Conditions of Service

March 2020

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APPENDICES

1 INTRODUCTION

1.1 Identification of Distributor and Service Area

London Hydro Inc. referred to herein as either London Hydro or the Distributor is a Corporation, incorporated under the laws of the Province of Ontario to distribute electricity.

London Hydro is licensed by the Ontario Energy Board (OEB) to supply electricity to its Customers as described in its Distribution Licence issued on March 26, 2003 by the OEB. Additionally there are requirements imposed on London Hydro by the various codes referred to in the Licence and by the Electricity Act and the Ontario Energy Board Act.

London Hydro operates distribution facilities within its licenced territory as defined in its Distribution Licence, generally within the boundaries of the Municipality of the City of London.

London Hydro will normally provide one electrical service to each Customer's location at a nominal service voltage. For new or upgraded electrical services, the Customer or their representative shall make application and shall consult with London Hydro concerning the availability of supply, the voltage of supply, service location, metering and other details as described in these Conditions of Service. These requirements are separate from and in addition to those of the Electrical Safety Authority. Customers may be required to pay capital contributions for the addition of new electrical services in accordance with the policies and procedures outlined elsewhere in this document.

1.2 Related Codes and Governing Laws

London Hydro's scope of operation is defined by:

1. Electricity Act, 1998
2. Ontario Energy Board Act, 1998
3. Electricity Pricing, Conservation and Supply Act, 2002
4. Ontario Energy Board Amendment Act (Electricity Pricing), 2003
5. Distribution Licence
6. Affiliate Relationships Code
7. Transmission System Code
8. Distribution System Code
9. Retail Settlements Code
10. Standard Supply Service Code

In the event of a conflict between this document and the Distribution Licence or regulatory Codes issued by the OEB, or the Electricity Act, and its regulations, the Distribution Licence and associated regulatory Codes shall prevail.

When planning and designing an electricity service, Customers and their agents must refer to all applicable provincial and Canadian electrical codes, and all other applicable federal, provincial, and municipal laws, regulations, codes and by-laws to also ensure compliance with their requirements. The work shall be conducted in accordance with the Occupational Health and Safety Act, the Regulations for Construction Projects and the IHSA Electrical Utility Safety Rules.

1.3 Interpretation

Questions as to the interpretation or intent of any part of this document should be directed to London Hydro and London Hydro shall have the sole right to make such interpretation.

Headings and underlining are for convenience only and do not affect the interpretation of these Conditions of Service. Words referring to the singular include the plural and vice versa and words referring to a gender include any gender.

1.4 Amendments and Changes

London Hydro reserves the right to make changes to these Conditions of Service at any time. In the event of changes, a public notice shall be made in the form of either a notice in the local newspaper, or a notice on London Hydro's Website (www.londonhydro.com. Suggestions for revisions or improvement can be directed to London Hydro at (519) 661-5800, Ext. 6415.

The Customer is responsible for contacting London Hydro to ensure they have the latest version of these Conditions of Service.

1.5 Contact Information

London Hydro and its agents can be contacted 8:30am to 4:00pm Monday to Friday at (519) 661-5503.

For repairs and service or in event of an emergency outside of normal working hours, please call (519) 661-5555.

For new services and connections, contact the Engineering Department at (519) 661-5555.

The business offices and a department directory can be reached at (519) 661-5800.

London Hydro's mailing address is:

P.O. Box 2700
111 Horton St.
London, Ontario
N6A 4H6

1.6 Customer Rights

All Customers shall have non-discriminatory access to London Hydro's distribution system and services in accordance with the terms of these Conditions of Service and the applicable Acts, Regulations and Codes.

A Customer shall only be liable to London Hydro and London Hydro shall only be liable to a Customer for any damages that arise directly out of the wilful misconduct or negligence of London Hydro in providing distribution services to the Customer, of the Customer in being connected to London Hydro's distribution system, or of London Hydro or the Customer in meeting the respective obligations under this Conditions of Service, their licences, and any other applicable law.

Notwithstanding the above, neither London Hydro nor the Customer shall be liable under any circumstances whatsoever for any loss of profits or revenue, business interruption losses, loss of contract or loss of goodwill, or for any indirect, consequential, incidental or special damages, including but not limited to punitive or exemplary damages, whether any of the said liability, loss or damages arise in contract, tort, or otherwise.

A Customer or Embedded Generator shall indemnify and hold harmless London Hydro, its Directors, Officers, Employees and Agents from any claims made by any third parties in connection with the construction and installation of a generator by or on behalf of the Customer or Embedded Generator.

The provisions of these Conditions of Service and any amendments made from time to time form part of any Contract made between a connected Customer, Retailer, or Generator, and London Hydro.

1.7 Distributor's Rights

The supply of electricity is conditional upon London Hydro being permitted and able to provide such a supply, obtaining the necessary apparatus and material, and constructing works to provide the service. Should London Hydro not be permitted to supply or not be able to do so, it is under no responsibility to the Customer.

The Customer is required to provide London Hydro with sufficient lead time in order to ensure the timely provision of supply to new and updated premises or the availability of adequate capacity for additional loads to be connected at existing premises. If special equipment is required or equipment delivery problems occur, then longer lead times may be necessary. The Customer will be notified of any extended lead times.

Customers will be required to pay the cost of repair or replacement of London Hydro's equipment that has been damaged or lost by the direct or indirect act or omission of the Customer or its agents.

Nothing contained in this document or in any contract for the supply of electricity by London Hydro shall prejudice or affect any rights, privileges, or power vested in London Hydro by law under any Act of the Legislature of Ontario or the Parliament of Canada, or any Regulations thereunder.

London Hydro assumes no risk and will not be liable for damages resulting from the presence of its equipment on the Customer's premises or approaches thereto, or action, omission or occurrence beyond its control, or negligence of any Persons over whom London Hydro has no control.

Unless they are an Employee or an agent of London Hydro, or other Person lawfully entitled to do so, no Person shall remove, replace, alter, repair, inspect or tamper with London Hydro's equipment.

Other rights respecting access to equipment, payment of arrears, etc. are covered elsewhere in this document.

1.8 Disputes

Customer Complaint/Dispute Resolution Policy

Purpose

This Policy pertains to managing those individuals who have complaints regarding the service and/or service agreements provided by London Hydro. London Hydro is not responsible for handling complaints directed to retailers. Those customers may speak to their retailers. Subsequently, retailers may wish to discuss the issue with London Hydro if deemed necessary.

Policy Objectives

- Complaints should be assessed and dealt with effectively in the shortest time possible
- Record all complaints to improve future service and prevent recurring complaints
- Maintain customer satisfaction
- Ensure consistency and enable effective allocation of CS resources
- All customers are billed accurately and fairly
- London Hydro recovers all revenues owed to it

Retailer Dispute Procedure

1) Refer to OEB Retail Settlement Code Article 6-Dispute Resolution

   Retailers may not dispute: -hourly spot prices
   -NSLS calculations
   -other regulated charges

References

- Retail Settlement Code, Appendix C
- Retail Settlement Code, sections 2.7, 4.2, 9 and 12
- Electricity Distribution Handbook, chapters 9 and 11

Customer Dispute Procedure

1) London Hydro staff receives the complaint
2) Attempt to resolve the issue immediately
3) If unable to resolve the issue, the complaint is transferred to the supervisor or delegate
4) If the supervisor or delegate is unavailable, the staff member completes a call back form and informs the customer that London Hydro will contact them within 5 business days
5) If the supervisor or delegate cannot resolve the problem, the Escalated Call Process is followed whereby the complaint is directed to the Manager
6) The Manager attempts to resolve the issue however if unsuccessful, consults the appropriate department and/or the Department Vice President
7) If the issue is still outstanding after this time, the complaint is forwarded to the Vice President of the Department or designate
8) After considering all options a negotiation may occur to reach a resolution
9) Subject to the outcome of #8, London Hydro may proceed to make a final offer
10) If the customer disagrees with the proposed resolution they may opt to take the complaint to the Ontario Energy Board. This action would be initiated by the customer, not by London Hydro.

2 DISTRIBUTION ACTIVITIES (GENERAL)

2.1 Connections

This section includes information that is applicable to all Customer classes. Information applicable to specific Customer classes can be found in Section 3.

2.1.1 Building That Lies Along

London Hydro, as the Distributor, has an obligation to connect any building that "lies along" its distribution system as stated in Section 28 of the Electricity Act 1998.

A building "lies along" a distribution line if it is within the boundaries of London Hydro's licenced service territory, can be connected to London Hydro's distribution system without an Expansion or Enhancement, and meets the conditions of service outlined in this document.

Sections 2.3 and 3 outline the conditions under which London Hydro will provide service to Customers that "lie along" an existing distribution line. Customers that meet these conditions will not be denied service. Conditions for connection refusal are outlined in Section 2.1.3.

2.1.2 Expansions / Offer to Connect

2.1.2.1 Rationale

Extending the distribution system to connect new Customers requires a capital investment. The revenue generated by the new load may or may not offset the capital investment and on-going maintenance costs of the system expansion. If there is a shortfall between the anticipated revenue and the capital and maintenance costs, the Customer is required to make up the difference by paying a capital contribution (See OEB Distribution System Code Section 3.2 for a full discussion of this Net Present Value (NPV) calculation). The Distribution System Code is available on the OEB's website at www.oeb.gov.on.ca.

Due to the uncertainty of load projections and changing market conditions London Hydro requires an expansion deposit equal to 100% of the present value of the forecasted revenues to be paid by the Customer (as described in Section 3.2.20 of the Distribution Code). London Hydro's preference is to receive the expansion deposit in the form of a letter of credit (cash and/or a surety bond are also acceptable).

Essentially, the capital contribution and the expansion deposit together represent the value of the total estimated capital investment. Once the expansion work is complete, the actual costs for the capital investment will be known and London Hydro will write to the customer to adjust the values on record for the capital contribution and the expansion deposit if required. If the actual cost of the work was less than estimated, London Hydro will rebate the customer the difference and if the actual cost was more than estimated, the customer will be required to make up the shortfall. Correspondingly, the amount of the expansion deposit may need to be readjusted.

Once the facilities are energized, London Hydro will annually return a percentage of the expansion deposit for up to five years in proportion to the actual number of connections (for residential developments) or actual demand (for commercial and industrial developments) that materialized in that year.

For all projects where the customer elects to use the alternative bid process to construct the expanded facilities, London Hydro will retain an expansion deposit for warranty purposes at the time when the facilities are transferred to London Hydro. For projects constructed through the alternative bid process, a

10% deposit will be retained for a period of two years to cover the warranty period. The entire process is more fully described in Section 3.2 of the OEB Distribution System Code.

2.1.2.2 Definitions

To connect a building that does not "lie along" the distribution system, a system expansion is required. A system expansion is defined as being that part of the London Hydro distribution system that needs to be extended or reinforced to feed a new load or Customer, and in future, could be used to feed additional Customers. Normally, this includes the distribution plant (primary and secondary conductors, poles, transformers, etc) installed along City of London streets and roadways to service present and future load additions. It does not include that part of the system installed on private property for the exclusive use of the Customer(s) on that specific property. For example, the primary cable and transformation installed on private property to serve a specific Customer or group of Customers are considered connection assets (see Section 3) and are not considered a system expansion.

Note**:** Connection assets are not subject to the NPV calculation and therefore, no rebates apply.

2.1.2.3 Process

Customers requiring a system expansion must submit detailed plans and specifications to the Engineering Department well in advance of the anticipated project start date. At a minimum, the plans must show property lines, building outlines, roadways, curbs, sidewalks, deep services, and preferred location(s) for transformation and/or service entrance. The specifications must indicate if servicing will be overhead or underground, the required voltage, estimated kW peak by year for 5 years, and desired in-service date.

Within 60 days of receipt of all relevant information, London Hydro will present the Customer with a written "Offer to Connect". This Offer will contain an estimated cost to connect the service, including all applicable expansion costs that need to be immediately spent to expand the system to meet the Customers' load requirement. A tentative schedule for installation and energization will be provided, subject to receipt of the estimated capital contribution, expansion deposit and schedule for completion of other deep services. The projected rebate, if any, will be estimated by London Hydro and written in the Offer to Connect. The estimated capital contribution must be paid by certified cheque. Both the capital contribution and the expansion deposit amount will be identified and must be paid in accordance with the Offer to Connect letter.

London Hydro will provide one free estimate and Offer to Connect for any new project. If owners or contractors wish to explore alternative scenarios for servicing, London Hydro can provide additional estimates on a time and material cost recovery basis.

2.1.2.4 Connection Costs

Appendix A "Customer Charges for Electric Services" contains London Hydro's Engineering Instruction EI-7-R24 which describes the standard charges and unit prices for different types of connections. All connection charges are based on an overall cost recovery objective of one hundred percent (100%). The costs listed in Appendix A will be revised annually to reflect current Labour, Material and Equipment rates.

2.1.2.5 Additional/Unforecasted Load

Within the first five years, if new Customers not included in the original development plan connect to the system expansion, the original Customer may be entitled to an additional rebate. New Customers connecting to the expanded facilities will be charged a proportional share of the original cost of the expanded facilities based on their load and location, and the original Customer will be entitled to a rebate. At 12 month intervals, the original Customer may request London Hydro to review the NPV calculation if

additional Customers have been added. No rebates will be issued for additional load added after five years from the day the system was energized.

2.1.2.6 Phased Developments

If a development will be constructed in phases over several years, the estimated cost of servicing the first phase may reflect costs associated with the installation of equipment to accommodate the future phases. Customers must clearly identify the timing and scope of future phases with their original submittal. In the "Offer to Connect", London Hydro will identify any costs associated with accommodating future phases in the servicing cost estimate.

2.1.2.7 Examples

The following examples will illustrate the above mentioned definitions and procedures.

i) Connection versus Expansion – Example #1

A new commercial plaza is to be built in an area where a three phase line is already in service along the street. The plaza requires an 800 A, 347/600 V three phase service, underground distribution with the transformer located at the side of the building. London Hydro prepares an Offer to Connect with a cost estimate for the three phase primary riser, underground primary cables, and a padmount transformer. These components are considered connection assets since they will provide service to the commercial plaza only. No rebates are applicable.

ii) Connection versus Expansion – Example #2

A new residential home is to be built on an acreage outside the core area of the City. The existing London Hydro distribution system stops 600m from the property line. The home requires a 200 A, 120/240 V single phase service, with overhead construction. The home will be built 200m back from the edge of the road. London Hydro prepares an Offer to Connect with a cost estimate for the following: 600m of single phase primary overhead distribution along the roadway, 200m of single phase primary overhead distribution on private property including a drop service (transformation and up to 30m of secondary at no charge). The 600m of distribution along the roadway are considered a system expansion since additional Customers could be added if more lots develop. The ownership of the 200m distribution line will be as per section 3.1.1.3. The NPV calculation is completed for the 600m section only. If additional Customers make use of this section within the next five years, the NPV calculation will be reviewed (see next example).

iii) Additional Customers – Example #3

Two years after the line extension in the previous example has been in service, a nearby landowner decides to develop a property. The point of connection is at the mid-point of the expansion which was paid for by the original Customer. London Hydro prepares an Offer to Connect for the new Customer which includes 25% of the actual cost to build the 600m extension (50% of the cost to build the shared portion of the line extension). After the new Customer has been connected, the original Customer asks to have the NPV calculation reviewed. With the additional load added and the money collected for the shared portion of the line extension, the NPV calculation reveals the original owner is entitled to an additional rebate.

2.1.3 Connection Denial

London Hydro has the right to refuse to connect, or continue to connect, a Customer for any of the following reasons as specified in the Distribution System Code:

- Contravention of the laws of Canada or the Province of Ontario.
- Violation of conditions in London Hydro's Distributor's Licence.
- Use of a distribution system line for a purpose that it does not serve and that London Hydro does not intend it to serve. (e.g., using a pole to mount a sign or as a support for a fence, etc.)
- Adverse effect on the reliability or safety of the distribution system.
- Imposition of an unsafe work situation beyond normal risks inherent in the operation of the distribution system.
- A material decrease in the efficiency of London Hydro's distribution system.
- A materially adverse effect on the quality of distribution services received by an existing connection.
- Discriminatory access to distribution services.
- If the person or business requesting the connection, or an associated business owes London Hydro money for distribution services, including security deposits or capital contributions
- If an electrical connection to London Hydro's distribution system does not meet London Hydro's design requirements.
- Violation of any other conditions in this Conditions of Service document.

If London Hydro refuses to connect a building or facility that lies along one of its distribution lines, London Hydro will inform the person requesting the connection of the reasons for not connecting, and where London Hydro is able to provide a remedy, will make an offer to connect. If London Hydro is unable to provide a remedy to resolve the issue, it is the responsibility of the Customer to do so before a connection may be made.

2.1.4 **Inspections Before Connection**

All Customer electrical installations shall be inspected and approved by the Electrical Safety Authority and must also meet London Hydro's requirements. London Hydro requires notification from the Electrical Safety Authority of this approval prior to the energization of a Customer's supply of electricity. Services that have been disconnected for a period of six months or longer due to non-payment must also be re-inspected and approved by the Electrical Safety Authority prior to reconnection. Any service disconnected for any other reason requires re-inspection by the Electric Safety Authority (Electrical Safety Code Rule 2-012.).

In the event the Customer's existing service mast is damaged (for example, during a storm), the Customer is responsible for re-installing and re-anchoring the service mast and the installation must be re-inspected and approved by the Electrical Safety Authority before London Hydro can re-install the service conductors.

Temporary services, typically used for construction purposes, must be approved by the Electrical Safety Authority for a period of twelve months and must be re-inspected should the period of use exceed twelve months.

London Hydro reserves the right to inspect and witness the construction of any equipment or facilities that will be connected to London Hydro's distribution system. London Hydro will notify the Customer in advance if any witness testing or inspections will be required during construction.

All electrical equipment and materials used by the Customer will be subject to approval by London Hydro, the Electrical Safety Authority and the Canadian Standards Association (CSA) failing which, London Hydro reserves the right to withhold connection to the supply.

2.1.4.1 Overlap of Electrical Services

In certain situations where an existing service is being upgraded or relocated, London Hydro may allow two services to be energized for a period of up to 15 days to provide the owner with adequate time to transfer all internal circuits to the new system.

Prior to any overlap of services, the owner must obtain approval from London Hydro's Engineering Department and London Hydro reserves the right to disconnect the non-permanent service should the 15 day overlap period be exceeded.

2.1.5 Relocation of Plant

Anyone other than a Road Authority requesting London Hydro to relocate its plant or equipment will be required to pay 100% of the costs incurred by London Hydro. The above costs would include all engineering, labour, material, equipment, trucking, easements, applicable burdens, administrative costs, and taxes associated with the required plant modifications.

An exception to the 100% recovery of costs would occur in cases where London Hydro decided to modify or enhance its distribution system for its own purposes and did not replace or relocate the equipment in a "like for like" manner. Relocating plant "like for like" is defined as new plant built to the latest London Hydro standards that has the capacity to perform the same function as the plant that it replaces. In those cases, where the equipment is not relocated in a "like for like" manner, the differential in cost will be absorbed by London Hydro.

Anyone requesting the relocation of London Hydro's plant or equipment must submit a written request to London Hydro in order to initiate the relocation process. London Hydro will provide a cost estimate and must receive either a certified cheque in advance or a Letter of Guarantee from a chartered bank prior to any work being done.

If the relocation is from public to private property or is within the requestor's private properties, then the requestor must supply London Hydro with equivalent property rights in the form of a new easement, tree cutting rights, etc. if applicable.

The requestor is responsible for siting the new locations of all plant to be relocated as agreed to by London Hydro. The costs for any subsequent relocations required due to improper siting will be at the expense of the person requesting the locate.

If a Customer installs a new driveway and London Hydro's overhead structure does not have adequate clearance because of the location of the new driveway, London Hydro will raise or relocate its plant at no cost to the Customer. Where a Customer requires an aerial service to be relocated because of a proposed addition or swimming pool, the Customer will be responsible for 100% of the costs incurred. London Hydro will normally relocate and attach the service to the most secure point along the distribution system where

feasible. Normally an aerial service will be relocated to the property line between two neighbouring Customers to avoid further relocation.

Should a Customer require relocation of an underground service cable and/or a high voltage primary cable to clear a proposed addition or swimming pool, the Customer is required to provide a new trench between London Hydro's distribution point and the point of connection at the Customer's meter stack. London Hydro must be consulted to determine the location of the distribution point. The Customer will be responsible for 100% of the costs incurred.

2.1.6 **Easements and Access to Equipment**

The Customer shall grant, at no cost to London Hydro, where requested, an easement to permit the installation and maintenance of service. The width and extent of this easement shall be determined by London Hydro. In the case of multi-dwelling units such as townhomes or condominiums, a blanket easement on the entire property shall be provided to London Hydro by the Customer. The easement shall be granted prior to installation of the service.

To maintain the reliability, structural integrity and efficiency of the distribution system, London Hydro has the right to have supply facilities on private property registered against title to the property. Easements are required whenever London Hydro's underground or overhead plant is to be located on or above private property and crosses over to an adjacent property to service a Customer other than the owner of the original property. An easement may also be required if a property will be severed or if service locations require London Hydro to gain access from adjacent properties (e.g. mutual driveways, narrow side setbacks, land locked properties, etc.).

London Hydro’s Engineering Design department must be contacted in situations where a severance results in the new parcels being supplied and metered through a common service. This is necessary in order to ensure that customers on the resultant parcels are adequately supplied and metered in accordance with industry regulations.

The Customer will prepare, at their own cost, a reference plan and associated easement document(s) to the satisfaction of London Hydro's solicitor prior to its registration and will register the easement plan. Details will be provided upon application for service.

London Hydro requires access to a Customer's premises at all reasonable times to read meters, or to inspect, repair, or remove meters, wires, cables, or equipment owned by London Hydro. Customers must also provide sufficient access and clearance to permit London Hydro to adequately service its equipment including padmounted transformers, switching units, vaults, meters, etc.

For padmounted equipment, each side of the concrete pad must have at least 1 metre of clearance except any side with an access door which must have 2.5 metres of clearance in front. A clear path must be available to provide access to the equipment. No landscaping, bushes, sheds, or equipment should encroach on this area. Concrete pads must remain at least 5 cm above the surrounding grade and the grade of the immediate area should be sloped in such a manner that water does not collect around the pad.

London Hydro is not responsible for any damage or removal of any Customer-owned landscaping or equipment within the access area or on the easement. Where London Hydro is required to perform surface restoration following any repairs or maintenance to a Customer's service, London Hydro will provide only soil, sod, gravel or asphalt repairs.

Where a customer owns a private structure that impedes access to their own underground secondary service cable (eg. a shed, deck, concrete pad, landscaping, etc.), they will be responsible for all costs to remove the obstruction or relocate the service cable in the event repairs need to be made. London Hydro reserves the right to leave the premises without power until a remedy has been agreed to.

Where a Customer's service entrance is located more than 100m from the right-of-way and the Customer has elected to transfer the ownership and future maintenance of the primary line to London Hydro, the Customer will be responsible for maintaining and clearing an all weather roadway for vehicle access along the length of line.

2.1.7 **Contracts**

Generators and Customers with Customer-owned substations will be required to sign a Connection Agreement prior to commencement of service. London Hydro may require, at its discretion, other Customers with unusual conditions to also sign a Connection Agreement. In addition to contracting for the conveyance of electricity and the use of London Hydro's distribution system, Connection Agreements will typically define boundaries and responsibilities for the ownership, operation and maintenance of equipment at the Customer's location.

In all cases, notwithstanding the absence of a formal contract, or Connection Agreement, the taking and using of electrical energy from London Hydro by any Person or Persons implies and constitutes the acceptance of the terms and conditions of all regulations and rates as established by London Hydro. Such acceptance and use of energy shall be deemed to be the acceptance of a binding contract with London Hydro and the Person so accepting shall be liable for payment for all services and energy received and the contract shall be binding upon the Person's heirs, administrators, executors, successors or assigns.

2.1.7.1 Payment by Building Owner

The Owner of a building is responsible for paying for the supply of electricity by London Hydro to the building except in the case of multi-tenant buildings with individual meters where the occupants have contracted for supply with London Hydro. In the case of multi-tenant buildings with bulk metering, the Owner must pay the total cost of the electrical account. The Owner may then apportion the bill among individual tenants through inclusion in rent or contract a licenced unit sub-metering provider.

A Building Owner wishing to terminate the supply of electricity to their building must notify London Hydro in writing. Until London Hydro receives such written notice from the Owner, the Building Owner or the Occupant(s), as applicable, shall be responsible for paying for the supply of electricity to the building. London Hydro reserves the right to refuse to terminate the supply of electricity to an Owner's building when there are occupant(s) in the building (e.g. during certain periods of the winter). If billing responsibility resides with the owner and there is a unit occupied by a tenant, the Vital Service By-Law of the City of London will be enforced.

2.1.8 **Customers with Dual Feeds**

There are a number of different circumstances under which a Customer may require or request two sources of primary supply and/or two high voltage connections. Various situations are described below:

2.1.8.1 Customer Load Greater than 10 MW

The largest load that can be fed by a single primary supply at 16/27.6Y kV is 10 MW because of the limitations of the largest primary metering unit and current transformer used by London Hydro (200/100-5 A current rating).

If a Customer's load is predicted to exceed 10 MW then a second primary supply must be provided. The Customer will be permitted to totalize the load fed from the two supplies for peak demand metering purposes and will be responsible for paying the connection charges for both sources of supply as described in Section 3.

If a Customer required two primary connections because of load reasons, normal design practice would suggest that if possible, the two connections should also come from two separate sources of supply. This may not always be possible without a system expansion. If for security purposes, a Customer requires their two connections to be fed from separate sources of supply and if a system expansion is required to provide this, the Customer will be responsible for contributing to the cost of the expansion as outlined in Section 2.1.2.

2.1.8.2 Dual Feed due to London Hydro Loop-through Design

At times, the design of London Hydro's distribution system will call for a loop-through design that results in a Customer having two high voltage connections.

In the case of a loop-through padmount transformer for example, if London Hydro has chosen to put the Customer's transformer on a loop to enable the circuit to continue to feed other Customers, the first Customer receives the benefit of two high voltage connections at no extra charge.

In a case where a Customer owns their own switchgear and substation, if London Hydro chooses to add another cell to the switchgear to permit the primary circuit to continue to feed other Customers, London Hydro will pay for the cost of the additional switchgear cell. London Hydro could also elect to provide a separate switching unit with a tap to the Customer's equipment to allow for the loop through design. The Customer would therefore benefit from having two high voltage connections at no extra cost.

In these situations, it will be solely at London Hydro's judgement whether or not a loop-through circuit is required to allow the servicing of additional Customers.

2.1.8.3 Backup Supply and Standby Charges

Customers who have two high voltage connections must also decide how much transfer capability they require internally between the two connections and whether or not they require a true second source of supply.

As discussed earlier, normal design practice would attempt to connect a Customer's two high voltage connections to two separate feeders if such feeders were available. However, there is no guarantee in the future that those two feeders will actually remain as separate feeders. As loads change and as work on London Hydro's system progresses, switching of the system could result in both high voltage connections being actually fed from the same feeder. In some cases, a long term review of the distribution system in the area could result in such a situation becoming permanent. Therefore, if a Customer requires a true second source of supply, this must be identified during the planning stages, and arrangements must be made to ensure that the second high voltage connection will always be fed from a second source.

London Hydro also has restrictions on how much load can be automatically transferred between feeders. If a Customer has auto transfer capability within their premises, London Hydro will permit the Customer to transfer up to one megawatt (1 MW) of load (at 27.6 kV) from one high voltage connection to the other at any time without charge.

If a new Customer has a need to transfer more than one megawatt (1 MW) of load between its two high voltage connections, and needs to perform that transfer either automatically or manually without first obtaining permission from London Hydro, there will be a standby charge per kilowatt that will be charged every month for the amount of load the Customer wishes to be able to transfer. (See Appendix F). This standby charge

recovers the cost to London Hydro of reserving that amount of system capacity on the second source of supply at all times. The standby charge applies to new customers only.

If a Customer contracts to purchase standby capacity for an amount of load less than their normal load requirement at that connection point, proof of procedures for load shedding will be required to ensure that automatic load transfers do not exceed the contracted amount.

If the Customer wishes to be able to transfer more than one megawatt (1MW) between its two high voltage connections, and is willing to first notify London Hydro of their desire and request permission to make the load transfer, and if London Hydro reserves the right to deny the transfer because of loading conditions at the time, then the Customer will not be required to pay the standby charge. However, the Customer must be prepared to accept that their request to transfer load can be denied by London Hydro at any time since there would be no special planning guidelines in place to ensure that spare capacity was available on the second source of supply.

Also see Section 2.3.5 for a further discussion of billing arrangements for customers with more than one metered service connection.

2.1.9 **Pole Attachments**

Customers will not be permitted to make any attachments to London Hydro's poles without written consent. Generally, consent will only be provided to the City of London and City of London licenced franchisees, such as Bell Canada, Rogers Cable, and Group Telecom/Telus. Each pole attachment is subject to a yearly joint use charge (contact the Engineering Dept. for the latest approved rate) and the use of London Hydro's poles for Customer-owned service cables or equipment will only be permitted under special circumstances.

Unacceptable attachments include privately owned electrical service equipment and lighting, private signs, banners and notices, and privately owned brackets and planters. Any such attachments not approved by London Hydro will be removed at the owner's expense.

Notwithstanding this policy, London Hydro will cooperate with community groups to allow the use of London Hydro poles for certain community purposes. In all cases the design of the attachment must meet strict requirements to minimize wind loading and damage to the pole and all such installations must have full approval by the City of London who controls the use of the right-of-way. All costs and liability for the attachments are the responsibility of the community group.

2.2 Disconnection

London Hydro reserves the right to disconnect the supply of electrical energy for causes not limited to:

- Contravention of the laws of Canada or the Province of Ontario.
- Adverse effect on the reliability and safety of the distribution system.
- Imposition of an unsafe worker situation beyond normal risks inherent in the operation of the distribution system.
- A material decrease in the efficiency of the Distributor's distribution system.
- A materially adverse effect on the quality of distribution services received by an existing connection.

- Discriminatory access to distribution services.
- Inability of London Hydro to perform planned inspections and maintenance.
- Failure of the Customer to comply with a directive of London Hydro that London Hydro makes for purposes meeting its licence obligations.
- Failure of the Customer to maintain customer owned equipment that London Hydro believes poses a safety or system reliability risk.
- Overdue amounts owed by a Customer payable to London Hydro for the distribution or retail sale and supply of electricity.
- Electrical disturbance propagation caused by Customer equipment that is not corrected in a timely fashion.
- Energy diversion, fraud or abuse
- The Customer failing to provide a security deposit as required.
- Inability of London Hydro to access revenue meter data, or perform planned inspections, installations or maintenance of revenue metering equipment.
- Any other conditions identified in this Conditions of Service document.

London Hydro may disconnect the supply of electricity to a Customer without notice in accordance with a court order, or for emergency, safety, or system reliability reasons. The remainder of this section describes in more detail various disconnection circumstances.

2.2.1 **Collection of Arrears**

Immediately following the last due date for net payment, steps shall be taken to collect the full amount of the bill. If the bill is still unpaid fifteen days after the last date for net payment, London Hydro may initiate a notification process that may result in the service being disconnected and not reconnected until satisfactory payment or payment arrangements have been made. Additional charges including reconnect charges, late payment charges and security deposits may be billed where applicable.

No Customer shall be disconnected without first having been issued a disconnection notice advising the Customer of the disconnection timeframe. If a Customer does not pay the minimum required amount, London Hydro may limit or turn off the supply of power.

Where applicable, London Hydro will provide Fire and Safety Notices to the affected Customer. In the event billings are being paid by owners in which tenants are involved, London Hydro will endeavour to notify the tenant in writing seven days in advance of its intention to disconnect the supply of power. This notice will only be utilized when all other attempts have failed. If billing responsibility resides with the owner and there is a unit occupied by a tenant, the Vital Service By-Law of the City of London will be enforced.

Disconnection is not the same as termination of the Customer's contract for service. Disconnection in this section does not relieve the Customer of the liability for arrears or monthly service charges for the balance

of the term of contract nor shall London Hydro be liable for any resulting damage on the Customer's premises.

2.2.2 **Disconnection On Order Of Inspection Department**

The Electrical Safety Authority has the power under the Electricity Act, 1998 to order any utility to disconnect a service. The regulations pertaining to service discontinuance are contained in the Ontario Electrical Safety Code.

2.2.3 **Disconnection and Reconnection of Private Substations for Maintenance**

2.2.3.1 Introduction

Customers normally perform substation maintenance annually on the transformers and switchgear contained within the confines of their private substation. When this occurs there are a number of procedures that should be followed before this maintenance can be completed.

2.2.3.2 Procedure

The steps to be followed by owners or electrical contractors are outlined below:

i) The owner or electrical contractor will contact a London Hydro representative at (519) 661-5800 extension 5450 to arrange a date and time for the disconnection and reconnection of the high voltage connections for the substation. London Hydro normally requires at least three (3) working days advanced notice to schedule the disconnection and reconnection of the substation.

ii) The owner or electrical contractor will supply London Hydro with a purchase order number and a billing address.

iii) It is the responsibility of the owner or electrical contractor to contact the Electrical Safety Authority and complete an "Application for Inspection".

It should be noted that London Hydro is unable to reconnect the supply power until connection authorization has been received from the Electrical Safety Authority. In order to improve the inspection efficiency, the Electrical Safety Authority has an "advanced connection authorization" program available to qualified contractors. In this case the contractor shall provide the Electrical Safety Authority with at least two working days advanced notification of scheduled work. Provided that a permit has been issued for the work, the Inspection department will issue an advanced connection authorization to London Hydro. The Inspection Department will perform the actual inspection following reconnection of the substation.

iv) All substation disconnections and reconnections for maintenance are performed under a time and material basis. If the work is carried out during normal working hours (7:30 to 16:00) Monday to Friday except holidays, regular time will apply, any hours worked outside normal working hours will be billed at premium time.

The Electrical Safety Authority establishes the fee schedule for Electrical Inspections. Note that this fee schedule is revised annually.

v) If the electrical contractor does not require London Hydro to disconnect the high voltage connections but only requires the T1-L switch for isolation, the contractor may open this switch provided that they use approved safety procedures and contact London Hydro's System Operating Centre at 661-5800

ext. 5585 before operating the switch. The operation of the switch by the electrical contractor is permissible because the switch is normally part of the private substation.

vi) In the event that London Hydro is unable to perform scheduled work due to inclement weather, distribution system emergencies or similar, London Hydro's System Operating Centre will contact the owner or electrical contractor to reschedule the work.

If a maintenance job is scheduled to be completed during premium time and the owner or electrical contractor cancels the job within 24 hours of the start time, two hours at the applicable premium rate will be billed to the job.

2.2.4 **Disconnection & Reconnection of Residential Meters And Service Cables**

Appendix B contains London Hydro's Operating Instruction EI-28 which describes the procedure for disconnecting and later reconnecting meters and secondary supply service cables to residential buildings.

2.2.5 **Electrical Disturbances**

Customers must ensure that their equipment does not cause any disturbances such as harmonics and spikes that may interfere with the operation of adjacent Customer equipment. Examples of equipment that may cause disturbances include large motors, welders and variable speed drives.

If an undesirable system disturbance is being caused by the Customer's equipment, the Customer will be required to cease operation of the equipment until satisfactory remedial action has been taken. If the Customer does not take such action within a reasonable time, then London Hydro may disconnect the supply of power to the Customer.

When the supply of power is disconnected because of electrical disturbances, inspection is required before reconnection. It shall be the responsibility of the Customer requiring the reconnection to arrange for the inspection and the payment of fees.

London Hydro also reserves the right and has an obligation to disconnect a Customer's private line or equipment if it has caused or is likely to cause because of its condition, a disturbance or outage on London Hydro's system. It is the Customer's responsibility to maintain their privately owned equipment to industry accepted standards to ensure that outages affecting other London Hydro Customers do not occur due to lack of maintenance.

2.2.6 **Energy Diversion**

If London Hydro should find that energy diversion, fraud or abuse is taking place at a Customer's location, then London Hydro may disconnect the supply of power to the Customer.

When the supply of power is disconnected because of energy diversion, fraud or abuse, inspection is required before reconnection. It shall be the responsibility of the Customer requiring the reconnection to arrange for the inspection and the payment of fees.

2.2.7 **Hazardous Conditions**

If London Hydro should discover hazardous wiring or conditions that would put the life of the general public or London Hydro employees in jeopardy, the Customer will be notified of the condition and will be required to remedy the hazard. If the Customer does not take such action within a reasonable time, then London Hydro may disconnect the supply of power to the Customer.

When the supply of power is disconnected because of an electrical hazard, inspection is required before reconnection. It shall be the responsibility of the Customer requiring the reconnection to arrange for the inspection and the payment of fees.

2.2.8 **Reconnection After Six Months**

Where a service has been disconnected by London Hydro for non-payment of rates or due to a change of occupancy of the premises, for a period of six months or longer, Rule 2-012 of the Ontario Electrical Safety Code requires a re-inspection by the Electrical Safety Authority. It shall be the responsibility of the party requiring the reconnection to arrange for the inspection and the payment of fees.

Where no active accounts exist on a property for greater than 6 months, London Hydro will attempt to contact the property owner to determine if electrical service to the property is still required. If electrical service to the property is still required, the property owner will be asked to open an account. Otherwise, London Hydro reserves the right to remove the transformer and associated equipment after 6 months, when there is no active account,

2.2.9 **Disconnection of Overlapped Services**

London Hydro reserves the right to disconnect a service in situations where 2 services have been permitted to be overlapped should the overlap period exceed 15 days. (See Section 2.1.4.1).

2.2.10 **Demolition Requirements**

Anyone requesting a building demolition must first obtain a City of London Demolition Permit Application. The City of London will request London Hydro to confirm the disconnection and removal of all hydro services and equipment. To avoid delays, the Applicant must provide the following information to London Hydro's Dispatch Office at 661-5555: correct demolition address, all London Hydro accounts and meter numbers associated with the property, the Customer's name and phone number, and the list of equipment to be removed.

2.2.11 **House Moving**

If the loaded height of a house or building that is going to be moved is over 4.42 metres (14.5 feet), application must be made to London Hydro before the building can be moved on City streets.

The mover is required to complete an application at the City Clerk's Office, City Hall, 300 Dufferin Avenue and provide this application to London Hydro. Following an on-site visit to view the building and the proposed route of the move, the Engineering Department will provide the mover with an estimated cost based on the loaded height of the building, the distance and the route that will be taken. The mover must guarantee the height of the building at the time of making the deposit.

London Hydro will disconnect or raise overhead wires during the move and the mover will be required to pay the actual costs incurred.

2.2.12 **Removal of Transformers Supplying Abandoned or Inactive Services**

If it is determined that there are no active customer services attached to a transformer or the building supplied by a transformer is abandoned, London Hydro will attempt to contact the current landowner to determine if there are any future plans for the site that require electrical service. Barring any future plans for the site, the transformer will be removed after a maximum of 6 months. Depending on the available information, the transformer may be removed even earlier. Where no active accounts have existed on a

property for more than 6 months and the property owner indicates that they still require an electrical service to the property, the property owner will be asked to open an account. Otherwise, London Hydro reserves the right to remove the transformer.

2.3 Conveyance of Electricity

2.3.1 Limitations on the Guaranty of Supply

London Hydro will endeavour to use reasonable diligence in providing a regular and uninterrupted supply but does not guarantee a constant supply or the maintenance of unvaried frequency or voltage and will not be liable in damages to the Customer by reason of any failure in respect thereof.

Customers requiring a higher degree of security than that of normal supply are responsible to provide their own back-up or standby facilities. Customers may require special protective equipment at their premises to minimize the effect of momentary power interruptions or voltage sags.

London Hydro will endeavour to maintain voltage variation limits under normal operating conditions at the Customers' delivery points as specified by the latest edition of the Canadian Standards Association, C235.

Customers requiring a three-phase supply should install protective apparatus to avoid damage to their equipment, which may be caused by the interruption of one phase, or non-simultaneous switching of phases of the power supply by London Hydro.

Although it is London Hydro's policy to minimize inconvenience to Customers, it is necessary to occasionally interrupt a Customer's supply to maintain or improve London Hydro's system or to provide new or upgraded services to other Customers.

When practical, London Hydro will endeavour to notify Customers prior to interrupting the supply of power to any individual service. However, if an unsafe or hazardous condition is found to exist or if the use of electricity by a Customer’s apparatus, appliances or other equipment is found to be unsafe or damaging to London Hydro or the public, or if service must be disconnected to assist in the safe or efficient restoration of power, or maintenance of London Hydro's system, or in response to a shortage in supply, service may be disconnected without notice.

London Hydro shall have access rights to a property in accordance with Section 40 of the Electricity Act, 1998 and any successor Acts thereto.

2.3.2 Power Quality

London Hydro’s electric distribution system is designed and operated to meet or exceed the Service Quality Performance Standards published by the OEB.

When a customer has a concern about the operation of their electrical equipment related to transient or steady state voltage levels, flicker, harmonic distortion, farm stray (or tingle) voltage, etc., London Hydro will deal with the concerns as follows:

2.3.2.1 Customer Response Process

When customer Power Quality concerns are received, London Hydro will try to resolve the problem over the telephone. When the problem cannot be addressed or resolved over the phone, a site visit will be made to assess the concern. If the power quality problem cannot be easily identified during this site assessment, a power quality monitor will be installed at the customer service entrance or stray voltage measurements will

be made in accordance with Appendix H of the Distribution System Code. If the cause of the problem is identified as a London Hydro responsibility, London Hydro will take appropriate mitigation measures. If the problem is identified as being on the customer side of the system, the customer will be informed by a written report of the results of the analysis and their responsibility.

Any site assessment visit should occur within 10 days of the initial call from the customer.

Should monitoring be required, it could take up to another 2 weeks to identify the probable source of the power quality concern.

It the power quality issue is identified as a London Hydro controllable source, London Hydro will take mitigating action within 2 weeks of it being identified. Depending upon the source, it may take from 1 day to 2 months to resolve. In some cases, resolution may involve only the definition of a planned course of action.

If the power quality issue is identified as a customer responsibility, London Hydro will document the issue to the extent known in a written report to the customer within 2 weeks of the identification. London Hydro may follow up to ensure that the customer has initiated an appropriate plan of action.

2.3.3 **Electrical Disturbances**

London Hydro shall not be held liable for the failure to maintain supply voltages within standard levels due to Force Majeure as defined in Section 2.3.5 of these Conditions of Service.

Voltage fluctuations and other disturbances can cause flickering lights and other serious difficulties for Customers connected to London Hydro's distribution system. Customers must ensure that their equipment does not cause disturbances such as harmonics or spikes that might interfere with the operation of adjacent Customer equipment. Equipment that may cause disturbances includes large motors, welders, variable speed drives, etc. In planning the installation of such equipment, the Customer must consult with London Hydro.

In general, larger motors will require reduced voltage starting equipment to prevent electrical disturbances. The largest motors permitted to be started across the line are as follows:

120/240 volts - 3 H.P.

120/208Y volts - 5 H.P.

347/600Y volts - 25 H.P.

Under certain conditions where the service entrance equipment rating is low in comparison to the motor starting inrush current, if lamp flicker becomes objectionable at an adjacent Customer's premises, reduced voltage starting equipment will be required on motors smaller than those specified above.

Customers having non-linear load shall not be connected to London Hydro's distribution system unless power quality is maintained by implementing proper corrective measures such as installing filters, and/or grounding. Further, to ensure the distribution system is not adversely affected, installed power electronics equipment must comply with IEEE Standard 519-Latest Edition. The limit on individual harmonic distortion is 3%, while the limit on total harmonic distortion is 5%.

Customers who may require an uninterrupted source of power supply or a supply completely free from fluctuation and disturbance, must provide their own power conditioning equipment for these purposes.

Where more than one metered service connection is provided to a single land parcel in order to provide different supply requirements to separate buildings, and there is not electrical tie between the service connections, each connection will be treated as a separate customer for billing purposes. Where multiple feeds have been provided to a single land parcel because of limitations in London Hydro's supply capacity, or where multiple feeds have been provided for security purposes and there is an electrical connection between the feeds, all of the metered connections will be aggregated together and treated as one customer for billing purposes. Existing customers who have different supply or billing arrangements will be permitted to maintain their existing arrangement until a material change is required in one or more of the service connections.

2.3.4 **Standard Voltage Offerings**

London Hydro distributes electrical power through a 27.6 kV primary distribution system. The legacy 13.8 kV system is presently being phased out and converted to 27.6 kV as part of London Hydro's long term system plans. All supply feeders are arranged to run radial with open points between interconnections where practical. These feeders supply distribution transformers either directly or through 4.16 kV or 8.32 kV step-down sub-distribution systems.

London Hydro also maintains an underground network system in the downtown core that is distinct from the other systems. This low voltage secondary network system may be available to some Customers in the downtown core as a source of supply at 120/208Y volts depending on the local capacity of the system and the energy requirements of the Customer. Spot networks might also be available.

The supply of electricity at primary voltage levels will primarily be at 27.6 kV depending on the proximity of the Customer's premises to the nearest distribution facility. For connection of a Customer at 4.16 kV, London Hydro will carry out a special study to justify the investment as in many areas the 4.16 kV distribution facilities are being phased out. The cost of this study may be charged to the Customer.

London Hydro's standard secondary supply voltages are as follows:

- 120/240 volt, single phase, 3 wire
- 120/208Y volt, three phase, 4 wire (grounded wye)
- 347/600Y volt, three phase, 4 wire (grounded wye)

Not all secondary voltages are available at all locations. For example, some areas only have single phase power available and other areas such as industrial subdivisions may have a standardized 347/600Y volt secondary bus. In all cases Customers are required to consult with London Hydro to determine what secondary voltages are available.

London Hydro also has the following primary voltages in some but not all parts of its service territory:

- 2.4/4.16Y kV, three phase, 4 wire (grounded wye)
- 4.8/8.32Y kV, three phase, 4 wire (grounded wye)
- 16.0/27.6Y kV, three phase, 4 wire (grounded wye)

As stated above, not all of these voltages are available in all areas of London Hydro's service territory. Customers are required to consult with London Hydro to determine what voltages are available and to discuss their service requirements.

Customers requiring different voltages than those available in their area will be required to provide their own step down or step up transformation equipment.

In general, only one service will be permitted per Customer at one voltage, i.e., the Customer must supply their own transformation if other voltages higher or lower than the service voltage are required for any portion of their operation. Under normal circumstances, only a single service through a single point of entry will be provided for each land parcel. If a Customer has more than one building on a single land parcel, it will be the Customer's responsibility to sub-feed the additional building(s) from the single point of supply. Exceptions may be made for commercial and industrial properties with multiple, separate buildings with different supply requirements. Customers must make application to the Engineering Department to determine if more than one service to a property will be permitted.

Where more than one metered service connection is provided to a single land parcel in order to provide different supply requirements to separate buildings, and there is no electrical tie between the service connections, each connection will be treated as a separate customer for billing purposes. Where multiple feeds have been provided to a single land parcel because of limitations in London Hydro's supply capacity, or where multiple feeds have been provided for security purposes and there is an electrical connection between the feeds, all of the metered connections will be aggregated together and treated as one customer for billing purposes. Existing customers who have different supply or billing arrangements will be permitted to maintain their existing arrangement until a material change is required in one or more of the service connections.

2.3.5 **Voltage Guidelines**

London Hydro maintains service voltage at the Customer's service entrance within the guidelines of C.S.A. Standard CAN3-C235 (latest edition) which allows variations from nominal voltage of:

110/220 volts to 125/250 volts for 120/240V services for Normal Operating Conditions

106/212V to 127/254 V for 120/240V services for Extreme Operating Conditions

318/550V to 360/625 V for 347/600V systems for Normal Operating Conditions

306/530V to 367/635 V for 347/600V systems for Extreme Operating Conditions

Where voltages lie outside the indicated limits for Normal Operating Conditions but within the indicated limits for Extreme Operating Conditions, improvement or corrective action should be taken on a planned and programmed basis. Where voltages lie outside indicated limits for Extreme Operating Conditions, improvements or corrective action should be taken on an emergency basis. The urgency of such actions will depend on many factors such as the location and nature of load or circuit involved, the extent to which limits are exceeded with respect to voltage levels, the expected duration of the emergency, etc.

London Hydro will practice reasonable diligence in maintaining voltage levels, but is not responsible for variations in voltage from external forces such as operating contingencies, exceptionally high loads or low voltage supply from London Hydro's Transmitter or Host Distributor. London Hydro shall not be liable for any delay or failure in the performance of any of its obligations under this Conditions of Service due to any events or causes beyond the reasonable control of London Hydro, including without limitation, severe weather, flood, fire, lightning, other forces of nature, acts of animals, epidemic, quarantine restriction, war, sabotage, act of a public enemy, earthquake, insurrection, riot, civil disturbance, strike, restraint by court order or public authority, or action or non-action by or inability to obtain authorization or approval from any governmental authority or any combination of these causes. (”Force Majeure")

2.3.6 Backup Generators and other Non-Grid Connected Generators or Sources

Customers with portable or permanently connected generation capability used for emergency back-up or non-grid connected loads shall comply with all applicable criteria of the Ontario Electrical Safety Code. In particular, the Customer shall ensure that their emergency generation does not operate in parallel with London Hydro's system without a proper interface protection and does not adversely affect London Hydro's distribution system. See Section 3.5. Please request the latest copy of the Closed Transition Switching Requirements document.

Customers with permanently connected emergency generation equipment shall notify London Hydro regarding the presence of such equipment.

2.3.7 Electric Metering Details & Requirements

Appendix C contains London Hydro's Operating Instruction EI-29, "Electric Metering Requirements" which describes London Hydro's procedures and accepted practices for the design and installation of electric metering equipment. Appendix E contains London Hydro's Engineering Instruction EI-22, "Guidelines for Supplying Interval-Style Revenue Metering Systems".

2.4 Tariffs and Charges

2.4.1 Service Connections and Miscellaneous Charges

London Hydro's policy is to develop and set average Customer charges at a level to permit full recovery of the allowable connection charges described in the OEB's Distribution System Code.

Where fixed rate average connection charges do not apply, Customers will be charged on a time and material basis to fully recover the allowable cost.

A summary of London Hydro's fixed and per unit Customer charges are provided in Appendix A "Customer Charges for Electric Servicing".

2.4.1.1 Customers Switching to a Retailer

There are no physical service connection differences between Standard Service Supply (SSS) Customers and third party retailers' Customers. Both Customer energy supplies are delivered through the local Distributor with the same distribution requirements. Therefore all service connection requirements applicable to the SSS Customers are applicable to third party retailers' Customers.

2.4.1.2 Payment of Connection Charges and Supply Deposits

Where connection charges or deposits apply, an irrevocable (standby) Letter of Credit or Letter of Guarantee from a chartered bank, trust company or credit union is acceptable in lieu of a cash deposit. Purchase orders in lieu of a cash payment will be accepted from the City of London only.

2.4.2 Energy Supply

2.4.2.1 Standard Service Supply (SSS)

All existing London Hydro Customers are Standard Service Supply (SSS) Customers until London Hydro is informed of their switch to a Retail Electricity Supplier. The Service Transfer Request (STR) must be made by the Customer or the Customer's authorized retailer.

2.4.2.2 Retailer Supply

Customers transferring from Standard Service Supply (SSS) to a retailer must comply with the Service Transfer Request (STR) requirements outlined in Sections 10.5 through 10.5.6 of the Retail Settlement Code.

All requests shall be submitted as Electronic files and transmitted through London Hydro's EBT system. Service Transfer Requests (STR's) must contain information as set out in Section 10.3 of the Retail Settlement Code.

If the information is incomplete, London Hydro will notify the retailer or Customer about the specific deficiencies and await a reply before proceeding to process the transfer.

2.4.3 Deposits

London Hydro is the service provider for City of London Water Services. It is understood that London Hydro's Policies, where required, will cover the water services for the purpose of receivable security subject to any City of London By-Law.

2.4.3.1 Security Requirement – Residential Customers

New residential customers are not typically required to provide security deposits. However, it is the customer's responsibility to pay their bill on time. Customers are expected to maintain a Good Payment History. London Hydro reserves the right to apply a security deposit based on a Customer's inability to maintain a Good Payment History.

All security requirements will be reviewed no less than annually. Cheques will only be issued after a final bill has been rendered and paid. All other security adjustment including refunds due to GPH will appear on the customer's next bill. All security deposits will be returned within 6 weeks after a final bill has been rendered and all amounts owed by the customer to London Hydro have been paid. A final bill can only be rendered once London Hydro has been notified of an account status change, a forwarding address has been supplied and a final read has been made at the service location.

2.4.3.2 Security Requirement – Non-Residential Commercial Customers

Security must be provided to London Hydro by all General Service <50kW, General Service >50kW, >5000kW (Large User), or Embedded Generator Customers that fail to qualify for a security deposit exception and are billed by London Hydro.

Exceptions:

i) Federal, Provincial and Municipal governments, their agencies and their guarantees.

ii) School Boards

iii) All new customers who have a Good Payment History (GPH) with either London Hydro (Section 2.4.5.3), another Location Distribution Company or Gas Utility in Canada. If a customer is claiming an exception due to a payment history with a non-London Hydro Inc. utility the customer must provide a letter from that utility documenting a 5-year satisfactory payment history for the same legal entity. The payment history must have occurred in the past 24 months in order to qualify for an exception. Thereafter, this exception will continue to apply as long as section 2.4.5.3 is complied with.

iv) All existing customers that maintain a Good Payment History with London Hydro Inc.

v) At the customer's expense, they may provide an initial credit check that demonstrates they are a good credit risk, after which the customer must maintain a Good Payment History acceptable to LH. Failure to maintain a satisfactory payment history will result in an immediate security review.

2.4.3.2.1 Amount of Security

The amount of the security will be the following:

i) For a monthly billed customer. The average monthly load over the most recent twelve-month period prorated for 2.5 months *75 days. Where an average monthly load for the customer is not available LH will calculate the load based upon its best estimate.

ii) Where a customer is facing a security deposit requirement resulting from a poor payment history and where more than one disconnection notice has been issued, the amount of security will be calculated on the highest monthly load occurring in the immediately preceding 12 months.

iii) LH will review annually and alter if necessary the deposit amount upon the occurrence of the following:

a) Lack of maintenance of Good Payment History;

b) Anniversary of service installation;

c) A rating deterioration (see Credit Rating and Allowable Reduction table below) where the customer, at their discretion, has supplied London Hydro with a new credit check report; and/or

d) A significant consumption change. For example, if the original deposit is based upon historical consumption data that is inconsistent with consumption experienced with the current customer the amount of security will be adjusted once a new consumption pattern has been established.

Where a customer is facing a security deposit requirement resulting from a poor payment history and where more than one disconnection notice has been issued, the amount of security will be calculated on the highest monthly load occurring in the immediately preceding 12 months.

If requested, a Customer may pay their security deposit in four (4) equal monthly instalments.

Security Deposit assessments for Embedded Generation Customers will be evaluated by London Hydro using reasonable custom estimations of monthly load specific to the Customer.

The form of Security can be chosen by the Customer and must be in the form of cash, cheques, irrevocable and unconditional letter of credit, bank draft, or Surety Bond from a Bank as defined in the Bank Act of Canada. Security deposit amounts may be subject to additional standard changes including, but not limited to, late payment and returned item charges.

Where a non-residential Customer provides, at the Customer's expense, a credit rating from a recognized credit rating agency, the maximum amount of a security deposit which the Customer is required to pay shall be reduced in accordance with the following table:

Credit Rating (Using Standard & Poor's Rating Terminology)	**Allowable Reduction in Security Deposit Amount**
AAA- and above or equivalent	100%
AA-, AA, AA+ or equivalent	95%
A-, from A, A+ to below AA or equivalent	85%
BBB-, from BBB, BBB+ to below A or equivalent	75%
Below BBB- or equivalent	0%

2.4.3.3 Waiver of Security Requirement

Any customer who cannot qualify for an exception under 2.4.3 will be eligible for a 50% reduction in the security amount calculation once they enrol in a preauthorized payment plan (PAP) and have maintained good payment history for six consecutive bill periods. Any refunds of security will be applied to the Customer's next bill.

Customers who withdraw from a preauthorized payment plan will be subject to an immediate credit review.

Customers with general service >50 kW only, as an alternative to the deposit requirement, the Customer may choose an "Advanced Billing option". On the first of the month, London Hydro will establish the dollar value of the Customer's highest peak billing and bill this amount with their next regular billing. These customers will always be in a one-month credit position. Where customers wish to fit this advance billing option within their budget cycle, London Hydro will offer a payment schedule of up to 6 months for the calculated amount. Failure to maintain payments will result in an immediate security review.

2.4.3.4 Return of Security

All security requirements will be reviewed no less than annually. Security amounts may be returned, continued, or revised based on any of the following:

- Good Payment History;
- A rating deterioration (See Credit Rating and Allowable Reduction table above) where the customer, at their discretion, has supplied London Hydro with a new credit check report; and/or
- A significant consumption change. If the original deposit amount is based upon historical consumption data that is inconsistent with consumption experienced with the current customer, then the amount of security will be adjusted once a new consumption pattern has been established.

During annual review, customer's in the Large User billing classification may have 50% of the security returned if eligible due to payment history.

All security deposit related adjustments, including interest and refunds due to review, will appear on the Customer's next bill to be applied on account. For final bill customers, cheques will be issued within six weeks after a final bill has been rendered and all amounts owed by the Customer to London Hydro have been paid.

A final bill can only be rendered once London Hydro has been notified of an account status change, a forwarding address has been supplied and a final read has been made at the service location.

A customer may, no earlier than 12 months after the payment of a security deposit or on making

prior demand for a review, demand in writing that London Hydro undertake a review to determine whether the total (partial) amount of the security deposit should be returned.

2.4.3.5 Security Requirement - Retailer Prudential

The Ontario Energy Board's "Retail Settlement Code", requires Distributors to enter into security arrangements with each Retailer.

All Retailers must provide a Prudential Security Deposit to London Hydro regardless of their Credit Rating.

The amount of the deposit, the type of security, and the planned frequency for prudential review for timing and updating will be set out in the "Retailer Service Agreement".

This prudential calculation will be reviewed every 3 months.

Bulk-Metered Residential Condominium Customers

When a customer is a corporation within the meaning of the Condominium Act, 1998, and has an account that relates to more than 1 unit i.e. bulk metered they will be treated as a residential customer for security deposit purposes. Customers must self declare their status as a residential condominium corporation and provide sufficient evidence to support the declaration.

2.4.3.6 Interest on Security

(For all classes with the exception of Retail Prudential which is covered under the Retail Settlement Code)

Interest shall accrue monthly on security deposits made by way of cash or cheque commencing on receipt of the total deposit required by LH. The interest rate shall be at the Prime Business Rate as published on the Bank of Canada website less 2 percent, updated quarterly. The interest accrued to December 31st of each year. Deposit interest is calculated and applied to customer's account on return or closure of the account, whichever comes first. A cheque will be issued only to those customers no longer in the London Hydro service area and whose final bill has been rendered and paid.

2.4.3.7 Payment of Security

Residential Customer – Should security be required, a customer has the option to pay the deposit over six monthly equal payments.

General Service & Large Customers – Should security be required, a customer has the option to pay the deposit over four monthly equal payments.

2.4.3.8 Other Charges

As well as asking for additional money to be added to the deposit on hand, LH will also ask the customer to pay charges, including: late payment interest charges, returned item charges, reconnection charges and other charges.

2.4.3.9 Collection Procedures

Customers with overdue accounts, in addition to having to pay a security deposit, will be subject to the standard collection procedures of London Hydro, including: notices of late payment, late payment penalties including interest charges on overdue payments, collection and agency activity, notification of credit bureaus, court action, disconnection of service, as appropriate. Service may be disconnected for non-payment of any balance including any unpaid security deposit, after proper notice has been given to the Customer. Any payments made at the door of a Customer must be made with certified cheque, money order or cash.

2.4.4 Billing

2.4.4.1 General

London Hydro will render bills to all its Customers on a monthly basis. Bills for electrical energy consumption may be based on either a metered or estimated consumption, as determined by London Hydro. Bills rendered for electricity charges with a service period of less than 15 days will include prorated monthly fixed service charges.

When an actual meter reading cannot be obtained from the meter for three (3) months, the estimated billable consumption may be inflated to obtain the customer's awareness of the repeated estimations.

Billing periods and invoice dates will be solely at the discretion of London Hydro. Customers may only opt for calendar month billing periods where one or more of the following apply:

- They are a service using over 1 MW of demand;
- They are considered Class A for purposes of Global Adjustment calculations (see www.ieso.ca); or
- The load is unmetered.

London Hydro requires access to a Customer's premises at all reasonable times to read meters, or to inspect, repair, or remove meters, wires, cables, or equipment owned by London Hydro. If this access cannot be obtained, the electrical service will be subject to disconnection pending arrangements to allow a reading by London Hydro's personnel.

2.4.4.2 Miscellaneous Charges

An account setup fee will be charged to cover the cost of setting up a new account and performing the final meter reading when an account is closed. The fee will also apply to all accounts that move in or transfer from one location to another within London Hydro's service territory.

Customers shall be required to pay additional charges for the processing of Non-Sufficient Fund Cheques (NSF).

A complete list of current Ontario Energy Board approved tariffs and charges applied by London Hydro can be found on our website (www.londonhydro.com).

2.4.4.3 Sundry Charges

London Hydro also bills “Sundry Charges” which are non-distribution related and can be made up of the following:

- Damages resulting from accidents to London Hydro property;
- Developer charges for existing and new developments;
- Contractor assistance;
- Sale of scrap or obsolete equipment and material; or
- Other non-distribution charges.

Sundry billing may consist of charges for labour, equipment and materials to fully recover the allowable costs.

If non-payment occurs, London Hydro will take any and all necessary steps to fully recover the charges incurred which may include refusal to work on any existing or pending projects.

2.4.4.4 Primary and Secondary Billing (Associated Billing or Deduct Billing)

London Hydro does not offer deduct billing for new services.

2.4.4.5 Billing Responsibility

It is the responsibility of the customer who will be using and/or paying the charges to enter into a contract with London Hydro via an application for service. Where a tenant has not taken this responsibility, the service will be disconnected unless the owner has a Continuous Service Agreement in place to default the account to the owner of the property.

London Hydro reserves the right to request proof of identity for all services.

Where an account is in dispute regarding bill responsibility and no one has taken liability, the service will be disconnected until the customer has taken the responsibility from the date of dispute.

When an electric service is disconnected, billing of the Fixed Monthly Fees will continue to be charged and billed to the customer for the term of their contract.

When a commercial electric service is disconnected, billing of Fixed Monthly Fees will continue to be charged and billed to the customer for the term of their contract. In order to terminate fixed monthly fees, it is the responsibility of the Customer to request removal of the service connection as in section 2.2.4. In order to re-connect the service once it has been removed, there may be significant charges required. Customers are strongly advised to discuss options and costs with London Hydro prior to having their service removed.

2.4.5 Payments and Late Payment Charges/Interest

2.4.5.1 General

Bills are rendered for all applicable services.

Residential and GS<50kW consumers are provided a minimum of 20 days from the date a bill is issued to pay the bill amount in full without interest penalty.

A bill sent by mail is considered issued on the third day after being printed by London Hydro. For paperless billing Customers, a bill available through MyLondonHydro account portal is considered issued on the day London Hydro sends an email to notify the Customer their bill is ready.

Late payment charges equal to 1.5% per month (19.56% annually) is calculated on all past due charges including arrears.

Where the Customer has made a partial payment on or before the due date, interest charges will apply to any outstanding amount left owing after the due date. Interest is calculated on all charges including arrears and is compounded monthly.

Payments made by mail will be considered made three days prior to the date London Hydro receives the payment.

Payments made electronically or by credit card will be considered made on the date acknowledged or recorded by the consumer's financial institution.

In the event of partial payments, payments shall be allocated to the competitive and non-competitive electricity costs based on the ratio of the amounts billed for each category, then to non-electricity costs respectively. Credit balances arising from Customer overpayments may be refunded, by cheque, at the request of the Customer. In such instances, no interest shall be applied to the amount.

Outstanding bills are subject to the collection process and services may be disconnected. Service will be restored once satisfactory payment has been made. Disconnection of service does not relieve the customer of the liability for arrears.

2.4.5.2 Collection Procedures

Customers with overdue accounts, including unpaid security deposit, will be subject to London Hydro's standard collection procedures as follows:

- Late payment notices and penalties
- Collection and collection agency activity
- Disconnection notices
- Disconnection or limiting of service
- Notification of credit bureaus
- Court action

Any payments made at the door of a Customer must be made with certified cheque, money order, credit card, or cash.

At the time of disconnection, when a London Hydro service person comes to disconnect the service, the only option to avoid immediate disconnection is to:

1) Advise the service person that you will immediately make a credit card payment;

2) Immediately make a credit card payment in the full amount; and

3) Contact London Hydro Customer Services to notify us of your credit card payment.

London Hydro shall not be liable for any damages on the Customer's premises resulting from such discontinuance of service. A reconnection charge will apply where the service has been disconnected due to non-payment.

Customers shall be required to pay additional charges for the processing of Non-Sufficient Fund Cheques (NSF).

A Field Trip Charge (also known as a Collection of Account Charge) will apply whenever a visit to the Customer's premise is required to collect an overdue payment of an account or to obtain a signed application for service.

A New Account Setup Fee (or Occupancy Charge) covers the cost of setting up a new account and performing the final meter reading when an account is closed. The New Account Setup fee will apply to all new accounts that move from one location to another.

2.4.5.3 Good Payment History

The minimum time frame for establishing satisfactory payment history varies by Customer class as follows:

Customer Segment	Payment History Record
Residential	1 year
GS<50kW (Commercial)	3 Year
GS>50kW (Demand/Interval)	7 Year
Large User	7 Year

The customer will no longer qualify as a customer with a Good Payment History and will be subject to an immediate security review if any of the following events occur:

Disconnection of Service

- Residential Customer – When a Customer has one Disconnection of Service within the relevant period stated in the above table.

- Non-residential Customer – When a Customer has 1 Disconnection of Service within the relevant period stated in the above table.

Collect Trip (Field Collection Activity)

- Residential Customer – When a Customer has received more than 2 collect trips or a customer has received 2 collect trips within the relevant period stated in the above table, with one of those collect trips having occurred in the last 90 days from the assessment date.

- Non-residential Customer – When a Customer has received more than 2 field collection trips or a customer has received 2 field collection trips within the relevant period stated in the above table and 1 of those field collection trips having occurred in the last 3 years from the assessment date.

Returned Payment – Insufficient Funds

- Residential Customer – When a Customer has had 2 payments returned "Insufficient Funds" within the relevant period stated in the above table, with one of those returned payments having occurred in the last 90 days from the assessment date.

- Non-residential Customer – When a Customer has had 2 payments returned "Insufficient Funds" within the relevant period stated in the above table.

When a Customer makes an assignment in bankruptcy or is petitioned into bankruptcy proceedings and receives court protection from creditors under any provincial or federal legislation or in any civil proceedings and has had activity that negatively impacts their payment history with London Hydro, a security deposit will be required from all such customers when court documents allow. Once their payment history becomes a "Good Payment History", refunds will apply within the appropriate time lines depending on the classification of the customer. All customers under court protection will be subject to payment arrangements acceptable to London Hydro.

2.4.5.4 Discretion Clause

If extenuating circumstances exist and compelling reasons are demonstrated, an individual account may be reviewed by London Hydro and further accommodation may be provided.

2.4.6 Customer Class Definition and Application of Rates

All customers are to be classified according to the policies and guidelines of the Ontario Energy Board. The specific application of these policies and guidelines within the London Hydro service territory are outlined in this section.

All active services will be charged to the Monthly Service Charge.

The Ontario Energy Board approves all retail distribution and retail transmission rates for each retail customer class. Refer to Section 2.4.7 for reference to the current approved rates.

2.4.6.1 Annual Rate Class Review

To ensure fairness and uniform application of rates, it is necessary to confirm that all customers continue to be properly classified. To ensure that, London Hydro will conduct a periodic review of its customer base to determine changes to customer specific rate classifications. London Hydro will conduct a review for all customers based on the customer's consumption during a predefined annual 12-month consumption period. The annual 12-month consumption period will normally be deemed to be between the customer's first meter reading date occurring in October of each year through to the end meter reading date in October of the next year, unless otherwise specified. Normally, a customer rate reclassification review will occur in November of each year with the first change being made after January 1st of the new billing year.

Interim reviews of a customer's rate classification can be made at any time at either London Hydro's discretion or upon request by the customer, but not more frequently than once per calendar year. An interim review would be based on the preceding consecutive months, using load data for a minimum of 6 months but no greater than a maximum of 12 months. If an annual or interim review requires a customer to be moved into a different rate class, London Hydro will notify the customer of the rate reclassification a minimum of one bill period before the reclassification is being made. Rate reclassifications apply only to future charges; neither London Hydro nor the customer can charge or recover monies for payments made during the 12-month period preceding a review and rate reclassification.

Classification of Rates – Change in Use

When the use of a facility or electric service changes, the rate classification may also need to change to ensure fair and uniform application of rates (e.g. residential to commercial rate classifications). It is the responsibility of the customer to notify London Hydro immediately if the premise where electric service is provided is modified or altered in any way so as to result in a change to the rate class for which the service is qualified according to the policies and guidelines of the Ontario Energy Board Electricity Distribution Handbook, which can be viewed at www.oeb.gov.on.ca.

Customers are required to complete a new Application for Service when the facility or service use changes (after the service contract has been initiated). Rate reclassifications initiated through the new customer Application for Service apply to future charges only and become effective on the start of the next billing period.

London Hydro at its sole discretion will audit customer rate classifications and facility or service use through periodic field investigations. If it is identified that the rate classification does not match the service use, London Hydro reserves the right to change the customer's rate classification to the appropriate rate class. In addition, if it is found that the facility use change occurred without notification from the customer, London Hydro reserves the right to apply the rate reclassification retroactively up to two years. London Hydro will notify the customer of the rate reclassification at least one bill period prior to the reclassification.

Note: as outlined above it is the customer's responsibility to advise London Hydro of the property or service use via the Application for Service process.

2.4.6.2 Temporary Services

Customers will be classified into the temporary service classification whenever their billing period will be less than 12 months of consecutive service. The consecutive service period is defined as the time between when the electric service becomes activated by a customer for billing to the time the service becomes deactivated and the billing to the customer ceases. Initial customer rate classification will be determined by using the best available criteria from use of either forecasted consumption data, historical consumption data derived from typical/similar customer use when available or through the use of the Application of Rates and Charges, outlined in Chapter 9 of the OEB Rate handbook. For determining the appropriate customer rate class for temporary service customers, the evaluation process will use less than 12-month consumption averages for determining the appropriate rate class to be applied.

For new services expected to have a monthly demand greater than 50kW, an interval meter will be installed. Typically this will be provided with a cellular communication option and related fees as described in section 2.4.11.3.5, *General Service >50kW Interval Meter.*

There are two major sets of categories under which London Hydro must classify its customers and apply rates. These categories are distribution services and transmission services. The distribution services relate to the actual distribution system that London Hydro utilizes to provide services directly within the service territory. The transmission services are related to the infrastructure of both the transmission system and provincial electric market operations to provide service to the London Hydro service territory.

For each major category a definition of customer classes and rate applications are required.

Temporary services are required to adhere to the same technical requirements as permanent services.

2.4.6.3 Retail Distribution Billing Determinants

2.4.6.3.1 Residential – Energy Metered and General Service < 50 kW – Energy Metered

All non demand customers without interval meters will be deemed to be Residential – Energy Metered or General Service < 50 kW – Energy Metered. This rate class will include all residential customers and general service customers with either a 12-month average annual consumption period demand of less than 50 kW per month or projected average demand of less than 50 kW per month for new customers.

Any of the above class of customers that install an interval meter will be deemed to be on the same retail distribution rate schedule and rate application as this customer rate class. The service charge will be applied on a per (electric service) connection basis. See Section 2.3.5 for a further discussion of billing arrangements for customers with more than one metered service connection.

Multi-unit residential establishments such as apartment buildings supplied through one service (bulk meter) shall be classified as general service.

Where electricity service is provided to combined residential and business (including agricultural) usage and the wiring does not provide for separate metering, the classification shall be at the discretion of the utility and should be based on such considerations as the estimated predominate consumption.

2.4.6.3.2 Sentinel Lighting & Un-metered/Scattered loads

Sentinel Lighting & Un-metered/Scattered loads will be defined as the un-metered (Non-Streetlight) service accounts with London Hydro. The demand kW rate will be applied on an estimated peak (connected load) demand occurring at any time of the month and the monthly service charge will be applied on a per connection basis. See Section 2.3.5 for a further discussion of billing arrangements for customers with more than one metered service connection.

2.4.6.3.3 Street Lighting

Street Lighting will be defined as the un-metered street light service accounts with London Hydro. The demand kW rates will be applied on an estimated peak (connected load) demand occurring at any time of the month. The service charge will be on a per connection basis.

2.4.6.3.4 General Service >50kW Demand Metered (Obsolete)

This rate class includes all existing general service non interval-metered customers with a 12-month average annual consumption period demand of greater than or equal to 50 kW per month or projected average demand of greater than or equal to 50 kW per month for existing customers and having an annual consumption period demand of less than 200 kW per month for existing customers or projected average demand of less than 200 kW per month for new customers. Customers with a 12-month annual consumption period demand of greater or equal to 200 kW per month are to be placed in the General Service – Interval Metered category, as per the OEB Distribution System Code (DSC) Section 5.1.3. For demand non-interval metered customers the demand kW charge will be applied to billing demand (measured peak demand occurring at any time of the billing period). The measured demand will be adjusted for transformer losses and power factor as applicable to determine the billing demand. The billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer). The service charge will be applied on a per

(electric service) connection basis. See Section 2.3.5 for a further discussion of billing arrangements for customers with more than one metered service connection.

Due to recent changes in the Distribution System Code Section 5.1.3 (b), this rate class will be transitioned to interval metering, see section 2.4.11.3.5, *General Service >50kW Interval Meter*, and will not apply for new services.

Note: OEB Distribution System Code Section 5.1.3 states the following:

5.1.3 For the purposes of measuring energy delivered to the customer, a distributor shall:

(a) install a MIST meter on any new installation that is forecast by the distributor to have a monthly average peak demand during a calendar year of over 50 kW; and

(b) have until August 21, 2020 to install a MIST meter on any existing installation that has a monthly average peak demand during a calendar year of over 50 kW.

2.4.6.3.5 General Service >50kW Interval Meter

This rate class will include all general service interval metered customers with a 12-month average annual consumption period demand of greater than or equal to 50 kW per month or projected average demand of greater than or equal to 50 kW per month for new customers and having an annual consumption period demand of less than 5,000 kW per month or projected average demand of less than 5,000 kW per month for new customers.

The billing demand of a General Service – Interval Metered customer shall be based on the maximum demand in kilowatts during any consecutive 15 minutes (15-Minute Clock Average) in the bill period, as recorded on an interval meter in 15-minute intervals. The measured demand shall be adjusted for transformer losses and power factor as applicable to determine the billing demand. The billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

The service charge will be applied on a per (electric service) connection basis.

Note: OEB Distribution System Code Section 5.1.3 states the following:

5.1.3 For the purposes of measuring energy delivered to the customer, a distributor shall:

(a) install a MIST meter on any new installation that is forecast by the distributor to have a monthly average peak demand during a calendar year of over 50 kW; and

(b) have until August 21, 2020 to install a MIST meter on any existing installation that has a monthly average peak demand during a calendar year of over 50 kW.

Some General Service accounts may be eligible for the Regulated Price Plan (RPP). Eligibility for Designation is in accordance to the definitions outlined in the Ontario Energy Board Act, 1998, and Ontario Regulation 95/05. Customers that leave the regulated price plan for any reason may be subject to a “Final Regulated Price Plan (RPP) Variance Settlement Factor.” This settlement factor may be a credit or a charge based on the current factor issued by the Ontario Energy Board and is to be included in the first bill issued after the Customer is removed from designation status.

To determine the Billing Demand, the measured demand will be adjusted for primary or secondary transformer losses as appropriate. Primary transformer losses apply when the metering installation is on the supply side of the transformer.

Measured demand will be Power Factor Adjusted to determine Billing demand (i.e. the higher of 90% kVA or 100% kW).

2.4.6.3.6 Large User > 5,000 kW - Interval Meter

Customers with a monthly peak demand averaged over 12 consecutive months equal to 5,000 kW or greater shall be classified as large user. Where forecast demands clearly establish that a customer would become a large user, the customer may be classified as a large user as soon as the maximum demand exceeds 5,000 kW. Normally, a customer's classification will be reviewed annually at the end of the calendar year.

The billing demand of a large user customer shall be based on the maximum demand in kilowatts during any consecutive 60 minutes (Rolling 60-Minute Averages) in the bill period as recorded on an interval meter with a demand interval of either 5 or 15 minutes. The measured demand will be adjusted for transformer losses and power factor as applicable to determine the billing demand. The billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

The service charge will be applied on a per (electric service) connection basis.

2.4.6.3.7 Embedded Generation

Definition: Gross Peak Demand = Import energy plus generation energy less export energy.

Embedded generation, co-generation or load displacement customers have the option to reserve demand capacity on the London Hydro distribution system for import load through a mutual agreement/contract. The customer's contracted reserve amount shall not exceed the generator(s) nameplate capacity rating. The customer can make a request to change the reserve amount annually 30 days prior to the anniversary date of the agreement/contract. The distribution standby rate will be applied to all monthly kW reserved before any transformer discounts for customer owned equipment. The transformer discount will be applied to all kW reserved or billed when the customer owns their own transformation. The transformer discount will be applied to all incremental distribution kW's billed when the customer owns their own transformation and the customer is classified within the London Hydro OEB approved General Service 50 - 4,999 kW (Co-generation) rate category.

For the embedded generation customers with a gross peak demand annual average of greater than 1 MW per month the co-generation distribution rates will apply for those customers meeting the following conditions:

1. The generation is in operation at least 20% of the London Hydro determined annual rate reclassification period and the installed generation is at least 20% of the customers load requirements.
2. The customer wishes to reserve capacity (Standby reserve) on the London Hydro system.

The distribution kW rate is applied to the incremental billed demand. Incremental billed demand is equivalent to the peak monthly billed demand less the standby reserve kW.

The monthly measured peak demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

The billed demand will be determined by the measured peak demand occurring during any time of the billing period (i.e. month). The service charge will be applied on a per (electric service) connection basis.

When gross peak demand is determined to be over an annual average of 5,000 kW per month, the billing demand will be based on the maximum demand during any consecutive 60 minutes (Rolling 60-Minute Averages) in the bill period.

When gross peak demand is determined to be less than an annual average of 5,000 kW per month, the billing demand will be based on the maximum demand during any consecutive 15 minutes (15-Minute Clock Average) in the bill period.

For the embedded generation customers with a gross peak demand annual average of less than 1 MW and greater than 50 kW per month, the general service > 50 kW distribution rates will be applied, as long as there is no requirement for reserve capacity from the customer.

For the embedded generation customers with a gross peak demand annual average of less than or equal to 50 kW per month, the general service < 50 kW or residential distribution rates will be applied, as long as there is no requirement for reserve capacity from the customer.

For embedded generators greater than 1MW in capacity that use a non-renewable fuel source or those embedded generators greater than 2MW in capacity that use a renewable fuel source, the customer is required to meter the generation and provide London Hydro with access to the interval data. This is often achieved by the customer engaging a metering service provider (MSP) and enabling London Hydro to read the meter.

2.4.6.3.8 Embedded Distributor

In the case of embedded distributors, application rates will be based on Gross Peak Demand (Import energy plus generation energy less export energy).

When the actual or forecasted (new services) 12 month average Gross Peak Demand is:

- less than 5,000kW - General Service 50 TO 4,999 KW Service Classification rates will apply
- greater than or equal to 5,000kW - Large Use Service Classification rates will apply

2.4.6.3.9 Transformer Allowance

The transformer allowance will be applied to all kWs reserved or billed when the “eligible customer” owns their own transformation. “Eligible customer” is defined as those customers that are classified in the London Hydro OEB approved General Service 50 - 4,999 kW rate category.

2.4.6.3.10 Specific Service Charges

All specific service charge rates will be applied as outlined in the distribution rates schedules approved by the Ontario Energy Board.

2.4.6.4 Retail Transmission Billing Determinants

The application of demand rates identified in this Section follows the requirements outlined in the Hydro One Networks Inc., (HONI) Transmission Rate Schedules, OEB Distribution Rate Handbook and the OEB RP-1999-0044. For generation customers the use of coincidental demand variables and rules will only be applied to those customers that fall within the OEB approved Co-generation rate classification or any existing generation installed on or before October 31, 1998; otherwise the maximum peak and on peak demands (kW / kVA) in the TOU periods will be used to the determine demand variables.

2.4.6.4.1 Residential - Energy Metered, General Service < 50 kW - Energy Metered and Un-metered Scattered Loads

All non demand customers without interval meters will be deemed to be Residential – Energy Metered, General Service < 50 kW – Energy Metered or Un-metered Scattered Loads. This rate class will include all residential customers and general service customers with either a 12-month average annual consumption period demand of less than 50 kW per month or projected average demand of less than 50 kW per month for new customers. The rates will be applied to all energy adjusted for the total loss factor set out under the Retail Settlements Code.

Any of the above class of customers that install an interval meter will be deemed to be on the same retail transmission rate schedule and rate application as the Residential - Energy Metered and General Service < 50 kW - Energy Metered. As the number of interval metered customer's increase in these rate classes, a redefinition of the application could be made once coincident factor data is available.

2.4.6.4.2 Sentinel Lighting

Sentinel Lighting will be defined as the un-metered sentinel light service accounts with London Hydro and the rates will be applied on a connected load basis.

2.4.6.4.3 Street Lighting

Street Lighting will be defined as the un-metered street light service accounts with London Hydro and the rates will be applied on an average monthly-connected load basis.

2.4.6.4.4 General Service >50kW Demand Metered (Obsolete)

This rate class will include all non interval metered customers with a 12-month average demand of equal to or greater than 50 kW or a 12-month average demand of less than 200 kW.

For demand non-interval metered customers the retail transmission network and connection service charges will be based on their peak billed demand occurring at any time.

The measured demands for both connection and network retail transmission service charges shall be adjusted for transformer losses and power factor as applicable to determine the billing demand. The billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

Due to recent changes in the Distribution System Code Section 5.1.3 (b), this rate class will be transitioned to interval metering, see section 2.4.11.4.5, *General Service >50kW Interval Meter*, and will not apply for new services.

Note: OEB Distribution System Code Section 5.1.3 states the following:

5.1.3 For the purposes of measuring energy delivered to the customer, a distributor shall:

(a) Install a MIST meter on any new installation that is forecast by the distributor to have a monthly average peak demand during a calendar year of over 50 kW; and

(b) Have until August 21, 2020 to install a MIST meter on any existing installation that has a monthly average peak demand during a calendar year of over 50 kW.

2.4.6.4.5 General Service >50kW Interval Meter

This rate class will include all interval-metered customers with an annual average calendar year monthly demand of greater than or equal to 50 kW or less than 5,000 kW.

The network and connection billing demand of a General Service – Interval Metered customer shall be based on the maximum demand in kilowatts during any consecutive 15 minutes (15 Minute Clock Average) in the month as recorded on an interval meter. The measured demands for both connection and network retail transmission service charges shall be adjusted for transformer losses and power factor as applicable to determine the billing demand. The billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

The billed demand for network retail transmission service charges will be determined by the measured peak billed demand occurring during the peak periods of 7 am to 7 pm (local time) on weekdays excluding holidays as defined by the Hydro One Networks Inc., Transmission Rates Schedule.

The billed demand for connection retail transmission service charges will be determined by the measured peak billed demand occurring during any time of the billing period (i.e. month) as defined by the Hydro One Networks Inc., Transmission Rates Schedule.

Note: OEB Distribution System Code Section 5.1.3 states the following:

5.1.3 For the purposes of measuring energy delivered to the customer, a distributor shall:

(a) Install a MIST meter on any new installation that is forecast by the distributor to have a monthly average peak demand during a calendar year of over 50 kW; and

(b) Have until August 21, 2020 to install a MIST meter on any existing installation that has a monthly average peak demand during a calendar year of over 50 kW.

2.4.6.4.6 Large User > 5,000 kW – Interval Meter

A customer with a monthly peak demand regardless of whether the demand occurs in the peak or off-peak transmission system periods, averaged over 12 consecutive months, is equal to 5,000 kW or greater, shall be classified as large user. Where forecast demands clearly establish that a customer would become a large user, the customer may be classified as a large user as soon as the maximum demand exceeds 5,000 kW. Normally a customer's classification will be reviewed annually at the end of the calendar year.

The billing demand of a large user customer shall be based on the maximum demand in kilowatts during any consecutive 60 minutes (Rolling 60-Minute Average) in the month as recorded on an interval meter with

a demand interval of either 5 or 15 minutes. The measured demands for both connection and network retail transmission service charges shall be adjusted for transformer losses and power factor as applicable to determine the billing demand. The billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

The billed demand for network retail transmission service charges will be determined by the measured peak billed demand occurring during the peak periods of 7 am to 7 pm (local time) on weekdays excluding holidays as defined by the Hydro One Networks Inc., Transmission Rates Schedule.

The billed demand for connection retail transmission service charges will be determined by the measured peak billed demand occurring during any time of the billing period (i.e. month) as defined by the Hydro One Networks Inc., Transmission Rates Schedule.

2.4.6.4.7 Generation (Existing > 1 MW & Existing or New < 1MW)

Existing embedded generation is defined as those generators with required approvals for such generation before October 30, 1998. Embedded generation < 1 MW will be those generators installed at any time with a generation rating of 1 MW or less and have an interval meter installed on the service entrance.

For existing embedded generation customers with a generation rating of greater than 1 MW, the retail transmission rates and rate applications for Generation (Existing > 1 MW & Existing or New < 1MW) will apply to all customer import/consumed energy taken from the London Hydro distribution system.

For customers with a generation rating of 1 MW or less wishing to be classified as an embedded generator for determining transmission rate applications, the generation customer must meet the following conditions:

1. The account must be monitored via an approved interval meter.
2. The generator must be in operation at least 20% of the London Hydro determined annual rate reclassification period.
3. The installed generation must be at least 20% of the customers load requirements.

Retail Network Service Charge – rates applied to the measured coincidental net energy consumed during the clock hour at time of either the higher of the transmission system peak or 85% delivery point peak between the peak time hours of 7 am to 7 pm (local time) on weekdays excluding holidays as defined by the Hydro One Networks Inc., Transmission Rates Schedule.

The billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

Retail Connection Service Charge – rates applied to the measured coincidental net energy consumed during the clock hour at the time of their delivery point peak. The billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

The connection import demand will be determined by the billing import demand, which will be determined by the highest of either 90% kVA or 100% kW (Power factor adjusted). Import demand shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

2.4.11.4.8 Generation (Energy Metered Customer <50 kW)

For generation customers with a demand <50 kW the retail transmission network and connection energy rates will apply for the general service <50 kW and residential classes on consumed uplifted[1] energy.

2.4.11.4.9 Generation (New >1 MW)

New embedded generation >1 MW is defined as those generators with required approvals for such generation after October 30, 1998 and that have a generation rating of greater than or equal to 1 MW.

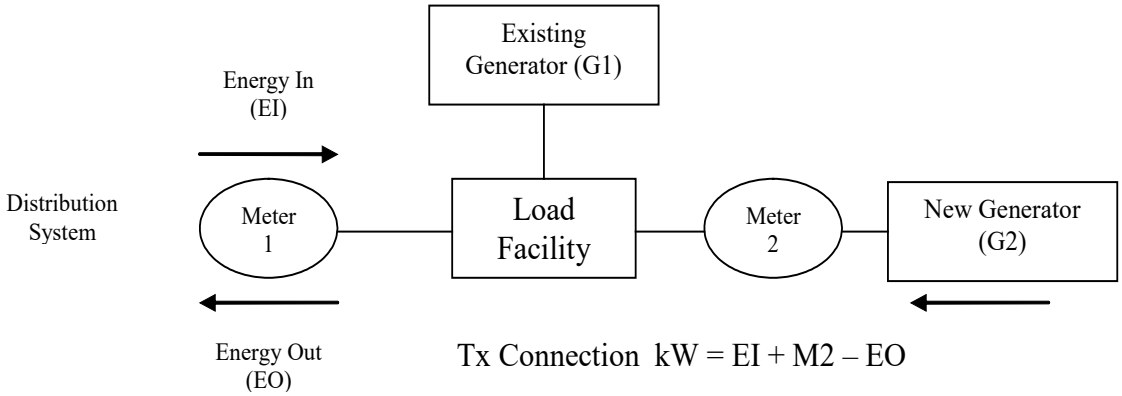
Retail Network Service Charge – rates applied to the measured coincidental net energy consumed during the clock hour at time of either the higher of the transmission system peak or 85% delivery point peak between the peak time hours of 7 am to 7 pm (local time) on weekdays excluding holidays as defined by the IESO.

The network billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

Retail Connection Service Charge – rates applied to the measured coincidental gross[2] energy consumed during the clock hour at the time of their delivery point peak. The billing demand will be determined by the higher of 90% kVa or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

2.4.11.4.10 Generation (Combination of Existing and New > 1 MW)

There may be incidences where a generator is connected with both existing and new generation behind the customer's main meter (Meter 1), as outlined in Sections 2.4.11.4.7 and 2.4.11.4.9 above and described in the following graphical presentation:



[1] Uplifted: defined as being the metered energy is uplifted by the OEB distribution total loss factor (TLF x kWh).

[2] Gross: defined as the gross energy consumed on the clock hour and derived as imported (Consumed) energy plus generation less exported (Received) energy. The received energy is defined as the energy exported to the distribution system.

For settlements of an embedded generation customer with both existing and new generation the following rule will apply for determining the gross billing demand, when considering transmission connection charges:

The transmission connection gross billing demand will be determined as,

Transmission connection demand being equal to the coincidental energy in (EI) plus the output of the new generation (M2) less energy exported out to the distribution system (EO) and if EO is greater than M2 let the allocated energy exported to the distribution system from the new generation (EA) equal M2.

The billing demand formula for connection charges to the embedded generation customer will be as follows, with demands recorded on the clock hour coincident with the delivery point connection peak time:

TC = EI + M2 - EA, IF EO > M2 then EA = M2 else EA = EO

Retail Connection Service Charge – rates applied to the measured coincidental gross energy consumed during the clock hour at their delivery point peak. The billing demand will be determined by the higher of 90% kVA or 100% kW (Power factor adjusted) and shall be adjusted for 1% transformer losses when the metering installation is deemed to be primary metered (Primary Meter = Meter on supply side of the transformer).

2.4.12 Distribution Rates

The Ontario Energy Board must approve all rates and charges that London Hydro applies.

The following are the types of rates and charges that are approved by the OEB:

- Loss Factors
- Retail Distribution Rates
- Retail Transmission Rates
- Wholesale Market Service Rate
- Standard Supply Service Rates
- Miscellaneous Rates and Charges

See Appendix F for the current copy of the OEB approval for each of the above referenced rate categories. For generators wishing to participate in the market as retail embedded and receive payment for their electricity delivered to the London Hydro distribution system all conditions outlined in Section 3.2 of the Retail Settlement Code must be met by the generator.

> *RSC Section 3.2- "A distributor shall enter into an agreement to purchase energy from an embedded retail generator within its service area, where such generator has indicated that it intends to generate electricity for sale directly to such distributor and that it has obtained such licences from the Board for generating and wholesaling electricity as are required. The contract shall specify that the generator must meet the technical and metering requirements set out in the Distribution System Code. The price under the agreement at which all energy sales shall be settled will be the competitive electricity price as described in Appendix "A" to the Code …"*

2.4.13 Energy Rates

2.4.13.1 Energy Rates for Consumed Energy

For all non-regulated price plan (NRPP) customers[1], the rules for applying commodity charges for energy consumed by the customer will be dictated by the requirements outlined in the OEB Retail Settlement Code.

2.4.13.1.1 Regulated Price Plan Customers

For all regulated price plan (RPP) customers[2], the rules for applying commodity charges for energy consumed by the customer will be dictated by the requirements outlined in the OEB Standard Supply Service Code and at rates defined in the OEB approved RPP rate schedules.

2.4.13.2 Consumption of Energy by Generation Customer

For all non-regulated price plan embedded generation customers, the rules for applying commodity charges for energy consumed by the generation customer will be dictated by the requirements outlined in the OEB Retail Settlement Code, in the same manner as all other load-consuming customers.

For all regulated price plan embedded generation customers, the rules for applying commodity charges for energy consumed by the generation customer will be dictated by the requirements outlined in the OEB Standard Supply Service Code and at rates defined in the OEB approved RPP rate schedules, in the same manner as all other load-consuming customers.

2.4.13.3 Payments for Energy Received from Generation Customer

The rules for compensating generators for excess energy exported to the distribution system will be dictated by the requirements outlined in Section 3.2 and Appendix A of the OEB Retail Settlement Code.

2.4.13.4 Payments for Energy Received from "net metered' Customers under O. Reg. 541/05 – Generation Customer

For all "net metered" eligible customers, Ontario Regulation 541/05, latest revision, will define the rules for compensating eligible[3] renewable generation customers for excess energy exported to the system.

2.5 Customer Information

A third party who is not a retailer may request historical usage information with the written authorization of the Customer to provide their historical usage information.

London Hydro will provide information appropriate for operational purposes that has been aggregated sufficiently, such that an individual's Consumer information cannot reasonably be identified, at no charge to

[1] Non-regulated price (NRPP) customer: All SSS or Retailer associated customers that are not eligible to participate in the RPP or have elected to opt of the RPP.

[2] Regulated price plan (RPP) customer: Low volume and designated customers that meet participant criteria defined in the OEB SSSC and Ontario Legislation or Regulation.

[3] Eligible: customer must meet all distribution and Provincial requirements

another Distributor, the transmitter, the IESO or the OEB. London Hydro may charge a fee that has been approved by the OEB for all other requests for aggregated information.

At the request of a Consumer, London Hydro will provide a list of retailers who have Service Agreements in effect within its distribution service area. The list will inform the Consumer that an alternative retailer does not have to be chosen in order to ensure that the Consumer receives electricity and the terms of service that are available under Standard Supply Service.

Upon receiving an inquiry from a Customer connected to its distribution system, London Hydro will either respond to the inquiry if it deals with its own distribution services or provide the Customer with contact information for the entity responsible for the item of inquiry, in accordance with Chapter 7 of the Retail Settlement Code.

An embedded Distributor that receives electricity from London Hydro shall provide load forecasts or any other information related to the embedded Distributor's system load to London Hydro, as determined and required by London Hydro.

3 CUSTOMER SPECIFIC

3.1 Residential

This section is divided into three categories of residential services: single-family or single-unit homes, multi-family buildings, and subdivision developments.

3.1.1 Single-Family Residential - General

Single-family residential dwelling units will be provided with a basic connection to London Hydro's electric system without charge as long as the meter base is located in the standard location, no further than 3 metres from the front corner of the dwelling, on the side closest to London Hydro's supply transformer. The basic connection includes the supply and installation of overhead distribution transformer capacity or an equivalent credit for transformation equipment and up to 30 metres of overhead conductor or an equivalent credit for underground services. The fee for non-standard locations is described in Appendix A.

For the purpose of determining whether a basic connection is provided free of charge or whether a commercial service charge applies, a single family residential dwelling must be zoned residential by the City of London, must be used for dwelling purposes, and must have only one electric meter. Any costs associated with modifying a service to a residential dwelling unit to add additional meters will incur General Service (Commercial) connection costs as described in Section 3.2.

Energy supplied to residential dwellings will be single phase, 3 wire, 60 Hz, having a nominal voltage of 120/240 volts, up to a maximum 200 amps per dwelling unit. Only one electrical service will be permitted per dwelling.

3.1.1.1 Early Consultation

Where a new service is required, the Customer must supply London Hydro with the following information well in advance of the date when the service will be required:

i) required in-service date

ii) requested service entrance capacity and voltage rating of the service entrance equipment

iii) locations of other services such as gas, telephone, water, cable TV, underground sprinkler systems, etc.

iv) details respecting heating equipment, air conditioners and any appliances which demand a high consumption of electrical energy

v) a survey or site plan indicating the proposed location of the service entrance equipment with respect to public rights of way and lot lines.

Customers requesting a disconnect or reconnect of an existing service to permit a service upgrade should refer to Appendix B "Disconnection and Reconnection of Residential Service Cables".

3.1.1.2 Point of Demarcation

For the purpose of this section, the points of demarcation described below refer to both the ownership and maintenance (operational) demarcation point.

The point of demarcation for residential overhead services is at the connection point where London Hydro's service drop connects to the Customer's anchor point and service mast weatherhead. London Hydro is responsible for the maintenance and repair of the transformer, transformer hardware and the first 30m of the overhead service wire. The Customer is responsible for the maintenance and repair of the anchor point, weatherhead and all points downstream of the connection splice including the meter socket base and the jaw and connection block assemblies. London Hydro is responsible for the maintenance and repair of the electric meter.

The point of demarcation for residential underground services is at the meter. London Hydro is responsible for the maintenance and repair of the transformer, transformer hardware, the underground secondary cable and the electric meter. The Customer is responsible for the maintenance and repair of the meter socket base, the meter jaw and connection block assemblies and all equipment downstream. The Customer is also responsible for the conduit that guides the service cable from underground to the meter base.

For Customers who have service entrances with recessed meter bases and 'Amalgamated' switches, combination panels or a similar configuration, London Hydro's service cables enter the Customer's disconnect switch ahead of the meter. In these instances, the Customer is also responsible for the maintenance and repair of the disconnect switch or combination panel.

For Customers whose service entrance is located more than 100 metres from the right-of-way, a high voltage primary line (either overhead or underground) will be required. The Customer will be responsible to own and maintain the primary portion of the line unless they elect to pay a 20% premium on the initial cost of the primary line to transfer the ownership and future maintenance responsibilities to London Hydro. If the Customer is responsible to maintain the primary line, the point of demarcation for overhead lines is at the first pole and the point of demarcation for underground lines is at the primary cable riser connection. The Customer is responsible for the maintenance and repair of all poles, primary conductors and hardware, (including regular tree trimming), primary cable terminators, cable hangers, and primary cables in addition to the equipment listed in the first two paragraphs of this section. London Hydro is responsible for the transformer, transformer hardware, the civil components associated with padmounted transformers (slab, pull box, grounding), and the first 30m of overhead secondary wire. London Hydro will be responsible for maintaining all residential underground secondary cables.

In all cases, if a Customer requires a primary line on their property, the Customer must sign a Connection Agreement that will describe in detail which party is responsible for the maintenance of various components of the line.

3.1.1.3 Servicing Details

The Customer or the Customer's electrical contractor must contact London Hydro to arrange a mutually agreeable service location and supply service arrangement.

i) Overhead Services

Arrangements for a service layout for overhead service conductors may be made through the Operations Administration Department at (519) 661-5555.

In overhead supplied areas, London Hydro will install overhead service wires from its aerial circuits on the public right of way at no charge to the Customer if the distance between London Hydro's supply point and the Customer's service entrance is not more than 30 metres. If the distance is greater than 30 metres, the Customer will incur a charge for additional material and labour as described in Appendix A. If a pole or poles and any other attachments are required on the Customer's property to support, anchor or terminate the service conductors, these shall be supplied and installed at the Customer's expense.

If the distance is greater than 100 metres, the Customer will be required to construct a primary voltage pole line on their property to support the circuit. The Customer will have a choice to either own and maintain this line or to pay a 20% premium on the initial cost of the line to transfer the ownership and future maintenance of the line to London Hydro as described in Section 3.1.1.2. London Hydro will make the connection to London Hydro circuits on the public right-of-way. If a transformer is required, London Hydro will supply the transformer and will install and maintain up to 30m of secondary service cable. The Customer will be responsible for the installation and maintenance of all poles, hardware, primary conductors (including regular tree trimming) and any secondary conductors beyond the first 30m from the transformer pole to the service entrance. The Customer will also be required to sign a Connection Agreement with London Hydro and connection charges will apply as outlined in Appendix A.

The permissible height for the service wires entering the residential dwelling is a minimum of 15 feet above the finished ground level. Higher elevations may be required to ensure proper clearance over driveways or from windows and other obstructions.

A Customer will be responsible to supply and install all equipment for the anchoring of the service wires near the service weatherhead. This will include a through bolt and insulator for the service attachment.

The Customer must locate the service conduit head not further than 3 feet from the corner of the building closest to London Hydro's supply point. The Customer's service conductors must run from the meter socket through the service conduit riser with at least 24 inches of conductor extending from the weatherhead to provide for connection to the service drop with an adequate drip loop.

The location of the service point of attachment must be such that the service wires will not cross over any part of the building, additions, out buildings, awning, or any place that is not accessible by London Hydro employees. The point of attachment must also be accessible by ladder.

ii) Underground Services

Arrangements for service layouts for underground supply service conductors may be made directly with the Engineering Department at (519) 661-5555.

In underground residential areas, London Hydro will install underground service wires for a fee if the distance from the property line to the Customer's service entrance is not more than 30 metres. The fee is described in Appendix A and represents the cost of the underground service less a credit for an equivalent basic overhead connection. A fee also applies if the service is not installed in the standard location, within 3 meters of the front corner of the building, on the side closest to London Hydro`s supply transformer.

In areas that are supplied with overhead circuits, a Customer may request an underground service and must meet the following conditions:

a) The Customer must arrange for a service layout, obtain approval for a proposed trench layout and provide a measurement for the length of secondary cable required. London Hydro will supply the secondary cable and deliver it to the jobsite for installation in the trench by the Customer.

b) The Customer is responsible for digging the trench and ensuring that the backfill is free of debris (bricks, stones, etc.). If the native material is unsuitable for backfill, the Customer is responsible to install 6 inches of sand bedding and cover. The trench must be a minimum of 36 inches in depth and 6 inches in width. London Hydro will advise the Customer of minimum clearances required from London Hydro's distribution equipment.

c) The Customer must provide a 50 mm (2 inch) rigid polyvinyl chloride (PVC) conduit from the base of the meter socket to at least 1 metre below finished grade. The service entrance and meter location must be located not further than 3m (10 ft.) from the corner of the building closest to London Hydro's supply point.

d) The Customer is responsible to install the secondary cable with a minimum of a 2 foot loop at the base of the metre (to allow for frost heave) and must provide mechanical protection and a weatherhead for installation on London Hydro's pole. London Hydro will install the mechanical protection and the weatherhead.

e) If a pole is required on the customer's property to support the underground dip, or if boring costs are incurred to cross a roadway, or if any other costs are required over and above the cost of an equivalent overhead connection, these will be at the customer's expense.

f) London Hydro will be responsible for terminating the secondary cable at the overhead circuit and on the line side of the Customer's meter base.

g) For services greater than 30m in length an additional charge per meter will be added as described in Appendix A.

h) For services greater than 100m in length please see Section 3.1.1.2.

London Hydro will own, operate and maintain the underground secondary cable provided there is reasonable access to the underground plant. The Customer will be responsible to remove and reinstate any privately owned obstructions (landscaping, sprinklers and sprinkler piping, sheds, buildings, etc.) if required for access. To avoid open cut driveways to repair future cable faults, an appropriate electrical conduit crossing will be accepted. Under no circumstances will drainage pipe be permitted.

In the event of a fault on the Customer's underground supply or an adjacent Customer's supply, London Hydro reserves the right to install temporary jumper cables from either a Customer's or a neighbouring Customer's service to maintain power to the affected Customer until the fault is repaired. The connections are made on the line side of the meter and do not affect consumption charges.

For services larger than 200 A, single phase, London Hydro will supply and install parallel secondary cables. Two 50 mm (2 inch) rigid polyvinyl chloride (PVC) conduits must be supplied by the Customer as well as an indoor main disconnect switch. London Hydro will install the secondary cables up through the entrance conduit into the Customer-owned switch and make the connections on the line side. For services larger than 200 A, connection charges will apply as described in Appendix A.

3.1.1.4 Metering

All of the requirements for metering single family residential dwellings are discussed in Appendix C "Electric Metering Requirements".

3.1.2 Multi-Family Residential

For the purpose of this document, multi-family residential dwellings are defined as buildings containing more than one single family dwelling unit that are either individually metered or are metered with a bulk meter and have a service entrance capacity greater than 200 amps.

Multi-family residential dwellings fall under the General Service (Commercial) classification and connection charges will apply as described in Section 3.2. Please refer to the appropriate General Service section of this document for the conditions of service that apply to multi-family residential dwellings.

3.1.2.1 Metering

Please refer to Appendix C "Electric Metering Requirements" for details on London Hydro's metering requirements.

3.1.3 Residential Subdivision Developments

Electrical service facilities for single family and multi-family townhouse and condominium residential developments will be installed underground consisting of mini-padmount transformers and primary/secondary conductors. Any variation in service will require London Hydro's review and approval. London Hydro will provide and install the complete distribution system including services to the line side of the Customer's meter base. The entire distribution system will be operated and maintained by London Hydro.

Early consultation with London Hydro is essential to avoid delays in servicing this type of development. London Hydro requires a minimum notice of 16 weeks prior to the required in-service date. The subdivider/developer is required to provide a site servicing plan and a lot grading plan for the placement of padmount transformers. If the area described by a Registered Plan will be developed in stages, it is important for each stage or portion of work to be given a designation that is understood and accepted by all parties.

London Hydro will design a subdivision electrical servicing layout and the subdivider/developer will have the opportunity to review London Hydro's design prior to installation. Minor changes are permitted as long as they do not compromise London Hydro's standards and practices.

London Hydro will require the subdivider/developer to authorize the installation through a "Joint Services Letter" process. This letter must be signed by the subdivider/developer before construction starts. The subdivider/developer must sign the final distribution drawings from London Hydro and provide grade levels for all above ground equipment to be installed.

The subdivider/developer must provide easements as required by London Hydro. For multi-family townhouse and condominium developments, a blanket easement will be required for the entire project site as a Condition of Service. (See Section 2.1.6).

In most cases, telephone, cable TV, and street lighting cables will be installed jointly during the electrical construction installation. London Hydro will facilitate the coordination process but the subdivider/developer is responsible for meeting the requirements of Bell Canada, Rogers Cable, and the City of London with respect to the installation of their services. London Hydro is not responsible for the design of any of these systems.

The subdivider/developer will be required to make a capital contribution towards the installation as described in Section 2.1.2 and Appendix A.

For details regarding service voltage, point of demarcation, access and service locations see Section 3.1.1.

3.2 General Service

This section describes the Conditions of Service applicable to General Service Customers. General Service Customers are also known as Commercial Customers and this section applies to all Customers other than single family residential Customers described in Section 3.1.1.

3.2.1 Early Consultation

Early consultation with London Hydro is essential since it's difficult to document all of the circumstances and conditions of service that would apply to all cases. Customers should consult with London Hydro in the early planning stages and submit the following information.

a) Required in-service date.

b) Voltage requirements.

c) Estimated initial maximum electric demand.

d) Estimated future maximum electric demand.

e) Specific listing of the type of loads for lighting, motors, heating, air conditioning, or other.

f) Grading plan and site plan, to scale, showing the building or buildings in relation to existing or proposed property lines, and other buildings or structures such as parking garages and loading ramps. If applicable, the plans should include vertical and horizontal views of the proposed incoming duct bank from the point of entry to the delivery point.

g) Number of suites and/or divisions within the building(s) and the areas of each.

h) Plan, to scale, of the area in which the transformer vault is to be located (if one is required), showing detail of the vault.

i) Plan, to scale, showing the electrical room and provision for the metering equipment.

j) A drawing if applicable depicting the single line riser schematic for the entire primary/secondary distribution system.

k) Where drawings are required by London Hydro, the Customer/Consultant will be required to provide digital format drawings. Digital drawings shall be supplied as georeferenced AutoCad files (.dwg format) or Microstation (*.dgn format). Information can be emailed or compressed into a ZIP file onto one or more disc volumes as required. The contents of the drawing files must explicitly follow layering, colour, and line-type schemes as set out by the City of London's GIS specifications.

3.2.2 **Point of Demarcation**

For the purpose of this section, the points of demarcation described below refer to both the ownership and maintenance (operational) demarcation point. The point of demarcation for various service types is generally as follows:

3.2.2.1 Overhead Secondary Services

For overhead secondary services, the point of demarcation is at the connection point where London Hydro's service drop connects to the Customer's anchor point and service mast weatherhead. London Hydro is responsible for the maintenance and repair of the transformer, transformer hardware, and the first 30m of the overhead service wire. The Customer is responsible for the maintenance and repair of the anchor point, weatherhead and all points downstream of the connection splice including the meter socket base and the jaw and connection block assemblies. London Hydro is responsible for the maintenance and repair of the electric meter.

3.2.2.2 Underground Secondary Services

For underground secondary services fed from padmount transformers, where the number of secondary conductors does not exceed 16 (4 per phase) plus neutral or where the conductors are not larger than 750 kcmil, the point of demarcation is at the secondary terminals of the transformer. If the Customer requires the use of a larger conductor size or more conductors per phase please contact the Engineering Design department to discuss further options. The Customer is responsible to maintain and repair the secondary cable terminators, secondary cables and all equipment downstream with the exception of any metering CTs and PTs and London Hydro's associated metering equipment. London Hydro is responsible for maintaining and repairing the electric meter, the padmount transformer and all primary cables and equipment upstream of the point of demarcation.

For installations with many parallel conductors or large cable sizes, London Hydro may supply and install a secondary distribution tap box and concrete foundation to relieve congestion inside the padmount transformer. The point of demarcation will be at the customer owned secondary terminals inside the tap box. The Customer is responsible to maintain and repair the secondary cable terminators, secondary cables and all equipment downstream with the exception of any metering CTs and PTs and London Hydro’s associated metering equipment. London Hydro is responsible for maintaining and repairing the secondary distribution tap box, the electric meter, the padmount transformer, the secondary cables and terminations from the padmount transformer to the distribution tap box and all primary cables and equipment upstream of the point of demarcation

For secondary connections in Customer vaults, the point of demarcation is at the secondary cable terminators. The Customer is responsible to maintain and repair the secondary cable and terminators and

all equipment downstream with the exception of any metering CTs and PTs or metering equipment if it is located on the secondary side of the service. The Customer is also responsible for maintaining the structural integrity of the Customer owned vault and keeping it in a dry, non-humid and safe environment. Repairs must be made by a "competent" person as defined in the Occupational Health and Safety Act. London Hydro is responsible for maintaining the transformers and any primary cables and equipment upstream of the point of demarcation. London Hydro is also responsible for the metering CTs & PTs and any associated equipment.

For secondary services fed from the downtown network system, the point of demarcation is at the secondary cable connections at the Customer's service entrance equipment or at the Customer-owned bus duct. The Customer is responsible for the maintenance of the service entrance equipment or the bus duct and all points downstream with the exception of any metering CTs and PTs and associated metering equipment. London Hydro is responsible for the maintenance and repair of the secondary cables upstream of the point of demarcation as well as the maintenance of any transformers and vaults located in the City of London right-of- way. In cases where the vault is supplied by the Customer because of lack of space in the right of way, the Customer is responsible for maintaining the structural integrity of the vault and keeping it in a dry, non-humid and safe condition.

3.2.2.3 Service Lengths Greater than 100 metres

For Customers whose service entrance is located more than 100 metres from the right-of-way, a high voltage primary line (either overhead or underground) will be required. The Customer can choose to own and maintain the primary portion of the line or they elect to pay London Hydro to install the primary line in an agreeable location. In this case, London Hydro will own and maintain the line. If the Customer is responsible to maintain the primary line, the point of demarcation for overhead lines is at the first pole and the point of demarcation for underground lines is at the primary cable riser connection. The Customer is responsible for the maintenance and repair of all poles, primary conductors and hardware, (including regular tree trimming), primary cable terminators, cable hangers, and primary cables. London Hydro is responsible for the transformer, transformer hardware and the first 30m of secondary cable or wire.

In all cases, if a Customer requires a primary line on their property, the Customer must sign a Connection Agreement that will describe in detail which party is responsible for the maintenance of various components of the line. The Agreement will also describe operational requirements necessary to provide isolation and protection of personnel and plant.

3.2.2.4 Customer-Owned Substations

For customer-owned substations, London Hydro supplies the Customer at high voltage and the Customer owns all high voltage equipment, transformers, and points downstream.

For overhead high voltage primary services, the point of demarcation is at the first pole or connection point on the Customer's property. The Customer is responsible for the maintenance and repair of all poles, primary conductors, disconnect switches, substation equipment and transformers downstream. London Hydro is responsible for the aerial primary conductor and any in-line disconnect switches or power fuses upstream of the first pole or connection point on the Customer's property.

For underground high voltage primary services, the point of demarcation is at the primary cable riser connection. The Customer is responsible for the maintenance and repair of the primary cable terminators, primary cables, substation equipment and transformers downstream of the demarcation point with the exception of metering CTs and PTs and associated metering equipment. London Hydro is responsible for the cable riser fused disconnect switch and lightning arresters and will hang the Customer's terminated

cable on the riser pole. The Customer is responsible for providing the supports for hanging the cable and the U-guard protection for the first 10 feet.

Customers have an obligation to maintain their customer-owned equipment on a regular basis. London Hydro reserves the right to disconnect customer-owned equipment if they believe it poses a safety or system reliability risk.

3.2.2.5 Deviations

In cases where there is a deviation in demarcation from what is described above, a separate Connection Agreement must be signed by the Customer and London Hydro to define each party's responsibilities. The Agreement will also describe operational requirements necessary to provide isolation and protection of personnel and plant.

3.2.3 Supply of Transformation and Fuse Coordination

The electric servicing of most commercial, industrial, institutional, and apartment buildings is via transformation supplied, owned, operated, and maintained by London Hydro.

However, there are a number of circumstances when a Customer must supply, own, operate and maintain their own electric power substation. These circumstances are described in detail in Appendix D "Design and Interconnection Requirements for Customer-Owned Electric Power Substations", Section 1.4.

It is London Hydro's practice to provide transformation to supply the Customer's actual demand. As such, the main switch and/or breaker setting may need to be fused or set at a lower level to provide coordination with London Hydro's primary transformer fuse. London Hydro will provide the time - current characteristic curve of the upstream protection to the Customer's Consultant. The onus is on the Customer to confirm suitable coordination.

3.2.4 Short Circuit Capacity

The Customer must ensure that their service entrance equipment has an adequate circuit interrupting capability in order to demonstrate compliance with Rule 14-012, Types and Ratings of Protective and Control Devices, of the Ontario Electrical Safety Code. London Hydro will provide on request, the maximum short circuit current available at any specific location and will provide short circuit information at either the primary point of supply if the service is a Customer-owned substation or at the secondary bushings at the transformer supplied by London Hydro. Maximum short circuit levels are provided since the actual levels may change from time to time as London Hydro's primary distribution circuits are reconfigured, capacity at supply transformer stations is increased, cogeneration facilities are connected, or as Hydro One's transmission/generation systems are modified.

3.2.5 Access and Easements

The Customer shall grant, at no cost to London Hydro, where requested, an easement to permit the installation and maintenance of service. See Section 2.1.6.

3.2.6 Servicing Details

The following information applies to larger general service Customers:

3.2.6.1 Overhead Secondary Services

Please refer to Appendix A to determine the maximum size of overhead secondary services that can be installed for various voltages.

Customers may be required to provide space for the transformer pole and transformer bank on their private property at the discretion of London Hydro.

Customers may at their option choose to provide their own underground secondary service cables to be fed from London Hydro's overhead transformer bank. This is described in the following section.

3.2.6.2 Underground Secondary Services

i) Supplied from London Hydro's Overhead System

The Customer may at their option provide underground secondary servicing from London Hydro's overhead system provided that:

- Service size is limited to 600 amperes, 120/208Y or 347/600Y volts.

  In special circumstances, London Hydro may allow the connection of an 800 ampere 120/208Y volt service - special application must be made to London Hydro.

- Secondary conductors are subject to approval by the Electrical Safety Authority and are limited to the numbers and maximum sizes as follows:

- For Corflex conductors, a maximum of 1 run of four 750 kcmil aluminum/copper conductors.

- For copper conductors and conduit, 1 run of four 500 kcmil copper conductors in one 4" rigid PVC conduit. The Customer must supply conduit, weatherhead(s) and all mounting hardware.

- A pole may be required on the Customer's property to terminate their underground service cables. The location of the pole must be approved by London Hydro and the installation must pass inspection by the Electrical Safety Authority.

ii) Supplied from a London Hydro Owned Padmount Transformer

London Hydro will supply, install and maintain padmount transformation on the Customer's property up to 2,000 KVA for a 347/600Y volt secondary service and up to 750 KVA for 120/208Y volt secondary services. London Hydro will supply and install the primary duct structure, cable, transformer foundation, ground grid, and the transformer, and will make the primary cable terminations as well as the secondary cable terminations at the padmount transformer. London Hydro will supply the secondary conductor termination connectors at the padmount transformer. For underground secondary services where the number of secondary conductors exceeds 16 (4 per phase plus neutral) or where the conductors are larger than 750 kcmil, the customer is required to supply and install a secondary distribution tap box and concrete foundation to relieve congestion inside the padmount transformer. London Hydro will provide the customer with the specifications for the tap box and although it must be purchased and installed by the customer, once it is installed, London Hydro will assume ownership of the tap box and will be responsible to maintain and repair it.

The Customer must provide the following:

- An accessible and safe location satisfactory to London Hydro and the Electrical Safety Authority for installing and maintaining the transformer installation and secondary distribution tap box if required. (See Ontario Electrical Safety Code Section 26-014 - Dielectric Liquid-Filled Equipment Outdoors). London Hydro may require the installation of traffic bollards at the transformer location.

- An accessible route for London Hydro's primary cable trench to allow for the installation of duct structure and to allow for pulling points if required (concrete pull boxes and/or precast manholes). Under no circumstances will the primary duct structure be permitted to exist under a building's foundation.

- The Customer is responsible for the supply and installation of all secondary conductors from their service entrance to London Hydro's padmount transformer or to the secondary distribution tap box in accordance with Electrical Safety Authority approval. London Hydro will allow up to 16 individual cables per transformer (4 cables per phase) with a maximum conductor size of 750 kcmil copper or aluminum. For services where the number of secondary conductors exceeds 16 (4 per phase plus neutral) or where the conductors are larger than 750 kcmil, a secondary distribution tap box and concrete foundation will be required and the customer will be responsible for purchasing and installing the tap box and for making their secondary terminations inside.

iii) Dual Transformers

London Hydro will permit a Customer to install double-ended low voltage switchgear complete with a tie breaker for larger 347/600Y volt services up to a maximum of 1600 amperes. This will allow London Hydro to install 2 padmount transformers to service an individual installation. In the event of single transformer failure, the remaining transformer can carry as much as 153% of its nameplate rating (depending on the previous duty cycle and ambient temperature) for up to 4 hours (the time usually required for London Hydro to change out a failed transformer). This type of installation can provide the Customer with added security, although in some case the Customer may be required to shed non-critical loads depending on when the failure occurs.

See Section 2.1.8 for additional discussion on Dual Supply and Backup Feeds.

3.2.7 **Metering**

Please refer to Appendix C "Electric Metering Requirements" for details on London Hydro's metering requirements.

3.3 General Service (Above 50 kW)

In addition to the requirements of Sections 3.2, London Hydro requires interval metering on all new services having a monthly average peak demand during the calendar year of over 50 kW. Please refer to Appendix E "Guidelines for Supplying Interval-Style Revenue Metering Systems".

3.4 General Service (Above 1000 kW)

Please see section 3.3 above.

3.5 Embedded Generation

3.5.1 General Requirements

All Embedded Generators must execute a Connection Agreement. The connection and operation of a Customer's embedded generator must not endanger workers or jeopardize public safety, or adversely affect or compromise equipment owned or operated by London Hydro, or the security, reliability, efficiency or the quality of electrical supply to other Customers connected to London Hydro's distribution system. If damage or increased operating costs result from a connection with a generator, London Hydro shall be reimbursed for these costs by the generator. The Embedded Generator shall be responsible for all costs associated with London Hydro performing studies and developing plans for risk mitigation that are to the satisfaction of London Hydro. Please refer to the London Hydro website for information regarding the general application process for connection of embedded generation (www.londonhydro.com).

3.5.1.1 Interface Protection and Isolating Devices

The Embedded Generator shall provide an interface protection scheme that minimizes the frequency and severity of disturbances on the distribution system and the impact on other customers. The Embedded Generation facilities must also meet the technical requirements as identified in the Connection Agreement. The interface protection shall be capable of automatically isolating the Generator (s) from the distribution system in the following situations:

(a) internal faults within the Generation facility
(b) external faults in the distribution system; and
(c) abnormal system conditions, including, but not limited to open phase and islanding, over/under voltage and over/under frequency.

The Embedded Generator shall provide, install and maintain a disconnecting device at the connection point with the distribution system for the purpose of isolating the Embedded Generation facility in case of emergency and for work protection. The disconnecting device shall:

(a) be located at or near to the demarcation point of connection of the Embedded Generation facility to the distribution system (for residential customers, within 1 meter of the service entrance point or electric meter), and must be readily accessible;

(b) provide a visible indication of the open main current-carrying path that isolates the Embedded Generation facility from the distribution system;

(c) have a three-pole gang operated switch mechanism suitable for load break operations at rated load. (Subject to London Hydro's prior written approval, single phase customers may use single pole switches or openers);

(d) meet Ontario Electrical Safety Code requirements, (i.e. shall have a valid certification mark indicating it is approved for use in Canada);

(e) be rated for maximum fault current available at that location on the distribution system; and

(f) be lockable in the open position, (the lock will be provided by London Hydro and must be operated by London Hydro only).

3.5.1.2 Compliance

All equipment of Embedded Generators connected, operating or procured before May, 2002 is deemed to be in compliance with London Hydro's performance requirements except for the requirements of the Electrical Safety Authority and isolating device requirements identified in Section 3.4.1.1.

London Hydro may require the equipment deemed compliant above be brought into actual compliance with London Hydro's performance requirements within a timeframe established by London Hydro, but not to exceed 12 months, where, at London Hydro's sole opinion, there is:

(a) a material deterioration of the distribution system reliability resulting from the performance of the Embedded Generator's equipment; or

(b) a material negative impact on the power quality of an existing or new customer resulting from the performance of the equipment at the Embedded Generation facility; or

(c) a material increase in Generating capacity at the site where the equipment deemed compliant is located.

3.5.2 Micro Generation General Requirements (<10kW)

3.5.2.1 Documentation

All Embedded Generators shall provide London Hydro with the following documentation to ensure that the Distribution System is adequately protected from potential damage or increased operating costs resulting from the connection of the Embedded Generation Facility:

(a) evidence of approval of the Electrical Safety Authority for all the Embedded Generator's owned electrical facilities.

(b) any other documentation reasonably related to London Hydro's obligations.

3.5.2.2 Disconnection of Embedded Generation Facility

London Hydro has the right to disconnect an Embedded Generation facility from its distribution system where, in the sole opinion of London Hydro, any of the following conditions exist:

(a) there is a material deterioration of the distribution system reliability resulting from the performance of the Embedded Generator's equipment;

(b) there is a material negative impact on the quality of power of an existing or a new Customer resulting from the performance of the equipment at the Embedded Generation facility;

3.5.3 General Technical Information Requirements (>10kW)

3.5.3.1 Documentation

a) electrical submissions signed and stamped by a licenced professional engineer; detailed single line diagrams showing all electrical devices associated with the Embedded Generation Facility such as generators, isolating devices, breakers, protection relays, inverter systems, instrument transformers, lightning arresters, fuses and metering.

b) evidence of approval of the Electrical Safety Authority for all the Embedded Generator's owned electrical facilities.

c) a copy of the report of the most recent re-verification of protections signed and stamped by a licenced professional engineer

d) A Letter of Equivalency – Confirmation of Verification Evidence Report, stamped and signed by a Professional Engineer registered in Ontario, shall be provided before a Letter of Completion is issued by London Hydro. The form can be obtained on the London Hydro web site, and

e) any other documentation reasonably related to London Hydro's obligations.

3.5.3.2 Metering for Embedded Generation Facilities

This section only applies to embedded generation facilities installed in larger commercial/industrial facilities with service sizes over 200 Amp. For smaller generators, please contact the Generation Dept. at 519-661-5800 Ext 5723 Also see Appendix C, section 1.2.3. for metering details.

Metering Installations - Installed After May, 2002

The metering shall be installed at the demarcation point of connection of the Embedded Generation facility to the distribution system. If this is not practical, London Hydro will, where appropriate, apply loss factors to the generation output in accordance with the loss factors applied for Retail settlements and billing.

The Embedded Generator shall install a Four-Quadrant Interval Meter in accordance with the Distribution System Code and London Hydro's standard metering requirements. The Embedded Generator shall provide London Hydro with the technical details of the meter installation.

Embedded Generation Facilities That Do Not Deliver Power to the Distribution System
Behind the meter generation, that does not deliver power to the distribution system, requires an appropriate meter to be installed on the output of the generator. This is often achieved by the customer engaging a metering service provider (MSP) and enabling London Hydro to read the meter.

Notwithstanding the foregoing, the Embedded Generator shall pay all incremental costs associated with such metering.

Metering Installations - Installed Prior to May, 2002

Where there is an existing meter installation for an Embedded Generation facility, the Embedded Generator shall take ownership of the meter installation in accordance with London Hydro's requirements by no later than the meter seal expiry date. The Embedded Generator shall provide London Hydro with the technical details of the metering installations for review, if requested.

Embedded Generation facilities that receive energy e.g. for station use or back-up supply, shall be placed in the appropriate Rate class and billed for the energy consumed.

3.5.3.3 Transformers

Any step-up transformation equipment required to step-up the Embedded Generation facility's output voltage to a London Hydro standard secondary voltage shall be supplied, installed, owned and maintained by the Embedded Generator.

For customers connected to the distribution system that wish to install an Embedded Generation facility, London Hydro may, at its sole discretion, permit the Embedded Generation facility to be connected through London Hydro's existing transformer. In such cases, the Embedded Generator shall be responsible for any and all damage to London Hydro's facilities and equipment caused by the operation of the Embedded Generation facility.

3.5.3.4 Maintenance Schedules

The Embedded Generator must implement and adhere to a regular scheduled maintenance plan to assure both London Hydro and the Embedded Generator that the connection devices, protection and control systems are maintained in good working order. The provisions of the maintenance plan are to be listed in the Connection Agreement. The Embedded Generator must conduct a re-verification at least every 48 months (or as specified in the Connection Agreement) and provide a written report to London Hydro signed by a professional licenced engineer.

London Hydro in its sole discretion, may request to witness the re-verification of any protections that could adversely impact the distribution system. The Embedded Generator shall pay for the re-verification and provide London Hydro a copy of the report giving the results of the re-verification of the protections.

3.5.3.5 Reporting Requirements

All Embedded Generators over 100 kW shall report any significant event to London Hydro within 5 business days. The Connection Agreement may include a list of events deemed significant and provide a standard report format.

The Embedded Generator shall keep a written log of the operation of its protections that result in the tripping of its interrupting devices. On request, the Embedded Generator must provide a copy of the log to London Hydro. The log shall contain, at a minimum, the following information:

(a) date and time of event/operation of protections

(b) which relay or protection feature of the relay initiating the trip

(c) conditions and unit output at the time of the trip that may be related to the operation (e.g. Lightning, outage of feeder, etc.).

3.5.3.6 Capital Contribution

When London Hydro is required to add new London Hydro facilities and equipment, alter existing London Hydro facilities and equipment, or increase the capacity of the distribution system to connect a new Embedded Generation facility (an "Expansion"), London Hydro will perform an economic evaluation to determine the Embedded Generator's capital contribution for the equipment, labour and ongoing maintenance costs of the Expansion as described in the Ontario Distribution System Code (DSC).

3.5.3.7 Disconnection of Embedded Generation Facility

London Hydro has the right to disconnect an Embedded Generation facility from its distribution system where, where in the sole opinion of London Hydro, any of the following conditions exist:

(c) there is a material deterioration of the distribution system reliability resulting from the performance of the Embedded Generator's equipment;

(d) there is a material negative impact on the quality of power of an existing or a new Customer resulting from the performance of the equipment at the Embedded Generation facility;

(e) the Embedded Generator has failed to re-verify the protection and control systems every 48 months or as specified in the Connection Agreement or failed to submit the report within 30 days; or

(f) the Embedded Generator's report of the re-verification of the protection and control systems shows unacceptable deficiencies.

3.6 Embedded Market Participant

Under the "Market Rules for the Ontario Electricity Market", Chapter 2, Section 1.2.1, "No persons shall participate in the IESO - administered Markets or cause or permit electricity to be conveyed into, through or out of the IESO - controlled grid unless that person has been authorized by the IESO to do so".

According to the Distribution System Code Section 6.1.4 "*A distributor shall enter into a Connection Agreement with a customer that is connected to the distributor's distribution system and is a wholesale market participant."*

"Wholesale Market Participant", means a person that sells or purchases electricity or ancillary services through the IESO-administered markets.

All Embedded Market Participants within the service jurisdiction of London Hydro, once approved by the IESO, are required to inform London Hydro of their approved status in writing, 30 days prior to their participation in the Ontario Electricity Market.

Pursuant to the OEB's *Distribution System Code,* the Owner shall provide a communication option to the remote metering cabinet in accordance with the requirements set forth in London Hydro's Engineering Instruction EI-22, *Guidelines for Supplying Interval-Style Revenue Metering Systems* as found in Appendix E.

The Customer is responsible to maintain and repair any equipment downstream including, but not limited to, any metering CTs and PTs, the Measurement Canada and/or IESO compliant electric meter and any other metering equipment. London Hydro is responsible for maintaining and repairing all equipment upstream of the point of demarcation.

Prior to adding any new or additional Embedded Generation, Embedded Wholesale Market Participants must execute a Generation Connection Agreement and be granted an offer to connect by London Hydro.

3.7 Embedded Distributor

All Embedded Distributors within the service jurisdiction of London Hydro are required to inform London Hydro of their status in writing 30 days prior to the supply of energy from London Hydro. The terms and conditions applicable to the connection of an Embedded Distributor shall be included in a Connection Agreement with London Hydro.

3.8 Unmetered Connections

This section pertains to the conditions of service and supply of electrical energy for unmetered connections.

All un-metered loads must be connected to a known fixed loads or defined duty cycles. Un-metered sporadic, event, or weather driven loads must be metered. Historically this has included cable TV power packs, bus shelters, telephone booths, traffic lights, and railway crossings.

The level of the consumption will be agreed to by the distributor and the customer, based on detailed manufacturer information/documentation with regard to electrical consumption of the unmetered load or periodic monitoring of actual consumption.

The customer must notify London Hydro of any changes to load impacting operations or demand/consumption characteristics.

London Hydro reserves the ability to require metering on already established un-metered loads. London Hydro reserves the ability to group unmetered services for the same customer onto one bill or with bills for metered services.

3.8.1 **Street Lighting**

The location of supply for street lighting circuits will vary and must be established through consultation with London Hydro for each application. Underground feeds will generally be supplied from padmount transformers, network vaults, or from an overhead system through a cable riser. Overhead systems will normally be fed by way of individual connections for each street light from the secondary spun bus, although in some circumstances, a separate street lighting circuit may be required.

All underground cable feeds must be enclosed in separate conduit from the power source to the first pull box or disconnect switch. All underground street lighting services will require a separate disconnect switch to allow for isolation of the service without requiring the presence of London Hydro personnel. In most cases, overhead street lighting systems will not require disconnect switches unless required by the Electrical Safety Authority.

The service voltage for overhead street lighting connections will be 120 volts, single phase, 2 wire and the service voltage for underground street lighting feeds will be 120 volts, single phase, 3 wire. The onus is on the installer to ensure a balanced loading between the two 120 volt legs of the supply.

Prior to the energization of a new street lighting service, London Hydro will require notification from the Electrical Safety Authority that the installation has been inspected and approved. The final power source connection will be made by London Hydro.

All street lighting services will be unmetered and energy consumption will be based on the connected wattage and the calculated hours of use using the approved methods and rates established by the OEB. A connection fee will apply as described in Appendix A based on London Hydro's approved commercial connection charges. London Hydro personnel must be involved in the disconnection and reconnection of existing street light services fed from padmount transformers or vaults where there is no disconnect switch accessible to the City of London's street light Contractor. A charge per trip will apply as described in Appendix A.

3.8.2 **Traffic Signals**

The location of supply for traffic signal systems will vary and must be established for each application through consultation with London Hydro.

Feeds may be from either the overhead or underground electrical systems and in all cases a disconnect switch will need to be installed and approved by the Electrical Safety Authority. All cabling used for the

purpose of traffic signal installations, must be installed in dedicated conduits separate from street lighting or any other secondary duct work.

The service voltage for traffic signal systems will be 120 volts, single phase, 2 wire.

Prior to the energization of a new traffic signal service, London Hydro will require notification from the Electrical Safety Authority that the installation has been inspected and approved. The final power source connection will be made by London Hydro.

All traffic signal services will be unmetered and energy consumption will be based on the connected wattage and the quantity of devices used in the installation using the approved methods and rates established by the OEB. A connection fee will apply as described in Appendix A based on London Hydro's approved commercial connection charges. London Hydro personnel must be involved in the disconnection and reconnection of existing traffic signal services fed from padmount transformers or vaults where there is no disconnect switch accessible to the City of London's traffic signal Contractor. A charge for disconnection/reconnection will apply as described in Appendix A.

3.8.3 **Bus Shelters**

The service location for bus shelters will vary and must be established for each application through consultation with London Hydro. The service voltage will be 120 volts, single phase, 2 wire and the method of supply could be from either overhead or underground circuits.

All underground feeds must be in separate conduit from the bus shelter to the power supply location. For feeds originating from London Hydro’s overhead system, the underground conduit for the cable riser will generally extend from the bus shelter to the nearest power supply pole. However, the service location could vary and London Hydro must be consulted for each application.

Prior to the energization of a new bus shelter service, London Hydro will require notification from the Electrical Safety Authority that the installation has been inspected and approved. The final power source connection will be made by London Hydro.

Bus service shelters will be unmetered and energy consumption will be based on the connected wattage and the calculated hours of use using the methods and rates approved by the OEB. A connection fee will apply as described in Appendix A based on London Hydro's approved commercial connection charges.

3.8.4 **Other Small Services**

Small power supplies, communication amplifiers, utility cathodic protection, railway crossings, and similar small customer loads are included in this section. The service voltage will be either 120 volts, single phase, 2 wire or 120/240V, single phase, 3 wire. Feeds may be from either the overhead or underground electrical systems and in all cases a disconnect switch will need to be installed and approved by the Electrical Safety Authority.

Prior to the energization of a new service, London Hydro will require notification from the Electrical Safety Authority that the installation has been inspected and approved. The final power source connection will be made by London Hydro.

These small services may be unmetered and energy consumption will be based on the connected wattage and the calculated hours of use using the methods and rates approved by the OEB. A connection fee will apply as described in Appendix A based on London Hydro's approved commercial connection charges.

3.8.5 **Updating Unmetered Load Data**

It is the responsibility of the unmetered load customer to notify London Hydro of any change such as wattage or usage pattern (ie. calculated hours of daily use) that would impact the billing amounts so that adjustments can be made to the bill on a go forward basis. Information regarding changes to streetlighting should be emailed to backofficesupport@londonhydro.com. Information for all other unmetered loads should be emailed to engadmin@londonhydro.com. This information must be supplied by a qualified individual who understands the operation of the device.

The unmetered load customer or London Hydro can initiate an audit at regular intervals or as required to ensure accurate billing.

3.8.6 **Notification of Material Changes Affecting Unmetered Load Customers**

London Hydro will communicate with all affected unmetered load customers in the event there is a material change that impacts them. These changes could relate to items such as preparation of cost allocation studies, load profile studies or other rate-related items.

4 GLOSSARY OF TERMS

"Affiliate Relationships Code" means the code, approved by the Ontario Energy Board.

"Billing Demand" means the metered demand or connected load after necessary adjustments have been made for power factor, intermittent rating, transformer losses and minimum billing. A measurement in kilowatts (kW) of the maximum rate at which electricity is consumed during a billing period.

"Building" means a building, portion of a building, structure, or facility.

"Conditions of Service" means a document developed by a Distributor in accordance with subsection 2.4 of the Distribution System Code that described the operating practices and connection rules for Distributors.

"Connection" means the process of installing and activating connection assets in order to distribute electricity to a Customer.

"Connection Agreement" means an agreement entered into between the Distributor and a person connected to its distribution system that delineates the conditions of the connection and delivery of electricity to that connection.

"Connection Assets" means that portion of the distribution system used to connect the Customer to the existing main distribution system, and consists of the assets between the point of connection on a Distributor's main distribution system and the ownership demarcation point with that Customer.

"Connection Authorization" when concerning supply of electrical energy to an electrical installation from a supply authority, shall mean written permission by the Electrical Safety Authority to London Hydro or any other person or corporation, to supply electric energy to a particular electrical installation; or

when concerning supply of electric energy from one part of an electrical installation to another, or from a source of electric energy other than that of London Hydro, shall mean permission from the inspection department to a contractor to connect a particular electrical installation or part thereof to a source of electric energy.

"Consumer" means a person who uses electricity that the person did not generate.

"Consumer's Service" shall mean all that portion of the Consumer's installation from the service box or its equivalent up to and including the point at which London Hydro makes connection.

"Contract" shall mean a contract for the supply of electrical service or energy.

"Contractor" shall mean any person who as principal, servant, or agent, by himself or herself or by associates, employees, servants or agents performs or engages to perform either for his or her own use and benefit or for that of another and for or without remuneration or gain any work with respect to any electrical installation or any other work to which the Ontario Electrical Code applies.

"Customer" shall mean the person or persons contracting for the supply of electric service or energy from London Hydro, including person or persons who are currently attached to the distribution grid and in receipt of electricity through default pursuant to the deregulation of the electricity market in May 2002. Customer should also include developers of residential or commercial subdivisions.

"Customer in Arrears" shall mean a Customer who owes to London Hydro charges or accounts for power after the due date, including an unpaid security deposit or reconnection fee.**"Demand"** means the average value of power measured over a specified interval of time, usually expressed in kilowatts (kW).

"Demand Meter" means a meter that measures a Consumer's peak usage during a specified period of time.

"Demarcation Point or Point of Demarcation" means the physical location at which a Distributor's responsibility for operational control or ownership and maintenance of distribution equipment including connection assets ends at the Customer. The demarcation point for operational control may be different then the demarcation point for the ownership and maintenance of equipment.

"Developer" means a Person or Persons owning property for which new or modified electrical services are to be installed.

"Disconnection" means deactivation of connection assets that result in cessation of distribution services to a Customer.

"Distribution Loss Factor" means a factor or factors by which metered loads must be multiplied such that when summed equal the total measured load at the supply point(s) to the distribution system.

"Distribution Losses" means energy losses that result from the interaction of intrinsic characteristics of the distribution network such as electrical resistance with network voltages and current flows.

"Distribution Services" means services related to the distribution of electricity and the services the Board has required Distributors to carry out, for which a charge or rate has been approved by the OEB under Section 78 of the Ontario Energy Board Act.

"Distribution System Code" means the code approved by the Ontario Energy Board.

"Distributor" means a Person who owns or operates a Distribution System.

"Electrical Safety Authority" or ESA means the Person or body designated under the Electricity Act Regulations as the Electrical Safety Authority.

"Electricity Act" means the Electricity Act 1998, SO 1998.

"Embedded Distributor" means a Distributor who is not a Wholesale Market Participant and that is provided electricity by a Host Distributor.

"Embedded Generator or Embedded Generation Facility" means a Generator whose generation facility is not directly connected to the IESO - Controlled Grid but instead is connected to a Distribution System.

"Embedded Retail Generator" means an Embedded Generator that settles through a Distributor's Retail Settlement System and is not a wholesale market participant.

"Embedded Wholesale Consumer" means a Consumer who is a Wholesale Market Participant whose facility is not directly connected to the IESO - Controlled Grid but is connected to a Distribution System.

"Embedded Wholesale Generator" means an Embedded Generator that is a Wholesale Market Participant.

"Energy Competition Act" means the Energy Competition Act, 1998, SO-1998.

"Energy Diversion" means the electricity consumption unaccounted for but that can be quantified through various measures upon review of the meter mechanism, such as unbilled meter readings, tap off load(s) before revenue meter or meter tampering.

"Enhancement" means a modification to an existing distribution system that is made for purposes of improving system operating characteristics such as reliability or power quality or for relieving system capacity constraints resulting, for example from general load growth.

"Expansion" means an addition to a distribution system in response to a request for additional Customer connections that otherwise could not be made: for example, by increasing the length of the distribution system.

"EUSA" is the Electrical and Utility Safety Authority.

"Gross Peak Demand" in the context of cogeneration billing is equal to Import energy *plus* generation energy *less* export energy.

"IESO" means the Independent Electricity System Operator of Ontario.

"IMO" means the Independent Electricity Market Operator (IESO) established under the Electricity Act.

"Inspector" shall mean any person duly appointed by the Electrical Safety Authority for the purpose of enforcing the Ontario Electrical Code.

"Load Factor" means the ratio of average demand for a designated time period (usually one month) to the maximum demand occurring in that period.

"Load Transfer" means a network supply point of one Distributor that is supplied through the distribution network of another Distributor and where this supply point is not considered a wholesale supply or bulk sale point.

"Load Transfer Customer" means a Customer that is provided distribution services through a load transfer.

"Market Rules" means the rules made under the Electricity Act.

"Measurement Canada" means the Special Operating Agency established by the Electricity And Gas Inspection Act, 1980-81-82-83, C.87.

"Meter Service Provider" means any entity that performs metering services on behalf of a Distributor.

"Meter Socket" means a mounting device for accommodating a socket type revenue meter.

"Multi-Family Residential Dwelling" means a dwelling zoned residential by the City of London, used for dwelling purposes, containing more than one single family dwelling unit that are either individually metered or are metered with a bulk-meter having a service entrance capacity greater than 200 amps.

"Non-regulated price (NRPP) customer" refers to all SSS or Retailer associated customers that are not eligible to participate in the RPP or have elected to opt of the RPP.

"OEB" is the Ontario Energy Board, the regulatory authority in Ontario responsible for electricity and gas.

"Ontario Energy Board Act" means the Ontario Energy Board Act, 1988, S.O. 1998, C.15.

“Overdue Accounts” means amounts which are overdue in respect to a Customer’s account including any unpaid security deposit.

"Permit" shall mean the official written permission of the Electrical Safety Authority, on a form provided for the purpose, authorizing work to be commenced on any electrical installation.

"Person" includes an individual, corporation, a sole proprietorship, partnership, unincorporated organization, unincorporated association, body corporate, and any other legal entity.

"Physical Distributor" with respect to a load transfer, means the Distributor that provides physical delivery of electricity to a load transfer Customer, but is not responsible for connecting and billing the load transfer Customer directly.

Point of Demarcation" see Demarcation Point.

“Premise” or **“Premises”** means the location at which an electrical Service is provided that has a London Hydro account.

Regulated price plan (RPP) customer refers to Low volume and designated customers that meet participant criteria defined in the OEB SSSC and Ontario Legislation or Regulation.

"Retail" with respect to electricity means,

a) to sell or offer to sell electricity to a Consumer

b) to act as agent or broker for a retailer with respect to the sale or offer for sale of electricity, or

c) to act or offer to act as an agent or broker for a Consumer with respect to the sale or offering for sale of electricity.

"Retail Settlement Code" means the code approved by the Ontario Energy Board.

"Retailer" means a person who retails electricity.

"Secondary Service" means any service which is supplied with a nominal voltage less than 750 volts.

"Service Agreement" means the agreement that sets out the relationship between a licenced retailer and a Distributor in accordance with the provisions of Chapter 12 of the Retail Settlement Code.

"Service Area" with respect to a Distributor, means the area in which the Distributor is authorized by its licence to distribute electricity.

"Single Family Residential Dwelling" shall be a dwelling zoned residential by the City of London, used for dwelling purposes, and having only one electric meter with a service entrance capacity of 200 amps or less.

"Standard Supply Service Code" means the code approved by the Ontario Energy Board.

"Supply Service" shall mean any one set of conductors run by London Hydro from its electrical system to a Consumer's service.

"Wholesale Market Participant" means a person that sells or purchases electricity or ancillary services through the IESO - administered markets.

"Wholesale Settlement Cost" means costs for both competitive and non-competitive electricity services billed to a Distributor by the IESO or a Host Distributor or provided by an Embedded Retail Generator or by a neighbouring Distributor.

"Wholesale Supplier" means a person who sells electricity or ancillary services through the IESO administered markets or directly to another person other than a Consumer.

APPENDICES

APPENDIX A

COMMERCIAL CHARGES FOR ELECTRIC SERVICING

APPENDIX A

COMMERCIAL CHARGES FOR ELECTRICAL SERVICING

SUMMARY

This Engineering Instruction outlines the Electric Service Charges for the current year. The purpose for revising the charges is to ensure that the Board's overall capital recovery objective of one hundred percent (100%) is obtained.

2019 ELECTRIC DEPARTMENT

BUILDER AND DEVELOPER CHARGES

DESCRIPTION	2019
Residential Per Unit Charges	
Single Family, Zero Lot Line	Actual
Multi-Family/Semi-Detached	Actual
Apartments/Commercial	
Assessed At 100% London Hydro Costs	
URD Service Locations	
Non-Standard	$29/m
Relocate Padmount Transformer	Actual
Install/Remove Temporary	
URD Transformer Locations (no conductor included)	$ 300.00*
Overhead From Existing Bus (no conductor included)	$ 500.00*

* Rate Specified by OEB

Primary Temporary Services:

100% labour, trucking & equipment to install and remove;
100% of non-recoverable material;
16% of recoverable material;
7% of transformer cost;
plus engineering charge

DESCRIPTION	CHARGE
Cut & Reconnect single phase commercial OH service up to 200 amp	$590.00
Cut & Reconnect three phase commercial OH service	$695.00
Telecom Power Supply or overhead streetlight connection	$600.00
Underground streetlight connection	$500.00

Prices do not include H.S.T

2019 COMMERCIAL CONNECTION CHARGES
A - SECONDARY SERVICES

120/240 VOLT

SERVICE	2019
100 AMP O/H	$1,760
100 AMP U/G	$1,660
200 AMP O/H	$2,470
200 AMP U/G	$2,340
400 AMP O/H	$5,140
400 AMP U/G	$4,760

120/208 VOLT

SERVICE	2019
100 AMP O/H	$3,070
100 AMP U/G TO POLE	$2,750
200 AMP O/H	$4,990
200 AMP U/G TO POLE	$4,380
400 AMP O/H	$8,380
400 AMP U/G TO POLE	$7,790
600 AMP U/G TO POLE	$20,830

347/600 VOLT

SERVICE	2019
100 AMP O/H	$4,180
100 AMP U/G TO POLE	$3,860
200 AMP O/H	$7,190
200 AMP U/G TO POLE	$6,590
400 AMP O/H	$18,250
400 AMP U/G TO POLE	$17,660
600 AMP U/G TO POLE	$34,050

A - SECONDARY SERVICES - (continued)

Network

	2019	
	Transformation	Secondary Connection
100 AMP	$2,712	$2,330
200AMP	$5,650	$2,330
400 AMP	$12,328	$2,330
600 AMP	$19,373	$4,450
800AMP	$27,122	$4,450
1000AMP	$33,903	$6,620
1200AMP	$45,203	$6,620

Note:

Total Network charges include both transformation and secondary connection costs. Prices do not include any primary/secondary duct charges. Apply where applicable.

Prices do not include H.S.T.

2019 COMMERCIAL CONNECTION CHARGES
B - PRIMARY SERVICES

DESCRIPTION	2019
Primary Supply	
Overhead	
Primary Tap	$3,250
Underground	
Three Phase Riser Pole	$7,220
Switching Enclosure	$1,410
Existing Loop Feed Transformer	$780
Manhole or Existing Underground Cable	$2,520
Primary Duct, Cable, Trenching & Support Structures	
Overhead	
Each pole span	$3,140
Underground	
Up to 50 feet from supply point	$1,950
Portion greater than 50 feet	
3 duct configuration/Meter	$100
6 duct configuration/Meter	$135
Manholes	$10,310
Transformer Support Structures, Grounding and Terminations	
Polemounted Transformers	
Pole, Anchoring, Guying and Grounding	
Tap Pole	$9,490
Main Line Pole	$5,520
Four secondary terminations	$1,450
Up to eight secondary terminations	$2,140
Padmounted Transformers	
Pad, Foundation and Grounding	$4,540
Up to eight secondary terminations	$1,960
Up to sixteen secondary terminations	$2,380
Engineering Charge	
Applied to previous item totals	5%-10%

Prices do not include engineering & primary/secondary duct charges.
Apply where applicable.

Prices do not include H.S.T.

2019 COMMERCIAL CONNECTION CHARGES

DESCRIPTION	2019	
Customer Owned Substations		
Connection at Riser Pole	$6,610	
Connection at Existing Switching Enclosure	$1,090	*
Padmounted Transformer Surcharge		
150 kVA	$13,820	
300 kVA	$16,530	
500 kVA	$21,370	
750 KVA	$27,750	
1000 KVA	$30,144	
1500 kVA	$38,190	
2000 kVA	$40,800	

***See Engineering Supervisor prior to quoting customer**

Prices do not include H.S.T.

APPENDIX B

DISCONNECTION AND RECONNECTION OF RESIDENTIAL SERVICE CABLES

Engineering Instruction EI-28

Disconnection & Reconnection of Residential Meters and Service Cables

Instruction Number: **EI-28**	Revision: **R6**
Original Release Date: **May, 1990**	Revision Date: **August, 2018**

Approved By:

Allan Van Damme, P.Eng.	William Milroy, P.Eng.
Director of Operations	Vice President, Engineering & Operations

For Bill Milroy Aug 13/18

REVISION INDEX

Changes from the previous edition of this Engineering Instruction are listed below. Relocation of paragraphs or editorial changes is not shown.

Revision Number	Issue Date	Section	Description of Change
R1	May, 1990		Initial Release
R2	May, 1994	Title	Revised to include the disconnection and reconnection of residential meters.
		1.2 (i)	Permits pre-qualified Electrical Contractors to remove and replace meters rated up to 200 amp, single-phase, provided certain procedures are followed.
		2.7	New section describing the administration and safety procedures a Contractor must follow in order to receive permission to disconnect and later reconnect a residential electric meter.
R3	May, 2001		All references to *London PUC* revised to read *London Hydro*, and all references to *Ontario Hydro's Electrical Inspection Department* revised to read *the Electrical Safety Authority*.
		1.2 (i)	Removed clauses permitting electrical contractors to remove and replace meters as London Hydro's Meter Shop Accreditation / ISO-9002 quality management system no longer permits this activity.
		2.7	Removed clauses permitting electrical contractors to remove and replace meters as London Hydro's Meter Shop Accreditation / ISO-9002 quality management system no longer permits this activity.
R4	April, 2003	1.4	New section
		2.7	Reference to ESA's fee schedule updated.
		Appendix A	Prices for premium time work revised.
R5	May, 2006	Appendix A	Prices for premium time work revised.
R6	August, 2018	Appendix A	Prices for premium time work revised.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Scope

This Engineering Instruction describes the procedure for disconnecting and later reconnecting the secondary supply service cables to residential buildings.

This Engineering Instruction is intended to coordinate the activities of London Hydro, the provincial Electrical Safety Authority, and the Contractor and is to be followed whenever a residential customer's consumer service equipment is to be renovated, upgraded or otherwise modified.

1.2 Purpose

Electrical contractors making upgrades or other changes to residential single-phase consumer's service equipment are governed by Rule 2-012, *Connection Authorization*, of the Ontario Electrical Safety Code. As part of the work, it is often necessary for the Contractor to remove and replace the revenue meter or arrange for London Hydro to disconnect and later reconnect the aerial or underground supply service cables.

This instruction stipulates the manner in which Rule 2-012 is to be administered. There are two fundamental objectives for the procedure, namely:

(i) safety -

London Hydro does not incorporate secondary overcurrent protection on the aerial or underground supply service cables extending from London Hydro's supply transformer or supply bus to the consumer's service equipment. As a consequence, London Hydro does not permit Contractors to disconnect, reconnect, or otherwise tamper with the supply service cables.

(ii) efficiency -

The customer will be better served if the Electrical Contractors, London Hydro, and the Electrical Safety Authority adopt a uniform procedure to coordinate the location of consumer service equipment, permits, disconnection of supply service cables, electrical inspection, and reconnection of supply service cables.

To adapt to changes in the business environment, London Hydro intends to review and update this procedures document periodically. As such, all suggestions for improvement are encouraged and will be considered provided neither of the above stated objectives is compromised.

1.3 Definitions

The terms listed following are defined in Section 0, *Definitions*, of the Ontario Electrical Safety Code:

- Connection Authorization
- Consumer's Service
- Contractor
- Inspection Department
- Inspector
- Permit
- Supply Service

1.4 Document Revisions and Distribution

This Engineering Instruction is distributed within London Hydro as controlled distributions document (i.e. all registered holders of Engineering Instruction manuals automatically receive updates as they are generated).

London Hydro customers and their agents can receive the current release of this Engineering Instruction in response to a formal application request but no updates thereafter. If there is an extended time period between an initial inquiry and carrying out of the work, the customer (or their agent) shall be responsible for ensuring that they have the most updated version of this Engineering Instruction before proceeding.

2.0 PROCEDURE FOR SERVICE CABLE DISCONNECTION & RECONNECTION

2.1 Overview

The steps to be followed by Contractors are outlined following:

[1] Obtain a "Residential Service Layout" from a representative of London Hydro. (Refer to Subsection 2.2 below). A "Residential Service Layout" form is not required if all work will take place downstream of the load side of the revenue meter.

[2] Schedule a date and time, which is mutually convenient to both London Hydro and the Contractor, for the supply service cables to be disconnected and reconnected. (Refer to subsections 2.3 and 2.5 herein)

Note: Upon completion of steps 1 and 2, London Hydro will automatically send the above-described information to the Electrical Safety Authority (e-mail).

[3] Apply to the Electrical Safety Authority for a "permit". (Refer to subsections 2.4 herein)

Details of the individual steps are given in the subsections that follow.

2.2 Service Layout

The Contractor shall contact London Hydro to arrange a mutually agreeable consumer's service location and supply service arrangement. (See Subsection 2.6 on page 3 if only a meter removal and reconnect is required).

London Hydro's contacts are identified following:

(i) for aerial supply service conductors -

Arrangements for a service layout may be made with the London Hydro's Dispatch Office at ☎ (519)-661-5555.

(ii) for underground supply service conductors -

Arrangements for a service layout may be made directly with the Engineering Design team at ☎ (519)-661-5800 Ext. 5385.

London Hydro's representative will record the pertinent information in a multi-part "Residential Service Layout" form. A sample residential service layout form is included as Appendix B.

Note: Contractors are reminded that the completed residential service layout forms have a limited validity period.

Note: Contractors are reminded to verify at this stage that the proposed equipment and arrangement is in accordance with the latest release of London Hydro's policies.

Note: Contractors are advised that, wherever possible, London Hydro will disconnect the supply service conductors at the street.

2.3 Scheduling

The onus is on the Contractor to schedule the removal and reinstallation of electric meters and the disconnection and reconnection of the supply service cables with London Hydro. Arrangements may be made by contacting London Hydro's Dispatch Office at ☎ (519) 661-5555.

London Hydro's Dispatch Office will record the scheduling information on the multi-part "Residential Service Layout" form. A copy can be made available to the Contractor if requested, and London Hydro will retain the remaining copies.

The onus is also on the Contractor to schedule the inspection of the consumer's service equipment with the Electrical Safety Authority.

Contractors are reminded of the following requirements and limitations:

(i) For scheduling the disconnection and reconnection of service cables, London Hydro's normal hours of work are: 7:30 a.m. to 4:00 p.m., Monday to Friday except holidays.

(ii) The Electrical Safety Authority has subdivided the City of London into 'inspection areas'. The inspection schedule for each area is available from the Electrical Safety Authority.

(iii) London Hydro generally requires at least three (3) working days advanced notification to schedule the disconnection and reconnection of supply service cables. In the summer months as long as ten (10) days may be required.

(iv) In cases where the old revenue meter is mounted within the building, the onus is on the Contractor to make access arrangements with the Owner so that the meter can be recovered and a final reading taken at the time of reconnection.

In the event that London Hydro is unable to perform scheduled work due to inclement weather, distribution system emergency, or similar, London Hydro's Dispatch Office will contact the Contractor to reschedule the work.

2.4 Application for Inspection

The Contractor shall contact the Electrical Safety Authority and complete an "Application for Inspection".

2.5 Connection Authorization

Contractors are reminded that London Hydro is unable to reinstall electric meters or reconnect supply service cables until connection authorization has been received from the Electrical Safety Authority.

In an effort to improve inspection efficiency, the Electrical Safety Authority has an "Authorized Contractor Program" available to **qualified** Contractors. Under this system, the Contractor shall provide the Electrical Safety Authority's Inspection Clerk with at least two working days advanced notification of scheduled work. Provided that a permit has been issued for the work, the Electrical Safety Authority will issue an advanced connection authorization to London Hydro. The Electrical Safety Authority will perform the actual inspection following reconnection of the supply service cables on the next normal day of inspection for that area.

Note: The onus is on the Contractor to make access arrangements with the Owner on behalf of the Inspector.

Note: For emergencies on weekends, evenings or holidays, the Electrical Safety Authority will waive permits and connection authorizations until the next working day for residential authorized contractors (refer to http://www.esainspection.net/ for a current listing of qualified contractors).

2.6 Revenue Meter Removal and Reinstallation ONLY

London Hydro's Electric Metering Shop is accredited by the Federal Government to calibrate, re-verify and seal revenue meters. Pursuant to this program, only trained London Hydro staff is authorized to remove and reinstall revenue meters. Even if all work is scheduled to take place downstream on the load side of the meter, Contractors are no longer permitted to remove or reinstall the meter themselves.

Arrangements can be made to schedule the removal and reinstallation of the electric meters by contacting London Hydro's Dispatch at ☎ 661-5555 to describe the location of the work, the nature of the work, and the date on which it will be carried out.

2.7 Service Fees

Provided the supply service cables can be disconnected and reconnected during London Hydro's normal working hours, this work will be performed at no cost.

Arrangements may be made to have supply service cables disconnected or reconnected, or both, outside London Hydro's normal working hours. The Contractor will, however, be required to make advanced payment (to the field staff) of a flat-rate charge for this service. For convenience, the charges are identified in Appendix A.

Note: Contractors are advised that for Connection Authorizations received after 3:00 pm, the Line or Underground Supervisor will make a judgement of whether the reconnection can be carried out without interfering with ongoing commitments or if the reconnection fee for work outside normal working hours should apply.

Note: In instances where the residential building is supplied via underground supply service cables, and the planned modifications to the customer's consumer service equipment requires London Hydro to extend or relocate the existing underground supply service cables, an additional charge shall apply. In general, London Hydro will directly invoice the customer for the additional charge.

The fee schedules for Electrical Inspection are established in their publication "*Electrical Inspection Wiring Fee Schedule*". This schedule can be found on the ESA's Internet site (http://www.esainspection.net/). Note that this publication is revised annually.

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Appendix A – 2018 Price Schedule

This appendix identifies the service charges payable to London Hydro for the disconnection and reconnection of supply service cables to residential buildings. The flat rate charges are as follows:

(i) During London Hydro's normal working hours:

- Disconnection - no charge
- Reconnection - no charge

(ii) Outside London Hydro's normal working hours:

- Disconnection - $201.40 + HST = $227.58
- Reconnection - $201.40 + HST = $227.58

The price schedules are updated annually. The onus is on the Contractor to ensure that he/she holds the most recent revision of the price schedule.

Appendix B – Example Residential Service Layout Form

London Hydro

Phone: 661-5555

Residential Service Layout

CUSTOMER INFORMATION

Name:

Address:

SCHEDULING INFORMATION

Contractor: Telephone:

Scheduled Disconnection Date & Time:

Scheduled Reconnection Date & Time:

Connection Authorization:

ELECTRIC SERVICING ARRANGEMENT

Prepared By: _____ Date: _____

Mast:

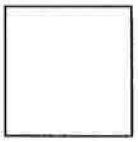
YES ☐

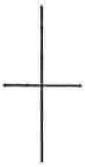
NO ☐

METER

INSIDE ☐

OUT ☐





TRANS LOC NO.	TRANS SIZE	TRANS VOLTAGE	SERVICE SIZE	SERVICE CONDUCTOR SIZE	SERVICES ON TRANSFORMER	NUMBER OF METERS.

NOTES:

(1) This Service Layout form is valid for six months only.
(2) All existing indoor residential meters must be relocated outdoors whenever the service mast or service wires are changed.
(3) Only rectangular meter bases will be accepted. Existing round meter bases must be replaced.
(4) The installation of jumpers to provide power in the absence of a meter will not be permitted.

Remarks:

FORM 134 07/02 SKU #60259 PRINTERS PLUS

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APPENDIX C

ELECTRIC METERING REQUIREMENTS

Engineering Instruction EI-29

Low-Voltage Electric Metering Requirements

Instruction Number: **EI-29**	Revision: **R12**
Original Release Date: **December 1993**	Revision Date: **May 2016**
Approved By:	
Luke Seewald, P. Eng. Director of Metering Services	William A. Milroy, P. Eng. Vice President of Operations and Engineering

Overview

This Engineering Instruction describes London Hydro's procedures and accepted practices for the design and installation of low-voltage revenue metering equipment.

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1 GENERAL

1.1 Electrical Safety Authority Inspection

The Electrical Safety Authority is the Inspection Authority for all wiring in a customer's premises. It is the responsibility of the customer to apply for an Inspection and to correct all deficiencies noted by the Electrical Safety Authority. The customer's service will not be connected until it has been inspected and approved.

1.2 Location of Meters

The customer must provide a convenient and safe location for the installation of meters and auxiliary equipment. A clear working space of not less than 36" but preferably 60" in front of the entire installation and a minimum ceiling height of 84" is required. The spaces provided for meters must be kept clear of foreign material and the meter equipment must not be boxed in or have the access restricted without the approval of London Hydro.

No water, steam, gas, sewer or other pipes or equipment are permitted to encroach on the safe working space requirements in front of the metering installation. Where a meter room is provided, no other equipment is permitted within the room. Violations will be reported to the Electrical Safety Authority and may result in fines or disconnection of electricity service.

Electricity meters mounted on free standing structures – wooded or metal pedestals need to be mounted at London Hydro standard metering height of 68". They must be mounted a minimum of 1 metre from road ways to prevent damage to the equipment, and for health and safety of the public and utility maintenance workers.

If at any time the elevation of the work area surrounding the metering installation (meter base, cabinet or Main service entrance switchgear) is altered the service location must be changed at the customers expense to bring the elevation of the (meter base, cabinet or Main service entrance switchgear) back to London Hydro approved heights.

Examples would be:

- Stair wells being installed under the metering equipment
- Decks or other structures built under or around the metering equipment that changes the elevation and or the minimum clearance surrounding the equipment

1.2.1 Outdoor Residential Meters

Residential meters must be installed outdoors because of the difficulty London Hydro has in gaining access to residential dwellings to read or maintain meters. If a residential meter or meters cannot be placed outside in an approved location, the Engineering Department must be consulted (☎ 519-661-5800 Ext. 5564).

Under some circumstances, parallel stacks may be permitted to accommodate outdoor residential meters but additional charges will apply.

All meters must be installed in an approved location. The centre of the meters must be 68" ± 4" from finished grade. Where meters are installed near driveways, the meters and conduits must be protected from moving vehicles. Finished grade levels must be maintained as per 1.2.

1.2.2 Indoor Polyphase Meters

All polyphase meters must be installed in a dedicated electrical room indoors. The indoor location provides the greatest protection for polyphase meters and London Hydro generally has less difficulty in gaining access to the commercial/industrial establishments where polyphase meters are used. This room is to be free of clutter, no storage, and not fit for human dwelling to ensure safety to all whom enter.

All indoor meters must be on the load side of the fused switch or breaker, which isolates the meter and load.

For new installations, all meters must be installed so that the centre of the meter is at 68" ± 4" above the finished floor. Any number of meters and sub-services may be installed if all meters can be installed at the required 68" height. This will be strictly enforced. The installation of metered load centres is also acceptable and recommended. The intent of this requirement is to ensure that for a given size electrical room, the customer has as much space as possible for future expansion.

After a new installation has been in service for a year or more, additional sub-services may be installed with the bottom of the meter and related switching equipment no lower than 24" and the top no higher than 74" above finished floor. This corresponds to the height of meters in a metered load centre. Additional sub-services and meters installed within a year of initial installation must meet the 68" requirement.

All meters must be in one location at the main service entrance, unless otherwise agreed to by the London Hydro Metering Department.

1.2.3 Service Upgrades and Modifications

When the service to an existing residential meter is modified or upgraded and where the upgrade requires a modification to the service mast or service wires, the installation must be brought up to current standards. For example, indoor meters must be reinstalled outdoors and recessed meter bases must be removed and replaced. The customer will be responsible for installing a rectangular meter base.

When the service to an existing installation having a round meter base is modified and this modification affects the meter base (new load wires or conduit), the round meter base must be removed and replaced with a rectangular meter base.

In addition to the above requirements, when a new meter is installed in a parallel metering configuration to accommodate FIT or microFIT generation, ganged 200 Amp meter bases are required. Contact the Dispatch Office (☎ 519-661-4749) to request a Residential Service Layout for all overhead meter base changes.

Contractors involved in residential service upgrades or modifications should also obtain a copy of London Hydro's Engineering Instruction EI-28, *Disconnection & Reconnection of Residential Meters and Service Cables*, available from London Hydro's Dispatch Department (☎ 519-661-4749). This document is also included as Appendix B within London Hydro's *Conditions of Service* publication.

1.2.4 Removal or Jumpering of Meters

All electric meters are sealed and belong to London Hydro. Electric meters can only be removed by London Hydro personnel.

Jumpers installed to provide power in the absence of a meter will not be allowed under any circumstances. Jumpers found on any type of service will be removed without notice.

During all new construction the temporary service must be planned in a manner to ensure that all

construction power will be metered.

1.3 Metering Cabinets

1.3.1 General

Wherever metering cabinets are required, the Electrical Contractor is required to provide and install the cabinet. London Hydro will supply and install any current and potential transformers required with the exception of current and potential transformers being mounted in switch gear and that is the responsibility of the electrical contractor. Section 2, Metering Details below, provides details on the size of cabinet required for various service sizes.

Problems may arise in using the specified size of cabinet particularly in rewiring older buildings. Approval for cabinet size or wiring deviations from the standard **MUST** be obtained prior to installation.

Minimum distance from floor to bottom of cabinet — 24"

Maximum distance from floor to top of cabinet — 78"

Metering cabinets must have double doors with the first opening door on the right hand side when facing the cabinet and must be designed to latch closed with a locking mechanism included to accommodate London Hydro's standard padlock and seal (8 mm inside diameter minimum).

Cabinets must be equipped with removable steel back panels (back-plates) to facilitate shop work and to allow the entire back panel to be removed for testing at other locations.

Metering cabinets for mounting locations outdoors must be approved by the Metering Department before installation. They must be weather proof (Nema 4x) with a drip shield.

The Electrical Contractor must allow for a minimum of 10 working days from the date of the instrument transformer pickup and backplate drop-off at London Hydro's Meter Shop, to the date of metering installation energization.

1.3.2 Conductors

Line and load wires must enter and exit the lower left and lower right sides of the meter cabinet and sufficient conductor length must be provided. Both the load and line side conductors must be long enough to reach the opposite side of the cabinet. Any deviation from this requires approval from the Meter Department.

Mineral insulated, solid or hard drawn wire conductors are not acceptable for meter loops.

Where two conductors per phase (parallel runs) are used, the customer is responsible to ensure that each pair of conductors on each phase is the same length. Parallel conductors should be measured by the Contractor and cut inside the metering cabinet with both the load and line sides long enough to reach the opposite side of the cabinet. Parallel conductors must not be looped through the cabinet without cutting, and must be identified and marked with corresponding phasing tape.

Neutral conductors can be run straight through the metering cabinet without being cut. London Hydro's will provide an insulated piercing connector for the neutral.

1.3.3 Installations Involving Switchgear

Whenever switchgear is used in the service entrance, a 36"W x 36"H x 12"D remote metering cabinet will

be required. All instrument transformers will be incorporated into the switchgear. London Hydro will supply instrument transformers (i.e. PTs and CTs) and will make available to the electrical contractor for installation. Bar type (in-line) CTs are not used so it is essential to have sufficient lead-time — consult the Meter Department.

The Electrical Contractor must allow for a minimum of 10 working days from the date of backplate drop-off at London Hydro's Meter Shop, to the date of installation.

The Contractor will be required to install a 1-1/4" conduit to connect directly from the section containing the instrument transformer compartment (cell) to the metering cabinet which must be located in the same room as the main service.

The conduit from the instrument compartment to the remote metering cabinet must be continuous with no breaks or LB junctions.

The conduit must not pass through any area in the switchgear that contains conductors which are connected to the line side of the main switch or breaker.

The conduit cannot exceed 50 ft. in length without special arrangements being made with the Meter Department. The instrument transformer compartment must be lockable with London Hydro's standard padlock.

1.4 Meter Bases

A meter base is to be supplied and installed by the Electrical Contractor to London Hydro's specifications and approved by CSA and the Ontario Electrical Safety Authority.

All meter bases must be fitted with a screw-type sealing ring.

All residential meter bases fed off of overhead services for polyphase and single phase indoor-located must be at least 7-1/2" wide and 9" high.

All residential meter bases fed off of underground service must be 200 amps rated per meter position.

Round 100 amp single phase meter bases are not permitted.

Bypass meter sockets are not permitted.

All polyphase meter bases must be equipped with a full sized isolated neutral block for proper metering.

Services with two or more meters must be clearly identified with lamicoid style labels indicating the customer's unit. The labels must be attached to a permanent section of the meter base. All switches feeding meter bases for both 1 phase and 3 phase installations must be clearly identified with lamicoid or P touch style labels. The meter will not be installed until these labels have been properly installed.

London Hydro supports Meter Bases that are part of external backup generator switchgear. The meter base enclosure must be no smaller than a CSA approved oversize meter base. All line side cable must be secured within sealable raceways or conduit. External backup generators shall only be connected through a disconnecting device at the connection point with the distribution system which will prevent back-feed in the event of an outage on the distribution system. The disconnecting device shall provide a visible indication of the open main current-carrying path that isolates the generator from the distribution system.

1.5 Remote Interrogation Metering (General Service > 50kW)

Any new or upgraded commercial customer with an anticipated average monthly peak (over a 12 month period) of 50 kW or greater is required to make provisions for Remote Interrogation metering and interval-Style revenue meter. This is the means London Hydro uses to access metering information remotely.

For additional details reference Engineering Instructions EI-22, *Guidelines for Supplying Interval-Style Revenue Metering Systems*.

1.6 Interval-Style Revenue Metering Systems

The OEB's Distribution System Code and London Hydro's policy dictate that retail customers with loads above a defined threshold must have interval-style revenue metering systems installed. Retail customers with loads below this threshold may also request the installation of an interval-style revenue metering system. Please see Engineering Instruction EI-22, *Guidelines for Supplying Interval-Style Revenue Metering Systems*, for further details on the installation of these types of meters. This document is also included as Appendix C within London Hydro's *Conditions of Service* publication which can be obtained from the Engineering Department.

1.7 Billable Services - Electric Meter Department

The type of metering service work that must be paid for by the electrical contractor is outlined below.

- Customer requested relocation of existing meters and meter related equipment, including removals and reinstallation of the meters and meter equipment.
- Customer requested additions and removals of meters to an existing metered service, including bulk to individual and individual to bulk metering conversions.

In both cases the cost of the meter is not billed. The cost associated with labour, trucking and materials will be billed on an hourly basis to the contractor that has requested and is named on the ESA inspection**.** The duration of the work (number of hours) is dependent on the metering situation. An estimate is available upon request.

In all cases the Electrical Contractor is encouraged to contact the Meter Department for all questions regarding billable electric metering services. London Hydro's hours of operation are: Monday to Friday - 7:30 am till 4:00 pm.

Contacts are:

Leading Electric Meter Technician
Phone: 519-661-5800, Ext. 5574
Fax: 519-661-5812

Electric Meter Supervisor
Phone: 519-661-5800, Ext. 6406
Fax: 519-661-5812

2 METERING DETAILS

All meters and metering transformers (CTs and PTs) and the corresponding communication equipment, wiring and attachment, including test switch blocks, are the property of and are supplied by London Hydro, unless otherwise specified. Any damaged or missing equipment will be billed to the customer at replacement value.

2.1 Single-Phase 120/240 V

2.1.1 Up To 200 Amp

Meters must be located outside. Meters used are 4-jaw, self-contained units. Electrical Contractor must supply and install a rectangular meter base measuring 7-1/2" wide x 9" high minimum for services feed overhead.

Meter bases for underground single-phase services must be 200 Amp rated per position, self-contained lugs with Allen screw connections for the line side cables that are large enough to accommodate up to 4/0 stranded cable. To prevent tampering, London Hydro's service cables must not pass through any other boxes, compartments or LBs before terminating in the meter base. If the meter base is part of a combined unit, or is mounted directly adjacent to a disconnect switch or other electrical compartment, there must be a solid barrier between the meter base and the adjacent compartment. The neutral connector block must be located in the meter base compartment to facilitate future troubleshooting and repairs. The following meter bases (or equivalent) are acceptable:

- Micro Electric BS2-TCV
- Murray Jensen ..... EK400 RO
- Commander LM2
- Hy-Del SC24-EXP
- Hy-Del ..... H22R (2 gang, 200 Amp for microFit installations)

2.1.2 400 Amp Residential

Electrical Contractor must supply and install a 36" x 36" x 12" meter cabinet on the load side of the main switch indoors to contain a current transformer and test facilities. A self-shorting meter base must be installed outdoors and connected by means of a 3/4" conduit not exceeding 50 ft. in length without J.B or L.B to the meter cabinet.

Meter base must be a Murray Jensen type CTS409PW with a SW090M add on, or approved equivalent.

2.1.3 400 Amp Commercial

Electrical Contractor must supply and install a 36" x 36" x 12" meter cabinet. A meter base is not required. London Hydro will install CTs and a meter inside the cabinet.

2.2 120/208Y V Network Service

Meters must be located indoors on the load side of the main switch. Meters used are 5-jaw, with the 5th jaw in the 9 o'clock position. The Electrical Contractor must supply and install a rectangular meter base or a metered load centre, where appropriate, complete with the 9 o'clock add on jaw. The Contractor must also install an isolated meter block in the meter base.

2.3 Three-Phase 120/208Y V Metering

2.3.1 Up To 200 Amp

Meters must be located indoors on the load side of the main switch. Where there is no building available (i.e. temporary services, sports fields), an approved weatherproof lockable enclosure (Nema 4x complete with rain cap) is acceptable. Meters used are 7-jaw, with the 7th jaw in the 6 o'clock position. The Electrical Contractor must supply and install a rectangular meter base or metered load centre where appropriate complete with the 6 o'clock add on.

2.3.2 400 Amp

The Electrical Contractor must supply and install a 36" x 36" x 12" meter cabinet indoors on the load side of the main switch. Inside the cabinet shall be a120V dedicated receptacle and circuit breaker, complete with breaker lock. The Electric Meter Department installs current transformers and meters as required in the cabinet.

2.3.3 600 Amp

The Electrical Contractor must supply and install a 36" x 36" x 12" meter cabinet to accommodate London Hydro's current transformers and meters.

If the Electrical Contractor prefers to install secondary switchgear, London Hydro will supply CTs to the electrical contractor for installation. In this case a remote metering cabinet measuring 36" x 36" x 12" is adequate complete with a 1-1/4" conduit from the switchgear to the cabinet. (See Section 1.3.3). A 120V dedicated receptacle and circuit breaker, complete with breaker lock, is required inside the cabinet.

2.3.4 800 Amp

The Electrical Contractor is responsible to have current transformers installed in the secondary switchgear and must provide a 1-1/4" conduit from the switchgear to a remote metering cabinet measuring 36" x 36" x 12". London Hydro will supply CTs to the electrical contractor. A 120V dedicated receptacle and circuit breaker, complete with breaker lock, is required inside the cabinet.

2.3.5 1000 to 3000 Amp

The Electrical Contractor is responsible to have current transformers installed in the secondary switchgear and must provide a 1-1/4" conduit from the switchgear to a remote metering cabinet measuring 36" x 36" x 12". London Hydro will supply CTs to the electrical contractor. A 120V dedicated receptacle and circuit breaker, complete with breaker lock, is required inside the cabinet.

2.4 Three-Phase 347/600Y V Metering

2.4.1 Up To 200 Amp

Meters must be located indoors and on the load side of the main switch. Where there is no building available (i.e. temporary services, sports fields), an approved weatherproof lockable enclosure (Nema 4x complete with rain cap is acceptable. Meters used are 7-jaw self-contained units with the 7th jaw in the 6 o'clock position. Electrical Contractor must supply and install a rectangular meter base or metered load centre where appropriate complete with the 6 o'clock add on jaw.

2.4.2 400 and 600 Amp

The Electrical Contractor must provide a 48" x 48" x 12" meter cabinet to accommodate London Hydro's CTs, PTs, meters and accessories. A 120V dedicated receptacle and circuit breaker, complete with breaker lock, is required inside the cabinet.

If the Electrical Contractor prefers to install secondary switchgear, London Hydro will supply CTs and PTs to the electrical contractor for installation. In this case a 36" x 36" x 12" remote metering cabinet is adequate complete with a 1-1/4" conduit from the switchgear to the communications and meter equipment cabinet. See Section 1.3.3, *Installations Involving Switchgear*, and Engineering Instructions EI-22 for further details on the communication options available.

2.4.3 800 Amp

The Electrical Contractor must arrange to have current and potential transformers installed in the secondary switchgear and must provide a 1-1/4" conduit from the gear to a remote metering cabinet measuring 36" x 36" x 12". London Hydro will supply CTs and PTs to the electrical contractor. A 120V dedicated receptacle and circuit breaker, complete with breaker lock, is required inside the cabinet. Communications equipment is also required, See Engineering Instructions EI-22 for further details on the communication options available.

2.4.4 1000 to 3000 Amp

The Electrical Contractor must arrange to have current and potential transformers installed in the secondary switchgear and must provide a 1-1/4" conduit from the gear to a remote metering cabinet measuring 36" x 36" x 12". London Hydro will supply CTs and PTs to the electrical contractor. A 120V dedicated receptacle and circuit breaker, complete with breaker lock, is required inside the cabinet. Communications equipment is also required, See Engineering Instructions EI-22 for further details on the communication options available.

2.5 Three-Phase Above 600 V Metering

For further details on this class of service see Appendix D Engineering Instruction EI-4, *Design and Interconnection Requirements for Customer-Owned Electric Power Substations*.

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APPENDIX D

DESIGN AND INTERCONNECTION REQUIREMENTS FOR CUSTOMER-OWNED ELECTRIC POWER SUBSTATIONS

Engineering Instruction EI-4

Design and Interconnection Requirements for Customer-Owned Electric Power Substations.

Instruction Number: **EI-4**	Revision: **R7**
Original Release Date: **November, 1989**	Revision Date: **March, 2017**

Revised By:

Jagoda Borovickic, P.Eng.
Manager of Design Engineering

Approved By:

Cole Tavener, P.Eng.
Director of Engineering

William Milroy, P.Eng.
Vice President of Engineering and Operations

Overview

This Engineering Instruction is intended to guide London Hydro's customers and their agents in the preparation of servicing plans and proposals for customer-owned electric power substations, installed on private property, and providing electric service to commercial, industrial, institutional, and apartment buildings.

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Revision Index

Changes from previous editions of this Engineering Instruction are listed below. Relocations of paragraphs or editorial changes are not shown.

Revision Number	Issue Date	Section	Description of Revision
R3	August 31, 2000		This Engineering Instruction was originally entitled *Cable Measurements on Riser Poles*. The original issue simply encompassed the interconnection of privately owned primary cables at a fused riser pole. This edition has been expanded to encompass the submission, design, and revenue metering requirements for the most commonly encountered customer-owned substation projects.
R4	September, 2009	1.4	Eligible added to projects and defined.
R5	July, 2013	3.4; 4.4; 5.1	Air-insulated padmounted sectionalizing switchgear replaced with deadfront padmounted sectionalizing switchgear. Cable termination requirements and coordination with London Hydro's system protection changed accordingly.
		6.2	Three-phase oil-filled primary metering unit replaced with dry type metering unit.
R6	April, 2016	1.5	Removed reference to EI-8, *Standard Arrangements for Providing Revenue Metering Pulse Signals to Customer-Owned Energy Management Systems*, as this is not available for new installations. Changed EI-22 document title to *Guidelines for Supplying Interval –Style Revenue Metering Systems*
		6.6	Changed section content and title to Meter Communication Circuit
		6.8	Removed section Optional Data Interfaces To The Revenue Meter. Pulse output no longer supported.
R7	March, 2017	4.2.2	Added request for installation of Dual-Winding Transformers, when qualified

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- London Hydro drawing E.CS-150, *Cable Measurement, PUC Pole Reference.*
- London Hydro drawing E.CS-415 Sht.2, Primary and Secondary Cable Riser Details.

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1 INTRODUCTION

1.1 Purpose and Intent

This Engineering Instruction identifies the division of responsibilities and installation requirements for customer-owned electric power substations, installed on private property, and providing electric service to commercial, industrial, institutional, and apartment buildings.

The intent of this Engineering Instruction is to guide London Hydro customers and their agents in the preparation of servicing plans and proposals for customer-owned electric power substations. Nothing contained in this Engineering Instruction shall prejudice or affect various the other codes or any regulations published in the current edition of the Ontario Electrical Safety Code.

1.2 Exclusions

This Engineering Instruction is not intended to encompass the unique requirements for electric power substations used to interconnect private co-generation facilities with the London Hydro's medium-voltage electrical distribution system.

1.3 Document Revisions and Distribution

This Engineering Instruction is distributed within London Hydro as controlled distributions document (i.e. all registered holders of Engineering Instruction manuals automatically receive updates as they are generated).

London Hydro customers and their agents will automatically receive the current release of this Engineering Instruction in response to a formal application request, but no updates thereafter.

If there is an extended time period between an initial inquiry and carrying out of the work, the customer (or their agent) shall be responsible for ensuring that they have the most updated version of this Engineering Instruction before proceeding.

1.4 Governing Policy

The electric servicing of most commercial, industrial, institutional, and apartment buildings is via transformation supplied, owned, operated and maintained by London Hydro.

However, a customer-owned electric power substation shall service projects that meet one or more of the following criteria:

- Projects that require transformation in excess of London Hydro's limitations (e.g. 500 kVA for supply from a pole-mounted transformer bank; 750 kVA at 120/208Y V for supply from a three-phase pad-mounted distribution transformer, 1500 kVA at 347/600Y V for supply from a three-phase distribution transformer (multiple units can be installed to provide 3000 or 4500 kVA transformation and the services are to be grouped in one common electrical room) , and 2000 kVA per transformer room at 347/600Y V for supply from an indoor transformer vault);
- Projects whereby the customer requires a utilisation voltage other than London Hydro's standard offerings of 120/208Y V, 347/600Y V or 2400/4160Y V;
- Projects whereby the customer's internal distribution scheme is incompatible with the types and ratings of over-current devices typically used by London Hydro on the high-voltage winding of distribution transformers.

  Note: London Hydro generally uses full-range current-limiting fuses with a nominal line-to-ground rating on the high-voltage winding of distribution transformers. Some internal distribution schemes, such as resistance- or reactance-grounded systems, can result in recovery voltage in excess of the fuse's capability when called upon to operate.

- Projects involving supply to customer processes that generate harmonics in excess of the design limitations of London Hydro's distribution transformers — refer to Section 4.1.5, *Load Current*, of IEEE Standard C57.12.00, *IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*.
- Projects for which London Hydro would not have unrestricted access to the distribution equipment using available equipment (e.g. London Hydro will not provide transformers for installation in enclosed courtyards, on an upper level of an office tower, etc.).

For "eligible projects" serviced via a customer-owned substation, the customer's bill shall be reduced by an allowance as approved by the Ontario Energy Board. Refer to London Hydro's tariff schedule (*Allowance for Customer-Owned Step-down Facilities*) for information on the prevailing allowance. "Eligible projects" is defined as those projects that will result in the customer being classified within the London Hydro OEB approved General Service 50 kW and over.

1.5 Reference Publications

Where reference is made to the following publications, such references shall be considered to refer to the latest edition and revisions thereto, unless stated otherwise. This Engineering Instruction refers to the following such publications and the year dates shown indicate the latest edition available at the time of printing:

- Ontario Electrical Safety Code, 25th Edition, 2016.
- CAN/CSA-C802.1-00(R2011), *Minimum Efficiency Values for Liquid-Filled Distribution Transformers*.
- CAN/CSA-C802.3-15 (R2011), *Maximum Efficiency Values for Power Transformers*.
- CAN/CSA Standard C22.3 No. 1-15, *Overhead Systems*.
- CSA Standard C22.3 No. 7-15, *Underground Systems*.
- CAN/CSA Standard C22.2 No. 31-10, *Switchgear Assemblies*.
- CAN/CSA Standard C22.2 No. 94-M91 (R2011), *Special Purpose Enclosures*.
- IEEE Standard C57.12.00 (R2012), *IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*.
- IEEE Standard 400.2-2013, *IEEE Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF)(less than 1 Hz)*.
- IEEE Standard 48-2009, *IEEE Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV Through 765 kV*.
- IEEE Standard 386-2006, *IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600 V*.
- London Hydro Engineering Instruction EI-7 (latest revision), *Customer Charges for Electric Servicing*.
- London Hydro Engineering Instruction EI-22 (latest revision), *Guidelines for Supplying Interval-Style Revenue Metering Systems*.

1.6 Installation Responsibilities

1.6.1 London Hydro

For customer-owned electric power substations, London Hydro's responsibilities are generally limited to:

- framing a primary cable riser pole or installing switchgear at the designated point of primary supply;

- connecting the customer's terminated underground primary cables to the riser or switchgear, or attaching the customer's aerial conductors to suspension / dead-end insulators at the tap pole; and
- supply of instrument transformers for the revenue metering system, outfitting the back panel of the remote metering compartment, and installing the interconnecting control wiring.

1.6.2 Owner

For customer-owned electric power substations, the Owner's responsibilities include:

- engineering design, procurement, installation and testing of the substation facilities; and
- engineering design, procurement, installation and testing of the aerial primary circuit, or alternatively the underground primary power cable and duct system, that interconnects the substation with London Hydro's primary distribution circuitry.

Note: Some insurance listing agencies (e.g. Factory Mutual) may have specific supplementary requirements that pertain to customer-owned electric power substations. The onus is on the Owner to familiarize himself with such requirements.

The Owner's responsibilities also includes:

- preparation of clearly defined procedures for isolating and grounding of equipment and circuits as needed for Owner and / or contractor maintenance functions; and
- staff training for the Owner's operations and maintenance personnel.

1.7 Project Scheduling

London Hydro strives to provide electric service with minimum delay or inconvenience. Owners will obtain prompt and satisfactory electric service provided they consider the following items when preparing their plans:

- The long lead times for the purchase and delivery of medium-voltage switchgear (where required) and instrument transformers, often on the order of 16 to 20 weeks, makes it essential that London Hydro's Engineering Department receive comparable advance notification of proposals to take electric supply. So that appropriately rated instrument current transformers may be selected for the project, it is essential that preliminary electric demand calculations accompany the advance notification.

  If primary voltage distribution circuit extensions are required, special equipment is required, or equipment delivery problems occur, then significantly longer lead times may be required. The Owner will be notified of any extended lead times.

- The Engineering Department will not release designs and work instructions to the Operations Department for construction until:
  - all technical submissions identified within Section 2 below have been received, reviewed, and approved where appropriate; and
  - payment of the electric servicing charges applicable to the project have been received.

  On average, two weeks from receipt of the above items should be allowed to prepare the designs and work instructions.

- Assuming all required materials are in stock, the job will be scheduled by the Operations Department on receipt of the engineering designs and work instructions. The projected start date averages two weeks after receipt, but this is dependent on the number and scope of other projects already included in the work schedule.

  Request for information relating to the job start date, progress, completion, etc. may be obtained directly from London Hydro's Project Scheduler & Materials Supervisor (☎ 661-5800 Ext. 5554).

1.8 Continuing Ownership Responsibilities

The Owner is responsible for carrying out normal life-of-plant maintenance and operation functions (refer to Rule 2-300, *General Requirements for Maintenance and Operation*, of the Ontario Electrical Safety Code) within the boundaries of the customer-owned substation. Although the Owner is responsible for contributing towards the costs of switching and protective equipment at the point of primary supply (e.g. fuse primary cable riser, fused aerial junction, etc.), London Hydro maintains exclusive operating control of these devices.

Owners of customer-owned substations are reminded that if in future the City of London should:

- undertake a road widening project; or
- pass an ordinance calling for the replacement of overhead electric facilities with underground electric facilities along certain public streets and roads,

the Owner shall bear a portion of the costs (in accordance with the prevailing cost sharing formula for joint-use facilities) of relocating or adjusting the facilities forming the point of primary supply.

2 SUBMISSION REQUIREMENTS

Electrical Inspection Bulletin 36-1-23, *Plan Submissions for High Potential Installations*, indicates the minimum content requirement for plans submitted to the provincial Electrical Safety Authority. One additional copy of the plans and specifications shall be submitted to London Hydro.

Prior to energizing the substation, London Hydro requires the following document submissions:

- One (1) set of as-built nameplate and outline drawings for the substation transformer and any medium-voltage switchgear;
- One (1) co-ordination study which demonstrates co-ordinated protection between London Hydro's over-current protection installed at the point of primary supply (where applicable), the substation's high-voltage over-current protection, and the substation's low-voltage over-current protection.
- One (1) set of certified test results for the substation transformer, showing as a minimum the tested no-load losses, the load losses (corrected to 85°C), and the impedance voltage.

3 INTERCONNECTION ARRANGEMENTS

3.1 Overview

In general, the point of primary supply (i.e. the delineation point between London Hydro's medium-voltage distribution system and the customer-owned medium-voltage facilities) will be at a designated riser pole, junction pole, or padmounted switchgear installed at standard location within the public road allowance.

All aerial or underground medium-voltage circuits between the point of primary supply and the customer-owned substation shall be designed in accordance with:

- CAN/CSA Standard C22.3 No. 1, *Overhead Systems*; or
- CSA Standard C22.3 No. 7, *Underground Systems*.

The following subsections illustrate the most common interconnection arrangements, and describe the usual division of installation responsibilities.

3.2 Aerial Supply Via a Primary Service Tap

For projects where the customer-owned substation is to be connected via private aerial conductors to London Hydro's aerial distribution system, London Hydro will frame the designated primary service tap pole with a steel cross-arm, suspension / dead-end insulators, straight dead-end conductor clamps, and (either inline or cross-arm mounted) drop-out style power fuses. See Figure 3-1 below for a typical primary service tap pole framing.

Note: The straight dead-end clamps stocked by London Hydro are of aluminum alloy construction and can accommodate conductor sizes ranging from #2 AWG ASC to 556.5 kcmil ASC. Owners planning to install *copper* conductors shall be responsible for providing to the site suitably sized straight dead-end clamps constructed of *malleable iron*.

Figure 3-1, Typical Fused Tap Framing

Figure 3-2, Typical Fused Riser Framing

The Owner shall leave a coil of conductor of sufficient length for London Hydro to make attachment to the primary service tap pole.

3.3 Underground Supply From a Primary Cable Riser

For projects where the customer-owned substation is to be connected via underground power cable to London Hydro's aerial distribution system, London Hydro will frame the designated riser pole with a

cluster bracket, power fuse mounts C/W power fuses, distribution class surge arresters, and a pole grounding system. The Owner is responsible for the supply and installation of primary power cable, cable terminations (including pin-style compression terminal connectors with a tin-plated copper rod design) and attachment devices for attaching the terminator to the termination cluster mount. Refer to Figure 3-2 above for an example of a typical fused riser pole framing.

The acceptable interface arrangements between the Owner's underground duct structure and the designated primary cable riser pole are illustrated in London Hydro drawing E.CS-415 Sht.2 *Primary & Secondary Cable Riser Details*. Specifically note that the concrete encasement of the duct bank does not extend to the riser pole.

The Owner is further responsible for the supply of U-cable guard and straps to the site. The U-cable guard and straps shall comply with CSA Item Standard C83.53, *U-Cable Guard (Plain),* Item Standard C83.54, *U-Cable Guard (Flared),* and Item Standard C83.55, *U-Cable Guard Strap*, all for aluminum alloy product.

The cable measuring practice used by London Hydro is illustrated in London Hydro drawing E.CS-150, *Cable Measurement* (a copy has been included in Appendix A for convenience of reference). When a request for a measurement is received, the Line Department will give the measurement referenced from a painted staple installed at the base of the pole to the bottom bolt of the cable termination bracket.

London Hydro will attach the private power cables to the pole and the power fuse mount once the Owner has carried out an *acceptance test* in accordance with IEEE Standard 400.2 *IEEE Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF) (less than 1 Hz).*

Note: As a reference convenience, Clause 5.1.1 *VLF AC Withstand Voltage Test Parameters* and Table 3, VLF *Withstand Test Voltages for Sinusoidal and Cosine-Rectangular Waveforms,* within this standard indicate the appropriate acceptance test voltage for 28 kV cable system rating as being 36 kV $_{rms}$ (conductor to ground) for a 60 minute duration at 0.1 Hz.

3.4 Underground Supply from a Padmounted Switchgear

For projects where the customer-owned substation is to be connected via underground power cable to London Hydro's underground distribution system, London Hydro will install a three-phase, deadfront, padmounted, sectionalizing switchgear generally as illustrated in Figure 3-3 below. The Owner is responsible for the supply and installation of the underground duct and manhole system (from the switchgear to the substation), primary power cable, and cable terminations (load break elbow connectors).

Figure 3-3, Typical Padmounted Deadfront Sectionalizing Switchgear

For most projects, London Hydro will require an easement for the padmounted switchgear. The easement dimensions will depend upon the switchgear orientation as illustrated in Figure 3-4 below.

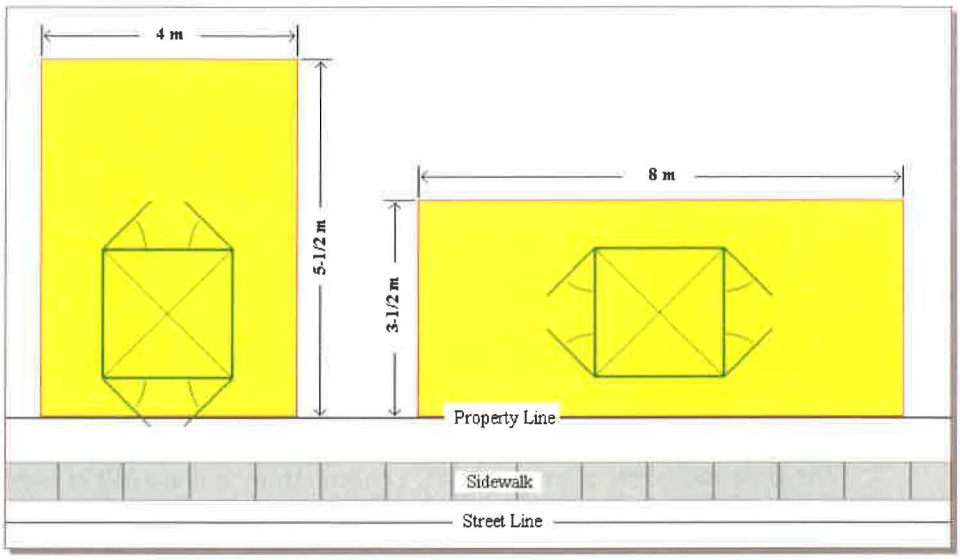


Figure 3-4, Minimum Easement Dimensions for Padmounted Switching Enclosure

Co-ordination of the installation will depend upon the status of the switchgear. If the switchgear happens to be de-energized, London Hydro will grant the Owner access to the interrupter switch compartment that forms the point of primary supply. If the switchgear is energized, then London Hydro's forces will be responsible for directing the final lengths of ducts into the switchgear foundation, direct the installation of power cables, stand by for the termination and acceptance testing of the power cables, and finally attach the power cables to the switchgear.

Figure 3-5, View of Switchgear Interrupter Switch Compartments

London Hydro will attach the private power cables to the pole and the power fuse mount once the Owner has carried out an *acceptance test* in accordance with IEEE Standard 400.2 *IEEE Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF) (less than 1 Hz).*

Note: As a reference convenience, Clause 5.1.1 *VLF AC Withstand Voltage Test Parameters* and Table 3, VLF *Withstand Test Voltages for Sinusoidal and Cosine-Rectangular Waveforms,* within this standard indicate the appropriate acceptance test voltage for 28 kV cable system rating as being 36 kV $_{rms}$ (conductor to ground) for a 60 minute duration at 0.1 Hz.

3.5 Underground Supply from an Indoor Switching Vault

For projects where the customer-owned substation is to be connected via power cable to an adjacent indoor switching vault, London Hydro will install a wall-mounted metal-enclosed fuse generally as illustrated in

Figure 3-6 below. The Owner is responsible for the supply and installation of the duct bank (from the fuse to the substation), primary power cable, and elbow-type separable connectors.

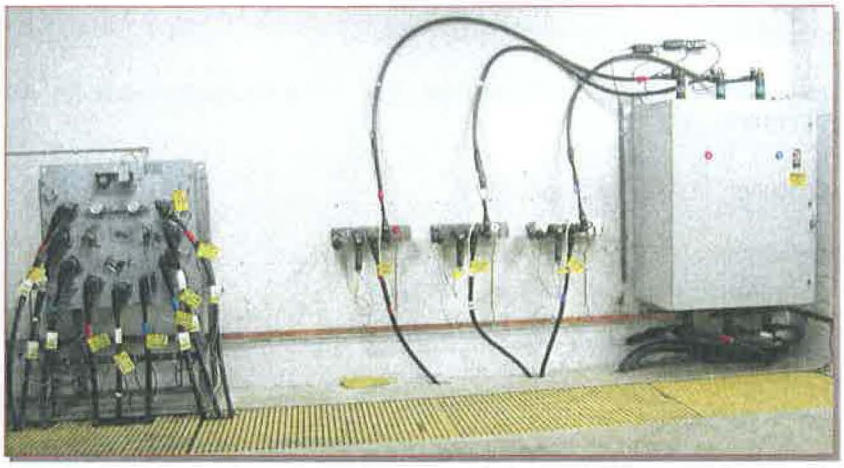


Figure 3-6, Indoor Switching Vault

London Hydro will attach the private power cables to the pole and the power fuse mount once the Owner has carried out an *acceptance test* in accordance with IEEE Standard 400.2 *IEEE Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF) (less than 1 Hz).*

Note: As a reference convenience, Clause 5.1.1 *VLF AC Withstand Voltage Test Parameters* and Table 3, VLF *Withstand Test Voltages for Sinusoidal and Cosine-Rectangular Waveforms,* within this standard indicate the appropriate acceptance test voltage for 28 kV cable system rating as being 36 kV_{rms} (conductor to ground) for a 60 minute duration at 0.1 Hz.

4 SUBSTATION EQUIPMENT RATINGS

4.1 Basic Impulse Insulation Level (BIL)

All customer-owned equipment shall be rated 150 kV BIL or greater for operation on the 16/27.6Y kV distribution system.

4.2 Transformer Winding Connections

4.2.1 Delta-Connected Primary Winding

Except in instances where the high-voltage over-current protection is via a three-pole circuit breaker, transformation with a delta-connected primary winding is not permitted for operation on the 16/27.6Y kV distribution system.

Note: For reasons set forth in ANSI/IEEE Standard C57.105, *IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems*, it is recommended that transformers with a three-legged core design be avoided.

Certain applications that are outside the *usual service conditions* for distribution or power transformers (e.g. loads with high harmonic content, arc furnace loads, etc.) will require the customer to procure a custom designed transformer. The transformer's internal winding connection for these applications shall be subject to investigation by London Hydro's Planning & Standards Engineer for compatibility with the distribution system.

4.2.2 Dual-Winding Transformers

Where the Customer's transformer is proposed to be located in an area where the 16/27.6Y kV distribution system is currently not available, the transformer shall be equipped with dual voltage windings suitable for connection to the 16/27.6Y kV distribution system.

4.3 Available Short-Circuit Levels

The fault levels given following are for demonstrating compliance with Rule 14-012, *Ratings of Protective and Control Devices*, of the Ontario Electrical Safety Code:

- 17,000 amperes r.m.s. symmetrical, for a bolted three-phase fault; and
- 12,000 amperes r.m.s. symmetrical, for a line-to-ground fault.

Note that these are maximum values at the point of supply. For a 16/27.6Y kV system, an asymmetry factor of 1.6 is commonly used.

4.4 Cable Terminations

For projects where underground power cable is installed, the cable terminators shall meet the requirements of IEEE Standard 48, *IEEE Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5 kV Through 765 kV*, for an outdoor, Class 1 termination with a *minimum* 28 kV insulation class rating.

For installation on a primary cable riser pole, the cable terminator design shall be for a *Level III* environment with parameters as follows:

- minimum leakage distance: ..... 720 mm
- minimum arcing distance: ..... 320 mm

For installation within a padmounted sectionalizing switchgear and in cases (generally within the core area of the city) where the private primary power cables are to be connected to London Hydro's wall-mounted

metal-enclosed fuses within an indoor switching vault, the power cables shall be terminated with elbow-style load-break separable connectors. Such connectors shall meet the requirements of ANSI/IEEE Standard 386, *IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600 V*, for devices with a 200 A, 16.2/28 kV class rating. For these projects, London Hydro will provide specific guidance on the selection of an appropriate elbow-style terminator.

5 OTHER DESIGN REQUIREMENTS

5.1 Co-ordination with London Hydro's Service Tap Fusing

For the primary service tap, London Hydro will install the service tap fusing/relaying identified following:

Table 5-1, Service Tap Fusing

Point of Primary Supply	Fuse Mounting	Largest Fuse Available [1) 2) 3)]
Aerial Tap	S&C Electric's type SMD-20 Drop-Out In-Line Fuse Mount	S&C Electric's *type SMU-20* power fuse rated 23 kV and 200K.
Primary Cable Riser	S&C Electric's SMD-20 Drop-Out Fuse Mount	S&C Electric's *type SMU-20* power fuse rated 23 kV and 200K.
Padmounted Switchgear	N/A	Molded Vacuum Interrupter (MVI) programmed as K Type fuse rated 200K
Indoor Switching Vault	S&C Electric's SML-20 Fuse Mounting	Hi-Tech current limiting fuse rated 17.2 kV and 50A.

Notes:

1) In cases whereby the current rating of the fuse is restricted (to obtain co-ordinated operation with upstream overcurrent devices), the Owner will be so notified following submission of plans (refer to Section 2).

2) Faster operating times will be achieved if the current rating of the fuse is as small as can be selected and yet still coordinate with the downstream substation protection. The current and speed ratings of type *SMU-20* power fuses available are 25K, 40K, 50K, 80K, 100K, 140K and 200K.

3) Hi-Tech current limiting fuses available at 20A, 30A, 40A and 50A continuous current rating.

The substation protection should co-ordinate with the service tap fusing in addition to meeting the requirements of Rule 26-252, *Overcurrent Protection for Power and Distribution Transformers Rated Over 750 V*, of the Ontario Electrical Safety Code.

5.2 Padlocking (for Unit Substations)

For projects where a unitized substation is being constructed, London Hydro has supplementary requirements to the interlock requirements set forth in CSA Standard C22.2 No. 31, *Switchgear Assemblies*, and the padlocking requirements of the provincial Electrical Safety Authority. These requirements are listed below:

- The access doors to the primary cable termination compartment and the primary switch compartment shall be designed to accommodate London Hydro's standard padlock.
- The installation of London Hydro's padlocks on the access doors (to the primary cable termination compartment and the primary switch compartment) shall not in any way impede the customer's ability to operate the primary switch for the purposes of isolation, to replace the primary fuses, to adjust the setting of the off-circuit tap changer, or to perform preventive or corrective maintenance activities within the secondary cable termination compartment.
- In cases where the customer prefers joint control of the high-voltage switch, the external operating handle shall be equipped with a dual-locking yoke, constructed in accordance with the sketch below.

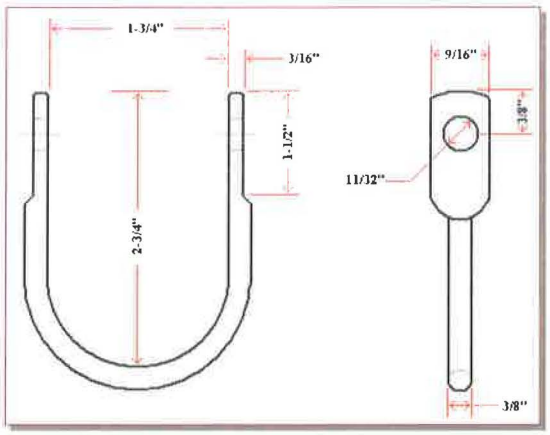


Figure 5-1, Typical Dual-Locking Yoke

Manufacturers of suitable yoke design include Almat Metal Limited's #K52-10 (with a 2¼ inch length) or #K52-20 (with a 3¼ inch length) products.

In general, the submitted nameplate and outline drawings for unit substations do not include sufficient detail for London Hydro to verify that the above requirements have been fulfilled. As such, London Hydro's approval of substation drawings does not imply acceptance of non-conforming padlocking arrangements.

5.3 Potential Indicator and Viewing Window

For substation designs with both metal-enclosed or metal-clad medium-voltage switchgear and primary metering, there is no requirement to provide a Kirk key interlock system between the access door for the primary metering unit and the main disconnect device. Instead, the metering compartment shall be outfitted as follows:

- The access doors shall accommodate installation of London Hydro's standard padlock;
- The compartment shall be outfitted with a Groupe Sicame *type IPL75-B13* potential indicator mounted on the centre phase bus bar. One such unit (with different bus bar clamping hardware) is depicted below:

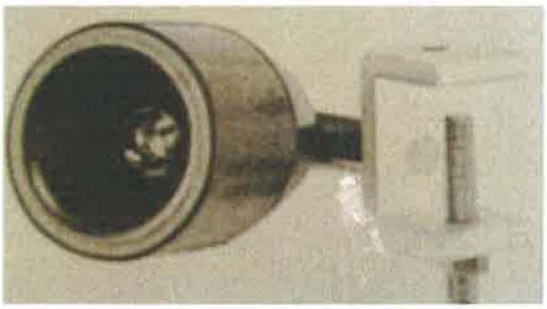


Figure 5-2, Potential Indicator

Note: The local distributor for these indicators is:

Thies Electrical Distributing Co.
43 Hilltop Drive
Cambridge, Ontario
N1R 1T2

☎ 519-621-2524

- The access door for the compartment shall be outfitted with a viewing window dimensioned and positioned for ready viewing of the potential indicator. One can assume that the user is standing 60 cm from the access door, and that the standing eye height of the typical user may range from 151.1 cm to 173.3 cm, (Source: Table XIII, *Standing Body Dimensions*, of MIL Standard 1472C, *Human Engineering Design Criteria for Military Systems, Equipment and Facilities*).

5.4 Underground Plant Locates

Under Section 228 (1)(a) of the provincial *Occupational Health and Safety Act*, it is the Owner's responsibility to obtain all utility clearances (including hydro) before any excavation takes place. Arrangements may be made through the central *Locates — Call Before You Dig* service. The telephone number may be found under the telephone book listings for any of the major utilities (e.g. London Hydro, Bell Canada, Union Gas, etc.).

6 REVENUE METERING REQUIREMENTS

6.1 General

The following guidelines determine whether revenue metering will be performed on the primary or secondary side of the substation transformer:

- In cases where the secondary voltage is non-standard (i.e. other than 120/208Y or 347/600Y volts), primary metering shall be installed.
- Except as noted in the Totalizing Circuitry section, London Hydro will not provide totalized revenue metering. In cases where the electric power substation is comprised of two or more substation transformers, primary metering shall be installed.
- The largest secondary current transformer provided by London Hydro is rated 3,000-5 amperes. For low-voltage service entrance equipment with a rating greater than 3,000 amperes, primary metering shall be installed. London Hydro will provide the metering unit or high-voltage instrument transformers, but the Owner is responsible for providing the high-voltage metering compartment or mounting provisions on a pole.
- London Hydro will only provide secondary metering to projects where the substation transformer is designed to meet the requirements of CAN/CSA-C802.1, *Minimum Efficiency Values for Liquid-Filled Distribution Transformers*, or CAN/CSA-C802.3, *Maximum Losses for Power Transformers*, and compliance is conclusively demonstrated via the submission of test results from the transformer manufacturer. Such test results shall bear the seal of a Registered Professional Engineer.

Where primary metering is installed, the revenue metering system will be configured to deduct the transformer losses from the measured demand and energy readings. The maximum no-load and load loss values given in CAN/CSA Standard C802.1 or CAN/CSA Standard C802.3 (as applicable) are used to determine the deduction.

6.2 Primary Metering for Outdoor Substations

For outdoor primary metering installations, London Hydro will supply and install pole-mounted medium-voltage metering unit that consists of:

- three (3) - Sadtem *type OCF24-2 - 34.5 kV voltage class* outdoor current transformers (see Figure 6-2 below); and
- three (3) – Sadtem *type YE7 - 34.5 kV voltage class* (unfused) outdoor potential transformers (see Figure 6-3 below)
- aluminum cluster mount bracket

One such unit is illustrated below.

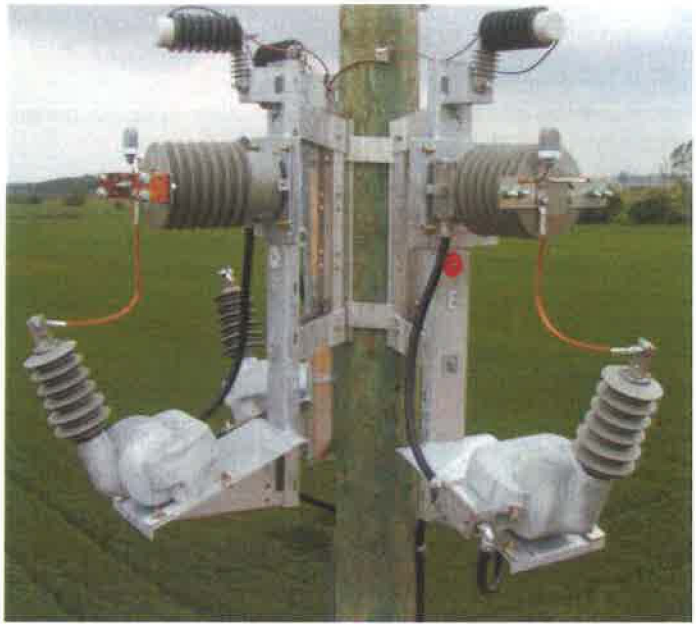


Figure 6-1, Typical Primary Metering Unit

For primary metering installations in outdoor switchgear, London Hydro will supply the following instrument transformers to the medium-voltage switchgear manufacturer for factory-installation:

- three (3) - Sadtem *type OCF24-2 - 34.5 kV voltage class* outdoor current transformers (see Figure 6-2 below); and
- three (3) – Sadtem *type YE7 - 34.5 kV voltage class* (unfused) outdoor potential transformers (see Figure 6-3 below),

for arrangement in a 3-element revenue metering scheme.

Figure 6-2, Typical Outdoor CT

Figure 6-3, Typical Outdoor VT

London Hydro will provide outline drawings to medium-voltage switchgear manufacturers who may be unfamiliar with these types of instrument transformers.

6.3 Primary Metering for Indoor Substations

For primary metering installations in indoor substation switchgear, London Hydro will supply the following instrument transformers to the medium-voltage switchgear manufacturer for factory-installation:

- three (3) - Sadtem *type SW54 - 34.5 kV voltage class* indoor current transformers (see Figure 6-4 below); and
- three (3) – Sadtem *type RY6A - 34.5 kV voltage class* (unfused) indoor potential transformers (see Figure 6-5 below),

for arrangement in a 3-element revenue metering scheme. These units are illustrated below.

Figure 6-4, Typical Indoor CT

Figure 6-5, Typical Indoor VT

London Hydro will provide outline drawings to medium-voltage switchgear manufacturers who may be unfamiliar with this type of instrument transformer.

6.4 Secondary Metering

For secondary metering installations, London Hydro will supply the following instrument transformers to the low-voltage service-entrance switchgear manufacturer for factory-installation:

- three (3) – ABB *type CMF*, Schlumberger *type R6MC,* GE *type JAK-0* (or similar) dual-ratio window-style current transformers; and
- three (3) – ABB *type PT.7*, Schlumberger *type ME-7,* GE *type PTM-0,* Hammond *type VM6* (or similar) indoor potential transformers, rated 360:120 V.

for arrangement in a 3-element revenue metering scheme. These units are illustrated below.

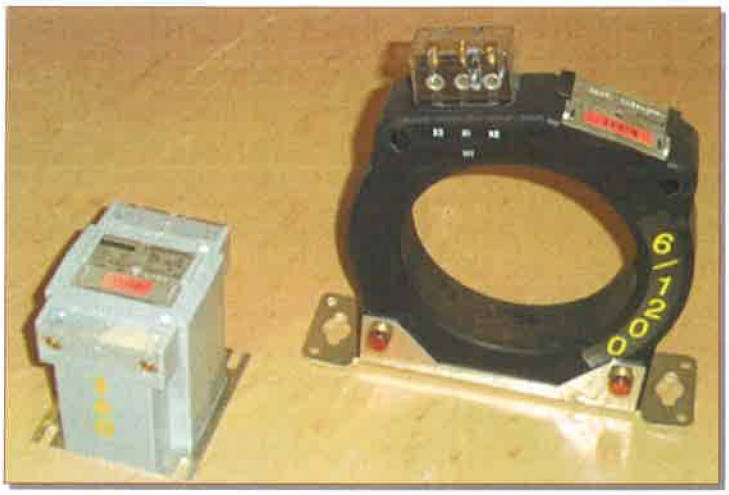


Figure 6-6, Low-Voltage Instrument Transformers

London Hydro will provide outline drawings to low-voltage switchgear manufacturers who may be unfamiliar with this type of instrument transformer.

6.5 Remote Metering Cabinet

6.5.1 General Arrangement

The customer is responsible for supplying and installing:

- a remote metering cabinet, with dimensions as specified in subsection 6.5.2 or 6.5.3 below, and located no greater than fifty feet (50') from the metering unit / instrument transformers.
- a 1-¼ inch diameter conduit interconnecting the revenue metering compartment or metering unit with the remote metering cabinet.
- a ½ inch diameter conduit interconnecting the remote metering cabinet with telecommunications circuit.

London Hydro will supply and install the interconnecting control wiring.

6.5.2 Outdoor Metering Cabinet Specification

For outdoor installations, the remote metering cabinet shall conform to CAN/CSA Standard C22.2 No. 94, *Special Purpose Enclosures*, for a metallic *Type 4X* enclosure (i.e. outdoor, water-tight, corrosion-resistant). The cabinet shall have nominal external dimensions no less than 48" H x 36" W x 12" D.

The enclosure shall have the design features / accessories listed following:

- finish colour: grey (ASA #61) or natural if aluminum or stainless steel construction;
- single-door design, with piano-hinge and a 135° door stop;
- removable inner panel;
- a three-point latching assembly with a handle designed to accept a standard Hydro padlock;
- drip shield, to protect door and hardware from falling dust and water; and
- four (4) external mounting tabs for affixing the enclosure to a wall, substation fence, or wood pole (with adapters).

All conduit entries shall enter into the bottom of the enclosure.

Note: The products indicated below have been used successfully on other projects:

- Hammond Manufacturing Co. Ltd..... #1418-N4-SSS12 enclosure c/w doorstop, drip shield, and latch assembly.
- Ralston Metal Products Ltd. ..... #V-GP-483612 (custom) enclosure c/w #V-4836 inner panel, and vault-type padlocking handle & 3-point hardware.

This information is offered only to assist Owners, and not to preclude the installation of competing enclosures with equal or better designs.

As an alternative, in cases where the substation includes metal-enclosed or metal-clad switchgear, the provisions for revenue meters, test switches, etc. can be designed as a sub-compartment (with separate access provisions) to the primary metering compartment

6.5.3 Indoor Metering Cabinet Specification

For indoor installations, the remote metering cabinet shall conform to CAN/CSA Standard C22.2 No. 94, *Special Purpose Enclosures*, for a metallic *Type 12* enclosure (i.e. indoor, dust-proof, drip-proof). The cabinet shall have nominal external dimensions no less than 36" H x 36" W x 12" D.

The enclosure shall have the design features / accessories listed following:

- finish colour:grey (ASA #61) or natural if aluminum or stainless steel construction;
- double-door design, with piano-hinge and 135° door stops;
- removable inner panel; and
- a three-point latching assembly with a handle designed to accept a standard Hydro padlock.

All conduit entries shall enter into the bottom of the enclosure.

As an alternative, in cases where the substation includes switchgear, the provisions for revenue meters, test switches, etc. can be designed as a sub-compartment (with separate access provisions) to the primary metering compartment.

6.6 Meter Communication Circuit

Pursuant to the Ontario Energy Board's *Distribution System Code*, the Owner shall provide a communication option to the remote metering cabinet in accordance with the requirements set forth in London Hydro's Engineering Instruction EI-22, *Guidelines for Supplying Interval-Style Revenue Metering Systems*.

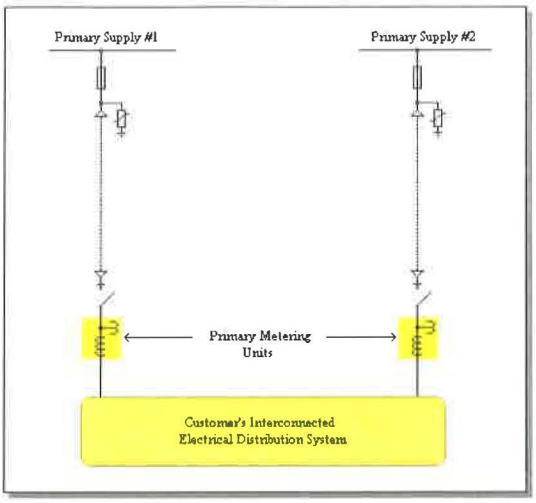
6.7 Totalizing Circuitry

London Hydro will provide totalizing circuitry in the following instances:

[1] Limitations in London Hydro's electric distribution system capacity or revenue metering equipment do not allow a customer to be supplied via a single point of supply. In this case, London Hydro will supply the necessary instrument transformers and totalizing equipment at no cost.

Example #1: A customer-owned substation to be supplied from London Hydro's 16/27.6Y kV primary distribution system has a predicted electric demand in excess of 10 MW. This demand exceeds the capability of the 200/100-5 A current rating of the largest current transformer used by London Hydro.

The customer will be required to take two or more points of primary supply with a service and revenue metering arrangement as illustrated following:

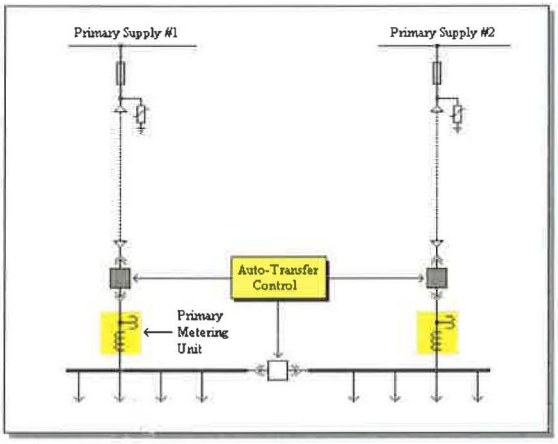


London Hydro will determine whether totalizing is performed locally at the customer's premises or remotely at London Hydro's premises based on cost and mutual convenience considerations.

Example #2: A customer-owned substation to be supplied from London Hydro's 16/27.6Y kV primary distribution system has a predicted electric demand in excess of 20 MW. This demand exceeds the preferred normal load rating of the distribution circuit.

The customer will again be required to take two or more points of primary supply with a service and revenue metering arrangement as illustrated in Example #1.

[2] The customer has installed an internal auto-transfer system and is contracting for standby power. In this case, the customer is responsible for the second (and subsequent) set of instrument transformer as well as the cost of totalizing equipment.



As a final note, some customers have sites distributed throughout the service area. One example is the City of London's pollution control plants. While any given site may be eligible for totalized revenue metering if one or more of the above stated criteria are fulfilled, a totalized billing would not be provided for the collection of data.

Note: Totalized billing should not be confused with summary billing, a service that is presently offered by London Hydro.

6.8 Allowance for Customer-Owned Step-Down Facilities for Multi-Metered Projects

Where a bulk revenue meter is provided in a multi-tenant residential building (e.g. apartment building) or multi-tenant commercial building, the allowance for customer-owned transformation (refer to Section 1.4 on page 1) will be calculated based on the peak monthly demand recorded by the bulk revenue meter. Where individual tenant metering is provided, the allowance will be calculated based on the maximum

monthly peak demand of the *house* meter unless provisions are made in the customer's service entrance switchgear for additional metering for allowance calculation purposes. Contact London Hydro for additional details.

7 INSPECTION RESPONSIBILITIES

The provincial Electrical Safety Authority is responsible for inspecting the customer-owned substation. Upon receipt of connection authorization (refer to Rule 2-012, *Connection Authorization*, of the Ontario Electrical Safety Code) from the Inspector, London Hydro will install London Hydro's padlocks (as required), install fuses at the point of primary supply, and then close the main switch to energize the substation.

8 PRICE SCHEDULES

London Hydro's contributed capital requirements for the utility portion of the work at the point of interconnection (e.g. framing a primary cable riser pole, installing a padmounted switchgear, etc.) vary from year to year and are outlined in the latest edition of Engineering Instruction EI-7, *Customer Charges for Electric Servicing*.

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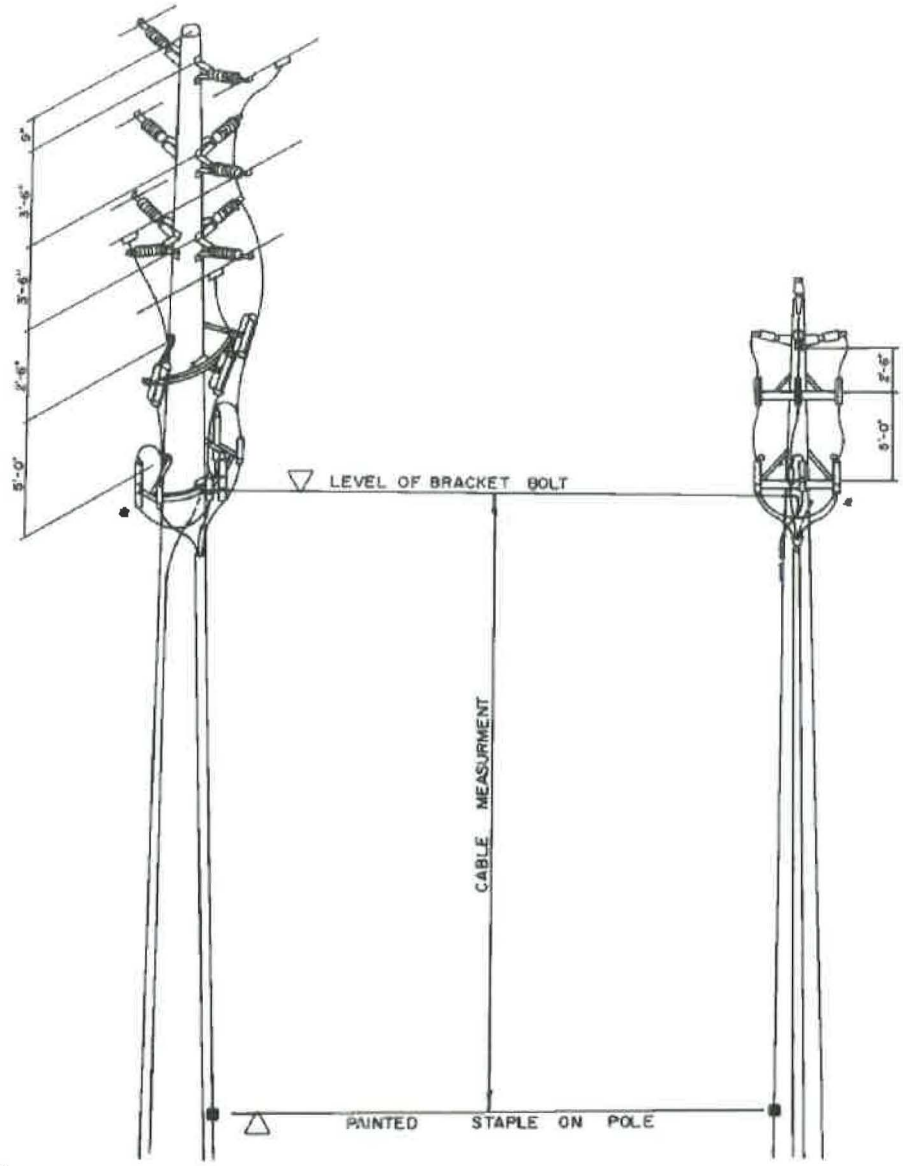
APPENDIX A – DRAWINGS

E-CS-150



* CONTRACTOR TO MAKE ALLOWANCE FOR OUTER CABLES, RADIUS-AND-TERMINATOR LENGTH AND SUPPORT.

REVIEWED BY:
LONDON HYDRO
ENGINEERING
DATE Feb 11/13

REV.	DATE	ORDER	DESCRIPTION	BY	CHK'D	APP'D

THE PUBLIC UTILITIES COMMISSION
CITY OF LONDON

CABLE MEASURMENT
PUC POLE REFERENCE

DESIGN	DRAWN	DATE	ORDER	SCALE
	RJT	NOV. 1989		NTS

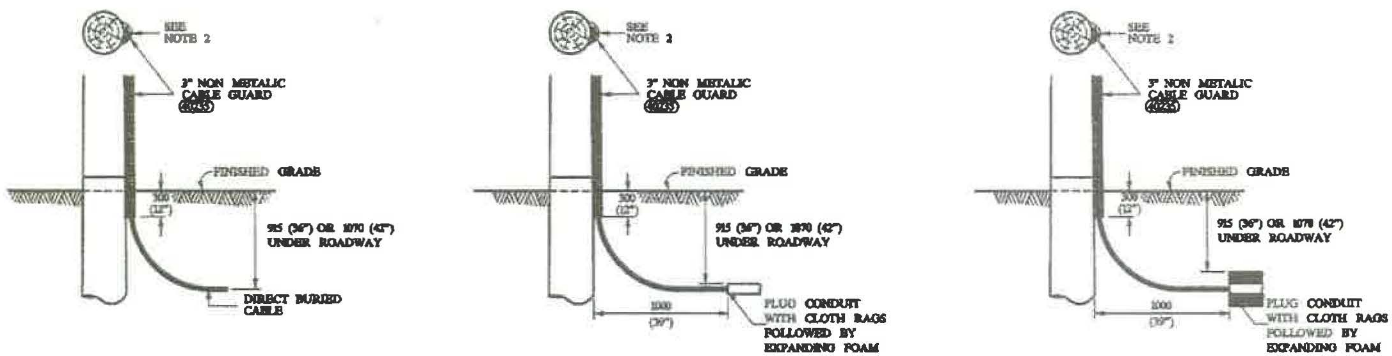
CHECKED | APPROVED | DWG. E-CS-150 EI-4-R1

APPENDIX A – DRAWINGS (Continued)

LONDON HYDRO

M LINEAR DIMENSIONS SHOWN IN MILLIMETRES

ECS-415
SHT. 2
APR 2005



CABLE RISER DIRECT BURIED (FIG. #1)

CABLE RISER IN DIRECT BURIED CONDUIT (FIG. #2)

CABLE RISER IN CONCRETE ENCASED CONDUIT (FIG. #3)

NUMBER OF PRIMARY CABLES PER CABLE GUARD	
SIZE AND VOLTAGE RATING OF CABLE	CABLES IN 76mm (3") CABLE GUARD
1000 kcmil 28 kV XLPE CN PVCJ CABLE	1
#1/0 Al 28 kV XLPE CN PVCJ CABLE	3
#3/0 Cu 28 kV XLPE CN PVCJ CABLE	3

NOTES:

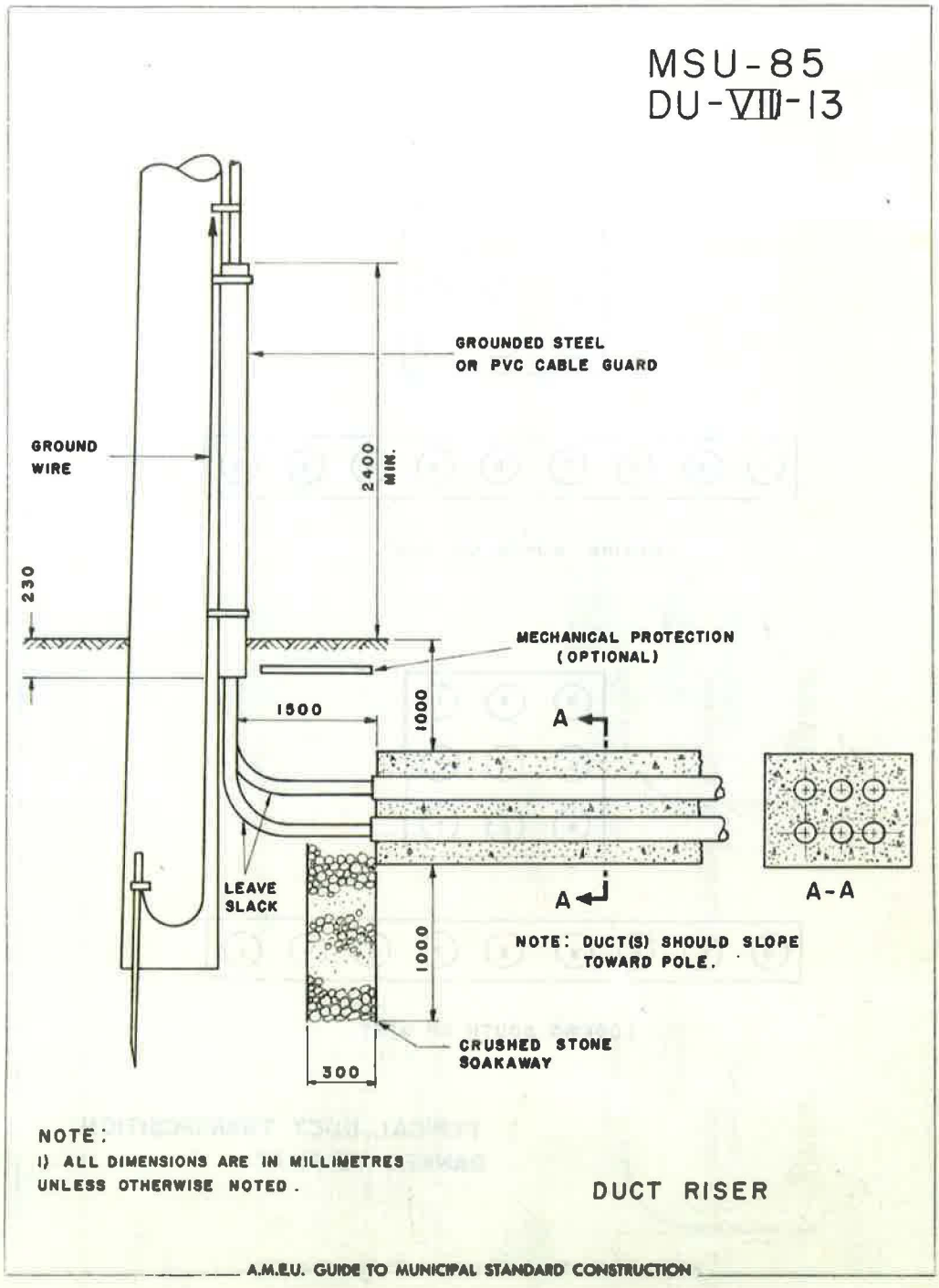
1. ALL DUCTS MUST STOP 1000mm (39") FROM THE POLE.
2. RISER DUCTS, CABLES & GUARDS) ARE TO BE LOCATED ON THE OPPOSITE SIDE OF THE POLE TO THE TRAFFIC FLOW IF ON ROADWAYS.
3. SPARE DUCTS ARE TO BE CAPPED.
4. ALL DUCTS CONTAINING CABLES ARE TO BE PLUGGED WITH CLOTH RAGS FOLLOWED BE EXPANDING FOAM.
5. ALL CABLE GUARDS ARE TO BE EMBEDDED A MINIMUM OF 300mm (12") BELOW FINISHED GRADE.

PRIMARY & SECONDARY CABLE RISER DETAILS "AFTER 2005"

CHECKED BY: Joseph Pezzin
APPROVED BY: W. Kuchar..., P.Eng
DATE: Feb 2/05

London Hydro

APPENDIX A – DRAWINGS (Continued)



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APPENDIX E

GUIDELINES FOR SUPPLYING INTERVAL-STYLE REVENUE METERING SYSTEMS

Engineering Instruction EI-22

Guidelines for Supplying Interval-Style Revenue Metering Systems

Instruction Number: **EI-22**	Revision: **R8**
Original Release Date: **April, 2003**	Revision Date: **July, 2017**
Approved By:	
Luke Seewald, P.Eng. Director, Metering Services	William Milroy, P.Eng. Vice President of Engineering and Operations

Overview

The Distribution System Code and London Hydro's policy dictate that retail customers with loads above a defined threshold have interval-style revenue metering systems installed. Retail customers with loads below this threshold may also request the installation of an interval-style revenue metering system. This Engineering Instruction sets forth the procedure, division of responsibilities, and recoverable costs associated with the installation of interval-style revenue metering systems.

REVISION INDEX

Changes from the previous edition of this Engineering Instruction are listed below. Relocation of paragraphs or editorial changes is not shown.

Revision Number	Issue Date	Section	Description of Change
R0	April, 2003		Initial Release
R1	July, 2004	1.1	500 kW changed to 200 kW
		6.8	$12 changed to $27
R2	September, 2005	1.1	Added paragraph 5.1.4 from the Distribution System Code
		4.4	Added new Section 4.4, Alternate Means of Communication Requirements
		4.5	Revised old Section 4.5 (now 4.6), Telephone Line Sharing
		4.9	Prices updated to reflect reduced equipment costs
		6.1	Prices in Table 8-1 updated to reflect reduced interval meter costs
		6.2	Prices in Table 8-2 adjusted to reflect current burden rate for labour
		6.6	Prices in Table 8-3 adjusted to reflect revised burden rate for labour
		6.8	Revised Section 6.8, Manual Data Collection
R3	September, 2006	4.4	Price adjusted
		4.6	Price adjusted
		6.8	Price adjusted
R4	January, 2013	2.2	Contact Information, removed stale workflow.
		3.0	Clarified 120V receptacle responsibility.
		6.1, 6.2	Prices adjusted to reflect revised burden rate for labour.
		6.6	Require meter access authentication, pricing
		6.8	Clarified weekly site visits
		8.1	Clarified MVWEB access
		Appendix A	Removed

Revision Number	Issue Date	Section	Description of Change
R5	May, 2014	1.4	Included Smart meters within definitions
		2.2	Removed Meter Modification Flowchart
		4.0-5.0	Added Communications options and TCP/IP
R6	September, 2014	1.1	Updated DSC 5.1.3 update requiring MIST metering on GS>50 installations
		2.1	Added Figure for meter type determination
		4.2	Added requirement for static IP address
		9.1	Updated Interval Data Center Web Link
R7	April, 2016	All	Removed "Customer-Requested" from document title and all incidents
			Removed all references to MV-90
			General update to reflect service offerings, communication options and GS > 50kW
R8	July 2017	7.0-7.6, 8.4, 8.9	Updated to clarify interface options
		8.6, 10.1-10.4	Updated contact information

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1.0 INTRODUCTION

1.1 Background

Licensed electricity distributors, such as London Hydro, are required to comply with the Ontario Energy Board's *Distribution System Code* as a condition of their electricity distribution license.

Certain clauses within the Code apply to interval metering for retail customers and are repeated below for convenience of reference:

5.1.3 For the purposes of measuring energy delivered to the customer, a distributor shall:

a) install a MIST meter on any new installation that is forecast by the distributor to have a monthly average peak demand during a calendar year of over 50 kW; and

b) have until August 21, 2020 to install a MIST meter on any existing installation that has a monthly average peak demand during a calendar year of over 50 kW.

5.1.4 A distributor may set a threshold level for installation of MIST meters other than that required by section 5.1.3 as long as the threshold is delineated by customer class in the distributor's Conditions of Service and sets a threshold lower than that required by section 5.1.3.

5.1.5 A distributor shall provide an interval meter within a reasonable period of time to any customer who submits to it a written request for such meter installation, either directly or through an authorized party, in accordance with the Retail Settlement Code, subject to the following conditions:

- *The customer that requests the interval metering shall compensate a distributor for all incremental costs associated with that meter, including the capital cost of the interval meter, installation costs associated with the interval meter, ongoing maintenance (including allowance for meter failure), verification and re-verification of the meter, installation and ongoing provision of communication line or communication link with the customer's meter, and cost of metering made redundant by the customer requesting interval metering.*
- *The distributor shall determine whether the meter will be a MIST or MOST meter, subject to the requirements of this Code.*
- *A communication system utilized for MIST meters shall be in accordance with the distributor's requirements.*
- *A communication line shall be required in the case of inside or restricted access meters.*

London Hydro's threshold limit for the installation of interval meters is consistent with the OEB's *Distribution System Code*, i.e. MIST-type interval meters shall be installed on all services having a monthly average peak demand during the calendar year of over or equal to 50 kW.

1.2 Purpose

This Engineering Instruction sets forth the procedure, division of responsibilities, and recoverable costs associated with the installation of interval-style revenue metering systems.

1.3 Revenue Meter Ownership and Maintenance

London Hydro will own, furnish, install, calibrate, test, and maintain all revenue meters and associated equipment (e.g. instrument current and voltage transformers) used for retail billing and settlement purposes within its franchise service territory.

London Hydro will continue to read revenue meters in its service territory. Metered data used for retail billing and settlement purposes will be supplied to the customer's energy service provider (in cases where London Hydro is not the default energy services provider).

1.4 Definitions

The following definitions are not intended to embrace all legitimate meanings of the terms.

Interval meter means a revenue meter that measures and records electricity use on an hourly or sub-hourly basis throughout the billing period. "Smart meters" are not considered Interval meters.

Non-interval meter means a revenue meter that measures and records electricity usage cumulatively over the meter reading period.

MIST meters means interval meters from which data are obtained and validated within a designated settlement timeframe; MIST is an acronym for "Metering Inside the Settlement Timeframe".

MOST meters means interval meters from which data are only available outside of the designated settlement timeframe; MOST is an acronym for "Metering Outside the Settlement Timeframe".

1.5 Document Revisions and Distribution

This Engineering Instruction is distributed within London Hydro as controlled distributions document (i.e. all registered holders of Engineering Instruction manuals automatically receive updates as they are generated).

London Hydro customers and their agents will receive the current release of this Engineering Instruction in response to a formal application request (see Section 2.0 below), but no updates thereafter.

If there is an extended time period between an initial inquiry and carrying out of the work, the customer (or their agent) shall be responsible for ensuring that they have the most updated version of this Engineering Instruction before proceeding.

2.0 APPLICATION REQUEST

2.1 New Services

For new services that wouldn't otherwise automatically qualify for an interval-style revenue meter (i.e. the projected load is below the threshold identified in Section 1.1), the provision of a interval-style revenue meter will be coordinated by the Engineering Department as part of the usual service order process. As London Hydro's Electric Metering Technician would normally be going to the customer's site anyway, the installation cost for an interval meter as outlined in Section 8.2 is waived. However the customer will be responsible for other costs as outlined in Sections 8.1, 8.3, 8.5 and 8.6 herein. To meet the requirements of MIST metering for smaller GS>50kW services the following diagram illustrates the type of metering based on service size and installation type:

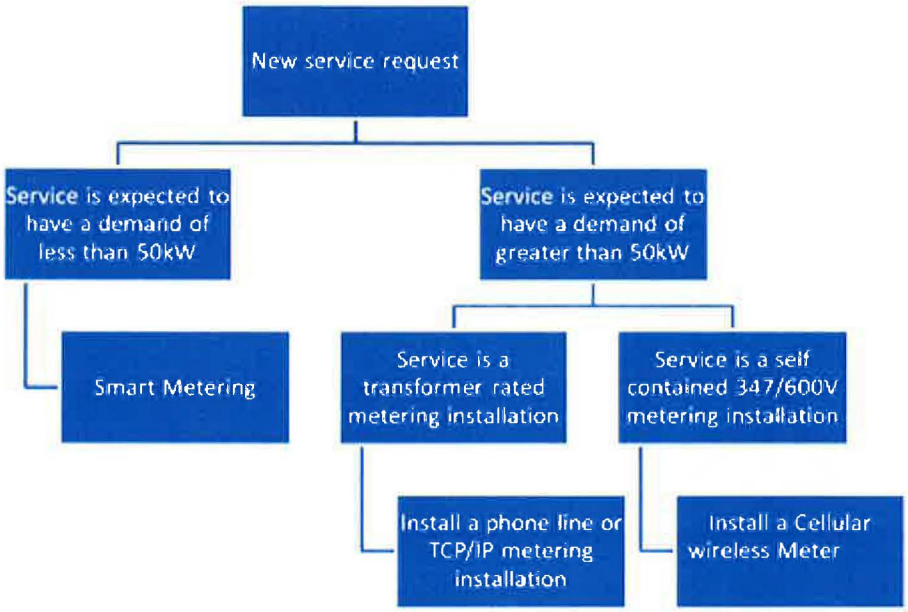

Figure 2-1, Meter Type Determination

2.2 Modifications to Existing Services

This section provides an overview of the internal work process involved in converting non-interval revenue metering systems to interval revenue metering systems at the customer's request. For most installations, the service equipment such as the meter enclosure or cabinets will be capable of accepting the interval-style revenue meter and the only upgrade required will be the installation of an interval style meter, communication method & 120 volt dedicated receptacle and breaker, complete with a breaker lock.

London Hydro's Electric Meter Department (☎ 519-661-5800 Ext. 5574) will provide the exclusive liaison function between the customer and other London Hydro departments or work groups.

2.3 Termination of Service

The customer shall also be required to reimburse London Hydro for removal costs at the time of termination of service. Removal costs for are the costs of removing the interval meter and restoring the metering facility to a non-interval recording configuration. London Hydro will invoice the customer for such removal and restoration costs at the time of removal and restoration based on actual time (including travel

time to and from the site) and material costs for the work. The customer shall be required to agree to pay such costs as a condition to returning to non-interval metered service.

3.0 RESPONSIBILITIES FOR SERVICE ENTRANCE EQUIPMENT MODIFICATIONS

For all new three-phase low-voltage services (e.g. 120/208Y and 347/600Y V) and medium-voltage services (e.g. 8/13.8Y kV and 16/27.6Y kV), London Hydro's standard arrangement for the revenue metering system is what is termed a three-element scheme. Most revenue metering systems installed prior to the advent of microprocessor-based revenue meters were arranged in what is termed a 2½-element scheme.

For all Interval meter installations the customer must supply a dedicated 120 volt receptacle to the meter cabinet housing the electrical meter, the receptacle should be clearly marked and a breaker tie installed to prevent nuisance outages to the metering cabinet.

Measurement Canada's Bulletin E-24-E (Rev 1), *Policy on Approval and Use of 2½ Element Metering*, calls for the phasing out of 2½-element schemes on an *opportunity* basis. London Hydro's approach is consistent with Measurement Canada's long-term expectations.

Conversion from *2½ Element* to *3 Element* generally requires installation of an additional instrument voltage transformer, test link panel and interconnecting control wiring. The customer will not be responsible for London Hydro's labour and equipment costs to carry out this conversion work. To comply with the prevailing worker safety legislation, such conversion projects will generally require a planned service interruption to the customer's premises.

NOTE:

There are a few remaining three-phase three-wire 600 V services remaining within London Hydro's service territory. London Hydro is unable to provide interval meters for these customers unless the customer undertakes a larger project to upgrade their service entrance equipment (and incoming supply cables if underground) to a three-phase four-wire 347/600Y V arrangement.

For low-voltage transformer-rated services, London Hydro will provide an additional instrument voltage transformer at no cost for installation in the service entrance switchgear or metering cabinet. High-voltage revenue metering installations generally already have interval-style revenue metering systems installed. The scope of conversion work to be carried out in conjunction with requests for interval-style meters on these installations will be determined on a case-by-case basis by the Electric Metering Supervisor and Director of Network Planning based on the nature, age and condition of the existing high-voltage instrument transformers or metering unit.

3.1 Role of Electrical Safety Authority (ESA)

The provincial Electrical Safety Authority is generally not involved in the conversion of a revenue metering system from non-interval to an interval type. However, if the customer's service entrance equipment (e.g. meter base, revenue metering compartment, remote metering cabinet, interconnecting conduit, etc.) is observed to be severely corroded, damaged, or otherwise in a state of disrepair, London Hydro is obliged to refer the matter to the provincial Electrical Safety Authority for re-inspection (pursuant to Rule 2-016, *Re-Inspection,* and Rule 2-018, *Defects*, of the Electrical Safety Code).

If the service entrance equipment has to be upgraded, the customer will need to obtain a qualified electrical contractor to perform this work in accordance with the provincial Electrical Safety Code and London Hydro's supplementary requirements.

3.2 Communication Options

The following are communication options available for selection and paring with each issued interval-style revenue meter, but due to site specific conditions and/or type of meter not all may apply:

a) TCP/IP wired via customer Internet Service Provider (ISP)

b) Dedicated Telephone Line

c) London Hydro provided Cellular

The customer is responsible for all costs associated with installing, operating and maintaining the communication to the electricity meter for options a) or b) above.

TCP/IP wired option will be available for new services and on an opportunity basis during scheduled meter change outs. If customer requests a communication change prior to a scheduled meter change out additional Time and Material fees shall apply.

In all cases where the customer selected communication option is not installed by the advised period, or meter installation, the assumed communication option will be a London Hydro provided Cellular solution. London Hydro will own the cellular carrier subscription but the cost of this service will be billed to the customer on a monthly recurring basis on their electrical bill, reference section 8.4. If the communication option is requested to be changed at a later date the customer is subject to Time and material Fees.

3.3 Revenue Meter Data Retrieval Frequency

Although the revenue meter can generally store several weeks of consumption data, London Hydro will retrieve the interval data from each revenue meter each day to minimize data loss in case of equipment failure.

4.0 Connection to the TCP/IP Wired via Customer ISP Network

4.1 General Responsibilities

The customer shall provide a working Ethernet connection to each interval-style revenue meter for communication. The customer is responsible for all costs associated with installing, operating, and maintaining this Ethernet service and corresponding Internet Service Provider (ISP) subscription.

London Hydro recommends DHCP IP address assignment when interfacing with a customer network, but static addressing is also available upon request. Figure 4-1 below depicts the typical meter data communication traffic.

To allow network traffic London Hydro's devices use IPSec VPN Tunnelling to ensure secure data exchange and require ports UDP 500 and 4500 open to connect.

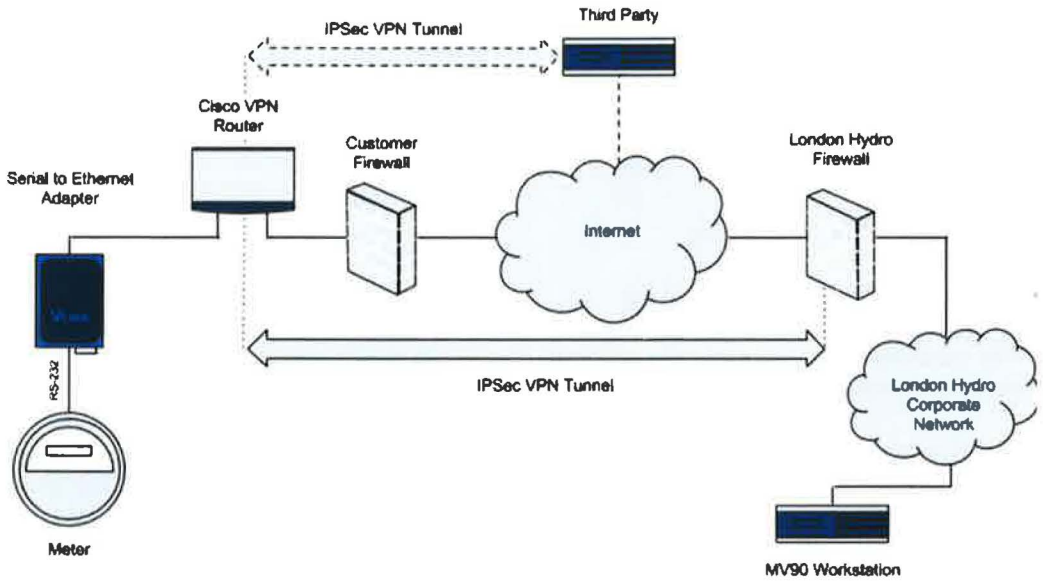

Figure 4-1, Internet Metering

4.2 Overview

To enable TCP/IP communication, the customer's meter is connected to a London Hydro specified VPN (Virtual Private Network) Router. The router is configured by London Hydro to establish an IPSec VPN tunnel to London Hydro's firewall, encrypting all meter communication. If required, London Hydro can configure third party access to the meter at an additional cost.

4.3 Point of Demarcation

The electric meter is owned by London Hydro. The necessary networking equipment is issued and owned, operated and maintained by London Hydro. They are locked in a meter cabinet and cannot be accessed by the customer. The router is configured by London Hydro and the device is locked so that the customer cannot change the router software configuration. Third party access can be configured at the time of installation, or later by London Hydro staff.

For interface arrangement details see section 5.6.

4.4 TCP/IP wired Ethernet acceptance testing

For Ethernet connections the communication must be thoroughly tested by the installer to verify the following:

- Link is active
- Outbound communications are enabled
- Inbound communications can be received
- The DHCP/static IP address provided is correct

When the customer notifies London Hydro that the installation of an operational Ethernet connection has been completed, London Hydro will schedule the meter installation upgrade, unless an interval meter

already exists. At the time of the meter upgrade, London Hydro's Metering Technician will verify that the Ethernet connection is operational. If the connection is tested to be operational the meter shall be installed and connected via the CAT5 cable, and proceed to confirm communications with London Hydro's central metering data collection system.

If the Ethernet service is not operational, the meter installation and/or upgraded shall not proceed, and the customer will be required to correct the defect. When the customer notifies London Hydro of the defect correction, London Hydro will revisit the site and upgrade the meter installation. However, the customer will be subject to the prevailing additional site visit charge – see Table 8-3 on page 24 herein.

5.0 CONNECTION TO THE PUBLIC SWITCHED DEDICATED TELEPHONE NETWORK

5.1 General Responsibilities

The customer is responsible to provide a dedicated analogue telephone line used to communicate with each interval-style revenue meter. The customer is responsible for all costs associated with installing, operating, and maintaining this telephone service. The customer must inform London Hydro of new and/or changed phone number assigned to the electric meter.

London Hydro staff will make the final physical connection to the meter and/or cabinet demarcation.

The telephone company will bill monthly service subscription fee directly to the customer, as the subscription will be in the customer's name, not London Hydro.

London Hydro's central metering data collection system does not support Voice over Internet Protocol (VoIP) telephone systems. Therefore, VOIP service is not permitted and/or satisfy the communication requirement.

5.2 Wire-Line Telecommunications Circuit

London Hydro's central metering data collection system communicates with the interval-style revenue meters via a telephone-based communications system that is configured as per IEEE Standard 1390, *Utility Telemetry Service Architecture for Switched Telephone Network*, for outbound telemetry (i.e. calls initiated by London Hydro) using direct dial access.

The local loop circuit (including the customer's premise wiring between the demarcation point and the revenue meter) shall be a conventional two-wire analogue voice service line with direct dial (using dual tone multi-frequency or Touch-Tone® dialing) access.

Note: The telephone company may refer to the required telephone circuit as a "Plain Old Telephone Service" (POTS) circuit.

5.3 Alternate Means of Communication Requirements

The customer shall be responsible for ensuring that London Hydro has satisfactory and reliable reads with 100% accessibility to interrogate (read) the meter remotely. If the customer uses a line sharing device or alternate means of communication (i.e. any means other than a dedicated telephone line) and it fails to meet London Hydro's requirements, then the customer shall provide a dedicated telephone line to the meter on London Hydro's request. London Hydro's decision will be final and mandatory for the customer. The customer shall pay either the OEB approved special meter reading charge or the actual time and material charge applicable for site visits until such time as the problem with the communication circuit has been resolved to London Hydro's satisfaction.

5.4 Telephone Line Sharing

Upon written approval from the London Hydro Meter Database Management Supervisor, a customer may share a telephone circuit (among various office equipment used on an intermittent basis such as facsimile machines, credit card authorization terminals, point-of-sale terminals, etc.), by supplying and installing a call processor as illustrated in Figure 5-1 below. In situations where London Hydro is unable to get 100% satisfactory meter reads from the shared telephone circuit (as outlined in London Hydro's requirements previously stated in Section 5.3) then the customer shall provide a dedicated telephone line or Ethernet connection to the meter on London Hydro's request. London Hydro's decision will be final and mandatory for the customer. The customer shall pay either the OEB approved special meter reading charge or the actual time and material charge applicable for site visits until such time as the problem with the communication circuit has been resolved to London Hydro's satisfaction.

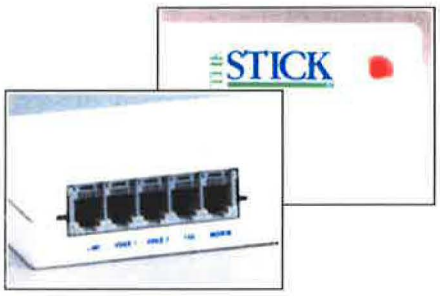

Figure 5-1, Typical Automatic Call Processor

Note: Most call processors require a 120 Vac supply from a nearby receptacle.

Where call processors are used, the following features (offered by the telephone company) shall be blocked:

- Call waiting; and
- Call forwarding.

5.5 Isolation Equipment for High-Voltage Metering

Telecommunications equipment located within customer-owned high-voltage electric power substations shall be electrically isolated to protect wired communications lines from high voltages and current. The customer will be responsible for retaining a consultant to:

- Carry out a GPR study in accordance with IEEE Standard 367, *Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault*;
- Selection isolation equipment that fulfils the requirements of IEEE Standard 487, *Recommended Practice for the Protection of Wire-Line Communication Facilities Serving Electric Power Stations*, for a *Type 1* service and *Class B* service performance objective.
- Submitting the isolation system design to Bell Canada's *Access Network – Provisioning Support* department for approval.

The customer shall further be responsible for the procurement, installation, testing, and ongoing maintenance of the protective equipment.

5.6 Interface Arrangement for Metering Cabinets and Remote Metering Cabinets

It is essential that the communication line be permanently installed to ensure its continued availability for meter interrogation. Since London Hydro does not allow premise-wiring contractors to make modifications to energized metering cabinets and remote metering cabinets, the Owner shall arrange for the

communications lines (phone or Ethernet) wired to premise metering cabinet, and confirmed operational prior London Hydro coordinating a meter installation.

The requisite preparation work is outlined below:

NOTE: A RJ45 bulkhead jack will be installed by London Hydro on the side of the metering cabinet illustrated in Figure 5-2, denoting the demarcation.

- A standard eight-conductor Category 5e cable, or better, shall be installed in ½ inch diameter EMT, which complies with CSA Standard C22.2 No. 83-M1985 (R1999), *Electrical Metallic Tubing*, to the metering cabinet demarcation.
- Twelve to eighteen inches of Category 5e, or better, shall be coiled and terminated with a male RJ-11 for analogue phone, or, male RJ-45 for Ethernet connection, but not plugged into the meter cabinet demarcation Jack.
- A tag bearing the network switch and port number for Ethernet connections, or, phone number for the telephone circuit, shall be attached to the wire.

Figure 5-2, RJ-45 Bulkhead Jack

London Hydro's Electric Metering Technician will complete the installation of the communication line into the revenue meter and/or metering cabinet demarcation Jack.

5.7 Telephone Circuit Acceptance Testing

Prior to interval meter installation by London Hydro, the dial-type telephone line shall be thoroughly tested by the premise-wiring contractor to verify the following:

- Dial tone is available
- Outbound calls can be made
- Inbound calls can be received
- The assigned phone number is correct
- The outside line access digit (where applicable) is correct

Plugging in a standard telephone set into the jack and making both inbound and outbound calls can easily accomplish this testing.

When the customer notifies London Hydro that the installation of an operational telephone line has been completed, London Hydro will schedule the meter installation upgrade unless an interval meter has already

been installed. At the time of the meter upgrade, London Hydro's Metering Technician will verify that the telephone line is operational. If the telephone line is operational, the Metering Technician will install the meter, connect the telephone line, and establish communications with London Hydro's central metering data collection system.

If the telephone line is not operational, the meter installation will not be upgraded, and the customer will be required to correct the defect. When the customer notifies London Hydro of the defect correction, London Hydro will revisit the site and upgrade the meter installation. However, the customer will be subject to the prevailing *additional site visit charge* — see Table 8-3 on page 24 herein.

6.0 CONNECTION TO THE LONDON HYDRO PROVIDED CELLULAR NETWORK

6.1 General Responsibilities

London Hydro will provide, and own, the cellular communication hardware and/or service but the customer will be responsible to pay the monthly recurring service fee associated. See section 8.4 for recurring monthly fee added to customer electrical service bill.

Depending on site specific conditions cellular service may not be possible if no signal is available in the meter location. In this case the customer must make other arrangements for meter communication, either option (a) TCP/IP via Customer ISP or (b) Dedicated analogue Telephone line.

London Hydro cellular service is via Bell Mobility networks. As a general rule, if a cellular phone with Bell service plan has a strong signal in close proximity to the electrical meter demarcation, then a cellular solution has a high probability of working.

6.2 Overview

Electric meter data is exchanged with London Hydro's central metering data collection system using TCP/IP communication protocol, similar to Ethernet service described above in Section 4.0, the differentiating factor is the network link is provided by a public carrier's cellular network via private APN for enhanced security and reliability. There are no customer required network configurations and/or requisite site work for a cellular communication option.

6.3 Point of Demarcation

The electric meter is owned by London Hydro. The necessary networking equipment is issued and owned, operated and maintained by London Hydro. The equipment is locked in a meter cabinet and cannot be accessed by the customer. The router is configured by London Hydro and the device is locked so that the customer cannot change the router software configuration. Third party access can be configured at the time of installation, or later by London Hydro staff.

For Interface arrangement details see section 5.6.

6.4 Interface Arrangement for Self-Contained Revenue Meters

For new service, or in case where the existing revenue metering system consists of a self-contained single-phase, network or poly-phase revenue meter, the meter shall be installed, or upgraded, with a self-contained meter that has a cellular module under the meter cover. Therefore only a meter base is required, which is the customers responsibility but no metering cabinet required.

NOTE:

There are a few remaining three-phase three-wire 600 V services within London Hydro's service territory. London Hydro is unable to provide interval meters for these customers unless the customer undertakes a larger project to upgrade their service entrance equipment (and incoming supply cables if underground) to a three-phase four-wire 347/600Y V arrangement.

7.0 AVAILABILITY OF OTHER INTERFACES TO THE REVENUE METER

This section pertains to customers interested in a real-time interface between the revenue meter to building load management systems or other types of data collection systems.

Please contact London Hydro's Meter Data Management (MDM) representative by email: mdm@londonhydro.com for additional details and/or inquiries.

7.1 KYZ Output Pulses – Discontinued Offering

Due to advances in the state-of-the-art, London Hydro no longer purchases revenue meters with pulse outputs. Consequently (effective October 2001), London Hydro no longer supplies KYZ output pulses to customer-owned energy management systems.

Note: Customers to which London Hydro previously supplied KYZ output pulses (in accordance with Engineering Instruction EI-8, *Standard Arrangements for Providing Revenue Metering Pulse Signals to Customer-Owned Energy Management Systems*) will be grandfathered until expiry of the government seal on the metering installation.

7.2 Serial Data Communication Interface – Discontinued Offering

Certain high-end interval-style revenue meters that London Hydro procures can be equipped with an interface for data interchange with a customer's energy management system. The interface is specified to meet the signalling and protocol requirements of:

- ANSI/TIA/EIA Standard 232-F-1997, *Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange;* and
- Modbus (10-bit ASCII variant) as defined on Schneider Automation's web site (www.modicon.com/techpubs/toc7.html).

7.3 Local Area Network Data Communication Interface – Discontinued Offering

Certain high-end interval-style revenue meters that London Hydro procures can be equipped with an interface for data interchange with a customer's local area network.

7.4 Periodic Modem (Telephone) Access for Measured Load Information

Customers or third parties with own software solutions, interested to remotely interrogate the revenue meter can obtain parameters that will allow the meter to be remotely interrogated. It is imperative that the customer or third parties not interfere with London Hydro's remote meter read interrogation schedule.

7.5 Customer Engagement Portal Data Download and Retrieval Interfaces

London Hydro customers have the ability to delegate access to their account information to third parties through automated and on-demand process featured in MyLondonHydro, Interval Data Centre and Property Management Portal applications. London Hydro applications offer time range data downloads in CSV and HTML file formats.

Please contact greenbutton@londonhydro.com for any inquiries related to this service

7.6 MyLondonHydro Greenbutton Data Platform Interfaces

London Hydro Green Button Platform offers download and connect my data functionality. Green Button Download my Data feature provides on-demand data download in XML file format for predefined or selected time periods (today, yesterday, current week, current month, last three months, last six months, last on year or selected period). Green Button Connect my Data functionality offers API

(application program interface) for third party data authorization and access. To leverage Connect my Data functionality, third party has to comply with Green Button Standard and has to be registered as third party app within London Hydro Green Button Data platform.

Please contact greenbutton@londonhydro.com for any inquiries related to this service

8.0 RECOVERABLE COST ELEMENTS

8.1 Incremental Cost of Interval Meter

The customer will be responsible for reimbursing London Hydro for the incremental cost between a non-interval and an interval electronic meter. The difference between the two styles is essentially that the interval meter has both mass-memory (for recording electrical consumption data for each time interval) and a built-in communication tunnel / RS232 (for communicating to a common metering data collection system).

Based on procurements throughout 2015, the incremental cost (GST excluded) for the various styles of revenue meters are tabulated below.

Table 8-1, Incremental Costs for Interval-Style Meters

Meter Style	Incremental Cost of Interval Meter
Self-Contained:	
• Single-Phase	$800.^{00}$
• Network	$800.^{00}$
• Polyphase	$800.^{00}$
Transformer Rated:	$800.^{00}$

The incremental cost may be significantly greater in instances where a specific revenue meter is required to provide a specific external interface to a building load management system (refer to Section 7.0 herein) or to provide additional reporting (refer to Section 10.0 herein).

8.2 Installation Cost of Interval Meter

The installation cost for an interval-style revenue meter will depend upon the overall scope of work and the timing of the work. If no modifications to the service entrance equipment or instrument transformers and control wiring are required, the interval meter can generally be installed and connected to the telecommunications system in a 1½-hour timeframe (included travel to and from the site).

Table 8-2, Hourly Rates for Interval Meter Installation Work (2015)

Cost Element	During Normal Working Hours	Outside of Normal Working Hours
Labour (2 technicians)	$173.^{90}$ / hr	$212.^{40}$ / hr
Transportation	$13.^{91}$ / hr	$13.^{91}$ / hr

Pursuant to the federal *Electricity and Gas Inspection Act*, London Hydro will re-verify the accuracy of the installed population of revenue meters on a cycle ranging from 6 to 12 years, depending upon the type of revenue meter. In cases where the requested work is planned and carried out within 90 calendar days preceding the date when the meter is scheduled for re-verification, the labour and transportation costs to install an interval meter will be waived.

8.3 Installation and Recurring Cost of a Telecommunications Circuit

The customer is responsible for all costs associated with revising the premise wiring to provide a communications connection circuit to the revenue meter.

The customer is also responsible for the ongoing monthly tariff charges, if any, from the telephone or communications company for providing and maintaining the communications.

8.4 Recurring Cost of a London Hydro Provided Cellular Service

London Hydro's central metering data collection system is capable to communicate with the interval-style revenue meters via a cellular-based communications. This is a "plug and play" option with no additional work required by the customer for installation. The approved Ontario Energy Board rate is $30.00 per month, and would be added to the customer's bill for the ongoing cost and maintenance of the cellular connection. This fee may be adjusted from time to time in accordance with Ontario Energy Board rules and regulations.

It should be noted that this option may not be available for all installations as it is dependent on reliable cellular coverage. Meters located inside buildings and inside steel meter cabinets may not perform well with this solution.

London Hydro reserves the right to approve or deny a communication method based on its anticipated reliability.

8.5 Administrative Fee to Validate Central Meter Data Collection System Parameters

The cost of conducting a so-called end-to-end test between the revenue meter and central meter data collection system to validate the metering parameters is included in the installation cost of the revenue meter (as outlined in Section 8.2 above).

8.6 Recurring Monthly Service Charge

Customers with interval-style revenue metering systems will have a cost component of $5.^{50}$ per month embedded within the monthly service charge for information processing. This fee covers what the Ontario Energy Board refers to as the VEE function (i.e. validating, estimating, and editing of revenue metering data).

Note: A complete description of the VEE procedures can be obtained from London Hydro's Meter Database Management Services (MDMS) Department by email: mdm@londonhydro.com.

Customers with interval-style revenue meters that have enrolled with a retailer will also have their interval meter data sent to the appropriate retailer via the Ontario Retail Settlement Electronic Business Transaction System in accordance with the Ontario Energy Board's *Retail Settlement Code*.

8.7 Administrative Fee to Modify Remote Access Passwords

To prevent unauthorized access to data and programmable functions, revenue meters are programmed with several levels of remote access passwords. Upon request, customers will be provided with a password that will allow them (or their agents) read-only access to meter information (billing and load profile data, status information, and program information). Proof of eligibility to access the meter by customers or third party will be required at the discretion of London Hydro. Appropriate letters of authorization may be required upon request.

At the time of original installation, only the customer will be issued a formal letter documenting their assigned remote access password. The onus will be on the customer to disseminate their assigned password to their agents or energy service providers (if any).

London Hydro will entertain customer-initiated requests to change the remote access password. The customer is responsible for the costs of dispatching a Metering Technician to the site to make the configuration change to the revenue meter. The flat rate charge (less GST) for such service calls is tabulated below:

Table 8-3, Flat Rate Additional Site Visit Charge (2014)

Cost Element	During Normal Working Hours	Outside of Normal Working Hours
Labour (1½ hour, including traveling time)	$144.[66]	Service not offered
Transportation	$16.[80]	"

Note: Requests to change the remote access password might be expected following a change in the customer's energy service provider.

8.8 Recovery of Stranded Investment Costs

Although rare, London Hydro has a small population of *unique* revenue metering systems installed that haven't yet reached their normal asset lifetime and, if removed from active service, couldn't be deployed in other locations. For these situations, customers requesting a change to an interval meter will be expected to reimburse London Hydro for the residual value of the existing revenue metering equipment. The residual value assessments will be unique to each installation, but in all cases will be based on an expected 30-year service lifetime for the asset.

8.9 Manual Data Collection

If London Hydro is unable to retrieve the metered data using the remote communication method, then London Hydro will visit the meter location and collect the data using a manual data retrieval system. At a minimum, such visits are required weekly to meet validation and editing standards and to ensure the meter is functioning satisfactorily and does not require replacement.

If the inability to retrieve metered data is due to a failure of the remote communication method, London Hydro will notify the customer of such failure, and the customer will be responsible for repairs. If necessary, London Hydro will collect metered data manually for up to one week after notifying the customer of the communication failure. Thereafter, if the remote communication method is still not operational, London Hydro will continue to collect the data manually at the OEB approved special meter reading charge ($30.00 per visit), or the actual time and material charge applicable for the site visits required by a meter reader, or meter technician, until such time as the problem with the communication circuit has been resolved.

In all cases where the customer selected communication option is not installed or repaired within 10 weeks, the assumed communication option will be a London Hydro provided Cellular solution. London Hydro will own the cellular carrier subscription but the cost of this service will be billed to the customer on a monthly recurring basis on their electrical bill, reference section 8.4. If the communication option is requested to be changed at a later date the customer is subject to Time and material Fees.

9.0 Project Scheduling

London Hydro strives to provide electric service with minimum delay or inconvenience. The timing of a meter replacement can be affected by each of the following conditions:

- Metering equipment availability;
- New business volume;
- Number of pending requests for interval metering systems;
- Volume of meter re-verification work for compliance with Measurement Canada statutes;
- Weather constraints; and
- Installation site constraints.

Assuming all required materials are in stock, the job will be scheduled on receipt of payment from the customer. The projected start date averages three weeks after receipt, but this is dependent on the factors listed above.

Request for information relating to the job start date, progress, completion, etc. may be obtained directly from London Hydro's Electric Metering Lead Technician (☎ 519-661-5800 Ext. 5574).

10.0 OTHER SERVICE OFFERINGS

10.1 Load Profile Reports

London Hydro offers all interval metered customer's access to their interval meter data via an on-line web presentment tool through MyLondonHydro Account portal.

This Interval Data Center has several predefined reports that can be run for selected time periods in addition to the ability to export the data so that it can be incorporated into custom spreadsheets and reports. This service is currently being provided to London Hydro customers free of charge. To sign up for access complete the sign up form at https://www.londonhydro.com/ and allow two business days for completion.

Customers can also receive load profile reports directly from London Hydro for a fee.

Please contact London Hydro's Meter Data Management (MDM) by email: mdm@londonhydro.com, for a list of load profile offerings, or to obtain samples of available reports.

10.2 Power Quality Monitoring

Certain models of interval-style revenue meters that London Hydro has available can be configured to capture and record power quality events (e.g. out-of-limit detection, harmonic distortion measurement, sag/swell detection, etc.).

Please contact London Hydro's Meter Data Management (MDM) representative by email: mdm@londonhydro.com, for additional details and/or inquiries..

10.3 Metering Validation and Sealing

London Hydro offers meter validation test-bench capabilities and meter metrology sealing capabilities.

Please contact London Hydro's Meter Data Management (MDM) representative by email: mdm@londonhydro.com, for additional details and/or inquiries.

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APPENDIX F

APPROVED RETAIL RATES

Schedule A

To Decision and Rate Order

Tariff of Rates and Charges

OEB File No: EB-2018-0051

DATED: March 28, 2019

London Hydro Inc.

TARIFF OF RATES AND CHARGES

Effective and Implementation Date May 1, 2019

This schedule supersedes and replaces all previously approved schedules of Rates, Charges and Loss Factors

EB-2018-0051

RESIDENTIAL SERVICE CLASSIFICATION

This classification applies to an account taking electricity at 750 volts or less where the electricity is used exclusively in a separate metered living accommodation. Separately metered dwellings within a town house complex or apartment building also qualify as residential customers. Multi-unit residential establishments such as apartment buildings supplied through one service (bulk meter) shall be classified as General Service. Where electricity service is provided to combined residential and business (including agricultural) usage and the wiring does not provide for separate metering, the classification shall be at the discretion of London Hydro and should be based on such considerations as the estimated predominant consumption. Non IESO generation accounts, primarily net-metered accounts taking electricity at 750 volts or less where the electricity is used exclusively in a separate metered living accommodation shall be classified as residential. Class B consumers are defined in accordance with O. Reg. 429/04. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

Unless specifically noted, this schedule does not contain any charges for the electricity commodity, be it under the Regulated Price Plan, a contract with a retailer or the wholesale market price, as applicable. In addition, the charges in the MONTHLY RATES AND CHARGES - Regulatory Component of this schedule do not apply to a customer that is an embedded wholesale market participant.

It should be noted that this schedule does not list any charges, assessments, or credits that are required by law to be invoiced by a distributor and that are not subject to Ontario Energy Board approval, such as the Global Adjustment and the HST.

MONTHLY RATES AND CHARGES - Delivery Component

Service Charge	$	25.07
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$	0.31
Rate Rider for Smart Metering Entity Charge - effective until December 31, 2022	$	0.57
Rate Rider for Disposition of Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) (2019) - effective until April 30, 2020	$/kWh	0.0003
Rate Rider for Recovery of 2018 RTSR Revenue Shortfall - effective until October 31, 2020	$/kWh	0.0016
Retail Transmission Rate - Network Service Rate	$/kWh	0.0070
Retail Transmission Rate - Line and Transformation Connection Service Rate	$/kWh	0.0062

MONTHLY RATES AND CHARGES - Regulatory Component

Wholesale Market Service Rate (WMS) - not including CBR	$/kWh	0.0030
Capacity Based Recovery (CBR) - Applicable for Class B Customers	$/kWh	0.0004
Rural or Remote Electricity Rate Protection Charge (RRRP)	$/kWh	0.0005
Standard Supply Service - Administrative Charge (if applicable)	$	0.25

London Hydro Inc.

TARIFF OF RATES AND CHARGES

Effective and Implementation Date May 1, 2019

This schedule supersedes and replaces all previously approved schedules of Rates, Charges and Loss Factors

EB-2018-0051

GENERAL SERVICE LESS THAN 50 KW SERVICE CLASSIFICATION

This classification applies to a non-residential account taking electricity at 750 volts or less whose average monthly maximum demand is less than, or is forecast to be less than, 50 kW. Multi-unit residential establishments such as apartment buildings supplied through one service (bulk meter) shall be classified as General Service. Where electricity service is provided to combined residential and business (including agricultural) usage and the wiring does not provide for separate metering, the classification shall be at the discretion of London Hydro and should be based on such considerations as the estimated predominant consumption. Class B consumers are defined in accordance with O. Reg. 429/04. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

Unless specifically noted, this schedule does not contain any charges for the electricity commodity, be it under the Regulated Price Plan, a contract with a retailer or the wholesale market price, as applicable. In addition, the charges in the MONTHLY RATES AND CHARGES - Regulatory Component of this schedule do not apply to a customer that is an embedded wholesale market participant.

It should be noted that this schedule does not list any charges, assessments, or credits that are required by law to be invoiced by a distributor and that are not subject to Ontario Energy Board approval, such as the Global Adjustment and the HST.

MONTHLY RATES AND CHARGES - Delivery Component

Service Charge	$	32.98
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$	0.41
Rate Rider for Smart Metering Entity Charge - effective until December 31, 2022	$	0.57
Distribution Volumetric Rate	$/kWh	0.0110
Rate Rider for Disposition of Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) (2019) - effective until April 30, 2020	$/kWh	0.0008
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$/kWh	0.0001
Rate Rider for Recovery of 2018 RTSR Revenue Shortfall - effective until October 31, 2020	$/kWh	0.0016
Retail Transmission Rate - Network Service Rate	$/kWh	0.0066
Retail Transmission Rate - Line and Transformation Connection Service Rate	$/kWh	0.0055

MONTHLY RATES AND CHARGES - Regulatory Component

Wholesale Market Service Rate (WMS) - not including CBR	$/kWh	0.0030
Capacity Based Recovery (CBR) - Applicable for Class B Customers	$/kWh	0.0004
Rural or Remote Electricity Rate Protection Charge (RRRP)	$/kWh	0.0005
Standard Supply Service - Administrative Charge (if applicable)	$	0.25

London Hydro Inc.

TARIFF OF RATES AND CHARGES

Effective and Implementation Date May 1, 2019

This schedule supersedes and replaces all previously approved schedules of Rates, Charges and Loss Factors

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GENERAL SERVICE 50 TO 4,999 KW SERVICE CLASSIFICATION

This classification applies to a non residential account whose average monthly maximum demand used for billing purposes is equal to or greater than, or is forecast to be equal to or greater than, 50 kW but less than 5,000 kW. Note that for the determination of the billing demand and the application of the Retail Transmission Rate - Network Service Rate and the Retail Transmission Rate - Line and Transformation Connection Service Rate the following sub-classifications apply:

General Service 50 to 199 kW non-interval metered
General Service 50 to 4,999 kW interval metered.

Class A and Class B consumers are defined in accordance with O. Reg. 429/04. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

Unless specifically noted, this schedule does not contain any charges for the electricity commodity, be it under the Regulated Price Plan, a contract with a retailer or the wholesale market price, as applicable. In addition, the charges in the MONTHLY RATES AND CHARGES - Regulatory Component of this schedule do not apply to a customer that is an embedded wholesale market participant.

If included in the following listing of monthly rates and charges, the rate rider for the disposition of WMS - Sub-account CBR Class B is not applicable to wholesale market participants (WMP), customers that transitioned between Class A and Class B during the variance account accumulation period, or to customers that were in Class A for the entire period. Customers who transitioned are to be charged or refunded their share of the variance disposed through customer specific billing adjustments. This rate rider is to be consistently applied for the entire period to the sunset date of the rate rider. In addition, this rate rider is applicable to all new Class B customers.

If included in the following listing of monthly rates and charges, the rate rider for the disposition of Global Adjustment is only applicable to non-RPP Class B customers. It is not applicable to wholesale market participants (WMP), customers that transitioned between Class A and Class B during the variance account accumulation period, or to customers that were in Class A for the entire period. Customers who transitioned are to be charged or refunded their share of the variance disposed through customer specific billing adjustments. This rate rider is to be consistently applied for the entire period to the sunset date of the rate rider. In addition, this rate rider is applicable to all new non-RPP Class B customers.

It should be noted that this schedule does not list any charges, assessments, or credits that are required by law to be invoiced by a distributor and that are not subject to Ontario Energy Board approval, such as the Global Adjustment and the HST.

MONTHLY RATES AND CHARGES - Delivery Component

Service Charge	$	161.11
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$	2.01
Distribution Volumetric Rate	$/kW	2.7818

London Hydro Inc.

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Rate Rider for Disposition of Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) (2019) - effective until April 30, 2020	$/kW	0.0589
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$/kW	0.0347
Rate Rider for Recovery of 2018 RTSR Revenue Shortfall - effective until October 31, 2020	$/kW	0.6354
Retail Transmission Rate - Network Service Rate	$/kW	2.2972
Retail Transmission Rate - Line and Transformation Connection Service Rate	$/kW	2.0113
Retail Transmission Rate - Network Service Rate - Interval Metered	$/kW	2.9458
Retail Transmission Rate - Line and Transformation Connection Service Rate - Interval Metered	$/kW	2.8026

MONTHLY RATES AND CHARGES - Regulatory Component

Wholesale Market Service Rate (WMS) - not including CBR	$/kWh	0.0030
Capacity Based Recovery (CBR) - Applicable for Class B Customers	$/kWh	0.0004
Rural or Remote Electricity Rate Protection Charge (RRRP)	$/kWh	0.0005
Standard Supply Service - Administrative Charge (if applicable)	$	0.25

London Hydro Inc.

TARIFF OF RATES AND CHARGES

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EB-2018-0051

GENERAL SERVICE 1,000 TO 4,999 KW (CO-GENERATION) SERVICE

Embedded generation, co-generation or load displacement customers have the option to reserve demand capacity on the London Hydro distribution system for import load through mutual agreement/contract. For the embedded generation customers with a gross peak demand annual average of less than 1,000 kW and equal to or greater than 50 kW per month, the General Service 50 to 4,999 kW distribution rates will be applied, as long as there is no requirement for reserve capacity from the customer. For the embedded generation customers with a gross peak demand annual average of less than 50 kW per month, the General Service Less Than 50 kW distribution rates will be applied, as long as there is no requirement for reserve capacity from the customer. Class A and Class B consumers are defined in accordance with O. Reg. 429/04. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

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If included in the following listing of monthly rates and charges, the rate rider for the disposition of WMS - Sub-account CBR Class B is not applicable to wholesale market participants (WMP), customers that transitioned between Class A and Class B during the variance account accumulation period, or to customers that were in Class A for the entire period. Customers who transitioned are to be charged or refunded their share of the variance disposed through customer specific billing adjustments. This rate rider is to be consistently applied for the entire period to the sunset date of the rate rider. In addition, this rate rider is applicable to all new Class B customers.

If included in the following listing of monthly rates and charges, the rate rider for the disposition of Global Adjustment is only applicable to non-RPP Class B customers. It is not applicable to wholesale market participants (WMP), customers that transitioned between Class A and Class B during the variance account accumulation period, or to customers that were in Class A for the entire period. Customers who transitioned are to be charged or refunded their share of the variance disposed through customer specific billing adjustments. This rate rider is to be consistently applied for the entire period to the sunset date of the rate rider. In addition, this rate rider is applicable to all new non-RPP Class B customers.

It should be noted that this schedule does not list any charges, assessments, or credits that are required by law to be invoiced by a distributor and that are not subject to Ontario Energy Board approval, such as the Global Adjustment and the HST.

MONTHLY RATES AND CHARGES - Delivery Component

Service Charge	$	2,199.58
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$	27.46
Distribution Volumetric Rate is applied to billed demand in excess of contracted amount (e.g. nameplate rating of the generation facility)	$/kW	3.8424

London Hydro Inc.

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Rate Rider for Disposition of Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) (2019) - effective until April 30, 2020	$/kW	0.0347
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$/kW	0.0480
Rate Rider for Recovery of 2018 RTSR Revenue Shortfall - effective until October 31, 2020	$/kW	0.3199
Retail Transmission Rate - Network Service Rate	$/kW	3.4007
Retail Transmission Rate - Line and Transformation Connection Service Rate	$/kW	2.9646

MONTHLY RATES AND CHARGES - Regulatory Component

Wholesale Market Service Rate (WMS) - not including CBR	$/kWh	0.0030
Capacity Based Recovery (CBR) - Applicable for Class B Customers	$/kWh	0.0004
Rural or Remote Electricity Rate Protection Charge (RRRP)	$/kWh	0.0005
Standard Supply Service - Administrative Charge (if applicable)	$	0.25

London Hydro Inc.

TARIFF OF RATES AND CHARGES

Effective and Implementation Date May 1, 2019

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STANDBY POWER SERVICE CLASSIFICATION

This classification refers to an account that has Load Displacement Generation and requires London Hydro to provide backup service. The distribution Standby Power rate will be applied to all monthly kW's reserved. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

Unless specifically noted, this schedule does not contain any charges for the electricity commodity, be it under the Regulated Price Plan, a contract with a retailer or the wholesale market price, as applicable.

If included in the following listing of monthly rates and charges, the rate rider for the disposition of WMS - Sub-account CBR Class B is not applicable to wholesale market participants (WMP), customers that transitioned between Class A and Class B during the variance account accumulation period, or to customers that were in Class A for the entire period. Customers who transitioned are to be charged or refunded their share of the variance disposed through customer specific billing adjustments. This rate rider is to be consistently applied for the entire period to the sunset date of the rate rider. In addition, this rate rider is applicable to all new Class B customers.

If included in the following listing of monthly rates and charges, the rate rider for the disposition of Global Adjustment is only applicable to non-RPP Class B customers. It is not applicable to wholesale market participants (WMP), customers that transitioned between Class A and Class B during the variance account accumulation period, or to customers that were in Class A for the entire period. Customers who transitioned are to be charged or refunded their share of the variance disposed through customer specific billing adjustments. This rate rider is to be consistently applied for the entire period to the sunset date of the rate rider. In addition, this rate rider is applicable to all new non-RPP Class B customers.

It should be noted that this schedule does not list any charges, assessments, or credits that are required by law to be invoiced by a distributor and that are not subject to Ontario Energy Board approval, such as the Global Adjustment and the HST.

MONTHLY RATES AND CHARGES - Delivery Component

Standby Charge is applied to the contracted amount (e.g. nameplate rating of the generation facility).	$/kW	3.1736
Rate Rider for Disposition of Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) (2019) - effective until April 30, 2020	$/kW	0.0347
Rate Rider for Recovery of 2018 RTSR Revenue Shortfall - effective until October 31, 2020	$/kW	0.3199
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$/kW	0.0396

London Hydro Inc.

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LARGE USE SERVICE CLASSIFICATION

This classification applies to an account whose average monthly maximum demand used for billing purposes is equal to or greater than, or is forecast to be equal to or greater than, 5,000 kW. Class A and Class B consumers are defined in accordance with O. Reg. 429/04. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

Unless specifically noted, this schedule does not contain any charges for the electricity commodity, be it under the Regulated Price Plan, a contract with a retailer or the wholesale market price, as applicable. In addition, the charges in the MONTHLY RATES AND CHARGES - Regulatory Component of this schedule do not apply to a customer that is an embedded wholesale market participant.

If included in the following listing of monthly rates and charges, the rate rider for the disposition of WMS - Sub-account CBR Class B is not applicable to wholesale market participants (WMP), customers that transitioned between Class A and Class B during the variance account accumulation period, or to customers that were in Class A for the entire period. Customers who transitioned are to be charged or refunded their share of the variance disposed through customer specific billing adjustments. This rate rider is to be consistently applied for the entire period to the sunset date of the rate rider. In addition, this rate rider is applicable to all new Class B customers.

If included in the following listing of monthly rates and charges, the rate rider for the disposition of Global Adjustment is only applicable to non-RPP Class B customers. It is not applicable to wholesale market participants (WMP), customers that transitioned between Class A and Class B during the variance account accumulation period, or to customers that were in Class A for the entire period. Customers who transitioned are to be charged or refunded their share of the variance disposed through customer specific billing adjustments. This rate rider is to be consistently applied for the entire period to the sunset date of the rate rider. In addition, this rate rider is applicable to all new non-RPP Class B customers.

It should be noted that this schedule does not list any charges, assessments, or credits that are required by law to be invoiced by a distributor and that are not subject to Ontario Energy Board approval, such as the Global Adjustment and the HST.

MONTHLY RATES AND CHARGES - Delivery Component

Service Charge	$	20,745.65
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$	258.98
Distribution Volumetric Rate	$/kW	2.3151
Rate Rider for Disposition of Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) (2019) - effective until April 30, 2020	$/kW	(0.0515)
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$/kW	0.0289
Rate Rider for Recovery of 2018 RTSR Revenue Shortfall - effective until October 31, 2020	$/kW	0.8355
Retail Transmission Rate - Network Service Rate - Interval Metered	$/kW	3.0176
Retail Transmission Rate - Line and Transformation Connection Service Rate - Interval Metered	$/kW	2.8026

London Hydro Inc.

TARIFF OF RATES AND CHARGES

Effective and Implementation Date May 1, 2019

This schedule supersedes and replaces all previously approved schedules of Rates, Charges and Loss Factors

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MONTHLY RATES AND CHARGES - Regulatory Component

Wholesale Market Service Rate (WMS) - not including CBR	$/kWh	0.0030
Capacity Based Recovery (CBR) - Applicable for Class B Customers	$/kWh	0.0004
Rural or Remote Electricity Rate Protection Charge (RRRP)	$/kWh	0.0005
Standard Supply Service - Administrative Charge (if applicable)	$	0.25

London Hydro Inc.

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STREET LIGHTING SERVICE CLASSIFICATION

This classification applies to an account for roadway lighting with a Municipality, Regional Municipality, Ministry of Transportation and private roadway lighting, controlled by photo cells. The consumption for these customers will be based on the calculated connected load times the required lighting times established in the approved Ontaro Energy Board street lighting load shape template. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

Unless specifically noted, this schedule does not contain any charges for the electricity commodity, be it under the Regulated Price Plan, a contract with a retailer or the wholesale market price, as applicable. In addition, the charges in the MONTHLY RATES AND CHARGES - Regulatory Component of this schedule do not apply to a customer that is an embedded wholesale market participant.

It should be noted that this schedule does not list any charges, assessments, or credits that are required by law to be invoiced by a distributor and that are not subject to Ontario Energy Board approval, such as the Global Adjustment and the HST.

MONTHLY RATES AND CHARGES - Delivery Component

Service Charge (per connection)	$	1.68
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$	0.02
Distribution Volumetric Rate	$/kW	8.3930
Rate Rider for Disposition of Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) (2019) - effective until April 30, 2020	$/kW	(0.1389)
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$/kW	0.1048
Rate Rider for Recovery of 2018 RTSR Revenue Shortfall - effective until October 31, 2020	$/kW	0.5784
Retail Transmission Rate - Network Service Rate	$/kW	2.0226
Retail Transmission Rate - Line and Transformation Connection Service Rate	$/kW	1.7709

MONTHLY RATES AND CHARGES - Regulatory Component

Wholesale Market Service Rate (WMS) - not including CBR	$/kWh	0.0030
Capacity Based Recovery (CBR) - Applicable for Class B Customers	$/kWh	0.0004
Rural or Remote Electricity Rate Protection Charge (RRRP)	$/kWh	0.0005
Standard Supply Service - Administrative Charge (if applicable)	$	0.25

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SENTINEL LIGHTING SERVICE CLASSIFICATION

This classification refers to accounts that are an unmetered lighting load supplied to a sentinel light. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

Unless specifically noted, this schedule does not contain any charges for the electricity commodity, be it under the Regulated Price Plan, a contract with a retailer or the wholesale market price, as applicable. In addition, the charges in the MONTHLY RATES AND CHARGES - Regulatory Component of this schedule do not apply to a customer that is an embedded wholesale market participant.

It should be noted that this schedule does not list any charges, assessments, or credits that are required by law to be invoiced by a distributor and that are not subject to Ontario Energy Board approval, such as the Global Adjustment and the HST.

MONTHLY RATES AND CHARGES - Delivery Component

Service Charge (per connection)	$	4.73
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$	0.06
Distribution Volumetric Rate	$/kW	15.5619
Rate Rider for Disposition of Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) (2019) - effective until April 30, 2020	$/kW	(0.2070)
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$/kW	0.1943
Rate Rider for Recovery of 2018 RTSR Revenue Shortfall - effective until October 31, 2020	$/kW	0.5978
Retail Transmission Rate - Network Service Rate	$/kW	2.0253
Retail Transmission Rate - Line and Transformation Connection Service Rate	$/kW	1.7734

MONTHLY RATES AND CHARGES - Regulatory Component

Wholesale Market Service Rate (WMS) - not including CBR	$/kWh	0.0030
Capacity Based Recovery (CBR) - Applicable for Class B Customers	$/kWh	0.0004
Rural or Remote Electricity Rate Protection Charge (RRRP)	$/kWh	0.0005
Standard Supply Service - Administrative Charge (if applicable)	$	0.25

London Hydro Inc.

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Effective and Implementation Date May 1, 2019

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UNMETERED SCATTERED LOAD SERVICE CLASSIFICATION

This classification applies to an account taking electricity at 750 volts or less whose average monthly maximum demand is less than, or is forecast to be less than, 50 kW and the consumption is unmetered. Such connections include cable TV power packs, bus shelters, telephone booths, traffic lights, railway crossings, etc. The level of the consumption will be agreed to by the distributor and the customer, based on detailed manufacturer information/documentation with regard to electrical consumption of the unmetered load or periodic monitoring of actual consumption. Class B consumers are defined in accordance with O. Reg. 429/04. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

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It should be noted that this schedule does not list any charges, assessments, or credits that are required by law to be invoiced by a distributor and that are not subject to Ontario Energy Board approval, such as the Global Adjustment and the HST.

MONTHLY RATES AND CHARGES - Delivery Component

Service Charge (per connection)	$	2.37
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$	0.03
Distribution Volumetric Rate	$/kWh	0.0204
Rate Rider for Disposition of Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) (2019) - effective until April 30, 2020	$/kWh	(0.0002)
Rate Rider for Recovery of Advanced Capital Module (2018) - effective until the effective date of the next cost of service-based rate order	$/kWh	0.0003
Rate Rider for Recovery of 2018 RTSR Revenue Shortfall - effective until October 31, 2020	$/kWh	0.0016
Retail Transmission Rate - Network Service Rate	$/kWh	0.0066
Retail Transmission Rate - Line and Transformation Connection Service Rate	$/kWh	0.0055

MONTHLY RATES AND CHARGES - Regulatory Component

Wholesale Market Service Rate (WMS) - not including CBR	$/kWh	0.0030
Capacity Based Recovery (CBR) - Applicable for Class B Customers	$/kWh	0.0004
Rural or Remote Electricity Rate Protection Charge (RRRP)	$/kWh	0.0005
Standard Supply Service - Administrative Charge (if applicable)	$	0.25

London Hydro Inc.

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microFIT SERVICE CLASSIFICATION

This classification applies to an electricity generation facility contracted under the Independent Electricity System Operator's microFIT program and connected to the distributor's distribution system. Further servicing details are available in London Hydro's Conditions of Service.

APPLICATION

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by theOntario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

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MONTHLY RATES AND CHARGES - Delivery Component

Service Charge	$	5.40

London Hydro Inc.

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ALLOWANCES

Transformer Allowance for Ownership - per kW of billing demand/month	$/kW	(0.60)
Primary Metering Allowance for Transformer Losses - applied to measured demand & energy	%	(1.00)

SPECIFIC SERVICE CHARGES

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

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CUSTOMER ADMINISTRATION

Easement letter	$	15.00
Special meter reads	$	30.00
Account set up charge/change of occupancy charge (plus credit agency costs if applicable)	$	30.00
Returned cheque (plus bank charges)	$	15.00
Cellular meter read charge	$	30.00

NON-PAYMENT OF ACCOUNT (see Note below)

Late payment - per month	%	1.50
Late payment - per annum	%	19.56
Collection of account charge - no disconnection	$	10.00
Disconnect/reconnect at meter - during regular hours	$	35.00
Disconnect/reconnect at meter - after regular hours	$	185.00
Disconnect/reconnect at pole - during regular hours	$	185.00
Disconnect/reconnect at pole - after regular hours	$	415.00

OTHER

Meter interrogation charge	$	5.50
Temporary service - install & remove - overhead - no transformer	$	500.00
Temporary service - install & remove - underground - no transformer	$	300.00
Service call - after regular hours	$	165.00
Specific charge for access to the power poles - $/pole/year (with the exception of wireless attachments)	$	43.63
Install/remove load control device - during regular hours	$	65.00
Install/remove load control device - after regular hours	$	185.00

NOTE: Ontario Energy Board Rate Order EB-2017-0183, issued on March 14, 2019, identifies changes to the Non-Payment of Account Service Charges effective July 1, 2019

London Hydro Inc.

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Effective and Implementation Date May 1, 2019

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RETAIL SERVICE CHARGES (if applicable)

The application of these rates and charges shall be in accordance with the Licence of the Distributor and any Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, which may be applicable to the administration of this schedule.

No rates and charges for the distribution of electricity and charges to meet the costs of any work or service done or furnished for the purpose of the distribution of electricity shall be made except as permitted by this schedule, unless required by the Distributor's Licence or a Code or Order of the Ontario Energy Board, and amendments thereto as approved by the Ontario Energy Board, or as specified herein.

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Retail Service Charges refer to services provided by a distributor to retailers or customers related to the supply of competitive electricity.

One-time charge, per retailer, to establish the service agreement between the distributor and the retailer	$	100.00
Monthly Fixed Charge, per retailer	$	40.00
Monthly Variable Charge, per customer, per retailer	$/cust.	1.00
Distributor-consolidated billing monthly charge, per customer, per retailer	$/cust.	0.60
Retailer-consolidated billing monthly credit, per customer, per retailer	$/cust.	(0.60)
Service Transaction Requests (STR)		
Request fee, per request, applied to the requesting party	$	0.50
Processing fee, per request, applied to the requesting party	$	1.00
Request for customer information as outlined in Section 10.6.3 and Chapter 11 of the Retail Settlement Code directly to retailers and customers, if not delivered electronically through the Electronic Business Transaction (EBT) system, applied to the requesting party		
Up to twice a year	$	no charge
More than twice a year, per request (plus incremental delivery costs)	$	4.00
Notice of switch letter charge, per letter (unless the distributor has opted out of applying the charge as per the Ontario Energy Board's Decision and Order EB-2015-0304, issued on February 14, 2019)	$	2.00

LOSS FACTORS

If the distributor is not capable of prorating changed loss factors jointly with distribution rates, the revised loss factors will be implemented upon the first subsequent billing for each billing cycle.

Total Loss Factor - Secondary Metered Customer < 5,000 kW	1.0315
Total Loss Factor - Secondary Metered Customer > 5,000 kW	1.0146
Total Loss Factor - Primary Metered Customer < 5,000 kW	1.0212
Total Loss Factor - Primary Metered Customer > 5,000 kW	1.0045