

Metering Requirements 750 Volts or Less



TORONTO HYDRO

METERING REQUIREMENTS 750 VOLTS OR LESS

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PREPARED BY: *F. Pignataro, P.ENG*
Frank Pignataro, P. Eng, Engineering Planning

REVIEWED BY: *[Signature]*
Sandro Nasso, Director, Investment Planning

<u>CERTIFICATE OF APPROVAL</u> THIS TECHNICAL SPECIFICATION MEETS THE SAFETY REQUIREMENTS OF SECTION 4 OF ONTARIO REGULATION 22/04	
<u><i>F. Pignataro, P.ENG</i></u> Frank Pignataro, P. Eng INVESTMENT PLANNING	<u><i>August 6, 2019</i></u> DATE

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1. SCOPE

1.1 Toronto Hydro Requirements

This publication covers the requirements of Toronto Hydro, in addition to the requirements of the “Supply Authority” stated in the Ontario Electrical Safety Code, for service entrance, connection, and metering of electrical energy to Toronto Hydro customers for Permanent and Temporary Services.

1.2 Ontario Electrical Safety Code

Nothing contained in these Requirements shall prejudice or supersede any requirements of the Ontario Electrical Safety Code or affect regulations of existing building codes, unless specifically stated herein.

Some of these requirements identified by the latest edition of the Ontario Electrical Safety Code have been included for convenience and reference purposes, even though they may be under the Electrical Safety Authority (ESA) jurisdiction.

2. PURPOSE

This document is intended to provide guidance to Toronto Hydro customers and their agents in the design, preparation of plans and construction of the proposed service installation with respect to revenue metering. The requirements apply to all new, rearranged or upgraded services, both permanent and temporary, and are intended to provide an efficient and safe supply of electrical energy with respect to revenue metering.

It shall be the responsibility of the Customer to conform to the latest edition of the Toronto Hydro Conditions of Service and the Ontario Electrical Safety Code.

3. DEFINITIONS, PUBLICATIONS AND THE INTERNATIONAL SYSTEM OF UNITS

3.1 Definitions

3.1.1 In addition to the definitions stated in Section “0” of the Electrical Safety Code, the following meanings have been ascribed to the already defined or new terms.

Acceptable	Meets Toronto Hydro Requirements.
Approval	Approval of drawings and customer’s equipment is limited to Toronto Hydro’s requirements and should not be construed as acceptance of liability due to faulty design and/or workmanships.
Compartment	A subdivision of a switchgear/switchboard unit.

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Customer/ Consumer	The person or persons, firm, Corporation or their agents who request or use Toronto Hydro Services.
Meter-Mounting Devices	A meter socket or a meter cabinet.
Switchboard	A full height and full depth module of a switchgear or switchboard assembly. It is sometimes referred to as “cell”, “unit”, ‘cubicle” or “section”.

3.2 Associated Publications and Standards

In addition to all applicable Toronto Hydro Standards and the applicable reference publications listed in the latest edition of the Ontario Electrical Safety Code, the following publications shall also apply:

- Toronto Hydro Conditions of Service
- Ontario Electrical Safety Code
- Canadian Standards Association (CSA) Standard, C22.2 No. 4, Enclosed Switches
- CSA Standard, C22.2 No. 31, Switchgear Assemblies
- CSA Standard, C22.2 No. 115, Meter - Mounting Devices
- Electrical and Electronic Manufacturers Association of Canada (EEMAC) Standard for Switchgear Assemblies G8 – 2
- The Ontario Municipal Engineers Association (MEA) Guide to Municipal Standard Construction Part V-Metering and Service Entrance Equipment
- Electrical and Electronic Manufacturers Association for Revenue Metering Equipment in Switchgear Assemblies G10-1
- Ontario Building Code
- The *Occupational Health and Safety Act* and Regulations for Industrial Establishments
- CSA Standard, C235-83 – Preferred Voltage Levels for AC Systems 0 to 50,000 V

NOTE: All publications shall be of the latest edition.

3.3 The International System of Units

SI units have been used in this publication for measurements and weights. The metric units have been rounded as close as possible to the previously used units. Equipment or materials not available in metric units shall be equal to or larger than the units specified in this publication.

All drawings submitted by customers shall be in metric units.

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4. PROCEDURE FOR SERVICE APPLICATION

4.1 Approval Routine

4.1.1 Initial Data Requirements

Application for supply of service shall include service address, load details, size and location of service and desired service date.

4.1.2 Drawings Required

Once the type of service has been determined, detailed drawings and specifications shall be submitted for review and acceptance (see Section 4.2).

4.1.3 Approvals Prior to Manufacture

Manufacture or work associated with the installation of equipment should start only after the design has been reviewed and accepted by Toronto Hydro.

4.2 Engineering Drawings and Specifications

4.2.1 Drawings Required for Acceptance

Fully dimensioned and scaled drawings submitted for Toronto Hydro's review and acceptance shall include but not be limited to the following list:

- (a) Electrical room layout drawing showing the location of the electrical switchboard and all revenue metering (meter cabinets and or meter centres). (2)
- (b) Single line distribution diagram. (2)
- (c) Manufacturer's or shop drawings of the proposed switchboard, with a utility compartment detail drawing. (2)
- (d) Meter centre drawings. (2)

The minimum number of copies of drawings required is indicated in brackets. This requirement may change without notice. Additional drawings may be requested.

4.2.2 Drawing Revisions

If any drawings require revision, Toronto Hydro will determine the number of copies of each drawing to be re-submitted for further review and acceptance.

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4.3 Service Change, Relocations and New Services

4.3.1 Meter Installation and Meter Disconnection

Under no circumstances is the Toronto Hydro meter seal to be cut or tampered with, or the meter to be removed from its socket by the Customer or their representative. The activity of a meter installation or meter disconnection shall only be performed by Toronto Hydro. For a meter installation or meter disconnection, the customer or their representative is to call 416-542-2533.

5. SERVICE ENTRANCE AND ELECTRICAL ROOMS

5.1 General Requirements

5.1.1 Residential Outdoor Meters

Meters for new, changed or relocated residential services (not including high rise apartment and condominium buildings) shall be mounted outdoors.

5.1.2 Non-Residential Meters – 300 Volts or Less

Meters for new, changed or relocated commercial/industrial services may be mounted indoors or outdoors provided the location is approved by Toronto Hydro.

5.1.3 Non-Residential Meters – Greater than 300 Volts

Meters for new, changed, or relocated commercial/industrial services shall be mounted indoors. A meter used for a temporary service can be mounted outdoors, provided it is installed in a weatherproof enclosure.

5.2 Legislation and Specified Requirements

Where a service entrance electrical room contains a switchboard, the means of egress from such a hazardous room shall conform to the latest revisions of the Ontario Building Code and to the Ontario *Occupational Health and Safety Act* and Ontario Regulation 851 for Industrial Establishments made thereunder.

5.3 Exit Doors and Hardware

In addition to Section 3.4 of the Ontario Building Code on “Exits”, the following shall be provided:

Exit Doors

- (i) Exit doors shall open in the direction of exit travel and shall be equipped with panic type hardware.

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- (ii) No exit door shall open directly to the street or open space where there is danger of blockage from ice or snow and pedestrian or vehicular traffic. Such situations shall be discussed with Toronto Hydro to find solutions.
- (iii) Exit doors shall be clearly identified.

5.4 600 Volt Delta and 347/600 Volt Y – In Electrical Rooms

600 Volt Delta and 347/600 Volt Y services are NOT ACCEPTABLE in the same electrical room.

5.5 Fire Pump Services

Fire pump service shall be metered using a 1220 mm x 1220 mm x 305 mm (48" x 48" x 12") meter cabinet.

6. SWITCHBOARDS

6.1 Compartments

6.1.1 Compartment Isolation

The following items of equipment shall be isolated by means of separate compartments:

- (a) Each service entrance switch or breaker (CSA Standard C22.2 No. 4).
- (b) Each set of Toronto Hydro revenue metering instrument transformers.

NOTE: Barriers shall be installed between metered and unmetered sections.

6.2 Electrical Clearances

6.2.1 Canadian Standards Association (CSA) Requirements

Where cable or bus connections are made to any component supplied or installed by Toronto Hydro (i.e. revenue metering current and voltage transformers), such connections shall be assumed to be bare conductor and full clearances shall be maintained in accordance with the following CSA table and note, below:

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Table 3 of CSA Standard C22.2 No. 31, M89

Nominal voltage Rating (v)	Minimum Spacing (mm)			
	Opposite Polarity		To ground	
	Through Air	Over Surface	Through Air	Over Surface
120 ac	12.5	19	12.5	19
240 ac	19	31	19	25
480 ac	22	44	22	34
600 ac	25	50	25	38

NOTE: Where a neutral is involved, the spacing between the neutral and other current-carrying parts may be based on the lower voltage that normally occurs between them. The spacing from neutral to grounded metal parts are to be the same as those between the current carrying conductors and grounded metal parts.

6.3 Equipment Access Doors

6.3.1 Equipment Working Space Requirement

Doors with vertical hinges shall be installed on the electrical cabinets and compartments containing live equipment where Toronto Hydro personnel will be required to work, such as service entrance switches, metering compartments, switchboard covers over main breakers and unmetred sections of the switchboards.

6.3.2 Provision for Sealing and Padlocking Equipment Access Doors

Hinged doors as described in section 6.3.1 shall have provision for sealing. Where bolts are used for fastening they shall be of the captive knurled type with minimum 25 mm diameter slotted heads.

Equipment access doors shall be equipped with padlock hasps measuring at least 30 mm wide by 5 mm thick capable of accepting a standard Toronto Hydro padlock with an 8 mm shackle.

6.3.3 Equipment Access Door Openings

All hinged outer access doors shall open at least 135° and all hinged inner doors or screens shall open at least 90°.

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7. TORONTO HYDRO REVENUE METERING EQUIPMENT

7.1 General Information

7.1.1 Scope of Supply

Toronto Hydro will supply all meters, instrument transformers and secondary wiring required for revenue metering. All revenue metering equipment shall remain the property of Toronto Hydro.

7.1.2 Customer's Instrumentation

- (a) Customer's instrumentation shall be connected on the load side of the Toronto Hydro metering and must be located in a separate compartment.
- (b) Customer's relays, instruments or other devices shall not be connected in the metering circuit.
- (c) Bottom connected A and P base type meters shall not be used as splitter boxes.
- (d) The only exception to (a) or (b) is the installation of a Toronto Hydro approved meter base plug-in transfer device used to connect a portable generator for emergency back-up generation. Refer to Section 2.3.6 of the Conditions of Service.

7.2 Metering Instrument Transformers

7.2.1 Instrument Transformer Data

Toronto Hydro will provide the manufacturer's name, type and rating of metering instrument transformers. Additional information, if required, will be available at the request of the customer.

7.2.2 Meter Instrument Transformer Enclosures

All metering instrument transformers and associated meters shall be installed in an approved enclosure. For indoor applications the cabinet shall be National Electrical Manufacturers Association (NEMA) type 1. For outdoor installations the cabinet shall be NEMA type 3R. CSA approval is required for both types.

7.2.3 Metering Transformers on Load Side

Metering transformers shall be connected on the load side of the main fused switch or circuit breaker. The only exception is approved 400 amp single phase meter sockets.

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7.2.4 Mounting Arrangements

Provision shall be made by the customer for mounting the metering transformers (see Sections 7.4 and 7.5) including the supply and installation of all material for the primary connections to the current transformers.

7.3 Meter Cabinet Size for Meters without Instrument Transformers

7.3.1 Meter Cabinet for Meters Only

Meter cabinet size requirements for meters are shown in Table I. All dimensions are in mm.

TABLE I - MINIMUM METER CABINET SIZE FOR METERS AND APPROVED METER SOCKETS

Meter Type	Phase	No. of Meters	Minimum Meter Cabinet Size (in mm)	Meter Socket (Manufacturer – Part Number)
Self-contained up to 200 A , 600 V	Poly or Single Phase	1	Not applicable	CSA Approved. Enclosure cannot contain other auxiliary devices.
Gang Metering Unit, Self-contained up to 400 A	Single Phase	2, 3, or 4	Not applicable	CSA Approved. Enclosure cannot contain other auxiliary devices.
Transformer-rated Bottom Connected	Single or Poly	1 or 2	915w x 915h x 305d	Not Applicable
*Remotely Interrogated Meter (RIMS) Metering Transformer-rated Bottom Connected	3PH 3Wire	1	915w x 915h x 305d	Eaton - TSU8 Microelectric - CT108 Hydel - CTS800PW – See Diag. #4 for layout. See Note 1 below.
	3PH 4Wire	1	915w x 915h x 305d	Eaton - TSU13 Microelectric - CT113 Hydel - CTS130PW – See Diag. #4 for layout. See Note 1 below.
*Transformer-rated Socket (S base)	3PH 3Wire	1	Not applicable	Eaton - TSU8 Microelectric - CT108 Hydel - CTS800PW
	3PH 4Wire	1	Not applicable	Eaton - TSU13 Microelectric - CT113 Hydel - CTS130PW
Transformer-rated Socket (S base) 201-400 Amp; 240 V Residential/ Commercial	Single	1	Not applicable	Hydel - CT4-TSB3 (with 300/5 CT) Eaton – TCC5-TH See Diag. #3 For Wiring.

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* Where metering transformers are located remotely (i.e. in switchboard).

Notes:

1. Not applicable for totalized services.

7.3.2 Multiple Metering Points

Where there are multiple metering points requiring more than one set of metering transformers to be totalized, or where a recording instrument or special equipment is required, Toronto Hydro shall be consulted regarding cabinet size.

7.4 Meter Cabinet Size for Meters with Instrument Transformers

7.4.1 Meter Cabinet for Meters, Instrument Transformers, and Associated Equipment

Meter cabinet size for meters, instrument transformers, and associated equipment is shown in Table II. All dimensions are in mm.

TABLE II – MINIMUM METER CABINET SIZE FOR METERS

Voltage (V)	Phase	Wire	Main Switch Size	Minimum Meter Cabinet Size (in mm)
120/240	1	3	>400 – 800 A.	1220 w x 1220 h x 305 d
600*	3	3	>200 – 800 A.	1220 w x 1220 h x 305 d
120/208 347/600 Y	3	4		
240/416*	3	4	>200 - 800 A.	1220 w x 1220 h x 305 d

*For existing services only.

Note: (1) A larger cabinet or two (2) separate cabinets may be required:

- Where cable size exceeds the main switch capacity, or
 - Where more than 2-500 kcmil CU or 2-750 kcmil AL are used, or
 - Where meter cables do not enter the meter cabinet in a location to permit efficient use of space
- (2) Meter cables in a meter cabinet will be located so that the most efficient use of the space is accomplished. Diagram #2 shows the preferred meter cabinet area that will be utilized for the installation of meter(s) and accompanying test switches. The cables and instrument transformers must not encroach on the metering area shown in the diagram.
- (3) Once the meter cabinet has been installed, but before the conduit/corflex cable has been installed, the customer/electrician **must** contact Toronto Hydro (see Diagram #2 for phone numbers) to arrange for metering inspection.

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- (4) Where main switch capacity exceeds 800 A, a switchboard is required with a separate compartment for the instrument transformers. See Section 7.11 for details. Fire pump services are exempt, provided that the conductors are no larger than 2-500 kcmil.
- (5) A neutral wire is required for metering 120/208 Volt and 347/600 Volt services. The customer shall provide and install a full size neutral cable (white) from the neutral bus in the main switch or splitter to the meter cabinet. If the neutral cable is provided for metering purposes only, it shall be terminated at an insulated neutral block. See Diagram #2.

7.5 Meter Cabinets

7.5.1 General

- (a) Meter cabinets containing Toronto Hydro equipment shall not be used as splitter boxes.
- (b) Meter cabinets, installed outdoors or where sprinklers are used, shall be weatherproof type, NEMA type 3R, CSA approved.
- (c) Meter cabinets installed outdoors shall be equipped with door stops.

7.5.2 Material

All meter cabinets shall be made of sheet steel, #16 Manufacturers Standard Gauge (MSG) minimum.

7.5.3 Doors

Meter cabinets for indoor and outdoor installation shall be equipped with vertically hinged doors. Cabinets 915 mm x 915 mm x 305 mm or larger shall have double doors opening at the center.

7.5.4 Locking and Sealing

Meter cabinets for indoor and outdoor installation shall be equipped with door latch and handle (or combination latch-handle) with provision for a Toronto Hydro padlock and seal.

7.5.5 Mounting Panel (Back Plate)

Meter cabinets shall be equipped with removable #16 MSG min. sheet metal interior panels. The panel shall be 75 mm narrower and 75 mm shorter than the meter cabinet and mounted with a clearance of 15 mm behind it.

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7.6 Mounting Height for Meter Cabinets

7.6.1 Minimum – Maximum Heights

Minimum distance from floor to base of cabinets shall be 600 mm. Maximum distance from floor to top of cabinets shall be 1830 mm.

Note: Any deviation from these dimensions shall require Toronto Hydro approval.

7.7 Freedom from Vibration

7.7.1 Mounting

Meter cabinets and panels shall be mounted so as to be free from vibration and mechanical shock.

7.8 Meter Cables

7.8.1 Cable Length, Material, Type and Size

- (a) Where instrument transformers are installed in a meter cabinet the minimum length of each meter cable, both line and load side, shall be 1200 mm.
- (b) Mineral insulated solid or hard drawn wire conductors are not acceptable for meter cables.
- (c) Line and load meter cables shall be identical in type, number of conductors and wire size.
- (d) Meter cables shall be on the load side of the main switch or breaker.

7.8.2 Entry Points

Line and load entry points shall be located so that meters and/or instrument transformers can be mounted to permit efficient use of space provided. See Section 7.4.1 note 2, and Diagram #2.

7.8.3 Primary Connections in Meter Cabinet

The customer/electrician shall make all primary connections on the meter cables in the meter cabinet:

- a) The customer/electrician is to contact Toronto Hydro (see Diagram #2 for phone number) to arrange installation of the metering current transformers.
- b) Once the metering transformers have been installed, the customer/electrician is to either insert the primary meter cables through the window type current

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transformers or make compression sleeve connection on the primary meter cables. Should bar type metering current transformers be used, then the customer/electrician shall make compression type terminal lug connections to the bar type metering current transformers. Mechanical connections are not acceptable.

- c) The customer/electrician shall supply all compression sleeves and or compression lugs.
- d) Toronto Hydro will wrap all the connections at the current transformers.

7.9 Meter Socket (Meter-Mounting Devices) – 200 Amps or Less

7.9.1 Customer Supplied Equipment

- (a) Meter sockets shall be provided and maintained by the customer. Meter sockets shall be CSA approved.
- (b) Round and shallow square meter sockets are not permitted.
- (c) Meter sockets shall be supplied with a metal sealing ring.
- (d) Automatic bypass devices are not permitted.
- (e) Meter sockets installed indoors shall be on the load side of the service switch.
- (f) Meter sockets for new and upgraded residential services shall be mounted outdoors in a location approved by Toronto Hydro.

7.9.2 Meter Sockets

- (a) Meter sockets are required for all services up to 200 A. The requirements are indicated below and shown in Diagram #1.

120/240 V	1 Phase	3 Wire	4-jaw socket
120/208 V	2 Phase	3 Wire	5-jaw socket
120/208 V	3 Phase	4 Wire	7-jaw socket
347/600 V	3 Phase	4 Wire	7-jaw socket
600 V*	3 Phase	3 Wire	5-jaw socket

* (Existing Services Only)

- (b) Gang metering units are acceptable, provided all of the following conditions are met:
 - (i) Single phase application,
 - (ii) 120/240 V,

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(iii) The number of meters within a gang metering unit cannot exceed four (e.g. 4-100 A, or any combination that does not exceed 400 A), and

(iv) The bus mains cannot exceed 400 A.

(c) Ringless meter sockets are not permitted.

7.9.3 Rating

(a) All new and upgraded services shall be 100 A or 200 A, and shall utilize a CSA approved meter socket.

(b) For a 100 A service the meter socket shall have a minimum rating of 100 A, and for a 200 A service the meter socket shall have a rating of 200 A.

7.9.4 Mounting and Space Requirements

(a) Meter sockets shall be installed in an acceptable manner and location. They must be mounted level in the horizontal and vertical planes (see Diagram #1 for terminal arrangements) at heights indicated below:

Outdoors – The centerline of the meter shall be 1700 mm ± 100 mm.

Indoors – The centerline of the meter shall be approximately 1700 mm but in no case shall it be more than 1800 mm or less than 600 mm.

(b) A clear space of 400 mm (w) x 600 mm (h) shall be provided for each meter mounting device.

7.9.5 Energization Prior to Installation of Meter

When the service is to be energized prior to the installation of the meter, acceptable temporary jumper bars may be used in the meter socket. Should the meter jaws be found to be damaged by improper use of jumpers, the customer shall replace the meter socket.

7.10 Service Identification

7.10.1 Marking and Labeling of Service Boxes and Equipment

(i) The customer shall permanently and legibly identify each metered service with respect to its specific address which shall include the store or apartment number, where applicable.

(ii) The identification shall be applied to all service switches and circuit breakers and to all meter cabinets and meter sockets that are not immediately adjacent to their service switches or circuit breakers.

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- (iii) Non-permanent markers or paper labels are not acceptable on equipment which requires identification.

7.11 Metering Requirements for Enclosed Switchboards

7.11.1 Separate Compartment

A separate compartment with a vertically hinged access door having provision for sealing and locking shall be provided for each set of metering instrument transformers for the exclusive use of Toronto Hydro. See Section 6.3 for sealing and locking requirements.

7.11.2 Mounting Hardware

Mounting bolts or nuts shall be installed in a manner which will permit complete installation and/or removal of the instrument transformers from within the compartment in which they are installed. Fixed mounting nuts or bolts shall be required for this purpose.

7.11.3 Installation by Manufacturer/Customer

- (a) When the switchboard drawings have been approved, the metering instrument transformers will be delivered upon request to the switchboard manufacturer for installation in the switchboard. The current transformers shall be installed with the polarity marks on the line side. The type and rating of instrument transformers to be supplied shall be determined by Toronto Hydro.
- (b) Metering instrument transformers delivered to the site by Toronto Hydro are to be installed in the switchboard by the customer/manufacturer.
- (c) All hardware, bus work and/or cable required for primary connections to metering current transformers shall be provided by the customer or the switchboard manufacturer.
- (d) The customer and or manufacturer shall not disassemble and/or change in any manner the Toronto Hydro equipment sent to them.

7.11.4 Window-Type Current Transformers

- (a) Where window-type current transformers are to be installed, the bus shall be sectionalized. The removable bus links through the current transformers shall be bolted in the vertical bus section directly above and below the current transformers. Where three window-type current transformers are used, they shall be mounted in a staggered arrangement.

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- (b) Where window current transformers are used and the switchboard bus is larger than the window opening, the customer or switchboard manufacturer shall modify the bus to accommodate the current transformers.
- (c) The instrument transformers will be supplied by and will remain the property of Toronto Hydro.

7.11.5 Voltage Transformers

Where required, provision shall be made for the installation of voltage transformers on a #16 MSG steel panel in an accessible location in the instrument transformer compartment. This panel must not obstruct access to the current transformers or the removable bus links through the current transformers. This panel is to be a minimum of 140 mm from the front of the instrument transformer compartment.

The voltage transformers are to be installed in the instrument transformer compartment by the switchboard manufacturer and/or electrician on site.

7.11.6 Neutral Bus Tap

A readily accessible continuous neutral copper bus of 25 mm x 3 mm or equivalent (#6 copper white TW75 wire), with three 10-24 tapped holes, shall be provided in each instrument transformer compartment for all 3 phase 4 wire services. If the main neutral bus passes through a metering instrument transformer compartment, the bus shall be provided with three 10-24 tapped holes.

7.11.7 Grounding Stud

A readily accessible grounding stud with a connector suitable for a #10 copper wire or a ground bar provided with three 10-24 tapped hole shall be provided in each instrument transformer compartment. The grounding facility in the compartment shall be connected directly to the switchboard ground bus.

7.11.8 Compartment Sizes

The minimum metering instrument transformer compartment size is provided in Table III.

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TABLE III

**METERING INSTRUMENT TRANSFORMER
COMPARTMENT – MINIMUM SIZES**

Metering Transformers and Compartments						
Voltage (Volts)	Phase	Wire	Service Size (Amperes)	Compartment Size	Number of Metering Transformers (Provision for)	
					Current	Voltage
240/120 208/120 N/W	1	3	Up to 800	A	1 or 2	0
	3	3	Over 800 Up to 4000	B		
208/120 416/240 600/347	3	4	Up to 800	A	3	3
			Over 800 Up to 4000	B	3	
600*	3	3	Up to 800	A	2	2
			Over 800 Up to 4000	B	2	
Voltages up to 600	(*) 3	(*) 3	Over 4000	C	2	2
	3	4			3	3

* For existing services only.

COMPARTMENT SIZES [width x height x depth (from CT mounting plate)]

- A - 762 mm x 762 mm x 210 mm (30" x 30" x 8.25")
- B - 915 mm x 762 mm x 324 mm (36" x 30" x 12.75")
- C - 965 mm x 914 mm x 381 mm (38" x 36" x 15")

7.12 Meter Cabinets and Conduit Requirements

7.12.1 Location of Meter Cabinet

Meter cabinets associated with revenue metering transformers mounted in a switchboard shall be installed in a location close to the switchboard and approved by Toronto Hydro.

7.12.2 Conduit and Metering Compartment

A separate conduit (to be continuous within the switchboard) is required from each revenue metering compartment to the meter cabinet. The meter conduit is to terminate at the front right or left corner of the revenue metering compartment and be unobstructed.

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7.12.3 Conduit Length and Size

The maximum length of conduit shall be no longer than 30 m. The customer shall supply and install a conduit of a nominal diameter of not less than 38 mm.

7.12.4 Conduit Fittings and Covers

- (a) The number of bends shall be kept to a minimum, but in no case shall there be more than three 90 degree bends.
- (b) The metering conduit run within the switchboard and between the switchboard and the meter cabinet shall not have fittings with removable covers. Pull boxes and or ‘LBs’ are not permitted.
- (c) The 38 mm metering conduit between the revenue metering instrument transformer compartment in the switchboard and the meter cabinet is to be rigid steel, EMT or PVC. Flexible conduit is not permitted.

7.12.5 Pull Line in Conduit Run

The customer shall install a strong nylon or polyrope pull line in the conduit between each revenue metering transformer compartment and the meter cabinet. An excess of 1500 mm loop shall be left at each end.

7.12.6 Connection of Meter Wires

Under no circumstances will Toronto Hydro install and connect meter wires unless the service is de-energized.

7.12.7 Meter Cabinet Bonding

The meter cabinet is to be bonded to the system ground in accordance with the Ontario Electrical Safety Code and ESA requirements.

7.12.8 Specialty Meter Sockets

Specialty meter sockets referred to as transformer-rated meter sockets are acceptable and can be used instead of a Meter Cabinet. See Diagram #4. Refer to Table I for approved transformer-rated meter sockets.

7.13 Meter Centres

7.13.1 Provision for Sealing

The customer shall make provision for the installation of Toronto Hydro seals on the following:

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- (a) removable covers and doors which provide access to unmetered circuits.
- (b) handles of all circuit breakers in the “OFF” position.

7.13.2 Provision for Padlocking

Circuit breakers or fused switches protecting a meter socket shall have provision for padlocking in the open position.

7.13.3 Meter Socket Assemblies

Only meter socket assemblies listed in Section 7.9.2 shall be used in Meter Centres. The meter sockets shall be properly aligned and mounted on a rigid base to prevent subsequent misalignment.

7.13.4 Protection of Meter-Mounting Devices

Each meter-mounting device shall be protected by a rated circuit breaker having adequate short circuit interruption capacity. The circuit breaker shall be connected ahead of the meter-mounting device commonly known as “cold” metering.

7.13.5 Identification of Socket and Cover

Each removable meter socket and circuit breaker cover shall be identified by a permanent and unique mark (number, letter, etc.) so that it cannot be interchanged with other similar covers. The same identification mark shall appear on the frame of the meter centre at the compartment where the cover belongs and shall be clearly visible when the covers and meters are in place. This identification mark need not be the number of the suite metered, thus making it feasible to have the identification marks applied during manufacture of the meter centre.

7.13.6 Identification of Individual Service

Each circuit breaker required for an individual service shall have a permanent customer identification plate (metal or engraved plastic) which cannot be erased or obscured by paint. The circuit breakers must easily be recognized.

7.13.7 Positioning of Meters

- (a) The centerline of the lowest meters shall not be less than 600 mm from the finished floor level. The centerline of the upper meters shall not exceed 1800 mm from the finished floor level.
- (b) The minimum horizontal distance between the adjacent meter and sockets shall be 152 mm rim-to-rim.

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- (c) The minimum vertical distance rim-to-rim between the adjacent meter socket openings shall be as follows:
 - (i) 76 mm: for 100 A, 4 or 5 jaw.
 - (ii) 152 mm: for 100 A, 7 jaw.
 - (iii) 152 mm: for 200 A, 4, 5, and 7 jaw.

7.13.8 Neutral for Meters

Where a neutral is required for metering, the meter - mounting device shall have a pre-wired neutral connection (see Diagram #1). This neutral connection shall be ungrounded. The connection to the 5th or 7th terminal, if not made directly to the distribution neutral bus, shall be not less than #12 AWG copper or equivalent. Where a connection is to be made between aluminum and copper conductors, a proper bi-metallic connector shall be used.

7.13.9 Barrier for Meters

Each meter socket shall be separated from others by a suitable barrier.

7.13.10 Sealing Ring

Each meter socket shall be equipped with a metal sealing ring.

7.14 Remote Metering (RIMS) – Services 50 kW and Greater

The customer is to provide and install the following:

- (a) A 120 Volt duplex receptacle, to be located at the bottom right corner inside the meter cabinet/ebox. The receptacle is to be connected to an uninterruptible power supply (UPS) if available. Should the meter cabinet be located in an outdoor environment, then the 120 Volt duplex shall be equipped with GFI protection.
- (b) The name and phone number of an on-site contact person.
- (c) In locations selected for cellular communications, a 32 mm (1^{1/4}”) EMT or PVC conduit from the meter cabinet to an outdoor location for the installation of an antenna to be mounted 1.8 m (6’) above ground. The conduit installation shall not be more than 30.5 m (100’) in length.
- (d) In locations where cellular communication cannot be installed, a 13 mm (1/2”) EMT or PVC conduit complete with bushings at both ends between the revenue metering cabinet/ebox and the telephone room (punch-board). The 13 mm (1/2”) conduit is to terminate at the top right corner of the meter cabinet/ebox.

A 2 pair (4 conductors) telephone cable is to be installed in the 13 mm (1/2”) conduit. A RJ11 (4 pin) telephone jack is also to be provided and installed on

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the telephone cable in the meter cabinet/ebox. The telephone jack is to be left at the bottom of the meter cabinet/ebox with enough telephone cable to allow mounting the jack anywhere in the cabinet/ebox. The telephone cable terminating in the telephone room is to be clearly labeled "TORONTO HYDRO METERING".

Toronto Hydro will arrange to have the telephone line activated. Customer owned telephone lines or customer shared telephone lines are not acceptable.

8. METERING REQUIREMENTS FOR MULTI-RESIDENTIAL BUILDINGS

8.1 Standard Metering Configuration

Developers are required to conform to Toronto Hydro's Standard Metering Configuration, see Diagram #5 "Typical Signal Line Diagram Layout for All Multi-Residential Buildings".

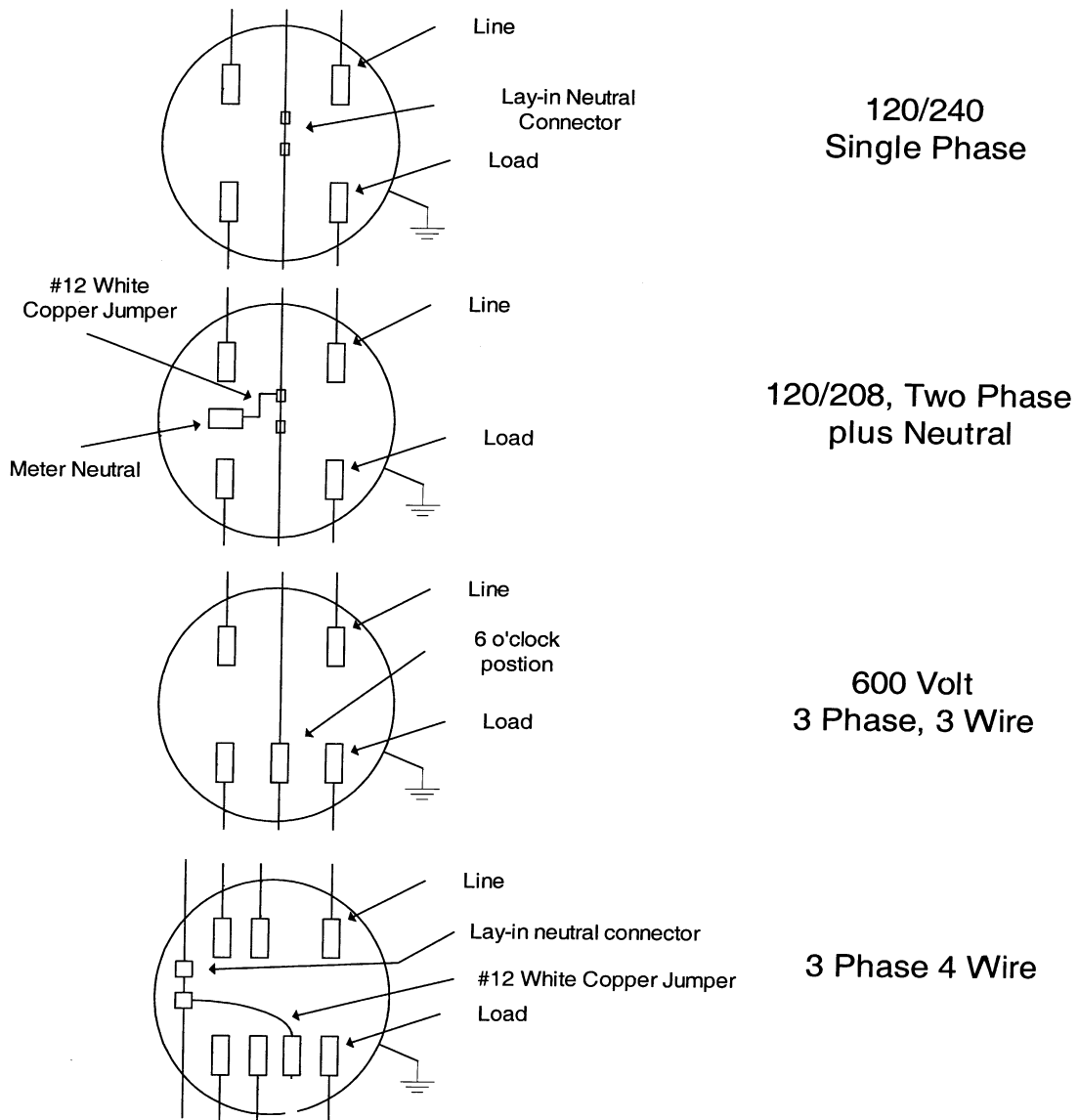
8.2 Electric Vehicle Charging Stations

Electric vehicle (EV) charging stations, when required, may be metered separately as shown on Diagram #5 "Typical Single Line Diagram Layout for All Multi-Residential Buildings".

APPENDIX

Diagram #1

Terminal Arrangements for Meter Mounting Devices

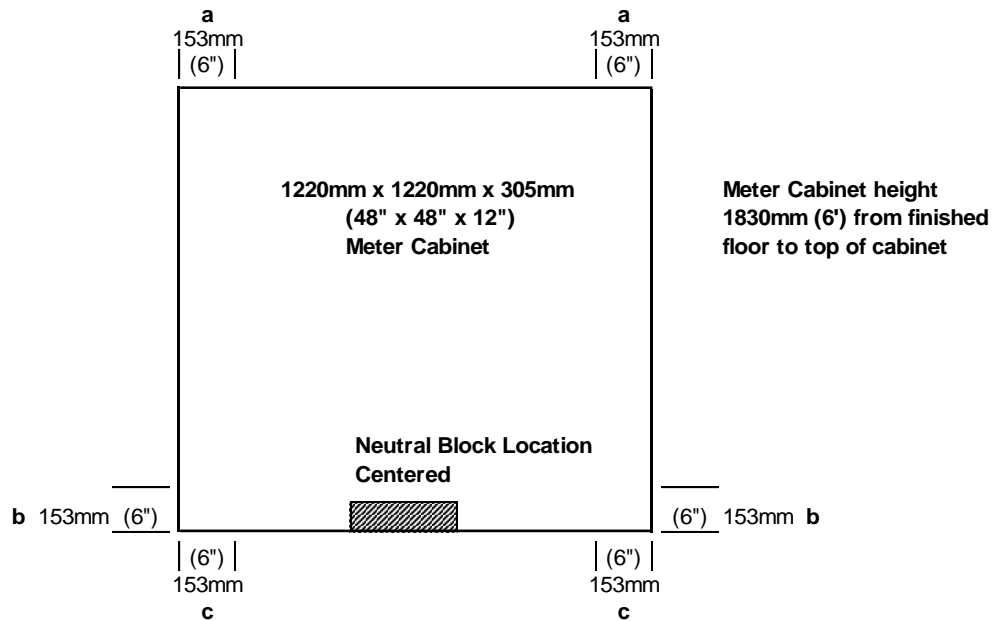


Revision Date: October 7, 2014

APPENDIX

Diagram #2

Cabinet Layout for CTs/PTs Located Within the Meter Cabinet



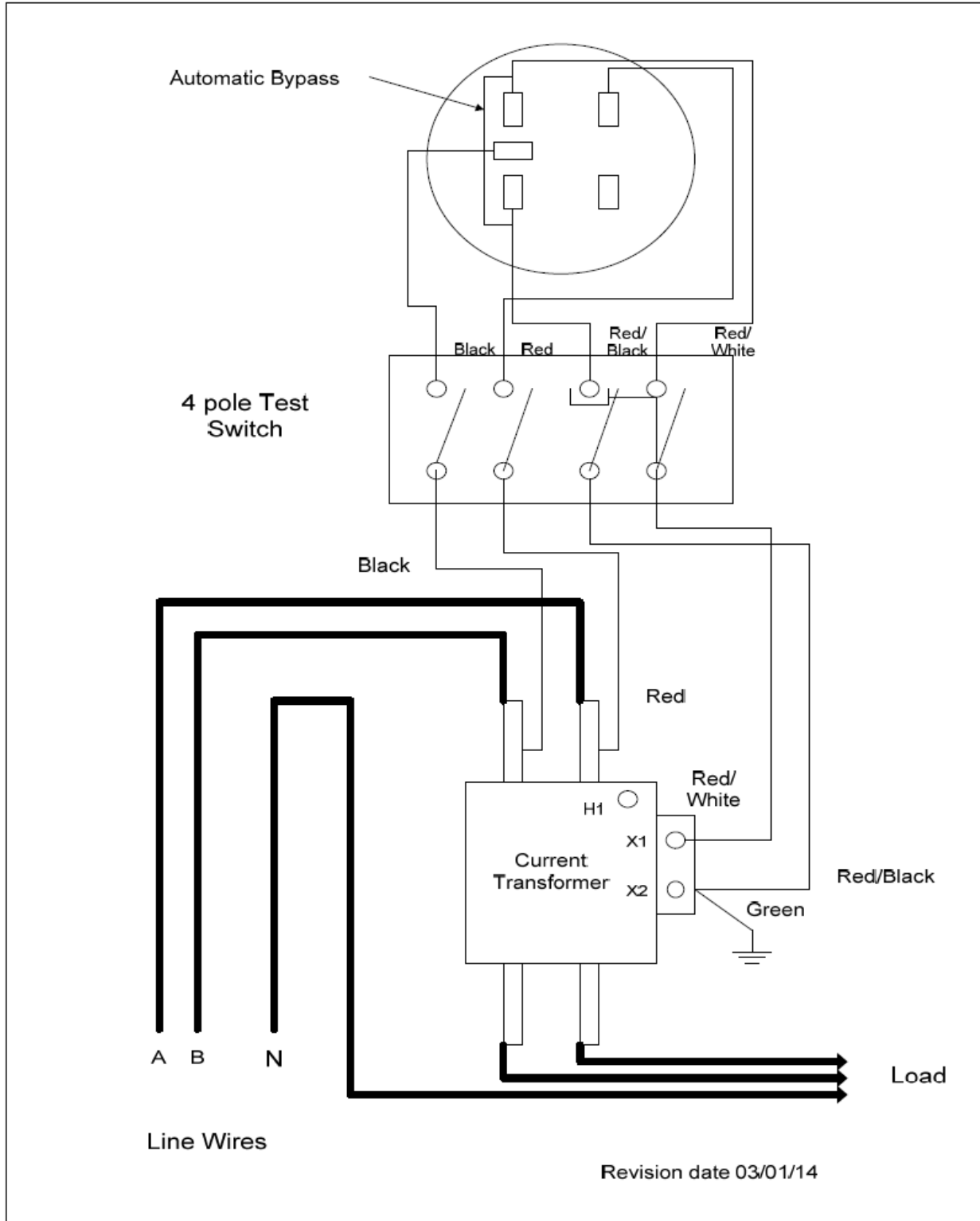
1. Entry and exit points must be at points **a to a**, **b to b** or **c to c**. Any other conditions require approval from Meter Crew Leader from the district you are working within.
2. The electrician will inform the Meter Crew Leader once the meter cabinet is mounted but before the conductors are pulled in. The Crew Leader will arrange for the installation of the metering equipment. All new jobs will utilize window type current transformers. The current transformers must be installed prior to the electrician pulling in the conductors.
3. The electrician will be responsible for pulling the cables through the appropriate current transformers and ensuring that phases correspond in cases of multiple conductors per phase. The electrician will lock off the switch until the metering installation is complete and all conditions are met with Toronto Hydro Electric System and ESA.
4. The electrician will be responsible for any splices, sleeve or lugs in the meter cabinet once the cable is pulled through the current transformers. Toronto Hydro will **not** provide any material for splices. Compression sleeves are recommended. All splice material must pass inspection by ESA.
5. For WYE type installation, the neutral must enter the meter cabinet. If the neutral is to be terminated in the meter cabinet, an insulated neutral block centered at the bottom of the meter cabinet will be required.
6. For any deviations from these requirements, please contact a Toronto Hydro Crew Leader for the area:
Crew Leader: East of Yonge Street – Sam Caldara - 416-542-3008
Crew Leader: West of Yonge Street – Tim Nobes - 416-542-3079 or Tony Palumbo – 416-542-3282

Revision date: Aug 1, 2018

APPENDIX

Diagram #3

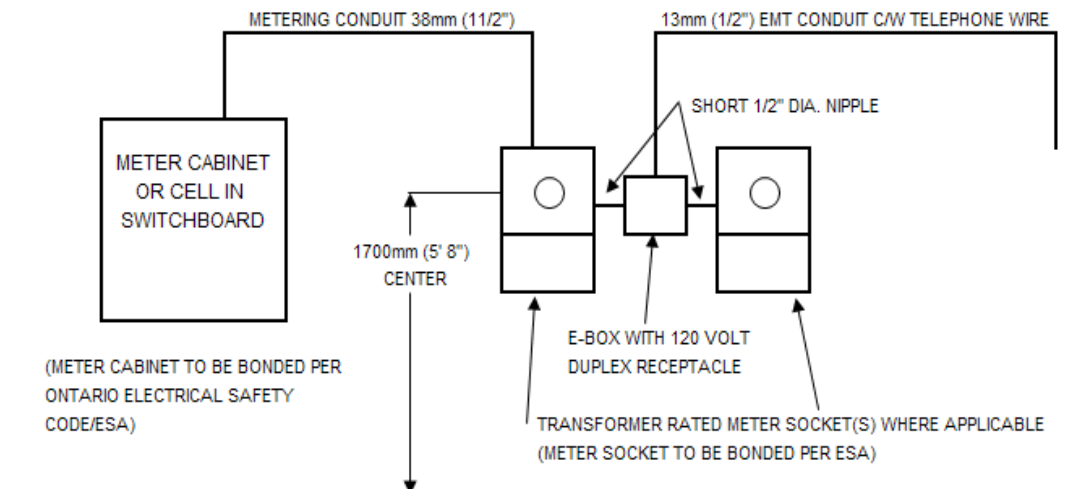
400 Amp Meter Socket
Wiring Diagram



APPENDIX

Diagram #4

METER REQUIREMENTS - NON TOTALIZED RIMS SERVICES



Requirements

- 1. Meter Socket** - must be transformer rated, no automatic bypass, provision for a 10 pole test panel, lockable cover to be bounded as per ESA, 1700mm (5' 8") to center of opening, socket can be located outdoors.
- 2. Meter Conduit** - 38mm (1 1/2") conduit, no LB's permitted, continuous from the meter instrument transformers to the meter socket, maximum of three 90 degree bends, maximum conduit length is 30m (100').
- 3. E-Box** - A 305mm x 305mm x 102mm (12" x 12" x 4") e-box with a hinged door directly adjacent [less than 102mm (4")] to the meter socket. The e-box will be connected to the socket with a 13mm (1/2") conduit. The connection to the meter socket is to be made at the top half of the meter socket opposite the meter socket jaws assembly. A 120 Volt duplex receptacle is to be located in this e-box. If possible, the 120 Volt supply should come from a UPS. The e-box must be lockable and when mounted outdoors, it must be weatherproof. E-Box is also used for RS-485 communication cable
- 4. Telephone Conduit** - A 13mm (1/2") EMT conduit, with bushings at both ends, complete with a 2-pair telephone cable, must extend from the e-box to where the telephone trunk lines terminate in the main telephone room. The telephone cable in the telephone room is to be clearly labelled "TORONTO HYDRO METERING". A RJ11 (4 pin) telephone jack is to be connected to the telephone cable in the e-box and left at the bottom of the e-box. See item 7.14 for further information. If the meter socket is located outdoors, the contractor will be required to install the conduit to a box that will allow the telephone provider to install an outdoor style phone jack.
- 5. Meter Cabinet** - If a meter cabinet is to be utilized to house the instrument transformers, it must be 1220mm x 1220mm x 305mm (48" x 48" x 12"). The cabinet will be mounted at 1.8m (6') to the top. The entry points for the cables will be bottom right, bottom left or top left and top right. Entry and exit points must be within 153mm (6") from the corners. Please contact the District Crew Leader when the cabinet is mounted so that the Crew Leader can arrange installation of the metering transformers before the conductors are pulled in. The current transformers may be window type or bar type. The contractor is to pull the cables through the window type current transformers or, if bar type, make the connections to the current transformers bars. The meter conduit will extend from the cabinet to the meter socket.
- 6. Meter Compartment in Switchboard** - Housing the metering transformers. The meter conduit is to extend continuously from this compartment to the meter socket. See item 2 above for meter conduit requirements.

APPENDIX

Diagram #5

TYPICAL SINGLE LINE DIAGRAM LAYOUT FOR ALL MULTI-RESIDENTIAL BUILDINGS

