and both ends of the duct shall be securely capped. This will allow for easy access to cables for future maintenance purposes.

The ducts shall be carefully installed and all joints, fittings, couplings, etc. are to be solvent weld so as to ensure a secure connection is maintained.

4.05 Customer-Owned Secondary Conductors

Secondary conductors are to be installed solely in the position indicated in the following figure. These conductors are not to be installed beneath the solid portion of the concrete pad nor are they to be installed in the position indicated by the primary conductor location.

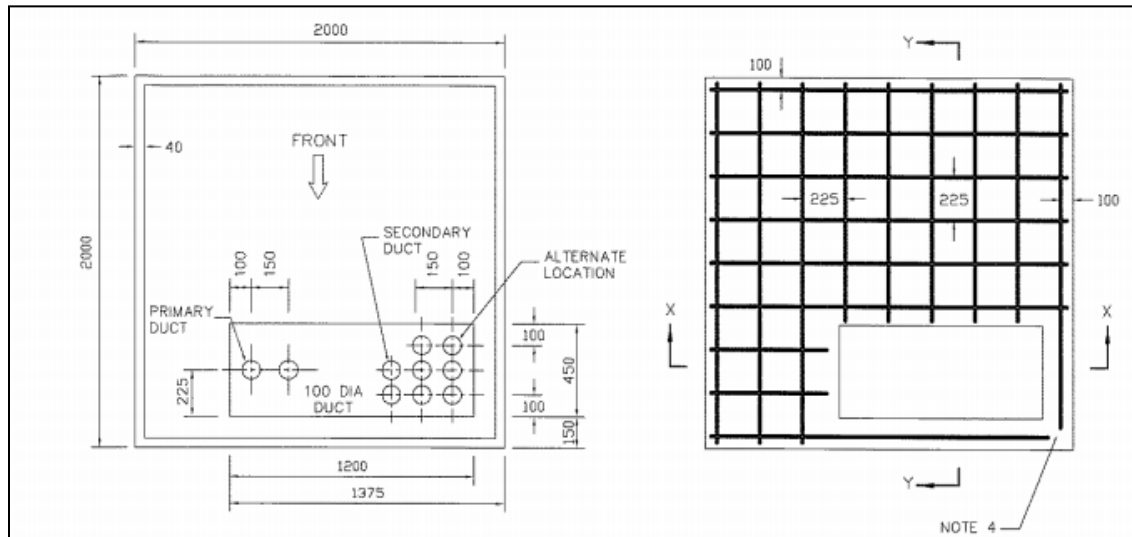


Figure 09: Transformer Concrete Pad Details

Secondary conductors are to be connected to the transformer using only hardware pre-approved by Newfoundland Power. For conductors up to 750MCM the hardware will be supplied by Newfoundland Power. For secondary connections greater than 750MCM all connection hardware shall be supplied by the customer. The connection of all conductors to the transformer unit will be performed by Newfoundland Power personnel only.

4.06 Concrete Pad-Mounted Transformer Base

Where a pad-mounted transformer is required, the Customer is responsible for contacting Newfoundland Power for additional details regarding its design and installation. The Engineering Department will determine a suitable location for the base and methods of grounding, trenching and duct details, construction and concrete specifications, etc.

The Customer shall provide a suitable concrete pad designed in accordance with the concrete pad standards as indicated in drawing 28-5 of this document. Newfoundland Power shall utilize the same concrete base standard for all pad-mounted transformer installations. Therefore the size and dimensions of the concrete base shall be common for each size of transformer. Under no circumstances shall the communications conduit run beneath the concrete pad.

Where the Customer or their consultant proposes to utilize a concrete pad arrangement of an alternate design, engineered drawings shall be submitted to Newfoundland Power for approval prior to construction.

A fire-resisting barrier or mechanical protection may be required in certain circumstances. The requirements for these protection devices are outlined in the following sections.

An acceptable grounded grid shall also be installed surrounding the concrete base using 2/0 bare stranded copper ground wire. This grid shall be comprised of four 20 x 1800 ground rods with the copper wire installed 600 mm minimum below final grade in one continuous loop around the pad and then going in through the void in the pad for connection to the transformer. Sufficient slack (1.5 m) shall be left in the ground wire during installation for connection to the transformer. This installation is discussed in further detail in drawing 28-4 within in this document.

4.07 Fire-Resisting Barriers

A fire-resisting barrier shall be required if the transformer is installed within 3 m of any combustible surface or material on a building or within 6 m of any door, window, or ventilation opening on a building.

The fire-resisting barrier consists of one or more concrete walls installed between the transformer and the door, window, ventilation opening or combustible surface. The fire-resisting barrier may also be built with or without a concrete top. A concrete top will not be acceptable if the transformer is not readily accessible by vehicles to facilitate maintenance of the transformer.

Where a three-walled barrier is installed, the transformer cable compartment shall face towards the open side of the barrier. This is to provide workers with adequate access for installation, maintenance and/or repairs.

4.08 Mechanical Protection

Mechanical protection shall be used to protect the transformer from vehicular damage. This mechanical protection consists of bollards installed 1 m minimum from the transformer pad. The bollards shall be installed a maximum of 1.3 m apart and are only required on sides where the hazard exists.

A bollard consists of a 90 mm steel pipe, 2.4 m long, painted yellow, placed inside a grout filled, 150 mm PVC conduit. The conduit must then be capped at the bottom using a PVC solvent weld. Finally this combination is cemented into a 450 mm sonotube or equivalent and placed in a trench at the appropriate location.

The following drawing shows the standard installation of pad-mounted transformer mechanical protection. For more information the installations, including all notes, see drawing 28-4 attached in Appendix A.

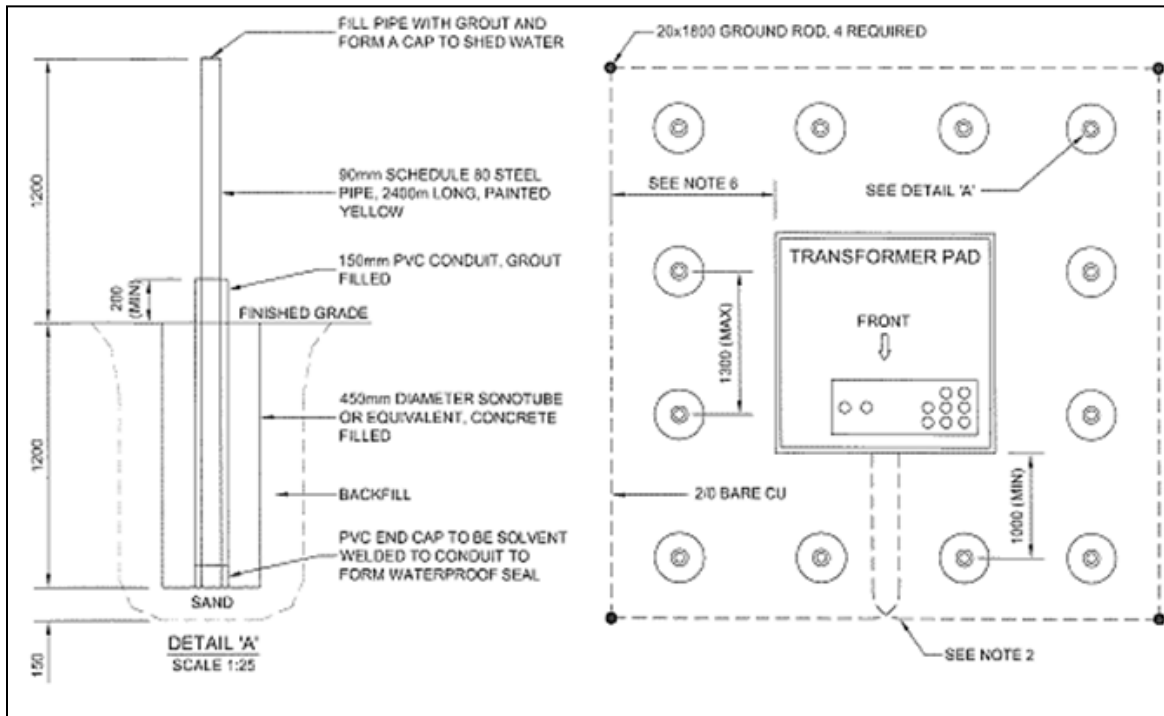


Figure 10: Transformer pad protection and grounding details

4.09 Definition of Backfill Materials

The material used for backfilling purposes shall generally be the material dug up during trenching. This material shall not contain any large or sharp rock which could possibly pierce the side of the conduit. Also the backfill material shall not contain organic material or an abundance of fine material. If the backfill is not adequate, a substitute, as defined below, shall be used.

Gravel Backfill – shall consist of well graded, free draining clean granular material containing no material larger than 70 mm in size and shall meet the minimum requirements for fines of Class B gravel as specified by the Department of Transportation.

All trenches should be backfilled by hand to the grade line in layers of backfill not exceeding 300 mm, except at road crossings where the backfill layers shall not exceed 150 mm. Each layer shall be thoroughly compacted with mechanical tampers until no further settling is present.

4.10 Definition of Fine Sand

The sand layer of material used to surround the conduit pipe shall not contain any stone or pebbles and shall be purged of fine material. Pea stone material shall not be an acceptable substitution for fine washed sand.

The sand shall be compacted so as to provide adequate protection to the buried duct. Measured from the center of the duct, a minimum of 150 mm of sand shall be placed above and below the duct.

5. Services Requiring Primary Voltages

5.01 General

Larger Customers may require services at the primary voltage level. The following are standard voltages⁷ supplied by Newfoundland Power at a primary level:

- a. 2400/4160 volts, three phase, four wire grounded wye
- b. 7200/12470 volts, three phase, four wire grounded wye
- c. 14400/24940 volts, three phase, four wire grounded wye

Generally, the Customers will receive service at one of the primary voltage levels listed above from an aerial distribution system. In this case, the Customer will be responsible for supplying and installing all distribution plant beyond the designated point of supply.

Detailed drawings of the installation including site plan and electrical one-line diagram along with detailed load information shall be provided to the Company by the Customer's electrical consultant.

The Company will be responsible for the review, modification and/or acceptance of the detailed drawings based on current standards. The Company will also determine the acceptable point of connection. Once the details are accepted, the installation of Customer-owned equipment may begin.

5.02 Primary Service Installation

For primary overhead service connection, Newfoundland Power normally supplies the following:

- a. Fused cut-outs on the supply end of the primary service connection.
- b. Fused links for over current protection on the Newfoundland Power primary service conductors.
- c. Solid links and Newfoundland Power feeder protective relaying for large primary services.

⁷ Not all primary voltages are available in all locations.

- d. Primary overhead service conductors and the primary service connection to the customer-owned load break device.

Newfoundland Power will supply and install all primary service conductors up to the point of delivery, which is typically a Newfoundland Power termination pole. A disconnecting device and primary metering installation will normally be installed on this terminal pole by Newfoundland Power.

The Customer shall supply and install a primary service pole and all aerial conductors beyond this primary service pole and shall supply the overhead conductor back to Newfoundland Power's terminal pole. Newfoundland Power will terminate the Customer-owned overhead conductor in Newfoundland Power's terminal pole. A disconnecting device shall be supplied and installed by the Customer in the Customer's primary service pole.

Where the primary service is an underground service from an overhead system, the Customer shall supply and install the underground primary cable from the Customer-owned primary service pole to the Customer's transformer.

5.03 Inspection, Maintenance and Ownership:

Before the connection of primary services, the Company must be provided with a letter of inspection from an inspector with jurisdiction in that area. The Company will also conduct a similar inspection to ensure the installation has been completed in accordance with the detailed drawings and all other Newfoundland Power requirements.

Once the inspection is completed and passed, the Customer maintains full ownership of the equipment beyond Newfoundland Power's terminal pole. The Customer shall be responsible for performing regular maintenance and testing on the equipment.

The Customer is responsible for implementing sufficient control means such that other Customers connected to the lines shall be provided a safe and reliable source of power.

If control measures are not implemented, the Utility reserves the right to request the changes be made and/or discontinue the service. If the measures are not implemented and other Customers are affected, a capital contribution for repair costs may be required from the primary service Customer.

6. Metering Requirements

6.01 General

All meter installations must comply with Newfoundland Power Metering Standards. Existing non-standard installations must be changed to conform with these standards when alterations are made to the service.

All meters are the property of Newfoundland Power and will normally be installed and removed by Newfoundland Power personnel. Under certain conditions where a Customer requires a meter to be temporarily removed, Newfoundland Power may authorize an electrical contractor to remove and install the meter. Newfoundland Power must be contacted before any work or disconnections are made.

Specialized metering installations that are not covered by these standards shall be developed by Newfoundland Power personnel.

6.02 Meter Locations

Metering equipment shall be surface mounted. Siding, brickwork, etc., shall not be installed around the metering equipment. Metering equipment shall be installed on top of the siding, brickwork, etc. This installation shall allow a minimum clearance of 0.6 m (2 ft) on all sides to facilitate meter removal/installation.

Under no circumstance will a Customer-owned meter socket be allowed to be mounted on a Newfoundland Power service pole.

The meter and associated metering equipment shall be in a location satisfactory to both the Utility and Inspection Authorities.

The center of the meter socket shall be installed within 1.8 m to 2.0 m above final grade.

Normally meter sockets are to be located on the outside of the building. Utility approval is required for meter sockets to be located inside of buildings with the exception of multiple occupancy buildings with more than four meter positions.

With multiple occupancy buildings with more than four meters, the meters may be located inside but they shall be conveniently grouped and readily accessible to meter readers and maintenance crews during normal business hours.

Meters shall not be located in bins, clothes closets, bathrooms, stairways, high ambient temperature rooms, dangerous or hazardous locations, locations where the headroom clearance is less than 2.2 m, or in any similar undesirable places.

Every meter shall be installed in a level position and solidly fixed to a wall or other support supplied by the Customer, free from excessive vibration.

A clear working space of 1.0 m minimum shall be provided in front of all metering panels. Passageways and working space shall be kept clear of temporary or permanent obstructions and shall not be used for storage purposes.

Meters shall not be recessed into walls, enclosed, boxed-in or otherwise obstructed so as to impede removal, reading, testing and/or re-installation of meters. No obstructions are permitted within 0.6 m (2 ft) of the meter socket.

Metering equipment shall not be installed within 1.8 m (6 ft) of a gas meter or propane tank unless separated by a suitable barrier.

6.03 Self-Contained Metering

6.03.1 General

Self-contained meters shall only be installed in locations in which a maximum of 200 amps per phase and/or a maximum of 347 volts phase-to-ground will be supplied.

Any service exceeding these requirements will need to utilize transformer-metering. Any existing service found to fall within the guideline for transformer-metering will need to be converted at the Customer's expense, or the service will no longer be provided due to safety reasons.

6.03.2 Standard Self-Contained Meter Configurations

Voltage	Phase/Wire	Connection	Socket	Drawing	Comments	Appendix Page Number
120/240	Single Phase, 3-wire	—	4 Jaw	30-2	N/A	46
120/208	Three Phase, 4-wire	Wye	5 Jaw	30-8	Fifth Jaw mounted in 9 o'clock position.	49
120/208	Three Phase, 4-wire	Wye	7 Jaw	30-10	N/A	50
347/600	Three Phase, 4 Wire	Wye	7 Jaw	30-11	N/A	51

Table 3: Standard Self-Contained Meter Configurations

Drawings of the standard self-contained meter configurations are included in Appendix A on the pages specified in Table 03.

It is the Customer's responsibility to supply a meter socket complete with a screw type sealing ring for Newfoundland Power's use that conforms to the latest edition of CSA Standard C22.2 No. 115: *Meter Mounting Devices*.

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

For all three phase services, a neutral connection to the meter is required. The main service neutral shall be connected to the socket neutral lug from within the meter socket.

6.04 Transformer-Rated Metering

6.04.1 General

Transformer-rated metering is required on services exceeding 200 amps per phase and/or where the nominal phase-to-ground voltage exceeds 347 volts.

Transformer-rated 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.

The instrument transformers are to be electrically connected on the load side of the service box immediately after the Customer's main service switch. The only exception to this regulation is with a 400 amp combination meter socket arrangement in which the current transformers will be contained within the meter socket. This arrangement is approved for residential applications only.

6.04.2 Current and Voltage Transformer Enclosure Specifications

Voltage Rating	No. Of Phases	Quantity Required		Minimum Cabinet Dimensions (mm)					
				200-400 Amp			500-800 Amp		
		C.T.	P.T.	Width	Height	Depth	Width	Height	Depth
120/240	1 Phase	2	-	500	500	250	750	750	250
120/240	3 Phase, 4 Wire Delta	3	-	750	750	250	900	900	250
120/208	3 Phase, 4 Wire Wye	3	-	750	750	250	900	900	250
347/600	3 Phase, 4 Wire Wye	3	2	750	750	250	Refer to Company for details		

Table 4: Current and Voltage Enclosure Specifications

The installation of current and voltage transformers shall conform to the CEC, Part I as well as Newfoundland Power’s metering standards.

The current and voltage transformer cabinets shall be supplied and installed by the Customer and have a mounting plate for the transformers. Plywood or other combustible backing plates are not permitted in these cabinets.

The current transformers will be supplied by the Company and installed by the Customer’s electrical contractor. Any necessary voltage transformers shall be supplied and installed by Newfoundland Power.

The current transformers contained within the 400 amp combination meter socket arrangement are purchased by the Customer as a complete unit.

For services over 800 amps, contact the Company for further details.

6.05 Secondary Wiring

- a. Electrical raceway shall be supplied and installed by the contractor from instrument transformer cabinets or primary metering equipment to meters in minimum sizes noted below:
 - i. Single phase service 2 & 3-wire meter, 32 mm (1 ¼”)
 - ii. Three phase, four-wire service, 32 mm (1 ¼”) minimum.

- b. The raceway shall be run as short as practicable: however no run may exceed 18 m or contain the equivalent of more than three 90-degree bends.

- c. All secondary wiring and metering equipment shall be bonded to ground in accordance with the CEC, Part I, Section 10.

6.06 Service (System) Neutral

The service (system) neutral is to be connected to all single phase meter sockets up to and including 200 amps. For single phase transformer rated installations, the instrument transformer cabinet must be bonded either through metallic conduit or suitably rated conductor. The neutral shall pass through the cabinet unbroken.

A neutral reference point must be provided for Newfoundland Power's use by the Customer in the instrument transformer cabinet via a CSA approved neutral lug which is attached to the unbroken service (system) neutral or via a #12 solid copper (white jacketed) wire attached to the neutral block in the main disconnect and terminated at a unique lug in the instrument transformer cabinet.

Every three phase, four wire system being metered with instrument transformers must have the neutral conductor grounded at the main service disconnect.

For further details on system neutral sizing requirements refer to the CEC Rule 4-022.

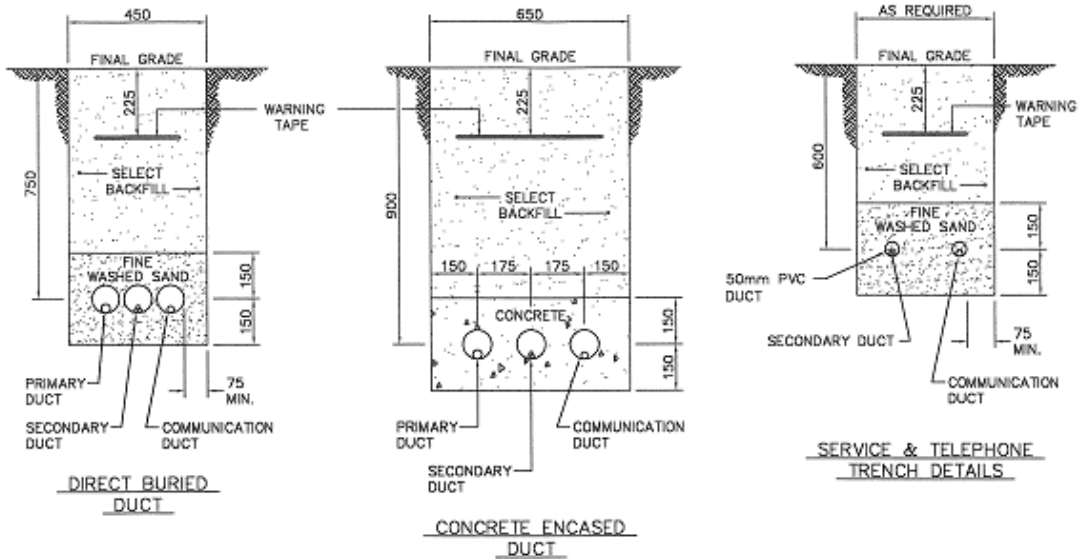
6.07 Primary Metering

Metering shall normally be conducted at the secondary distribution voltage level but, at the discretion of the Company, may be completed at the primary distribution level. If the Customer requires metering at the primary level, a capital contribution equal to the additional cost of the primary metering shall be paid to the Company.

These additional costs include the purchase and installation costs of the following:

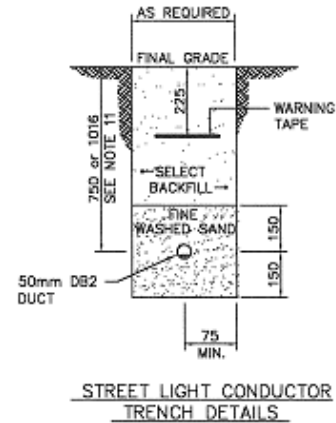
- a. Primary metering equipment.
- b. Installation of any poles, platforms, foundations, or other supporting structures required for the equipment.
- c. Changes and modifications to existing Newfoundland Power facilities required to accommodate the primary metering.
- d. Removal of any facilities required to accommodate the primary metering.
- e. Any other modifications or additions required to accommodate the installation.

Appendix A: Standard Drawings



NOTES:

1. CONCRETE TO HAVE A 28 DAY SPECIFIED STRENGTH OF 20 MPa WITH MAXIMUM AGGREGATE SIZE OF 20mm AND MAXIMUM SLUMP OF 75mm.
2. CONCRETE ENCASED DUCTS SHALL BE SUPPORTED BY APPROVED SPACERS PLACED AT 1200mm INTERVALS. NO WIRES OR METAL TIES ARE TO BE USED.
3. USE 100mm DIA. DUCT FOR EACH RUN OF PRIMARY CABLE AND 50mm DIA. DUCT FOR EACH RUN OF SECONDARY CABLE.
4. INSTALL MINIMUM #12 FISH WIRE IN EACH DUCT AND SECURELY CAP BOTH ENDS.
5. ALL FITTINGS, COUPLINGS, ETC. ARE TO BE SOLVENT WELD.
6. SPARE DUCTS SHALL BE INSTALLED AS REQUIRED.
7. ELECTRICAL DUCT SHALL BE PVC TYPE DB-2 OR APPROVED EQUIVALENT.
8. FOR MAXIMUM PULLING TENSION FOR PRIMARY AND SECONDARY CABLES SEE SECTION 25.
9. THE DIMENSIONS FOR TRENCH WIDTH AND DEPTH ARE TYPICAL DIMENSIONS AND MAY CHANGE DUE TO EXCAVATING EQUIPMENT, FIELD CONDITIONS AND NUMBER OF CIRCUITS REQUIRED.
10. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS.
11. WHERE THE INSTALLATION OF FENCING IS LIKELY TO OCCUR IN THE VICINITY OF NEWFOUNDLAND POWER'S UNDERGROUND STREET LIGHT CONDUCTOR, THE DEPTH OF THE CONDUIT SHALL BE INCREASED TO 1016mm, FOR ALL OTHER INSTALLATIONS A DEPTH OF 750mm IS ADEQUATE.



DISTRIBUTION STANDARDS



PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER

This Permit Allows
NEWFOUNDLAND POWER INC.

To practice Professional Engineering
in Newfoundland and Labrador.
Permit No. as issued by APBOL 00154
which is valid for the year 2010.

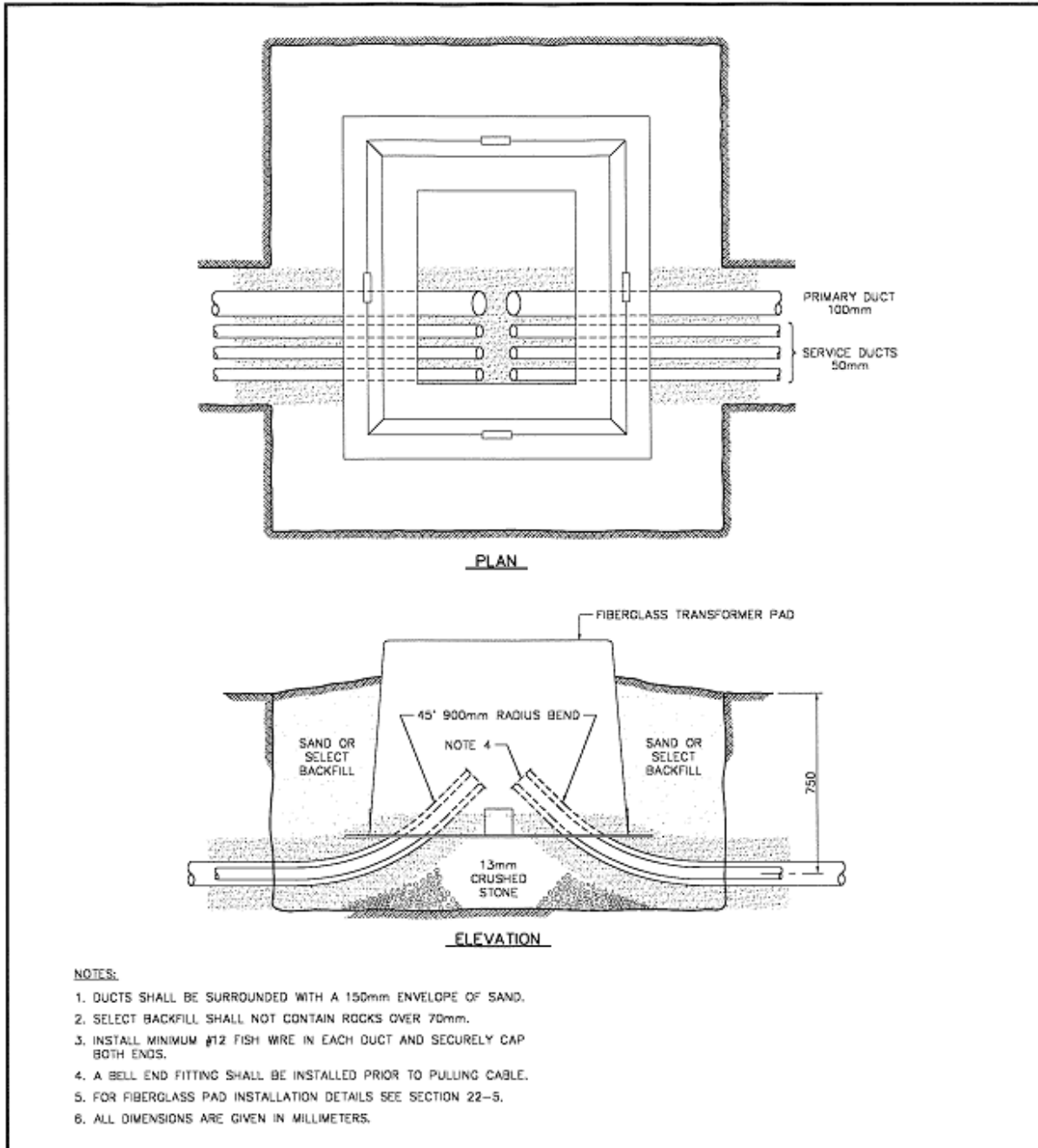
UNDERGROUND TRENCH DETAILS

Date: 00.11.16

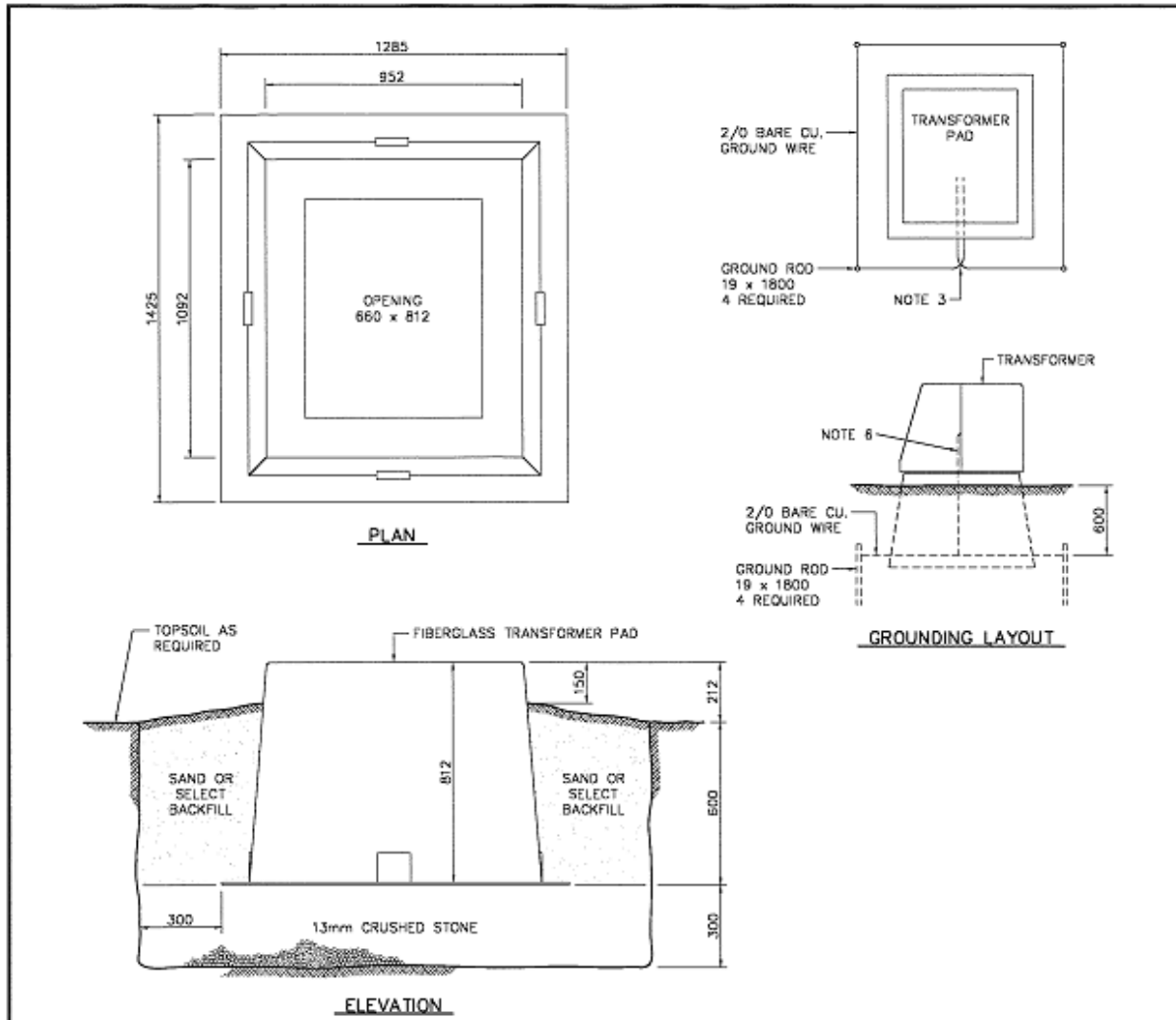
Drawn: J.K.

Rev.: 2010-08-20

STD No. **21-5**



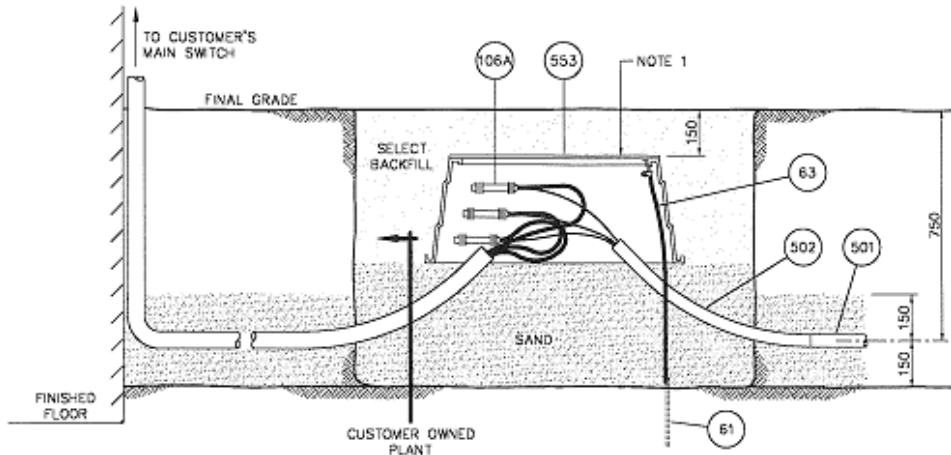
	DISTRIBUTION STANDARDS	NEWFOUNDLAND POWER A FORTIS COMPANY
	PROVINCE OF NEWFOUNDLAND PERMIT HOLDER This Permit Allows NEWFOUNDLAND POWER INC. <small>To practice Professional Engineering in Newfoundland and Labrador. Permit No. as issued by APEON 70032 which is valid for the year 1999.</small>	MINI-PADMOUNT TRANSFORMER DUCT ENTRANCE DETAILS
	Date: 99-07-31	Drawn: J.K.
	App: <i>ADG</i>	STD No. 21-8



NOTES:

1. FIBERGLASS PAD SHALL BE INSTALLED IN A TRULY HORIZONTAL POSITION ON A BASE OF 13mm CRUSHED STONE.
2. INSTALL 2/0 BARE COPPER GROUND WIRE IN ONE CONTINUOUS LENGTH TO FORM A LOOP AROUND THE PAD AND COME UP THROUGH VOID IN PAD, MINIMUM BURIAL DEPTH TO BE 600mm.
3. GROUND WIRE TO CROSS OVER AND BE CONNECTED AT THIS POINT.
4. SELECT BACKFILL SHALL NOT CONTAIN ROCKS OVER 70mm IN DIAMETER.
5. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS.
6. LEAVE SUFFICIENT SLACK (1.5m to 2m) IN GROUND WIRE FOR CONNECTION TO TRANSFORMER.

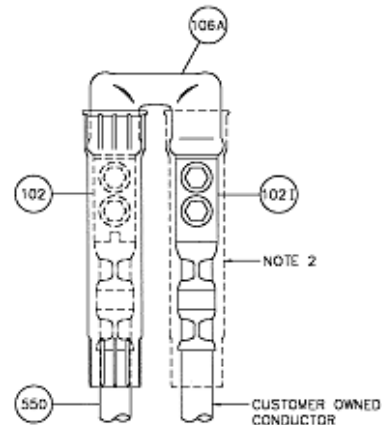
	DISTRIBUTION STANDARDS	NEWFOUNDLAND POWER A FORTIS COMPANY
	PROVINCE OF NEWFOUNDLAND PERMIT HOLDER This Permit Allows NEWFOUNDLAND POWER INC. <small>To practice Professional Engineering in Newfoundland and Labrador. Permit No. as issued by APBC's FPO012 which is valid for the year 2022.</small>	FIBERGLASS TRANSFORMER PAD INSTALLATION DETAILS AND GROUNDING GRID
	Date: 99-08-31	Drawn: J.K.
	App: <i>[Signature]</i>	STD No. 22-5



SERVICE ENCLOSURE DETAILS

NOTES:

1. THE STEEL COVER ON THE SERVICE ENCLOSURE SHALL BE GROUNDED USING MINIMUM #4 BARE COPPER TO A GROUNDING ROD.
2. WHEN ASSEMBLING THE SECONDARY BUS, INSTALL THE INSULATING SLEEVE ON THE CONDUCTOR PRIOR TO INSTALLING THE TERMINAL LUG. APPLY INHIBITING COMPOUND ON THE CONTACT SURFACES OF THE TERMINAL LUGS AND UNDERGROUND SERVICE BUS PRIOR TO TIGHTENING BOLTS. WIPE OFF EXCESS COMPOUND PRIOR TO INSTALLING INSULATING SLEEVE.
3. SELECT BACKFILL SHALL NOT CONTAIN ROCKS OVER 70mm IN DIAMETER.
4. CUSTOMER SHALL LEAVE AT LEAST 1.5m OF SLACK CONDUCTOR IN UNDERGROUND ENCLOSURE.
5. INSTALL BELL END FITTING PRIOR TO PULLING CABLE.
6. SERVICE CONDUCTORS ARE CONNECTED TO THE UNDERGROUND SERVICE BUS WITH STANDARD TRANSFORMER SPADE TERMINALS.
7. CONDUIT AND DUCT TO BE SEALED WITH DUCT SEAL.



SLEEVE INSTALLATION DETAILS

ITEM NO.	QUAN.	DESCRIPTION
61	1	ROD - GROUND, 19mm x 1800mm
63	A.R.	WIRE - COPPER GROUND
102C	1	TERMINAL - TRANSFORMER SPADE (NEUTRAL)
102D	2	TERMINAL - TRANSFORMER SPADE (PHASE)
102I	3	TERMINAL - TRANSFORMER SPADE 500 MCM CU.
106A	3	BUS - SERVICE ENTRANCE, 2 TERMINAL, U/G
501	A.R.	DUCT - PVC, 50mm
502	1	BEND - PVC DUCT, 50mm x 45 DEG., 90mm RAD.
550	A.R.	CABLE - U/G TRIPLEX, STR. CU., X-LINK
553	1	ENCLOSURE - U/G SERVICE



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which is valid for the year 1999.

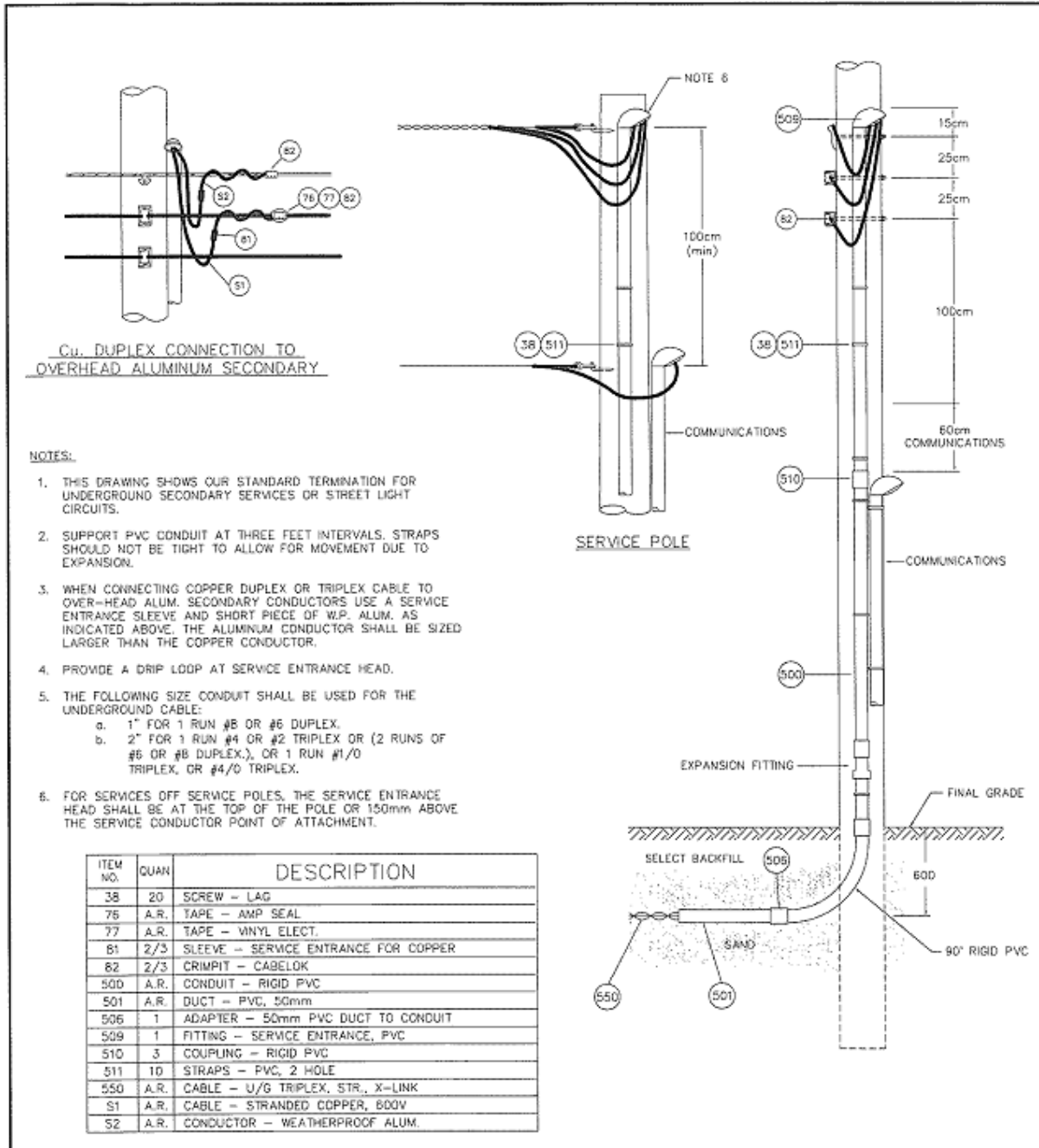
**400 AMP SERVICE
UNDERGROUND CONDUCTOR
TERMINATION DETAILS**

Date: 99-08-31

Drawn: J.K.

App: *[Signature]*

STD No. **23-5**



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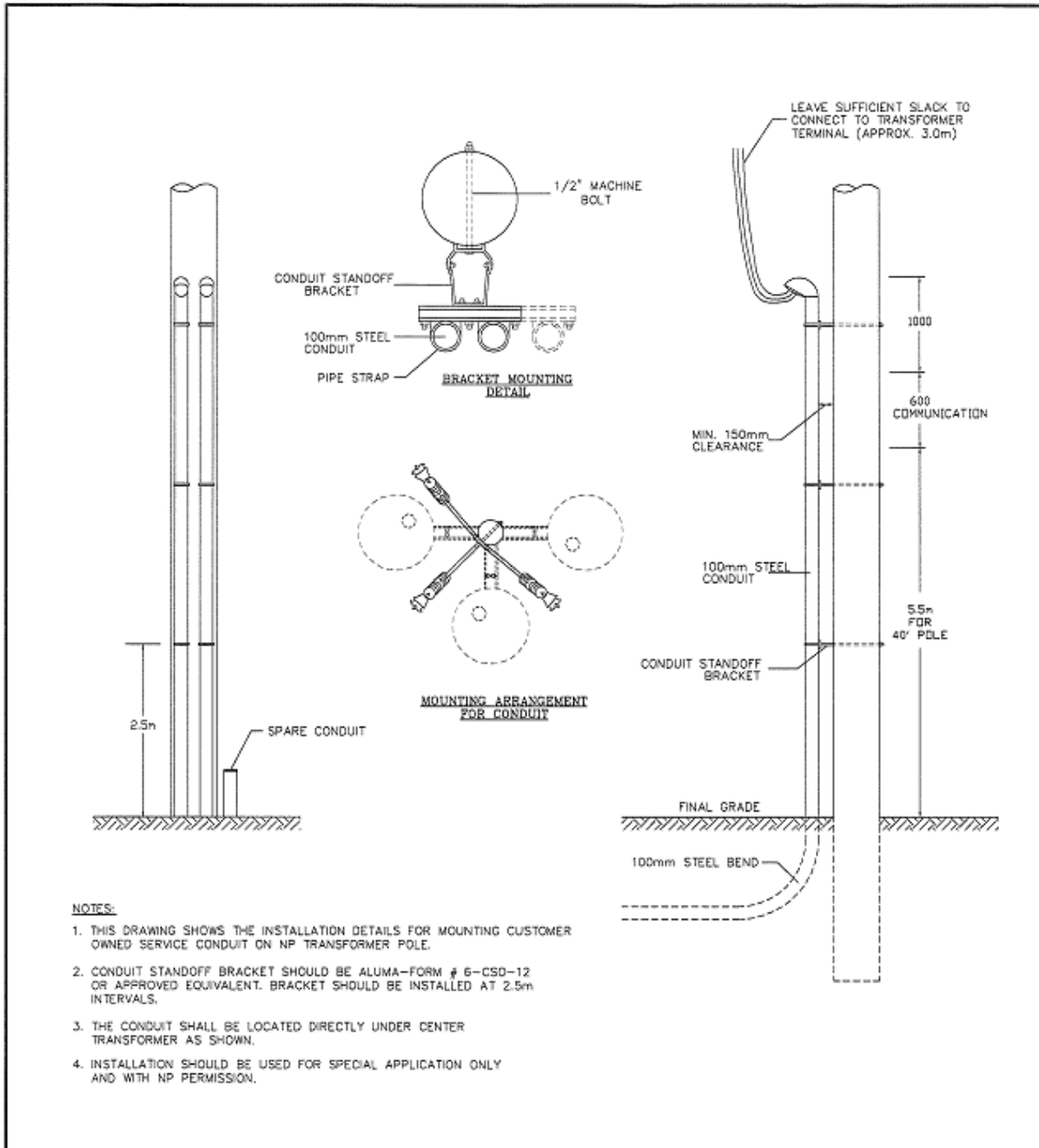


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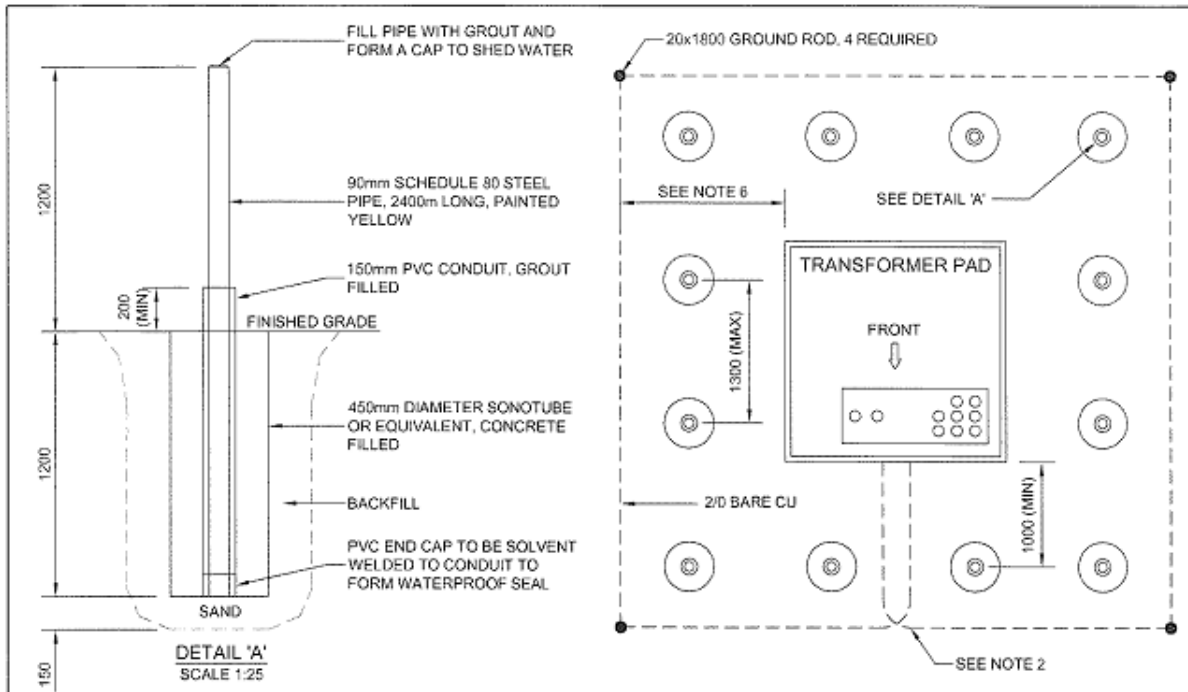
This Permit Allows
NEWFOUNDLAND POWER INC.
to practice Professional Engineering
in Newfoundland and Labrador.
Permit No. as issued by APEGNL 090325
which is valid for the year 2012.

SECONDARY CABLE TERMINATION

Date:	00.11.16	Drawn:	J.C.
REV.:	11.12.02	STD No.	27-2



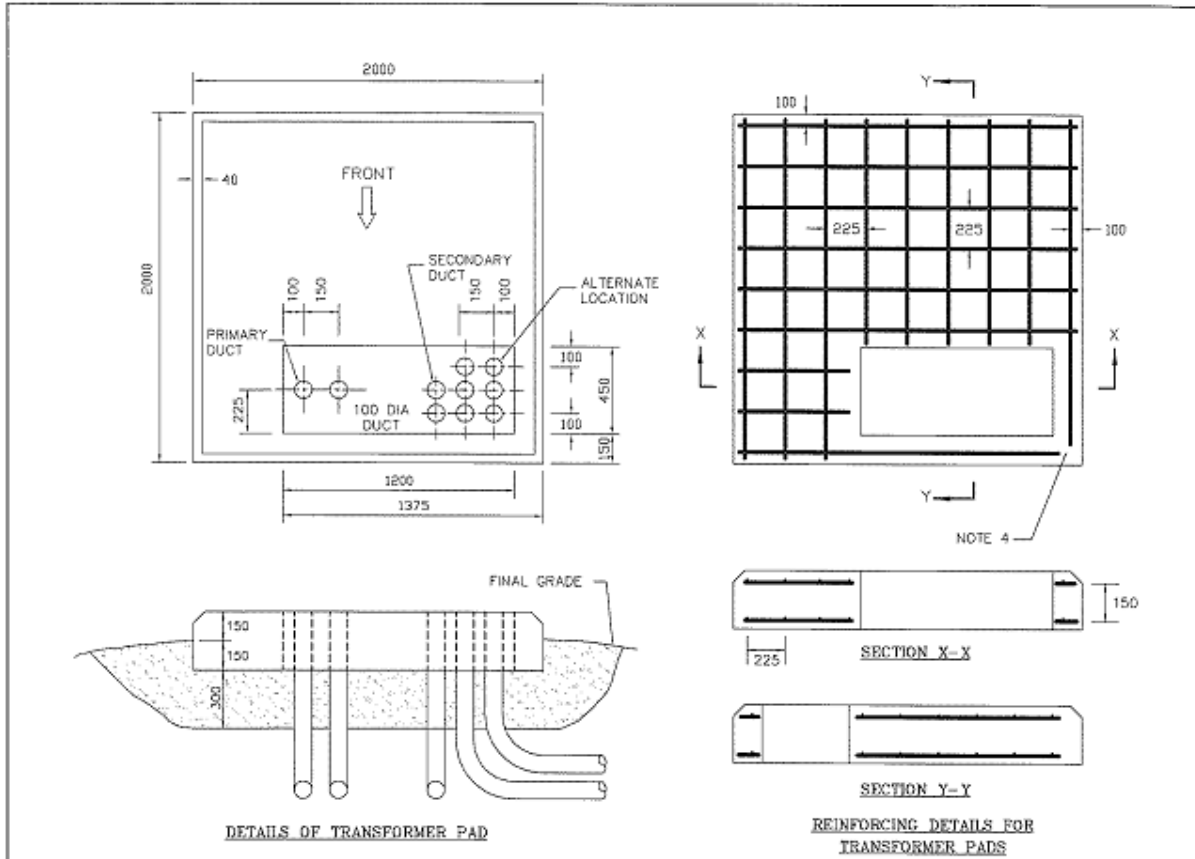
	DISTRIBUTION STANDARDS		 NEWFOUNDLAND POWER A FORTIS COMPANY	
	PROVINCE OF NEWFOUNDLAND PERMIT HOLDER This Permit Allows NEWFOUNDLAND POWER INC. To practice Professional Engineering in Newfoundland and Labrador. Permit No. as issued by APPEL - 10032, which is valid for the year 1998.		UNDERGROUND SECONDARY TERMINATION CUSTOMER OWNED	
		Date: 99-09-30	Drawn: J.C.	
		App: <i>AYB</i>	STD No. 27-3	



NOTES:

1. INSTALL 2/D BARE STRANDED COPPER GROUND WIRE IN ONE CONTINUOUS LENGTH TO FORM LOOP AROUND THE PAD AND COME UP THROUGH VOID IN PAD. MINIMUM BURIAL DEPTH TO BE 600mm. LEAVE SUFFICIENT SLACK (1.5m) IN GROUND WIRE FOR CONNECTION TO TRANSFORMER.
2. GROUND WIRE TO CROSS OVER AND BE CONNECTED AT THIS POINT WITH CONNECTOR APPROVED FOR DIRECT BURIAL.
3. WHERE VEHICULAR TRAFFIC MAY BE A HAZARD, BOLLARDS SHALL BE INSTALLED. BOLLARDS ARE ONLY REQUIRED ON SIDES WHERE THE HAZARD EXISTS.
4. BOLLARDS SHALL BE PLACED SO AS NOT TO OBSTRUCT OPERATION OF THE DOORS OR TRANSFORMER COMPONENTS.
5. WHERE BOLLARDS ARE REQUIRED, THEY SHALL BE INSTALLED A MINIMUM OF 1000mm FROM THE TRANSFORMER PAD.
6. THE GROUND WIRE LOOP SHALL BE INSTALLED 1000mm FROM THE TRANSFORMER PAD, WHEN BOLLARDS ARE NOT REQUIRED. WHEN BOLLARDS ARE REQUIRED, THE GROUND LOOP SHALL BE INSTALLED OUTSIDE THE BOLLARDS AT 1500mm FROM THE TRANSFORMER PAD.
7. PVC CONDUIT, OR EQUIVALENT, MUST BE INSTALLED TO INSULATE THE STEEL PIPE AND PREVENT TRANSFER OF TOUCH POTENTIAL IN THE EVENT OF A FAULT.

	DISTRIBUTION STANDARDS		
	TRANSFORMER PAD PROTECTION AND GROUNDING DETAILS		
PROVINCE OF NEWFOUNDLAND PERMIT HOLDER This Permit Allows NEWFOUNDLAND POWER INC. To practice Professional Engineering in Newfoundland and Labrador. Permit No. as issued by APEER - 00134 which is valid for the year 2012.	Date: 11-12-01 App:	Drawn: R. POWER STD No. 28-4	

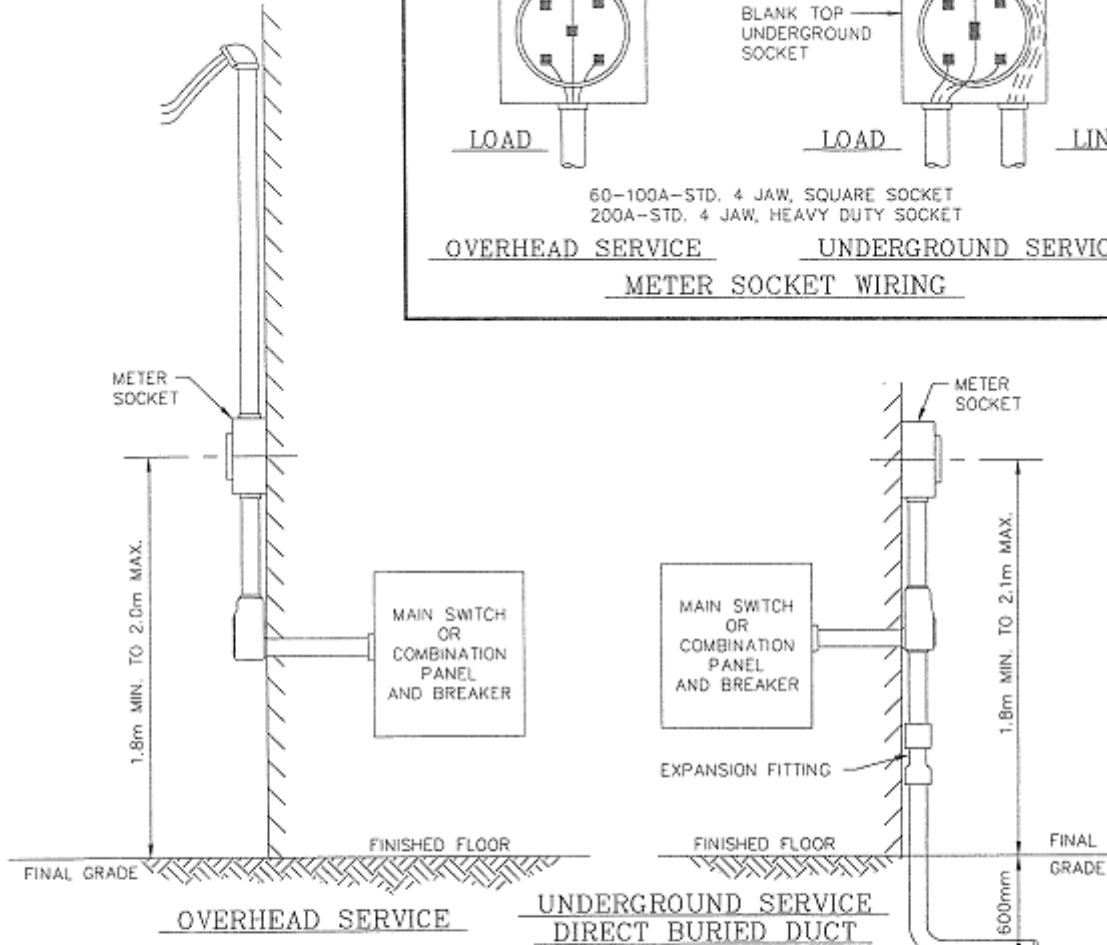
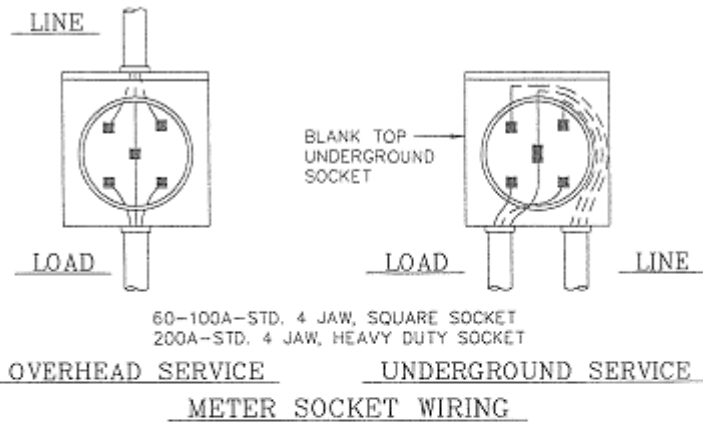


NOTES:

1. CONCRETE TO HAVE A 28 DAY SPECIFIED STRENGTH OF 28 MPa WITH MAXIMUM AGGREGATE SIZE OF 40mm. THE MAXIMUM SLUMP TO BE 50mm.
2. REINFORCING BARS SHALL BE 16mm (#15) DEFORMED INTERMEDIATE GRADE BILLET STEEL.
3. CONCRETE SURFACE TO BE LEVEL AND HAVE A SMOOTH FINISH TO ALLOW WATER RUN OFF.
4. REINFORCING BARS MUST NOT FORM A COMPLETE MAGNETIC PATH AROUND SPACE LEFT FOR CABLES AND DUCTS. A GAP SHALL BE PROVIDED IN THE REINFORCING BARS AS SHOWN.
5. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS.

	DISTRIBUTION STANDARDS		NEWFOUNDLAND POWER A FORTIS COMPANY	
	PROVINCE OF NEWFOUNDLAND PERMIT HOLDER This Permit Allows NEWFOUNDLAND POWER INC. To practice Professional Engineering in Newfoundland and Labrador. Permit No. as issued by #PESN 00036 which is valid for the year 2012.		TRANSFORMER CONCRETE PAD DETAILS	
		Date: 11-12-01	Drawn: R. POWER	
		App:	STD No. 28-5	

NOTE: FOR SERVICE ATTACHMENT
SPOOL DETAILS SEE DWG. No. 30-14.



NOTES

1. INSTALLATION SHALL CONFORM TO THE CANADIAN ELECTRICAL CODE, PART 1, LATEST VERSION.
2. METER SOCKET, RING TYPE, RATED 600V, SHALL BE SUPPLIED AND INSTALLED BY CUSTOMER.
3. SUBJECT TO PRIOR APPROVAL OF THE COMPANY, FOR OVERHEAD SERVICES ONLY, METER SOCKET MAY BE INSTALLED INDOORS AND WIRED ON THE LINE SIDE OF THE MAIN SWITCH IN CASES WHERE OUTDOOR LOCATION IS IMPRACTICAL.
4. FOR DIRECT BURIED CABLE APPLICATIONS, EXPANSION FITTING AND 90° RIGID PVC BEND MAY BE ELIMINATED.

SEE NOTE 4



STANDARD SERVICE & METERING ARRANGEMENT



PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
This Permit Allows
NEWFOUNDLAND POWER INC.

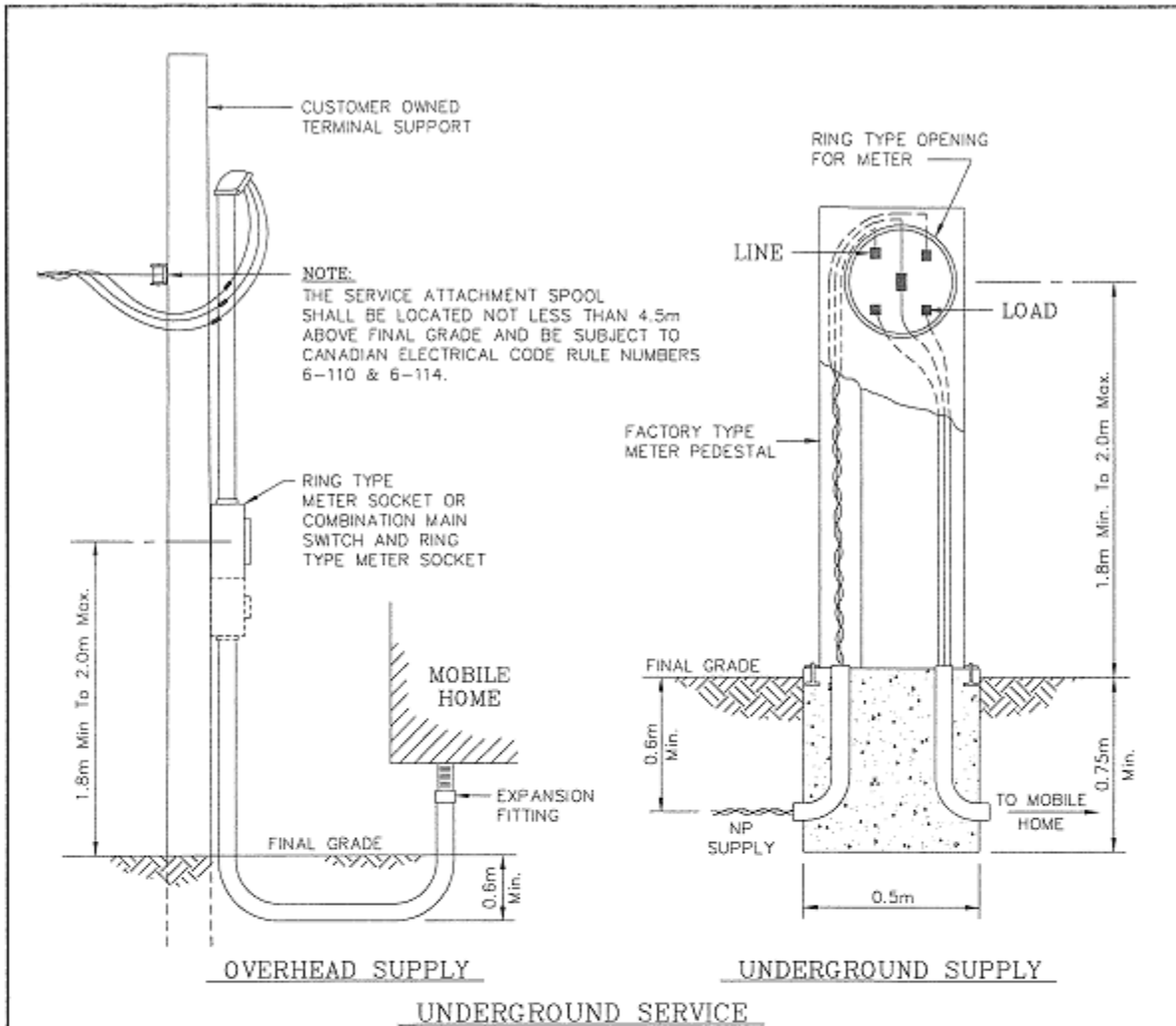
120/240 VOLT, 1 PHASE, 3WIRE
SINGLE OCCUPANCY, 60-200 AMP SERVICE

Date: 85-02-14

REV. DATE: 01/03/05

App:

STD No. **30-2**



NOTES:

1. INSTALLATION SHALL CONFORM TO THE CANADIAN ELECTRICAL CODE, PART 1, LATEST VERSION.
2. CUSTOMER IS RESPONSIBLE FOR INSTALLATION AND MAINTENANCE, AND WILL MAINTAIN OWNERSHIP OF ALL WIRING AND EQUIPMENT UP TO AND INCLUDING THE SUPPLY AND INSTALLATION OF THE TERMINAL SUPPORT OR METER PEDESTAL.
3. TERMINAL SUPPORT SHALL BE MINIMUM CLASS 4 TREATED POLE OR 200mm x 200mm TREATED TIMBER.
4. AMPLE SLACK TO BE LEFT IN UNDERGROUND CONDUCTORS TO ALLOW FOR FROST HEAVING.
5. SUBJECT TO PRIOR APPROVAL OF THE COMPANY, OTHER TYPE METER PEDESTALS MAY BE USED.
6. METER PEDESTAL OR TERMINAL SUPPORT SHALL BE LOCATED TO ALLOW MOVING THE MOBILE HOME INTO AND OUT OF POSITION.



STANDARD SERVICE & METERING ARRANGEMENT



PROVINCE OF NEWFOUNDLAND

PERMIT HOLDER
This Permit Allows
NEWFOUNDLAND POWER INC.

To practice Professional Engineering
in Newfoundland and Labrador
Permit No. as issued by APEC 20000
which is valid for the year 2021.

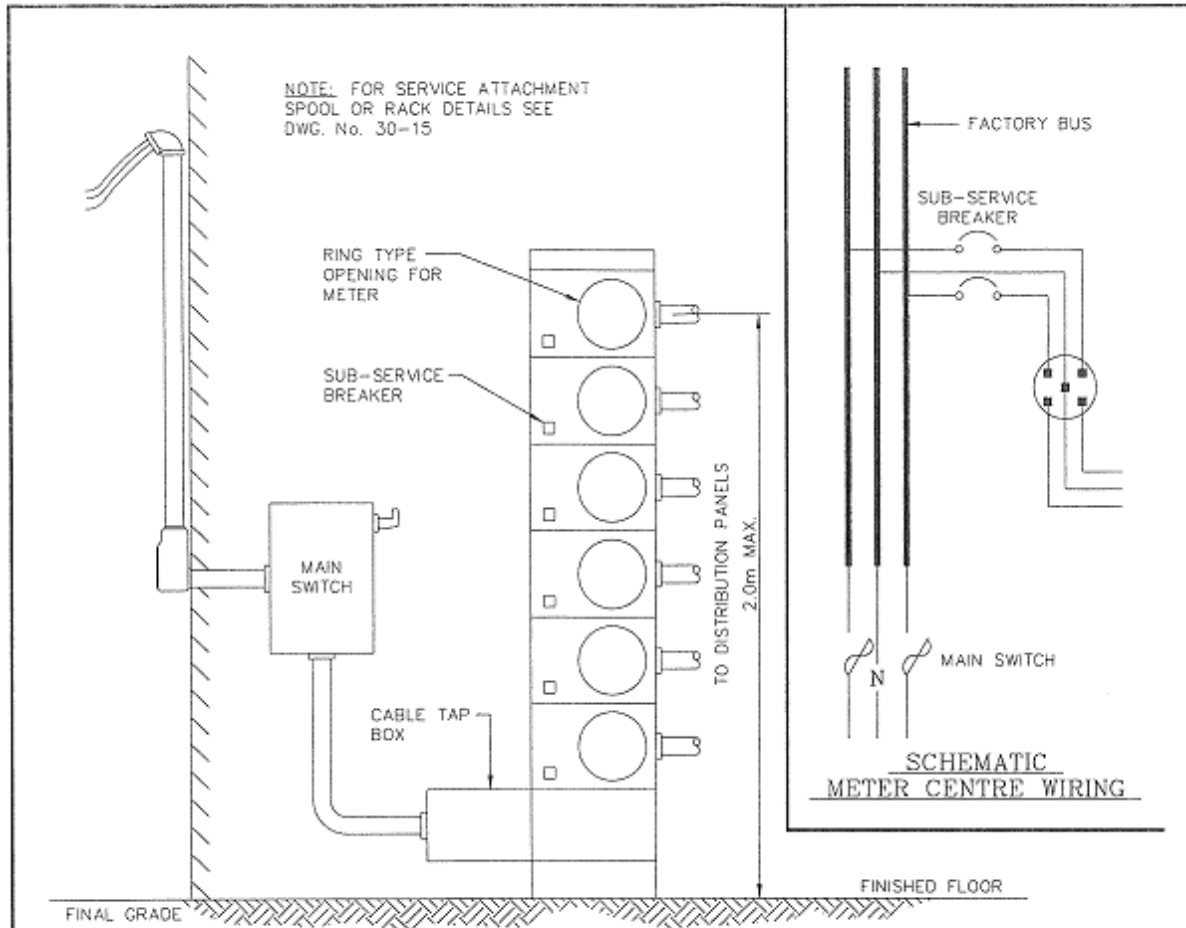
120/240 VOLT, 1 PHASE, 3 WIRE
60-200 AMP SERVICE, MOBILE HOME INSTALLATION

Date: 85-02-14

REV. DATE: 01/03/05

App:

STD No. **30-5**



METER CENTRE ARRANGEMENT

NOTES

1. INSTALLATION SHALL CONFORM TO THE CANADIAN ELECTRICAL CODE, PART 1, LATEST VERSION.
2. METER CENTRE SHALL BE SUPPLIED AND INSTALLED BY CUSTOMER.
3. METER CENTRE SHALL BE COLD METERED.
4. EACH POSITION SHALL BE LABELLED TO INDICATE CLEARLY WHICH SECTION OF THE INSTALLATION IT CONTROLS.
5. FOR INSTALLATION LARGER THAN SIX POSITIONS, THE ARRANGEMENT SHALL BE SUBJECT TO PRIOR APPROVAL OF THE COMPANY.



STANDARD SERVICE & METERING ARRANGEMENT



PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
This Permit allows
NEWFOUNDLAND POWER INC.
to practice Professional Engineering
in Newfoundland and Labrador.
Permit No. as issued by APESL 00080
which is valid for the year 2014.

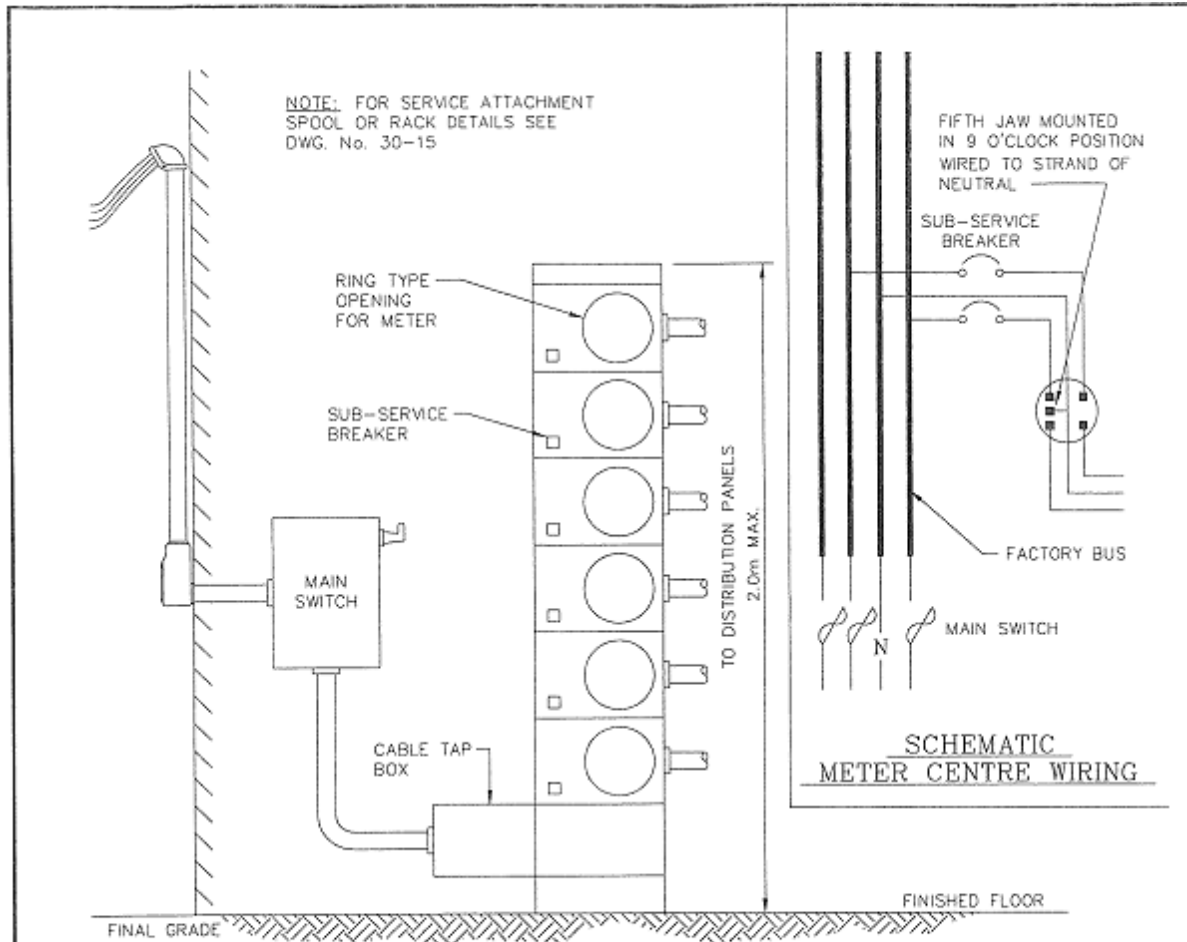
120/240 VOLT, 1 PHASE, 3 WIRE
MULTIPLE OCCUPANCY SERVICE UP TO 600 AMP MAX.

Date: 85-02-14

REV. DATE: 01/03/05

App:

STD No. **30-7**



METER CENTRE ARRANGEMENT

NOTES

1. INSTALLATION SHALL CONFORM TO THE CANADIAN ELECTRICAL CODE, PART 1, LATEST VERSION.
2. METER CENTRE SHALL BE SUPPLIED AND INSTALLED BY CUSTOMER.
3. METER CENTRE SHALL BE COLD METERED.
4. EACH POSITION SHALL BE LABELLED TO INDICATE CLEARLY WHICH SECTION OF THE INSTALLATION IT CONTROLS.
5. FOR INSTALLATION LARGER THAN SIX POSITIONS, THE ARRANGEMENT SHALL BE SUBJECT TO PRIOR APPROVAL OF THE COMPANY.
6. THIS METERING ARRANGEMENT SHALL BE USED FOR INDIVIDUAL TENANTS OCCUPYING SPACE IN A MULTIPLE OCCUPANCY BUILDING WHERE THE COMPANY PROVIDES ONE 3 PHASE, 4 WIRE, 120/208 VOLT SERVICE TO THE COMPLETE BUILDING.



STANDARD SERVICE & METERING ARRANGEMENT



PROVINCE OF NEWFOUNDLAND



PERMIT HOLDER
This Permit Allows
NEWFOUNDLAND POWER INC.

As a Registered Professional Engineer
in Newfoundland and Labrador
Permit No. as issued by APEBC 20085.
Valid to valid for the year 2009.

**120/208 VOLT, 3 PHASE, 4 WIRE
MULTIPLE OCCUPANCY SERVICE 1 PHASE NETWORK**

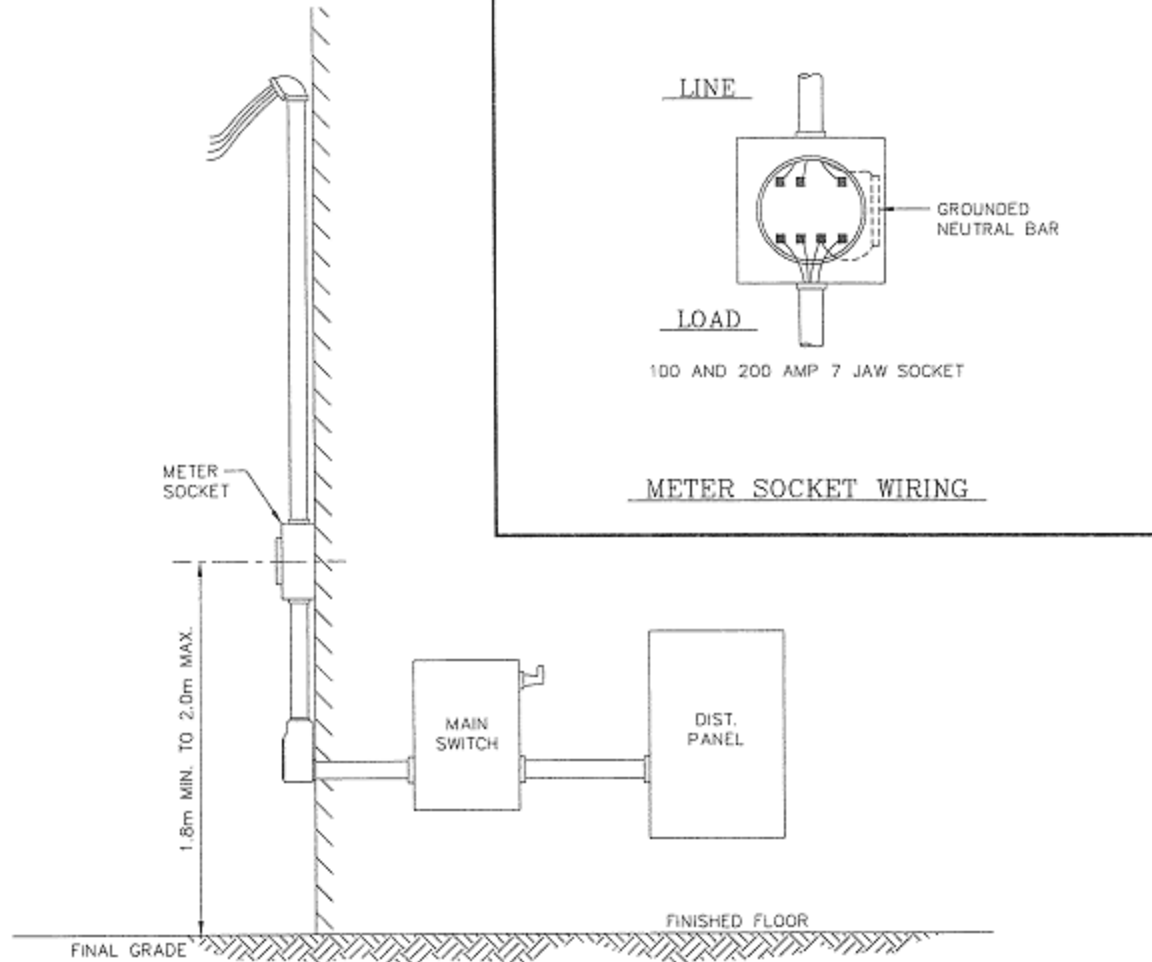
Date: 85-02-14

REV. DATE: 01/03/05

App:

STD No. **30-8**

NOTE: FOR SERVICE ATTACHMENT
SPOOL OR RACK DETAILS SEE
DWG. No. 30-15.



NOTES

1. INSTALLATION SHALL CONFORM TO THE CANADIAN ELECTRICAL CODE, PART 1, LATEST VERSION.
2. METER SOCKET, RING TYPE, RATED 600V, SHALL BE SUPPLIED AND INSTALLED BY CUSTOMER.
3. SUBJECT TO PRIOR APPROVAL OF THE COMPANY, METER SOCKET MAY BE INSTALLED INDOORS IN CASES WHERE OUTDOOR LOCATION IS IMPRACTICAL.



STANDARD SERVICE & METERING ARRANGEMENT



PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
This Permit Allows
NEWFOUNDLAND POWER INC.

To practice Professional Engineering
in Newfoundland and Labrador,
Permit No. as issued by APECA 20885,
which is valid for the year 2001.

**120/208 VOLT, 3 PHASE, 4 WIRE WYE
SINGLE OCCUPANCY, 100 & 200 AMP SERVICES**

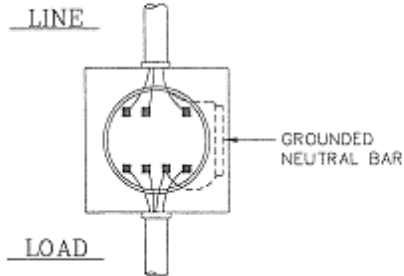
Date: 85-02-14

REV. DATE: 01/03/05

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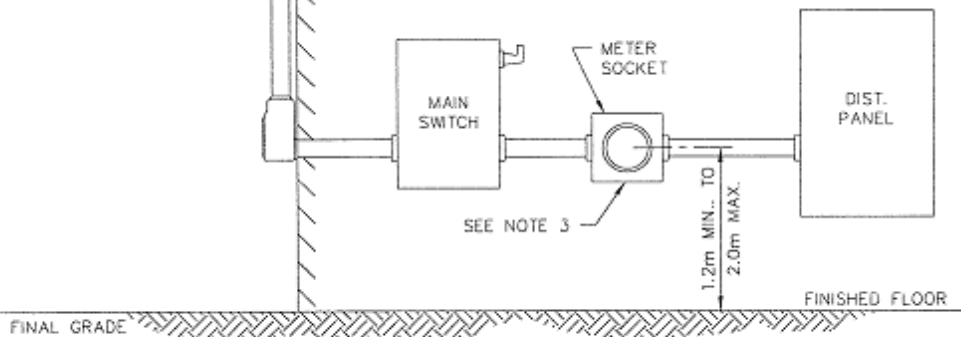
STD No. **30-10**

NOTE: FOR SERVICE ATTACHMENT
SPOOL OR RACK DETAILS SEE
DWG. No. 30-15.



100 AND 200 AMPERE 7 JAW SOCKET

METER SOCKET WIRING



NOTES

1. INSTALLATION SHALL CONFORM TO THE CANADIAN ELECTRICAL CODE, PART 1, LATEST VERSION.
2. METER SOCKET, RING TYPE, RATED 600V, SHALL BE SUPPLIED AND INSTALLED BY CUSTOMER.
3. THE MAIN SWITCH MUST BE INSTALLED ON THE LINE SIDE OF THE METER REGARDLESS OF WHETHER IT IS INDOORS OR OUTDOORS. FOR MULTIPLE OCCUPANCY SERVICES, LOAD SWITCHES MUST ALSO BE INSTALLED ON THE LINE SIDE OF THE METER.
4. IF METER IS INSTALLED OUTDOORS, METER TO BE INSTALLED AT A HEIGHT OF 1.8m MINIMUM TO 2.0m MAXIMUM ABOVE FINAL GRADE.



STANDARD SERVICE & METERING ARRANGEMENT



PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
This Permit Allows
NEWFOUNDLAND POWER INC.
To provide Professional Engineering
to Newfoundland and Labrador.
Permit No. as issued by APEBC - 00000.
which is valid for the year 2005.

347/600 VOLT, 3 PHASE, 4 WIRE
SINGLE OCCUPANCY, 100 & 200 AMP SERVICES

Date: 85-02-14

REV. DATE: 01/03/05

App:

STD No. **30-11**

