

Requirements for Electrical Service Connection

January 26, 2007



Residential & Commercial Projects

North of Denny Way
 Customer Engineering..... 206-615-0600
 South of Denny Way
 Customer Engineering..... 206-386-4200

Large Commercial & Industrial Accounts

Electric Service Engineer..... 206-233-7177

Commercial & Industrial Energy Conservation

Conservation..... 206-684-3749

New Streetlights, Alley Lights, & Floodlights

North of Denny Way 206-615-0600
 South of Denny Way..... 206-386-4200

Metering Crew Coordinators

Technical Metering..... 206-684-4259
 Technical Metering.....206-684-4260

Introduction

This book contains the general requirements for residential, commercial, and industrial customers to obtain new or improved electrical service from Seattle City Light (SCL). The requirements include those for smaller and for larger projects. Though much of the information is integrated into each chapter, we can point our residential customers and contractors to Chapters 1, 3, 5, 6 and 11 as having much of the basic information that they will need. Our commercial builders will find all the chapters contain some information that will apply to them. For those builders in our Network areas, Chapter 8 will be additionally helpful.

We have also included and expanded the glossary at the end of the manual, as we understand that some of the technical terms used throughout may not be familiar to everyone who will want to use this resource.

This manual is on the web at www.seattle.gov/light/contractors/RESC. Please refer to this site for added or modified information in this book. We will be making changes to keep up with current codes and hope that you will find this a convenient way to check for revisions. The most current version of the manual will be posted on this webpage, which will include these periodic revisions.

We will be updating information in the Requirements for Electrical Service Connection (RESC) more frequently than we have in the past. Changes will be listed and dated on the RESC web page.

Additionally, we now have a webpage that has resources that you may need for new projects. The address is www.seattle.gov/light/newconstruction. We will continue to add information to this site so it can be a useful vehicle for you to find the most current information about SCL guidelines and services. You will also find contact resources; feel free to get in touch with us to help you get your project started.

We hope that this document will prove useful to you. We are committed to providing you with excellent and professional service.

We look forward to working with you.

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Getting Started: Initial Requirements for Electrical Service

This chapter covers the basic customer requirements and procedures for initiating new electrical services connections by Seattle City Light (SCL). It provides a general overview for all customers, though specific requirements may vary depending on the scope of the project.

Service Areas

A map of SCL's service area and limits is located inside the front cover of this document. All residential and most commercial customers will be working with a SCL Customer Engineering Representative according to the customer's project location either north or south of Denny Way. Large commercial and industrial customers will work with SCL's Electric Service Engineers.

SCL also has three network areas: Downtown Seattle, First Hill, and the University District. Special requirements related to SCL's network areas are discussed further in Chapter 8, "Primary & Secondary Services in Network Areas."

Advance Notice

In many cases, SCL will be required to perform various planning, procurement, or work tasks in order to meet the customer's service needs. For some of these tasks, SCL has established advance notice requirements to ensure that it can complete the task(s) required within the customer's timeframe.

Following are SCL's advance notice requirements for several service-related tasks:

NEW OR ADDITIONAL ELECTRIC SERVICE The customer must contact SCL's Customer Engineering Unit or Electric Service Engineering several months before service is required to determine what kind of service is available at the customer's building site.

MAJOR WORK OR EQUIPMENT (FOR COMMERCIAL/INDUSTRIAL CUSTOMERS) SCL may need up to 18 months notice if the customer's new service makes it necessary to procure special equipment, to do major engineering, or to extend the distribution system. SCL cannot order any of the necessary equipment until adequate load information has been provided via SCL's Electrical Service Application (see forms at the end of this chapter) and a contract has been signed.

DISCONNECT OF SERVICE OR METER Small or residential projects which need to have a service or meter disconnected, require advance notice. Large services and on-site transformers will need a minimum of four weeks notice.

SERVICE EASEMENTS Where service easements will be required (e.g., when service lines cross one lot to serve another), the customer shall contact Seattle City Light at least three months before the planned service date. For details see Chapter 2, "Easements."

CONNECTION The customer needs to notify SCL when the City of Seattle Department of Planning and Development (DPD) inside Seattle or the State Department of Labor and Industries (L&I) or other agency outside Seattle, has approved the customer's service for connection. Additional prerequisites for connection are discussed throughout this document.

THREE-PHASE MOTORS For advance notice requirements relating to three-phase motors, see Chapter 12, "Motors and Special Loads."

Submission of Plans *

For new services or for rewire of existing services (including triplexes or larger multi-residential structures), the customer shall submit a plan package for SCL review and comment.

The plan package shall contain the following elements:

A plan set which includes:

1. A site plan including:
 - Any building on the property
 - Street designations and project address per DPD or L&I
 - Proposed location of service entrance, switchgear, and meter centers
 - “North” and directional arrow
 - Property boundary designations
2. Legal description(s) (as required)
3. Elevation drawings
4. Diagram of floor plans with unit designation
5. A project schedule
6. A load summary and schedule
7. A paving plan, if applicable
8. Billing and owner information
9. Completion of SCL’s Application for Service (See end of this chapter for forms)
10. A riser diagram showing:
 - The size of the main disconnect or bus
 - A detailed sketch of the proposed route of service conductors from the service termination point to the main disconnect or bus
 - The size, type, and number service conductors
 - Provisions for metering

* Note: Chapter 12, “Motors and Special Loads,” covers submission of plans for motors and special equipment.

Service Contracts

The customer may be required to sign a service contract before the electrical service is connected. SCL's Customer Engineering Representative or Electric Service Engineer, as applicable, will determine whether a service contract is required and can assist with establishing the terms of the contract. See page 2 for contact information.

Permit

The customer is responsible for obtaining all necessary permits, and for verifying permit requirements with their local jurisdiction. The customer must pay all permit and inspection fees.

Energy Code Compliance and Requirements

The customer's building may have to comply with the current City of Seattle or King County Energy Codes. Customers should contact their building inspector in the applicable jurisdiction to verify code compliance requirements.

Service Connection Prerequisites

CHARGES After receiving customer plans, SCL 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. The charges must be paid prior to the work being done.

CODE AUTHORITY INSPECTION AND APPROVAL SCL will not connect to the customer's service conductors until the proper code authority has inspected and approved the service for connection.

SERVICE CONNECTION SCL will make service connections only after all applicable SCL requirements have been met. The customer's responsibilities as delineated herein, in a service letter, contract and/or agreement with the Utility must have been fulfilled. All SCL inspections must have been completed and the project approved before connection.

The following section contains application forms for new construction and new services. There are 4 different application forms for varying types of projects.

The four types of applications are:

1. Residential Construction: for single family residences, duplexes, triplexes, and accessory dwelling units (ADU)
2. Commercial and Industrial
3. Mixed Use/Multi Residential: Mixed use, apartment and condominium buildings
4. Residential Plat Development: Multi-lot, Townhouses and Unit Lot Subdivisions

Before the forms are two guidelines. The first guideline describes the process for smaller residential projects, (the first application form) and the second guideline gives information for commercial, mixed use and short plat projects, (the second through fourth form).

The applications may be printed and then filled in and mailed to us.

The mailing address can be found on the form itself.

These forms and guidelines may also be found on our web page at:
<<http://www.seattle.gov/light/newconstruction>>

Residential Construction Single Family, Duplex, Triplex, and Accessory Dwelling Units

Seattle City Light



Customer Guide Electrical Service Connections

This is an outline of the process to get electrical service to new residential services. The steps below are generally sequential and divided by the customer responsibility and City Light's responsibility.

Customer

1. Contacts SCL for Service Application.
2. Reviews SCL *Requirements for Electric Service* (www.seattle.gov/light/NewConstruction) and has plans drawn up.
3. Submits application with scaled drawings below to (3 copies of each)
 - Site plan with the building footprint and desired location of the service entrance.
 - Legal description of the property
 - Load calculations
4. Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023.

City Light

5. Reviews application and plans.
6. Prepares design and determines charges.
7. Gives customer technical details of service and sends customer bill for hook-up charges.

Customer

8. Installs new Service Entrance
9. Calls Department of Planning and Development, or if outside of Seattle, the local jurisdiction, to inspect the service. If inspection passes, inspector signs permit as "ready for service, subject to Seattle City Light."
10. Pays the City Light hook-up fee.
11. Notifies City Light that service is ready for power.

City Light

12. Inspects the service. If the service meets City Light's requirements, it is approved and given to SCL crew to connect.
or
Notifies the customer there are corrections to be made before the job is sent to crew.
13. Connects the service, installs the meter and opens the account for energy billing.



Customer Guide Electrical Service Connections

In order to get your project started we require the following:

1. Completed Electrical Service Application.

2. Scaled Drawings (3 copies each)

- Architectural site plans showing exact dimensions and location of buildings with respect to property lines and profile to street/lanes
- Civil drawings showing water, sanitary and storm sewers, as well as all new utilities on public and private property
- Registered legal description of property
- Detailed electrical drawings for proposed building including meter room detail, riser diagram and electrical load calculations
- Elevation and section view drawings of structures including vaults. Note clearances from SCL power lines.
- One-line electrical diagram

Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023.

Note: we do not need a complete set of architectural drawings. Please submit the specific drawings requested above.

3. Revisions: You must notify SCL of all revisions to the plans that will affect the electrical service installation.

The Process

The key milestones in the service planning and installation process are:

Service Entrance Location and Preliminary Service Charge

In order to obtain an estimate of SCL service charges, we require: a legal description, site plan, load calculations, riser diagram, preferred service voltage and location.

Material Procurement – Critical Path Item

Lead-time for many electrical components can be lengthy; e.g. primary electrical cables and transformers require a minimum of twelve months once the order is placed. Primary voltage switching equipment can require up to 18 months once the order is placed. The procurement order will be placed five working days after the customer initiates or commits to the project (payment or contractual obligation).

Installation

Responsibility for installation is divided in the following manner:

- Supply and installation of most civil materials and labor on private property is the customer's responsibility. City Light engineers will give an estimate for the civil work to extend the distribution system for multi-lot developments.
- All civil work done by the contractor will be inspected by the Utility.
- Supply and installation of all electrical material (e.g., transformers, cable) will be by City Light.
- Pole installation on public rights-of-ways will be done by Seattle City Light. Primary voltage wires and poles will not be placed on private property.
- Customer's contractor will install metering sockets and EUSERC enclosures. City Light will provide the current transformers and the meters.
- Submit final electrical design and associated drawings.

Energization

The project will be scheduled for energization upon the receipt of:

- Necessary approvals from appropriate authorities, including electrical inspection from the electrical permitting authority and inspection from City Light.
- Execution of all required documents, including contracts, rental agreements, operating agreements, transportation agreements and easements as required.
- Completions of: metering identification, addressing of spaces and receipt of electrical room keys.
- Payment of electrical connection and construction fees.



Residential Construction Single Family, Duplex, Triplex, and Accessory Dwelling Units

Seattle City Light



Application for Electrical Service

FOR REFERENCE ONLY

Project name

New service address: _____

Legal description and parcel number: _____

Proposed use of building: _____

Building designation/addresses: _____

Service details (check one from each column)

Column 1	Column 2	Column 3
<input type="checkbox"/> Permanent <input type="checkbox"/> Temporary	<input type="checkbox"/> Overhead <input type="checkbox"/> Underground	<input type="checkbox"/> New building <input type="checkbox"/> Alteration to existing electrical service <input type="checkbox"/> Existing service removal
Is there a demolition? <input type="checkbox"/> Yes <input type="checkbox"/> No Net Metering? <input type="checkbox"/> Yes <input type="checkbox"/> No Relocate existing SCL poles, etc. <input type="checkbox"/> Yes <input type="checkbox"/> No		
Check for building & working clearances required from power lines. www.seattle.gov/dclu/Publications/cam/cam122.pdf		

Electrical load information for individual units

Size of service: _____ Amps Voltage: single phase three phase _____ Volts

Heating Type: Electric Gas Other

If electric: <input type="checkbox"/> Heat _____ kW <input type="checkbox"/> Furnace _____ kW <input type="checkbox"/> Baseboard heat _____ kW <input type="checkbox"/> Heat pump _____ ton <input type="checkbox"/> Air conditioner _____ hp <input type="checkbox"/> Dryer _____ kW <input type="checkbox"/> Water tank _____ kW <input type="checkbox"/> Range _____ kW <input type="checkbox"/> Hot tub/sauna _____ kW	Largest motor _____ hp Connected motor load _____ kW TOTAL connected load: _____ kW Single phase _____ kW Three phase _____ kW
--	---

I understand that any changes made to the above information or attached documents may increase the time and costs required for Seattle City Light (SCL) to provide service to the project.

Signature of owner or owner agent

Date

Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023

Single Family Residential Construction

Single Family, Duplex, Triplex, and Accessory Dwelling Units
Application for Electrical Service

CONTACT INFORMATION

Project name

New service address

Owner

Office phone _____ Cell phone _____

Fax number _____

Email _____

Address _____ City _____ State _____ Zip _____

Bill for construction charges Bill for energy

Who is authorized to make changes/decisions on this project?

General Contractor / Developer

Office phone _____ Cell phone _____

Fax number _____ Email _____

Address _____ City _____ State _____ Zip _____

Bill for construction charges Bill for energy

Electrical Contractor

Contact person _____

Office phone _____ Cell phone _____

Fax number _____ Email _____

Address _____ City _____ State _____ Zip _____

Architect

Office phone _____ Cell phone _____

Email _____

Engineer

Office phone _____ Cell phone _____

Email _____

Project Supervisor / Onsite Coordinator

Office phone _____ Cell phone _____

Email _____

Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023



Application for Electrical Service

FOR REFERENCE ONLY

Project name

New service address: _____

Legal description and parcel number: _____

Proposed use of building: _____

Building designation/addresses: _____

Service details (check one from each column)

1 <input type="checkbox"/> Permanent <input type="checkbox"/> Temporary	2 <input type="checkbox"/> Overhead <input type="checkbox"/> Underground	3 <input type="checkbox"/> New building <input type="checkbox"/> Existing service removal <input type="checkbox"/> Alteration to existing electrical service <input type="checkbox"/> Relocate existing SCL poles, etc
Street lights required ? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Is there a demolition? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Check for building & working clearances required from power lines. http://www.ci.seattle.wa.us/dclu/Publications/cam/cam122.pdf		

Electrical load information

Connected electrical heating load			kW
Connected lighting load			kW
Connected motor load			kW
Number of motors over 15hp (per RESC, motors over 15 Hp have starting current limitations. Provide NEMA code or LRC.)			
Largest motor			hp
Largest Motor LRC			Amps
Number of starts per 8-hour period, largest motor			
Other connected load (specify)			kW
Single phase _____	kW	Three phase _____	kW
Total connected load:			kW
Initial building demand			kW
Future building demand :	Date (____ / ____ / ____)		kW
Total demand:			kW
Bus Bars: Size _____ Amps		Service entrance main _____ Amps	
Service entrance conductors: Size _____ Conductors per phase _____ Conductors per neutral _____			
Secondary voltage desired (confirm with SCL before any equipment procurement) _____ Volts			
Number of meters required (phone line required for totalizing meters) _____			
Single phase meters _____		Three phase meters _____	
Construction start date _____			
Date electrical service required _____			

I understand that any changes made to the above information or attached documents may increase the time and costs required for Seattle City Light (SCL) to provide service to the project.

Signature of owner or owner agent

Date

Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023

Commercial and Industrial Buildings
 Application for Electrical Service

CONTACT INFORMATION

Project name

New service address

Owner

Office phone Cell phone

Fax number

Email

Address City State Zip

Bill for construction charges Bill for energy

Who is authorized to make changes/decisions on this project?

General Contractor / Developer

Office phone Cell phone

Fax number Email

Address City State Zip

Bill for construction charges Bill for energy

Electrical Contractor

Contact person

Office phone Cell phone

Fax number Email

Address City State Zip

Architect

Office phone Cell phone

Email

Engineer

Office phone Cell phone

Email

Project Supervisor / Onsite Coordinator

Office phone Cell phone

Email

Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023



Mixed Use/Multi Residential Buildings

Seattle City Light



Application for Electrical Service

FOR REFERENCE ONLY

Project name

New service address: _____

Legal description and parcel number: _____

Proposed use of building: _____

Building designation/addresses: _____

Service details (check one from each column)

Column 1	Column 2	Column 3
<input type="checkbox"/> Permanent <input type="checkbox"/> Temporary	<input type="checkbox"/> Overhead <input type="checkbox"/> Underground	<input type="checkbox"/> New building <input type="checkbox"/> Existing service removal <input type="checkbox"/> Alteration to existing electrical service
Is there a demolition? <input type="checkbox"/> Yes <input type="checkbox"/> No Net Metering? <input type="checkbox"/> Yes <input type="checkbox"/> No Relocate existing SCL poles, etc. <input type="checkbox"/> Yes <input type="checkbox"/> No		
Check for building & working clearances required from power lines. www.seattle.gov/dclu/Publications/cam/cam122.pdf		

Building information

Number of apartments <input type="checkbox"/> condos <input type="checkbox"/> _____	Number of commercial spaces _____
Residential panel size _____ Amps	Commercial panel size _____ Amps
Number of panels _____	Number of panels _____
Number of residential meters _____	Number of commercial meters _____
	Number of house meters _____

Electrical load information per residential unit

Size of panel per unit: _____ Amps If electric: <input type="checkbox"/> Heat _____ kW <input type="checkbox"/> Dryer _____ kW <input type="checkbox"/> Water tank _____ kW <input type="checkbox"/> Range _____ kW <input type="checkbox"/> Air conditioner _____ hp <input type="checkbox"/> Heat pump _____ ton	Connected electrical heating load _____ kW Connected lighting load _____ kW Connected motor load _____ kW Number of motors over 15hp (per RESC, motors over 15 Hp have starting current limitations. Provide NEMA code or LRC.) _____ Largest motor _____ hp Largest motor LRC _____ Amps Number of starts per 8-hour period, largest motor _____
Service entrance conductors: Size of conductors _____ # of conductors per phase _____ Size of neutral _____ Secondary voltage desired _____ Volts (Confirm with SCL before any equipment procurement)	Other connected load (specify) _____ kW Total connected load: _____ kW Service entrance main _____ Amps Number of meters required _____ Single phase meters _____ Three phase meters _____
	Construction start date _____ Date electrical service required _____

I understand that any changes made to the above information or attached documents may increase the time and costs required for Seattle City Light (SCL) to provide service to the project.

Signature of owner or owner agent

Date

Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023

Mixed Use/Multi Residential Buildings
Application for Electrical Service

CONTACT INFORMATION

Project name

New service address

Owner

Office phone Cell phone

Fax number

Email

Address City State Zip

Bill for construction charges Bill for energy

Who is authorized to make changes/decisions on this project?

General Contractor / Developer

Office phone Cell phone

Fax number Email

Address City State Zip

Bill for construction charges Bill for energy

Electrical Contractor

Contact person

Office phone Cell phone

Fax number Email

Address City State Zip

Architect

Office phone Cell phone

Email

Engineer

Office phone Cell phone

Email

Project Supervisor / Onsite Coordinator

Office phone Cell phone

Email

Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023



Residential Plat Development Multi-lot, Townhouses and Unit Lot Subdivision

Seattle City Light



Application for Electrical Service

FOR REFERENCE ONLY

Project name

Name: _____

Site address: _____

Number of lots: _____

Parcel number: _____

Lot designations/addresses: _____

Service details (check one from each column)

Column 1	Column 2	Column 3
<input type="checkbox"/> Permanent <input type="checkbox"/> Temporary	<input type="checkbox"/> Overhead <input type="checkbox"/> Underground	<input type="checkbox"/> New building <input type="checkbox"/> Existing service removal <input type="checkbox"/> Alteration to existing electrical service
Is there a demolition? <input type="checkbox"/> Yes <input type="checkbox"/> No Net Metering? <input type="checkbox"/> Yes <input type="checkbox"/> No Relocate existing SCL poles, etc. <input type="checkbox"/> Yes <input type="checkbox"/> No		
Are you developing the infrastructure and building the homes? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Are you developing infrastructure only? <input type="checkbox"/> Yes <input type="checkbox"/> No Is this a unit lot subdivision? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Check for building & working clearances required from power lines. www.seattle.gov/dclu/Publications/cam/cam122.pdf		

Electrical load information for individual units

Number of houses _____	Size of panel per house _____ Amps	Voltage _____
If electric: <ul style="list-style-type: none"> <input type="checkbox"/> Heat _____ kW <input type="checkbox"/> Dryer _____ kW <input type="checkbox"/> Water tank _____ kW <input type="checkbox"/> Range _____ kW <input type="checkbox"/> Air conditioner _____ hp <input type="checkbox"/> Heat pump _____ ton 	Construction start date _____ Date to clear property _____ Date temporary service required _____ Date road closings needed _____ Date curbs and paving scheduled _____ Date trench inspection needed _____ Date permanent electrical service required _____	
Townhouses – number of buildings _____ – number of units per building _____ Unit lot subdivision – number of units on parent lot _____		Total Connected Load _____ kW

I understand that any changes made to the above information or attached documents may increase the time and costs required for Seattle City Light (SCL) to provide service to the project.

Signature of owner or owner agent

Date

Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023

Residential Plat Development
Application for Electrical Service

For use with Multi-Lot, Townhouses, and Unit Lot Subdivision

CONTACT INFORMATION

Project name

Owner

Office phone Cell phone

Fax number

Email

Address City State Zip

Bill for construction charges Bill for energy

Who is authorized to make changes/decisions on this project?

General Contractor / Developer

Office phone Cell phone

Fax number Email

Address City State Zip

Bill for construction charges Bill for energy

Electrical Contractor

Contact person

Office phone Cell phone

Fax number Email

Address City State Zip

Architect

Office phone Cell phone

Email

Engineer

Office phone Cell phone

Email

Project Supervisor / Onsite Coordinator

Office phone Cell phone

Email

Mail to: Seattle City Light, 700 Fifth Avenue, Suite 3300, P.O. Box 34023 (N-2), Seattle, WA 98124-4023

Easements

Determination

Easements are required:

- a. Whenever Seattle City Light (SCL) conductors must pass over, under, or through private property belonging to a third party.
- b. Where service equipment such as poles and vaults, are located on property belonging to a third party.
- c. Where SCL locates our system or equipment on private property, as in the case of some primary service installations.

If an easement is required, the customer must contact us a minimum of three months before the desired service date. SCL will determine if easements are necessary.

Property Description

Seattle City Light will write the legal description of the easement areas based on detailed legal information furnished by the customer, describing the proposed service and/or distribution system. If a survey is necessary, it shall be performed at the customer's expense.

SCL will prepare final easement documents and send them to the customer or the customer's designated agent to be returned and processed.

Verification

SCL will not connect the customer's electric service until:

- a. We have verified that installations are within the boundaries of the easement areas. If the areas are not clearly defined, it is the customer's responsibility to provide markers which allow SCL to complete the verification.
- b. All required easements have been legally executed and returned to SCL and have been approved by the Utility for filing and recording.

Clearance Requirements

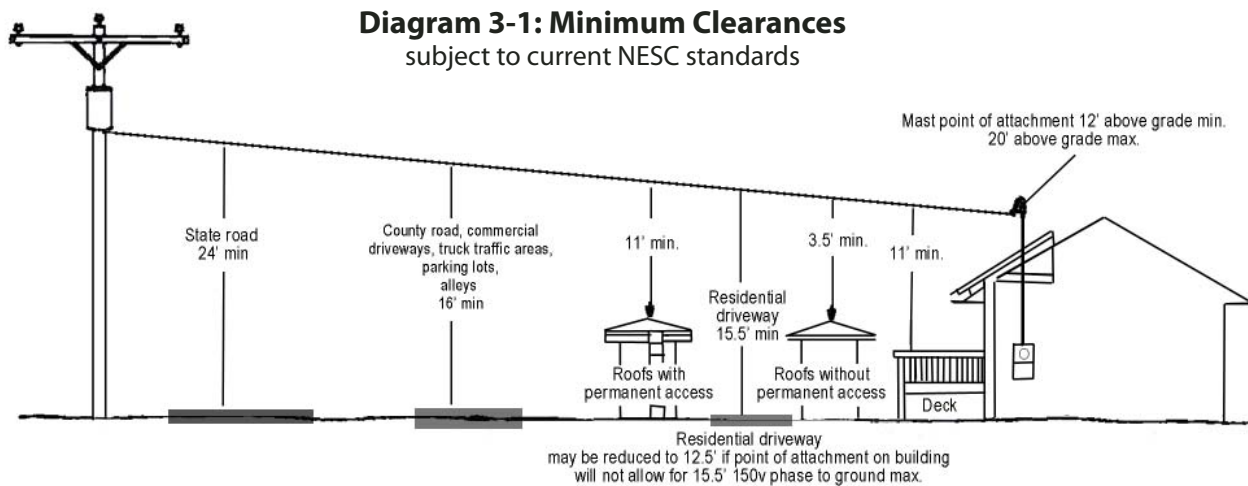
This chapter provides basic overhead and underground clearance requirements for both temporary and permanent services. Clearance requirements for meters, switchboards, and vaults are covered in Chapter 7, "Primary Service in Non-Network Areas;" Chapter 8, "Primary and Secondary Services in Network Areas;" and Chapter 11, "Metering."

WARNING: The clearances indicated in this chapter may no longer be valid. Please contact Seattle City Light's (SCL's) Customer Engineering Representative (Residential and Commercial) or SCL's Electrical Service Engineers (Large Commercial and Industrial) for the most current information. Refer to the National Electric Code (NEC), National Electric Safety Code (NESC), and City of Seattle Electrical Codes for further information.

Overhead Clearance

CLEAR PATH The path between the service pole and the point of service attachment must be clear of all obstructions including trees, branches, buildings, and other obstacles.

CONSTRUCTION CLEARANCE The customer is required to maintain 10 feet minimum working clearance from SCL distribution lines to any person, building sections and construction equipment, according to current Safety Standards for Construction Work (www.ini.wa.gov/wisha/rules/construction/HTML/296-155I_1.htm#WAC296-155-428) and General Safety and Health Standards (www.ini.wa.gov/wisha/rules/generalsafety/HTML/24_I-1.htm). The customer must contact SCL well in advance of starting construction so we can make temporary modifications to provide working clearances and determine the costs for the work. All estimated costs shall be paid in advance of SCL doing the work.



PERMANENT CLEARANCES The standards for clearances from the ground and from buildings are in accordance with the most recent edition of National Electrical Code and National Electrical Safety Code (NESC). The clearances described in this section are based on the 2007 NESC. The next issue of the NESC will supercede these clearances.

ADDITIONAL POLES Seattle City Light will require a service pole and anchor on your property if a clear, direct route is not available or if the distance is greater than 150' from our pole to your point of attachment. Please see Chapter 6 for further information.

MAINTENANCE The customer is responsible for maintaining clearance around service wires on private property.

Service Drop Conductor Clearances

CLEARANCES OF SERVICE DROP CONDUCTORS ABOVE FINAL GRADE

- A minimum 12 feet for **service drop** over areas accessible only to pedestrians, and for residential driveways without truck traffic for voltages limited to 150 volts to ground.
- A minimum of 10 feet to the bottom of the **drip loop** for areas accessible to pedestrians only or residential driveways without truck traffic for voltages limited to 300 volts to ground.
- A minimum of 16 feet for service drops over non-residential driveways, parking areas, streets, roads and alleys.

CLEARANCE OF SERVICE DROP CONDUCTORS ABOVE ROOFS

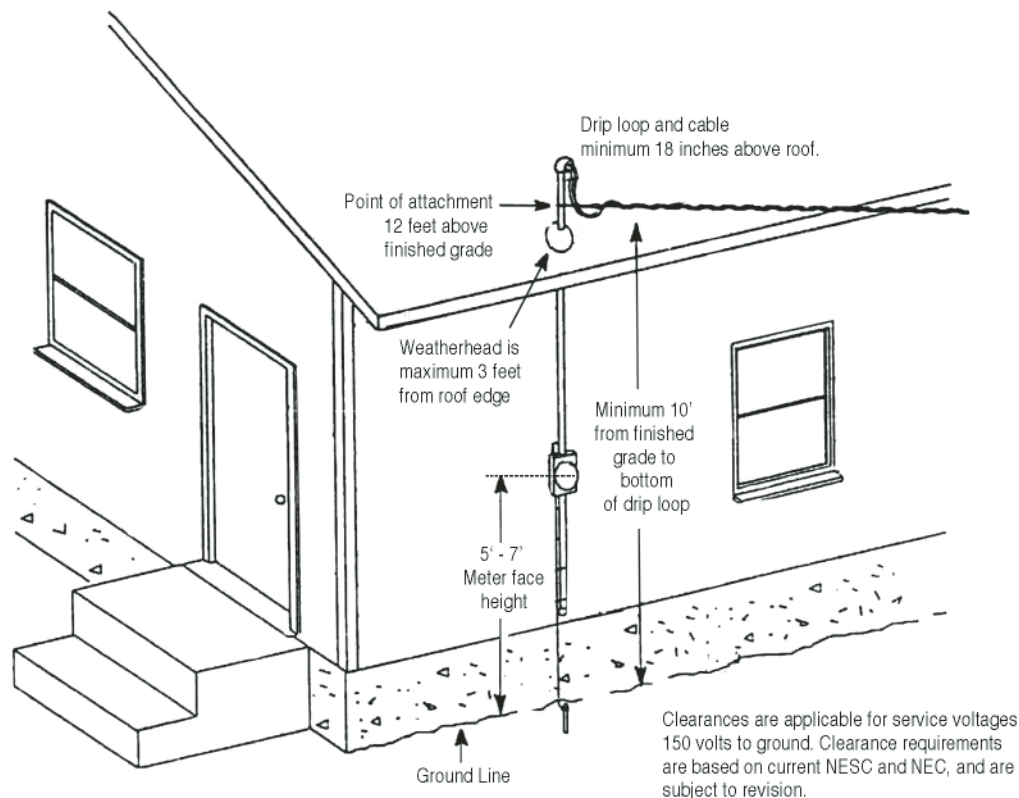
- A minimum of 3.5 feet above a sloped roof that is not accessible to pedestrians.
- A minimum of 18 inches above the roof overhang if not more than 4 feet of conductor passes over the roof.
- A minimum of 11 feet over the roof if it is accessible to pedestrians.

Clearances through trees for service drop conductors shall be a 3 foot radius around the wires.

WARNING:

The following clearances may no longer be valid. Please contact your Electrical Service Representative for the most current information.

**Diagram 3-2:
Residential Overhead Service**



IMPORTANT:

Call SCL before installing your service so we can approve the meter and service location.

Temporary Service

General Requirements

Temporary Services are installed for construction purposes and are used for a limited time period.

TIME LIMIT Temporary service installations are limited to a period of one year. An extension may be granted at Seattle City Light's (SCL's) discretion.

ELECTRICAL PERMITS AND INSPECTIONS The customer must obtain the required permit and undergo the required City or State inspections before the service is connected.

There will be a fee for installation and removal of a temporary service. SCL will determine the charges of installation, removal or relocation.

EQUIPMENT The customer must provide temporary service entrance equipment.

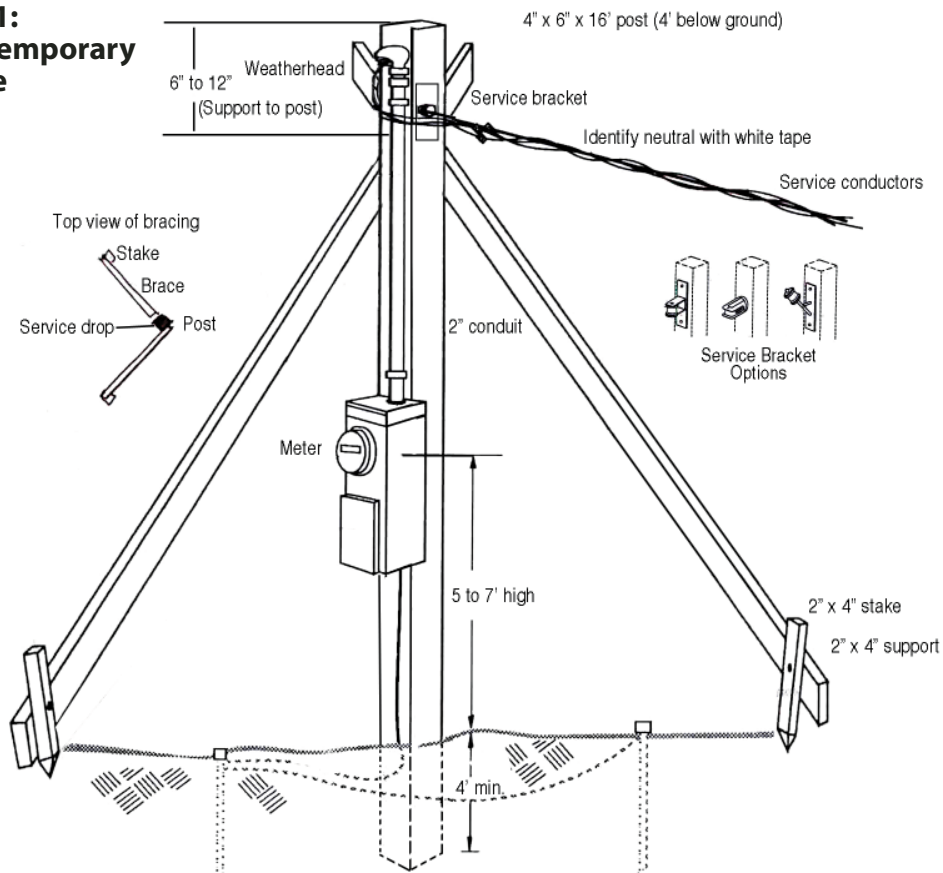
LOCATION OF CONNECTION Temporary services may be installed on your work shed, building, pole, or post acceptable to Seattle City Light.

LENGTH OF SPAN OR CONDUCTORS Temporary service drops or underground runs are normally limited to 150 feet to the nearest Utility-designated service point. Special permission is required for additional length.

Temporary Overhead Service

POLE AND POST SPECIFICATIONS The service attachment must be able to withstand the strain of the service drop. Specifications for temporary posts are diagrammed below and on the next page.

**Diagram 4-1:
Overhead Temporary
Service Pole**

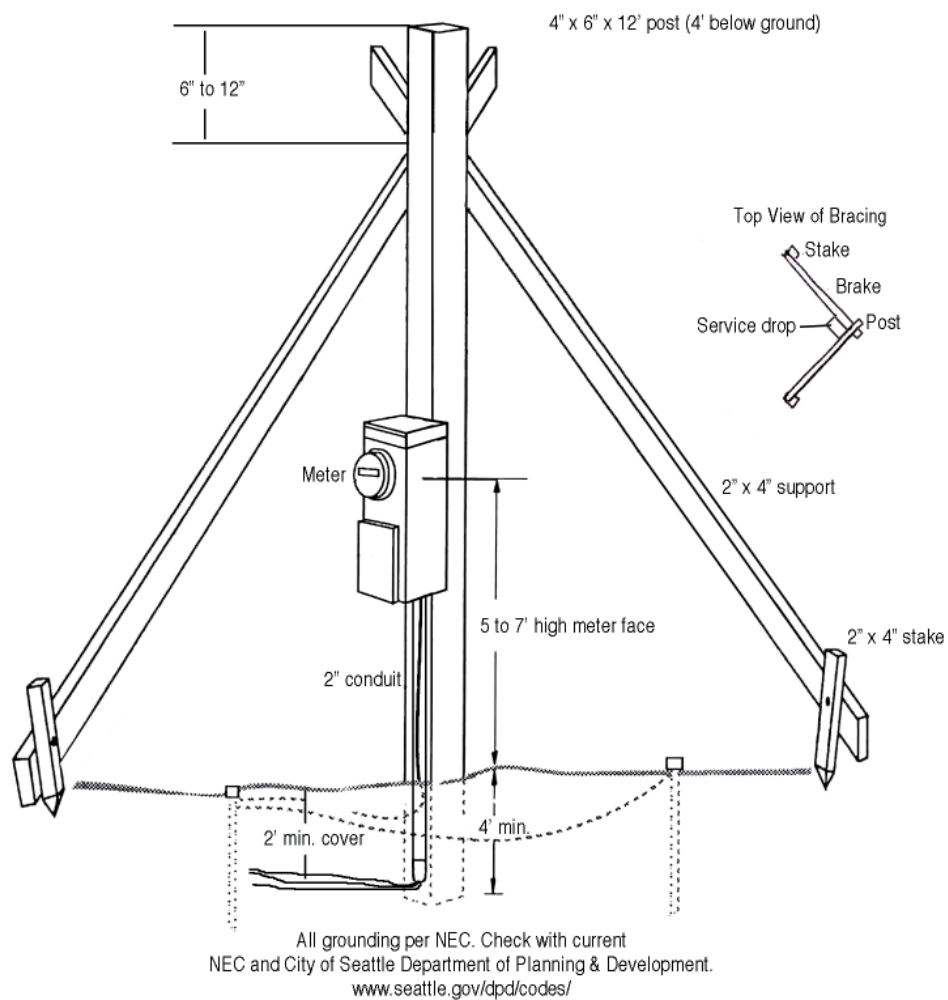


Temporary Underground Service

Where temporary underground service is necessary, the customer shall install a conduit riser at the temporary panel location and trench to the Utility-designated service stub, handhole, vault, or service pole. The diagram below shows the basic pole and trench specifications. See Chapter 5 for more information on underground services.

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

**Diagram 4-2:
Underground Temporary Service Pole**



Types of Secondary Service

This chapter describes the types of electrical service available and the general requirements pertaining to overhead and underground services.

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

Phases of Service: Single Phase and Three Phase

Single-phase, three-wire and three-phase, four-wire service can be provided. Three-phase, three-wire service is not available at any voltages. A 120/208 volt single-phase service will not be allowed outside the Network.

Ordinarily, only single-phase service is available in residential areas, although three-phase service may be made available in certain residential areas at the customer's expense.

Voltages Available

Primary service is service of more than 600 volts; secondary is less than or equal to 600 volts. Primary service is available at various voltages depending on the location of the project. The nominal voltages for secondary service are 120 volts, 208 volts, 240 volts, and 480 volts. Call your Electric Service Engineer or your Electric Service Representative for information about the voltages available in your area.

Service at the SCL's distribution voltage or at intermediate voltages above 600 volts may be available in some locations. The nominal voltages which SCL may supply for primary service are: 26,400Y/15,000 volts; 13,800Y/7,960 volts; 4,160Y/2,400 volts. Please contact the Electric Service Engineer for further information.

Service Sizes: Ampacity

SERVICE RATING The service rating shall be determined by the nameplate ampere rating of the main service disconnect. In the absence of a single main service disconnect, SCL 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 shall be the aggregate of the individual service ratings .

Table 5-1 lists the maximum service entrance ratings for each of the voltages that the Utility offers. These limits allow for customers to be served from transformers in the right-of-way instead of being served from a vault on their premises.

TABLE 5-1: MAXIMUM SERVICE ENTRANCE RATINGS FOR SECONDARY SERVICE

SINGLE PHASE SERVICE VOLTAGE	MAXIMUM SERVICE RATING (amps)
120/240	600
240/480	300
120/208 (Network) ¹	200
277/480 (Network) ¹	100
THREE PHASE SERVICE VOLTAGE	
208Y/120 ²	1000
480Y/277	600
480/240 Delta ³	300
240/120 Delta ³	600
208Y/120 (overhead) ⁴	600
208Y/120 (underground non-network) ²	1000

¹ Limitations indicated by the word “Network” in Table 5-1 apply only to the areas of the City served by the secondary network distribution systems.

² If the service ampacity exceeds 600 amperes for secondary underground service, the customer may be required to provide one spare service conduit.

³ The maximum allowable service ampacities indicated here 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 SCL.

⁴ If service ampacity exceeds 600 amperes SCL may require an underground service. At Seattle City Light’s option, an exception to the maximum service amperes may be granted for 208/120 volt services in buildings which are used exclusively for residential occupancy. This exception will be in writing.

LARGER SERVICES For services exceeding the ampacities shown in Table 5-1, customers will be required to provide the necessary facilities for the installation of Utility transformers and associated equipment on their premises. Other arrangements are allowed only if they are satisfactory to SCL.

MULTIPLE SERVICES In instances where there are multiple services the combined total ampacity shall not exceed the maximum ratings listed in Table 5-1. If original and added ampacity exceeds limits, the customer will be responsible for installation of a transformer vault on the property.

Transformation by Customer

If the customer requires a voltage other than the 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.

Secondary Overhead Services

ATTACHMENTS The service must be located so no more than one point of attachment to the building will be necessary.

DIRECT PATH A direct path shall be provided that will avoid the necessity of setting an additional pole or of trespassing another property.

BRACKETS AND MASTS The customer must furnish and install approved service brackets and masts. Information on brackets and masts can be found in Chapter 6.

MAXIMUM DISTANCE The maximum distance from Seattle City Light's (SCL's) distribution pole to the customer's point of attachment is 150 feet. For distances greater than 150 feet, a service pole may be required. For further information concerning additional poles, see Chapter 6.

UNIT SUBDIVISIONS SCL is not obligated to provide overhead service to unit subdivisions. The Utility will determine whether the site will have an overhead or underground service.

Location of Conductors and Service Equipment

Before the customer installs any equipment for overhead service, SCL needs to determine:

- a. Point where service wires will be attached
- b. Path for the service wire
- c. Location of the meter
- d. Location of service poles, including any poles that may be required for service drops longer than 150 feet.

Primary Overhead Service

New Primary Overhead Service is not available.

Single Service Rule

ONE SERVICE RULE Seattle City Light will provide only one service to a site or building (see City of Seattle Rate Ordinance). Additional services will be supplied only at SCL's option and will be agreed to in writing.

If SCL needs to add equipment to the distribution system to provide a second service, the customer will be billed the full cost of that addition.

MOBILE HOME PARKS SCL will provide only one service to a mobile park.

BOAT MOORAGES SCL will provide only one service to a boat moorage.

UNIT LOT SUBDIVISIONS Any property that is granted a unit lot subdivision must combine meters in such a way that they can be served from one service strike directly from SCL's distribution system. No bridled services will be allowed. An easement will be required up to the service termination point. This single service shall include any existing structures on the divided lot.

If the above conditions cannot be met with an overhead service, the service must go underground. The Utility will determine the route of the service from our distribution system. The customer needs to provide SCL with a copy of the recorded short plat including all the drawings.

FLAG LOTS Any property that is short platted in a single family zoning so that a new lot is created behind an existing lot must provide a minimum of a 12 foot access in order to serve the back lot with an overhead service. Otherwise the back lot must install an underground service conduit to the right of way closest to the distribution system.

Secondary Underground Services

When installing underground services, customers are required to perform the work on their property related to the new service. This includes digging trenches, installing conduit and installing handholes. The customer shall provide conduit from the meter socket, instrument transformer enclosure, terminal can, handhole, vault or pad. This conduit shall extend to the point of termination designated by the Utility either on the property line or in the right-of-way. See SCL's Policy and Procedure 424 for trenching in the right-of-way.

Conduit Specifications

All permanent underground services shall be in conduit. The customer shall install a conduit that has been approved by SCL in regards to type and manufacturer. Once installed, the conduit must be clear and unobstructed so that SCL can pull conductors through it. The Utility will install the service conductors from the designated point of connection on the customer's property to SCL's facility in the right-of-way. The SCL charges for the work are outlined in the Utility's Installation Charges Policy.

Process

Due to the complexity of underground installations, initial plans and specifications must be submitted to SCL well in advance for review.

Once the submitted plans are reviewed, SCL will provide the following information:

- a. Service termination facility requirements
- b. Size, location and arrangement of conduits entering the service termination facility
- c. Meter location
- d. Designation of the service pole, handhole, or vault
- e. Location of the conduits on pole, or entering handhole or vault; location of conduit runs in right-of-way or easement area.
- f. Length of customer's excess wire at the termination facility
- g. Routing of service conduit and trench
- h. Depth of trench and backfill specifications.

During construction the electrical installations shall be inspected by SCL before they are backfilled or covered. This includes trenches, conduit, handholes, vaults, and pads. SCL will also inspect the service after it is completed and the permit is signed off by the jurisdictional electrical inspector.

Customer Responsibilities

CONSTRUCTION, EXCAVATION AND RESTORATION All vaults, pads, handholes, conduit work, ditching, backfilling and restoration on private property must be done by and at the expense of the customer.

OPENINGS IN BUILDINGS AND WALLS The customer is responsible for making any necessary openings through building walls and for sealing the openings after conduits have been installed. SCL is not responsible for any damage attributable to service conduit openings.

WATER ENTRY PREVENTION The customer is responsible for preventing the entry of water into buildings, service equipment and anywhere it would be a problem.

The customer is responsible for the following measures to avoid water entry:

- a. 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. SCL Electric Service Representative or Electric Service Engineers can advise the customer in this concern.
- b. Watertight grouting of conduit where it enters the building, the vault, or the handhole.
- c. Watertight conduit sealing for customer/contractor installed conductors to prevent water from entering the service conduits.

Customer work in the right-of-way

In the city of Seattle, customers may hire contractors to install conduit in the right-of-way. They will need to secure permits to do so from the Seattle Department of Transportation. In the cities outside of Seattle, right-of-way permits shall be obtained by the customer from their respective public works departments. This applies to Shoreline, Burien, Tukwila, SeaTac and Lake Forest Park.

In unincorporated King County, Seattle City Light is required to do all the work in the public right-of-way. SCL will acquire the permit and perform the work and bill the customer for its costs including labor, materials, permits and inspections.

Temporary Underground Service

Where temporary underground service is requested, the customer shall install a conduit riser at the temporary panel location. The customer will trench to the Utility-designated service stub, handhole, vault, service pole or to the property line. The customer must pay Seattle City Light fees before the service is connected. The temporary post requirements are shown in Diagram 4-2 in Chapter 4.

Mobile Home Services

APPROVAL The customer must submit electrical plans for mobile home installations to SCL for approval.

SCL will supply one service to a mobile home park. Installation and maintenance beyond the service connection point will be the owner's responsibility. Each mobile home must be individually metered. Meter locations must be accessible and meters grouped.

Individually Owned Mobile Home Sites

ONE SERVICE RULE SCL will supply one service to a mobile home lot.

LOCATION OF SERVICE EQUIPMENT The National Electric Code, Article 550-32(a), requires a power supply to be located adjacent to the mobile home and not mounted in or on the mobile home. For overhead service SCL will set a service pole and/or anchor. The customer will be billed a service charge for labor and all materials furnished in accordance with the DPP 500 PIII-417, Schedule 102, "Service Poles and Anchors on Private Property." Your Electric Service Representative can get you a copy of this policy.

Where metering and service equipment are to be installed by the customer on a service pole approved for such use, confer with your Electric Service Representative for specifications. See contact information on inside front cover.

Houseboat Installations

Approval

The customer must submit electrical plans for houseboat installations to SCL for approval.

Termination Point of SCL Equipment

SCL service for a single houseboat or houseboat pier will be terminated on shore in equipment acceptable to the City of Seattle Department of Planning and Development or the State Department of Labor and Industries. The termination equipment must also be approved by SCL.

Distribution of Power/Metering

The distribution of electric service on a houseboat pier is the responsibility of the owner of the pier. Each houseboat must be individually metered and the meters must be located on the pier or shore.

Maintenance

For existing overhead service on houseboat piers, the wire and line hardware will be maintained by SCL as long as the following standards are maintained:

- a. Supports mounted on driven piling must be furnished, installed, and maintained by the customer. These supports may be A-frames or individual poles.
- b. A-frame timber shall not be less than 6 inches x 5 inches or the equivalent.
- c. Poles must not be less than 6 inches in diameter at the top.
- d. Adequate guying facilities must be provided for terminal supports at the end of the pier and for changes in line direction.
- e. Cross arms and A-frame cross members shall be no less than 14 feet above the pier.
- f. Spacing along the dock between supports, A-frame or pole, should be approximately 30 feet.
- g. The customer's pier wiring for lighting must not be installed on the cross member or crossarm that supports SCL's service conductors.

Upgrading Houseboat Pier Services

SCL 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. Service termination and metering shall be on the shore where SCL's responsibility ends.

Where unsafe conditions exist, service will be disconnected on shore until corrective action has been taken by the owner.

Houseboat Removal Charges

If it is necessary for SCL to disconnect electrical service to other houseboats in order to remove a houseboat, the labor must be paid by the requesting customer.

Equipment for Service Installation

This chapter describes requirements for services that have secondary voltages provided from Seattle City Light's transformers in the right of way. Most single family residential services are served with secondary voltages as are many smaller commercial services.

Overhead Services

A: Service Masts

Details of service mast installations are diagrammed below. Note the labeled parts of the service entrance, such as mast, weatherhead, bracket, etc. in diagram 6-2. They will be referred to throughout the chapter. Customer will provide all the equipment below except the meter which plugs into the customer's meter base.

Diagram 6-1: Surface-mounted Overhead Service Entrance

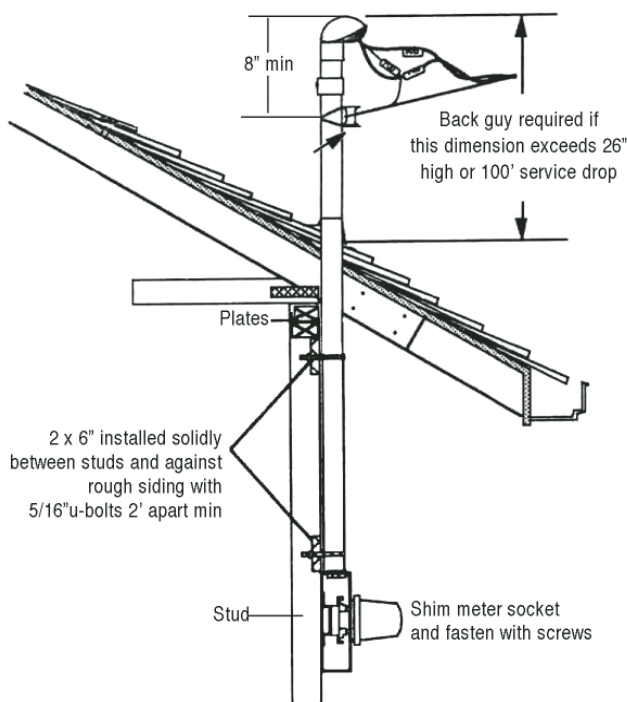
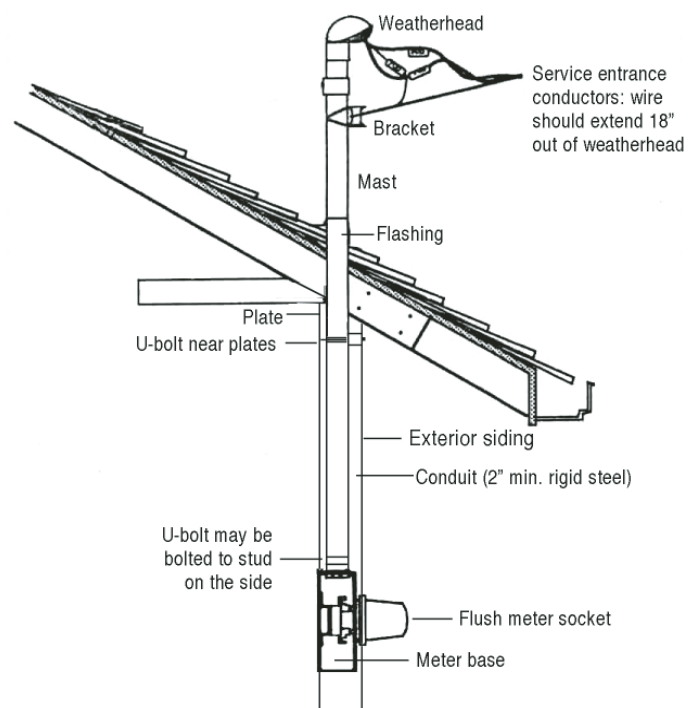


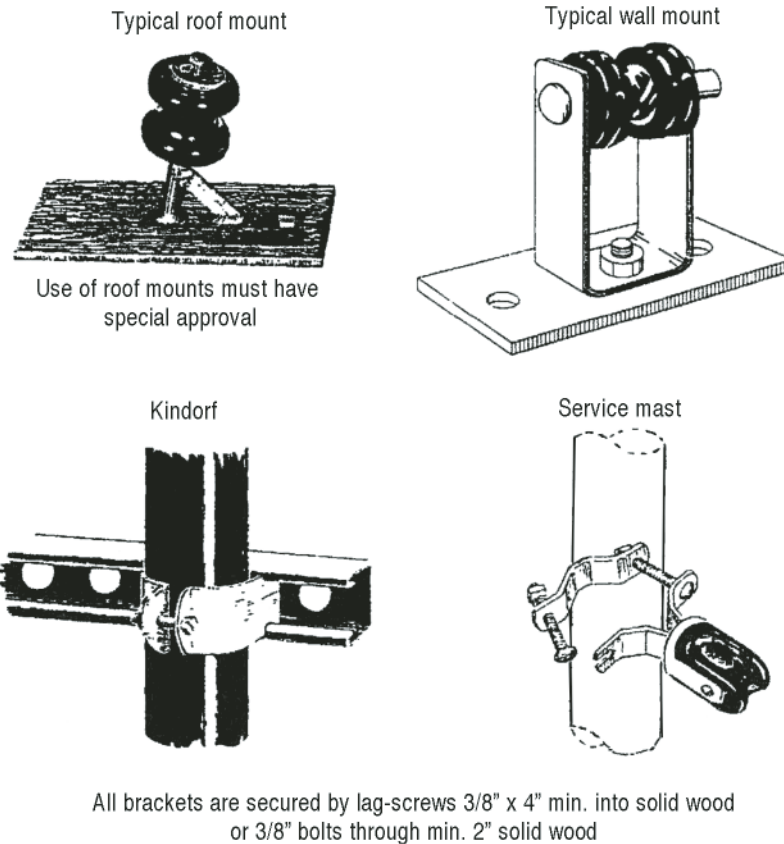
Diagram 6-2: Flush-mounted Overhead Service Entrance



B: Brackets

SCL-approved service brackets shall 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 shall not be higher than 20 feet above grade.

**Diagram 6-3:
Installation Brackets**



BRACKET BOLTS AND SCREWS Service brackets and channel brackets shall be installed with lag screws $3/8" \times 4"$ or larger and anchored in solid material.

- a. The distance between weatherheads served from the same service drop must not exceed 24 inches.
- b. The distance from the service bracket to the weatherhead(s) shall not exceed 24 inches.

BRACKETS ON MASTS Where service brackets are attached to a service mast, the mast must be 2 inches or larger rigid steel conduit and must be located within three feet of the roof edge.

EXCESS WIRE FOR CONNECTION Service entrance conductors sets shall have a minimum of 18 inches of wire extending from the weatherhead. Multiple service entrance conductors shall have a minimum of 30 inches of wire extended.

C: Poles

Service poles are poles that serve only one customer.

Seattle City Light (SCL) may require a service pole on the customer's property where:

- The distance from SCL's distribution pole to the customer's point of service attachment is greater than 150 feet.
- 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.
- The applicable code authority requires a service pole.

SERVICE POLE CHARGES SCL will install poles and anchors as called for in the previous section. The customer will be billed a service charge according to Installation Charges Policy 500 P III-417, "Service Poles and Anchors on Private Property."

EASEMENT If more than one customer is served from a pole on private property, an easement will be required to allow Seattle City Light to maintain the system.

POLE ACCESS IN NEW CONSTRUCTION Seattle City Light must have a 12-foot access road to set a pole on private property. If this space is not available, services will be undergrounded to the existing SCL designated facility.

MAINTENANCE SCL will maintain all poles and anchors that we install. If the customer is the owner of the pole, the customer shall pay SCL to maintain and replace it as needed. The Utility will not maintain existing poles that have been installed by the customers in mobile home parks.

TEMPORARY POSTS For temporary post specifications, see Chapter 4, "Temporary Service."

Underground Services

A. Trenches

Customer Responsibility On Private Property

All trenching, backfilling, and restoration on private property must be done by the customer at their expense. All installations must be inspected and approved by Seattle City Light before backfilling.

Customer Responsibility In the Public Right-of-Way

CONTRACTOR-INSTALLED UNDERGROUND SERVICE

- a. If customers elect to perform the work in the right-of-way, they may obtain their own permits, pay permit and inspection fees and do the trenching, conduit installation, backfilling and restoration. If SCL performs this work, the customer will be billed in accordance with installation Charge Policy 500 P III-417.
- b. When customers elect to do the work in the right-of-way, they shall install the conduit run from the meter base to the first ten feet of conduit on the pole, or into the handhole/vault designated by SCL. Customers shall not enter energized facilities. SCL will determine the specifications for conduit installation.

PERMITS Customers are responsible for acquiring all local jurisdictional permits and pass required inspections.

TEMPORARY SERVICE TRENCHES For temporary service, the customer must install a conduit riser at the temporary panel location and trench to a Utility-designated termination point: service stub, handhole, pole, vault, property line, or service pole.

TRENCH SPECIFICATIONS Service trenches are shown in Diagram 6-4. The guideline for utility separation and trench depth on private property is Appendix 1 of this manual. (U12.1.4/NDK-60)

Conduit for Secondary Service

The customer must contact SCL for information concerning the size, location, and arrangement of conduits entering the service terminal box or current transformer enclosure.

Conduit Sizing for Current Transformer Meter Installations

For information concerning the types and sizes of conduit appropriate for connections between meters and current transformer enclosures, please refer to Chapter 11, "Metering."

C. Conductors

SIZE OF SERVICE ENTRANCE CONDUCTORS The following table, Table 6-1, lists the sizes of underground service entrance cable that are accepted by SCL.

Aluminum (stranded)	Copper (stranded)
1/0 AWG (outside Network only)	#4 AWG
4/0 AWG	#2 AWG
350 kcmil	2/0 AWG
400 kcmil (outside Network only)	4/0 AWG
500 kcmil	350 kcmil
600 kcmil (outside Network only)	500 kcmil
750 kcmil	600 kcmil (outside Network only)
	750 kcmil

Service entrance conductors larger than 750 kcmil shall not be used.

Please note that an oxide inhibitor must be used with aluminum conductors.

COST OF UTILITY CONDUCTORS The cost of service conductors shall be charged in accordance with the Installation Charges Policy.

Network: Secondary Underground Service for Residential Structures

In areas where an underground network distribution system currently exists, SCL must be contacted for details. For requirements applicable to residential structures in the First Hill and University District network areas, please see Chapter 8, "Primary & Secondary Services in Network Areas."

Primary Services in Non-Network Areas

The non-network system comprises most of the majority of City Light's distribution system, which is an overhead system. This distribution system may have underground services or even underground areas, but the primary source wires that feed these customers are from overhead distribution poles. We refer to this system as "non-network" in this chapter.

Services to larger buildings, commercial office buildings and apartment buildings often have larger electrical services which are served with primary voltages. This means owners provide space and structures for SCL's transformers on their property.

Vaults, pads and handholes shall be furnished by the customer in accordance with SCL requirements and specifications. The customer shall contact SCL well in advance of vault design in order to receive the necessary requirements. These specifications will be provided by SCL in a service letter after reviewing the customer's plans. The following chapter includes general guidelines only and is not to be used for design instead of the SCL construction service letter.

Where the aggregate service entrance capacity exceeds 1,000 amperes at 208Y/120 volts; 600 amperes at 480Y/277 volts; or 600 amperes at 120/240 volts; the customer must provide a vault or other suitable facilities on private property for Utility transformer(s) and associated service equipment. Such vault or other facility for Utility transformer(s) must be located on the site being served.

SERVICE VOLTAGES AVAILABLE Transformers connected to SCL's primary distribution system will be furnished, installed and maintained by the Utility. Metering will be at the service voltage, unless otherwise agreed to in writing. SCL transformation will be to a standard voltage; i.e., 208Y/120 volts, 480Y/277 volts, 4160Y/2400 volts, or 13,800Y/7960 volts.

ADVANCE NOTICE It is essential the contractor notify SCL well in advance of designing their buildings, as the requirements for a primary service may alter the building design. For instance, SCL may require space not only for the vault but for a primary switchgear room.

INSPECTIONS Specific requirements given in the service letter will be part of Seattle City Light's vault inspection, both during and after installation. The customer is also required to be aware of and satisfy all applicable building codes for the City of Seattle as well as other cities and county jurisdictions served by SCL.

Vault Construction Non-Network Areas

DIMENSIONS

The dimension of the transformer vault is determined by SCL's engineering group.

The size of the vault is contingent on:

- The size of transformer(s) to be installed. Transformer size is determined by the customer's total electrical load.
- The type of devices used for the secondary connection to the customer's NEC-sized cables or bus bars.
- The working clearance needed around the equipment.

DRY SPACE

Vault interior must remain dry. The customer must prevent water from entering the vault.

Vault Access

The customer must provide properly supported, unobstructed access from the right-of-way to the vault for SCL equipment-handling machinery. SCL must be able to move electrical equipment in and out of the vault using SCL equipment. In-building vaults shall not be located more than one floor below the building's exterior finished grade. The customer is also responsible for providing sufficient building interior height so that SCL can move tall transformers into and out of the vault with the Utility's machinery.

If SCL cannot reach the vault with equipment to install the transformer, the customer may be granted the option of moving the transformers. If this option is allowed, the customer must sign an Equipment Transportation Agreement.

An Equipment Transportation Agreement is a legal document in which the building owner(s) take sole responsibility for moving the transformer(s) into and out of the transformer vault, to a mutually agreed upon location. At that point SCL will be able to deliver or pick up the transformer(s) using our normal transportation methods and equipment. Any damage that occurs to the transformer during transportation by the building owner(s) and any additional expense incurred as a result of said damage shall be paid by the building owner(s).

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

Vault Structure Requirements

Six-inch concrete or concrete-filled concrete masonry units are required. Autoclaved cellular concrete or multiple layers of gypsum board will not be accepted for vault construction.

Pre-tensioned or post-tensioned concrete: the location of the tension cables must be permanently marked on the concrete's surface. Embedded insets may be required for the following:

- Seismic transformer anchoring in vault floor
- Steel support channel in vault ceiling

Equipment hatches are not allowed in the vault's ceiling. Equipment may be lowered through an adjacent shaft. See SCL Construction Guideline U10-2.2. (<http://www.seattle.gov/light/engstd>)

Fire Rating

Walls, ceilings, and floors must have 3-hour fire protection. All penetrations through and joints in the vault floor, walls and ceiling must be sealed to meet a 3-hour fire rating.

Fire Clearance

All vaults 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 requirements of SCL and the appropriate City, County, or State inspecting authorities. Building owners must make provisions to prevent unwanted debris from accumulating in vaults .

Vault Doors

Must be Class A, 3-hour, fire-rated. Size will be determined by SCL.

Vault doors shall swing out 180 degrees and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure. (2006 NESC, Rule 113C). The exit devices must always be locked (storeroom function) and equipped with a cylinder which accepts a Best Universal Lock Company core. The core will be provided and installed by SCL.

Lighting

Customer will provide and install surface mounted PVC conduit, wire, outlets, switches and fixtures per SCL Construction Guideline U10-6. SCL will supply power for the lighting system and outlets. (<http://www.seattle.gov/light/engstd>)

Oil Containment

Install a removable oil containment sill behind the vault door after the transformers installed.

Sill height shall be a minimum of 8 inches.

Install a 18"x18"x12" dry sump, with steel grate, near the vault door but not directly behind the door. The vault floor shall slope 1 inch in 10 feet toward the sump.

Vault Grounding

Vault grounding impedance must be 25 ohms or less.

FOR VAULTS IN CONTACT WITH THE SOIL:

- Install four $\frac{5}{8}$ inch x 8 foot copper clad steel rods.
- Locate rods in vault corners as directed by SCL.
- Distance between any two rods shall be a minimum of 8 feet.
- Rods shall not extend into the public right-of-way or into a SCL easement over another property.
- Use driving head and coupling to drive rods. Drive rods into compacted earth. Do not drive into controlled density fill (CDF).
- Rods must extend 6 inches above vault floor.

FOR VAULTS ON UPPER FLOORS:

- Four $\frac{5}{8}$ inch x 8 foot copper clad steel ground rods shall be driven into compacted soil within the property to be served. The rods shall be a minimum of 8 feet apart.
- Install a single bare-copper, soft-drawn, concentric-stranded cable between two of the four rods and run the single cable into a corner wall of the transformer vault. The other two rods shall be similarly connected with a second, single cable run into the opposite corner of the vault. Run the ground cables into the vault no more than 18 inches above the floor. The cables shall penetrate the vault walls through a protective sleeve. Extend at least 36 in of cable into the vault.
- The copper ground cables shall be connected to the ground rods with an exothermic weld (CADWELD) or approved SCL connector. The size of the copper ground cables shall be adequate size to carry the available fault current.
- Between the rods and the vault, the vault ground cables shall remain 8 feet apart from any other electrical ground cable, unless protected by non-metallic electrical conduit. The ground cables shall be protected by non-metallic electrical conduit where not in contact with earth.

Vault Ventilation

Forced air ventilation is required. Fan capacity, in cubic feet per minute (CFM), will be based on transformer size.

Intake and exhaust vents shall be located in opposite corners.

Intake Vent Must Be:

- 18 inches above interior and exterior floor surfaces. Locate so air flows along the transformer cooling fins.
- Installed with a damper to block air when vault temperature reaches 140 F.
Cover with a screen or louver to exclude rodents and birds.

Exhaust Vent Must Be:

- 6 inches below vault ceiling, or in ceiling.
- Located so air flows along the transformer cooling fins.
- 10 feet from building doors, windows, or flammable surfaces.
- 3-hour fire rated outside of vault, inside building.
- Installed without a damper.
- Covered at exterior opening with a screen or louver to exclude rodents and birds.
- Exhausted to the outside of the building.

Ventilation Fan Must Be:

- Mounted outside of the vault.
- Maintained by the customer.
- Powered from the customer's service panel.
- Installed with a fan controller located outside of the vault which operates as follows:
 - when vault temperature > 70° the fan turns on.
 - when vault temperature > 140° the fan turns off and an alarm goes off.

THERMOSTAT AND VENTILATION CONTROLS

Transformer vaults shall have independent ventilation controls separate from the rest of the building. The thermostat must be located inside the vault. After initial setting by the customer, the thermostat shall be operated by SCL personnel only. The building's HVAC control system may monitor the vault temperature and fan alarm signal, but shall not control the vault fan or alarm.

Vibration and Noise Levels

The customer is responsible for isolating the transformer vault or pad. This will ensure sound and vibration levels satisfy the applicable laws and ordinances of the Washington Administrative Code, the City of Seattle or other applicable jurisdictions, including the customer's own requirements.

Unrelated Systems

No pipe or duct system unrelated to the electrical installation can enter or pass through a transformer vault or pad enclosure. No customer-owned equipment for the customer's use will be allowed in the vault or pad enclosure, with the exception of air ducts for vault ventilation.

Fire sprinklers are not allowed in the vault

Hoist Systems for Heavy Equipment

If special hoisting or transporting facilities are necessary to remove, install, or maintain SCL equipment on customer property, the customer is responsible for moving the equipment. The customer will transport the equipment to and from the point where SCL can use its normal equipment-handling methods. The customer will maintain the hoisting and transport facilities in a manner approved by SCL with advisory assistance from the Utility.

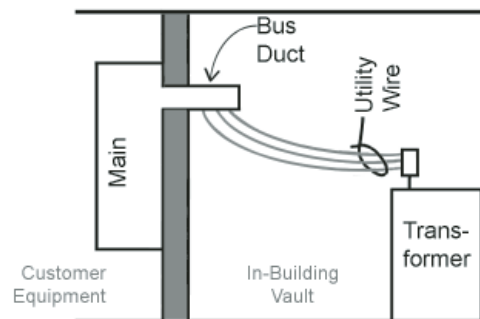
Elevators

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

NEC-sized Service Entrance Outside Network Areas

- The maximum size of NEC cable allowed to enter the vault is 750 kcmil.
- Depending on transformer size SCL may terminate a maximum of six (6) sets of NEC-sized cables directly on the transformer secondary terminals.
- SCL can terminate up to six (6) sets of NEC-sized cable on one set of multiple connectors. Seattle City Light may install two separate sets of multiple connectors in a vault, for a total of 12 sets of NEC-sized cable that are allowed to enter the vault.
- If multiple connectors are used, all NEC-sized cables entering the vault shall terminate on the multiple connectors.
- If the customer has more than 12 sets of NEC-sized cable entering the vault, or if the cable size is greater than 750 kcmil, then the customer must install NEC-sized bus bars in the transformer vault per SCL Construction Guideline U11-9.1 at <http://www.seattle.gov/light/engstd/>. See Diagrams 7-1 below.
- NEC-sized service-entrance conduits shall be 3-hour fire sealed, per the NEC, after the conductors are installed in the conduits.
- Visibly identify each conductor by phase and by the service panel, building address or building that it serves.

**Diagram 7-1:
Bus Extension**



All standards described in this chapter are general guidelines only; for design and construction specifications for projects, see your Seattle City Light representative for a service construction letter.

Primary & Secondary Services in Network Areas

Seattle City Light has three Network service areas: Downtown Seattle, First Hill and the University District.

Services to larger buildings, commercial office buildings and apartment buildings often have larger electrical services which are served with primary voltages, meaning the owners provide space and structures for SCL's transformers on their property.

Vaults, pads and handholes shall be furnished by the customers on their property in accordance with SCL requirements and specifications, which will be provided in a service letter after reviewing the customer's plans. This letter and these specifications will be specific to each project. This chapter includes general guidelines, but the customer must contact SCL well in advance of vault design in order to receive the required design specifications.

PRIMARY UNDERGROUND SERVICE IN NETWORK VAULTS Where the aggregate service entrance capacity exceeds 1,000 amperes at 208Y/120 volts or 600 amperes at 480Y/277 volts, the customer must provide a vault or other suitable facilities on private property for Utility transformer(s) and associated service equipment. Such vault or other facility for Utility transformer(s) must be located on the site being served. The vault requirement for service ampacities over 600 amperes at 480Y/277 volts does not imply that services at 480Y/277 volts are available in the 208Y/120-volt network areas at less than spot network loading, as determined by Seattle City Light (SCL).

ADVANCE NOTICE It is essential that contractors notify SCL well in advance of designing their buildings as the requirements for a primary service may alter the building design. For instance, SCL may require space not only for the vault but for a primary switchgear room.

INSPECTIONS The specific requirements given in the service letter will be part of Seattle City Light's inspection of the vaults during and after installation. The customer is also 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 SCL's service area.

Vault Construction in Network Areas

DIMENSIONS

The dimension of the transformer vault is determined by SCL's engineering group.

The size of the vault is contingent on:

- The size of transformer(s) to be installed. Transformer size is determined by the customer's total electrical load.
- The type of devices used for the secondary connection to the customer's NEC-sized cables or bus bars.
- The working clearance needed around the equipment.

DRY SPACE

Vault interior must remain dry. The customer must prevent water from entering the vault.

VAULT ACCESS

The customer must provide properly supported, unobstructed access from the right-of-way to the vault for SCL equipment-handling machinery. SCL must be able to move electrical equipment in and out of the vault using SCL equipment. In-building vaults shall not be located more than one floor below the building's exterior finished grade. The customer is also responsible for providing sufficient building interior height so SCL can move tall transformers into and out of the vault with the Utility's machinery.

If SCL cannot reach the vault with equipment to install the transformer, the customer may be granted the option of moving the transformers. If this option is allowed, the customer must sign an Equipment Transportation Agreement.

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

Any damage occurring to the transformer during transportation by the building owner(s) and any additional expense incurred because of said damage shall be paid by the building owner(s).

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

Structure Requirements

The vault walls shall be solid concrete up to eight feet high, minimum. The remainder of the walls shall be solid concrete or concrete-filled masonry units.

Pre-tensioned or post-tensioned concrete: the location of the tension cables must be permanently marked on the concrete's surface. Embedded insets may be required for the following:

- Seismic transformer anchoring in vault floor.
- Steel support channel in vault ceiling.

Equipment hatches are not allowed in the vault's ceiling. Equipment may be lowered through an adjacent shaft. See SCL Construction Guideline U10-2.2. (<http://www.seattle.gov/light/engstd>)

Fire Rating

Walls, ceilings, and floors must have 3-hour fire protection. All penetrations through and joints in the vault floor, walls and ceiling must be sealed to meet a 3-hour fire rating.

Fire Clearance

All vaults and pad-mounted transformers are to be located so as to provide safe access and code clearances from fire escapes, combustible materials, and other hazards, in accordance with the requirements of SCL and the appropriate City, County, or State inspecting authorities. Building owners must make provisions to prevent unwanted debris from accumulating in vaults.

Vault Doors

Must be Class A, 3-hour, fire-rated. Size will be determined by SCL.

Vault doors shall swing out 180 degrees and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure. (2006 NESC, Rule 113C). The exit devices must always be locked (storeroom function) and equipped with a cylinder which accepts a Best Universal Lock Company core. The core will be provided and installed by SCL.

Lighting

Vault lighting and outlets will be installed by SCL at the time the electrical equipment is installed. SCL will supply power for the lighting system and power outlets.

Oil Containment

Install a removable oil containment sill behind the vault door after the transformers are installed.

Sill height shall be a minimum of 4 inches.

Install a dry sump with a capacity of 2 cubic feet and minimum opening dimensions of 6" x 6", with easily removable steel grate, near the vault door but not directly behind the door. The vault floor shall slope 1 inch in 10 feet toward the sump.

Vault Grounding

Vault grounding impedence must be 25 ohms or less.

FOR VAULTS IN CONTACT WITH THE SOIL:

- Install four $\frac{5}{8}$ inch x 8 foot copper clad steel rods.
- Locate rods in vault corners as directed by SCL.
- Distance between any two rods shall be a minimum of 8 feet.
- Rods shall not extend into the public right-of-way or a SCL easement over another property.
- Use driving head and coupling to drive rods. Drive rods into compacted earth. Do not drive into controlled density fill (CDF).
- Rods must extend 6 inches above vault floor.

FOR VAULTS ON UPPER FLOORS:

- Four $\frac{5}{8}$ inch x 8 foot copper clad steel ground rods shall be driven into compacted soil within the property to be served. The rods shall be a minimum of 8 feet apart.
- Install a single bare-copper, soft-drawn, concentric-stranded cable between two of the four rods and run the single cable into a corner wall of the transformer vault. The other two rods shall be similarly connected with a second, single cable run into the opposite corner of the vault. Run the ground cables into the vault no more than 18 inches above the floor. The cables shall penetrate the vault walls through a protective sleeve. Cable shall be extended at least 36 inches into the vault.
- The copper ground cables shall be connected to the ground rods with an exothermic weld (CADWELD) or approved SCL connector. The size of the copper ground cables shall be adequate size to carry the available fault current.
- Between the rods and the vault, the vault ground cables shall remain 8 feet apart from any other electrical ground cable, unless protected by non-metallic electrical conduit. The ground cables shall be protected by non-metallic electrical conduit where not in contact with earth.

Vault Ventilation

Forced air ventilation is required. Fan(s) capacity, in cubic feet per minute (CFM), will be based on transformer size.

Intake and exhaust vents shall be located in opposite corners.

Intake Vent Must Be:

- 18 inches above interior and exterior floor surfaces. Locate so air flows along the transformer cooling fins.
- Installed with a damper to block air when vault temperature reaches 140 F. Cover with a screen or louver to exclude rodents and birds.

Exhaust Vent Must Be:

- 6 inches below vault ceiling, or in ceiling.
- Located so air flows along the transformer cooling fins.
- 10 feet from building doors, windows, or flammable surfaces.
- 3-hour fire rated outside of vault, inside building.
- Installed without a damper.
- Covered at exterior opening with a screen or louver to exclude rodents and birds.
- Exhausted to the outside of the building.

Ventilation Fan Must Be:

- Mounted outside of the vault.
- Maintained by the customer.
- Powered from the customer's service panel.
- Installed with a fan controller located outside of the vault which operates as follows:
 - when vault temperature > 70° the fan turns on.
 - when vault temperature >140° the fan turns off and an alarms goes off.

THERMOSTAT AND VENTILATION CONTROLS

Transformer vaults shall have independent ventilation controls separate from the rest of the building. The thermostat must be located inside the vault. After initial setting by the customer, the thermostat shall be operated by SCL personnel only. The building's HVAC control system may monitor the vault temperature and fan alarm signal, but shall not control the vault fan or alarm.

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, the City of Seattle or other applicable jurisdictions, including the customer's own requirements.

UNRELATED SYSTEMS

No pipe or duct system unrelated to the electrical installation can enter or pass through a transformer vault or pad enclosure. No customer-owned equipment for the customer's use will be allowed in the vault or pad enclosure except air ducts for vault ventilation.

Fire Sprinklers are not allowed in the vault.

HOIST SYSTEMS FOR HEAVY EQUIPMENT

If special hoisting or transporting facilities are necessary to remove, install or maintain SCL equipment on customer property, the customer will be responsible for moving the equipment. The customer will transport equipment to and from the point where SCL can use our normal equipment handling methods. The customer will maintain the hoisting and transport facilities in a manner approved by SCL, with advisory assistance from the Utility.

ELEVATORS

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

NEC-sized Service Entrance in Network Areas

BUS

The bus(es) shall not extend more than 18 inches laterally into the vault. SCL will use NEMA two-holed connectors with holes sized for ½ inch bolts, spaced 1¾ inch between hole centers, and side-to-side spacing of 2¼ inch. Connector plates shall be furnished to accept the appropriate number of leads. The number will be determined by SCL and by bus ampacity. If the bottom the bus or connector plates are below 8 feet, 8 inches high, they shall be equipped with a metal cabinet with a removable front panel. The cabinet shall have space for connection of service cables, and shall be designed such that the service cables enter horizontally, and shall not extend more than 18 inches into the vault. SCL Construction Guideline NCB-160 can be used as a general guide for terminating service entrance buses in the vault.

CONDUIT AND CABLES

Service cables shall extend into the vault far enough to reach the collector bus. The required length of the cable extension into the vault will be determined when the layout is firm. Each service entrance must have its own individual neutral cable.

Service entrance conductors for underground connections shall be any combination of the wire sizes listed below:

Stranded AL	Stranded CU
#2 AWG	#4 AWG
2/0 AWG	4/0 AWG
4/0 AWG	250 kcmil
350 kcmil	350 kcmil
500 kcmil	500 kcmil
750 kcmil	750 kcmil

The following conductors are not allowed in the Network: 1/0 Aluminum, 400 kcmil Aluminum, 600 kcmil Aluminum, or 600 kcmil Copper.

The service entrance conduits shall be 3-hour fire sealed per the NEC, after the NEC-sized conductors are installed.

Each conductor shall be visibly identified by phase and by the service panel, building address or building number that it serves.

Secondary Underground Service in Network Areas

The aggregate service ampacity shall be limited to 1,000 amperes at 208Y/120 volts, or 600 amperes at 480Y/277 volts, depending on which is available.

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

In buildings served from an underground network system, the customer must install the necessary conduit to the Utility-designated point at the property line. SCL will extend this conduit to SCL's service handhole or vault and install service conductors to the point of service connection designated by SCL.

Residential Services to First Hill & University District Networks

120/240 VOLT, SINGLE-PHASE SERVICE UP TO 225 AMPERES: The customer must provide a concrete pad or space on the premises for our dry-type transformer. The customer must also install service conduit to a point designated by SCL. The transformer space and grounding must be approved by us and must be in compliance with the City of Seattle electrical code. Where 120/240 volt service is available directly from the network system, SCL may not require a transformer pad or space.

208Y/120 VOLT, THREE-PHASE SERVICE, 100-1,000 AMPERES: 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 us. The transformer vault must be approved by SCL and must be in compliance with the SCL electrical and building codes.

480Y/277 VOLT, SINGLE-PHASE SERVICE TO 100 AMPERES: The customer must install service conduit to a Utility designated point on the property line.

480Y/277 VOLT, THREE-PHASE SERVICE: The basic requirements for secondary underground network service apply.

120/240 VOLT, SINGLE-PHASE SERVICE OVER 225 AMPERES: is not available.

Primary Underground: Transformer Pad Construction

Transformer pads may be constructed outside of buildings in appropriate applications. The following are general guidelines; the customer shall contact Seattle City Light well in advance of pad design in order to receive the specific requirements for the project.

Transformer Pad Dimensions

SCL will determine the pad size based on the customer's total load and the type of devices used for the secondary connection to the customer's NEC-sized cables.

MINIMUM CLEARANCES:

FOR PADS NOT REQUIRING A FENCED ENCLOSURE, THE PAD MUST BE:

- 10 feet from any property line between private properties
- 10 feet from building doors or windows
- 10 feet from combustible structures
- 6 feet from noncombustible conductive (metal) structures
- 3 feet from noncombustible, conductive and combustible, nonconductive structures with a 3-hour fire protection rating
- 3 feet from any property line adjacent to the public right-of-way

FOR PADS REQUIRING A FENCED ENCLOSURE, THE PAD MUST BE:

- 10 feet from any property line between private properties.
- 10 feet from building doors or windows.
- 10 feet from combustible structures.
- 6 feet from noncombustible conductive (metal) structures.
- 3 feet from noncombustible, nonconductive structures and combustible nonconductive structures with a 3-hour fire protection rating

FOR THE FENCES OF THE ENCLOSED PADS, THE FENCE MUST BE:

- 6 feet from any property line
- 6 feet from noncombustible conductive (metal) structures
- 3 feet from noncombustible, nonconductive structures and combustible, nonconductive structures with a 3-hour fire protection rating

Construction

- Prefabricated (from SCL approved manufacturer) or cast in place concrete
- Conduit locations in the pad must meet the requirements given in the applicable SCL Construction Guideline
- Foundations, footings, structures, tanks, piping, etc. are not allowed under the footprint of the pad

ACCESS

Provide unobstructed SCL vehicular (truck) access to the pad at all times for the installation and the servicing of electrical equipment.

GUARD POSTS

- To protect the pad-mounted transformer from vehicles, install 4 inch x 8 foot rigid steel posts, inserted to a depth of 4 feet and filled with concrete, after the transformer is installed.
- Locate guard posts a minimum of 6 feet in front of transformer doors. (Transformer doors will be located on the conduit-cutout side of precast pads.) Locate guard post a minimum of 3 feet from the pad on the other three sides of the pad.

Oil Containment

Paved Apron

- A paved apron that is impervious to spilled oil shall surround the concrete transformer pad. The apron will extend a minimum of 3 feet from the pad edge.
- Gravel on bare soil for the apron area is not sufficient to meet the intent of the appropriate oil spill regulations unless soils data is provided by and stamped by a Professional Engineer registered in the State of Washington. This must certify that the soil is sufficiently impervious to prevent escape of oil from the containment system before cleanup occurs.

Oil Containment System

An oil containment system includes: the concrete transformer pad, the paved apron, the surrounding curb, dike, berm or other appropriate barrier, and any oil/water collection and separation system. The intent of the oil containment system shall be to contain all spilled oil and oil-contaminated rainwater prior to cleanup. Since this containment system is subject to rain and snow accumulation, provision is required for handling water runoff.

The oil containment system shall conform to the current requirements of the Clean Water Act, Title 40 of the Code of Federal Regulations, Part 112 (see 40 CFR 112.7(c) as amended. For convenience, pertinent language from 40 CFR 112.7(c), current as of July 17, 2002 is quoted in part, as follows, or review the EPA website: www.epa.gov/oilspill.

"...The entire containment system...must be capable of containing oil...so that any discharge...will not escape...before cleanup occurs. At a minimum, you must use one of the following prevention systems or its equivalent:

- Dikes, berms, or retaining walls sufficiently impervious to contain oil
- Curbing
- Culverting, gutters, or other drainage systems
- Weirs, booms, or other barriers
- Retention ponds"

The criteria for regulations under 40 CFR 112 takes into consideration the potential for oil spill discharge into navigable waters. In the SCL service area, discharge to navigable waters would typically be of concern if there is potential discharge to storm drain systems.

Design, construction, operation and maintenance of oil containment systems shall be the responsibility of the property owner and includes:

- Appropriate provisions for oil and water run-off
- Separation of oil from water
- Periodic collection and proper disposal of oil and oil-contaminated water

Spill Prevention, Control & Countermeasure (SPCC) Plans

For SCL-owned transformers located on private property, preparation of SPCC plans in conformance with 40 CFR 112 shall be the responsibility of the property owner.

Pad Grounding

Foundations, footings, structures, tanks, piping, etc. are not allowed under the footprint of the grounding grid.

FOR PADS NOT REQUIRING A FENCED ENCLOSURE:

Install four $\frac{5}{8}$ inch x 8 foot copper-clad steel ground rods, set at the pad's corners, per the applicable SCL Construction Guideline.

FOR PADS INSIDE FENCED ENCLOSURES:

- Install four $\frac{5}{8}$ inch x 8 foot copper-clad steel ground rods, set at the pad's corners, per the applicable SCL Construction Guideline.
- All conductive parts of the enclosure's fence shall be tied to the pad's ground grid.
- The fence gate shall be grounded to the fence post with a flexible braided copper strap.
- Install ground rods and ground cable around the perimeter of the metal fence, 18 inches away from the fence, including out around the swing of the gate when opened, as instructed by SCL.

THE FENCE SHALL BE:

- 6 feet from conductive (metal) structures.
- 3 feet from nonconductive structures.

Service Termination Facility

FOR PADS NOT REQUIRING A FENCED ENCLOSURE:

- If the customer has more than four (4) sets of NEC-sized service entrance cables, the customer may be required to install a service termination handhole for installation of multiple connectors. SCL will pull utility service cables from the transformer to the service termination handhole and terminate the service on the multiple connectors.
- SCL can terminate up to six (6) sets of NEC-sized cable on one set of multiple connectors. SCL may install two separate sets of multiple connectors in a large handhole, for a total of 12 sets of NEC-sized cable allowed to enter the handhole.
- If the customer has more than 12 sets of NEC-sized cable or if the cable size is greater than 750 kcmil, then the customer must install NEC-sized secondary bus bars, spaced and drilled per Construction Guideline U11-9.1, in a service termination facility. (<http://www.seattle.gov/light/engstd/>) SCL will pull utility service cables from the transformer to the service termination facility and terminate the service on the bus bars.

THE SERVICE TERMINATION FACILITY MAY BE:

- An in-building vault on an exterior wall at the same grade as the pad.
- A stand-alone, pad-mounted, cable-to-busbar termination enclosure.

FOR PADS REQUIRING A FENCED ENCLOSURE:

If the customer has more than six (6) sets of NEC-sized service entrance cables or the cable size is greater than 750 kcmil, then the customer must install NEC-sized secondary busbars. These will be spaced and drilled per SCL Construction Guideline U11-9.1, in a stand-alone, pad-mounted, cable-to-bus-bar termination enclosure located next to the fenced enclosure. The bus bars must extend over the fence into the enclosure at a height given in U11-9.1. Construction guidelines can be found at <http://www.seattle.gov/light/engstd>.

Maintenance of Conductors & Division of Responsibility

This chapter distinguishes Seattle City Light's (SCL's) responsibility for equipment and maintenance from that of the customer. The customer is responsible for:

- All masts, brackets, conduits, and other service entrance equipment
- Conduit and trenching to SCL's designated point of connection to the system
- All equipment on the load side of the meter
- Any other equipment for which the customer is assigned responsibility in written agreements between us.

Primary Underground Service

Division of Responsibility

For each installation of primary underground service, SCL will establish the point where SCL's responsibility ends and the customer's responsibility begins. All facilities on the customer's side of this point will be furnished, installed, operated, and maintained by the customer unless other arrangements are agreed to in writing. The customer is also responsible for conduit and trenching to SCL's designated point of connection to the system.

Extensions of Primary Underground

ADDITIONAL PADS OR VAULTS Any extensions of primary service conductors to additional transformer vaults or pads will be made by SCL and will remain our property. The customer, however, must furnish and install the primary conduit, vault or pad as required and must pay the cost of the extension.

EXTENSIONS BEYOND A PRIMARY METER Extensions beyond a primary meter are the customer's responsibility.

Transformers

Transformers connected to our primary distribution system will be furnished, installed, and maintained by SCL. The customer will be responsible for removing any transformer that SCL determines it cannot remove. Transformers on the customer's side of the meter are the customer's responsibility to furnish, install and maintain unless otherwise agreed to in writing.

Poles

SCL will maintain all their own installed poles and anchors. Customer-owned poles installed by SCL will be maintained by SCL at the customer's expense.

Metering Equipment

SCL will maintain all meters, instrument transformers, and related equipment. See also Chapter 11, "Metering."

Maintenance of Underground Conductors

Underground conductors will be maintained by SCL in the following manner:

SERVICES IN CONDUIT SCL will provide new service wire if the existing conductors fail. SCL's crew will pull out the old wire and install new service wire provided they are able to remove the old conductors. If the conduit has been damaged or rusted, the wires may not be able to be removed. The conduit housing the service is the customer's property and responsibility. If the wires cannot be pulled from the conduit, the customer will be responsible for trenching and installing new conduit from the meter base to a point designated by SCL. Then SCL will furnish and install the new service wire.

SERVICES WITHOUT CONDUIT In situations where the service wire is buried in the ground without conduit and the service fails, SCL 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.

This procedure applies only if there is a single fault or break in the run of wire. Often when direct burial conductors age they will fail in more than one location. This indicates the entire service run needs to be replaced. If the crew has exposed and repaired one fault, and the service has more faulted areas, the customer will be required to trench and provide a conduit run from the meter base to a point designated by SCL. Then SCL will furnish and install the service conductors in the newly installed conduit.

CHARGES FOR MAINTENANCE There will be no charges for installing underground service conductors on existing services for replacement due to failure. The exceptions are as follows:

- a. The service was not installed by SCL but by a private contractor within five (5) years of the date of the failure. In this case the wire is to be replaced by the installer according to the SCL specifications.
- b. 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.

TEMPORARY RESTORATION OF SERVICE SCL may restore service on a temporary basis until the customer completes the necessary work so SCL can replace the service conductors. If SCL is unable to install an electrical meter during this time, the customer will receive an estimated bill for the period their electrical usage is un-metered.

The temporary service will be granted for a maximum of two (2) weeks. The connection will not be maintained beyond this period.

CHAPTER 11

Metering

Meters are required on the customer's premises for all Seattle City Light (SCL) electrical services so the Utility can accurately determine customer usage for accurate billing and for maintaining appropriate distribution to our customers.

SCL provides and installs all electrical meters into customer-installed meter bases. This chapter will describe the requirements for meter equipment and installations.

SCL'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 are required 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. Drawings shall also be submitted for customer-designed pedestals or other structures on which the customer is proposing to mount metering or service entrance equipment.

Meter Sockets: Construction Guidelines

All services shall be metered in accordance with the Electrical Utility Service Equipment Requirements Committee (EUSERC) Standards. Refer to www.euserc.com for further information.

While SCL provides and installs the meter, the customer is responsible for providing and constructing the meter socket and current transformer equipment, if applicable. All meter sockets and enclosures shall meet ANSI C12 and ANSI/UL414 Standards for Meter Sockets. See Appendix 2 at the end of this manual.

SCL does not allow automatic or lever type circuit closing devices.

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 unmetereed leg as in existing three phase, three-wire services.

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

Unused threaded or knockout openings must be closed with an approved plug locked in place from the inside. Metering equipment enclosures shall be weatherproof if they are located outside.

Meter rings will be provided by Seattle City Light.

Metering Voltages

All services shall be metered at the service voltage. The exception would be 480Y/277 volt three-phase services transformed to 120/208 volts or 120/240 volts for distribution in multi-unit buildings.

All high voltage services, 601 volts and above, shall be metered at the service voltage in accordance with the Electric Utility Service Equipment Requirements (EUSERC) standards.

Where voltages are over 600 volts, contact the Technical Metering Unit for high voltage metering requirements.

Service Entrance Conductors for Metered Loads

- a. Unmetered service conductors and metered load conductors shall not be run in the same conduit, raceway, or wiring gutter.
- b. Metering equipment and enclosures containing unmetered service conductors, wire troughs, and busing shall be sealable and lockable as determined by SCL.
- c. Metered load conductors shall not pass through sealable sections, including transformer enclosures.
- d. Service conductors shall be continuous from the service connection point to the meter socket or instrument transformer enclosure, or in a main disconnect for group installations. The conductors shall not pass through any junction box or "T" condulets. This does not prohibit the use of buses or wire troughs on the line side of multi-meter installations if the enclosures are locked and sealed.

Conductor Connections:

For Aluminum

An oxide inhibitor is used for all aluminum conductors and connections.

The meter socket shall have lugs approved for aluminum.

For Copper

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

Service Entrance Equipment Sequencing

For Single Meters Self-Contained:

- a. The sequence of service equipment with self-contained metering shall first be meter socket and next the fused disconnect/circuit breaker. A switch cannot precede the meter except in certain multi-unit installations (described below).
- b. Pedestal metering shall not contain the customer's main disconnect.
- c. Residential services do not require block by-pass sockets, however they are strongly recommended.
- d. Commercial services require block by-pass sockets.

MASTER METERING

SCL shall 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. SCL 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.

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

For Multi-Unit Installations:

- a. A main disconnect may be installed ahead of the meters in multi-unit installations involving more than six individual sockets provided that all equipment ahead of the meters has sealing provisions.
- b. In multiple meter socket installations, which have a switch or breaker ahead of the meters, the breaker shall 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.

Special Metering Requirements for Multi-Unit Buildings

- a. Prior to meter installation all separately metered spaces and their meter sockets must be identified by final space or unit number, letter designation, and/or street address. If permanent numbering of the spaces is not practical before meter installation, the customer shall provide temporary identification.
- b. All multi-unit buildings shall have at least one meter for each unit. Where common load exists, an additional house meter is required.
- c. The sockets in meter banks shall be so arranged that the minimum vertical distance between socket centers is 9 inches and the minimum horizontal distance is 8 inches. Additional clearance requirements are described in Appendix 5.
- d. Space checks are required for all new and rewired multi-unit buildings to verify socket-to-unit panel wiring.
- e. 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.
- f. 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.
- g. Load determination shall be based upon the greatest aggregate nameplate ratings of each fused disconnect or circuit breaker.
- h. Where common load exists an additional house meter will be required.

Metering Equipment Location

- a. Single meter sockets shall be installed in an accessible location outside the building. Multiple socket installations may be located inside the building.
- b. SCL may post a Utility logo on the outside of meter room doors.
- c. SCL shall inspect and approve the customer's choice of location for meter sockets and metering equipment. The location must be readily accessible without risk of bodily harm to SCL employees and free from vibration, corrosive atmosphere, and extreme temperatures.
- d. Inside meter locations shall have sufficient lighting to read meters and maintain equipment.
- e. The area around and access to all SCL equipment shall be free from vegetation.
- f. Meter rooms shall be for the sole purpose of electrical switchgear and metering equipment. Under no circumstances shall gasoline, diesel fuel, propane, paints, or any other noxious or hazardous materials be stored in a meter room.
- g. Metering equipment shall not be installed over stairs, stairwells, steps, or public walkways. If mounted on a balcony or platform, a permanent stairway to the area is required. Ship's ladders are not allowed.
- h. 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.
- i. The number of meter centers in apartment buildings shall not exceed one for every three floors.
- j. All current transformer enclosures will be installed in an accessible location outside the building or in an approved electric meter room. For residential services the enclosures shall be outdoors and accessible during normal Utility working hours.

Meter Height

The meter height is measured from grade or the floor to the center of the meter.

All sockets shall be mounted plumb and securely fastened.

Table 11-1 Meter Height Requirements

Type of installation	Minimum height	Maximum height
Single meter socket Self-contained	5 feet	7 feet
Multi-Unit Installations	2 feet	7 feet
Current Transformer-rated Sockets	5 feet	6 feet
Pedestal Socket	3 feet	5 feet

Access to Metering Equipment

- a. SCL 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 SCL's equipment.
- b. Access shall not be blocked by either permanent or portable materials.
- c. Any fenced or enclosed area shall be made accessible with a double locked padlock and/or a key box. Where metering equipment is located inside the building, SCL reserves the right to install a key box. The customer shall provide keys and/or key cards.
- d. All metering equipment covers shall 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 instrument transformer enclosure covers or doors.
- e. All metering equipment doors shall open a minimum of 90° from the front of the enclosures. Outdoor equipment enclosure doors must have a hold open device.
- f. The width of the working space shall be proficient to permit ready access to the metering equipment and in no case shall be less than 3 feet. The height of the working space shall be equal to the overall height of the metering equipment and in no case less than 7 feet, 1 inch. The working space shall extend at least 3 feet out from the face of the meter.
- g. A level standing working space shall be provided and maintained in front of all meter equipment.

Protection of Metering Equipment

- a. Where damage of metering equipment has or is likely to occur from vandalism, vehicles or other causes, SCL may require the customer to install protective devices such as bollards, barriers, or enclosures at the customer's expense.
- b. Metering equipment enclosures installed in outside locations shall be weatherproof.
- c. Pedestal metering equipment shall be sturdy enough for reasonable installation or removal of a meter without damage to the pedestal.
- d. Indoor spaces housing metering equipment shall have the ambient air temperature maintained below 30 degree C (86F). The customer is responsible for cost of maintenance, repairs and replacement of meter equipment resulting from ambient temperature.

Ownership of Metering Equipment

SCL installs and maintains meters, instruments, transformers and associated equipment which are on the SCL side of the meter. The Utility has ownership of this equipment. The customer's equipment includes: meter sockets, enclosures, landing pads, lugs, conduit, and conductors. These are installed and maintained by the customer who is the owner of this equipment.

SCL shall determine the specific equipment requirements after reviewing customer plans.

Current Transformer-Rated Metering

Current transformers and/or voltage transformers are required on all services that exceed 225 amps. The two exceptions to this case are residential services with 400 amps services that use 320 metering and remote metering with services under 225 amps.

For residential installations, two connections shall be permitted on the load side of the current transformers. The customer shall provide and install SCL-approved terminal lugs. The conductors may be wired directly to the panels from the landing pads

All commercial transformer installations shall be wired from the landing pads to either an approved AIC rated bus gutter or to a common mainline switch. Commercial installations shall not have conductors going directly to the panels from the landing pads.

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

Current Transformer Landing Pad Enclosures

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

Exception: Taps shall 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.

- a. All services rated at 800 amps or less may use transformer landing pads. Landing pads shall be centrally mounted in the enclosure and the conductors will enter and leave near the corners.
- b. Transformer enclosures for all services rated over 800 amps shall be installed in manufactured switchgear.
Exception: Temporary services over 800 amps but under 1200 amps may use a UL-approved manufactured instrument transformer enclosure with applicable fault-current-rated busing.

- c. The minimum size of enclosures shall be as follows:

Single phase: 24 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.

- d. All landing pads shall be of heavy-duty type with minimum (AIC) fault duty rating of 50,000 amps rms symmetrical. They shall be UL labeled and built to EUSERC standards.
- e. The cover of the transformer enclosure cans or switchgear shall 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. All metering equipment doors shall open a minimum of 90° from the front of the enclosures. The socket associated with the transformers may be mounted on the enclosure door. See current EUSERC requirements.
- f. The top of transformer enclosure shall not be higher than 8 feet and the bottom shall not be lower than 6 inches from the finished grade or floor.

Secondary Wiring for Transformer-Rated Meters

- a. The customer shall provide a 1-inch minimum conduit between the transformer enclosure and the meter socket.
- b. Junction boxes and condulets are not allowed in metering secondary runs.
- c. The customer shall provide metering secondary conductors, leaving 6 feet of wire in the transformer enclosure and 2 feet of wire in the socket enclosure.

Exception: SCL will provide secondary conductors when the socket is mounted on or within ten (10) feet of the enclosure of the transformer.

- d. If PVC conduit is used, a #12-solid green ground wire shall be installed.
- e. All secondary conduit runs over 50 feet shall have prior approval by SCL's Technical Metering Unit.
- f. The conductor colors for the metering secondary run are as follows:

Single Phase: 1 black, 1 red #12 solid conductor

1 black, 1 red and 1 white #10 solid conductor

Three Phase: 1 black, 1 red, 1 blue, 1 white #12 solid conductor

1 black, 1 red, 1 blue, 1 white #10 solid conductor

Metering on Switchboards

- a. 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.
- b. Current transformer metering: the space requirement for a socket meter and test switch will be 24 inches horizontal by 15 inches vertical. All meter panels will open a full 90° to the switchgear. All side clearances will meet EUSERC and G-7 standards.
- c. Meters will not be mounted on panels covering compartments that contain any customer's equipment that requires servicing. For further information contact Technical Metering.

Net Metering Inspection/Acceptance Procedure

SCL sponsors a "Net Metering" program for customers interested in combining SCL's service with their own solar-generated electricity. Customers wishing to participate in this program may obtain a customer information packet by calling their SCL Customer Engineering Representative. Representatives can be reached at (206) 386-4200 (South of Denny Way) or (206) 615-0600 (North of Denny Way). The information packet outlines the necessary steps to install solar equipment and to initiate net metering at the customer's location.

Net metering will not be allowed in SCL's network service areas.

Communications Provisions for Large Metered Loads

Where totalized metering is permitted, the customer shall install the totalizing circuitry. Meter totalizing shall meet the Utility's criteria and be approved by SCL before metering equipment will be installed. The customer shall provide and maintain a phone line that meets SCL requirements. Call the Technical Metering Unit for installation information.

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 at the point of metering. The customer shall own, install, and maintain the phone/communication line. The approved specifications for this line can be found at the end of this document in Appendix 3.

For all internal meter rooms, the customer shall install Schedule 40, 1½-inch conduit from the interior of the room to the exterior of the building for automated meter reading. The conduit shall extend 4 inches at each end and be capped.

Cogeneration

If interested in cogeneration, customers should contact SCL's Electric Service Engineer at 206-233-7177 for specific requirements.

Motors and Special Loads

Certain of Seattle City Light’s (SCL’s) large commercial or industrial customers may require motors or special voltages for their businesses. This chapter identifies SCL’s requirements related to motors and special loads and voltages.

The Utility requires detailed information about new installations of motor load. The specific information required is included in this chapter as well as a worksheet included in Appendix 4 at the end of this manual. This information should be provided to SCL well ahead of the installation. Manufacture of special equipment and major construction may require up to 18 months advance notice.

The customer is responsible to provide suitable protective devices on all motor installations, including adequate protection against single phasing on polyphase motors.

Motor-Starting Limitations

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. Conforming to the requirements in the sections below does not assure that interference problems will not occur.

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 volts (208 volts in the Network system). Single-phase motors must not exceed the maximum locked rotor currents listed in Tables 12-1 and 12-2, unless approved in writing by SCL.

Rated Size	At 208 Volts (Network only)	At 240 Volts
5 horsepower	149 amperes	129 amperes

Unit Size (in tons)	Motor Size (in horsepower)	At 208 Volts (in amps)	At 240 Volts (in amps)
2	2 hp	80 amps	69 amps
2 ½	2 ½ hp	100 amps	87 amps
3	3 hp	120 amps	104 amps
3 ½	3 ½ hp	140 amps	121 amps
4	4 hp	160 amps	138 amps
4 ½	4 ½ hp	180 amps	156 amps
5	5 hp	200 amps	173 amps

Starting Limitations on Poly-Phase Motors

Across-the-line starting of 15-horsepower motors or less will normally be permitted for starting currents less than values in Table 12-3. Reduced starting current shall be required on all motors exceeding 15-horsepower nameplate rating, or motors started more frequently than one start per hour, unless otherwise agreed by SCL. The customer will provide specifications and details of motor characteristics for all motors larger than 15 horsepower at which time SCL will determine the maximum allowable starting current for a given installation. Upon failure to install the required starting device, SCL will disconnect the service until it is acceptable. Reconnection shall be at the customer's expense.

Table 12-3
Poly-phase Motor
Maximum Allowable Locked Rotor Current
(Derived from NEMA Standards)

Rated Size in horsepower (hp)	At 208 volts 3-Phase In amperes	At 240 volts 3-Phase In amperes	At 480 volts 3-Phase In amperes
15 hp	256 amps	222amps	111 amps

Starting in Group Start Installations

The maximum permissible current value in Table 12-3 applies to an installation of a single motor. Starters 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 approved in writing by SCL for the largest motor in the group.

Approval

The following information must be submitted to SCL in writing when reduced starting current is required.

- a. Address of motor installation
- b. Description of driven load
- c. Motor voltage
- d. Number of phases
- e. Motor horsepower
- f. Horsepower rating of the largest motor in a group
- g. Type of starting device
- h. Maximum number of motor starts per 8-hour period
- i. Locked rotor current guaranteed by the manufacturer or by test
- j. Power factor at locked rotor current
- k. Description of soft-starting device
- l. Maximum current during soft-start
- m. Power factor during soft-start
- n. Assumed frequency is 60 Hz

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 SCL. Typically, regeneration is intermittent and can cause misoperation of the distribution system which may jeopardizing worker safety.

Interference of Non-inductive Loads

Noninductive loads must comply with the interference-correction rules stated in Chapter 13.

Maximum Switched Load

Maximum increment of load to be switched as a unit will be: 100 kilowatts, three-phase; or 30 kilowatts, 240 volts single-phase, without written approval from SCL. 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.

Welding Equipment

Welding equipment shall conform to the standards of the National Electrical Manufacturers Association (NEMA).

Minimum Power-Factor Limitations

Lighting

Low power-factor lighting, such as 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.

85% Minimum Power Factor

The average monthly power factor should 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 SCL's distribution system unless there is written approval by SCL to allow it as a result of financial or operational harm to customer equipment. The average monthly power factor must be greater than or equal to 85% lagging or else SCL is no longer obligated to serve the customer.

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.

Special Voltage Requirements

Transformation to other than the available service voltage will be furnished by the customer on the load side of the Utility's metering equipment, unless otherwise agreed to in writing by SCL.

Meter Requirements for Large Loads

For more meter requirements for large loads, refer to Chapter 11, "Metering."

Technical & Special Service Requirements

Limits of Service & Service Equipment

Only nominal 60 Hz alternating current is available.

All metering shall be at the service voltage, unless other arrangements are agreed to in writing.

SCL's stock of transformers for supplying standard voltages consists of oil-filled, non-PCB types only.

Special Technical Provisions

SCL reserves the right to impose special requirements for unusual service installations.

The customer's electrical load must be balanced between phases to a level acceptable to SCL.

1. AN OXIDE INHIBITOR must be used when terminating stranded aluminum.

2. SPECIAL VOLTAGES If the customer requires voltages or phases other than those available, the customer must supply the necessary equipment and space for it. All such equipment must be installed on the customer's side of the meter, unless otherwise agreed to in writing.

3. INTERFERENCE Whenever the customer's equipment causes interference with his own service or that of other customers, SCL may require the customer to provide (and pay for) special equipment that will correct the interference. Interference problems may arise when:

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

Requirements for motors, low power factor lighting, and welding equipment are given in Chapter 12.

4. FAULT CURRENT LIMITERS When the customer installs fault current limiters on the line side, SCL's side, of the first disconnect or main breaker, the customer must install a current limiter enclosure that meets the requirements below:

- a. The enclosure shall 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.
- b. The current limiter enclosure shall 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.
- c. The customer is responsible for maintaining and replacing fault current limiters. If repair or maintenance operations require SCL to temporarily disconnect the service, the customer will be billed for this labor. After any maintenance operation, the customer must notify us for replacement of meter seals.

Limitations to Specified Service Areas

Overhead service will not be installed in Local Improvement Districts, Road Improvement Districts, underground arterials, voluntary underground areas, ordinance underground area, or network areas. The main downtown business district, the University business district, and First Hill are served from underground network distribution systems. Other areas may be in the process of being converted to such systems or may be in the planning stages for conversion.

SCL will not upgrade existing overhead distribution on houseboat piers. If additional loads require the wires to be upgraded, the customer will be responsible for:

- a. Submitting plans of the proposed design for our approval
- b. Contracting the work
- c. Maintaining the distribution systems supports and complying with provisions of Chapter 5

Closed Transition Transfer Switches

Closed transition transfer switches are not permitted in underground network distribution areas.

APPROVAL All specifications and drawings of the closed transition transfer switch shall be submitted to SCL prior to construction.

The information shall include one- and three-line diagrams showing all electrical equipment and protective devices. All equipment and devices shall be identified by function, rating, manufacturer's catalog number, and shall include installation and operation manuals, specifications, operating features and settings.

MEANS OF DISCONNECTION There must be a disconnect on the line side of the transfer switch. The disconnect must have a visible break and must have provisions to lock in the open position only.

SCL must have 24-hour access to the disconnect. The customer must immediately notify us in writing whenever the access route or operating procedures change.

Frequency, Phase & Voltage

FREQUENCY Seattle City Light's frequency is 60 Hz nominal.

WAVEFORM The generator must deliver a sinusoidal waveform during transfer switch operation.

VOLTAGE MAGNITUDE The voltage magnitude at the emergency supply terminal of the transfer switch shall be the same as that of SCL at the service terminal point during transfer switch operation. The service voltage is determined by SCL.

PHASE SEQUENCE The phase sequence of the voltage at the emergency supply terminal of the transfer switch must be the same as that of SCL at the service terminal point.

PHASE VOLTAGE The phase voltage at the emergency supply terminal of the transfer switch must be in phase with that of SCL at the service terminal point during transfer switch operation.

MAINTENANCE OF EQUIPMENT The transfer switch and all related equipment must be furnished, installed and maintained by the customer, and must be capable of withstanding and interrupting the maximum fault current specified by SCL.

The customer shall provide us with a schedule of routine maintenance to be performed, and have the maintenance record available showing that it was done.

PROTECTIVE EQUIPMENT During the time the emergency power system is connected to SCL's service terminal point via the transfer switch, protective devices are required. They will separate this emergency supply from SCL's system to protect from faults or low voltages on the system, or for faults on the customer's equipment. These devices and their settings shall be approved by SCL.

SCL's distribution feeders are subject to automatic reclosing. Generally two reclosures may occur; the first within 2 seconds of the initial trip. Customers with synchronous machines are required to disconnect from the distribution system prior to the first reclosure in order to protect their equipment.

The customer is fully responsible for the protection of the load, the transfer switch, the emergency power system, and all associated equipment. Protection should be provided against all malfunctions or equipment failures and consideration should be given to:

- a. Transient surges initiated by faults, lightning, switching, or other system disturbances
- b. Generator overspeed or underspeed during operation of the transfer switch

PROTECTIVE RELAYS Protective relays shall protect Seattle City Light's (SCL's) system from phase-to-phase and phase-to-ground overcurrents on emergency power and shall disconnect customer emergency systems for faults or low voltage on SCL's system.

LOCKOUT RELAYS The customer must provide one or more frequency relays for disconnecting the emergency system from the Utility's system when the frequency exceeds 62 Hz for 0.5 seconds or when the frequency fails below 59 Hz for 1.0 second.

VOLTAGE RELAYS The customer must provide voltage relays to disconnect the generator when the distribution voltage (on a 120-volt basis) exceeds these limits when the voltage is:

- a. 140 volts or more, the relay shall operate within 50 milliseconds (3 cycles)
- b. 130 volts or more for one second, the relay shall operate without intentional delay
- c. 90 volts or less for one second, the relay shall operate without intentional delay

SYNCHRONIZATION OF EQUIPMENT The customer must provide equipment for synchronizing the generator to SCL's system and protective relaying independent of the system.

The synchronizing device must be installed to control the closing of the generator to SCL's system. The system parameters shall all be within these tolerances before closing:

- Frequency difference less than 0.2 Hz
- Angular difference less than five degrees
- Voltage difference less than five percent

Synchronous generators may be manually synchronized within these parameters, using automatic relay supervision. Synchro-check type relays are not acceptable.

LOCKS ON DISCONNECT SWITCHES Provisions must be made by SCL for the installation of a Best Lock Company cylinder lock, or padlock, to lock the disconnect switch in the open position. The disconnect switch shall not be lockable in the closed position.

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

Electromagnetic Interference (EMI)

Electric and magnetic fields are a physical phenomenon characteristic of the flow of electricity from the generation source to the electrical load. Magnetic fields increase with increasing amounts of current in the electrical system that is determined by the customer's consumption of electricity. The electric and magnetic fields associated with the customer's vault and their building's electrical system may interfere with the use of certain sensitive electronic equipment, including computers, computer monitors, and other business and medical equipment. Such electromagnetic interference (EMI) may occur in equipment and devices that are susceptible.

It is our customers' responsibility to determine how to best protect their buildings and equipment from the use of electricity on the premises, including EMI, by designing and locating their electrical systems and vaults to minimize such interference. Some possible measures are: moving sensitive electronic equipment away from the walls, floor or ceiling of the vault; purchasing and installing protective equipment to reduce or manage the electric and magnetic fields. The costs of such measures are the customer's responsibility as well as their design and implementation. Please refer to the City ordinance. SMC21.49.110 (G) and (Q)

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

Power Surges, Faults, Transients, and Outages

Electrical equipment and the availability of electricity to a building can be affected by power surges, faults, natural and switching transients, planned and emergency power outages, natural mechanical failure and other events not within the control of the City Light Department. Customers may avoid such problems by installing protective devices or backup generation equipment in the case of power outages. It is the customer's responsibility to take the above steps as provided by Seattle City ordinance (SMC 21.49.110(G) and (Q).

Surge protective devices purchased and installed by the customer should provide protection from surge voltages generated within customer premises and generated by lightning, switching, and arcing on the Department's system to the full range of parameters described in "IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits, C62.41-1991," or latest revision.

Seattle 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.

Glossary

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.

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

BOLTED FAULT A short circuit that has zero or near zero resistance between faulted conductors.

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 BARS An electrical conductor in the form of rigid bars that serve as a common connection for 2 or more electrical circuits.

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.

COLLECTOR BUS A device that connects Seattle City Light's service conductors to the customer's service entrance conductors.

COMMERCIAL Use of electricity by a customer in other than a single-family residence or duplex.

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 the utility is overhead wire.

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

CROSS ARM An attachment that is mounted horizontally on a Utility pole to support wires and associated hardware.

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 Seattle City Light.

DE-ENERGIZATION To shut off power.

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 BURIAL The installation of electric conductors in a trench without the use of a conduit. Direct burial installations are no longer accepted by SCL.

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 the Seattle City Light's supply system to the wiring system of the premises.

ENERGY The capacity for doing work. In the context of electricity rates and services, the word "energy" refers to electrical energy. In this sense, energy is a measure of the quantity of units of electricity used in a given time period, measured in kilowatt-hours.

ESE Electric Service Engineer works with identified major commercial and industrial customers to facilitate their electrical service installations.

FAR SIDE SERVICE Electrical Service is served from the distribution system which is located on the opposite side of a public street, thoroughfare, or right-of-way from the customer's premises.

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

FAULT CURRENT MAXIMUM The highest current a customer may expect to be supplied from Seattle City Light's system to equipment (switchboard) during a bolted fault.

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.

INDUSTRIAL Use of electricity for manufacturing, processing, refining, or freezing.

Glossary (continued)

INSTRUMENT TRANSFORMER

Current and/or voltage transformers used in connection with metering and control devices.

JUNCTION BOX 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 for wire.

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

KVA Kilovolt Ampere rating 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.

LINE ANGLE STRUCTURE A corner pole of structure on a dock where the dock and distribution system change direction.

LOAD CENTER The equipment which is the main control used for disconnecting the customer's electric service. This equipment includes circuit breakers, fuses, or switches located near the entrance of the supply conductors.

LOCAL AUTHORITY 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).

LOCAL IMPROVEMENT DISTRICT

(LID) A project undertaken by property owners within a specific geographic area inside Seattle to accomplish a specific improvement project.

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 BASE A receptacle for the installation of an electric meter. Also referenced as meter socket.

METER TOTALIZING 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.

METERING EQUIPMENT

Any equipment used to measure electrical energy.

MOTOR PROTECTIVE DEVICE

A device responsive to motor current and temperature that protects the motor against dangerous overheating due to overload, failure to start, or single-phasing (in the case of three-phase motors).

MOTOR-STARTING LIMITATIONS

Limits placed by Seattle 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.

NEARSIDE SERVICE Electrical Service that is served from the distribution system located adjacent to the customer's property.

NEC National Electric Code

NEMA STANDARD Any standard recommended by 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. Customers with their own generation offset the electricity they would have purchased from their utility. If such customers generate more than they use in a billing period, their electric meter turns backwards to indicate their net excess generation.

NETWORK A complex underground distribution system that has multiple primary feeds that are connected on the secondary side, and has redundant distribution components to provide enhanced system reliability. Network systems exist in downtown Seattle, First Hill and 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.

PANIC BAR A device that allows a door to be pushed open from the inside without using a key.

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 Seattle City Light's service conductors are attached to a structure by an approved service bracket.

POTENTIAL TRANSFORMER Obsolete term for voltage transformer.

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

PRIMARY SERVICE Service voltage greater than 600 volts.

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

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

PUBLIC STREET Land acquired and/or dedicated by or to a governmental agency for public use, for general public access and utilities. Public right-of-way includes any land open to the public that the City owns or controls through easement. Street right-of-way includes all property from the street center to the adjacent property line, including planting areas and sidewalks.

PULLING HANDLINE A rope or string that is installed in conduit in order to assist the pulling of the wire through the conduit.

RACEWAY An enclosed channel for holding wires or cables.

RECLOSURE 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, reclosures can automatically "re-close" the circuit and restore normal power transmission once the problem is cleared.

RESIDENCE A single-family dwelling.

RESISTANCE A material's opposition to the flow of electric current; measured in ohms

ROAD IMPROVEMENT DISTRICT (RID) A project undertaken by property owners within a specific geographic area outside Seattle to accomplish a specific improvement project.

SALVAGEABLE Materials having a value to Seattle City Light.

SCL Seattle City Light

SECONDARY SERVICE Service voltage of 600 volts or less.

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

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

SERVICE CONTRACT An agreement between the customer and Seattle City Light.

SERVICE DROP CONDUCTORS (SERVICE DROP) The overhead conductors from Seattle City Light's pole to the customer's point of attachment.

SERVICE EASEMENT A right acquired by Seattle 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 CONDUCTORS, OVERHEAD The service conductors between the terminals of the service equipment and a point usually outside the building, clear of walls, where joined by tap or splice to the Utility's service drop.

SERVICE ENTRANCE CONDUCTORS, UNDERGROUND The service conductors between the terminals of the service equipment and the point of connection to the service lateral.

SERVICE ENTRANCE EQUIPMENT Service conduit, conductors, weatherhead, meter base, and load center.

SERVICE LATERAL An underground service tap from Seattle City Light's distribution system to the customer's point of service connection.

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 Seattle City Light's distribution system.

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

SERVICE RATING The size in amps of the service entrance equipment

SERVICE STRIKE The overhead point of attachment for the utility'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.

SERVICE TERMINAL BOX A metal box used exclusively to terminate Seattle City Light's service laterals and provide a connection to the customer's service entrance conductors.

SHORT PLAT A short subdivision; a division of land into two to nine lots. See Chapter 23.24 of the Seattle Municipal Code.

Glossary (continued)

SINGLE-PHASE, THREE-WIRE

SERVICE Typically 120/240V AC is carried between two wires: hot and neutral and a third ground wire for safety. Single-phase power is used to power all typical home electrical appliances; it is used in residential outlets.

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

SPAN A length of conductor or cable between supports.

SPLICING VAULT A concrete chamber in an underground system which Seattle City Light's workers may enter for the purpose of installing and maintaining electrical equipment. A splicing vault does not contain transformers.

SPOT NETWORK LOADING A spot network is a network service comprised 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.

SUBSTATION A facility in which transformers are located that change transmission voltages to distribution voltage.

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

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

TERMINAL CAN An enclosure in which the Utility's wires meet the customer's NEC rated wires. It is used as a termination point for the Utility's service lateral.

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, and is used in industrial areas and in large buildings.

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 the utility cannot access the in-building vault to install and remove its transformers. The building owner assumes the responsibility for moving the transformers.

UNDERGROUND RESIDENTIAL

AREA A residential area supplied by an underground distribution system.

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

VAULT An approved chamber for electrical equipment. Vaults must meet Seattle City Light's construction requirements.

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

VOLTAGE TRANSFORMER (VT)

A transformer that is designed to have its primary winding connected parallel with a circuit and used for transforming voltage to a value suitable for measurement or control.

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.

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 the utility.

WIRE TROUGH A factory fabricated wireway; an open cable wire enclosure in which several cables are housed.

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.

**INSTALLATION DETAILS FOR UNDERGROUND SERVICES
 NONMETALLIC AND RIGID STEEL CONDUIT ON PRIVATE PROPERTY**

A. General

1. No definite separation is required between power, telephone and CATV cables although 8" to 12" is advisable.
2. All direct burial cables*, nonmetallic and rigid steel conduit for lateral service to private property from the distribution trench shall be 36" minimum below final grade in the public right-of-way. All rules for material types, trench finish and backfill shall be as noted below.
3. The bottom of the trench shall be free of debris and fine graded by hand to remove sharp embedded rocks and loose stones over 1/2", or the trench shall be over-excavated and the over-excavation replaced with bedding material to cover protruding rocks and stones by at least 2". The bottom shall be graded even. Bedding shall be sand. Over conduit, place bedding material or a 2" layer of unsaturated excavated material selected to exclude all sharp rocks and stones over 1/2" size. Around all telephone and television cables, place bedding material or select excavation material. Backfill conforming to this may be placed directly over conduit and all cables.
4. The customer is responsible for ensuring against entry of water into buildings, into or through service equipment, or other locations where entry of water could be considered a problem. See the Seattle City Light "Requirements for Electrical Service Connection" manual for details.

B. Nonmetallic Conduit on Private Property

1. Minimum depth shall be 18" over nonmetallic conduit. (36" for high voltage conduit — above 600 volts)
2. Conduit shall be PVC schedule 40 or other nonmetallic conduit approved for direct burial.
3. Bending of PVC conduit with heat (e.g., heat blankets or hot boxes) is prohibited. See Construction Guideline U2-11 Note 8, or in the Network area, Network Construction Guideline NDK-10 Note 10.

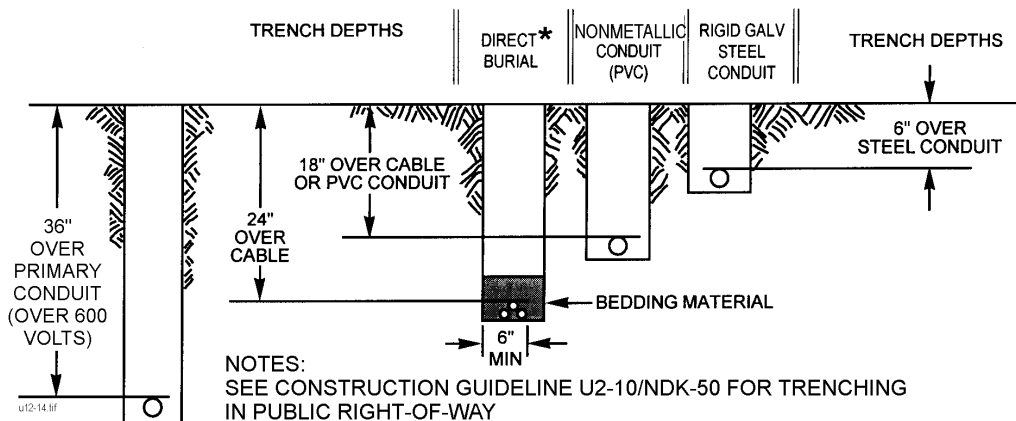
C. Rigid Steel Conduit on Private Property

1. Minimum depth shall be 6" over rigid steel conduit. (36" for high voltage conduit — above 600 volts)
2. Conduit shall be rigid galvanized steel.

D. Direct Burial Cables on Private Property

Not allowed for new permanent construction.

Trenching Depths for Private Property



*NOT ALLOWED FOR PERMANENT CONSTRUCTION

ORIGINATOR	STANDARDS COORDINATOR	STANDARDS SUPERVISOR	UNIT DIRECTOR
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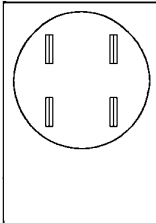
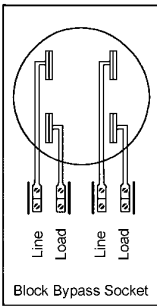
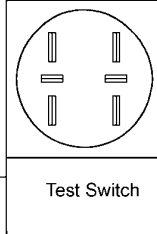
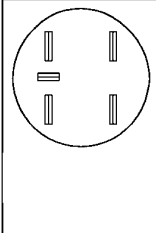
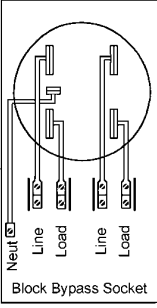
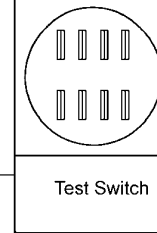
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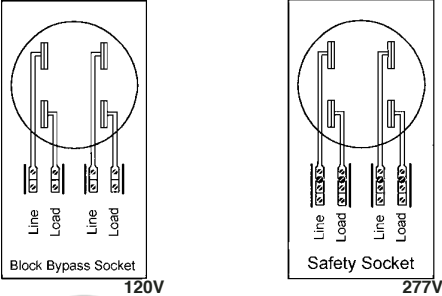
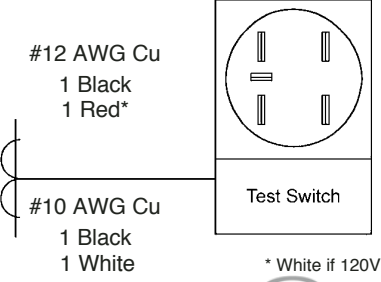
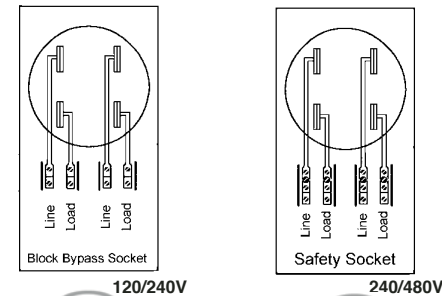
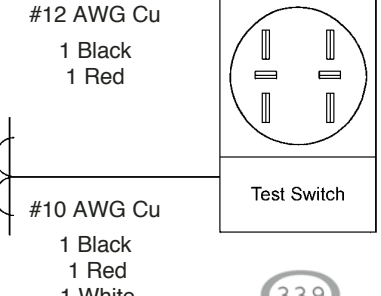
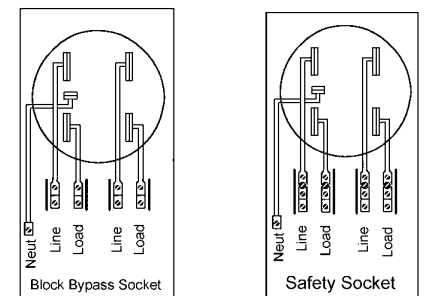
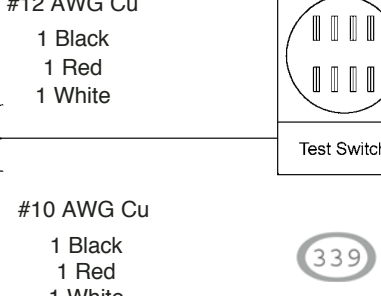
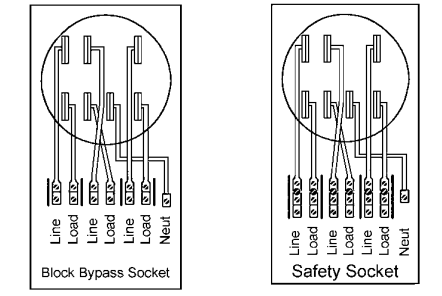
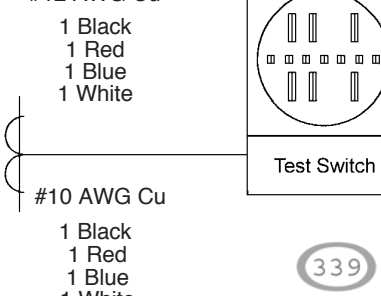
STANDARD NUMBER: **DU13-4/NMT-30**
 PAGE: 1 of 2
 DATE: January 28, 1974
 REV: April 1, 2004

METER BASE ARRANGEMENTS

Notes:

1. When nonmetallic conduit is used between C.T. can and meter socket, add 1 #12 or larger solid green wire for ground. Applies to all "B" Figures.
2. When neutral is insulated, it shall be bonded to the socket. All sockets shall be U.L. listed. Applies to all Figures.
3. Circuit closing devices are **not approved**. Applies to all Figures.
4. All 480V services 200 amps or less require a 200 amp continuous duty safety socket.
5. All commercial services 200 amps or less and under 300 volts require a continuous duty block bypass socket.
6. All Delta services (240/120V or 480/240V 3 phase 4 wire) up to 200 amps shall have the high leg on the right hand jaws of the 7-terminal meter socket. Applies to Figure 6A.
7. All residential 120/208V single phase services up to 400 amps shall have the 5th terminal at the 9 o'clock position, and wired to the neutral in the meter socket. Applies to Figure 2A.
8. All commercial 120/208V single phase services up to 200 amps shall have the 5th terminal at the 9 o'clock position, and wired to the neutral in the meter socket. Applies to Figure 5A.
9. All EUSERC requirements refer to the latest revisions of EUSERC documents. Typical EUSERC drawing number **339**
10. C.T. secondary wire sizes increase for 50 feet and greater.
11. Block bypass sockets are recommended for all residential use.

Residential Metering Requirements			
Types of Service	Maximum Metering Capacity Up to 400 Amp	Metering Capacity Over 400 Amp	
<p>1 Ø 3W 120/240V</p> <p>EUSERC Compliance Fig. 1A EUSERC Dwg. F-1 Code 4 with EUSERC Dwg. 302A (up to 225 amps) or 302B (over 225 amps and up to 400 amps).</p> <p>Fig. 1B EUSERC Dwg. F-1 Code 6 with EUSERC Dwg. 339 (over 400 amps).</p>	 <p>Up to 225 Amps</p> <p>302A</p>	 <p>Line Load Line Load</p> <p>Block Bypass Socket</p> <p>320 Amp Class</p> <p>302B</p>	<p>#12 AWG Cu 1 Black 1 Red</p>  <p>Test Switch</p> <p>#10 AWG Cu 1 Black 1 Red 1 White</p> <p>339</p>
<p>Fig. 1A</p>	<p>Fig. 1B</p>	<p>Fig. 1B</p>	
<p>1 Ø 3W 120/208V</p> <p>EUSERC Compliance Fig. 2A EUSERC Dwg. F-1 Code 5A with EUSERC Dwg. 302A (up to 225 amps) or 302B (over 225 amps and up to 400 amps).</p> <p>Fig. 2B EUSERC Dwg. F-1 Code 8 (Code 15 Alternate) with EUSERC Dwg. 339 (over 400 amps).</p>	 <p>Up to 225 Amps</p> <p>302A</p>	 <p>Neut Line Load Line Load</p> <p>Block Bypass Socket</p> <p>320 Amp Class</p> <p>302B</p>	<p>#12 AWG Cu 1 Black 1 Red 1 White</p>  <p>Test Switch</p> <p>#10 AWG Cu 1 Black 1 Red 1 White</p> <p>339</p>
<p>Fig. 2A</p>	<p>Fig. 2B</p>	<p>Fig. 2B</p>	
ORIGINATOR	STANDARDS COORDINATOR	STANDARDS SUPERVISOR	UNIT DIRECTOR
<i>Ted Allestad</i>	<i>Charles L. Shaffer</i>	<i>John Chimmer</i>	<i>Harold Juy</i>

Commercial Metering Requirements		
Types of Service	Maximum Metering Capacity Up to 200 Amp	Metering Capacity Over 200 Amp
<p>1 Ø 2W 120V 1 Ø 2W 277V</p> <p>EUSERC Compliance Fig.3A EUSERC Dwg. F-1 Code 4 with EUSERC Dwg. 302B (up to 200 amps and 120 V) or Dwg. 305 (up to 200 amps and 277 V or higher).</p> <p>Fig. 3B EUSERC Dwg. F-1 Code 5A with EUSERC Dwg. 339 (over 200 amps).</p>	 <p style="text-align: center;">120V 277V</p> <p style="text-align: center;">(302B) (305)</p> <p style="text-align: center;">Fig. 3A</p>	 <p style="text-align: center;">* White if 120V</p> <p style="text-align: center;">(339)</p> <p style="text-align: center;">Fig. 3B</p>
<p>1 Ø 3W 120/240V 1 Ø 3W 240/480V</p> <p>EUSERC Compliance Fig.4A EUSERC Dwg. F-1 Code 4 with EUSERC Dwg. 305 (up to 200 amps).</p> <p>Fig. 4B EUSERC Dwg. F-1 Code 6 with EUSERC Dwg. 339 (over 200 amps).</p>	 <p style="text-align: center;">120/240V 240/480V</p> <p style="text-align: center;">(302B) (305)</p> <p style="text-align: center;">Fig. 4A</p>	 <p style="text-align: center;">(339)</p> <p style="text-align: center;">Fig. 4B</p>
<p>1 Ø 3W 120/208V 1 Ø 3W 277/480V</p> <p>EUSERC Compliance Fig.5A EUSERC Dwg. F-1 Code 5A with EUSERC Dwg. 305 (up to 200 amps).</p> <p>Fig. 5B EUSERC Dwg. F-1 Code 8 (Code 15 Alternate) with EUSERC Dwg. 339 (over 200 amps).</p>	 <p style="text-align: center;">120/208V 277/480V</p> <p style="text-align: center;">(302B) (305)</p> <p style="text-align: center;">Fig. 5A</p>	 <p style="text-align: center;">(339)</p> <p style="text-align: center;">Fig. 5B</p>
<p>3 Ø 4W 208Y/120V 3 Ø 4W 240/120V delta 3 Ø 4W 240Y/138V 3 Ø 4W 480Y/277V 3 Ø 4W 480/240V delta</p> <p>EUSERC Compliance Fig.6A EUSERC Dwg. F-1 Code 7 with EUSERC Dwg. 305 (up to 200 amps). Fig. 6B EUSERC Dwg. F-1 Code 13 (Code 15 Alternate) with EUSERC Dwg. 339 (over 200 amps).</p>	<p style="text-align: center;">High leg on right-hand terminals if delta (orange).</p>  <p style="text-align: center;">208Y/120V, 240/120V delta, 240Y/138V 480/277V, 480/240V delta</p> <p style="text-align: center;">(302B) (305)</p> <p style="text-align: center;">Fig. 6A</p>	 <p style="text-align: center;">(339)</p> <p style="text-align: center;">Fig. 6B</p>

Seattle City Light Metering Phone Line Requirements

A phone line is required to communicate with your electric meter(s) for one or more of the following reasons:

1. You are installing one or more new services, which will have large general service or high demand rates. Seattle City Light (SCL) requires phone lines for all new large services.
2. You have one or more existing large general service or high demand rate meters, have elected to use Seattle MeterWatch and desire daily updates of the meter data. SCL strongly encourages the installation of phone lines on existing large services.
3. You have requested totalizing metering for your existing large services. Currently, SCL can read this kind of metering only by phone.
4. Under normal conditions, calls will originate from SCL facilities between 3 and 6 AM each morning. In the future, meters may be programmed to originate calls for abnormal conditions or routine data upload.

Coordination To request or arrange phone read metering for new services, contact your SCL Electric Service Engineer (ESE). For existing services contact the SCL MeterWatch Coordinator, Bahiru Egziabiher at 206-684-3762 (smw@seattle.gov). They will arrange for SCL to identify the meter(s) to be read, install the telephone network interface box(s) and provide any special instructions for your installers. You must supply the activated phone line and provide the telephone number to SCL before SCL will install the modem-equipped meters.

Telephone Line Specification and Installation The telephone line shall be dedicated standard analog service as opposed to digital service. SCL does not accept shared use lines due to various problems this approach creates. Either a PBX extension or measured business (1 MB) line is acceptable. SCL strongly recommends blocking long distance and collect 900/976 calls.

If a dedicated measured business line is used, the line must be extended from the phone company wiring closet or Minimum Point of Entry (MPOE) to the meter. If a PBX line is used, the extension will be from the nearest point of service to the meter. Installers should use category 5, industry standard telephone cable and route the wire as a permanent installation in accordance with applicable codes and standards.

Installers shall terminate the cable with a hardwire connection at the SCL-provided telephone network interface box which will typically be located within one to three feet from the meter or meter enclosure.

SCL will make the connection between the meter and the interface box.

The line shall be labeled at both ends with:

- "Seattle City Light Metering Use Only"
- The telephone number including outside line access digit if required
- The maintenance and repair telephone number
- The telephone service provider's name

Testing of Phone Line Before notifying SCL that the line is installed and operational, the installer shall test to ensure that for a standard analog phone at the interface box:

- Dial tone is available,
- Noise and static levels are at or below standard voice quality lines,
- Outbound calls can be made, and
- Inbound calls to the identified number can be received.

Notification that the Line is Ready When the line is installed, labeled, operational and tested, the customer or their installer must contact SCL to advise that the line is ready and supply the new phone number. Please contact your ESE or Bahiru Egziabiher as indicated in the Coordination section above. New electric rates and meter data services that require phone communication with the meter cannot be implemented until after SCL has received this notification. Modem and totalizing meters will not be installed until the phone line is ready with dial tone.

Responsibility It is the customer's responsibility to maintain and pay for the phone line and service. SCL will notify the designated contact if a problem occurs. Prompt resolution by the customer is required to minimize possible impact to billing data. Extended or repeated phone line failures may force SCL to remove totalizing metering to avoid on-going billing problems.

Future SCL is actively monitoring and evaluating alternate methods to communicate with meters. There is significant activity in this area that may provide new solutions that could be of mutual benefit to our customers and SCL. Customers will be informed when SCL is supporting new options.

For more information on Seattle MeterWatch go to www.seattle.gov/light/key/smw/ or contact Bahiru Egziabiher at 206-684-3762 (smw@seattle.gov).



Motor Load Detail Worksheet

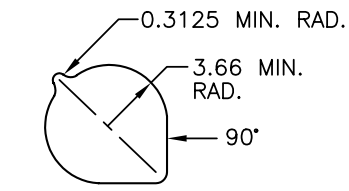
Project name

Service address:

Date submitted:

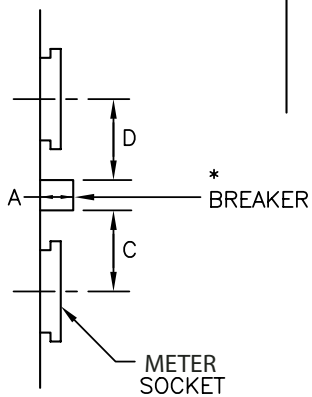
Information Requested	Motor #1	Motor #2
Description of Driven Load		
Motor Voltage		
Number of Phases		
Motor Horsepower		
Maximum number of starts in 8 hour period		
Locked rotor current per manufacturer		
Power factor at locked rotor current (if not given SCL will assume 40%)		
Description of Soft-starting device		
Maximum current during soft-start		
Power factor during soft-start (SCL will not estimate this value)		

Complete all requested information for each motor 15 hp or higher. Please copy if additional pages are needed.



METER CUTOUT DETAIL

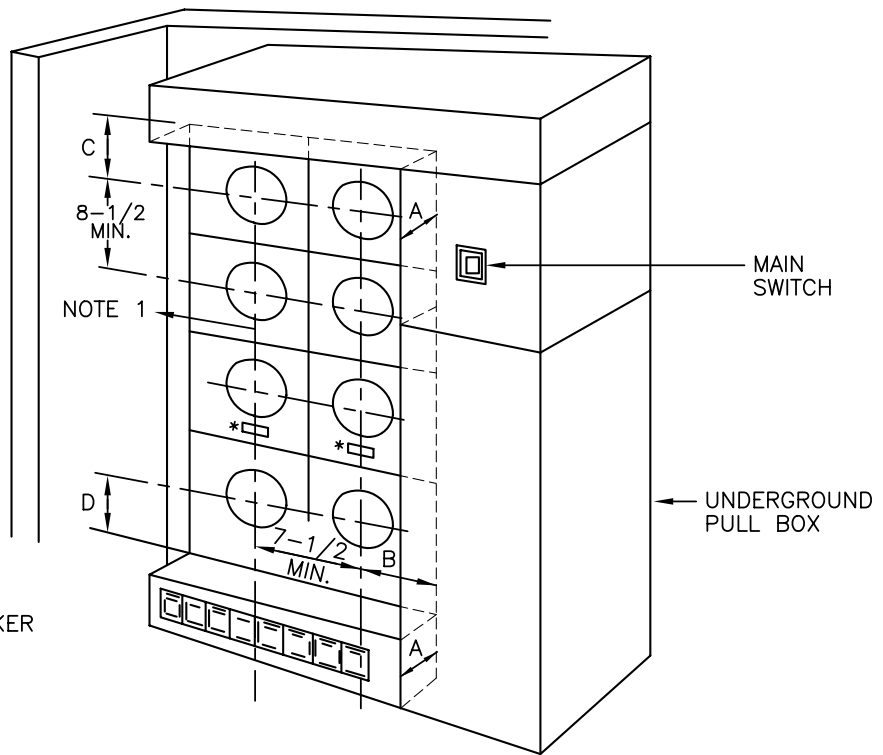
FIGURE 1



SIDE VIEW DETAIL

FIGURE 2

* Alternate breaker position below meter socket
See side view detail for clearance dimension



DIMENSIONS - INCHES			
"A" (PROTRUSIONS)	"B" MIN.	"C" MIN.	"D" MIN.
0 (No protrusion)	3-3/4"	4"	4-3/4"
Greater than 0" to 1-1/8"	4-1/4"	4"	4-3/4"
Greater than 1-1/8" to 2"	4-1/4"	4-1/4"	6-1/4"
Greater than 2" to 4"	6-1/4"	4-1/4"	8"
Greater than 4" to 11" max.	6-1/4"	10"	8"

ALL DIMENSIONS SHOWN ARE IN INCHES

REV.	DATE	DESCRIPTION		
3	10/87	REVISED NOTE 2.		
SCALE N.T.S.		CLEARANCES FOR RESIDENTIAL MULTIPLE METERING INSTALLATIONS	SHT 1 OF 2	
DATE 10/87			ELECTRIC UTILITY SERVICE EQUIPMENT REQUIREMENTS COMMITTEE	DWG NO. 353

NOTES:

1. Where an adjacent wall or other obstruction extends more than 11 inch perpendicular from the face of the meter panel, a 10 inch minimum dimension to the meter socket axis is required. For obstructions extending 11 inch or less from the meter panel, the side clearance shall conform to that of Dimension "B".
2. Panels shall be removable to provide access to the customers equipment with the utility meters and tamperproof sealing rings in place. When there is more than one meter socket per panel, the minimum meter cutout opening, as detailed in Figure 1 above shall apply.
3. Underground landing lugs shall not be placed under any socket cover.
4. Dimension "B" shall be increased by the amount that the main switch door, including operating handle, reduces the clearance when opened 90 degrees.
5. See drawing 300/2 for meter maximum and minimum heights.
6. Removable meter panel covers shall not exceed 6 square feet in area.
7. Distribution conductors shall be barriered from metering compartment.

REV.	DATE	DESCRIPTION		
3	10/87	REVISED NOTE 2.		
SCALE N.T.S.		CLEARANCES FOR RESIDENTIAL MULTIPLE METERING INSTALLATIONS		SHT 2 OF 2
DATE 10/87				ELECTRIC UTILITY SERVICE EQUIPMENT REQUIREMENTS COMMITTEE