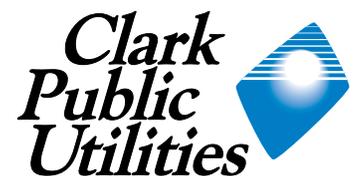


C O M M E R C I A L Electric Service Handbook



2026

Building or remodeling commercial property in Clark County, Washington
This handbook provides information regarding Clark Public Utilities standards and requirements for installing commercial electric service.



CONTACTS



Construction Services

Office Hours: Monday-Friday
7:00 AM to 4:00 PM

Location: 8600 NE 117th Ave
Vancouver, WA 98662

PO Box 8900 • Vancouver, WA • 98668

Updated March 2026

Clark Public Utilities

- ▶ Website

clarkpublicutilities.com

- ▶ Construction Services Department

construction@clarkpud.com

- To initiate a new service or service upgrade, request a service line inspection or disconnection, or to provide backfill or electrical service approval notification.

(360) 992-8558

- ▶ Construction Design

designdesk@clarkpud.com

- For questions regarding existing work requests, designs, job status, or prepayment.

(360) 992-8511

- ▶ Meter Department

meterdepartment@clarkpud.com

- For meter equipment questions, scheduling CT delivery and installation or meter equipment review.

(360) 992-8001

- ▶ Operations Office

ops@clarkpud.com

- To request primary inspections, primary standbys or for questions on a scheduled job.

(360) 992-8839

- ▶ Customer Service Department

clarkpublicutilities.com/contact

- For general billing questions regarding existing electric or water accounts or to pay a construction invoice with check by phone.

(360) 992-3000

Other Contact Information

“Call Before You Dig” Utility Notification Center

- ▶ To request locates of underground utilities

callbeforeyoudig.org

811 or (800) 424-5555

Washington State Department of Labor and Industries

lni.wa.gov

- ▶ To obtain an electrical permit
- ▶ Questions regarding a permit or code
- ▶ To request an electrical inspection

(360) 896-2300

(360) 896-2360

(360) 896-2350

City of Vancouver

cityofvancouver.us

- ▶ To obtain an electrical permit
- ▶ Questions regarding a permit or code
- ▶ To request an electrical inspection

(360) 487-7833

(360) 487-7801

(360) 487-7890

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CHAPTER

1

Introduction

This handbook is a guide to Clark Public Utilities' requirements for new or altered electric service to commercial structures. The information in the following chapters applies to Clark Public Utilities commercial customers.

Codes, permits and inspections

This handbook should be used only as a guide. It should not be interpreted to conflict with regulations of the State of Washington or other regulatory bodies having jurisdiction.

It is the customer's responsibility to ensure the project complies with all federal, state and local codes that may apply. All codes and requirements related to a project shall be addressed before construction begins.

Electrical service equipment inspection for new service

Prior to Clark Public Utilities connecting the service, the newly installed service equipment requires an electrical inspection from the Authority Having Jurisdiction (AHJ): Department of Labor and Industries or the City of Vancouver. It is the customer's responsibility to request this inspection with the appropriate agency.

Local inspecting agencies can be contacted at the following:

- ▶ Washington State Department of Labor and Industries lni.wa.gov
(360) 896-2300
- ▶ City of Vancouver (within Vancouver city limits) cityofvancouver.us
(360) 487-7800

How to contact Clark Public Utilities

Located inside the front cover of this handbook is a listing of Clark Public Utilities' contact information. This list also includes phone numbers and websites for other construction related contacts.

To request a new service or inquire about an existing construction project, contact our Construction Services department construction@clarkpud.com or call (360) 992-8558, Monday through Friday between 7:00 a.m. and 4:00 p.m.

Jobs are scheduled for connection once all project requirements have been met (permits, easements, primary inspections, prepayment, etc.), the service has been inspected by the AHJ and the customer has completed backfilling the trench. Contact the Operations office ops@clarkpud.com or call (360) 992-8839 for current construction scheduling.

Online applications for service, a copy of this publication, and additional information can be found on the Clark Public Utilities website: clarkpublicutilities.com.

For general billing questions regarding existing electric or water service accounts, please call our 24-hour customer service line at (360) 992-3000 or visit clarkpublicutilities.com

CHAPTER

2

Commercial Electric Service General Information

This chapter provides general information on the responsibilities of both the utility and the customer, as well as the process for starting a project.

Clark Public Utilities is responsible for:

- ▶ Developing electrical designs in accordance with utility construction standards to effectively meet the needs of both the customer and the utility.
- ▶ Applying for right-of-way (ROW) trenching and crossing permits within Clark County unincorporated and for all work being done along or under state roads and highways. Fees for these permits will be included on the customer's Clark Public Utilities construction bill.
- ▶ Inspecting installations of primary and secondary up to the point of delivery (transformer, secondary pedestal, junction box or collector cabinet). Service conductors beyond the point of delivery are inspected by the AHJ.
- ▶ Installing current transformers (CTs) when required.
- ▶ Connecting the service after the customer provides notification of service approval from the AHJ.
- ▶ Setting the electric meter in a customer-installed and maintained meter base.

Customer is responsible for:

- ▶ Initiating an electric service work request and establishing both a construction billing account and an electric service account.
- ▶ Providing civil drawings, one-line diagrams and load summaries. A full list of required project information can be found in [***Chapter 3 Commercial Underground Installations***](#).
- ▶ Hiring a utility-approved primary electrical installation contractor to supply and install all required primary (high voltage) electrical equipment based on the utility-provided electrical design. Visit our website, clarkpublicutilities.com to view the current contractor list.
- ▶ Contacting your utility design engineer at least two weeks before starting construction. This allows time for plan review, site staking, installation of necessary equipment and any required design revisions.
- ▶ Obtaining ROW trenching and crossing permits inside any city limits.
- ▶ Notifying the Utility Notification Center (Call Before You Dig) and other utilities of the project **before** any digging or excavation.
- ▶ All trenching related to the installation.
- ▶ Obtaining electrical wiring permits and inspections from the state or local AHJ.
- ▶ Installing the primary and secondary service, including the required primary and secondary facilities, trenches, conduit, conductor and metering equipment.

- ▶ Requesting the installation of CTs - when required - once the metering enclosures and service conductors are in place but not yet energized.
- ▶ Maintaining the service line and associated all utility owned infrastructure/equipment, excluding the meter.
- ▶ Maintaining electrical equipment safety clearances for both existing and new installations of primary and secondary equipment.
- ▶ Ensuring that all utility owned infrastructure/equipment remains accessible to utility personnel 24-hours a day, seven days a week.

Ownership and maintenance responsibilities

Once the new service passes electrical inspection, has been backfilled by the customer and is energized by the utility, Clark Public Utilities assumes ownership of the primary voltage facilities. The utility is then responsible for the repair and maintenance of the primary voltage system, associated facilities and the meter.

All service equipment, conductors and wiring on the customer (load) side of the transformer (including the service mast of overhead services) is owned and maintained by the customer. Commercial services that include a secondary pedestal/junction box are customer-owned on the load side of the secondary connectors. The customer is responsible for facilitating any necessary repairs or modifications to the underground service line, switchgear and electrical panels.

NOTE: Commercial customers installing primary metering will have ownership and maintenance agreements that are mutually agreed upon. In most cases, the customer owns and maintains all facilities and equipment beyond the primary meter.

Starting the commercial electric service design process

A billing account will be established at the time the financially responsible party contacts the Construction Services department to request new or altered electric service or completes and submits the webform [Commercial Electric Service Request](#), found on our website, clarkpublicutilities.com.

Construction Services can be reached at construction@clarkpud.com or (360) 992-8558, Monday through Friday, between 7:00 a.m. and 4:00 p.m. A construction coordinator will ask for billing information and the address of the new service site. For detailed information required to initiate a commercial electric service request, see [Chapter 3: Commercial Underground Installations](#).

Service voltage

The following table provides a listing of commercial voltages offered by Clark Public Utilities.

Table 2-1 Commercial service voltages

Service Type	Voltage
Single-phase	120/208 Volt, 3 wire* (limited applications) 120/240 Volt, 3 wire 240/480 Volt, 3 wire* (limited applications)
Three-phase	120/208 Volt, 4 wire wye, grounded 120/240 Volt, 4 wire delta* (limited applications) 277/480 Volt, 4 wire wye, grounded

* Requires pre-approval from a utility design engineer.

Motor loads

Commercial customers with large motor loads are responsible for providing and maintaining code-approved protective devices. These devices are required to protect motors against overloads, short circuits, ground faults, low voltage and single phasing of three-phase motors. Motor installations larger than 50 horsepower (HP) at 480 volts require reduced-voltage equipment, such as soft starters, variable frequency drives (VFDs) or a reduced-voltage starter.

Clark Public Utilities reserves the right to require soft-starting or power factor correction equipment - regardless of motor size - if the motor's starting characteristics cause voltage sags exceeding 5% at the point of common coupling, create power quality issues for adjacent services, or result in any other system disturbance. Motor starting methods shall comply with IEEE 519 and ANSI C84.1.

High-density loads

If the electric service will serve a 24-hour, high-density load (HDL) - such as a data center, indoor growing operation or electric vehicle (EV) charging station - inform your utility design engineer to ensure facilities are sized to accommodate the HDL. The utility design engineer will also provide contact information for the Energy Resources department which can advise on appropriate rate schedules for each HDL application.

Solar generating facilities

Interconnection of a customer owned and operated solar generating facility requires pre-approval of the planned generating system, interconnection and metering. All generating systems must pass electrical inspection from the local AHJ before the utility will connect the service and set the meters. Clark Public Utilities requires the installation of both a production meter and net meter for solar generating systems.

The following steps are required for interconnection of customer owned generating facilities with capacity up to 100 kW AC:

- ▶ Completed and signed Interconnection Application and Agreement.
- ▶ One-line electrical diagram.
- ▶ Site plan with proposed meter (net and production) locations.
- ▶ Manufacturer equipment cut sheets.
- ▶ Prepayment of all applicable fees and charges.

NOTE: Facilities with a generation capacity greater than 100 kW are subject to additional requirements.

For information and application paperwork related to solar and other types of generating facilities, contact the Energy Resources department at netmetering@clarkpud.com or call (360) 992-3244. You can also visit our website at clarkpublicutilities.com for additional resources and documentation.

Meter equipment location requirements

The meter base and associated devices (CT enclosure, switchgear, etc.) must be attached to a permanent fixed structure. This location is to remain accessible to Clark Public Utilities personnel 24 hours a day, without the need to call for an appointment.

Location requirements:

- ▶ On the outside of the structure being served.
- ▶ On the ground floor, with the center of the meter 5 to 6 feet above finished grade (5 feet preferred).
- ▶ Readily accessible to utility personnel 24 hours a day.

- ▶ Inside an electrical equipment room that has an exterior entrance and provides the utility with 24-hour access. The proposed location must be approved by a utility design engineer before construction begins.

These approved locations allow Clark Public Utilities to:

- ▶ Read the meter in a cost-effective manner.
- ▶ Maintain the metering equipment efficiently.
- ▶ Disconnect the electrical service quickly in case of emergency.

NOTE: See [Chapter 4, Commercial Metering](#) for more information.

Trenching

The licensed and bonded, utility-approved primary electrical installation contractor hired by the customer is responsible for excavating all primary electrical trenches and for contacting the utility to request inspection of the primary trench, regardless of whether the excavation work is subcontracted. This contractor is also responsible for backfilling and compacting all trenches after all required inspections have been completed. The primary electrical installation contractor remains the single point of contact for the project and is responsible for coordinating all excavation work and required utility inspections. All utility work within the public road ROW, including trenching and road crossing installation, must be performed by a contractor licensed and bonded to perform excavation work.

For additional trenching information, see [Chapter 3, Commercial Underground Installations](#).

Locating existing underground utilities

State law requires customers to contact the Utility Notification Center (the underground utilities locating service) at least two full business days in advance of trenching, directional drilling/boring, or excavation.

Utility locates must be in place prior to the start of digging.

NOTE: The day the request is made is not included in the two business days.

Table 2-2 Color codes for locating underground utilities

Color	Underground Service
Red	Electric
Yellow	Gas, Oil, Steam
Orange	Telephone, Cable TV
Blue	Water
Purple	Reclaimed water
Green	Sewer, Storm drain
Pink	Temporary survey marks
White	Proposed excavation

Customers within Clark County can call the national “Call Before You Dig” number, 811 or 1-800-424-5555 or go to callbeforeyoudig.org/washington. One request to the Utility Notification Center notifies all utilities that locates have been requested. Underground electric distribution lines owned and maintained by Clark Public Utilities and the commercial service line from the source equipment to the main structure (this line will be marked private -PVT) will be located. This service is free of charge. The customer is responsible for facilitating locates for privately-owned, underground utilities beyond the main commercial structure.

Visit callbeforeyoudig.org/washington to view a list of private locate companies. **Table 2-2** shows the color code for marking the location of each utility.

NOTE: Any digging within 24 inches of location marks must be done with hydrovac/hydro excavation or with wood or fiberglass handled tools. Do not use digging bars in the vicinity of buried electric cables.

Joint use facilities

Joint use describes a group of utilities that share pole space or underground trenches to reduce installation and maintenance costs for customers. In Clark County, joint use agreements exist with telecommunications providers, cable television companies, fiber optic networks, and wireless service providers.

Joint use trench

The customer may place telephone, cable television, or other communication wires in a trench with electric service conductors, providing the installation meets the requirements of Clark Public Utilities and all other parties sharing the trench. In certain cases, natural gas and water services may be installed in a common trench. See [Chapter 3, Commercial Underground Installations](#) for additional trenching information.

NOTE: Sewer lines, water mains and storm drainage systems are **not** allowed in a joint trench with Clark Public Utilities' electric distribution, secondary or service lines.

Overhead joint use

Whenever an existing Clark Public Utilities pole is replaced or an overhead service is converted to underground and the pole has joint users attached, the pole will be abandoned (left on site) to the remaining joint users on that pole. The utility has no authority to remove or relocate other utilities on the pole. It is the customer's responsibility to contact all joint use utilities for conversion of their services and to coordinate the removal of the pole(s) prior to beginning the project.

Notifying other utilities about new service installations

New construction typically involves the installation of telephone lines, cable television cables and natural gas lines, as well as electric power cables. It is the customer's responsibility to notify each utility about the intended service installation.

Conduit

All new underground primary and secondary electrical systems that will be owned by the utility require continuous runs of conduit. Conduit specifications will be provided by a utility design engineer. The conduit installation will be inspected by utility personnel, ensuring it meets all relevant standards and requirements.

Conduit specifications for the commercial service line will be provided by the design firm or qualified electrical contractor hired by the customer. These requirements are dictated by the National Electrical Code (NEC). Commercial service line conduit installations are inspected by the AHJ.

The number of service circuits and size of conduit may be limited by the source facility. A utility design engineer will review the service design and provide information on the allowable number of circuits and size of conduit for the source facility being utilized. See [Table 3-2](#) for additional information.

Contact the AHJ regarding specific conduit requirements and guidance on local code variations, environmental conditions and installation practices to ensure compliance with the NEC and local regulations.

Work clearances around transformers

A minimum of 10 feet of clear, level working space is required in front of a pad-mounted transformer, three feet from the back and sides. This allows utility personnel enough room to perform transformer switching (rerouting of high voltage power) and maintenance. Landscaping, fences and other obstructions must not encroach on these clearances.

Additional safety clearances may also apply. More information about clearances around pad-mounted equipment and transformer placement can be found in [Chapter 3, Commercial Underground Installations](#).

Cost for service

Charges vary depending on the location of existing electrical facilities, the size of service requested and the type of metering required. Below is a brief description of the charges that may apply to commercial electric service requests. These charges are subject to change. Contact Clark Public Utilities' Construction Services department at construction@clarkpud.com or (360) 992-8558 for verification of current rates.

NOTE: Adding additional load to an existing commercial service may require upgrades to the existing facilities and distribution system. Costs for required upgrades are the responsibility of the financially responsible party.

System development charge

This charge covers costs incurred by the utility to increase the capacity of the existing electric distribution system. Charges are based on phase, voltage and panel size of the new or altered service.

Service panel changes and upgrades may also require payment of the system development charge.

Miscellaneous construction charges

New and upgraded services that require an extension of primary facilities or upgrades to existing secondary/primary facilities may have additional charges applied. These charges cover the cost of labor and materials used to modify the utility's existing system when connecting additional services.

A utility design engineer will evaluate the job site and advise of any miscellaneous construction charges that may apply.

For inquiries about construction fees or new or upgraded electric service, contact Construction Services at construction@clarkpud.com or (360) 992-8558. Additional resources and current service charges are available at clarkpublicutilities.com/building-remodeling.

NOTE: Electric service requests on file for more than six months are subject to review and may require updates to reflect current rates and charges.

Right-of-way (ROW) work permit charges

Clark Public Utilities will apply for all ROW work permits required for electric facilities installed within unincorporated Clark County ROW. This includes permits required for trenching and crossing on federal, state, county and railway ROW.

Fees for these permits vary depending on the requirements of the job and will be added to the customer's construction billing.

If the job site is within any incorporated city limit, it is the customer's responsibility to apply for and secure the required ROW permits.

Temporary services

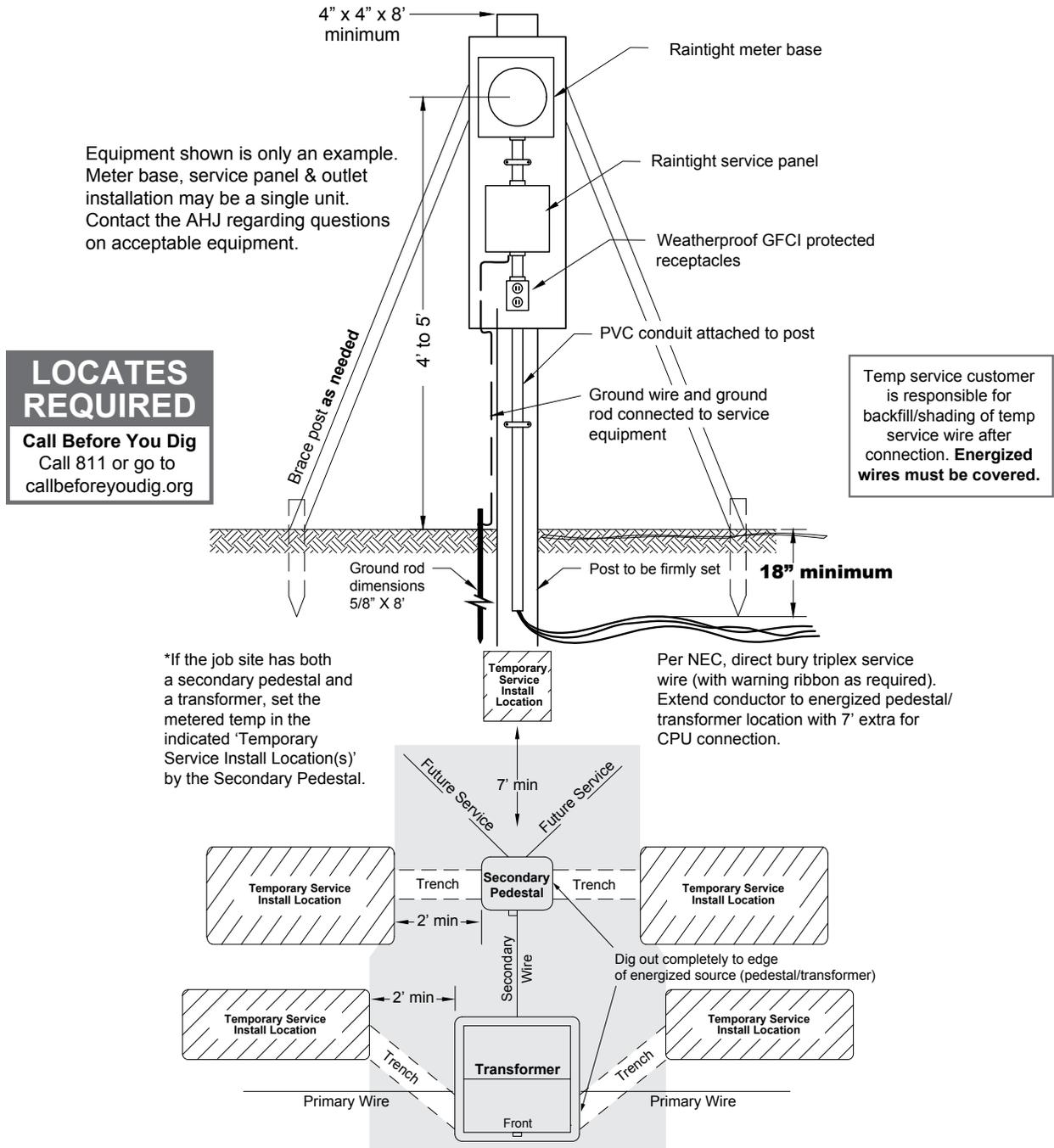
Commercial customers may request a metered temporary service to provide electrical service during the building process. A utility design engineer will provide a design indicating the source and location for the requested temporary service. When an underground-fed temporary service is required, the customer is responsible for providing and installing the service post and bracing (if needed), the meter base, underground conductors, and panel(s) in accordance with the NEC. After the installation passes inspection by the AHJ and the utility is notified of approval, the utility will connect the service and set the meter. The customer is then responsible for backfilling and shading the temporary service conductors after connection. Energized conductors must be covered. (**Figure 2-1**)

Overhead temporary services require the customer to provide and install the service post, meter base, panel(s), weatherhead and overhead wire support tripod.

Additional overhead temporary service installation information:

- ▶ Minimum clearance of 12' 6" at the point of attachment and 10' from the wire drip loop to the ground is required per the NEC.
- ▶ Ensure the support tripod is tall enough to maintain required overhead clearances.
- ▶ An overhead line to a temporary service installed on a commercial job site shall not cross a driveway.
- ▶ The utility will provide the overhead conductor, meter and connect the service once the electrical inspection has passed and the utility is notified.

Figure 2-1 Metered temporary service - underground feed



Temporary electric service equipment and installation must meet NEC requirements and pass inspection by the AHJ before Clark Public Utilities can set a meter and energize the service.

NOTE: If source equipment is **not** energized, temporary service wire must be landed and tagged in the source facility by the contractor setting the temporary service equipment.

CHAPTER

3

Commercial Underground Installations

This chapter provides a checklist of steps for installing a new commercial service, including trench specifications, equipment placement requirements and the process for securing ROW work permits.

Commercial electric service checklist

The following checklist will assist in preparing a project for the installation of a commercial underground electric service. After these items have been completed, Clark Public Utilities will connect the service and set the meter.

- Visit clarkpublicutilities.com to fill out a [New Electric Service Request-Commercial](#) web form or contact our Construction Services department at construction@clarkpud.com or (360) 992-8558 and provide the following information:
 - Job site address and/or Assessor's Parcel Number (APN).
 - Description of commercial business to be served.
 - Financially responsible person/entity billing information.
 - Contact person's name and phone number for design related questions.
- Provide the following information to the utility design engineer assigned to your project:
 - Civil drawings of the planned project including:
 - Structure boundaries and surveyed property lines.
 - Curbs and sidewalks.
 - Existing and proposed wet and dry utilities to be installed.
 - Future road improvements surrounding the site with curbs and sidewalks shown.
 - Existing and proposed utility and/or access easements.
 - Required streetlighting.
 - Feasible location for electrical equipment indicated.
 - Voltage requirements.
 - Load information (panel size and expected load) and itemized load summaries.
- Obtain a primary and/or secondary voltage electrical design from a utility design engineer.
- Hire an electrical contractor from Clark Public Utilities' approved primary electrical installation contractors list to purchase and install any required primary underground facilities as specified in the utility-provided electrical design.
- Prior to ordering electrical enclosures, submit the switchgear plan to your utility design engineer for review.
- Secure all ROW work and crossing permits as required.
- Obtain required easements prior to the start of construction. Services will not be connected until easements are secured by the customer.
- Obtain an electrical work permit from the Authority Having Jurisdiction (AHJ) for installation of the commercial electric service and metering equipment.

- ❑ Contact the Utility Notification Center (Call Before You Dig) Locating Service to identify the location of existing underground utilities. Visit callbeforeyoudig.org/Washington, dial 811 or call (800) 424-5555 to request locates at least two business days prior to excavation. **Utility locates must be confirmed in place prior to the start of digging.**
- ❑ Pay all pre-billed utility construction charges.
- ❑ The approved primary electrical installation contractor hired by the customer contacts the Operations Office at ops@clarkpud.com or (360) 992-8839 to request inspection of all newly installed primary trenches, conduit, cable and pad-mounted equipment.
- ❑ Once the switchgear is installed and service wires are terminated, the customer's electrician contacts Clark Public Utilities' Meter Coordinator meterdepartment@clarkpud.com or (360) 992-8001 to schedule the delivery and installation of CTs and the meter.
- ❑ Obtain an electrical service inspection from the AHJ.

Once Clark Public Utilities has received verification of service approval and the customer has completed backfilling the trench, the utility will:

- ▶ Energize all electrical facilities required.
- ▶ Connect underground primary and secondary conductors in an energized source facility.
- ▶ Install the electric meter in the customer-owned meter base, if not already installed.

Design responsibilities

Clark Public Utilities

A Clark Public Utilities design engineer will provide a design showing:

- ▶ New electrical facilities required.
- ▶ Upgrades of the existing distribution system.
- ▶ Sourcing for required street lighting.

Commercial customer

The customer's electrical designer is responsible for providing a design of all electrical services required to serve the commercial structure. This includes designs for the following customer-owned and maintained services and equipment:

- ▶ Service to the commercial structure.
- ▶ Switchgear plan that includes equipment specifications, site location of the gear, and access details. If a utility-approved electrical equipment room is required, include a floor plan.
- ▶ Street light layout and light specification sheets, as required by the municipality with jurisdiction.
- ▶ Fire-pump service: This service may require a dedicated circuit.

Once the electrical design is complete, the customer is responsible for hiring a utility-approved primary electrical installation contractor to trench and install the primary voltage electrical equipment as outlined in the utility-provided electrical design.

Commercial streetlighting

Commercial job sites within incorporated cities of Clark County may require streetlighting as part of a project. It is the customer's responsibility to provide a streetlight service design for any municipally required public roadway or frontage streetlighting.

Once the customer-provided lighting design has been approved by the municipality with jurisdiction, the customer's design firm is required to submit this plan to the utility design engineer. This requirement also applies to the addition of new lights to an existing streetlight circuit.

A utility design engineer will provide a design indicating the source and electrical facilities required to serve the new streetlights.

Streetlighting ownership and maintenance

Commercial developers submitting municipally approved street lighting designs that specify Clark Public Utilities' standard streetlighting materials are required to obtain all materials and provide all labor for installation through an outside vendor or contractor. The utility will only maintain approved materials that are installed to Clark Public Utilities' specifications.

Streetlight circuits installed within city limits and owned and maintained by the respective city must be installed according to the NEC behind a city-owned and maintained disconnect or meter base. This equipment shall be installed in the ROW and is inspected by the AHJ. All conductors providing service to these street lights (underground and overhead) are owned and maintained by the city.

New street lighting designs calling for non-standard materials are customer-owned and maintained. The utility requires a meter base or disconnect installed ahead of all customer-owned and maintained streetlighting services.

Site preparation

The following site requirements must be met before the installation of a new commercial service can begin:

- ▶ Property lines and corners have been surveyed and marked.
- ▶ County/City-approved site plan is submitted and driveway/approach is rocked.
- ▶ A utility-provided electrical design has been completed for the installation of all primary and secondary voltage lines and equipment.
- ▶ The customer has hired an electrical contractor from Clark Public Utilities' current list of approved primary electrical installation contractors to install any primary voltage lines or equipment.
- ▶ All required permits have been secured (ROW trenching, street crossing, etc.).
- ▶ Required easements have been obtained.
- ▶ The site is at final grade or acceptable sub-grade in the area of construction.
- ▶ The trench route is clear of construction material and any obstructions.

Primary trench

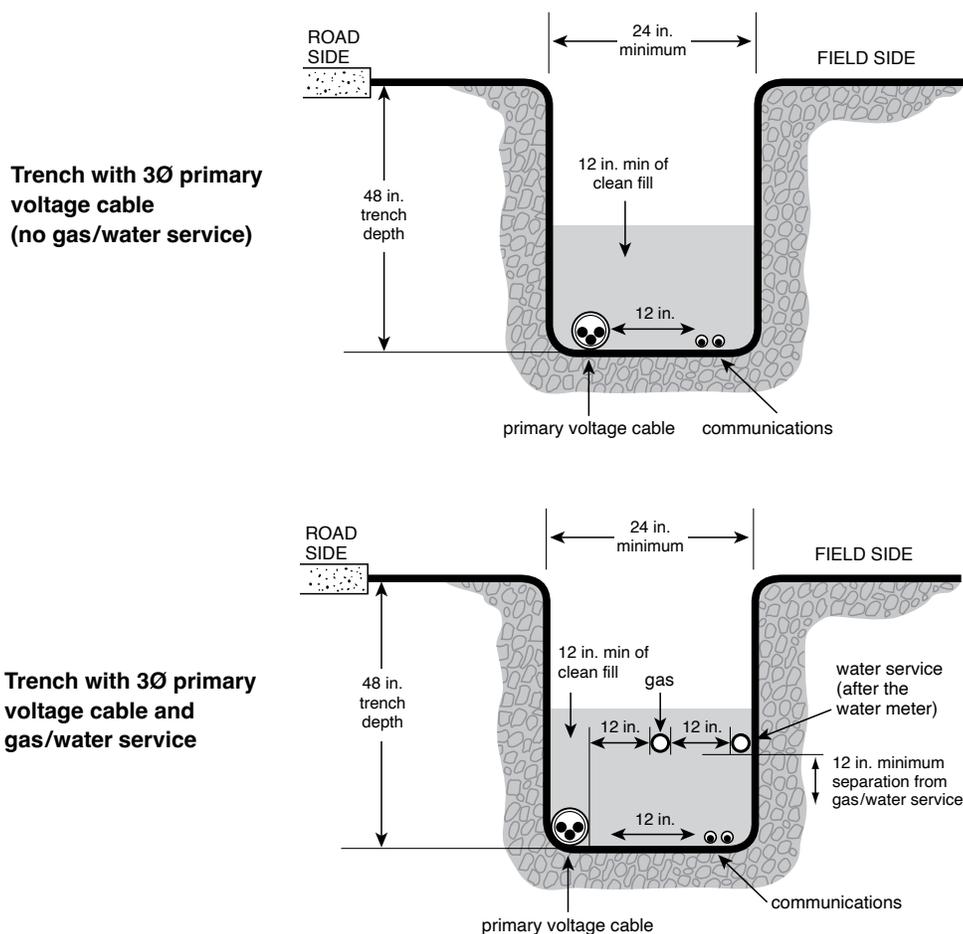
Trench width and depth

The primary trench width is 24 inches unless otherwise approved by utility personnel. The excavator may need to increase the trench width to accommodate other conduits and/or lines installed in a joint use trench. When increasing the trench width, remember to allow a minimum of 12-inch horizontal separation between Clark Public Utilities' electrical conduits and other utility service lines.

The trench depth for primary electrical lines is 48 inches. **Figure 3-1** illustrates the utility's width and depth requirements for primary line extension trenches with and without a natural gas/water service line.

NOTE: Sewer lines, water mains and storm drainage systems are not allowed in a joint trench with Clark Public Utilities' electric distribution, secondary or service lines.

Figure 3-1 Typical utility trenches with primary voltage cable



NOTE: Maximum allowable depth for the utility's standard open trench is 48 inches. It is the contractor's responsibility to ensure compliance with all federal, state and county regulations and trench safety standards. Additionally, the contractor must adhere to all applicable permit requirements including crossing depths.

Trench excavating requirements

The following utility trench and excavating requirements must be met before primary power conduits can be installed:

General utility trenching requirements

- ▶ The contractor is responsible for ensuring work is performed in accordance with the most recent utility-provided electrical design prior to the start of work. The contractor must contact the utility design engineer to verify they have the current design.
- ▶ The approved primary electrical installation contractor shall comply with all requirements of a ROW work or crossing permit.
- ▶ All crossings shall be perpendicular to the road.
- ▶ Utility locates must be requested at least two business days in advance and confirmed in place prior to the start of any excavation work.
- ▶ All road crossings for electric primary, secondary and service line shall be installed at a minimum depth of 48 inches.
- ▶ Trenches shall be excavated according to the trench detail ([Figure 3-1](#)), and the utility-provided electrical design.
- ▶ Any trench 4 feet or deeper requires protection and/or shoring per OSHA and WAC 296-155-655.
- ▶ Primary electrical trenches must be at least 5 feet from a structure's footings/foundation.
- ▶ Trenches shall be straight and the bottom smooth, level and free from rocks and construction debris.
- ▶ The contractor shall remove all water from the primary and secondary voltage trenches prior to inspection, either by pumping or draining.
- ▶ The approved primary electrical installation contractor hired by the customer is responsible for calling the utility to request inspection of the primary trench.

Contractor responsibility for open excavations

Open trenches or pits excavated in preparation for future equipment installation shall remain the sole responsibility and liability of the contractor from the time of excavation until the trench or pit is properly backfilled or otherwise closed. The contractor is required to implement and maintain appropriate safety measures to prevent accidents and unauthorized access.

Acceptable safety measures include, but are not limited to:

- ▶ Caution tape
- ▶ Safety barrier fence - 'snow fence'
- ▶ Barricades - 'waffle board barriers'
- ▶ Plywood covers
- ▶ Steel plates or trench covers

These measures must be inspected and maintained regularly by the contractor to ensure continued safety and compliance with all applicable regulations.

Plan projects and schedule work to minimize the duration of open excavations, and promptly contact the Operations office, ops@clarkpud.com or (360) 992-8839, to request inspections. Once the utility completes inspections and/or work, they notify the contractor to proceed with backfilling.

Utility work within a public road ROW

- ▶ A licensed and bonded excavation contractor must perform all utility work in the public road ROW. This includes all trenching or installation of crossings for primary and secondary voltage electric service.
- ▶ If the utility work will take place within any incorporated city limits, the approved contractor hired by the customer must apply for and secure the ROW work permit.
- ▶ Clark Public Utilities will apply for the Clark County Public Works Utility (PWU) permit required for trenching and road crossings in Clark County unincorporated and all Washington State Department of Transportation (WSDOT) Utility Accommodation permits required for work being done along or under state roads and highways.
- ▶ Fees for permits secured by the utility will be added to the financially responsible party's Clark Public Utilities construction bill.
- ▶ Regardless of which entity secured the ROW work permit (the utility or the contractor), the excavation contractor is responsible for complying with all permit requirements. This includes advanced notification prior to the start of any work in the ROW.
- ▶ The maximum allowable open trench depth is 48 inches, unless working within the WSDOT ROW, in which case a minimum of 5 feet of cover above the top of the conduit is required.
- ▶ Any utility work in the public ROW must meet the erosion and sediment control requirements of the local jurisdiction.
- ▶ The contractor is responsible for roadway restoration and clean-up as required by the permit issuing agency.

NOTE: *It is the contractor's responsibility to ensure compliance with all applicable federal, state, and county permit and trench safety requirements.*

Horizontal Directional Drilling (HDD)

Horizontal directional drilling (HDD) used to cross an existing road or driveway, install electric service, or install primary voltage electrical service must meet the following requirements:

- ▶ **Primary voltage service or primary crossings:** The utility-approved primary electrical installation contractor hired by the customer must contact the utility design engineer at least two weeks before starting work to obtain site approval and verify the current design. A pre-construction meeting may be required to review the HDD route or construction details.
- ▶ **New service or service crossings:** The HDD contractor hired by the customer to install electric service must contact the utility design engineer at least two weeks before starting work to obtain site approval and verify the current design. A pre-construction meeting may be required to review the HDD route or construction details.
- ▶ Pre-approval and review of the route by the utility design engineer prior to the start of construction.
- ▶ Review of the utility's standard (HDD1) prior to construction.
- ▶ Compliance with all utility requirements and permit regulations set by the AHJ.
- ▶ Utility locates must be requested and **confirmed in place** prior to the design engineer's review and approval of the trench route, and before the start of HDD.
- ▶ Road crossing and ROW work permits have been secured prior to the start of work.
- ▶ Conduit piping used shall be gray in color.
- ▶ Electrical conduit must meet wall thickness requirement of SDR13.5 or schedule 80.
- ▶ Installation using approved mechanical couplings for all HDPE-to-PVC transitions. See the utility's approved materials list.
- ▶ A copy of the bore log is provided to the Operations office at ops@clarkpud.com when the trench/conduit inspection is requested.

Primary voltage conduit

Clark Public Utilities requires the installation of a continuous conduit for all primary voltage conductors. Conduit is installed by a utility-approved primary electrical installation contractor hired by the customer. It is the approved primary electrical installation contractor's responsibility to contact the utility and request the conduit inspection.

The primary voltage conduit shall meet the following specifications:

- ▶ Electrical grade, UL listed, schedule 40 PVC.
- ▶ Gray in color.
- ▶ 2-inch diameter, one conduit per phase conductor, or one 4-inch diameter conduit containing three phase conductors. A utility design engineer will specify the required conduit size, wall thickness and total degree of bends allowed on the utility-provided electrical design.
- ▶ All conduit couplers are long bell/deep socket.
- ▶ All conduit joints shall be permanently connected using PVC cement.
- ▶ A maximum of 270 degrees of total bend is allowed in the primary conduit run. This allows for up to three 90 degree elbows, including the elbow into the source facility.
- ▶ Install only manufactured conduit elbows. Heat bending conduit is not acceptable.
- ▶ Overhead to underground commercial services require a 36" radius, schedule 40, 90-degree elbow seated in the trench and a schedule 80 conduit extension installed in the pole bracket clamp attached to the pole base (**Figure 3-2**).

NOTE: Do not pull primary cable until the trench and conduit inspections have passed and the trench has been backfilled.

Primary cable

The approved primary electrical installation contractor calls for any required standbys (only a qualified Clark Public Utilities representative can access energized equipment), provides and pulls the cable and requests a primary cable and makeup inspection. A Clark Public Utilities representative will inspect the primary and secondary cables leading to and connecting with utility-owned equipment. The AHJ will inspect the commercial service wire to the building and the metering equipment.

General primary cable handling details

- ▶ Pulls over 450 feet require a pulling calculation.
- ▶ Do not pull cable until the primary trench and conduit have passed utility inspection and the trench is backfilled.
- ▶ When pulling cable into energized equipment, a primary standby is required. Only qualified utility personnel may open, enter, or manipulate energized primary equipment.
- ▶ Cable pulling equipment shall be set up at the un-energized equipment (e.g., transformer, junction box, etc.).
- ▶ Always pull primary cable from the energized source facility to the newly installed, un-energized (or de-energized existing) equipment.

NOTE: Pulling cable in the opposite direction is only permitted if explicitly specified on the utility-provided electrical design.

- ▶ The utility-approved primary electrical installation contractor is required to contact the Operations office at ops@clarkpud.com or (360) 992-8839 at least two business days prior to the start of work to schedule a primary standby.

- ▶ Cable pulled into any un-energized utility equipment requires termination and tagging completed by the approved primary electrical installation contractor.
- ▶ All primary cable pulls require the use of utility-approved lubrication.

The table below indicates the minimum amount of lubricant required based on the total pull footage.

Table 3-1 Cable pulling lubricant

Maximum Length (ft)	1 – 1/0 Cable in 2" Conduit		3 – 1/0 Cables in 4" Conduit	
	Minimum Gallons	Minimum Quart Front-End Packs	Minimum Gallons	Minimum 1/2 Gallon Front-End Packs
70	0.25	1	0.5	1
150	0.50	2	1.0	2
225	0.75	3	1.5	3
300	1.00	4	2.0	4
375	1.25	5	2.5	5
450*	1.50	6	3.0	6

**For every additional 75 feet beyond 450 feet, add:
 -1 quart for 1-1/0 conductor in 2" conduit
 -1/2 gallon for 3-1/0 conductors in 4" conduit*

Primary voltage installations to utility pole bases

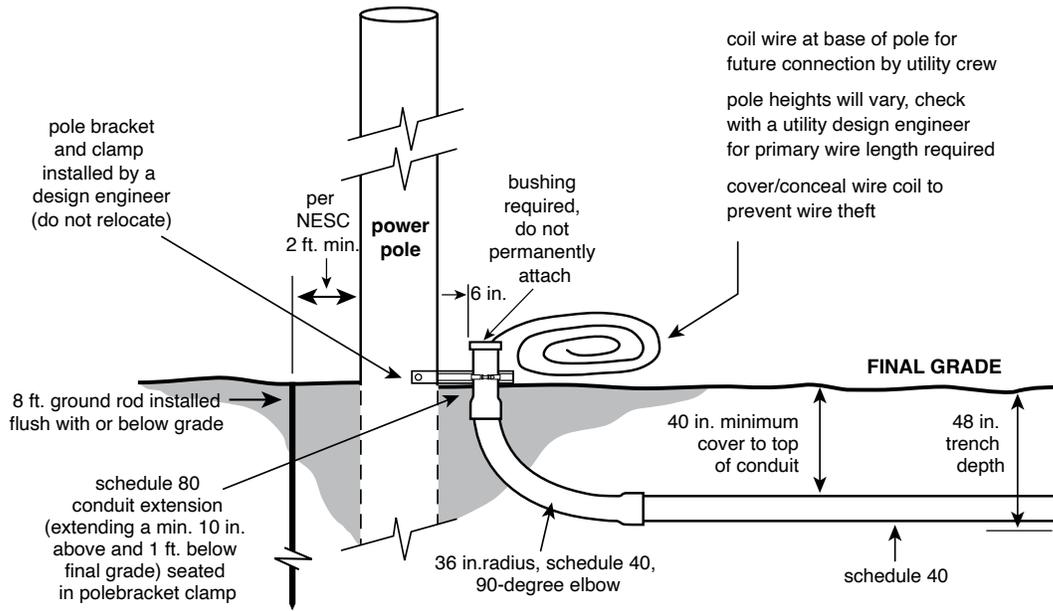
A utility representative will install a pole bracket and clamp assembly at the base of the source pole. The commercial customer is responsible for providing and installing the following equipment up to Clark Public Utilities' pole bases (see [Figure 3-2](#)):

- ▶ 48-inch depth trench up to and exposing the pole base.
- ▶ Conduit and wire as outlined in the utility-provided electrical design. Pole heights vary, check with your utility design engineer for the length of wire coil required.
- ▶ Schedule 40 conduit elbow seated properly in the trench next to the pole base.
- ▶ Schedule 80 conduit extension installed in the pole bracket clamp attached to the pole base.
- ▶ All exposed conduit, both above grade and extending at least 1 foot below grade at the pole base, must be electrical grade, UL listed, gray, schedule 80 PVC.
- ▶ Primary junction box when specified in the utility-provided design.
- ▶ Pole heights vary, check with your utility design engineer for the length of wire coil required.
- ▶ Approved ground rod per the National Electrical Safety Code (NESC), for utility connection of the pole ground wire, if one is not already present (see [Figure 3-2](#)).

Additional pole base installation information:

- ▶ Do not trench to or install primary wire to a utility pole that does not have a pole bracket assembly installed. Contact the utility design engineer to install or reattach the assembly.
- ▶ Do not remove or relocate a utility-installed pole bracket assembly.
- ▶ Cover/conceal wire coils left at pole bases to prevent wire theft.
- ▶ Schedule work to minimize the time that wire is coiled at the pole base. Promptly contact the Operations Office at ops@clarkpud.com or (360) 992-8839 to request inspections.

Figure 3-2 Primary voltage overhead to underground pole bracket installation



NOTE: Install ground rod according to the NESC.

Secondary and service conduit

The design firm hired by the customer will provide conduit specifications for the commercial service. These requirements are specified by the NEC and fall under the jurisdiction of the AHJ.

The number of secondary service circuits and size of conduit may be limited by the source facility. The requirements of each job site vary.

The following table provides conduit and wire requirements for the most common source equipment.

Table 3-2 Secondary and service conduit/wire

Transformer	Phase	Mounting Base	Max Runs (including futures)	Conduit Size Maximum	Wire Size Maximum
25-75 KVA	Single	UTP1	4	3 in.	500 kcm
75-100 KVA	Single	UTB box pad	6	3 in.	500 kcm
100 KVA	Single	UTP2	4	3 in.	500 kcm
All Sizes	Three	UTP4 pad	6	4 in.	750 kcm
All Sizes	Three	UTP5 vault	12	6 in.	750 kcm

NOTE: If more than 12 runs of service are needed, contact utility design engineer.

Pedestal/Junction Box		Line Side			Load Side*		
Equipment	Phase	Max Runs (including futures)	Conduit Size	Wire Size	Max Runs (including futures)	Conduit Size Maximum	Wire Maximum
UED 6	Single	2	3 in.	350 kcm	4	3 in.	350 kcm
UE 18	Single	2	3 in.	350 kcm	6	3 in.	500 kcm
UE 38	Three	2	4 in.	350 kcm	6	4 in.	500 kcm

*Wire and conduit size per NEC

NOTE: Conduit maximum and wire size limitation for utility owned line side equipment due to physical constraints.

Underground secondary pedestal/junction box

Site preparation and excavation

Prior to the installation of an underground secondary pedestal/junction box, the job site requires:

- ▶ Survey and staking of property lines.
- ▶ Excavation to final grade.
- ▶ Curbs poured.

A utility design engineer will determine the size of the pedestal/junction box required. Equipment required and location will be indicated on the utility-provided electrical design.

The customer is responsible for:

- ▶ Excavating the site according to the dimensions provided by the utility design engineer.
- ▶ Installing the appropriate pedestal or junction box as specified in the utility-provided electrical design.
- ▶ Installing all required, utility provided, equipment warning labels and tags per UID1. Contact Construction Services: construction@clarkpud.com or (360) 992-8558 to request equipment warning labels and number tags.
- ▶ Providing and installing all identification tags on underground conductor as indicated in the utility-provided electrical design and utility standard UID2.
- ▶ Backfilling around the equipment:
 - Flush with final grade if located in a hard-surfaced area.
 - Two inches below the pedestal or junction box's indicated grade line if located in a landscaped area.

Conduit and cable installation

Prior to Clark Public Utilities energizing a secondary pedestal or junction box, the customer is responsible for:

- ▶ Installing conduit for all cables entering the enclosure.
- ▶ Installing conduits so that cable is pulled toward the bell ends.
- ▶ Providing, installing and marking all required spare conduits, including tagging each conduit with its length and direction.
- ▶ Capping all spare conduits that are plumbed into the enclosure.
- ▶ Terminating and tagging all cables inside an un-energized secondary pedestal or junction box.

If the secondary pedestal or junction box is energized, the customer must request a standby with qualified utility personnel. Once scheduled, the customer is responsible for plumbing conduit and cable into the secondary enclosure.

To schedule a secondary standby, contact our Construction Services office, construction@clarkpud.com or (360) 992-8558. Please provide at least two business days' notice for scheduling.

Trench backfill requirements

Clark Public Utilities will not energize electrical facilities until all primary trenches are backfilled to final grade by the contractor.

Once primary inspections are complete, the contractor is responsible for the following:

- ▶ Allowing PVC cement to cure according to manufacturer's recommendations prior to backfill.
- ▶ Completing backfill as soon as practical after facilities are placed and inspected.
- ▶ Carefully placing backfill to prevent damage or movement of the conduit(s).
- ▶ Providing a minimum 12-inch bedding of clean cover (rocks no larger than 5/8-inch) placed over power conduits.
- ▶ Ensuring all backfill is free of rocks larger than 5" and foreign materials/objects.
- ▶ Installation of caution tape may be required on certain projects.
- ▶ Backfilling with controlled density fill (CDF)/select backfill when required by utility personnel.
- ▶ Completing backfill up to and around customer-installed elbows attached to the pole bracket assembly ([Figure 3-2](#)).
- ▶ Relocation costs due to change in grade or alignment.

NOTE: Do **not** pull primary cable until the trench and conduit inspections have passed and the trench has been backfilled.

Transformers

Transformer sizing

Transformer sizing is determined by a utility design engineer using load information supplied by the customer.

Maximum available fault current

The contractor is responsible for providing and installing equipment capable of withstanding available fault currents. [Table 3-3](#) lists the maximum available short-circuit current for Clark Public Utilities' most commonly installed pad-mounted transformers. These values apply at the transformer's secondary bushings and do *not* account for voltage drop or impedance in the customer's secondary conductors.

Short-circuit current information for existing pad-mounted transformers, overhead units, or transformer banks is available by contacting a utility design engineer.

Table 3-3 Maximum available short-circuit current for new single-phase and three-phase pad-mount transformers

SINGLE-PHASE (in symmetrical kA)			
KVA	240/120	Min. Z%	Max. Z%
25	10	1.04	2.0
50	10	2.08	3.0
75	10	3.13	4.0
100	14	2.98	4.0
THREE-PHASE (in symmetrical kA)			
KVA	208Y/120	Minimum Z%	
75	10	2.08	
150	22	1.89	
300	42	1.98	
500	65	2.14	
750	65	3.20	
1000	85	3.27	
KVA	480Y/277	Minimum Z%	
75	14	.64	
150	14	1.23	
300	25	1.44	
500	30	2.01	
750	30	3.01	
1000	50	2.41	
1500	50	3.61	

NOTE: To facilitate future system expansions or upgrades, it is recommended to calculate using the short-circuit current rating of the next larger transformer size. This helps to ensure compatibility and adequate protection.

Transformer location and access

Underground electrical facilities must be readily accessible by the utility during construction and for future operation and maintenance. The area around pad-mounted electrical equipment must provide a clear and level working space and remain free from obstructions such as landscaping, fences, retaining walls, structures, posts etc.

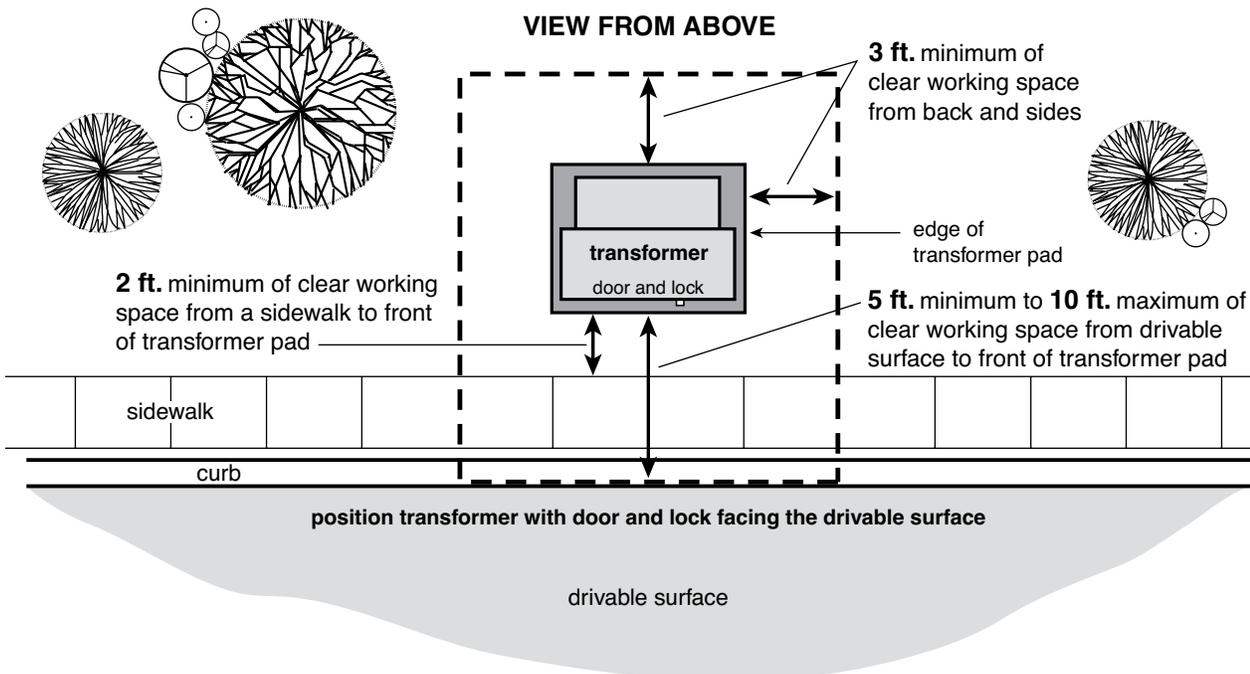
Prior to the installation of any pad-mounted equipment, the job site *requires*:

- ▶ Survey and staking of property lines.
- ▶ Excavation to final grade.
- ▶ Curbs poured.

All transformers and pad-mounted equipment are to be located:

- ▶ Within 10 feet of a drivable surface but not closer than 5 feet (**Figure 3-3**).
- ▶ With the front of the equipment (door and lock side) facing toward the drivable surface.
- ▶ With the transformer pad parallel to the edge of the drivable surface.
- ▶ Allowing 10 feet of clearance in front and 3 feet from the back and sides of the equipment (**Figure 3-3**).
- ▶ At least 2 feet from a sidewalk for pedestrian safety.

Figure 3-3 Commercial pad-mounted transformer location and access



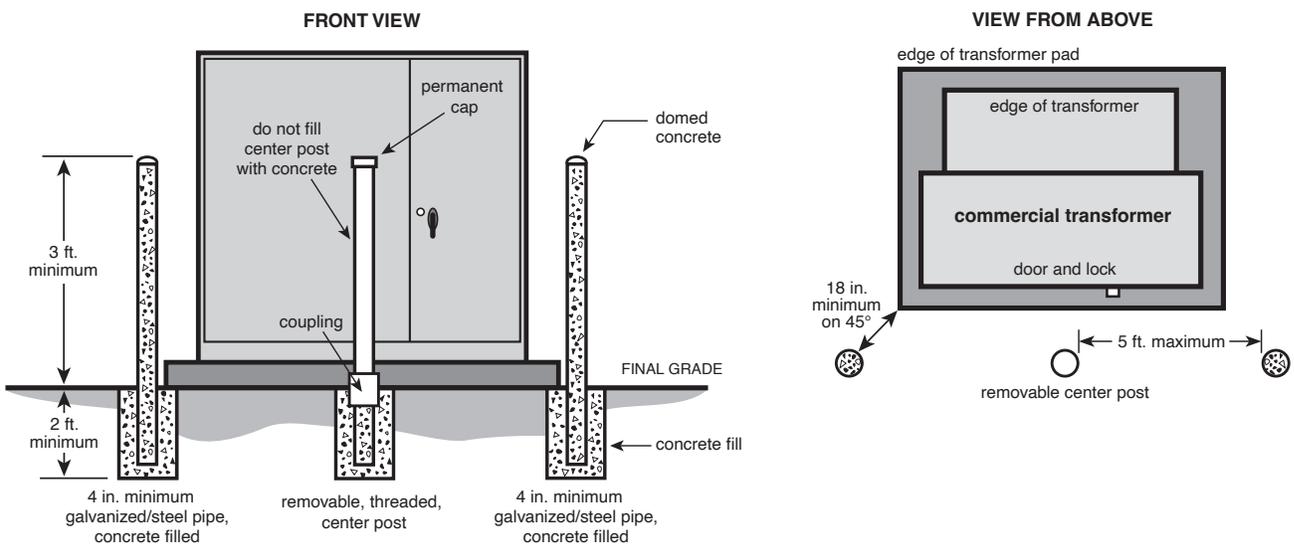
Guard post installation

The installation of guard posts (bollards) may be required when electrical equipment is exposed to vehicular traffic. It is the customer's responsibility to supply, install and maintain guard posts when required by Clark Public Utilities personnel. See [Figure 3-4](#).

Materials and installation requirements:

- ▶ 5-foot by 4-inch (minimum and preferred) galvanized or steel pipe.
- ▶ Set each post a minimum of 24 inches deep.
- ▶ Fill posts with concrete.
- ▶ Posts set in stable soil are to be surrounded by 6 inches of concrete.
- ▶ Use 12 inches of concrete around each post in areas with unstable soil or sand.
- ▶ If several guard posts are used, locate them no more than 5 feet apart or as otherwise specified by a Clark Public Utilities representative.
- ▶ If bollards are required for a three-phase transformer, a threaded, removable center post, without a locking mechanism, is required ([Figure 3-4](#)).
- ▶ When a removable center post is installed, the threaded joint requires treatment with an anti-seizing agent. This post also requires a permanent cap to prevent the entry of debris.
- ▶ Single phase pad-mounted transformers and other electrical equipment will require two bollards installed on either corner of the front (opening) side of the equipment.
- ▶ Install yellow, smooth finish, bollard sleeve(s) or paint exposed section of post "traffic yellow."
- ▶ See utility standard UTP9, for additional information.

Figure 3-4 Guard post (bollard) installation for commercial three-phase transformers



NOTE: Additional guard posts may be required at back and sides of transformer.

Safety clearances around transformers

Clearances from pad-mounted transformers to structures are measured from the nearest metal portion of the transformer to the structure or any overhang. The clearance from a building is 10 feet if the building has combustible walls, and 3 feet if the building has non-combustible walls as shown in [Figure 3-5](#). [Table 3-4](#) provides additional safety clearances that apply to any oil-filled electrical equipment.

Figure 3-5 Commercial pad-mounted transformer minimum safety clearances

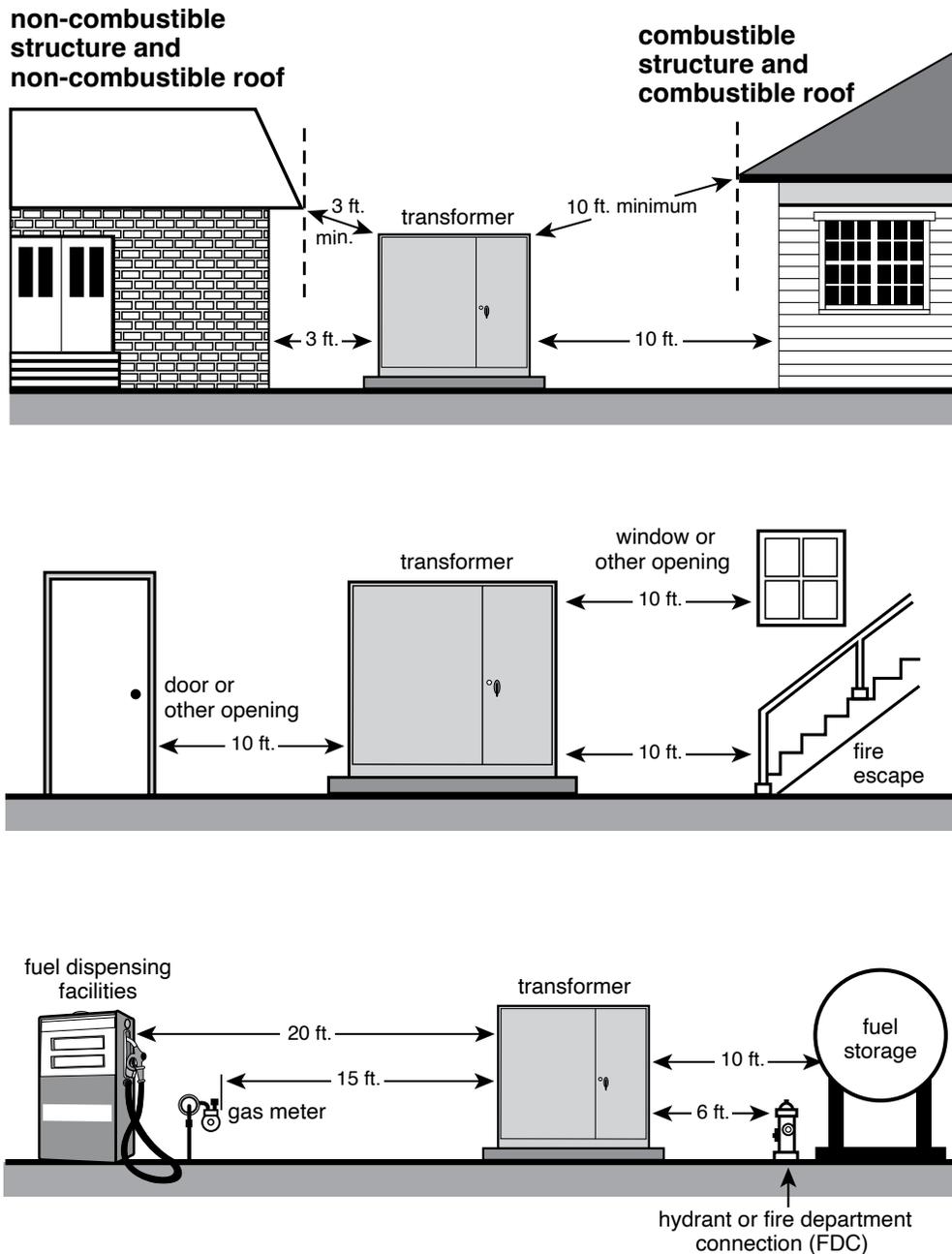


Table 3-4 Pad-mount transformer safety clearances

Feature	Clearance distance
Combustible walls or roof (including stucco, hardiplank or equivalent)	10 ft.
Non-combustible walls provided the side of the transformer facing the wall does not have doors. Materials that pass UBC standard 2-1 or ASTM E136-79 are considered to be non-combustible.	3 ft.
Doors, windows, vents, fire escapes, and other building openings	10 ft.
The water's edge of a swimming pool	15 ft.
The water's edge of a natural or manmade open body of water	25 ft.
Facilities used to store hazardous liquids or gases (e.g. service station fuel storage tank or permanent oil/gas/propane tanks)	10 ft.
Storage tank and service facility filling points and relief vents, including natural gas meters or threaded gas service piping	15 ft.
Facilities used to dispense hazardous liquids or gases (e.g. service station gas pumps or propane bulk dispensing tanks)	20 ft.
Well water system wellhead	15 ft.
Fire sprinkler valves, FDC standpipes and fire hydrants	6 ft.

NOTE: Electrical clearances do not supersede any environmental permit requirements, clearances or reviews.

CHAPTER

4

Commercial Metering

This chapter contains information on the metering equipment required for connection of a new or upgraded commercial electric service. Call your utility design engineer or the meter department coordinator (360) 992-8001 regarding questions about commercial electric service metering.

Figures and Tables found in Chapter 4:

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Table 4-1	Single-phase commercial meter socket requirements	Page 32
Table 4-2	Three-phase commercial meter socket requirements	Page 33
Figure 4-2	Three-phase, self-contained (direct connect) meter base with required safety sockets (100 and 200 amp)	Page 34
Figure 4-3	CT Meter Base - EUSERC 339	Page 36
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Figure 4-4	Three-phase current transformer (CT) metering less than 800 amps	Page 38
Figure 4-5	Commercial CT mounting base - single-phase / three-phase	Page 39
Figure 4-6	Switchgear metering	Page 40
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Figure 4-10	Commercial tenant spaces-adjacent breaker	Page 44
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Figure 4-13	Residential multi-unit meter pack	Page 46
Figure 4-14	Residential multi-unit panel label	Page 46
Figure 4-15	Other multi-meter packs: duplex, ADU, quadplex, etc.	Page 47

General commercial metering responsibilities

The following information applies to all metering systems installed for Clark Public Utilities' commercial customers.

Clark Public Utilities is responsible for:

The utility is responsible for furnishing, installing and maintaining the following commercial metering equipment:

- ▶ Self-contained and transformer-rated meters.
- ▶ Current transformers (CTs) and test switch.
- ▶ Potential (voltage) transformers (PTs), when required for primary metering.
- ▶ Associated CT meter wiring.

NOTE: *Only qualified and authorized Clark Public Utilities personnel shall unlock, remove, install and seal meters and related metering equipment.*

Customer is responsible for:

The customer is responsible for providing, installing and maintaining the following commercial meter equipment:

- ▶ Meter base.
- ▶ CT enclosure with CT mounting base.
- ▶ Switchgear and cabinet.
- ▶ Connectors and insulating covers.
- ▶ Service conductors.
- ▶ Metering conduit between CT enclosure and meter base.
- ▶ Protection equipment.
- ▶ Equipment grounds.

Commercial meter bases

The following general requirements apply to all commercial meter bases called for by the utility and installed by the customer:

- ▶ Ring-type meter socket enclosures.
- ▶ Rated for exterior use and rain tight.
- ▶ Underwriters Laboratories (UL) rated.
- ▶ Meets NEC requirements.
- ▶ All unused openings in the enclosure are tightly sealed from the inside of the meter base.
- ▶ Installed level, plumb and fastened securely to a rigid structure that is being served.

NOTE: *The requirements for each job site may vary. If necessary, a utility design engineer will review the customer's commercial service design and provide guidance on metering requirements.*

Grounding requirements

All customer-owned and installed meter equipment including meter bases, enclosures, CT cans, switchgear and conduit shall be bonded and grounded by the customer in accordance with the NEC and the requirements of the AHJ.

Service inspection and approval

The customer is responsible for securing the electrical wiring permit and requesting an electrical inspection. Once the metering equipment is installed, the Authority Having Jurisdiction (AHJ), requires that the installation pass an electrical inspection prior to being energized by the utility. Once approved for service, the customer is responsible for notifying the utility they have passed the electrical inspection. Contact Construction Services, construction@clarkpud.com or 360-992-8558 to advise of service inspection approval. Clark Public Utilities will not connect a new commercial electric service without notification of electrical inspection approval.

Additional customer equipment

Customer-owned equipment, including current-limiting fuses and load monitoring devices (such as power meters, energy meters, submeters, multi-circuit meters, and intelligent power distribution units), is not permitted inside a meter base, CT enclosure or distribution transformer. The utility requires all customer-owned equipment to be installed on the load side of the meter system, either within the customer's service panel or in a separate enclosure located between the meter base and the service panel.

All meter equipment is installed ahead of the main disconnect unless otherwise agreed upon by Clark Public Utilities.

Protection

A self-contained meter base requires a safety socket for most commercial applications over 120 volts. This includes all voltages, three-phase and single-phase, and any self-contained meter base installed inside an enclosed cabinet.

The ampacity rating of the main circuit breaker, or safety switch, cannot exceed the maximum rating on the meter base. Three-phase services, with continuous ampacity exceeding 200 amps, require CT metering.

Meter equipment installed in areas accessible to vehicular traffic may require the installation of guard posts. The customer is responsible for providing, installing and maintaining these posts when required by a utility representative. See [Guard post installation](#) section and [Figure 3-4](#) for requirements.

Meter equipment locations

Building exterior

Clark Public Utilities requires all commercial meter equipment (meter bases, CT enclosures, switchgear, etc.) to be mounted on the outside of a permanent, fixed structure containing the load being served.

Customer-owned commercial meter systems must be installed in a location that allows 24-hour access to utility personnel for meter reading, testing and maintenance. This location is to remain free of obstruction, vibration, corrosives and abnormal temperature fluctuation.

All meter equipment locations are subject to approval by a Clark Public Utilities representative prior to installation.

Approved commercial meter equipment locations:

- ▶ On the exterior of the structure being served.
- ▶ On the ground floor, with the center of the meter 5 to 6 feet above finished grade (5 feet preferred).
- ▶ In an area that is not subject to being fenced-in or enclosed.

Contact your utility design engineer to review any unique conditions or requirements prior to installation of meter equipment.

These locations allow Clark Public Utilities to:

- ▶ Read the meter in a cost-effective manner.
- ▶ Maintain the meter efficiently.
- ▶ Disconnect the service in case of emergency.

NOTE: *A utility-provided lockbox or hasp lock may be required to allow utility personnel 24-hour access to metering equipment.*

Do **not** locate meter equipment:

- ▶ On poles owned by Clark Public Utilities.
- ▶ On customer-owned wood poles or posts (only a temporary electric service meter base can be installed on a customer-owned wood pole/post).
- ▶ Where shrubs or landscaping could obstruct access.
- ▶ Above a stairway or window well.
- ▶ Inside a breezeway or fenced area.
- ▶ On a mobile structure such as a trailer.
- ▶ In a drive thru where vehicular traffic could obstruct access.

Metering installed in a vehicle traffic area will require guard posts. See guard post installation requirements and [Figure 3-4](#) for additional information.

Electrical equipment rooms

Clark Public Utilities requires all commercial meter equipment to be mounted on the outside of the structure containing the load being served. In certain situations the commercial structure may have an electrical equipment room. These installations require prior approval from a utility representative **before** construction begins and must provide 24-hour access to all meter equipment, without the need to call for an appointment.

To maintain safety and allow maintenance of metering equipment, Clark Public Utilities has the following requirements for electrical equipment rooms:

- ▶ Utility approval of the electrical equipment room design prior to construction.
- ▶ 24-hour access to all utility-maintained equipment.
- ▶ All metering equipment, including the meter base, must be installed together within the designated electrical equipment room(s).

- ▶ Outward opening access door that leads directly to the outside and is equipped with a panic-style push bar.
- ▶ A minimum door size of 2 feet 8 inches by 6 feet 8 inches.
- ▶ Signage on the exterior of the door stating “Electrical Room”
- ▶ Well lit inside the room and the entrance.
- ▶ Contains electrical and communications equipment only, no storage of other items.
- ▶ Working space and clearances around all metering equipment is maintained at all times (**Figure 4-1**).
- ▶ A lockbox containing the access key, card key or door combination.

Lockbox requirements

Clark Public Utilities will provide both the mounting plate and lockbox required for access to the electrical equipment room. The customer or electrical contractor is responsible for the installation of the lockbox in accordance with the provided specifications. To schedule the on-site exchange of materials and installation of the equipment room lockbox, please contact the Meter Coordinator, meterdepartment@clarkpud.com or 360-992-8001.

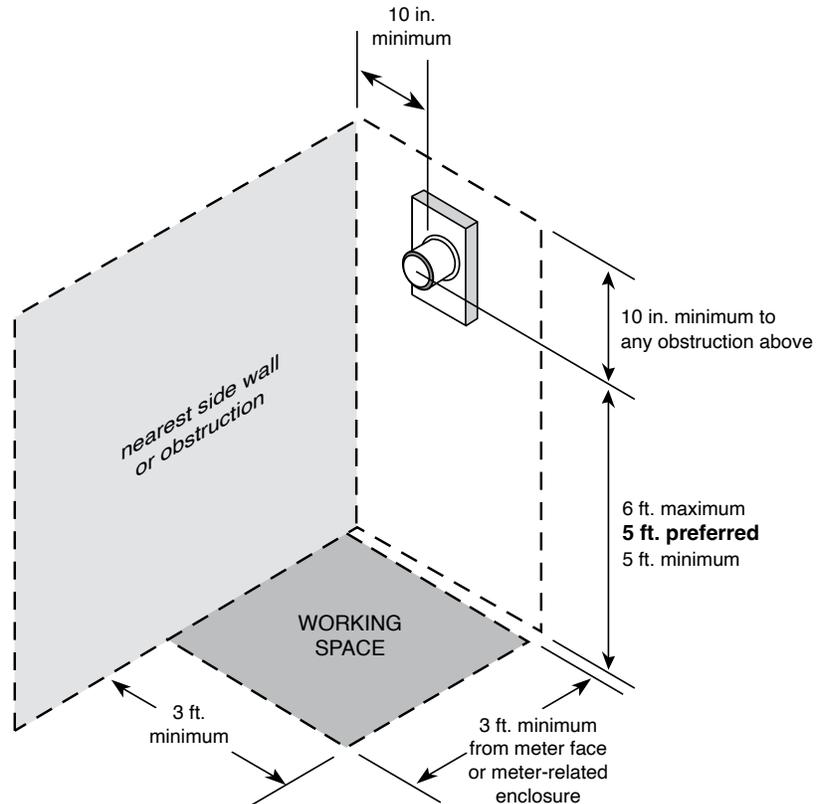
Lockboxes installed for access to electrical equipment rooms have the following requirements:

- ▶ Visible from and installed within 10 feet of the electrical equipment room door.
- ▶ Key, card key or door combination provided by the customer.
- ▶ Door combinations must be engraved on a hard plastic or metal tag no larger than 2 inches long by 1 inch in height, with a 1/16 inch hole punched in the top left corner for hanging.
- ▶ If equipment room door locks are changed, it is the customer’s responsibility to contact the utility as soon as possible to coordinate the exchange of new keys, card keys or combinations. Contact Field Service, contactfieldservices@clarkpud.com or 360-992-3046 to schedule an appointment for obtaining keys/combinations/etc.

Clearance requirements for metering equipment

Meter clearances are measured from the center of the meter socket or from the center of the face of the meter. The customer is required to provide and maintain these clearances at all times. The following clearances are required for all commercial meters:

- ▶ The center of the meter shall be between 5 and 6 feet above finished grade (5 feet preferred).
- ▶ A clear working space, 3 feet deep (**Figure 4-1**) in front of the meter, CT enclosure and switchgear. This space is to be kept clear of any obstructions including landscaping.
- ▶ 10-inch minimum horizontal and vertical clearance between the center of the electric meter and any obstruction (**Figure 4-1**).
- ▶ Recessed meter bases require prior approval from a utility design engineer and must be equipped with a safety socket.
- ▶ If a flush or recessed meter base is installed, the siding or finished surface of the structure shall not overlap the cover of the meter base.
- ▶ The opening around a flush or recessed meter base must extend a minimum of 3 inches.
- ▶ Electric meters located near natural gas meters or threaded service piping must maintain a minimum of horizontal clearance of 3 feet.

Figure 4-1 Meter equipment minimum work clearances

Meter base installation tips

When installing a commercial meter base the following mechanical checks will ensure the installation runs as smoothly as possible. After installing the meter base, verify:

- ▶ Conductors are not under undue strain on the terminals.
- ▶ Terminals are rated for the size and type of conductor used.
- ▶ Strands have not been removed to make conductors fit under-sized terminals.

Meter socket types

The following tables provide useful information on the requirements of the most common single-phase and three-phase commercial meter sockets accepted by Clark Public Utilities.

Table 4-1 Single-phase commercial meter socket requirements

SC = Self-contained CT = Current transformer B-Line part numbers are for cross reference only.

Source Voltage	Ampacity	Meter Base	Reference B-Line Part Number or Equivalent	# of Terminals	Manual Block Bypass	Safety Socket	Test Switch Required	Meter Configuration Diagram
SINGLE-PHASE								
120 2 wire	0–100 amp	SC	U121314 (or 124TB)	4	Yes	No	No	
120/240 3 wire	0–60 amp	SC	U121314 (or 124TB)	4	Yes	No	No	
120/240 3 wire	60–200 amp	SC	124TB	4	No	Yes	No	
	201 to 320 amp	SC	324N, 324NF	4	Yes	No	No	
	Over 400 amp	CT	12146	6	n/a	n/a	Yes	
240/480 3 wire	0–200 amp	SC	124TB	4	No	Yes	No	
120/208 3 wire network	0–200 amp	SC	124TB, 114TB (<100 amp)	5*	No	Yes**	No	
	Over 200 amp	CT	12148	8	n/a	n/a	Yes	

*5th terminal is purchased from supplier separately

**House meters that are part of a residential meter pack do not require a safety socket or a manual bypass

Table 4-2 Three-phase commercial meter socket requirements

SC = Self-contained CT = Current transformer B-Line part numbers are for cross reference only.

Source Voltage	Ampacity	Meter Base	Reference B-Line Part Number or Equivalent	# of Terminals	Manual Block Bypass	Safety Socket	Test Switch Required	Meter Configuration Diagram
THREE-PHASE								
120/208 4 wire wye	0–200 amp	SC	127TB	7	No	Yes	No	
	Over 200 amp	CT	121413	13	n/a	n/a	Yes	
120/240 4 wire delta	0–200 amp	SC	127TB	7	No	Yes	No	
	Over 200 amp	CT	121413	13	n/a	n/a	Yes	
277/480 4 wire wye	0–200 amp	SC	127TB	7	No	Yes	No	
	Over 200 amp	CT	121413	13	n/a	n/a	Yes	

NOTE: All enclosed or recessed meter sockets must have a safety socket. Consult a utility design engineer for pre-approval and requirements.

Self-contained metering systems

Self-contained, or direct connect meters, carry full load current and connect directly across full line voltage. A safety socket is required for most self-contained commercial meter systems with a service voltage greater than 120 volt. Structures with single-phase loads greater than 320 amps of continuous current require CT metering.

Self-contained metering can be installed for the following services:

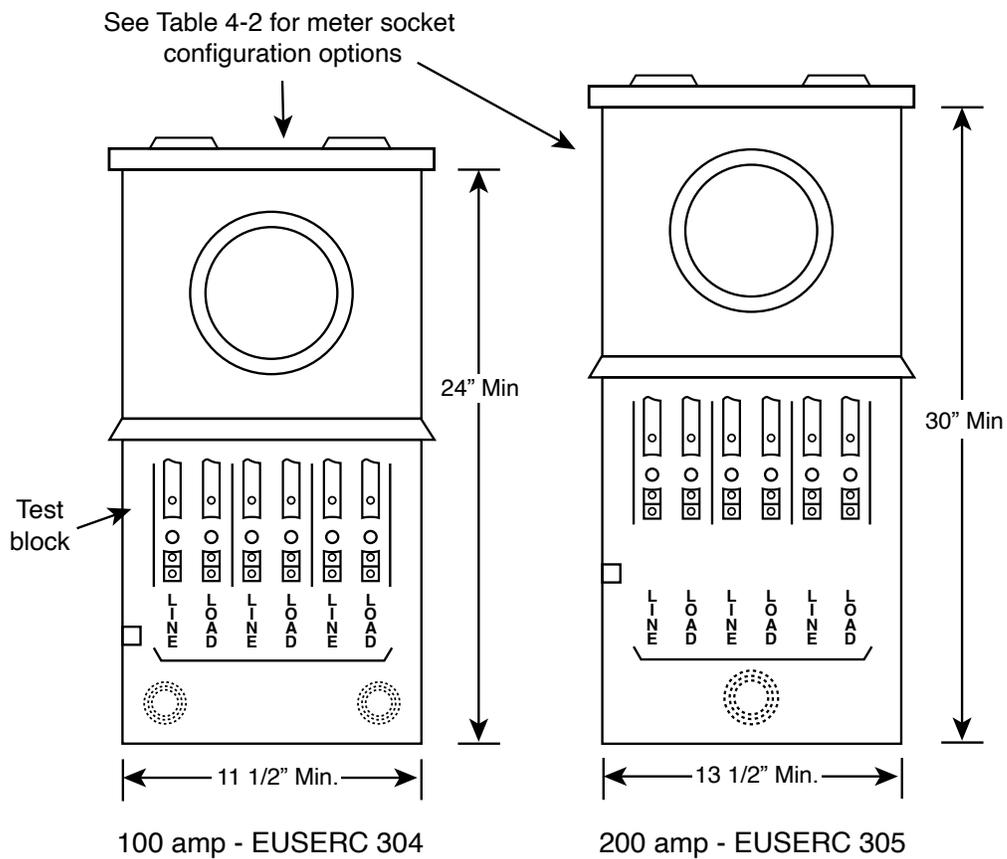
- ▶ Single-phase, up to 400 amps (320 amps continuous).
- ▶ Three-phase, up to 200 amps 120/208 or 120/240 volt with a maximum motor load of 60 hp.
- ▶ 277/480 volt services, up to 200 amps with a maximum motor load of 125 hp.

NOTE: A 4 wire delta service requires the high leg to be marked orange and installed on the far right side of the meter base.

Safety socket

A safety socket allows the utility to maintain self-contained metering systems without interrupting service to the commercial customer. The meter terminals are de-energized allowing utility personnel to safely perform routine meter maintenance. A safety socket (test block) style meter base must be EUSERC approved and is required for all self-contained commercial services, with the exception of those noted in [Tables 4-1 and 4-2](#).

Figure 4-2 Three-phase, self-contained (direct connect) meter bases with required safety sockets (100 and 200 amp)



Manual bypass

Manual bypass meter sockets also allow maintenance of self-contained metering equipment while maintaining service to the customer. Meter terminals are not de-energized when bypassed. A manual bypass meter socket is only acceptable for the following commercial applications:

- ▶ 120 volt services.
- ▶ 120/240 volt services less than 60 amps.
- ▶ 120/240 volt services 201-320 amp (324N, 324NF).

Installation of a manual bypass meter base must be approved by a utility design engineer prior to installation. See [Table 4-1 Single-phase commercial meter socket requirements](#).

NOTE: *The only self-contained commercial meter exceptions that do not require a safety socket or manual bypass style meter base are single-phase temporary services (120/240 or 120/208 voltages).*

Current transformer (CT) metering

All commercial CT metered installations require a test switch provision (mounting plate only) inside the meter base. The utility will provide the test switch.

Clark Public Utilities will provide and install the CTs, meter, test switch and associated wiring. Once the meter gear is installed and the service wires are terminated, contact the Meter Coordinator, meterdepartment@clarkpud.com or at 360-992-8001 to schedule the delivery and installation of CTs.

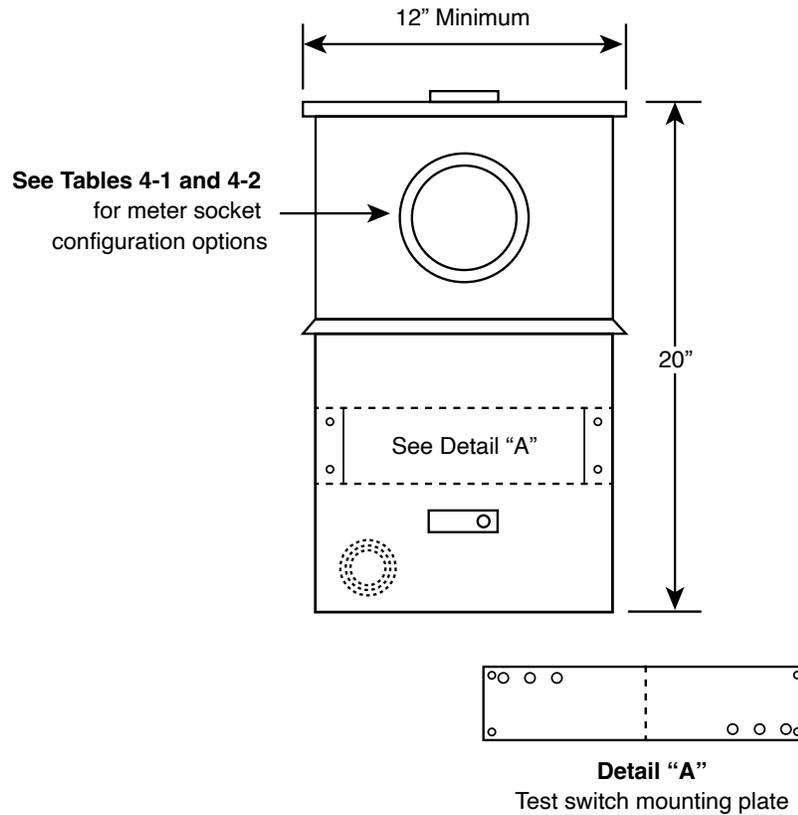
The customer is responsible for providing and installing any additional metering equipment beyond the point of delivery. The location of CT metering equipment must be approved by the utility design engineer. If there are any questions regarding the installation, the customer should contact the Meter Coordinator prior to pulling wire to schedule a CT meter review.

Current transformer (CT) metering is required in the following situations:

- ▶ Three-phase service exceeding 200 amps.
- ▶ Single-phase service exceeding 400 amps (320 amps continuous).

NOTE: *Services over 800 amps require switchgear.*

Figure 4-3 CT Meter Base - EUSERC 339



The CT metering equipment installed by the customer shall meet the following general requirements:

- ▶ Securely mounted, plumb and level on the outside of the structure.
- ▶ Rated for exterior use, rain tight and NEMA 3R-rated.
- ▶ 6 feet maximum height to top of CT cabinet.
- ▶ There are no knockouts on the top of the CT enclosure. A meter base is not allowed above or below a CT enclosure.
- ▶ Bottom of CT cabinet a minimum of 18 inches from finished grade or floor.
- ▶ A single, side opening, hinged door with sealing provisions.
- ▶ Factory-installed hinges located on the opposite side of the enclosure from where the meter socket is located.

- ▶ Permanent load and line labeling corresponds with appropriate connections inside the CT enclosure.
- ▶ Grounding and bonding of both the CT meter base and CT enclosure in accordance with the NEC and the local inspecting agencies.

NOTE: A CT enclosure cannot be used as a junction box or bus gutter.

Table 4-3 CT enclosure and mounting base specifications

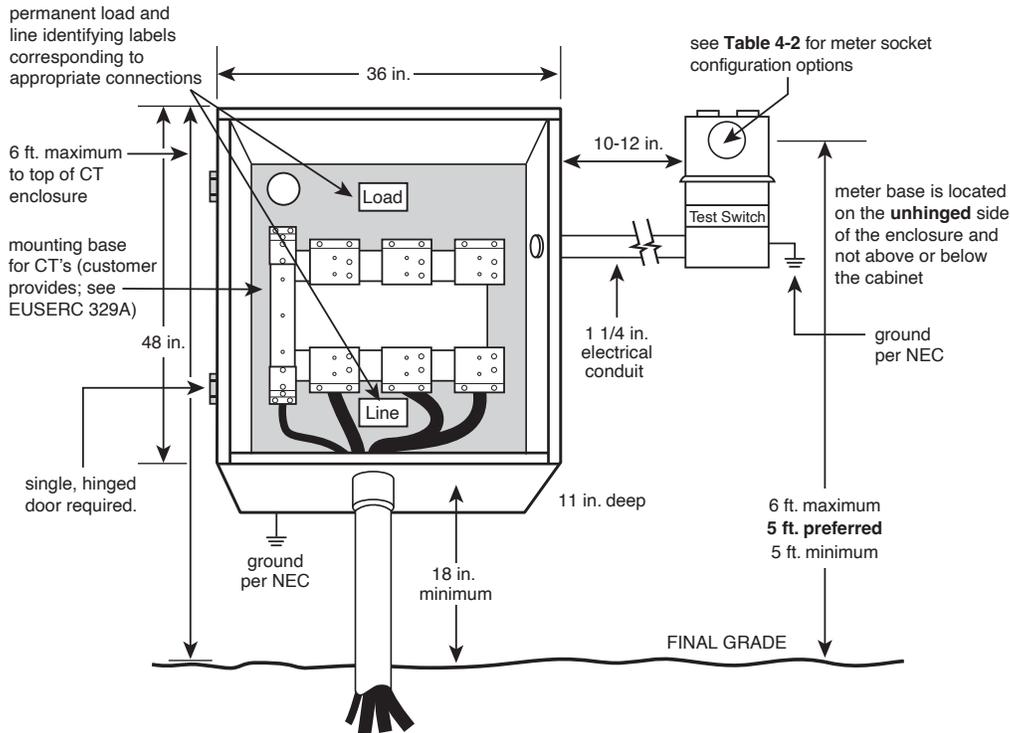
Amperes	Phase	Dimensions (W"x H"x D")	CT mounting base (lug lug)
200–400 amps	Single-phase	24"x30"x11"	6019-HAL
401–800 amps	Single-phase	30"x36"x11"	6019-HEL
200–400 amps	Three-phase	30"x36"x11"	6067-HAL
401–800 amps	Three-phase	36"x36"x11"	6067-HEEL
401–800 amps	Three-phase	36"x48"x11"	6067-HEEL

CT metering conduit

Customer-installed conduit between the meter base and CT enclosure requires:

- ▶ 1-inch minimum electrical conduit for single-phase services; 1 1/4-inch minimum for three-phase services.
- ▶ Schedule 80 PVC or rigid galvanized conduit (flex conduit is not acceptable).
- ▶ Grounding bushings at both ends of the run if galvanized conduit is used.
- ▶ A maximum length of 35 feet (pull cord/string required for runs over 10 feet) between the enclosure and meter base.
- ▶ Conduit installed with no more than three 90-degree elbows in the total length (270 degrees total).
- ▶ A continuous run, with no conduit bodies (LB joints, condulets, etc.).
- ▶ Conduit entering the meter enclosure adjacent to the test switch (see [Figure 4-4](#)).

Figure 4-4 Three-phase current transformer (CT) metering less than 800 amps

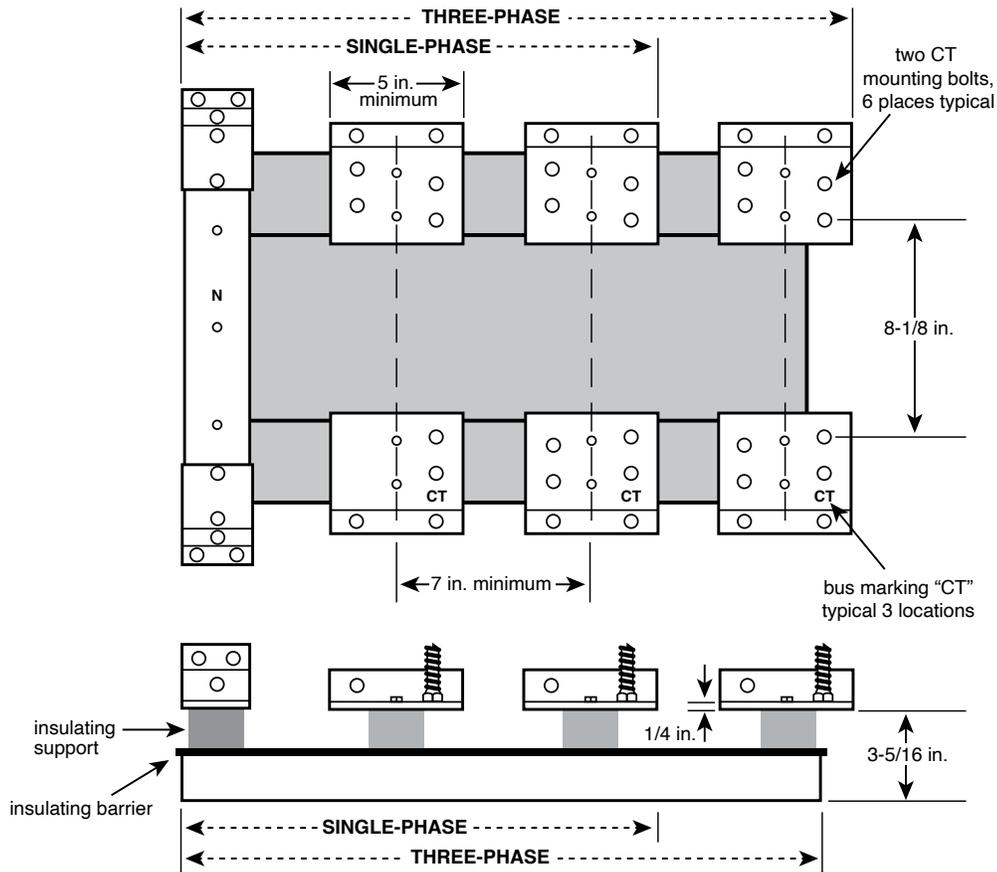


NOTE: See *Table 4-2 Three-phase commercial meter socket requirements*

CT mounting base

Installation requirements for current transformer mounting bases are as follows:

- ▶ Mounting base fault current rating is sufficient for the application.
- ▶ Line and load side terminations require two bolts per connector and two bolts on the neutral bus.
- ▶ The customer furnishes all lugs and terminates both load and line side conductors to the bus.
- ▶ A 4-wire delta service requires the high leg to be marked orange and installed on the far right side of the CT enclosure.

Figure 4-5 Commercial CT mounting base - single-phase / three-phase

NOTE: For additional information see EUSERC drawings 328B/329B

Switchgear metering

Switchgear metering is required for three-phase services greater than 800 amps. At the customer's discretion, this type of metering may also be installed for services ranging from 201 to 800 amps. The customer-installed equipment must be EUSERC-approved.

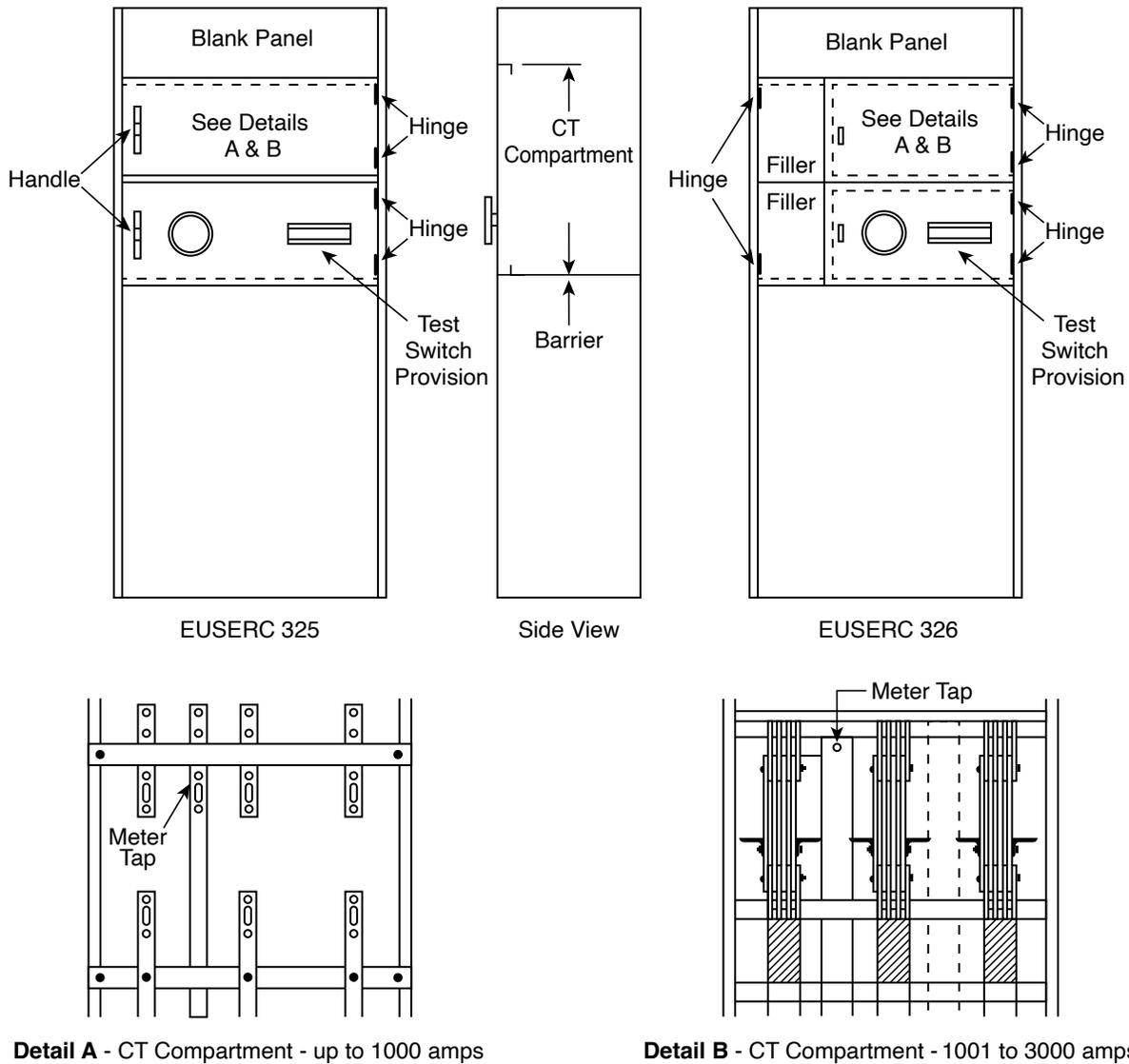
All customer-installed switchgear requires:

- ▶ Integrated CT mounting provision.
- ▶ Service section.
- ▶ Set of bus bars/links.
- ▶ Panel(s).
- ▶ Meter base with provisions for a test switch.
- ▶ Independent, 24-hour access to metering equipment by utility personnel.

Meter socket integrated into the switchgear door (preferred) requires the following:

- ▶ Locking provision for the meter enclosure section.
- ▶ 48 in. minimum concrete mounting pad in front of cabinet.
- ▶ Case ground as required per the NEC.

Figure 4-6 Switchgear metering



Remote meter base installed separate of switchgear door requires:

- ▶ Prior approval by a utility design engineer.
- ▶ Metering conduit installed inside the switchgear section must terminate in the CT compartment in **front** of the CTs.
- ▶ Conduit for meter wiring must be continuous from the meter base to the CT compartment.
- ▶ Maximum length of 35 feet (pull cord/string required for runs over 10 feet) between the enclosure and meter base.
- ▶ Conduit installed with no more than three 90-degree elbows in the total length (270 degrees total).
- ▶ Meter base is grounded per the NEC.

NOTE: Customers requiring more than 480 volts of service will have primary metering. Ownership and maintenance agreements for primary metered services will be mutually agreed upon with Clark Public Utilities.

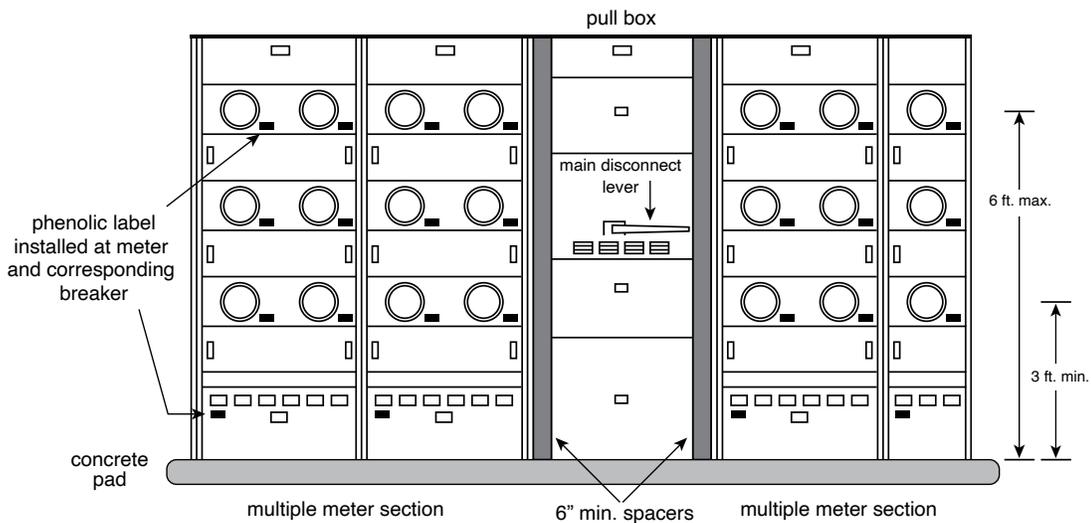
Multiple metered services

Commercial tenant spaces

Non-residential multiple meter installations such as ganged, modular and switchgear metering have the following requirements:

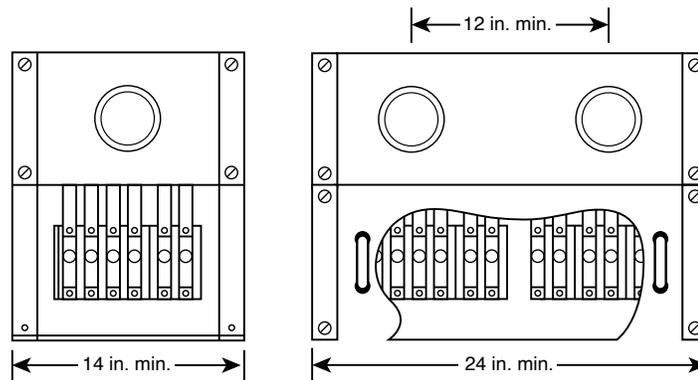
- ▶ The center of the meter socket must be positioned a minimum of 3 feet and a maximum of 6 feet above finished grade or the floor of an approved electrical equipment room.
- ▶ Meter packs with more than six meters require a main disconnect per the NEC ([Figures 4-7 and 4-10](#)).
- ▶ All self-contained meter bases require a safety socket.
- ▶ Each metered service is permanently labeled (see [Multiple meter labeling](#) section for additional information).

Figure 4-7 Self contained switchgear (floor-mounted) metering



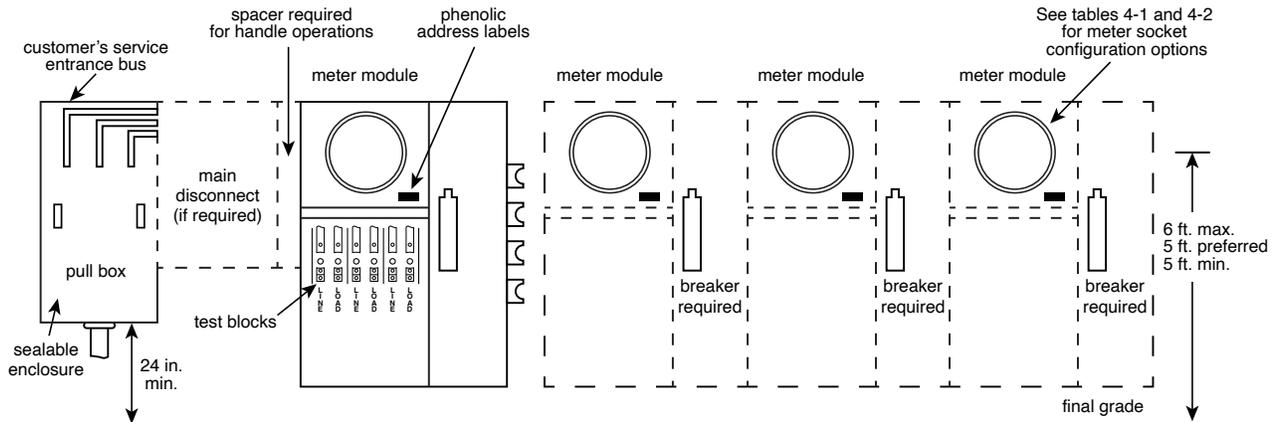
NOTE: A prefabricated multiple meter enclosure may not align with the required maximum and minimum meter socket heights. Contact the utility design engineer to discuss unique installations or clarify any specific requirements prior to mounting of the enclosure.

Figure 4-8 Three-phase switchgear safety socket bypass detail



0-200 amp, 0-600 volts, EUSERC 306

Figure 4-9 Modular meter base installation - 800 amps or less



NOTE: Modular meter base installations are limited to no more than two rows of meter sockets.

Residential multifamily

Multiple meter installations for residential services such as multifamily units shall meet the following requirements prior to the utility connecting the service:

- ▶ The center of the meter socket must be positioned at least 3 feet, but no more than 6 feet, above finished grade or the floor of an approved electrical equipment room.
- ▶ Meter packs may not exceed four meters in height.
- ▶ Meter packs containing more than six meters must include a main disconnect, in accordance with the NEC ([Figure 4-13](#)).
- ▶ Three-phase house service meters, when seated in a separate meter base, must include a safety socket.
- ▶ Stand-alone single-phase house service meters must include a safety socket.
- ▶ A spacer is required between meter sockets and other enclosures in the meter pack. Refer to [Figure 4-13](#) for additional details.
- ▶ Meter bases may not be used as junction boxes.
- ▶ Each metered service must be permanently labeled according to Clark Public Utilities' [Multiple meter labeling detail](#).
- ▶ If there will be multiple meter rooms in a building, pre-approval from a utility design engineer is required.

Multiple meter labeling

Meter equipment requires permanent labeling that identifies the unit/suite and building address of the structure being served or what the meter is serving (ELEVATOR, FIRE PUMP, HOUSE, etc.). Proper labeling ensures accurate billing, worker safety, and the ability to disconnect the correct unit(s)/suite(s) during an emergency or for maintenance.

Before electric meters will be set, the customer/electrician is responsible for ensuring that all meter equipment is labeled appropriately as outlined below.

NOTE: Meter equipment labels described are in addition to the labeling requirements of the inspecting AHJ.

Contact the Meter Coordinator for meter sets when the following is complete:

- ▶ The customer has confirmed final addressing with the AHJ.
- ▶ Labeling is completed as outlined below.
- ▶ Services are final approved/stickered by the inspecting AHJ.
- ▶ Panel covers are removed but on site (see [Figure 4-11](#) for commercial applications) and labeled as required.

Meter Coordinator (360) 992-8001
or meterdepartment@clarkpud.com

General labeling requirements

- ▶ A minimum of 1/2 inch height letters are required for all meter equipment labels described.
- ▶ Hard plastic, metal or phenolic block labels with raised or engraved letters are required. (These types of labels are available at trophy and sign shops.)
- ▶ Numerals/letters and the background must be in contrasting colors.
- ▶ Screws, rivets or permanent adhesive must be used to affix an identification plate to the metering equipment (WAC 296-46B-100).
- ▶ An address/building number label is required for the building's main disconnect label. If there are six or less meters and no main disconnect, the address/building number label may be attached to the meter pack.
- ▶ An address/building number label includes: house number, direction, street name, street type and building number.

EXAMPLE: 1000 NE 75 CIR BLDG A

- ▶ A permanent label is also required at the meter base, corresponding breaker, electrical panel (commercial tenant space) and building (HOUSE) meter.
- ▶ Meter equipment labels must correspond to permanent unit/suite numbers attached to or next to corresponding unit doors/suite entrances.
- ▶ Each electrical panel requires a label displaying the number of the unit(s)/suite(s) it serves.
- ▶ Multi-unit residential structures with six or less meters (duplex, triplex, ADU, etc.) also require corresponding labeling, as outlined above, at the meter, panel and, when the project is complete, the unit door.
- ▶ Confirmation of final addressing from the county or city with jurisdiction is required before meters will be set.

Figure 4-10 Commercial tenant spaces-adjacent breaker

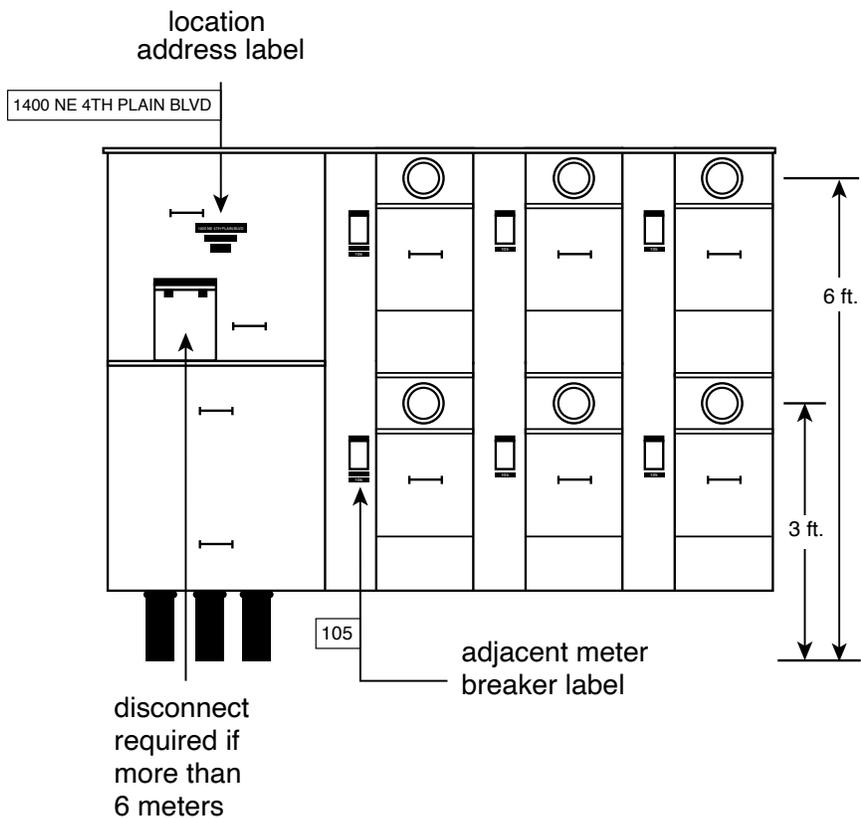
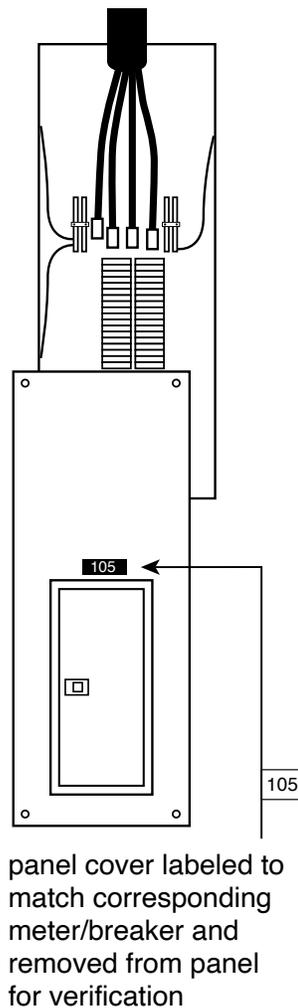


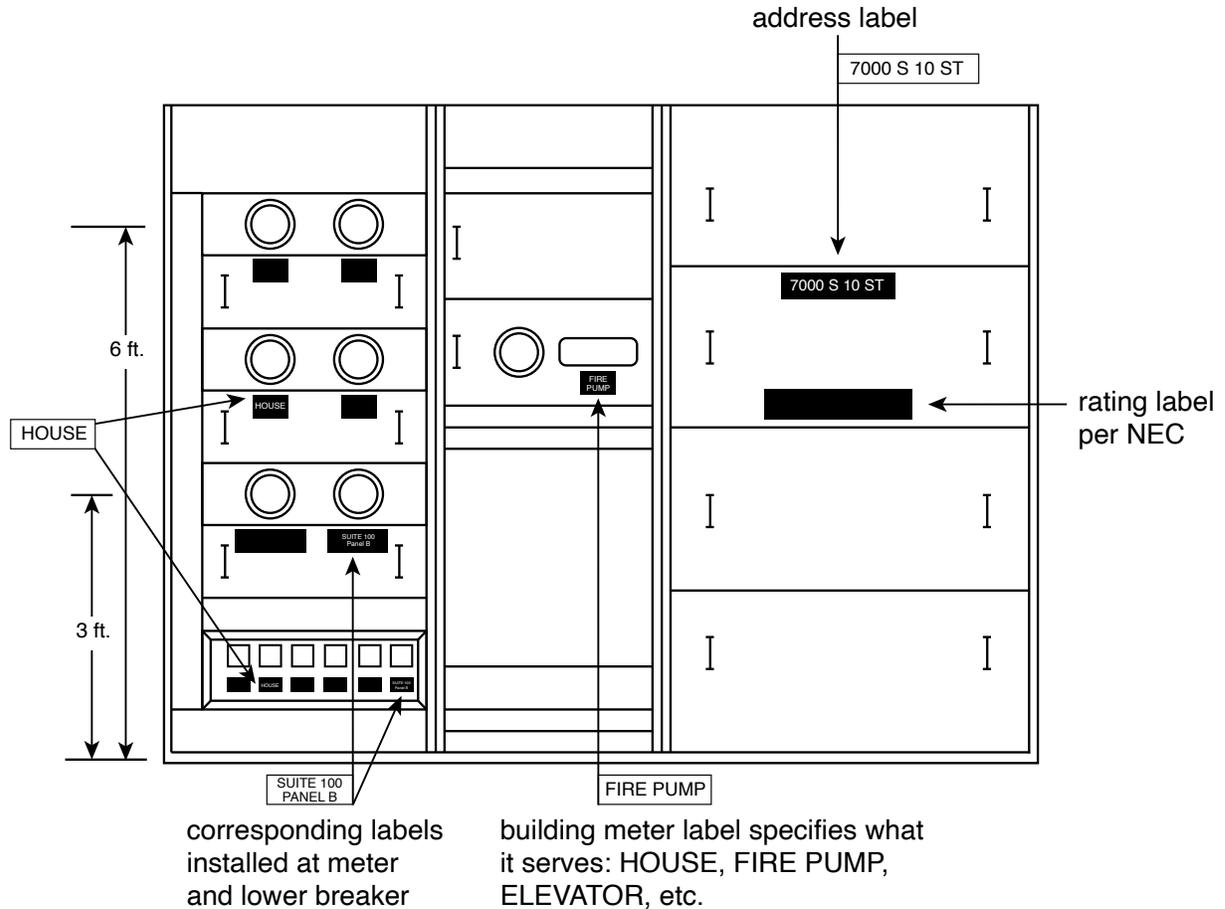
Figure 4-11 Panel label



Commercial tenant space meter labeling

- ▶ The main disconnect, meter base, corresponding breaker, suite entry and panel cover must be permanently labeled for commercial applications.
- ▶ The main building house meter is labeled 'HOUSE'.
- ▶ If a meter does not serve a specific unit/suite or HOUSE, it must be labeled with what equipment the meter is serving (ELEVATOR, FIRE PUMP, etc.).
- ▶ If multiple meters serve one unit/suite, the meter bases shall be labeled to match their corresponding panels.

Example: 123 PANEL A, 123 PANEL B

Figure 4-12 Commercial tenant space - lower breaker

- ▶ If multiple HOUSE meters serve one building, the meter bases shall be labeled to match their corresponding panels.

Example: HOUSE A, HOUSE B

- ▶ Marker tape, printed labels or permanent markers are NOT acceptable permanent labeling in commercial applications.
- ▶ Panel covers require permanent labeling of unit/suite number on the outside of the panel. In commercial applications, panel covers must be on site, labels attached, removed from panel and set below (see [Figure 4-11](#)) to allow service verification before meters will be installed.

NOTE: Meters will NOT be set until labeling is correct and complete.

Figure 4-13 Residential multi-unit meter pack

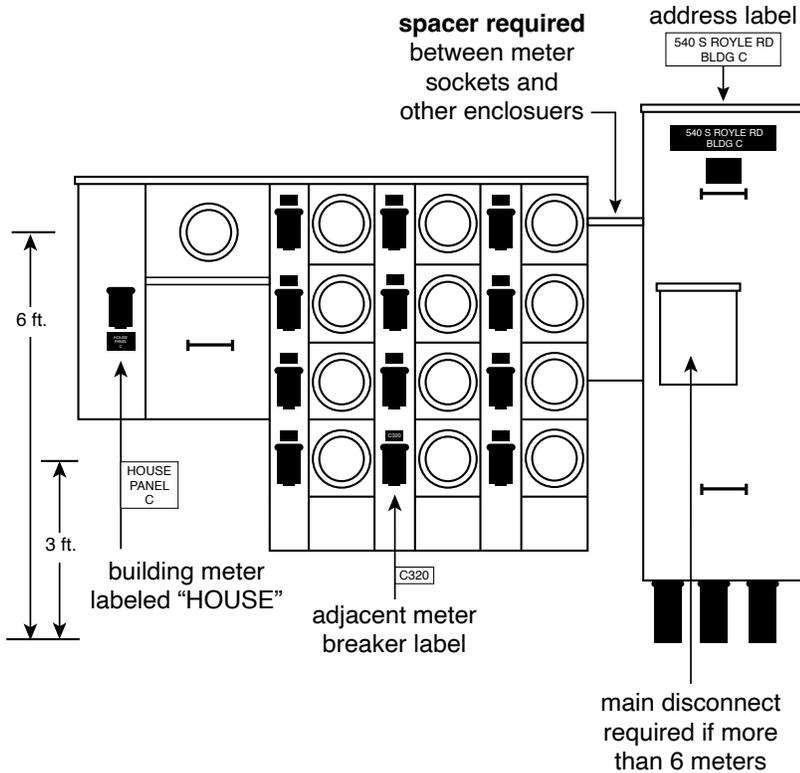
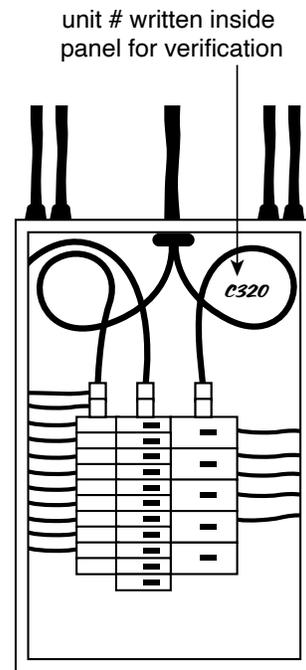


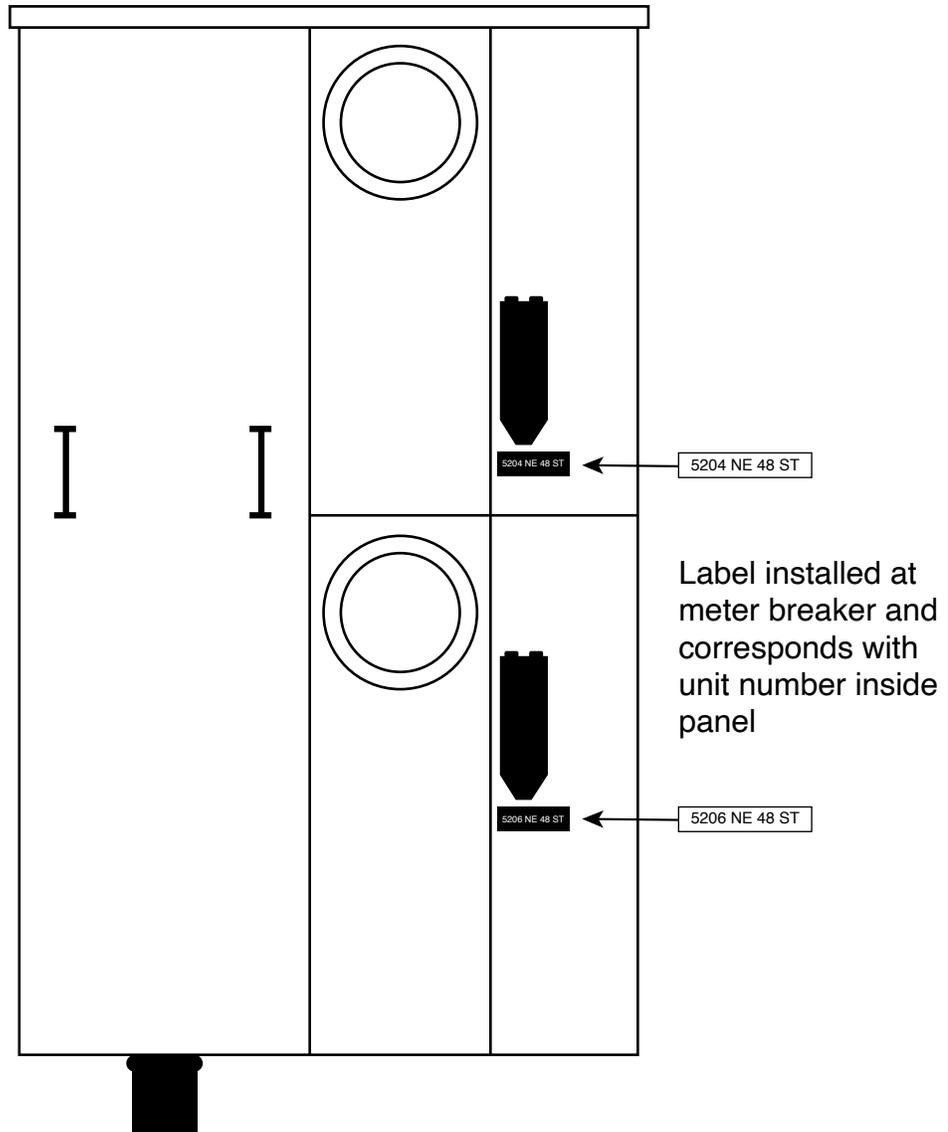
Figure 4-14 Residential multi-unit panel label



Residential multi-unit meter labeling

- ▶ The main disconnect, meter breaker and panel must be permanently labeled. When project is complete, unit doors must be permanently labeled and correspond to meter equipment labeling.
- ▶ The main building house meter is labeled 'HOUSE'.
- ▶ Marker tape, or permanent markers are NOT acceptable permanent labeling for main disconnect and meter breaker.
- ▶ The panel of a residential multi-unit service is labeled on the *inside* of the breaker panel with the unit/space number (panel covers are not required on site at the time meters are set). A permanent marker may be used for unit labeling inside a residential electrical panel, see [Figure 4-13](#)

NOTE: Meters will NOT be set until labeling is correct and complete.

Figure 4-15 Other multi-meter packs: duplex, ADU, quadplex, etc.

- ▶ Residential meter packs with two or more meters must have permanent labels on the meter breaker and inside the corresponding breaker panel (a permanent marker may be used for unit labeling inside a residential electrical panel).
- ▶ Unit numbers or house address(es) can be used.
- ▶ Final addressing must be confirmed and as assigned by the county or city with jurisdiction.



PO Box 8900

Vancouver, WA • 98668

360-992-8558

www.ClarkPublicUtilities.com