



Seattle City Light

# REQUIREMENTS FOR ELECTRIC SERVICE CONNECTION 2023 Edition



# Requirements for Electric Service Connection

Welcome to the 2023 edition of the Seattle City Light *Requirements for Electric Service Connection (RESC)*. This handbook is designed for use by City Light customers, contractors, and electricians to explain utility requirements for a variety of electric service installations.

The RESC serves as a guide to the process of obtaining new electric service. The information presented herein is not intended to be all-inclusive; customers are required to review and adhere to the requirements of all standards referenced in this document relevant to their project.

A companion document, the Standards for Electric Service, is a collection of all the standards referenced in the RESC and in Service Construction Letter attachments.



Mike Haynes, Assistant General Manager

**Seattle City Light**  
**Requirements for Electric Service Connection 2023 Edition**

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Contact: [Standards.Pub@seattle.gov](mailto:Standards.Pub@seattle.gov)  
Prepared by Laura Vanderpool, Standards Engineering  
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# Significant Changes Since Last Publication

2022 Edition Section	2023 Edition Section	Title	Description
<b>1</b>		<b>Getting Started</b>	
1.10	1.10	Clearances	<ul style="list-style-type: none"> <li>Title of subsection changed from "Clearances" to "Clearance Between 26 kV Overhead Distribution Conductors and Buildings."</li> <li>Bullet points slightly reworded to reflect SCL 0100.04 content.</li> <li>Figure removed. An updated version now resides in new standard.</li> <li>In boxed out information, standard references changed from D2-3 and 0214.00 to new standard SCL 0100.04, which covers specifically the 14-ft clearance.</li> </ul>
1.12	1.12	Balanced Load	<ul style="list-style-type: none"> <li>The phrase, "...to a level acceptable to City Light" struck from the first sentence.</li> </ul>
8	1.13	Voltage Surge Protection	<ul style="list-style-type: none"> <li>New subsection. Content extracted from last edition's "Customer Protective Devices and Back-Up Generators" section 8 and relocated to this section as a more appropriate location.</li> </ul>
9.1	1.14	Electromagnetic interference	<ul style="list-style-type: none"> <li>Content relocated from now-eliminated Technical Requirements section 9; content unchanged.</li> </ul>
<b>2</b>		<b>Temporary Service</b>	
2.7	2.7	Temporary Overhead Service	<ul style="list-style-type: none"> <li>Label "ABOVE GRADE" measurement corrected from 4'-6" to 4'-6' in Figure 2.7</li> </ul>
2.8	2.8	Temporary Underground Service	<ul style="list-style-type: none"> <li>Label "ABOVE GRADE" measurement corrected from 4'-6" to 4'-6' in Figure 2.8.</li> </ul>
<b>3</b>		<b>Looped Radial Service</b>	
3.6.2 (partial)	3.3	Modification to Existing Electric Service	<ul style="list-style-type: none"> <li>New subsection added; subsequent section numbering revised.</li> <li>Content relocated from section 3.6.2 that defines modifications to existing service that would require the customer to bring their entire electric service up to current City Light construction standards.</li> </ul>
3.4	3.5	Clearances	<ul style="list-style-type: none"> <li>Sentence changed from "All projects must meet the requirements for clearances from utility equipment. See Section 1.10" to "All projects must meet the requirements for clearances as specified in 0100.04, D2-3 and 0214.00."</li> </ul>
3.6.2	3.7.2	Secondary Underground Services	<ul style="list-style-type: none"> <li>Content regarding modifications to existing service removed from this section and relocated to new section 3.3.</li> <li>Figure 3.6.2 (now Figure 3.7.2) updated to reference new material standards 1544.33 and 1544.42</li> </ul>

<b>2022 Edition Section</b>	<b>2023 Edition Section</b>	<b>Title</b>	<b>Description</b>
<b>4</b>		<b>Network Service</b>	
4.3	4.3	Clearances	<ul style="list-style-type: none"> <li>Sentence changed from “All projects must meet the requirements for clearances from utility equipment. See Section 1.10” to “Clearances must meet the requirements of 0214.00.”</li> <li>Call-out box added.</li> </ul>
<b>5</b>	<b>5</b>	<b>Distributed Energy Resources (DER)</b>	
			<ul style="list-style-type: none"> <li>Revised first sentence from “Distributed Energy Resources (DER) refers to the ability to deliver power from customer- or City Light-owned sources interconnected with the City Light distribution system, such as solar, wind, batteries, and fuel cells” to “DERs are sources, and groups of sources, of electric power that are interconnected with the City Light Distribution System, including generators and energy storage technologies capable of exporting power. Examples of DERs include solar arrays, wind generators, batteries, and fuel cells.”</li> </ul>
5.7	n/a		<ul style="list-style-type: none"> <li>Deleted subsection on battery storage.</li> </ul>
<b>6</b>	<b>6</b>	<b>Metering</b>	
<b>6.2</b>		<b>Requirements, General</b>	
n/a	6.2.1	Electric Utility Service Equipment Requirements Committee (EUSERC) Material and Equipment Requirements	New section added that states, “All electric service installations must be constructed of material and equipment that meet the applicable requirements of EUSERC standards.” This allows for scattered individual statements about material and equipment and EUSERC standards to be eliminated.
6.4	6.2.1	Meter Sockets	Second paragraph, “All services must be metered...” relocated to new subsection 6.2.1.
<b>6.5</b>	<b>6.5</b>	<b>Location, Access, and Protection of Metering Equipment</b>	
6.5.1	6.5.1 and 6.5.2	Location	<ul style="list-style-type: none"> <li>5<sup>th</sup> paragraph, “Inside meter locations...” relocated to SCL 1554.42.</li> <li>Struck final paragraph, “Electric meter sockets” as it is covered in City Light standards.</li> <li>Relocated statements pertaining to “access” to section 6.5.2.</li> </ul>
6.5.2	6.5.2	Access to Metering Equipment	<ul style="list-style-type: none"> <li>Struck 6<sup>th</sup> paragraph, “The width of the working space...” as it is covered in City Light standards.</li> </ul>
6.6	6.6	Meter Height, Working Space, and Clearances	<ul style="list-style-type: none"> <li>Changed title of section from “Meter Heights and Clearances” to “Meter Height, Working Space, and Clearances” and replaced all content with new sentence directing the reader to SCL 1554.33 and SCL 1554.42.</li> </ul>



2022 Edition Section	2023 Edition Section	Title	Description
6.7	6.7.1 and 6.7.2	Service Entrance Equipment Sequencing	<ul style="list-style-type: none"> <li>Reformatted the two headings into subsections 6.7.1 and 6.7.2.</li> </ul>
6.8	6.8	Metering Requirements for Multi-Unit Buildings	<ul style="list-style-type: none"> <li>Deleted the paragraph and bullets at the end of the subsection on meter room clearances and directed the reader to SCL 1554.42.</li> </ul>
<b>6.9</b>	<b>6.9</b>	<b>Current Transformers</b>	
6.9.2	6.9.2	Landing Pads and Enclosures	<p>EUSERC referenced deleted. Covered in subsection 6.2.1.</p> <p>Sentence in 3<sup>rd</sup>-to-last paragraph, "All metering equipment doors must open a minimum of 90 degrees from the front of the enclosures" deleted. Covered in subsection 6.5.2.</p>
<b>6.10</b>	<b>6.10</b>	<b>Switchgear</b>	
6.10.2	6.10.2	Switchgear Operating at Voltages Up to and Including 480 V	<ul style="list-style-type: none"> <li>Paragraph that reads, "All side clearances will meet City Light standards" changed to "All clearances must meet requirements specified in <i>City Light Construction Standard 1554.42, Meter Height, Working Space, and Clearances</i> in the Standards for Electric Service) "</li> <li>Paragraph that reads, "Metering section panels on switchgear will open a full 90 degrees to the switchgear" deleted. Covered in subsection 6.5.2.</li> </ul>
<b>8</b>		<b>Customer Protective Devices and Back-Up Generators</b>	
8	8 and 1.13	Emergency Backup Generators	<ul style="list-style-type: none"> <li>Rewrote and retitled this section from "Customer Protective Devices and Back-Up Generators" to "Emergency Backup Generators" to contain that information only. Surge protective devices content relocated to new subsection 1.13.</li> <li>Statement added, "All emergency backup generation equipment must have a transfer switch."</li> <li>Subsection 8.3 retitled from "Locks on Disconnect Switches" to "Disconnect Switches."</li> </ul>
<b>9</b>		<b>Technical Requirements</b>	
			<ul style="list-style-type: none"> <li>Section eliminated.</li> </ul>
9.1	1.14	Electromagnetic Interference	<ul style="list-style-type: none"> <li>Content relocated to new subsection 1.14 titled, "Electromagnetic Interference."</li> </ul>
9.2	1.13	Power Surges, Faults, Transients, and Outages	<ul style="list-style-type: none"> <li>Content deleted and reconfigured as section 1.13.</li> </ul>
<b>10</b>	<b>9</b>	<b>Maintenance of Equipment and Facilities</b>	
			<ul style="list-style-type: none"> <li>Section unchanged; renumbered to section 9</li> </ul>

# 1. Getting Started: Applying for Electric Service

## 1.1. Introduction

This chapter outlines the process for applying for service and securing all permits and inspections, as well as provides a timeline of average turnaround times to complete the application process.

The *Standards for Electric Service*, an annual publication consisting of construction and material standards related to electric service, can be found [HERE](#).

For questions or comments concerning the RESC, please contact [Standards\\_Pub@seattle.gov](mailto:Standards_Pub@seattle.gov).

## 1.2. Service Areas

Customers will be assigned a City Light Representative based on the location and complexity of the project. Visit the [Apply for New or Upgraded Electric Service](#) page and click on the link (projects up to 1 MW or projects over 1 MW) to determine your correct City Light contact for your project."

City Light has two categories of distribution: Looped Radial and Network. Network areas include Downtown Seattle, South Lake Union, First Hill, and parts of the University District. Requirements related to the Looped Radial system are discussed in Chapter 3, and requirements related to our Network areas are discussed in Chapter 4.

## 1.3. Connection Timeline

Table 1.3 shows estimated times required for each phase of the application process. Projects requiring special transformation or line extensions depend in part on equipment availability.

**TABLE 1.3. ESTIMATED TURNAROUND TIMES PER PHASE OF APPLICATION PROCESS, LOOPED RADIAL**

Service Type	Application Processing	Engineering	Service Connections
Service removal – simple (single-phase, 400 A or less)	2 weeks	Not applicable	6 weeks
Service removal – complex (three-phase and/or underground)	2 weeks	8 weeks	8 weeks
Temporary power – simple (single-phase, overhead, 400 A or less)	2 weeks	Not applicable	6 weeks
Temporary power – complex (three-phase and/or underground)	2 weeks	8 weeks	8 weeks
Service upgrade – simple (single-phase, overhead, 200 A or less)	2 weeks	10 weeks	10 weeks
Service upgrade – complex (three-phase and/or underground)	2 weeks	8 weeks	10 weeks
New service - simple (single-phase, overhead, 400 A or less)	2 weeks	10 weeks	10 weeks
New service – complex (three-phase and/or underground)	2 weeks	12 weeks	16 weeks*
Line extensions, plat development	2 weeks	16 weeks	16 weeks*

\* Add up to five weeks for non-arterial street permitting, and fifteen weeks for arterial permitting.

Notes:

1. Network projects have unique timelines. For more information, consult your City Light Representative.
2. It is essential that contractors notify City Light well in advance of designing their buildings, as the requirements for a primary service may alter the building design. For instance, City Light may require space not only for the vault, but for a primary switchgear room as well.

#### 1.4. Service Connection

City Light will make service connections only when:

- All applicable City Light requirements have been met
- The customer's responsibilities, as delineated herein, in a Service Construction Letter, in a contract, or via an in-field conversation with a City Light Representative have been fulfilled.
- All City Light inspections have been completed and the project approved.

#### 1.5. Charges

City Light will determine charges for service work based on the size of the service, the service location, and the work required to connect it to our system. Charges must be paid prior to the work being done, either at a SCL Payment Counter or by mail. Field representatives are not allowed to accept payments.

See [City Light Departmental Policy and Procedure \(DPP\) 417, Service Installation](#) for service installation charges. Click on "Accounts and Charges" and scroll down list to locate.

#### 1.6. Application Process for New or Enlarged Services

##### 1.6.1. Pre-Application Consultation

City Light provides general engineering and service advice prior to application to determine project feasibility and considerations.

Customers are strongly advised to contact City Light during the planning phase of their project to verify the available service point and requirements in order to avoid costly mistakes and service delays.

Contact information:

##### **Small/Medium Projects**

(206) 233-APPS (2777)

Email: [SCL\\_serviceapplications@seattle.gov](mailto:SCL_serviceapplications@seattle.gov)

##### **Large Commercial and Industrial Projects**

(1 MW demand and greater)

Seattle Municipal Tower

700 5<sup>th</sup> Avenue

(206) 684-3186

Email: [SCL\\_serviceapplications@seattle.gov](mailto:SCL_serviceapplications@seattle.gov)

### 1.6.2. Application for Electric Service

Customers can apply for electric service using the online [Application for Electric Service](#).

Based on the application's criteria, customers will need to submit a plan package for City Light review and comment.

A typical plan package, provided for both permanent and temporary construction, consists of the following elements:

- Legal Site Plan
- Electrical Site Plan
- Building Elevation Plan
- Riser Diagram
- Load Calculations

Additional documents, such as easements, in-building vault details, street improvement plans, and short plat/unit lot subdivision information may be required to complete the project. The City Light Representative assigned to your project will advise customers of any additional documents required.

### 1.7. Permitting and Inspections

**For projects located in the public right-of-way in incorporated King County**, which includes Burien, Lake Forest Park, Normandy Park Renton, SeaTac, Seattle, Shoreline, and Tukwila, customers can do all civil construction work. The customer is responsible for securing all required permits and inspections.

**For projects located in the public right-of-way in unincorporated King County**, which includes Skyway and White Center, City Light is required to do all civil construction work. City Light will acquire the civil construction permits, perform the work, and bill the customer for all related costs including labor, materials, permits, and inspections.

Customers will be responsible for acquiring all local jurisdictional permits and pass required inspections and for verifying permit requirements with their local jurisdiction. The customer must pay all permit and inspection fees. City Light will not connect to the customer's service conductors until the proper code authority has inspected and approved the service for connection.

**Note:** Electrical permits can only be obtained by customers if they are doing the work themselves. If the work is being performed by an electrician, the electrician is required to obtain the permit.

Projects requiring engineering services will receive a Service Construction Letter. This letter will contain customer drawings and references to all applicable City Light standards for the project, as well as instructions for arranging City Light inspections.

The requirements stated in the Service Construction Letter will be part of the City Light inspection criteria. The customer is also required to meet all applicable building codes for the city and county jurisdictions in the City Light service area.

### **1.8. Easements**

City Light will secure an easement whenever City Light equipment such as poles, vaults, handholes, conductors, etc. are located on private property in order to serve multiple properties.

### **1.9. Location of, and Excavation Near, Underground Utilities**

Before digging, please contact the Utilities Underground Location Center ("One- Call") at 811 or 1-800-424-5555 at least two business days in advance to locate and mark underground utilities, per state law (RCW 19.122).

All excavations adjacent to City Light poles or other facilities (vaults, handholes, etc.) must comply with WAC 296-155, Part N, Excavation, Trenching and Shoring. Pole protection/supporting systems used while excavating must comply with [WAC 296-155-655](#), General Protection Requirements, item (9) and must not affect the structural integrity of poles while the systems are in place or after the systems have been removed.

### **1.10. Clearance Between 26 kV Overhead Distribution Conductors and Buildings**

The clearance between SCL 26 kV overhead distribution conductors and buildings shall be a minimum of 14 ft.

The 14-ft clearance allows for:

- A safer work environment when performing maintenance
- Building work to occur without the need to request a line outage from SCL
- The performance of routine building maintenance by individuals other than qualified electrical workers
- Scaffolding to be erected, and other exterior maintenance to occur, while meeting the 10-ft clearance rules as described in WAC 296-155-428

City Light transmission lines require even greater clearance. If a project requires work in proximity to any energized lines, City Light may de-energize and ground the lines or relocate the lines temporarily. This work will be done at the customer's expense.

See <i>City Light Construction Standard SCL 0100.04, "Clearance Between 26 kV Overhead Distribution Conductors and Buildings"</i> for more information in the <a href="#">Standards for Electric Service</a> .
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### **1.11. Notification of Added Load**

Customers who wish to add load to existing service must notify City Light per [Seattle Municipal Code 21.49](#) (S) and [WAC 480.100.148](#) (1).

### **1.12. Balanced Load**

The customer's three-phase electrical load must be balanced between phases. For open-delta services, the customer is required to connect all single-phase loads across the grounded phase.

### **1.13. Voltage Surge Protection**

City Light recommends that customers install voltage surge protective devices that provide protection from surges generated within the customer's premises and from the City Light system. It is the customer's responsibility to take the steps as provided by City Ordinance (Seattle Municipal Code 21.49.110) (G) and (Q).

City Light personnel are available to provide information regarding such problems. However, such consultations are not a substitute for professional advice from the customer's contractors and their own professional electrical engineers.

### **1.14. Electromagnetic Interference**

City Light personnel are available to provide information regarding such problems. However, such consultations are not a substitute for professional advice from the customer's contractors and their own professional electrical engineers.

### **1.15. Available Fault Current**

City Light will provide customer with the available fault current upon request. It is the customer's responsibility to provide service entrance equipment designed to handle the available fault current.

### **1.16. Online Resources**

The following City of Seattle resources may be viewed on the Internet:

- [City Light New Construction Website](#)
- [City Light Engineering Standards Library](#)

### **1.17. Installation of Facilities for Other Utilities**

The specifications referenced in this manual do not include facilities for other utilities serving this project.



## **2. Temporary Services**

### **2.1. Introduction**

This chapter provides information on all considerations related to obtaining temporary services, including time limits, permitting and inspections, charges, required equipment, location of service connection, and requirements specific to overhead and underground service.

### **2.2. Requirements, General**

Temporary service locations must be approved by City Light.

The customer must provide temporary service entrance equipment.

### **2.3. Time Limit**

Temporary service installations are limited to a period of one year. An extension may be granted at City Light's discretion.

### **2.4. Electrical Permits and Inspections**

See Section 1.7.

### **2.5. Charges**

See Section 1.5.

### **2.6. Engineering Requirements for Large Services**

Three-phase temporary services and single-phase services greater than 400 A may require City Light engineering design services.

### **2.7. Temporary Overhead Service**

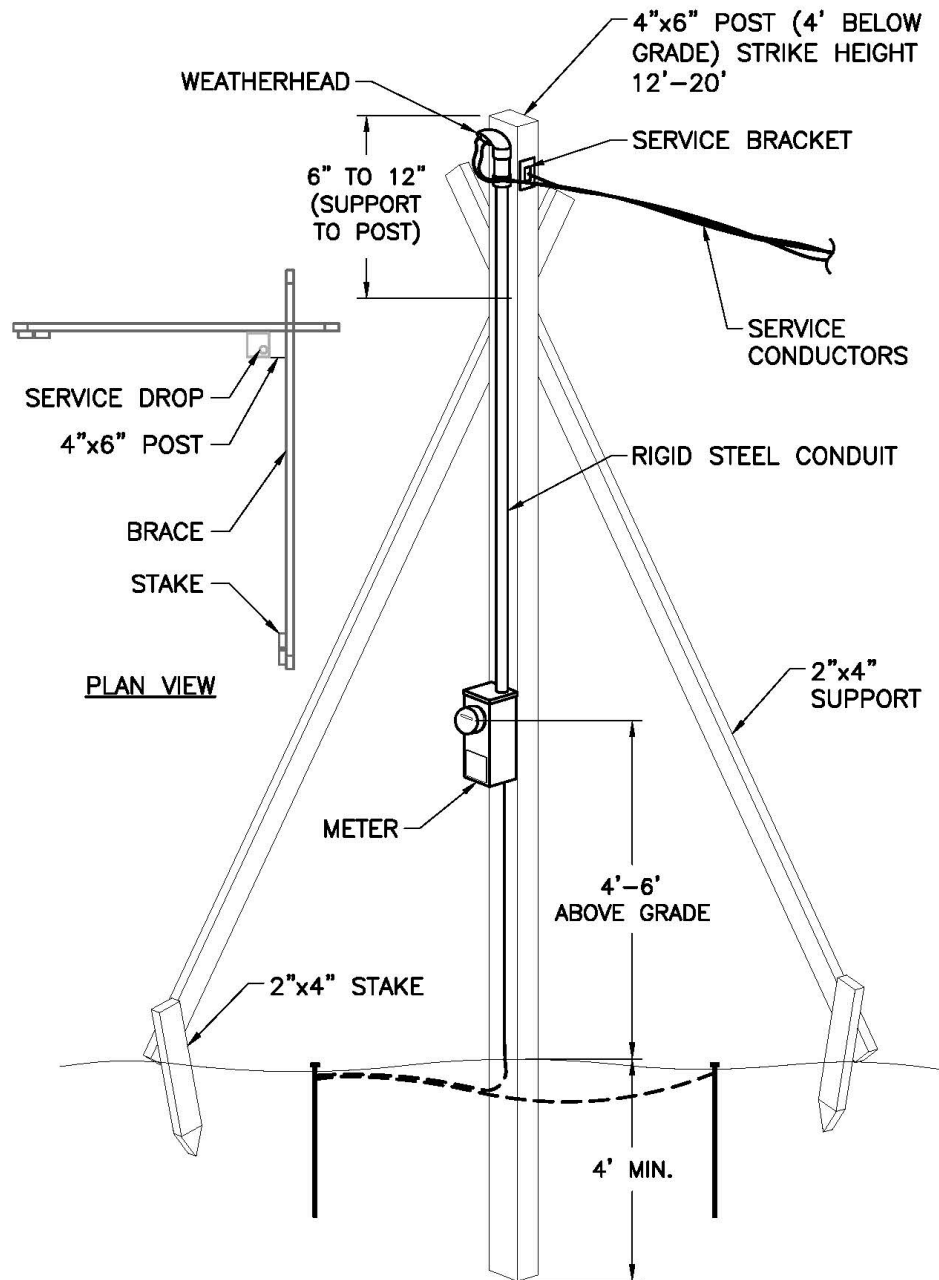
The service attachment must be able to withstand the strain of the service drop. Specifications for temporary posts are shown in Figure 2.7.

The neutral wire must be identified with white tape.

For three-phase, open-delta service, the high leg must be identified with orange tape.

A total of 18 inches of conductor must extend out of the weatherhead.

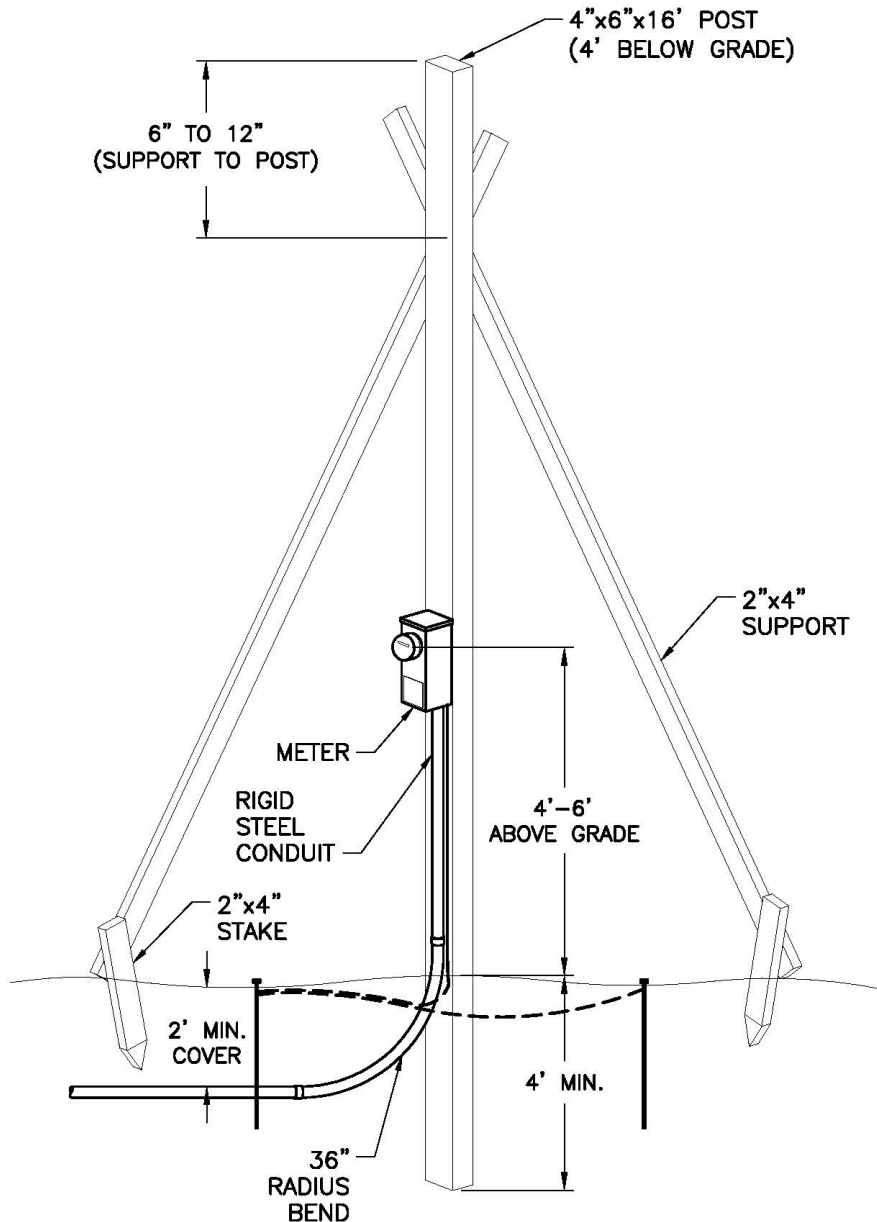
**Figure 2.7. Typical Overhead Temporary Service Pole**



## 2.8. Temporary Underground Service

Customer must install a conduit riser at the temporary panel location and trench to the City Light-designated service stub, handhole, vault, or service pole. Figure 2.8 shows the basic pole and trench specifications.

**Figure 2.8. Typical Underground Temporary Service Pole**



For more information on underground service on private property, See *City Light Construction Standard 0224.01, "Customer Requirements for Underground Secondary Service, Looped Radial System"* and *City Light Construction Standard 0224.07, "Requirements for Secondary Conduit Installation"* in the [Standards for Electric Service](#).

## 3. Looped Radial Service

### 3.1. Introduction

“Looped Radial” refers to the City Light distribution system that comprises the entire service territory outside of the Network areas. It has underground service and underground areas (such as business districts and certain residential areas), but the primary source of wires that feed these customers are from overhead distribution poles.

### 3.2. Availability of Service

Individual structures must typically be serviced by a single service drop. If the customer requires additional amperage to an existing structure, the customer must upgrade the existing service. If the customer requires a different voltage, they may provide the transformation from the voltage provided by City Light. Please see table 3.3, “Available Service Voltages and Maximum Secondary Service Entrance Ratings” for more information.

City Light may provide additional secondary services to development sites in some circumstances, for example:

- To allow for an additional secondary voltage to serve the same site if a pole or underground facility is available to accommodate the necessary equipment. If City Light needs to add equipment to the distribution system to provide a second service, the customer will be billed the full cost of that addition, including the equipment.
- If site has need for physically separated point of service not intended to serve its main structure(s) or operation.

Additional service drops must not be attached to, or feed equipment in, buildings with existing electrical service, and must not be bridled. (See Glossary.)

For an additional primary feed with a different voltage on an existing site, the customer must install a load break vault with the second primary run feeding a separate vault or pad mount transformer cabinet.

City Light may require a utility easement for placement of equipment that will be owned and maintained by the utility. It is the customer’s responsibility to provide legal description(s) and a professional approved surveyed drawing of the property. City Light will secure the easement at the customer’s expense. See section 1.6.8 for more information.

### **3.3. Modifications to Existing Electric Service**

Modifications made to a customer's electric service may require the customer to bring the entire electric service up to current City Light construction standards.

Examples include:

- New meter base
- Change of meter location
- Change of panel location
- Any increase to the load capacity of the service
- Additional meter(s)

Any modifications to underground-fed services that have existing direct-buried cable will require the installation of a new conduit run in accordance with SCL 1561.05. City Light will provide a drawing specifying the route of the conduit required for the installation. All work associated with trenching, backfill, and restoration must be completed by, and at the expense of, the customer. See Section 1.7.

For information on charges related to modifications, see Section 1.5.

### 3.4. Available Service Voltages and Maximum Secondary Service Entrance Ratings

Table 3.3 shows the available service voltages and corresponding maximum secondary service entrance ratings for service in the Looped Radial system

TABLE 3.3. AVAILABLE SERVICE VOLTAGES AND MAXIMUM SECONDARY SERVICE ENTRANCE RATINGS		
Single-Phase Service Voltage (V)	Service	Maximum Secondary Service Rating (A) <sup>b</sup>
120/240	Primary and Secondary	600
240/480	Primary and Secondary	300
Three-Phase Service Voltage (V)		
120/208Y	Primary and Secondary	1000
120/240 Open Delta <sup>a</sup>	Primary and Secondary	600
277/480Y	Primary and Secondary	600
240/480 Open Delta <sup>a</sup>	Primary and Secondary	300
2400/4160Y	Primary only	Not applicable
7960/13,800Y	Primary only	Not applicable
15,420/26,400Y	Primary only	Not applicable

Notes:

<sup>a</sup> The maximum allowable secondary service ampacities indicated in the table represent the total single-phase and three-phase loads combined. The customer will be required to connect all single-phase loads across the grounded phase, unless otherwise agreed to by City Light.

<sup>b</sup> Primary service does not have maximum service ratings.

If service ampacity exceeds 600 A, City Light may require an underground service. At City Light's option, an exception to the maximum service amperes may be granted for 120/208Y service in buildings that are exclusively for residential occupancy. This exception will be in writing.

Single-phase, three-wire and three-phase, four-wire service can be provided. Three-phase, three-wire service is not available at any voltages.

The service rating must be determined by the nameplate ampere rating of the main service disconnect. In the absence of a single main service disconnect, City Light will determine the service rating by the nameplate rating of the main service bus or the rating of the main bus in the service entrance panel, whichever applies.

In buildings where multiple services are connected from one service drop or service lateral, the service rating for the building will be the aggregate of the individual service ratings.

Services to larger buildings, commercial office buildings and apartment buildings may have large electrical services where the aggregate service entrance capacity exceeds the allowed maximum secondary service size listed in Table 3.3. For these services, the customer must provide a vault or pad on private property for City Light transformer(s) and associated service equipment. See Section 3.7, Primary Service.

Transformers connected to the City Light distribution system will be furnished, installed and maintained by City Light.



If the customer requires a voltage other than the stated standard voltages, the customer must supply the equipment required. All special transformation equipment must be installed on the load side of the meter, unless otherwise agreed to in writing.

Vaults, pads, and termination facilities must be furnished by the customer in accordance with City Light standards and other codes pertaining to the corresponding Authority Having Jurisdiction.

### **3.5. Clearances**

All projects must meet the requirements for clearances from utility equipment as specified in SCL 0100.04, SCL D2-3 and SCL 0214.00.

*For more information on clearances, see City Light Construction Standard 0100.04, "Clearance Between 26 kV Overhead Distribution Conductors and Buildings," City Light Construction Standard D2-3; "Clearances from Structures and Ground," and City Light Construction Standard 0214.00; "Clearances Between SCL Underground Assets and Non-SCL Structures and Objects" in the [Standards for Electric Service](#).*

### **3.6. Water Entry Prevention**

The customer is responsible for the following measures to avoid water entry into buildings and service equipment:

- System design that considers elevation differences and other factors that would cause a problem. The design should prevent water from entering the building or electrical equipment to prevent electrical hazard or property damage. A City Light Representative can advise the customer in this concern.
- Watertight grouting of conduit where it enters the building, the vault, or the handhole.
- Watertight conduit sealing for customer/contractor-installed conductors to prevent water from entering the service conduits. The vault interior must remain dry. The customer must prevent water from entering the vault.

### **3.7. Secondary Service**

"Secondary service" is defined as service that can be served from a transformer located in the public right-of-way on a pole, on a pad, or in a vault.

Secondary service can be either overhead or underground, single-phase or three-phase.

Most single-family residential service in the City Light system is single-phase; however, there are instances where three-phase service is available.

Some local jurisdictions regulate the type of services allowed within their boundaries (overhead vs. underground). The customer must contact the Authority Having Jurisdiction to verify allowable types of service.

### 3.7.1. Secondary Overhead Services

Types of secondary overhead service include service mast with and without supporting wires, and wall-mounted.

Neutral must be identified with white tape, high leg identified with orange tape, and three-phase circuits identified appropriately.

The distance between weatherheads served from the same service drop must not exceed 24 inches.

Service entrance conductor sets must have a minimum of 18 inches of wire extending from the weatherhead. If multiple service masts are installed, a minimum of 30 inches of wire must be extended from the weatherhead.

Customer must establish a 3-ft radius of clear space along the path between the utility pole and the strike point on the building.

Service conductors must be free of trespass of neighboring properties.

The point of attachment must be between 12 and 20 ft above grade, with the drip loop a minimum of 11 ft above grade.

For more information on service drop clearances, see *City Light Construction Standard 0130.30, "Secondary Service Drops"* in the [Standards for Electric Service](#).

#### 3.7.1.1 Service Mast Installation

Service mast installation for overhead service entrances may be surface-mounted or flush-mounted.

The customer must provide all the equipment shown in figures 3.7.1.1a and 3.7.1.1b except the City Light-provided meter, which plugs into the customer's meter socket.

Flush mounted meter sockets require a cover inspection by a City Light Representative. See Figure 3.7.1.1b.

A back guy or a stiff-leg set is required if the height between the top of the weatherhead and where the mast clears the roofline exceeds 26 inches or the service drop exceeds 100 ft. See figures 3.7.1.1c and 3.7.1.1d.

City Light-approved service brackets must be furnished and installed by the customer. Brackets and their attachments need to be capable of withstanding the tension of the service wires. The point of attachment must be between 12 and 20 ft above grade. See Figure 3.7.1.1e.

For service masts where the bracket is attached to the mast, rigid steel conduit with two points of attachment is required. Single-phase services must have a minimum 2-inch conduit, three-phase services must have a minimum 3-inch conduit. The service mast must be within 3 ft of the roof edge.

The service bracket must be a minimum of 18 inches above the roofline, and no closer than 8 inches from the weatherhead.

Roof brackets are not allowed.

Service masts must be attached to the structure at two points at least 2 ft apart.

Attachment methods may include the following:

- Kindorf brackets on the exterior of the building.
- U-bolts into a 2 in x 6 in board mounted to studs.

See Figure 3.7.1.1f.

Roof penetrations (e.g., eaves, fascia, etc.) must not be used as an attachment point.

**Figure 3.7.1.1a. Surface-Mounted Service Mast Installation**

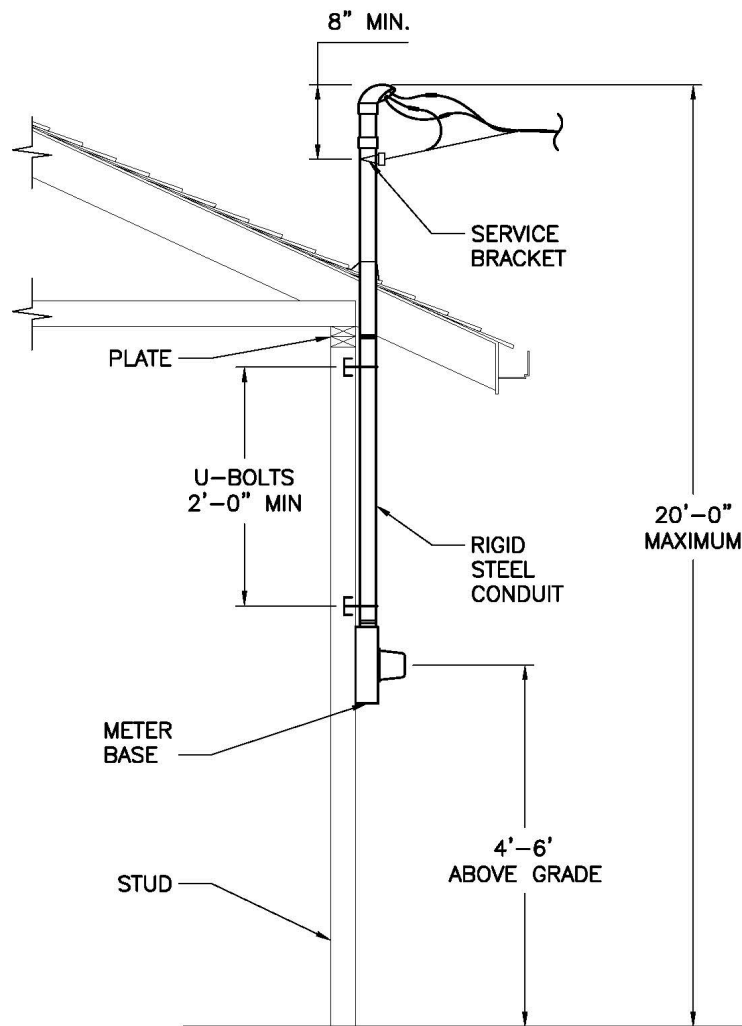
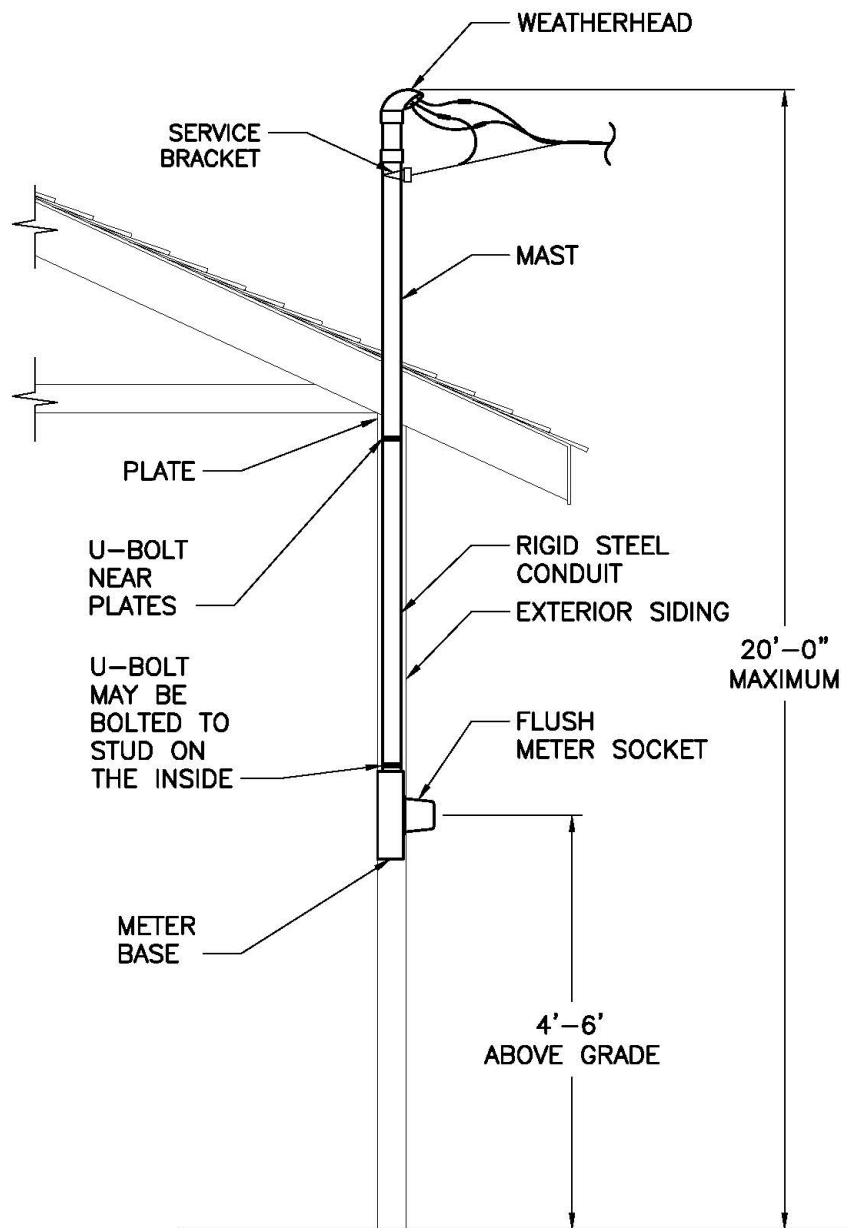


Figure 3.7.1.1b. Flush-Mounted Service Mast Installation



**Figure 3.7.1.1c. Back Guy**



**Figure 3.7.1.1d. Stiff Leg Set**



**Figure 3.7.1.1e. Service Bracket**



**Figure 3.7.1.1f. Kindorf Bracket Attachment**



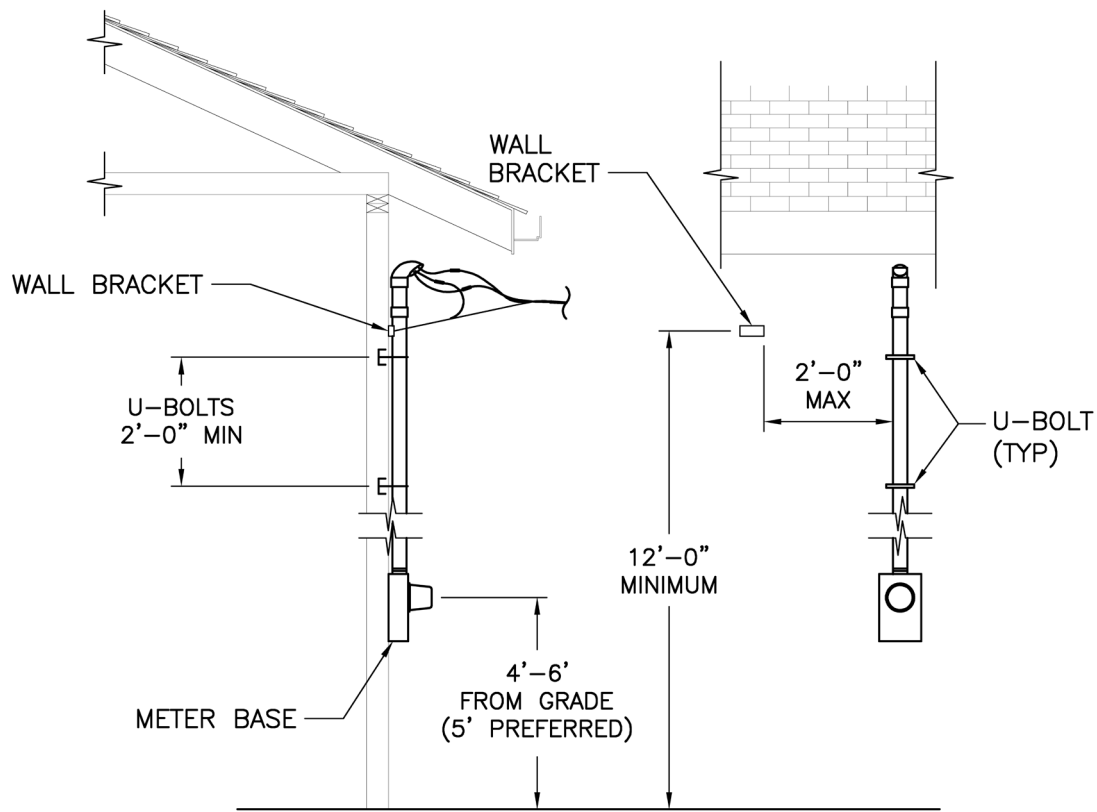
### **3.7.1.2 Wall-Mounted Service Installation**

All wall-mounted service brackets and Kindorf brackets must be secured by lag screws, 3/8 in x 4 in minimum, into solid wood, or 3/8 in bolts through 2 in minimum solid wood.

The point of attachment must be between 12 and 20 ft above grade, with the drip loop a minimum of 11 ft above grade.

The distance from the service bracket to the weatherhead(s) must not exceed 24 inches. See Figure 3.7.1.2.

**Figure 3.7.1.2. Wall-Mounted Service Installation**



### 3.7.1.3 Service Poles and Guys

Service poles are: (1) poles that serve only one customer, and (2) are located on the customer's property. City Light may require a service pole on the customer's property where:

- The distance from the City Light distribution pole to the customer's point of service attachment is greater than 150 ft.
- A clear, direct route without trespass is not available for the service drop from the distribution pole to the customer's point of service attachment.

**Note:** City Light must have a 12 ft-wide access road to set a pole on private property. If this space is not available, services will need to be located underground. See Section 3.7.2.

- The applicable code authority requires a service pole.

City Light will install guys on service poles as needed.



### 3.7.2. Secondary Underground Services

All secondary underground service shall be installed in accordance with SCL 1561.05.

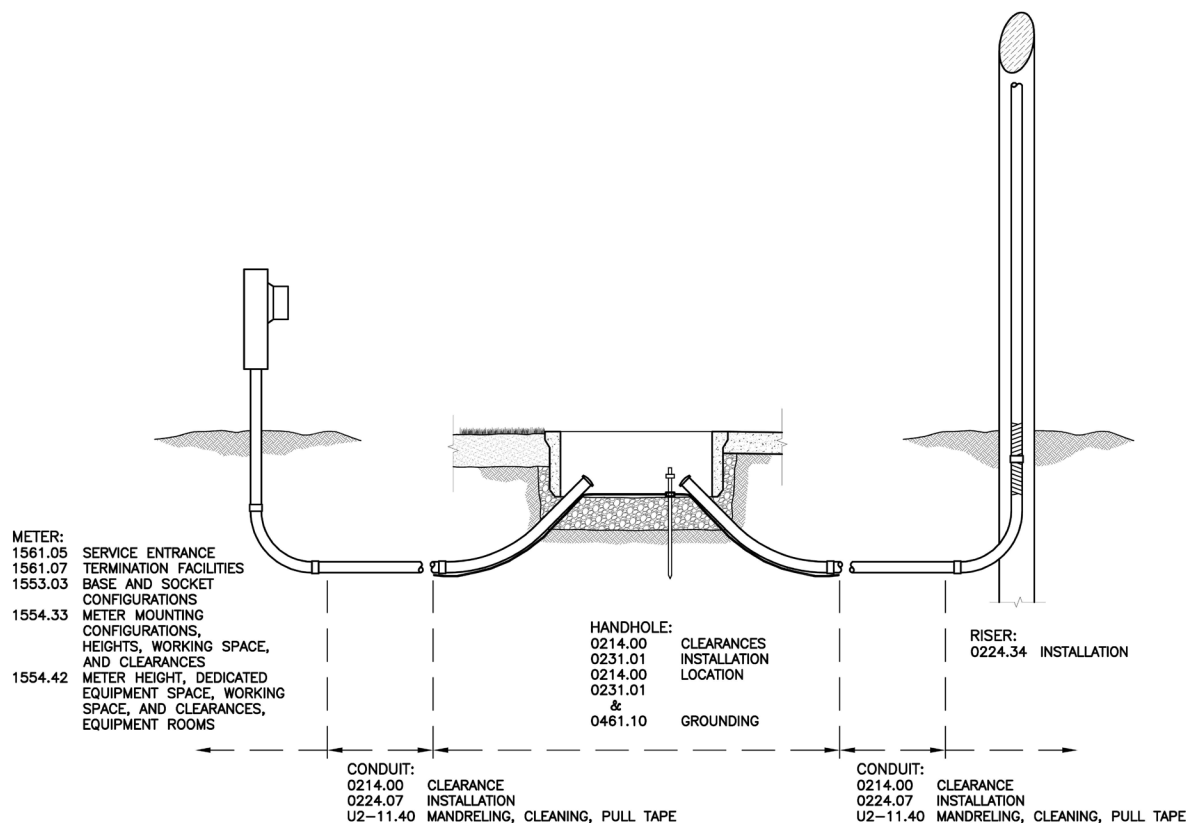
City Light will install the service conductors from the designated point of termination on the customer's property to the City Light facility in the right-of-way or easement area.

It is the customer's responsibility to ensure required clearances between City Light underground structures and other utilities' structures, and to trench up to and expose the location of entry into the SCL facility. A City Light Electrical Reviewer or Underground Crew must supervise the last five feet of conduit installation. Under no circumstances shall a customer or contractor enter an energized facility.

A City Light Electrical Reviewer or Underground Crew must supervise the final 5 ft of trenching to any energized City Light vault or handhole.

Figure 3.7.2 provides a visual guide to all the City Light standards that govern the City Light underground secondary service.

**Figure 3.7.2. Guide to Underground Secondary Service Standards**



For more information on installing secondary underground services, please see *City Light Construction Standard 1561.05, "Customer Requirements for Underground Residential Service Entrances, Single or Dual Meters,"* *City Light Construction Standard 0224.01, "Customer Requirements for Underground Secondary Service, Looped Radial System,"* and *City Light Construction Standard 0214.00, "Clearances Between SCL Underground Assets and Non-SCL Structures and Objects"* in the [Standards for Electric Service](#).

### 3.8. Primary Service

Primary service is any service that exceeds the maximum secondary service capacity shown in Table 3.3. These services require transformers or primary metering enclosures to be located in vaults or on pads located on customer's property.

The customer is required to be aware of and satisfy all applicable building codes for the City of Seattle as well as other cities and county jurisdictions in the City Light service area.

Table 3.8 shows the City Light construction standards corresponding to transformer location.

TABLE 3.8. CONSTRUCTION REQUIREMENTS BY TRANSFORMER LOCATION	
Transformer Location	City Light Standards (see <a href="#">Standards for Electric Service</a> )
Vault inside building	SCL 0751.00, "Customer Requirements, In-Building Transformer Vaults, Network and Looped Radial Systems" SCL 0751.60, "Concurrent Customer Requirements, In-Building Transformer Vaults"
Vault outside building	SCL 0732.50, "Customer Requirements for Below-Grade Transformer Service Vaults, Looped Radial System"
Concrete pad outside building	SCL 0724.50; Customer Requirements for Padmount Transformer Services, Looped Radial System"

*Note: Dimensions of the transformer vault or pad are determined by City Light and are contingent on:*

- *The capacity of transformer(s) to be installed. Transformer size is determined by the customer's total electrical load and aggregate service entrance capacity.*
- *The type of devices used for secondary connection to the customer's NEC-sized service entrance equipment.*
- *The working clearance needed around the equipment.*

All vault and pad-mounted transformers must be located to provide safe access and code clearances from fire escapes, combustible materials, and other hazards. Building owners must make provisions to prevent unwanted debris from accumulating in and around vaults and pads.

The customer must contact City Light well in advance of building design to receive the necessary requirements. These specifications will be provided by City Light in the Service Construction Letter after reviewing the customer's plans.

### 3.8.1. Water Entry Prevention

The customer is responsible for the following measures to avoid water entry into buildings and service equipment:

- System design that considers elevation differences and other factors that would cause a problem. The design should prevent water from entering the building or electrical equipment to prevent electrical hazard or property damage. A City Light Representative can advise the customer in this concern.
- Watertight grouting of conduit where it enters the building, the vault, or the handhole.
- Watertight conduit sealing for customer/contractor-installed conductors to prevent water from entering the service conduits. The vault interior must remain dry. The customer must prevent water from entering the vault.

### 3.8.2. Vault Access

The customer must provide properly supported, unobstructed access from the right-of-way to the vault for City Light equipment handling machinery to deliver all necessary equipment. In-building vaults must not be located more than one floor below the building's exterior finished grade and must have elevator access.

For all properties with an in-building vault, and for properties where below grade vaults and transformer pads are located such that the customer cannot meet the requirements spelled out above, a City Light Equipment Transportation Agreement (ETA) must be signed by the property owner.

An ETA is a legal document in which the building owner(s) take sole responsibility for moving the transformer(s) into and out of the vault, to a mutually agreed-upon location from which City Light is able to deliver or pick up the transformer(s) using our normal transportation methods and equipment.

All ETAs will be recorded on the property title at the property owner's expense, as all future owners are obligated to the same terms and conditions of the agreement. Any damage occurring to the transformer during transportation by the building owner(s) and any additional expense incurred because of said damage must be paid by the building owner(s).

A copy of the ETA must be kept in the vault, permanently installed in a document enclosure on the vault wall beneath the light switch. The customer must provide and install a weatherproof enclosure large enough to hold a paper copy of the ETA.

For vault construction requirements, see: *City Light Construction Standard 0751.00, "Construction Requirement, In-Building Transformer Vaults, Network and Looped Radial Systems"* and *City Light Construction Standard 0751.60, "Concurrent Customer Requirements, In-Building Transformer Vaults"* in the [Standards for Electric Service](#).

### **3.9. Fire Clearance**

All vault and pad-mounted transformers must be located to provide safe access and code clearances from fire escapes, combustible materials, and other hazards. This is necessary to comply with the fire clearance requirements of City Light and the appropriate City, County, or State inspecting authorities. Building owners must make provisions to prevent unwanted debris from accumulating in and around vaults and pads.

The customer must contact City Light well in advance of building design to receive the necessary requirements. These specifications will be provided by City Light in the Service Construction Letter after reviewing the customer's plans.

### **3.10. Vibration and Noise Levels**

The customer is responsible for isolating the transformer vault or pad so that sound and vibration levels satisfy the applicable laws and ordinances of the Washington Administrative Code (WAC), the City of Seattle, or other applicable jurisdictions, including the customer's own requirements. Further, it is the customer's responsibility to mitigate any magnetic field effects from any customer-owned sensitive equipment.

### **3.11. Elevators**

Elevator service must be provided to any building level where a transformer vault is located.

### **3.12. Special Services**

#### **3.12.1. Mobile Home Parks**

City Light will supply one service to a mobile home park per [Seattle Municipal Code 21.49.100](#), Paragraph H, Section 2. Installation and maintenance beyond the service connection point will be the owner's responsibility. Meter locations must be accessible, and meters grouped. See Chapter 6, Metering, for more information.

#### **3.12.2. Mobile Homes on Individual Owner Lots (not part of a mobile home community)**

Mobile home installations that are not part of a mobile home community will require a service pole and meter socket that is not attached to the mobile home, per NEC requirements.

#### **3.12.3. Houseboat Piers**

City Light service for houseboats must be terminated on shore. The termination equipment must also be approved by City Light.

City Light will not upgrade existing overhead distribution on houseboat piers. If additional loads require upgrading of houseboat pier electrical distribution, it is the customer's responsibility to do so.

#### **3.12.4. Boat Moorages**

New or upgraded service to boat mooring establishments must be master metered per [Seattle Municipal Code 21.49.100](#), Paragraph H, Section 1. See Chapter 6, Metering for more information.

#### **3.12.5. Unit Lot Subdivisions**

For unit lot subdivisions, the parent parcel is considered one development site. Service entrance conductors must be combined in such a way that all structures on the parent parcel can be served from one service drop or service lateral directly from the City Light distribution system. The design of the distribution system to serve the site must be within the sole discretion of City Light. No bridled services will be allowed.

## 4. Network Services

### 4.1. Introduction

Network service areas are designed to provide redundancy and continuity of service in the case of outages and include protective devices to prevent backfeed onto the grid. Because of this, there are special rules for customer generation. Please see Chapter 5, "Distributed Energy Resources," for more information.

City Light has four network service areas: Downtown, First Hill, University District, and the South Lake Union Area.

Secondary services in network areas are served from street networks, where the transformers and related equipment are located in facilities in the right of way. Primary services are served from spot networks, where the facilities are located on the property of the service.

This chapter includes general guidelines for service installations in network areas. Customers must contact City Light well in advance of the project starting to receive the required design specifications.

### 4.2. Availability of Service

Individual structures will typically be serviced by a single service drop. If the customer requires additional amperage to an existing structure, the customer must upgrade the existing service. If the customer requires a different voltage, they may provide the transformation from the voltage provided by City Light. Please see table 3.3, "Available Service Voltages and Maximum Secondary Service Entrance Ratings" for more information.

City Light may provide additional secondary services to development sites in some circumstances, for example:

- To allow for an additional secondary voltage to serve the same site if a pole or underground facility is available to accommodate the necessary equipment. If City Light needs to add equipment to the distribution system to provide a second service, the customer will be billed the full cost of that addition, including the equipment.
- If site has need for physically separated point of service not intended to serve its main structure(s) or operation.

Additional service drops must not be attached to, or feed equipment in, buildings with existing electrical service, and must not be bridled. (See Glossary.)

For an additional primary feed with a different voltage on an existing site, the customer must install a load break vault with the second primary run feeding a separate vault or pad mount transformer cabinet.

City Light may require a utility easement for placement of equipment that will be owned and maintained by the utility. It is the customer's responsibility to provide legal description(s) and a professional approved surveyed drawing of the property. City Light will secure the easement at the customer's expense. See section 1.6.8 for more information.



### 4.3. Clearances Between SCL Underground Structures and Other Structures

All projects must meet the requirements for clearances between SCL underground structures and other structures as specified in SCL 0214.00.

See City Light Construction Standard 0214.00; "Clearances Between SCL Underground Assets and Non-SCL Structures and Objects" in the [Standards for Electric Service](#).

### 4.4. Permitting and Inspections

See Section 1.7.

### 4.5. Service Notes, General

All services in the Network system are underground.

Single-phase, three-wire and three-phase, four-wire service can be provided. Three-phase, three-wire service is not available at any voltages.

The service rating must be determined by the nameplate ampere rating of the main service disconnect. In the absence of a single main service disconnect, City Light will determine the service rating by the nameplate rating of the main service bus or the rating of the main busing in the service entrance panel, whichever applies.

In buildings where multiple services are connected from one service drop or service lateral, the service rating for the building must be the aggregate of the individual service ratings.

Table 4.5 shows the available service voltages and corresponding maximum service entrance ratings for secondary service in Network Areas.

TABLE 4.5. AVAILABLE SERVICE VOLTAGES AND MAXIMUM SECONDARY SERVICE ENTRANCE RATINGS FOR NETWORK AREAS	
Single-Phase Service Voltage (V)	Maximum Secondary Service Rating (A)
120/208	200
277/480	100
Three-Phase Service Voltage (V)	
120/208Y	1000
277/480Y	600

<sup>a</sup> The maximum allowable service ampacities indicated in the table represent the total single-phase and three-phase loads combined. The customer will be required to connect all single-phase loads across the grounded phase, unless otherwise agreed to by City Light.

Services to larger buildings, commercial office buildings and apartment buildings may have large electrical services where the aggregate service entrance capacity exceeds that allowed maximum secondary service size listed in Table 4.5. For these services, the customer must provide a vault on private property for City Light transformer(s) and associated service equipment. Such a vault for City Light transformer(s) must be located on the site being serviced, or in an easement area on private property.

#### 4.6. Vault Construction

For vault construction requirements, see *City Light Construction Standard 0751.00, "Construction Requirement, In-Building Transformer Vaults, Network and Looped Radial Systems"* and *City Light Construction Standard 0751.60, "Concurrent Customer Requirements, In-Building Transformer Vaults"* in the [Standards for Electric Service](#).

Dimensions of the transformer vault are determined by City Light and are contingent on:

- The capacity of transformer(s) to be installed. Transformer size is determined by the customer's total electrical load and aggregate service entrance capacity.
- The type of devices used for secondary connection to the customer's NEC-sized service entrance equipment.
- The working clearance needed around the equipment.

#### 4.7. Water Entry Prevention

The customer is responsible for the following measures to avoid water entry into buildings and service equipment:

- System design that considers elevation differences and other factors that would cause a problem. The design should prevent water from entering the building or electrical equipment to prevent electrical hazard or property damage. A City Light Representative can advise the customer in this concern.
- Watertight grouting of conduit where it enters the building, the vault, or the handhole.
- Watertight conduit sealing for customer/contractor installed conductors to prevent water from entering the service conduits. The vault interior must remain dry. The customer must prevent water from entering the vault

#### 4.8. Vault Access

The customer must provide properly supported, unobstructed access from the right-of-way to the vault for City Light equipment handling machinery to deliver all necessary equipment. In-building vaults must not be located more than one floor below the building's exterior finished grade and must have elevator access.

For all properties with an in-building vault, and for properties where below grade vaults and transformer pads are located such that the customer cannot meet the requirements spelled out above, a City Light Equipment Transportation Agreement (ETA) must be signed by the property owner.

An ETA is a legal document in which the building owner(s) take sole responsibility for moving the transformer(s) into and out of the vault, to a mutually agreed-upon location from which City Light is able to deliver or pick up the transformer(s) using our normal transportation methods and equipment.

All ETAs will be recorded on the property title at the property owner's expense, as all future owners are obligated to the same terms and conditions of the agreement. Any damage occurring to the transformer during transportation by the building owner(s) and any additional expense incurred because of said damage must be paid by the building owner(s).

A copy of the ETA must be kept in the vault. The customer must provide and install a weatherproof enclosure large enough to hold a paper copy of the ETA. The ETA must be permanently installed in a document enclosure on the vault wall beneath the light switch.

#### **4.9. Fire Clearance**

All vault and pad mounted transformers must be located to provide safe access and code clearances from fire escapes, combustible materials, and other hazards. This is necessary to comply with the fire clearance requirements of City Light and the appropriate City, County, or State inspecting authorities. Building owners must make provisions to prevent unwanted debris from accumulating in and around vaults and pads.

The customer must contact City Light well in advance of building design to receive the necessary requirements. These specifications will be provided by City Light in the Service Construction Letter after reviewing the customer's plans.

#### **4.10. Vibration and Noise Levels**

The customer is responsible for isolating the transformer vault or pad so that sound and vibration levels satisfy the applicable laws and ordinances of the Washington Administrative Code (WAC), the City of Seattle, or other applicable jurisdictions, including the customer's own requirements. Further, it is the customer's responsibility to mitigate any magnetic field effects from any customer-owned sensitive equipment.

#### **4.11. Elevators**

Elevator service must be provided to any building level where a transformer vault is located.

#### **4.12. NEC-Sized Service Entrances in Network Areas**

The maximum size of an NEC cable allowed to enter a vault is 750 kcmil.

Depending on transformer size, City Light may terminate a maximum of six (6) sets of NEC-sized cables directly on the transformer secondary terminals.

#### 4.13. Secondary Service

The aggregate service ampacity must be limited to 1000 A at 120/208Y, or 600 A at 277/480Y, depending on which is available.

Where the service entrance ampacity exceeds 200 A at 120/208Y or 100 A at 277/480Y, the service must be three-phase, four-wire, and the load must be balanced.

The customer must install the necessary conduit to the City Light-designated point of termination. City Light will extend this conduit to the City Light service handhole or vault and install service conductors to the point of service connection designated by City Light.

**TABLE 4.13. REQUIREMENTS FOR RESIDENTIAL AND MULTI-FAMILY SERVICE IN NETWORK AREAS**

<b>Single-Phase Service Voltage (V)</b>	<b>Requirement(s)</b>
120/208 up to 200 A	The customer must install service conduit to a City Light-designated point on the property line.
277/480Y up to 100 A	The customer must install service conduit to a City Light-designated point on the property line.
<b>Three-Phase Service Voltage (V)</b>	
120/208Y greater than 1000 A	The customer must supply a transformer vault or space on the premises for our transformer(s), as well as service conduits to the property line as specified by City Light. The transformer vault must be approved by City Light and must be in compliance with City Light electrical and building codes.).
277/480Y greater than 600 A	The customer must supply a transformer vault or space on the premises for our transformer(s), as well as service conduits to the property line as specified by City Light. The transformer vault must be approved by City Light and must be in compliance with City Light electrical and building codes.).

#### 4.14. Primary Service

Contractors must notify City Light well in advance of designing their buildings, as the requirements for primary service may alter the building design. For example, City Light may require space not only for the vault, but for a primary switchgear room as well.

Where the aggregate service entrance capacity exceeds 1000 A at 120/208Y or 600 A at 277/480Y, the customer must provide a vault or other suitable facilities on private property for the City Light transformer(s) and associated service equipment. Such vault or other facility for Utility transformer(s) must be located on the site being served.

Services greater than 600 A at 277/480Y will be required to be spot networks. They cannot be served from the adjacent street network.

#### **4.15. Fault Current Limiters**

When the customer installs fault current limiters on the line side (the City Light side) of the first disconnect or main breaker, the customer must install a current limiter enclosure that meets the requirements below:

The enclosure must be sealable and separate from our service termination point. The customer's weatherhead, service terminal box, meter socket, and current transformer enclosures are not acceptable locations for current limiters.

The current limiter enclosure must be clearly marked "Fault Current Limiters," and it may not be used for any other purpose, such as a connection point for taps or extensions.

The customer is responsible for maintaining and replacing fault current limiters. If repair or maintenance operations require City Light to temporarily disconnect the service, the customer will be billed for this labor. After any maintenance operation, the customer must notify City Light for replacement of meter seals.

## 5. Distributed Energy Resources

DERs are sources, and groups of sources, of electric power that are interconnected with the City Light Distribution System, including generators and energy storage technologies capable of exporting power. Examples of DERs include solar arrays, wind generators, batteries, and fuel cells.

### 5.1. General Provisions

All customers who interconnect with the City Light distribution system must submit an interconnection application and a signed interconnection agreement with City Light to City Light prior to commencing generation.

All DER installations must be inverter-based.

The cumulative output of the inverter(s) is measured in kW AC

DER power export is prohibited in the City Light Network areas, but customers are allowed to generate to offset consumption. For more information, see Section 5.4, "Distributed Energy Resources within the City Light Network Areas."

The customer must also submit a one-line diagram showing the generation system, proposed metering locations, and how the system interconnects to the building's electrical system.

If customer generation is being connected to an existing service, the location of the interconnection meter socket must meet all current requirements for access and placement as defined in Chapter 6, Metering.

All systems with a generating capacity of 25 kW or greater shall have a lockable AC disconnect adjacent to and on the load side of the interconnection meter or at a location approved by City Light.

**Exception:** City Light Network areas have special labeling and disconnect provisions. See Section 5.5.

Line side taps are not allowed in meter sockets or current transformer (CT) cabinets.

### 5.2. Net Metering

City Light offers net metering Per [Seattle Municipal Code 21.49.082](#) up to 100 kW AC of generating capacity from DERs.

**Exception:** Installations above 100 kW AC of generating capacity, but less than 2 MW AC are eligible for the City Light Large Solar Program. Contact your City Light Representative (for information about this program).

### 5.3. Engineering Review

City Light Engineering may evaluate the proposed DER for adverse impacts to the SCL distribution system. If an adverse impact is determined, additional engineering analysis will be required. This may delay the commissioning of the installation. An engineering review is required if any one of the following conditions is met:

- DER is over 10 kW AC
- An integrated battery back-up system is present
- DER is within a Network service area

### 5.4. Distributed Energy Resources (DERs) within City Light Network Service Areas

All DER installations within City Light Network services areas will be subject to approval by City Light Engineering and must meet all requirements listed in Chapter 4.

Interconnection of a DER requires compliance with the latest revision of IEEE standard 1547-2018, *Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces*. As such, customers may generate to offset load, but backfeed is not allowed.

The aggregate generating capacity of the DER must not exceed a previously selected percentage of the total service capacity. If solar energy DERs are used exclusively, only the anticipated daytime minimum load must be considered. City Light will select one of the following methods to determine anticipated minimum load:

- The measured minimum load in the previous year, if available
- Five percent of the maximum load of the previous year
- The applicant's good faith estimate, if provided
- City Light's good faith estimate if provided in writing to the Applicant along with the reasons why City Light considered the other methods to estimate minimum load to be inadequate.

The DER will require a protective scheme as specified by City Light. Any associated equipment will be installed at the customer's expense.

### 5.5. Labeling and Disconnect Provisions

All disconnect switches shall have the following characteristics:

- Twenty-four (24)-hour accessibility to utility personnel as defined in [Seattle Municipal Code: 21.49.110](#), Section N
- Location to be approved by City Light prior to system installation
- A visible break component to be approved by City Light
- Provision for locking in the open position (only)

All signage must be installed per NEC 110.21 (B) and (C).

## **5.6. Microgrids**

A microgrid is an interconnected energy system with the capability to island and operate autonomously. A microgrid is composed of load, one or more sources of generated energy, and a balancing controller.

Customer-owned microgrids will require an engineering review and approval. Contact your City Light Representative for more information.



## 6. Metering

### 6.1. Introduction

Electricity meters are required for all electrical services so City Light can determine customer usage for accurate billing and for maintaining appropriate distribution to our customers.

City Light provides and installs all electricity meters for customer-installed meter sockets. This chapter describes the requirements for equipment, location, and clearances for both simple and complex meter installations.

City Light installs and maintains meters, instruments, transformers and associated equipment that are located on the City Light side of the meter. City Light has ownership of this equipment. Customer-owned, installed, and maintained equipment includes meter sockets, enclosures, landing pads, lugs, conduit, and conductors.

City Light will determine the specific metering equipment requirements after reviewing customer plans and / or drawings.

Drawings must be submitted and approved for customer-designed pedestals or other structures on which the customer is proposing to mount metering or service entrance equipment. All drawings or prints submitted to City Light must be engineering or architectural grade.

### 6.2. Requirements, General

#### 6.2.1. Electric Utility Service Equipment Requirements Committee (EUSERC) Material and Equipment Requirements

All electric service installations must be constructed of material and equipment that meet the applicable requirements of EUSERC standards. Contact your City Light Representative for questions regarding EUSERC.

#### 6.2.2. Service Entrance Conductors for Metered Loads

Unmetered service conductors must be continuous from the service connection point to the meter socket or current transformer enclosure, or in a main disconnect for group installations.

Unmetered service conductors must not pass through any junction box, conduit, or fitting, or have any other point of access, regardless of lockable function.

Unmetered service conductors and metered load conductors must be run in separate conduit, raceway, or wire trough.

For multi-meter installations, the use of bus or wire troughs is permitted for unmetered service conductors if the enclosures are approved, sealable, and lockable by City Light.

Metering equipment, enclosures, and wire troughs containing unmetered service conductors and/or bus must be sealable and lockable as determined by City Light.

Metered load conductors must not pass through sealable sections, including current transformer enclosures.

Any and all equipment or switchgear compartments that afford access to unmetered service conductors or bus bar must be sealable and lockable by City Light.

### 6.2.3. Conductor Connections

For aluminum conductors and connections, an oxide inhibitor must be used. The meter socket must have lugs approved for aluminum.

When copper is used as conductor, meter terminals, and/or socket jaws, an oxide inhibitor must not be used.

## 6.3. Voltages

All services must be metered at the service voltage.

**Exception:** 480Y/277 V, three-phase services transformed to 120/208 or 120/240 for distribution in multi-unit buildings is allowed.

All primary voltage services (4160 V, 13,800 V and 26,400 V) must be metered at the service voltage in accordance with the Electric Utility Service Equipment Requirements (EUSERC) standards and City Light Construction Standards.

For voltages greater than 600 V, contact your City Light Representative for primary voltage metering requirements.

## 6.4. Meter Sockets

While City Light provides and installs the meter and instrument transformers, the customer is responsible for providing and installing the meter socket and current transformer enclosure as applicable. See Section 6.9 for Current Transformer rated service requirements.

All meter sockets must meet ANSI C12.1 and UL 414 Standards for Meter Sockets.

Meter sockets and equipment enclosures must be raintight, NEMA 3R rated if they are located outside.

It is important to refer to *City Light Construction Standard 1553.03, "Meter Base and Socket Configurations"* (see [Standards for Electric Service](#)), to identify the correct meter socket for your application in order to avoid delays to receiving service.

Commercial services require either a block bypass or a safety socket.

Block bypass sockets are required on 400 A (class 320) residential services.

200 A residential services do not require block bypass sockets; however, they are strongly recommended.

Block bypass sockets are required on three phase services when the voltage is less than 277 V to neutral or 480 V phase to phase.

Safety sockets are required when the service voltage is 277 V to neutral or 480 V phase to phase.

City Light does not allow automatic, lever type, or slide-link socket bypass devices.

City Light does not allow ringless meter sockets/bases of any type.

Sockets must be plumb and securely fastened to the supporting structure.

Unused threaded or knockout openings must be closed with an approved plug locked in place from the inside.

Only metering taps are allowed in meter sockets. Examples of metering taps are the 5th and 7th terminal connections to the neutral and a 5th terminal connection to the unmetered leg as in existing three-phase, three-wire Delta services.

5th terminals must not be installed in 120/240 V sockets.

The line side conductors must be connected to the top terminals of the meter socket. The load side conductors must be connected to the bottom terminals.

**Exception:** Production meter sockets must be wired with the line side conductors connected to the bottom terminals, and the conductors from the generation source on the top terminals.

Flush-mounted meter sockets must be encased in concrete or require cover inspection.

Meter rings will be provided by City Light.

## **6.5. Location, Access, and Protection of Metering Equipment**

### **6.5.1. Location**

Single-meter sockets must be installed in an accessible location outside the building. Multiple socket installations may be located outside or inside the building.

Metering equipment must not be installed over stairs, stairwells, steps, or public walkways. If mounted on a balcony or platform, a fixed stairway to the area is required and must be maintained for the duration that the service exists. Ship's ladders are not allowed. For balcony or platform installations the structure must be professionally engineered. The structure must meet all Washington Administrative Code (WAC) requirements. City Light requires meshing be installed on the railing as an additional safeguard with the opening not to exceed 1/2 inch.

City Light may post a Utility logo on the outside of meter room doors. City Light will inspect and approve the customer's choice of location for meter sockets and metering equipment prior to beginning equipment installation. The location must be free from vibration, corrosive atmosphere, and extreme temperatures.

Equipment rooms where meters are installed must be for the sole purpose of electrical switchgear and metering equipment. Under no circumstances will gasoline, diesel fuel, propane, paints, or any other noxious or hazardous materials be stored in a meter room.

Meter locations must not be under or over any structure which might be enclosed or removed in the future, such as a porch, deck, carport, or stairway.

All current transformer enclosures must be installed in an accessible location outside the building or in an approved equipment room. For residential services the current transformer enclosures must be outdoors and accessible during normal business hours.

#### **6.5.2. Access to Metering Equipment**

City Light reserves the right to access the customer's premises during normal business hours (Monday through Friday, 8 AM to 4 PM) for meter reading, testing, installation, removal, inspection, and/or maintenance of City Light equipment.

The location must be readily accessible without risk of bodily harm to City Light employees.

Access must not be blocked by either permanent or portable materials.

The area around all City Light equipment must be free from vegetation.

Any fenced/enclosed areas and/or metering cabinets/enclosures must be made accessible with a City Light-provided key box at the owner's expense. This lock box will be co-located with the Fire Department's Lock Box (where applicable). The customer must provide keys and/or key cards.

All metering equipment covers must be readily accessible. They may not be plastered, caulked, or built in, in any way, so as to impede the opening of the meter cover or metering equipment covers including current transformer enclosure covers or doors.

All metering equipment doors must open a minimum of 90 degrees from the front of the enclosures. Outdoor equipment enclosure doors must have a hold open device.

#### **6.5.3. Physical Protection of Metering Equipment**

Where damage of metering equipment has or is likely to occur from vandalism, vehicles or other causes, City Light may require the customer to install protective devices such as bollards, barriers, or enclosures at the customer's expense.

Pedestal metering equipment must be sturdy enough for reasonable installation or removal of a meter without damage to the pedestal. Contact your City Light Representative for requirements.

Indoor spaces housing metering equipment must have the ambient air temperature maintained below 30 degrees C (86°F). The customer is responsible for cost of maintenance, repairs and replacement of meter equipment resulting from ambient temperature.

## 6.6. Meter Height, Working Space, and Clearance Requirements

All meter installations must meet the requirements as specified in SCL 1554.33 and SCL 1554.42.

For more information on meter height, working space, and clearance requirements, see *City Light Construction Standard 1554.33, "Meter Mounting Configurations, Heights, Working Space, and Clearances, Exterior (Outdoor)* and *City Light Construction Standard 1554.42, "Meter Height, Dedicated Equipment Space, Working Space, and Clearances, Equipment Rooms* in the [Standards for Electric Service](#).

## 6.7. Service Entrance Equipment Sequencing

### 6.7.1. Single Self-Contained Meter Installation:

- The meter socket must be installed ahead of the fused disconnect/circuit breaker. A fused disconnect/circuit breaker cannot precede the meter except in certain multi-unit installations (described below).
- Pedestal metering must not contain the customer's main disconnect.

### 6.7.2. Multi-Unit Self-Contained Meter Installations

- A main disconnect/breaker may be installed ahead of the meter sockets in multi-unit installations of more than six individual sockets provided that all equipment ahead of the meters has sealing provisions.
- The breaker must be the common trip type, i.e., must open or close all ungrounded conductors simultaneously. The breaker must be constructed to prevent being changed to a non-trip type.

## 6.8. Metering Requirements for Multi-Unit Buildings

The number of meter centers in apartment buildings must not exceed one for every three floors.

Prior to meter installation all meter sockets must be identified with permanent labeling by final space or unit number, letter designation, and/or street address. Meter sockets must have engraved phenolic nameplates installed on the cover of the meter socket.

**Note:** Felt-tip pens and label-maker tape are not considered permanent marking.

Permanent numbering of the separately metered spaces or units is required. If it is not practical before meter installation, the customer must provide temporary identification at the main entrance of the space for the purpose of performing space checks.

Please see the appendix document, "Contractor's Pre-Installation Checklist Multi-Unit Metering," for more information.

All multi-unit buildings must have at least one meter for each unit. Where common load exists, an additional house meter is required.

City Light-conducted space checks are required for all new and rewired multi-unit buildings to verify socket-to-unit panel wiring.

All auxiliary dwelling units without separate metering, and/or units found to have mixed or common loads will be billed in the owner's name.

After the initial service installation, all additional space checks, address changes, and mixed- load checks will be charged to the owner or person making the request.

Load determination will be based upon the greatest aggregate nameplate ratings of each fused disconnect or circuit breaker.

For information on meter height, working space, and clearances for equipment (meter) rooms, see *City Light Construction Standard 1554.42, Meter Height, Dedicated Equipment Space, Working Space, and Clearances, Equipment Rooms* in the [Standards for Electric Service](#).

## 6.9. Current Transformers

### 6.9.1. Current Transformer-Rated Metering

Current transformers (CTs) and/or voltage transformers are required on all services that exceed 225 A. See Figure 6.9.1 for a typical CT service.

**Exceptions:** (1) residential services with 400 A services that use class 320 metering, and (2) remote metering with services under 225 A.

**Figure 6.9.1. CT Service, Typical**



All transformer-rated meter sockets must have test switch provisions.

### 6.9.2. Landing Pads and Enclosures

Current transformer enclosures must contain only service conductors, metering equipment, and meter conductors. They must not be used as a junction box, gutter, or raceway for the purpose of making taps.

**Exception:** Taps must be allowed on the load side of the customer's landing pads to accommodate emergency services, fire pumps, and/or elevator ventilation systems as allowed by local/national fire codes.

All services rated at 800 A or less that use current transformer landing pads having mechanical lug provisions for termination of line and load conductors. Landing pads must be centrally mounted in the current transformer enclosure and the conductors will enter and leave near the corners.

**Note:** If terminations cannot be made in accordance with manufacturer requirements and/or equipment listing, a bus gutter will be required to accommodate additional taps.

The minimum size of current transformer enclosures must be as follows:

- Single-phase 400 A or under: 24 inches wide x 48 inches high x 11 inches deep
- Single-phase over 400 A: 36 inches wide x 48 inches high x 11 inches deep
- Three-phase: 36 inches wide x 48 inches high x 11 inches deep

**Note:** Larger current transformer enclosures may be necessary depending on the National Electric Code (NEC) requirements for conductor bends.

All landing pads must be of heavy-duty type with minimum (AIC) fault duty rating of 50,000 A rms symmetrical. They must be UL labeled.

The cover of the current transformer enclosure or switchgear must be side-hinged and have provisions for locks and seals. Hinges must be built so that they cannot be disassembled from the outside of the enclosure.

The top of the current transformer enclosure must not be higher than 7 ft and the bottom must not be lower than 6 inches from the finished grade or floor.

Connection to the grounded service conductor (neutral) must not be used to bond current transformer enclosures. Bonding must be derived from the service main grounding point.

### 6.9.3. Secondary Wiring

The customer must provide a 1-inch minimum conduit between the current transformer enclosure and the meter socket. A maximum of 360 degrees of bends is allowable. For metering runs over 75 ft, a 1-1/4-inch minimum conduit is required.

Junction boxes and condulets are not allowed in conduit runs for secondary metering conductors.

The customer must provide metering secondary conductors, leaving 8 ft of wire in the current transformer enclosure and 2 ft of wire in the socket enclosure.

**Exception:** City Light will provide the metering secondary conductors when the socket is within 10 ft of the current transformer enclosure.

All secondary conduit runs over 75 ft must have prior approval by the City Light Technical Metering Unit. Conduit runs beyond 250 ft are not permitted.

The conductor colors for CT metering secondary runs are as follows:

- Single-phase: 1 black, 1 red, #12 solid conductor (voltage)
- 1 black, 1 red and 1 white #10 solid conductor (current)
- 1 green #12 solid conductor (bonding)
- Three-phase: 1 black, 1 red, 1 blue, 1 white, #12 solid conductor (voltage)
- 1 black, 1 red, 1 blue, 1 white #10 solid conductor (current)
- 1 green #12 solid conductor (bonding)

For secondary runs over 75 ft the current conductors need to be sized as follows:

- #8 stranded conductors for current circuits from 75 ft to 150 ft
- #6 stranded conductors for current circuits from 150 ft to 250 ft

## 6.10. Switchgear

### 6.10.1. General

City Light's Technical Metering Unit will provide the customer with specific information on metering requirements for individual projects after they have reviewed plans submitted by the customer. Prints or drawings of the metering equipment must be submitted and approved by City Light prior to manufacture when the equipment is to be installed in switchgear. The drawings need to show the sequence of compartments, dimensions of the gear and manufacturer information.



### 6.10.2. Switchgear Operating at Voltages Up to and Including 480 V

Multiple self-contained metering: the clear space around each meter socket will not be less than one inch at the top and the sides, and not less than 2 inches at the bottom.

All clearances must meet requirements specified in *City Light Construction Standard 1554.42, Meter Height, Dedicated Equipment Space, Working Space, and Clearances, Equipment Rooms* in the [Standards for Electric Service](#).

The termination cabinet, current transformer cabinet and any other switchgear section exclusively under City Light's control must not contain any customer equipment that requires servicing, control wiring or load monitoring equipment. These sections must contain only service entrance conductors/bus and City Light metering equipment. For further information contact your City Light Representative.

Permanent switchboard metered services must not have the electric meter located on the switchboard door adjacent to the current transformer compartment. The meter must be located in a remote single meter socket with a test switch provision on the nearest possible wall.

**Note:** Permanent engraved phenolic unit or equipment designation labeling is required at both the meter socket and the switchboard.

### 6.10.3. Switchgear Operating at Voltages Greater Than 480 V

Contact your City Light Representative for requirements and construction guidelines.

## 6.11. Master Metering

City Light will not supply electricity for any new service to a duplex or multiple dwelling building for the purpose of master metering the energy usage of the dwelling units, a central space heating system, or a central domestic water heating system, per [Seattle Municipal Code 21.49.100](#). City Light will not supply electricity for any upgraded service to an existing duplex or multi-unit building for the purpose of master metering new central or individual space heating systems.

An owner-occupied dwelling unit also containing an additional "accessory housing unit" meeting all provisions as defined in [Seattle Municipal Code 23.44](#) and approved by the City of Seattle will be allowed to master meter.

Master metering is required for boat moorages but prohibited for houseboats.

## 6.12. Advanced Metering Infrastructure (AMI) for Meter Rooms

Where meter rooms are vertically stacked, a 2-inch Schedule 40 PVC conduit pathway connecting all of the meter rooms must be provided for the Advanced Metering antenna cable. Lateral meter rooms should also be tied into the vertical distribution stack whenever possible.

The conduit must have a maximum of 360 degrees in total bends.

A 1/8-inch minimum nylon zip tie pull string is to be provided in the conduit.

All connection cables for Advanced Meters will be provided by City Light and installed by the customer. City Light will make all connections.

Cables must be in contiguous runs, without splices, unless otherwise approved by City Light.

In either the top-most or bottom-most meter room (including sub-grade meter rooms), provide a 2-inch Schedule 40 PVC conduit to a NEMA 3R enclosure (enclosure must be at least 8 in x 8 in x 6 in) mounted on exterior of the building. The conduit must have a maximum of 360 degrees in total bends and be no more than 100 ft of total length.

A 1/8-inch minimum nylon zip tie pull string is to be provided in the conduit.

NEMA 3R enclosure must be mounted in a location that is approved by City Light and is safe to access. NEMA 3R enclosure must be mounted between 14 and 20 ft above ground level, unless roof top access is available and can be accessed without hazard/restraint.

Cables must be in contiguous runs, without splices, unless otherwise approved by City Light.

In the meter room with conduit to the exterior of building, the customer must provide a 2 ft by 2 ft by 3/4-inch plywood mounting board with dedicated duplex receptacle:

- Plywood must be mounted on wall adjacent to meter (or meter bank) less than 20 lineal ft from closest meter.
- The bottom edge of the plywood mounting board must be between 4 and 6 ft above floor level.
- A dedicated 120 V, 15 A duplex power receptacle must be located below the plywood mounting board.

### **6.13. Communications Provisions for Large Metered Loads**

New or enlarged commercial/industrial services served by a single meter with loads that are expected to reach 1 megawatt or more, or that will be totalized, are required to have a phone line or communication line that meets City Light requirements at the point of metering. The customer must own, install, and maintain the phone/communication line.

Totalizing is permitted per [Seattle Municipal Code 21.49.010](#). For more information, contact your City Light Representative.

Where totalized metering is permitted, the customer must install the totalizing circuitry. Meter totalizing must meet the Utility's criteria and be approved by City Light before metering equipment will be installed

#### **6.14. Temporary Totalized Metering**

At City Light's discretion, Temporary Totalized Metering may be utilized to capture a customer's total consumption for billing purposes. This temporary metering will generally apply to a project during initial construction but may be used when a customer is altering or upgrading their service entrance equipment.

All required equipment for this metering will be the sole responsibility of City Light, and all metered consumption will be billed in accordance with the appropriate rate schedule.

If a customer completes a Temporary Totalized Metering Agreement Form with the assistance of the appropriate City Light Representative, they will be allowed to shunt self-contained meter sockets prior to installation of the permanent metering.

Once the facility is ready for permanent meter installation, it is the responsibility of the property owner to contact City Light and ensure that all metering facilities are prepared according to City Light specifications, including the Multi-Unit Pre-metering Checklist. Failure to meet these requirements may result in fines, additional trip charges, and installation delays.

Communication Provisions for Large Metered Loads are in no way altered or impacted by the requirements of the Temporary Totalized Meter specifications.

#### **6.15. Net Metering**

City Light allows net metering on approved customer generation installations of up to 100 kW AC in most areas of the service territory. For more information, see Chapter 5, Distributed Energy Resources.

## 7. Motors and Special Loads

### 7.1. Introduction

Some of City Light's large commercial or industrial customers may require motors or special loads. This chapter identifies the City Light requirements related to motors and special loads.

All motor equipment must conform to the standards of the National Electrical Manufacturers Association (NEMA).

City Light requires detailed information about new motor load installations.

At time of application for service, the customer must provide suitable protective devices on all motor installations, including protection against single phasing on polyphase motors.

### 7.2. Motor-Starting Limits and Interference

The customer's use of electricity must not interfere with the quality of their own service and must not interfere with the quality of service to other customers. If any motor and associated device(s) cause interference with its owner's or another customer's electrical service, the owner of the motor/device is responsible for taking corrective action at their own expense. Conforming to the requirements does not assure that interference problems will not occur.

Interference problems may arise when:

- The customer needs voltage control within unusually close tolerances
- There is an unbalance of single-phase and three-phase loads
- Where the customer intermittently switches large loads on and off, such as electric boilers, heaters, or motors

### 7.3. Voltage Flicker

Voltage flicker is defined as the subjective impression of fluctuating luminance caused by voltage fluctuations. It is caused by momentary motor starting currents, switching currents, or by fault current of the distribution system.

The customer is required to adhere to City Light-established voltage flicker limits.

See <i>City Light Construction Standard 0041.05, "Voltage Flicker Limits"</i> in the <a href="#">Standards for Electric Service</a> .
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#### 7.4. Starting Limitations on Single-Phase Motors

One-half horsepower or larger motors on recurrent starting with more than one start per hour, such as those operating water pumps or furnace blowers, must be served at not less than 240 V (208 V in the Network system). Single-phase motors must not exceed the maximum locked rotor currents listed in tables 7.4a and 7.4b, unless approved in writing by City Light.

**TABLE 7.4a. SINGLE-PHASE MOTOR MAXIMUM ALLOWABLE LOCKED ROTOR CURRENTS**

Rated Size (hp)	At 208 V	At 240 V
5	149 A	129 A

**TABLE 7.4b. SINGLE-PHASE HERMETIC REFRIGERANT MOTOR COMPRESSOR MAXIMUM ALLOWABLE LOCKED ROTOR CURRENTS (FROM NEMA STANDARDS)**

Rated Size (hp)	Motor Size (hp)	208 V (Network Only)	240 V
5	5	200 A	173 A

#### 7.5. Starting Limitations on Polyphase Motors for Secondary Services

Across-the-line starting of 15-horsepower motors or less will be permitted for starting currents less than values in Table 7.5. Reduced starting current devices must be required on all motors exceeding a 15 hp nameplate rating, or motors started more frequently than one start per hour.

Upon failure to install the required starting device, City Light will disconnect the service until it is acceptable. Reconnection must be at the customer's expense.

**TABLE 7.5. POLYPHASE MOTOR MAXIMUM ALLOWABLE LOCKED ROTOR CURRENT (DERIVED FROM NEMA STANDARDS)**

Rated Size (hp)	120/208Y, Three-Phase (A)	120/240, Three-Phase (A)	277/480Y, Three-Phase (A)	240/480 Open Delta (A)
15	250	125	108	63

*Note: Starting devices may be omitted on smaller motors of a group installation when the omission does not result in a starting current in excess of the starting current limits shown.*

#### 7.6. Electric Power Regeneration Due to Motor Drive/Control

Regeneration of electric power while braking, or upon motoring-down, must not exceed circuit loading at the common point of termination unless the operation has been approved by City Light. Typically, regeneration is intermittent and can cause mis-operation of the distribution system which may jeopardize worker safety.

### **7.7. Maximum Switched Load**

The maximum increment of load to be switched as a unit will be 90 kVA, three-phase or 30 kVA, single-phase. Loads in excess of these amounts may require the customer to furnish and install special switching equipment to reduce the magnitude of unit loads to be cycled on and off.

### **7.8. Welding Equipment**

Welding equipment must conform to the standard of the National Electrical Manufacturers Association (NEMA).

### **7.9. Minimum Power-Factor Limitations**

#### **7.9.1. Lighting**

Low power-factor lighting, such as LED, neon, mercury vapor, and fluorescent, must have suitable auxiliary equipment to provide a power factor of not less than 97% lagging at the meter location.

#### **7.9.2. 85% Minimum Power Factor**

The minimum power factor per billing cycle must be at least 97% lagging and always above 85% lagging at the meter location. Any auxiliary power factor correction equipment must be switched with the load so that at no time will it supply leading Volt Ampere Reactive (VAR) to the City Light distribution system unless there is written approval by City Light.

#### **7.9.3. Capacitor Control**

Capacitors installed by the customer for power-factor correction must be switched by automatic means so that the capacitors will be switched off during periods of reduced load.

## **8. Emergency Backup Generators**

### **8.1. Inverter-Based Generator Systems**

All inverter-based generator systems must have batteries as their energy source.

### **8.2. Transfer Switches**

All emergency backup generation equipment must have a transfer switch.

Transfer switches must be the “open transition” type.

Specifications and drawings of the open transition switch must be submitted to City Light as part of the application process.

### **8.3. Disconnect Switches**

Provisions must be made with City Light for the installation of a City Light-approved and provided padlock to lock the disconnect switch in the open position. The disconnect switch must not be lockable in the closed position.

When de-energization of an in-building transformer vault is required, City Light will open and tag the required disconnect switch and lock it in the open position.

## 9. Maintenance of Equipment and Facilities

### 9.1. Introduction

This chapter describes the division of responsibility between City Light and the customer for the maintenance of equipment. Table 10.1 shows distribution of responsibility by category.

**TABLE 10.1. DISTRIBUTION OF RESPONSIBILITY FOR MAINTENANCE OF EQUIPMENT AND FACILITIES**

#### **Customer**

- All masts, brackets, conduits, and other service entrance equipment
- Installation of conduit and trenching to the City Light-designated point of connection to the system
- Equipment on the load side of the meter
- Any other equipment for which the customer is assigned responsibility in written agreements between City Light and the customer
- Vegetation to ensure a 3-ft radius of space for overhead conductors from the service pole to the weatherhead; if there is a transformer on the service pole, the customer is not responsible for any vegetation in a 4-ft area around the transformer
- Underground services, as follows:
  - **Services in conduit:** City Light will provide new service wire if the existing conductors fail. The City Light crew will pull out the old wire and install new service wire provided they are able to remove the old conductors.  
**Note:** If the conduit has been damaged or rusted, the wires may not be able to be removed. The customer will be responsible for replacing the conduit run.
  - **Services without conduit:** In situations where the service wire is buried in the ground without conduit ("Direct bury") and the service fails, City Light will locate the fault, excavate, repair the cable, and backfill the excavated material. The customer is responsible for all surface restoration, e.g., grass, shrubbery, concrete.

**Note:** Only one repair will be attempted per service drop. If additional faults occur, the customer will be responsible for replacing the failed service with a service in conduit that meets City Light standards.

#### **City Light**

- All vegetation pole-to-pole.
- All City Light-installed poles and anchors.
- Customer-owned poles installed by City Light – this maintenance will be at the customer's expense.
- All meters, instrument transformers, and related equipment. See Chapter 6, Metering.



## **9.2. Charges**

There will be no charges for installing underground service conductors on existing services for replacement due to failure. Except where the conductors have faulted as a result of some action on the customer's part, e.g., wire damaged by digging; post or retaining wall installation damaging conduit and wire; improper backfill. If the cause of the fault is related to such or other actions, the customer will be charged for the repair work.

## **9.3. Temporary Restoration of Service**

City Light may restore service on a temporary basis until the customer completes the necessary work so City Light can replace the service conductors. If City Light is unable to install an electrical meter during this time, the customer will receive an estimated bill for the period their electrical usage is unmetered.

The temporary service will be granted for a maximum of two (2) weeks.

# Glossary

**AMPERES:** The base unit of electric current.

**AMPACITY:** Current-carrying capacity measured in amperes.

**ASSOCIATED EQUIPMENT:** In discussions of metering equipment, the term includes the meter socket, instrument enclosures, test switches, and other equipment.

**AUTHORITY HAVING JURISDICTION:** Refers to the local jurisdiction which permits and inspects electrical services. In the City of Seattle, this is the Department of Planning and Development (DPD).

**BALANCED:** When loads or phase currents on a three-phase circuit are equal.

**BRIDLED SERVICE:** An overhead service wire originating from one Utility pole that uses a guy wire from an adjacent pole to change the route of the service drop to the service entrance attachment point.

**BUS (BAR):** Flat metallic conductor housed within switchgear or an enclosure.

**CABINET:** An enclosure designed for surface or flush mounting and provided with a frame, mat or trim, and swinging doors. Cabinets are usually employed to contain panel boards.

**CONNECTION:** A one-way electric service connection between the utility and the customer. See Interconnection.

**CONDUCTOR:** A material that allows electricity to move through it easily. A wire, cable, bar, rod or tube which serves as a path for electricity to flow. The most common conductor used by City Light is overhead wire.

**CONDUIT:** A UL-labeled wireway with a smooth interior surface that permits easy drawing in of the electrical conductors.

**CURRENT:** The electrical current is simply a measure of how much electricity passes a given point in a fixed amount of time. It is measured in amperes.

**CURRENT TRANSFORMER (CT):** A transformer used in instrumentation to assist in measuring current.

**CUSTOMER:** Any person, firm, corporation, government agency, or other entity that uses, has used, or has contracted for electric service from City Light.

**DEMAND:** The amount of electricity drawn from an electrical system at a given time, measured in kW's; The amount of power required to meet the customer's load at a given instant or averaged over any designated interval of time, expressed in kilowatts or megawatts.

**DIRECT BURY:** The installation of electric conductors in a trench without the use of a conduit. Direct burial installations are no longer accepted by City Light.

**DRIP LOOP:** A downward loop in the customer's conductors, near where the customer's conductors attach to the Utility's overhead conductors, to prevent water from entering the service at the weatherhead.

**EASEMENT:** See Service Easement.

**ELECTRIC SERVICE:** All service conductors (primary and secondary), transformers, and distribution system equipment for delivering electric energy from City Light's supply system to the wiring system of the premises.

**FAULT CURRENT:** A current that flows between conductors or between a conductor and a ground because of an abnormal connection between the two.

**GENERAL SERVICE:** Any service that is not residential, as defined by the [Seattle Municipal Code](#).

**GROUND ROD:** An approved metal rod or pipe placed in the ground to which electric connection can be made in order to maintain earth potential on equipment.

**GROUP INSTALLATION:** An installation that includes more than one electrical device, such as panels, meters, motors, etc., connected together by a common electric circuit.

**GUTTER:** See Wiring Gutter.

**GUYING FACILITY:** Cables or braces used to relieve stress on masts and poles.

**HANDHOLE:** A permanently installed protective enclosure (usually below grade), which is used for gaining access to electrical conductors for the purpose of pulling, splicing, or terminating.

**HERTZ (Hz):** A unit of frequency equal to one cycle per second; refers to the frequency of alternating current (ac).

**HIGH LEG:** In a four-wire Delta service, the phase leg that is at higher potential/voltage to ground than the other two-phase legs. Also called the wild leg or the delta leg.

**INSTRUMENT TRANSFORMER:** Current and/or voltage transformers used in connection with metering and control devices.

**INTERCONNECTION:** A type of electric service connection in which the customer has installed a Distributed Energy Resource and has entered into an Interconnection Agreement with City Light. See Ch. 5, Distributed Energy Resources.

**INVERTER:** An electronic device used to change dc current into ac current.

**JUNCTION BOX:** A box, which may be metallic or non-metallic, that has openings in the sides and back and is used to protect and support electrical wire connections or conductor splices.

**KCMIL:** One thousand circular mils; a measurement of wire size.

**KEYBOX:** A permanently installed lock box with keys enclosed. Keyboxes allow City Light personnel to gain access to a customer's premises for the purpose of reading, installing, servicing, or removing City Light system components.

**KILOWATT (kW):** One thousand watts; a standard measure of demand for power or capacity.

**KILOWATT HOUR (kWh):** The standard unit of measure for electric energy. One kilowatt-hour is one kilowatt of electricity supplied for one hour.

**KILOVOLT AMPERE (kVA):** A rating that designates the output which a transformer can deliver at rated voltage and frequency without exceeding a specified temperature rise.

**LANDING PADS:** Hardware upon which current transformers are mounted in the CT can.

**LOCKED ROTOR CURRENT:** Steady-state current drawn by a motor with the rated voltage and frequency applied and the rotor locked in a stationary position. This is the maximum current the motor will draw.

**MANDREL:** A tapered, or cylindrical, spindle inserted into, and pulled through the distance of, the installed conduit run for clearing the conduit run of foreign material.

**MASTER METER:** Any single meter that measures the electrical consumption of all units or subdivisions of a building.

**METER SOCKET:** A receptacle for the installation of an electric meter.

**METER TOTALIZING:** See Totalized Metering.

**METERING EQUIPMENT:** Any equipment used to measure electrical energy.

**MOTOR STARTING LIMITATIONS:** Limits placed by City Light on maximum starting current of electric motors.

**MULTIPLE DWELLING BUILDING:** Any building or any portion of the building which contains three or more dwelling units, occupied with provisions for living, sleeping, cooking, and sanitation.

**NEC:** National Electric Code.

**NEMA:** The National Electrical Manufacturers Association.

**NET METERING:** A method of crediting customers for electricity that they generate on site in excess of their own electricity consumption.

**NETWORK SERVICE AREAS:** Network service areas are designed to provide redundancy and continuity of service in the case of outages and include protective devices to prevent backfeed onto the grid. Network service areas exist in Downtown Seattle, First Hill, South Lake Union, and parts of the University District.

**NEUTRAL:** The grounded conductor of a single-phase, 3-wire or 3-phase, 4-wire system. The identified conductor that is at zero potential/voltage to ground.

**NON-INDUCTIVE LOAD:** An electrical load consisting entirely of resistance.

**OVERCURRENT:** An overcurrent is a current exceeding the rated current. An overcurrent can be due to overloading a circuit, a fault or a short circuit.

**OXIDE INHIBITOR:** A compound used to retard oxidation on electrical connections where aluminum conductors are used.

**PEDESTAL:** A free-standing structure used exclusively to support or contain electrical metering equipment and/or customer service equipment.

**POINT OF ATTACHMENT:** The point at which City Light's service conductors are attached to a structure by an approved service bracket.

**POWER FACTOR:** The ratio of true power (kilowatts) to the apparent power (kilovolt-amperes) for any given load and time.

**PRIMARY SERVICE:** Any service that exceeds the maximum secondary service capacity shown in Table 3.3. These services require transformers or primary metering enclosures to be located in vaults or on pads located on customer's property.

**PRIVATE PROPERTY:** Land owned in fee-simple title by an individual, individuals, or corporations.

**PUBLIC RIGHT-OF -WAY:** Land set aside and designated for use by the public for common access and City Light functions, such as streets, alleys, boulevards, and walkways.

**RACEWAY:** An enclosed channel for holding wires or cables.

**RECLOSER:** A complex form of circuit breaker which protects electrical systems from temporary voltage surges and other unfavorable conditions. In addition to preventing electrical overloads from passing through a circuit, reclosers can automatically "reclose" the circuit and restore normal power transmission once the problem is cleared.

**RESIDENCE:** A single-family dwelling.

**SECONDARY SERVICE:** Services where the load is served from transformers in the right-of-way or easement areas that meet the requirements defined in Table 3.3.

**SERVICE BRACKET:** Approved insulators installed by the customer to provide a mechanical termination for the overhead service wires from the City Light distribution system to the customer's structure.

**SERVICE CONDUCTORS:** Extend from the City Light distribution system to the point of service connection at the customer's property or facility.

**SERVICE EASEMENT:** A right acquired by City Light to construct, operate, maintain, reconstruct, and alter overhead or underground electric facilities on private property, including property owned by another public agency.

**SEAL:** A locking device to secure a meter or other service equipment.

**SERVICE ENTRANCE CAPACITY:** The rating in amperes of the customer's service equipment.

**SERVICE ENTRANCE EQUIPMENT:** Service conduit, conductors, weatherhead, meter socket, and load center.

**SERVICE MAST:** For overhead service, the conduit above the meter used to provide mechanical protection for the customer's service conductors, and to support the service drop from the City Light distribution system.

**SERVICE POLE:** A pole necessary to provide adequate clearance and support of the service drop.

**SERVICE RATING:** The size (in amperes) of the service entrance equipment.

**SERVICE STRIKE** The overhead point of attachment for City Light's service drop to be attached to the customer's conductors.

**SERVICE STUB:** An underground conduit to be used in the future to pull conductors to the customer's property.

**SHORT PLAT:** A short subdivision; a division of land into two to nine lots. See [Seattle Municipal Code 23.24](#).

**SPACE CHECK:** In new construction, a field check is performed by City Light to verify that the metering designations assigned by the contractor are correct as to which unit each meter is serving.

**SPOT NETWORK:** A spot network is a network service composed of three or four primary circuits in a vault that are connected together on the secondary side of the transformers and is not interconnected with a distributed grid outside the vault

**STEP-DOWN TRANSFORMER:** A device that lowers voltages: the high voltage winding is connected to the input or power source and the low voltage winding to the output or load.

**SWITCHGEAR:** The switches, fused switches, or circuit breakers used for disconnecting an electrical circuit.

**TEMPORARY SERVICE:** A customer's service panel energized by City Light on a temporary basis for construction purposes.

**THREE-PHASE, FOUR-WIRE SERVICE:** Voltage is carried through three conductors 120° out of phase with the other two. Three-phase power provides a more efficient means of supplying large electrical loads like motors. It is used in industrial areas and in large buildings.

**TOTALIZED METERING:** Totalized Metering (Adjacent or Remote) is the measurement for billing purposes on the appropriate rate, through one meter, of the simultaneous demands and energy of a customer. Totalizing can be permanent or temporary.

**TRANSFORMER:** Referring to a voltage transformer; a stationary device that increases or decreases the voltage in an electrical system, through the use of primary and secondary coils.

**TRANSPORTATION AGREEMENT:** A legal agreement that is required in cases where City Light cannot access the in-building vault to install and remove its transformers. The building owner assumes the responsibility for moving the transformers.

**UNIT LOT SUBDIVISION:** Subdivision of land to build townhouses, cottage housing developments, and single-family residences where such uses are permitted. The development as a whole, i.e., the parent lot, meets applicable development standards. As a result of the subdivision, the unit lot developments are allowed to be non-conforming to some developmental standards. See [Seattle Municipal Code 23.22.062](#).

**UTILITY:** Seattle City Light ("City Light")

**VAULT:** An approved chamber for electrical equipment. Vaults must meet City Light construction requirements.

**VOLTAGE:** The pressure behind the flow of electricity, measured in volts.

**VOLTAGE FLICKER:** The subjective impression of fluctuating luminance caused by voltage fluctuations. It is caused by momentary motor starting currents, switching currents, or by fault current of the distribution system.

**WAC:** Washington Administrative Code.

**WATT:** A unit of measure of electric power.

**WEATHERHEAD:** Rain tight conduit fitting installed on the top of the overhead service mast, where the service drop is attached to the service entrance equipment.

**WIRE TROUGH:** A sheet metal channel/enclosure with a removable cover used to connect two electrical cabinets or as a standalone assembly to house insulated electrical conductors.

**WIRING GUTTER:** A box with a removable face for electrical wires to run through. Wire gutters are used when a single large cable serves several electrical meters. The cable entering the wiring gutter is distributed and connected to the other services. The box is lockable and sealed by City Light

**WORKING PLATFORM:** A safe, clear, unobstructed floor area with safe access to all electric equipment, protected according to WAC Standard 296-24-75007.

**WORKING SPACE:** An area free of any obstructions in front of meters, service panels, and electric equipment for providing safe access to install, remove, or repair all electrical devices. A safe working space must meet the requirements of the National and City Electrical Codes.

## Appendix: Multi-Unit Metering Pre-Job Checklist

- ☐ **1. Certificate of Occupancy**- Proof of issuance provided to ESR/ESE or consultation with CD Crew chief for approval. **Note:** Only applies to buildings with TTM.
- ☐ **2. Parking** - Adequate parking is available close to the metering location. (SCL Meter Crews need to park for the duration of the work due to the amount of equipment that needs to be transported).
- ☐ **3. Access** - The meter rooms and passage ways are clean and clear of all equipment/debris.
- ☐ **4. Lighting** - Adequate lighting provided by contractor to safely perform the work.
- ☐ **5. Meter Base Labels** - Meter bases shall have engraved phenolic nameplates installed on the cover of the meter socket identifying the final space or unit number, letter designation, and/or street address. *Note: Felt-tip pens and label marker tape are not permanent markings.*
- ☐ **6. Unit Labels**- All units receiving meters shall have at least temporary identification at the main entrance of the space. *Note: It is imperative to notify the Electrical Service Representative/Engineer (ESR/ESE) if the address changes after meter installation.*
- ☐ **7. Panels Safe to Energize** - All unit electrical distribution panels have been approved for service by an electrical code inspector and are safe to energize. *Note: These panels must be energized to perform space checks at the time of meter installation.*
- ☐ **8. Electrical Contractor on Site** - Electricians are available at time of meter install to operate breakers or switches and install/remove panel covers as needed.
- ☐ **9. Access for Space Check** - All units are safe and accessible to perform space checks at the time of meter installation.
- ☐ **10. Key Box Installed** - Note: The key box without a cover will be provided by the ESR/ESE.

Project Address: \_\_\_\_\_

Print Name: \_\_\_\_\_ Title: Superintendent

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Print Name: \_\_\_\_\_ Title: City Light ESR/ESE

Signature: \_\_\_\_\_ Date: \_\_\_\_\_