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1. General Information

1.1. Introduction and Purpose

TD-7001M, "Electric & Gas Service Requirements" ("Greenbook") Manual guides applicants on how to establish gas and electric services and ensure that Pacific Gas and Electric Company (PG&E) delivers safe, uniform service. This manual does not provide all scenarios that applicants may encounter and relies on PG&E Inspectors and Job Owners (JOs) to discuss issues on a case-by-case basis.

The 2026 Greenbook supersedes all previous editions and revisions. The Greenbook is typically updated annually; however, PG&E's building requirements, as well as gas and electric design standards, are subject to change throughout the year. Contact your local PG&E JO regarding any questions.



A lack of compliance with, or deviation from, TD 7001M, "Electric & Gas Service Requirements" ("Greenbook") Manual, PG&E gas or electric design standards, or PG&E tariffs is subject to PG&E's inspection, review, and approval. See TD-4001P-07, "Gas Variance Process" or TD-2951P-01, "Request for Variance from Electric Distribution Standards" (for access to this document, please see your PG&E Job Owner).

Applicants must comply with all [California Public Utilities Commission \(CPUC\)](#) General Orders outlined in this manual. Any non-compliance or deviation from the General Orders, PG&E gas or electric design standards, or PG&E tariffs may result in the rejection of an applicant's work for PG&E service connection.

Applicants may be required to make changes to ensure compliance with applicable CPUC General Orders, PG&E design standards, or PG&E tariffs at the applicant's own expense.

1.2. General Definitions

This manual uses the terminology listed in [Table 1-1, "Terminology and Definitions,"](#) on Page 1-2 to explain roles and responsibilities.

1.2 (continued)

Table 1-1. Terminology and Definitions

Terminology	Definition
Company	Refers to Pacific Gas and Electric Company (PG&E) and is used throughout this manual.
Applicant or Applicant Installer	Refers to PG&E's customer, or to the person or persons representing the PG&E customer in the application/construction process, including a contractor, design consultant, or installer.
PG&E Inspector	Refers to PG&E's qualified gas or electric personnel who inspect equipment and facilities installed by the applicant. They are responsible for ensuring all installed equipment and facilities meet PG&E specifications and standards.
PG&E Job Owner (JO)	Refers to PG&E's "Project Manager" who oversees the applicant's project(s) and is a liaison between the applicant and internal PG&E resources. All questions and feedback should be funneled through the JO.

1.3. SmartMeter Program

1. PG&E's SmartMeter Program is part of a statewide effort driven by the CPUC to upgrade California's energy infrastructure with automated metering technology. The SmartMeter Advanced Meter Reading system includes a programmable, solid-state electric meter and a gas module installed on a traditional gas meter at each service delivery point to measure and record energy use.
2. For more information on SmartMeters, including instructions on tracking energy use online, or information on the opt-out program, visit the [SmartMeter site](#).
3. For direct access applicants using a Meter Service Provider (MSP), refer to [Direct Access Standards for Metering and Meter Data \(DASMMD\) in California](#) (March 1999).

1.4. Governance

1. PG&E facilities must abide by General Orders set forth by the [CPUC](#). **These regulations and orders include, but are not limited to, the following documents:**
 - [General Order \(G.O.\) 95, "Rules for Overhead Electric Line Construction"](#)

1.4 (continued)

- [G.O. 112-F, "Rules Governing Design, Construction, Testing, Operation, and Maintenance of Gas Gathering, Transmission, and Distribution Piping Systems"](#)
 - [G.O. 128, "Rules for Construction of Underground Electric Supply and Communication Systems"](#)
 - [G.O. 165, "Inspection Requirements for Electric Distribution and Transmission Facilities"](#)
 - [Code of Federal Regulations \(CFR\), Title 49, "Transportation," Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards"](#)
2. PG&E requires contractors to employ properly certified personnel for their specific, required skills. Electric workers must be properly qualified (Qualified Electrical Worker, Qualified Person, etc.) as defined in [State of California High Voltage Safety Orders \(Title 8, Chapter 4, Subchapter 5, Group 2 per Electric Sample Form No. 79-716, "General Terms & Conditions for Gas and Electric Extension & Service Construction by Applicant."](#) Gas workers must be properly qualified (plastic fusion, welding, etc.) as defined in 49 CFR Subpart N, 49 CFR §192.227, 49 CFR §192.285, and GO 112-F §105.
3. Applicants must comply with all other federal, state, and local regulations (i.e. local permits and ordinance, Equal Opportunity Regulations, Cal-OSHA, OSHA, Environmental Protection Agency, Federal Aviation Administration etc.).
- a. In such cases, the Federal Aviation Administration (FAA) requires filing notice of the proposed construction a minimum of 45 days before starting. The FAA may issue a determination of hazard to air navigation and recommend actions to mitigate or eliminate that hazard. For additional information, contact the PG&E JO.

1.5. Obtain Interactive Training System (ITS) Qualifications for Gas and Electric.

1. **Electric:** To apply for a Qualified Applicant Designer or Applicant Installer position, visit [Applicant Designer Qualification Program](#) and [Applicant Installer Prequalification Requirements](#).
- a. Each applicant installer contractor is required to register and create an account with ITS.
- b. Individuals performing or documenting work to install PG&E facilities (i.e., laborers, operators, welders, fitters, field engineers, etc.) will be required to complete an individual Safety Quality Conduct Assessment (SQCA).
- c. Individuals successfully completing the assessment will be issued an ITS Wallet Card with a QR code that can be scanned by PG&E inspectors using a smart phone device to view and validate the pre-qualification in the field.

1.5 (continued)

- d. For individuals and homeowners installing PG&E facilities for which the applicant, installer, and customer are one in the same, email PG&EApplicantInstallerPreQual@pge.com to obtain an ITS profile 12 weeks in advance of the pre-construction meeting.

NOTE

Applicant installers already maintaining Operator Qualified (OQ) certifications required for gas installations in ITS will be able to use their existing account and wallet cards by simply adding the SQCA to the student's profile.

2. **Gas:** To apply for a Qualified Operator position, visit [Gas Pipeline Contractors | PG&E](#).
 - 1) Each applicant installing gas facilities will also be required to register with National Compliance Monitoring System (NCMS) and submit documentation supporting a compliant drug and alcohol testing program for any individual performing an OQ covered task.
 - 2) Register with ITS and complete the SQCA prior to being approved to register with NCMS.
 - 3) PG&E reserves the right to revoke applicant installer pre-qualification and ability to install PG&E assets for willful, serious, or repeated breaches of safety, poor quality, non-compliant work, failure to comply with DOT regulations per 49 CFR Part 199 (as applicable), or breaches of conduct. Breaches of conduct include, but are not limited to, disrespectful, offensive, or intimidating language or behavior towards PG&E personnel. Reinstatement of pre-qualification status will be considered upon submittal and adherence to a documented corrective action plan.

NOTE

NCMS is integrated with ITS to provide evidence of the individuals' compliance with drug and alcohol testing on the ITS wallet card.

1.6. Safety Alert and Calling 811 for a Ticket

Safety Alert

1. **Electric:** Contacting overhead or underground electric lines or equipment and natural gas pipelines can cause serious injury or death. Any part of a crane, scaffold, construction material, antenna, cable, rope, guy wire, or tool that touches an overhead electric line or penetrates an underground cable can become energized.
2. **Gas:** Penetrating an underground natural gas line with a backhoe or other tool can cause an explosion or flash fire.

1.6 (continued)

**WARNING**

To avoid potential accidents, do not begin to excavate before identifying underground facilities. Call 811 prior to any digging.

- a. State law requires applicants to contact Underground Service Alert North (USAN) or Dig Alert by dialing 811 or [filling out a form](#) at least 2 working days before excavation (weekends and holidays excluded).
- b. Ensure that you call 811 when planning underground work, before digging begins, to allow adequate time for utilities to determine the location of underground gas and electric lines or equipment. Additional information is available at [Yard Safety](#).

1.7. Steps for Underground Service Alert (USA):

1. Outline the dig site in white paint, chalk, flags or flour
2. Contact 811 at least two working days before starting the project
3. Wait for the utility partners to respond or locate their utilities
4. Confirm all utility partners on the ticket have responded and your start time has passed. Reference the USA color-code identifiers in [Table 1-2, "USA Color Coding"](#) on Page 1-6

This is a free service.

Do **not** use 811 for design purposes.

1.7 (continued)

Table 1-2. USA Color Coding¹

Excavation Sites & Underground Facilities	Marking Color
Proposed Excavation	White
Temporary Survey Markings	Pink
Electric Powerlines	Red
Gas-Oil-Steam Chemical	Yellow
Communication Phone & CATV, Cable	Orange
Potable Water	Blue
Reclaimed Water, Irrigation	Purple
Sewer & Storm Drain	Green
¹ Call 2 working days before you dig	

1.8. Arc Flash

Arc-Flash Hazard Warning

1. Applicants must comply with all other federal, state, and local regulations (i.e. Equal Opportunity Regulations, Cal-OSHA, OSHA, Environmental Protection Agency, etc.).
2. All applicants or persons authorized by PG&E who are working on, working near, or observing others working on any PG&E equipment, enclosures, or other facility potentially are exposed to arc-flash hazards and are required to wear the appropriate level of flame-resistant (FR) clothing for the task at hand.
3. The tags must be clearly visible on the outside of all FR garments, must be clearly identifiable as flame resistant, and clearly indicate the arc rating hazard risk category. All garments must have a minimum arc rating of 8 cal/cm² (i.e. CAT 2 and HRC 2). This includes:
 - a. FR long sleeve shirt and FR pants
 - b. Standard FR coverall
4. Applicants who do not wear the required FR clothing will be asked to leave the job site immediately.
5. **PG&E Safety Training Resources**
 - a. At the discretion of PG&E Inspectors, applicants may be allowed to enter a PG&E energized facility to perform work or may require a PG&E crew to perform work to ensure safety of everyone. If the work requires a PG&E crew, then the PG&E Job Owner will schedule accordingly.

1.8 continued

- b. PG&E must ensure that contractors and construction workers avoid electric and natural gas hazards by practicing basic safety rules. Visit [Enterprise Contractor Safety](#) for more details.

1.9. When do I need to contact PG&E for changes to service?

1. An applicant must put in an application to [YourProjects.pge.com](#) or call 1-877-743-7782 if the applicant "make[s] any material change either in the amount or character of the electric lamps, appliances or apparatus installed upon the premises to be supplied with electric energy," per [Electric Rule 3](#), or "make[s] any material change either in the amount or character of the gas appliances or apparatus installed upon the premises to be supplied with gas by PG&E," per [Gas Rule 3](#). PG&E requires this information to determine the following factors:
 - The adequacy of existing utility services and supply facilities.
 - The need to modify those facilities to meet and supply the changed load or equipment requirements. This includes changes in the character or nature of the Applicant's previously approved gas and/or electric service.
2. For more information, applicants can review [Electric Rule 2](#) and [Gas Rule 2](#), both titled "Description of Service," as well as [Electric Rule 3](#) and [Gas Rule 3](#), both titled "Application for Service."
3. If an applicant fails to notify PG&E, and the changes exceed the capabilities of the installed utility service, metering, or other equipment and damage those facilities, the applicant is liable for all damages and resultant costs to PG&E.

1.10. What are PG&E's roles and responsibilities?

1. PG&E is responsible for planning, designing, and engineering its service facilities and service laterals using Company design standards for design, materials, and construction. PG&E will perform all tie-in work to existing distribution and/or energized facilities. PG&E ensures safe and reliable electric and gas service to all end users.
2. PG&E provides the following standard services to applicants:
 - a. Establishing service at one service delivery point, through one meter, and at one voltage class or pressure, to one legal parcel or premise.
 - b. Designing service to extend from the connection to the distribution facilities along the shortest, most practical, and most available route to the service termination facility or service delivery point, as determined by PG&E.
 - c. PG&E may require a service location to be closer to the distribution facilities in the following instances:

1.10 (continued)

- In areas where the nearest building is a considerable distance (i.e., 200 feet or more) from the property line.
 - If, in PG&E's judgment, there is a potential hazard between the property line and service location, then PG&E provides, installs, and maintains all meters, metering transformers, test switches, and secondary wiring from the metering transformers to the meter.
3. PG&E must comply with all regulations (primarily CPUC General Order requirements, including applicable Code of Fed Reg for Gas) up to the meter per [Subsection 1.4, "Governance"](#) on Page 1-2.

1.11. General Applicant Roles and Responsibilities

1. Applicants and contractors must not tamper with PG&E facilities including, but not limited to, the list below:
- Enter or access PG&E facilities or enclosures without a qualified PG&E Inspector on site.
 - Remove or interfere with PG&E meters, seals, padlocks, or other locking devices.
 - Connect house gas pipes or other facilities to the plugged side of the gas service-tee fitting (reserved for PG&E use only).
 - Paint, color, or discolor PG&E gas and electric facilities, including meters.
 - Locate service termination enclosures inside inhabitable areas of residences.
 - Applicants are not allowed to install any device, disconnect, or connect to PG&E's service or equipment (including, but not limited to, PG&E's electric or gas meters and energized distribution system).
 - Applicants must [submit an application](#) with PG&E and contact their respective PG&E Job Owner to schedule a PG&E installation of any approved customer or third-party owned devices, including Meter Socket Adapters. See [Electric Rule 31](#) and [Section 7, "General Metering Information,"](#) for more information on Meter Socket Adapters.
 - If any customer-owned devices were not installed by PG&E, then PG&E Personnel will remove them from the applicant's premises.
 - State law prohibits tampering with or connecting to utility property without PG&E's consent and may result in legal penalties. Unauthorized connections to PG&E facilities may violate:

1.11 (continued)

- [California Penal Code, Part 1, "Crimes and Punishments," Title 13, "Crimes Against Property," Chapter 5, "Larceny," Part 498](#), California Penal Code, Title 13, Chapter 5 (§498) and Chapter 15 (§593c).
 - [Chapter 15, "Malicious Injuries to Railroad Bridges, Highways, Bridges, and Telegraphs," Part 593c](#), California Civil Code, Title 3.5 (§1882 et seq.).
 - Violators could be subject to damages pursuant to [California Civil Code, Division 3, "Obligations," Part 4, "Obligations Arising From Particular Transactions," Title 3.5, "Utility Services," Section 1882, et. Sequitur](#)
2. If service disconnection or meter removal is needed due to remodeling or alterations, then applicants must contact PG&E's Job Owner via the application process. See [Section 1.12, "What Do I Need to Do to Get Service From PG&E \(PG&E's Applicant Process\)?"](#) on Page 1-12.
 3. Review and understand all PG&E tariffs and design standard requirements applicable to the project.
 4. Maintain the applicant's/customer's portion of their facilities:
 - **Gas:** For residential service, it begins at house pipe stub-out (i.e., the houseline) and into the applicant's building, residence, or structure. For commercial service, it begins where the gas service bypass reconnects with the gas service outlet piping.
 - **Electric Overhead:** Begins at the point of attachment (i.e. connections at the weather head) and into the applicant's building, residence, or structure and customer-owned poles, if applicable.
 - **Electric Underground:** Begins at termination point in the panel and into the applicant's building, residence, or structure.

In addition, the applicant owns and must maintain substructures (i.e., conduits) on private property. Applicants are responsible for providing, installing, and maintaining any structures (i.e., bollards, retaining walls, etc.) that are required to protect service facilities from damage.
 5. Anything beyond the meter (i.e. meter panel) is customer-owned/responsibility and applicants are required to follow local requirements (i.e., ordinances or codes). Enforcement behind the meter requirements is under the jurisdiction of the Authority Having Jurisdiction (AHJ) such as county or city inspectors.

1.11 (continued)

6. Approved Metering and Service-Termination Equipment

All service termination and metering equipment must conform to nationally recognized standards, meet all applicable certification requirements, and bear the certification marking of a nationally recognized testing laboratory. Nationally recognized standard organizations include, but are not limited to, the following:

- [National Fire Protection Association \(NFPA\)](#)
- [National Electrical Manufacturers Association \(NEMA\)](#),
- [Underwriters Laboratories \(UL\)](#), and
- [Occupational Safety & Health Administration's \(OSHA's\) Nationally Recognized Testing Laboratory \(NRTL\) Program](#).
- The equipment must meet the requirements specified in the [Electric Utility Service Equipment Requirements Committee \(EUSERC\)](#) manual and requires PG&E approval for use in construction projects.

7. Providing and Maintaining Access to PG&E on an Applicant's Property.

- a. PG&E has the right to access Company facilities located on an applicant's premises at any time, for any purpose connected with gas and/or electric service to inspect facilities, read meters, and perform routine maintenance and emergency work as needed.
- b. Provide and maintain a clear route, free of any obstructions, to install gas or electric facilities. Refer to [Table 1-3, "Access Summary"](#) on Page 1-11 for more details.

1.11 (continued)

Table 1-3. Access Summary

Access	Summary
Access Road Requirements	Applicants must provide access roads to PG&E pad-mounted or subsurface equipment (i.e. transformers, switches). Roads must: • Always be accessible • Be constructed with Class 2 or AB road base • Be at least 10 feet wide • Have 18 feet of vertical clearance • Include a 30-foot radial or hammerhead-style turnaround at the end of the roads
Equipment Placement Guidelines	Equipment must be placed no more than 15 feet from the edge of the access road. Avoid placing equipment: • Directly under or near overhead lines (transmission, distribution, communication). • In areas where safe lifting equipment operation is compromised.
Vegetation Clearance	Applicants must clear the area of vegetation obstructions where PG&E facilities will be installed (i.e. overhead services) per Electric Rule 16.

8. Applicants may lock meter rooms if PG&E has independent and unrestricted access 24/7. PG&E will provide a lock box for which applicants will install near the meter room entrance to hold the meter room's access key. Applicants may speak with the PG&E Job Owner on alternative lock options.
9. For overhead or underground specific working space/clearance requirements, see PG&E's gas or electric design standards:
 - a. [Electric Design Standard 051122, "Clearances and Location Requirements for Enclosures, Pads, and Underground Equipment"](#)
 - b. [Gas Design Standard J-15 "Gas Meter Locations"](#)
10. **Obtaining Necessary Permits and AHJ Inspections**
 - a. Applicants are responsible for reviewing city and/or county ordinances, laws, or any requirements.
 - b. Any city/county information that conflicts with PG&E's design standards is subject to review and approval by PG&E. Applicants must factor additional time into their project timeline.

1.11 (continued)

- c. Applicable rules and laws of the state of California, including, but not limited to:
 - Plumbing codes (i.e., Uniform Plumbing Code)
 - Mechanical codes (i.e., California Energy Code, California Fire Code)
 - Electric codes (i.e., National Electric Code)
 - California Building Code (i.e., Chapter 11B)
11. Local and state ordinances require applicants to obtain the appropriate permits and final inspections before PG&E establishes services to any building or structure (see [Subsection 1.17, "PG&E Connection and/or Construction"](#) on Page 1-21 for more details).
 - a. Gas meter release forms obtained from a permitting agency must include the specific, requested pressure (e.g., 7-inches w.c., 2 psig, 5 psig).
12. If the applicant's work is not inspected, approved, or cleared by the AHJ, then under [Electric/Gas](#) Rule 11 and [Electric/Gas](#) Rule 16, PG&E has a right **not** to connect service (gas or electric) until the applicant complies. In situations where service is already in existence and the applicant has performed work that poses a significant safety risk, then under [Electric/Gas](#) Rule 11 and [Electric/Gas](#) Rule 16, PG&E has authority to disconnect service or not energize/pressurize, respectively.

1.12. What Do I Need to Do to Get Service From PG&E (PG&E's Applicant Process)?

1. The process for installing or changing gas and electric services takes time and planning. Contact PG&E early in the process with accurate load information and deadlines to allow adequate time for completing the service requests.
2. Large-capacity gas meters, electric transformers, or other special equipment often require several months' lead time to ensure a timely delivery from the manufacturer.
3. **Submit Your Application**

Applicants can apply for new or changes to gas or electric services under 2 options:

 - a. Call the Building and Renovation Service Center at 1-877-743-7782
 - b. Apply at [Your Projects Portal](#) and upload all required documentation, including permits (if applicable) and drawing files for architectural, landscape, mechanical, elevation and civil site plans showing electric and gas meter locations in the online application.
4. Applicants are required to submit single-line drawings and metering equipment specification sheets ("cut sheets") for electric service greater than 200-amps and all pedestals (regardless of amperage):

1.12 (continued)

- The single-line drawings must show an electric diagram, including load and line locations and main disconnecting means.
 - Provide house meter connected load, if applicable (kVA or kW) along with square footage of all individual residence(s).
 - The metering specification sheet must show the build of the metering equipment including detailed specifications, build standard, and cite EUSERC references.
5. This is a courtesy review and is **not** an approval of the switchboard. The final approval is in the field during our inspection. The customer is responsible for building the switchboard to meet **all** PG&E requirements, as described in the PG&E Greenbook. Be advised, PG&E does not accept all EUSERC drawings.
- a. If applicants are planning for any items below, they must submit the drawings listed in [Table 1-4, "Meter Drawings and Descriptions,"](#) below, with labels and mark ups.
- Subtractive metering for mixed-use, high-rises above 16 stories
 - Grouping meter in a location above the ground floor
 - Indoor electric meter room

Table 1-4. Meter Drawings and Descriptions

Sets of Drawings	Description
Building site plans	Shows where the electric room is located, including driving and walking paths to the room.
Elevation plans (all sides)	Shows where the room is located, including access and walking paths to the room, and any ramps and driveways leading to the room.
Floor plan	Shows the dimensions of the room, all service and metering equipment to be installed (including fire pumps), and the working space and clearances surrounding all equipment.

6. Application Intake and Review
- a. Once the application is submitted, PG&E assigns a dedicated Job Owner. This person will become the point of contact for the applicant or contractor/QAD (qualifies applicant designer). PG&E recommends contacting a contractor to help plan service changes.
- b. A PG&E JO will contact the applicant within three business days.
- c. The applicant or the applicant's contractor will be asked to supply details of the project.

1.12 (continued)

- d. Project details include scope, timeline, blueprints, and the load requirements for appliances. Provide details about any appliances or equipment the applicant plans to install.
- e. If payment for an engineering advance (EA) is required, then the PG&E Job Owner will notify the applicant during this time.
- f. If necessary, a field meeting will be scheduled.

NOTE

The applicant is required to provide all mandatory documents and materials. Deliver them to the assigned PG&E Job Owner.

Avoid application cancellation by submitting the documents and paying the Engineer Advance (EA) within 35 calendar days. PG&E Job Owner will review and complete the application intake process within 66 calendar days from application submission. This process complies with Senate Bill 410 and Assembly Bill 50 timeline regulations.

g. Select Applicant's Design Options

- 1) Designs are a set of construction documents used to plan, install, and maintain PG&E infrastructure. They are used throughout the entire construction process to establish electric and/or gas service to applicants.
- 2) PG&E designs for the Work Requested by Others (WRO) application type (i.e., relocation/rearrangement of existing facilities). However, if WRO work is associated with "New Business Work," the design can be performed by a Qualified Applicant Designer (see [Section 1.5, "Obtain Interactive Training System \(ITS\) Qualifications for Gas and Electric,"](#) on Page 1-3, for more details).
- 3) For the New Business (NB) application type, applicants may elect to have PG&E perform the designs or a Qualified Applicant Designer to develop their own designs.

h. Select Applicant Install Option.

- 1) Applicants must ensure that construction activities are performed according to PG&E's design standards, PG&E-approved "as -built" construction drawings, clear PG&E inspection requirements, and obtain all applicable AHJ permits. These requirements apply to work performed on private property, within the franchise area, or in public right-of-way areas. Applicants have the following options for facility installation:
 - Applicant-performed work
 - PG&E-installed work
 - PG&E-Applicant Shared Work

1.12 (continued)

7. **Applicant-Performed Work:** Applicants may elect to perform substructure construction (see [“PG&E-Applicant Shared Work”](#) below) and install PG&E electric facilities. Applicant coordinates all necessary safety precautions (i.e. traffic control). In addition to the PG&E-Applicant Shared Work, Applicant-Performed Work also includes:
 - Furnishing and installing electric equipment as required on the construction drawing.
 - Providing satisfactory termination facilities on or within the structures being served.
 - Furnishing and “making up” terminations (i.e. load-break elbows) as required on the construction drawing.
 - Furnishing and installing risers (on existing poles) (to connect underground service to overhead facilities)
 - Furnishing and installing gas service
8. **PG&E-Installed Work:** Applicants may elect PG&E to perform all construction work, including substructures, and applicants will only be responsible from PG&E’s point of attachment (service connection) to the building or structure. No PG&E inspection is required. Applicants can skip to [Section 1.17 “PG&E Connection and/or Construction,”](#) on Page 1-21.
9. **PG&E-Applicant Shared Work (substructure only):** Applicants may elect to perform substructure construction only. This includes construction activities conducted on private property, in the franchise area, and/or in other rights-of-way areas. This may extend the project timeline. Construction activities include:
 - All necessary trenching, backfilling, soil compaction, and other digging (i.e., cross bore) as required.
 - Furnishing, installing, owning, and maintaining all conduits (conduit, bends, couplings, end bells, cable protectors,) on applicant's premises.
 - Furnishing and installing substructures (boxes and pads) including grounding and ground rods
 - Service riser conduit and connector for underground-overhead connection
 - Paving (cut, patch, and final repair)

1.12 (continued)

10. **PG&E prepares the project design**

- During the project design phase, PG&E identifies the costs and prepares construction drawings or reviews Applicant Design drawings depending on Applicant's elected design option.

11. **Amp Interruption Capacity (AIC/SCI) Letter.**

An AIC Letter from PG&E provides the maximum fault current (SCI - Short Circuit Current Interrupting [capacity]) available at the applicant's service location. This helps ensure the applicant's electrical equipment—such as circuit breakers and panels—can safely handle electrical faults. Applicants' equipment must be rated to safely interrupt the fault current PG&E provides; otherwise, there's a risk of equipment damage, fire, or injury.

12. To Request an AIC letter, provide the assigned PG&E Job Owner with the:

- Service address
- Meter number
- Service voltage and phase (single or three)
- Main panel size (amps)
- Overhead or underground service
- Distance from meter to transformer/splice box
- Label: either residential or commercial

Applicants may request an AIC letter at any stage of the project—even before the design is finalized. If the design isn't complete, PG&E will use a worst-case scenario based on standard transformer and cable sizes to calculate the SCI value. This ensures the value is safe and conservative.

For the most accurate results, it's best to request the AIC letter after the applicant's design is mostly complete. However, early requests are welcome and can help with planning and equipment selection.

13. **Contract execution and payment.**

Along with the project design, applicants will receive a contract. The contract has the full amount of the project work to be executed via Docusign.

- Contracts must be executed within 90 days of receipt.
- Once executed, the contract is valid for up to 12 months.
- The design is valid for up to 18 months from the date contract is sent to the applicant.

1.13 "At -Risk" Install

1. Applicants must be aware that underground conduits, enclosures, and substructures must not be installed in the ground or building foundations before PG&E issues an approved design for the installation.
2. Unapproved installations are considered "at risk" and the applicant assumes the risk for any work performed without requesting PG&E's advanced approval. No variance requests can be made during this process. Applicants run the risk of rework and are responsible for all costs associated with changes to unapproved work.
3. For applicants to proceed with an "at-risk" install PG&E-Applicant Shared Work (Substructure only), applicants must complete the following per TD-9100P-21, "Applicant Install At-Risk Process" (for access to this document, please see your PG&E Job Owner):
4. Complete steps 1-5 in [Section 1.12, "What Do I Need to Do to Get Service From PG&E \(PG&E's Applicant Process\)?"](#)
 - a. If the job is a gas estimate/design, then perform the following steps:
 - 1) Verify that the construction sketch is not yet approved.
 - 2) Follow the recommended minimum preliminary design requirements for "at-risk" installations.
 - 3) Ensure that the preliminary drawing, crayon drawing, or joint trench (JT) composite drawing includes the following information:
6. **Trench (including JT) cross-section elements:**
 - a. Street details
 - b. Pipe size(s)
 - c. Trench location in relation to Public Right of way, private property or franchise the following items:
 - d. Right-of-way (ROW)
 - e. Property line(s)
 - f. Service points
 - g. Tie-in point(s)
7. For applicants to proceed with an "at-risk" install for Applicant-Performed Work, Applicants must complete the following per TD-9100P-21, "Applicant Install At-Risk Process" (for access to this document, please see your PG&E Job Owner):
 - a. Submit the full application package, including site plans and intent, to the PG&E Job Owner.
 - b. When requested, attend Globals meeting and sign off.

1.13 (continued)

- c. Return signed Globals application to the JO.
 - d. Submit design to JO.
 - e. Applicant Design may need to modify and resubmit designs, as requested.
8. Once approved, the JO will send a letter to the applicant confirming the at-risk installation.
 9. PG&E Inspectors, at their discretion, can deny or allow at-risk installations. PG&E Inspectors also can require pot holing in the foundation and ground or require other inspection methods needed to determine if installation meets the requirements.

1.14 What Happens After the Application and Designs are Ready? Pre-Construction Meetings are Held

1. All Applicant-Performed Work and PG&E-Applicant Shared Work require a pre-construction meeting. The pre-construction meeting is intended to:
 - Introduce key individuals and exchange contact information.
 - Discuss panel location and metering information.
 - Discuss the project timelines.
 - Advise personnel about construction and inspection obligations (See [Subsection 1.15, "When are PG&E Inspections required?"](#)) and clarify roles and responsibilities.
 - Review construction drawings and electric and/or gas service records.
 - Review PG&E design standards and requirements.
 - Verify prequalification "Safety, Quality, and Conduct Assessment (SQCA)" via QR code. See [Section 1.5, "Obtain Interactive Training System \(ITS\) Qualifications for Gas and Electric."](#)
 - Discuss warranty obligations (See [Subsection 1.18, "Warranty Inspections \(as applicable\)"](#) for more details).
 - Confirm if there is a "Facility at Risk letter" by referring to [Subsection 1.13, "At-Risk Install."](#)
 - Confirm Applicant responsibilities for as-built documentation per TD-2051P-10, "Electric Distribution As-Built Procedure" (for access to this document, please see your PG&E Job Owner).

1.14 (continued)

2. The applicant is responsible for scheduling the pre-construction meeting and the PG&E Job Owner is responsible for facilitating this meeting and completing Form TD-4462M-F01, "Pre-Construction Meeting Checklist" (for access to this document, please see your PG&E Job Owner).
 - a. Participants in formal pre-construction meetings must include:
 - Applicant and their representative(s)
 - Applicant's contractor(s)
 - PG&E Job Owner
 - PG&E's gas and electric Inspectors
 - Representatives from all other joint trench utilities (if applicable)
 - Corrosion mechanic, as needed

1.15 When are PG&E Inspections required?

1. For both PG&E Applicant Shared Work and Applicant-Performed Work, applicants are required to schedule PG&E Inspectors during various stages of the construction process. Most common inspections points are detailed in [Table 1-5, "Common Inspections,"](#) on Page 1-20.

1.15 (continued)

Table 1-5. Common Inspections

Commodity	Common Inspections
Gas Work	• After trench is dug • After gas stub completion • Gas fusion • After gas pipe lay-in • Excavation around PG&E facilities (PG&E standby)
Underground Electric Work	• Excavation around PG&E facilities (PG&E standby) • After trench is dug and conduit is laid • For a cable pull or install cable splices¹ • Before pouring concrete for foundation • Camera inspection • For installing any electrical equipment (i.e. pad mount transformer, interrupter, etc.) • For mandrel test • For electric final walk-through
Overhead Electric Work	• Excavation around PG&E facilities (PG&E standby) • After pole and meter panel are installed • For electric final walk-through • For temporary power
¹ Applicants can only schedule a PG&E Inspector for 3 consecutive days. Applicants who request more than 3 consecutive days must have approval from a PG&E Inspection Supervisor per TD-4462M, “Applicant-Installed Facilities Inspection Manual” (for access to this document, please see your PG&E Job Owner).	

To schedule an inspection, fill out form [TD-4462M-F02, “Request for Inspection”](#) and email it to your “Local Inspection Desk” 48 hours in advance of preferred inspection date. To find your “Local Inspection Desk,” visit our [Contact List](#).

1.16 What if I need changes in my design?

1. PG&E may revise its design and construction documents relating to applicant service requirements between updates to this manual.
2. Except when required by Authority Having Jurisdiction (AHJ), PG&E will apply only those construction and design specifications, design standards, terms, and conditions that are applicable to a new extension of service project for the 18 months from the date contract is sent to the applicant.

1.16 (continued)

3. These requirements apply if applicants complete approved projects within 18 months. If the applicant has not initiated construction within 18 months of PG&E's initial approval, PG&E may review the design and, if warranted, refresh the cost estimate.
4. When building projects are divided into separate phases (or tracts) where some of the construction phases will not be completed for more than 18 months from the date the project is approved, PG&E will initiate a review of the design and apply current PG&E construction and design specifications, design standards, forms, and conditions that are applicable to the remaining phases of the project.
5. If the applicant does not fulfill obligations under the extension agreement, PG&E may, at its discretion, cancel the Agreement (see [Form 62-0982, Section 20](#)). PG&E can then request another review of the design before approving construction activities.
6. On applicant design jobs, the version of the design and construction document that is in effect on the date PG&E approves and signs off on the final Globals package determines the requirements that the design must meet. The Globals package is valid for 90 days.
7. To make changes to an approved design, reach out to your PG&E Job Owner. Provide them with a marked-up version of the new design using the existing drawings or plans. This might require updating:
 - Globals
 - Site plans
 - Elevation plans
 - Single line diagrams
 - Switchgear cut sheets and/or loads
8. The PG&E Job Owner submits the materials to PG&E External Estimating team on your behalf. If you receive approval, then the revisions will be completed in about 30 days.

1.17 PG&E Connection and/or Construction

1. If the applicant selected Applicant-Performed Work and PG&E-Applicant Shared Work, then the PG&E Job Owner will confirm when the applicant is "cleared for construction" by the PG&E Inspector. From there, the PG&E Job Owner will schedule a PG&E crew for service connection once the applicant submits approved paperwork from the AHJ.

1.17 (continued)

2. If the applicant selected PG&E-Installed work, then the PG&E Job Owner will schedule a PG&E crew for service connection once the applicant submits approved paperwork from the AHJ.
3. PG&E will only energize or pressurize applicants within 6 months of approval from the AHJ. Anything beyond 6 months will require the applicant to obtain another approval from the AHJ.

1.18 Warranty Inspections (as applicable)

1. If the applicant has elected for Applicant-Performed Work or PG&E-Applicant Shared Work, then as outlined in [Form 79-716, "General Terms & Conditions for Gas and Electric Extension & Service Construction by Applicant,"](#) PG&E reserves the right to inspect facilities regarding a 1-year warranty for equipment and material and 2-year warranty for trenches starting when the meter was set (applicant is energized or pressurized).
 - PG&E will schedule a warranty inspection 30 days prior to the warranty expiration and complete TD-4462M-F10, "Warranty Inspection Log" (for access to this document, please see your PG&E Job Owner) based on findings. If no defect is found, the PG&E Job Owner will issue an "Acceptance of Facility" letter to the applicant.
 - If a defect is identified, the PG&E Job Owner will send a "Basic Warranty" letter to the applicant indicating the warranty obligations. The applicant has 30 days to correct the problem(s). If after 30 days, the corrections were not complete, the PG&E Job Owner will contact the applicant to discuss corrections, which may result in PG&E performing the correction and billing the applicant for the work.

1.19 What are my requirements for clearances around PG&E Facilities?

1. Vegetation Clearance for Underground Facilities



To avoid potential accidents, do not begin to excavate before identifying underground facilities. Call 811 before digging.

- a. **Electric Underground (Distribution and Transmission):** Plant vegetation with a minimum of 5 feet from the electric cables.
- b. **Gas Pipelines (Distribution and Transmission):** Plant large trees at least 14 feet from the edge of the pipeline and choose low-growing lawns and flower beds for the area above the pipeline. See [Right Tree, Right Place Guide to planting safely near gas pipelines](#) for details on which plants are safe near PG&E's gas pipelines.

1.19 (continued)

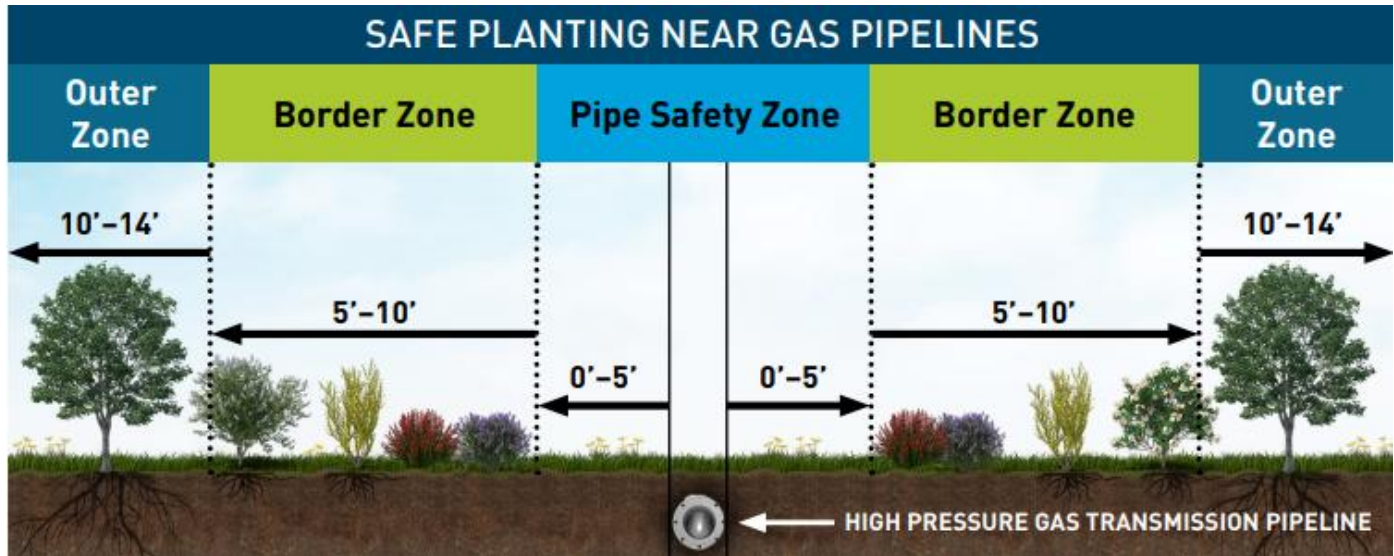


Figure 1-1.
Safe Planting Near Gas Pipelines

- c. **Joint Trench (Electric and Gas):** Follow the guidelines for gas pipelines above.

2. **Vegetation Clearance for Overhead Facilities.**

The state of California requires electric utilities to keep electric lines (i.e., high-voltage lines) clear of vegetation. All newly constructed distribution lines and existing lines must meet these requirements.

NOTE

PG&E may determine that the distribution line should be installed underground, or that trees should be removed, if the planned line extension does not meet or exceed the clearance requirements between existing trees and overhead electric lines.

- a. **Distribution:** Depending on the applicant's location of the work, only certain types of plants may be placed up to 50 feet on either side of the pole. (see figure "Safe Planting Near Overhead Powerlines.")
- b. **Transmission:** Depending on the applicant's location of the work, only certain types of plants may be placed up to 60 feet on either side of the pole. (see figure "Safe Planting Near Overhead Powerlines.")

See [Guide to planting safely near overhead high-voltage powerlines](#) for details on which plants are safe near PG&E's electric overhead lines for distribution and transmission.

1.19 (continued)

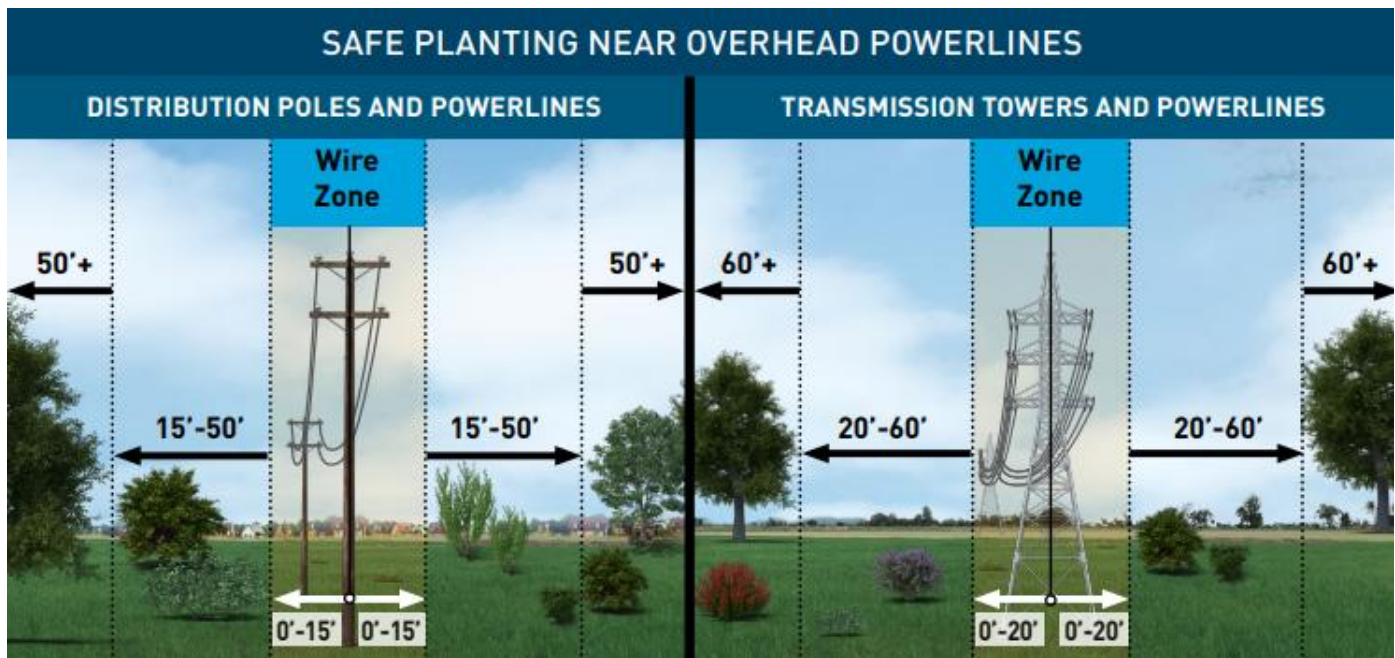


Figure 1-2.
Safe Planting Near Overhead Powerlines

- c. For both distribution and transmission powerlines, do not plant any vegetation within 10 feet of a pole or structure, or 5 feet of a guy wire.
- d. PG&E will not connect new lines to the existing distribution system until the applicant provides 15 feet of adequate clearance from the distribution lines and trees.
 - 1) When planting near overhead electrical service drops, applicants must consider both safety and access to the electric facilities when irrigation pumps and other electrical loads require repair.
- e. Applicants must not plant trees under or adjacent to primary overhead distribution lines. When discovering any new tree plantings, PG&E reserves the right to remove those trees to protect its facilities.
- f. Removing Vegetation Near Existing, High-Voltage, Energized Lines

1.19 (continued)

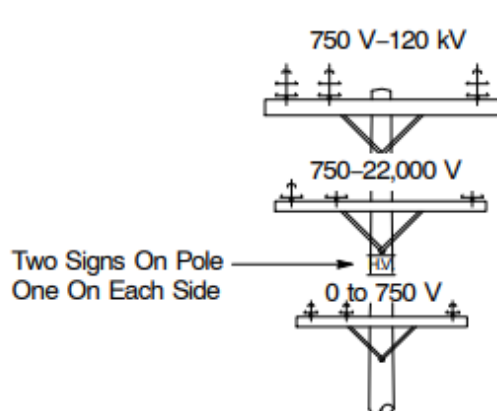


CAUTION

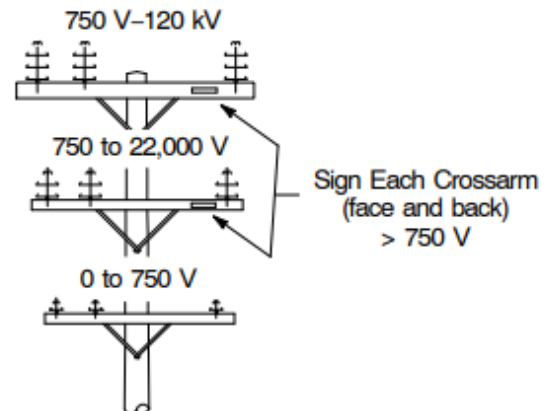
Because safety is the Company's highest priority, the [California Occupational Safety and Health Administration \(Cal/OSHA\)](#) requires that all vehicles, equipment, tools, and people maintain a minimum 10-foot distance from all high-voltage power lines.

For details, see the California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 5, Group 2, "High-Voltage Electrical Safety Orders," [Article 37, Provisions for Preventing Accidents Due to Proximity to Overhead Lines,](#) and [Article 38, "Line Clearance Tree Trimming Operations."](#)

- 1) Applicants or unqualified tree-trimming contractors should never attempt to trim or remove trees that are within 10 feet of high-voltage power lines (i.e., conductors).
- 2) If it is necessary to trim or remove trees located within 10 feet of a high-voltage power line, applicants must notify PG&E at 1-877-295-4949
- 3) Generally, high-voltage power lines are any overhead lines that connect from pole to pole. These lines typically are 600 volts and greater with a posted "HIGH VOLTAGE" sign on the poles and crossarms, as shown in [Figure 1-3, "Signing of Pole,"](#) and [Figure 1-4, "Signing of Wood Crossarms,"](#) respectively.



**Figure 1-3.
Signing of Pole**



**Figure 1-4.
Signing of Wood Crossarms**

- i. However, applicants should contact PG&E for assistance if a line's voltage is unknown and should always assume that lines are high voltage.

1.19 (continued)

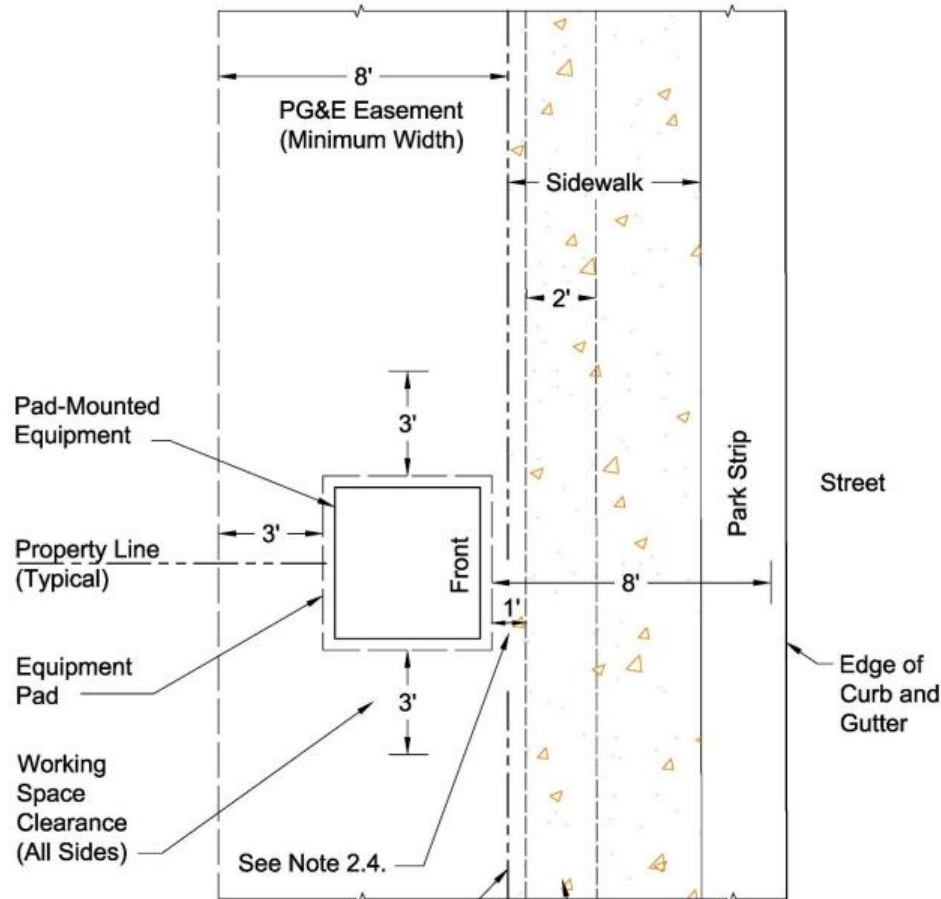
- 4) During PG&E's normal tree-trimming schedule, contractors qualified to perform high-voltage line clearances will prune or remove trees at no cost to applicants to create a safe distance between the vegetation and high-voltage power lines.
- 5) For more information about PG&E's vegetation management requirements, visit [Right Tree, Right Place](#).

1.20 What are Easements and how do they apply to me?

1. An easement is a legal right for PG&E and other utilities to install, access, and maintain its utility infrastructure, like electric and gas lines, on a private property for the benefit of the public. These easements are created through deeds and tract maps, establishing a specific area where PG&E has the right to place and operate its facilities, which a property owner cannot obstruct.
2. Electric Distribution Overhead Easement Requirements.
 - a. For applicants constructing an overhead service, PG&E requires a 10 feet land easement and up to 36 feet overhang easement to allow PG&E the vegetation clearance it needs around the wires.
3. Electric Distribution Underground Easement Requirements.
 - a. For applicants installing distribution underground service, PG&E requires a 10 feet easement.
 - b. The exception to this is for brand new single family residential subdivisions. As an alternative, a minimum 8-foot-wide easement may be allowed only if all the following requirements have been met:
 - i. The trench location must be in the public right of way (franchise) area, located outside of any highway, street, or road, and typically installed under the sidewalk and next to the easement on private property.
 - ii. All PG&E pad-mounted and subsurface equipment (e.g., transformers, enclosures, etc.), excluding the underground cable, must be installed in the designated easement.
 - iii. PG&E gas facilities (trenched or bored) do not utilize the same reduced 8-foot wide easement as electric facilities.
 - iv. Ensure there is a minimum of 1 foot (12 inches) of clearance from the trench to the closest edge of an enclosure or pad. Including the bottom of a box pad, which is wider than the top.
 - v. Only secondary, service, and 200-amp primary distribution local line cables are installed in a trench, under the sidewalk, in the public right of way, with a reduced 8-foot-wide easement.

1.20 (continued)

- vi. Trenches that contain 600-amp primary main line are not installed in or next to an 8-foot-wide easement. This is due to the size of main line equipment.
4. For pad-mounted equipment that only has doors on the front, the preferred orientation is with the 8-feet of working space facing the road. [See Figure 1-5, "Pad-Mounted \(PM\) Equipment – Top View,"](#) below.



**Figure 1-5.
Pad-Mounted (PM) Equipment – Top View**

Figure 1 Pad-Mounted (PM) Equipment - Top View

5. When the preferred orientation of the pad-mounted equipment cannot be achieved, then rotate it 90 degrees, in line with the direction of the easement, and ensure there is a minimum 8 feet of clear working space in front of the equipment.
6. Pad-mounted equipment with doors on the front and back should be rotated 90 degrees, so the front and back of the equipment is in line with the path of the easement, and the doors do not face the road. Ensure a minimum of 8 feet of clear working space is in front of both doors.

1.20 (continued)

7. When the installation of larger equipment (e.g., transformers, switches/interrupters, enclosures, Junctions) and pads are required, an easement extension (i.e., bump-out) must be allocated, as needed. A bump-out off the easement must be attached to, extended outward from the 8-foot easement, and located on private property away from public right of way.
8. If a bump-out (extension), off an easement, is required, ensure the equipment pad or footprint and the working space clearances are accounted for. See [Figure 1-6, "Large Pad-Mounted \(PM\) Equipment - Top View,"](#) below, and [Electric Design Standard 051122, "Clearances and Location Requirements for Enclosures, Pads, and Underground Equipment."](#)

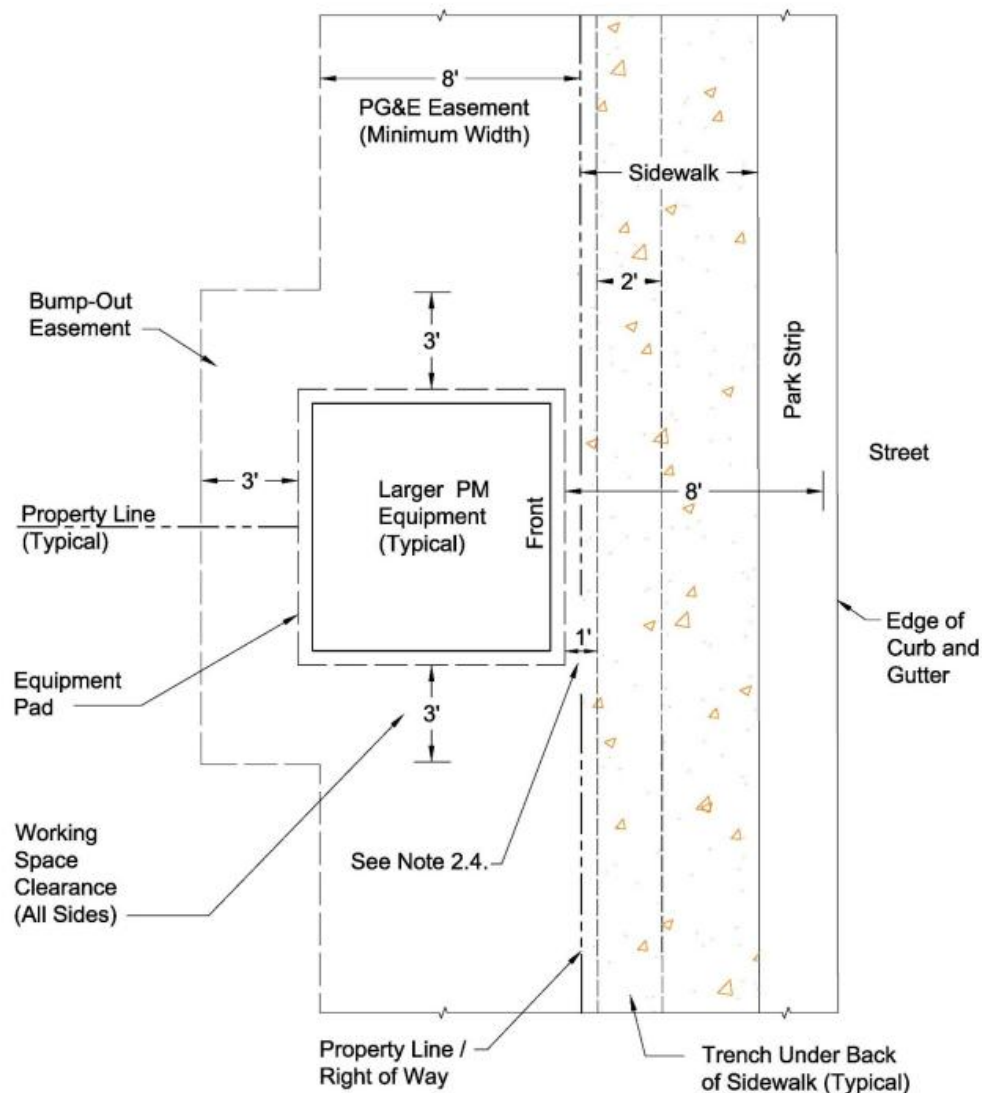


Figure 1-6.
Large Pad-Mounted (PM) Equipment – Top View

1.20 (continued)

9. Electric Transmission Easement Requirements
 - a. PG&E must review and evaluate any proposed land uses or encroachments in PG&E's electric transmission (60kV and above) easements and rights of-way. Applicants request must be submitted to PG&E's Land Department. Unless approved, applicants cannot install anything in the transmission easement.
10. Gas Easement Requirements (Distribution and Transmission).
 - a. For Applicants installing a trench with gas, including joint trench, PG&E requires a minimum 10 feet easement for both mains and services.

1.21 Installing Utility Services to Mobile Homes

1. The term "residential" includes mobile homes installed on foundations in locations other than mobile home parks.
2. PG&E will not serve utility services to mobile homes except under at least 1 of the following circumstances:
 - a. The mobile home is fixed in place (i.e. no running gear or wheels). The mobile home must not be capable of movement.
 - b. The mobile home is installed on a foundation system as describe in State of California, Title 25, "Housing and Community Development," Division 1, "Housing and Community Development," Chapter 2, "Mobile home Parks and Installations," Article 7, "MH-Unit and Commercial Modular Installations and Facilities," Section 1333, "Foundation Systems."
 - c. Serviced by meter pedestals or other PG&E-approved services. The meter facilities must be installed at a fixed location.
3. See [Electric Design Standard 052521, "Electrical Service Requirements for Mobile Home Developments."](#) for electric requirements.
4. See [Gas Design Standard J-12.4, "Mobile Home/Manufactured Home Meter Set Installation"](#) for gas requirements.
5. Applicants must follow all PG&E design standards when providing service to building homes:
 - a. Applicants must not install gas mains, services, and meters under existing or proposed structures including mobile homes, sheds, porches, carports, and stairs.
 - b. Applicants should install the gas distribution mains in the roadway, when it is practical to do so, and in joint trenches, when it is feasible. On private property, ensure that the easements are at least 10 feet wide for mains and at least 5 feet wide for service piping. Only use easements for utility installations.

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2. Gas Service

2.1 Overview

This section of the manual covers general gas service and gas meter-set requirements for residential and nonresidential installations.



WARNING

To avoid potential accidents, do **not** begin to excavate before identifying underground facilities. See [Section 1. "General Information,"](#) of the Greenbook Manual on how to contact 811 for a ticket.

2.2 Requirements for Gas Meters

The following information describes the meter set requirements for gas services.

1. **Delivery Pressure**

The following information describes the types of delivery pressures available with gas service, as outlined in [Gas Rule 2, "Description of Service."](#)

a. **Standard Delivery Pressure**

PG&E typically provides gas service pressure to the service delivery point at 7 inches of water column (WC). This is approximately ¼ per square inch gauge (psig), as measured on the gas meter outlet.

b. **Elevated Delivery Pressure**

PG&E may provide gas service at higher gas-delivery pressures, depending on the location of the applicant's facility and the requirements of the gas system serving that location. PG&E maintains sole authority to determine if the elevated delivery-pressure service is available at a specified location.

In all elevated delivery-pressure service situations, PG&E reserves the right to reduce the gas service pressure to standard delivery pressure, as outlined in [Gas Rule 2, "Description of Service."](#)

2.2 (continued)

NOTE

When providing elevated gas-pressure service, PG&E can incur additional costs. In these cases, special facilities charges will apply as described in [Gas Rule 2, "Description of Service."](#) Applicants must pay these charges **before** PG&E can provide the services.

2. When requesting elevated gas service delivery pressure, applicants must follow these steps:

- a. Fill out the appropriate PG&E [application for service process online form](#) and note the gas-service delivery pressure being requested in the "Load Information" portion of the form.
- b. Provide detailed load information for all appliances and their intended use.
 - **Steps c – e must be completed when the delivery pressure is greater than 2 psig.**
- c. Submit a formal, written letter or email request from customer with justification for elevated gas-service delivery pressure.
- d. Submit a houseline piping schematic.
- e. Submit the manufacturer's equipment specifications, if applicable to ensure that the appliances will operate as designed.

3. Gas Meter-Set Locations

- a. For descriptions of and specific requirements for preferred gas meter locations and clearances, see [Gas Design Standard J-15, "Gas Meter Locations."](#)
- b. For information on SmartMeters, read below:
- c. Additional Meter-Set Requirements—SmartMeter Module Location Requirements.
 - 1) PG&E's SmartMeter Advanced Meter Reading system uses radio frequency (RF) technology to transmit gas meter reads automatically. This allows PG&E's customers to monitor their daily energy use.
 - 2) SmartMeter customers have additional location requirements specific to the meters necessary for PG&E to operate its SmartMeter Advanced Meter Reading system. Applicants must be aware of the following requirements to ensure that the SmartMeter Advanced Meter Reading system can operate properly.

2.2 (continued)

- 3) **Do not** locate the meters in any room, cabinet, enclosure, or configuration that blocks or interferes with the radio frequency signal transmissions. An example of such a prohibited enclosure is a metallic cabinet.
- 4) **Do not** locate the meters in close proximity to (i.e., 6 inches or less) any metallic object that could block or interfere with the radio frequency signal transmission.
- 5) **Do not** install gas meters within 5 feet of building walls and ceilings if they are made from a significant amount of metal or metal reinforcements.

Most SmartMeter gas modules are installed directly on a gas meter. If a gas meter is installed in a cabinet, meter room, below grade, basement garage, or other location where communication problems may exist, PG&E may install a module in a remote location away from the gas meter to ensure proper radio frequency transmissions.

The equipment may be installed on nearby gas pipes, a customer-owned building wall/ceiling, or an outside location. The equipment may need to be attached to the structure or wall to route the wiring.

d. SmartMeter Gas Network Utility Closet Requirements for Indoor Meter Rooms

- 1) [Gas Design Standard J-16 "Gas Meter Room"](#) provides SmartMeter infrastructure installation and construction requirements for customers designing indoor gas meter rooms. It addresses below-grade and multiple above-grade meter room installations such as those that may exist in urban, high-rise environments to ensure PG&E's SmartMeter RF network is established for these customers.
- 2) These provisions are required for commercial and/or residential, with single or multiple indoor meter rooms to ensure SmartMeter gas network communication access and performance.
- 3) A separate SmartMeter gas network utility closet must be constructed for each indoor meter room directly adjacent (with a common or shared wall) to the natural gas meter room. In addition, two 1-1/2 inch conduits are required; one from the SmartMeter gas network utility closet to the outside of the building and one from the SmartMeter gas network utility closet to the indoor gas meter room. See the requirements listed in [Gas Design Standard J-16 "Gas Meter Room."](#)

2.3 Gas Service

1. Gas Service Design Requirements

The gas distribution main is located in an easement adjacent to the applicant being served. A "gas service" is the section of the pipeline that connects the PG&E's gas distribution main to one or more customers. For an example, see TD-9500P-13, Attachment 1 (for access to this document, please see your PG&E Job Owner).

- a. When designing gas service, consider the following:
 - 1) Avoid offsets, diagonal runs, bends, and services installed under driveways or customer-paved areas. **Exceptions require PG&E's advance approval.** When the building or structure is on a corner lot, PG&E determines the gas main for connection. Install and connect the gas service to the gas main in the adjoining street, highway, alley, lane, road, or easement.
 - 2) Do not install gas services under or through retaining structures (e.g., retaining walls) greater than 3 feet above ground. A retaining wall is a structure that retains, or holds back, material (usually earth) and prevents it from sliding or eroding away. Retaining walls are designed to resist the pressure of the material being held back.
 - 3) All plastic gas distribution service pipes and stub completions must be a minimum diameter of 1 inch for all new business installations and customer-requested service relocations.
 - 4) Applicants should install the gas service in joint trenches, when it is feasible to do so. Locate the gas service 5 feet from the face or foundation of any building as described in [Gas Design Standard A-04, "Cover and Clearance Requirements for Transmission Lines, Distribution Mains, and Service Lines."](#)

2. PG&E does not permit the following types of installations:

- a. Installing gas services under or through structures, buildings, foundations, or decks. On an exception basis, PG&E may approve a gas service riser in a gas meter room that meets the requirements in [Design Standard J-16, "Gas Meter Room."](#)
- b. Installing gas service and gas service risers directly into concrete or asphalt pavement materials.
- c. Installing gas service pipes, fittings, risers, and other materials that are not approved by PG&E.

2.3 (continued)

3. Branch Services

- a. **Branching may be used to provide service to no more than two buildings.** The meter installations must be located on adjacent sides of the two buildings being served.
- b. Design and install all branch services as described in [Gas Design Standard A-42, "Standard Branch Service Installation,"](#) and [Gas Design Standard A-90, "Polyethylene Gas Distribution System Design."](#)

4. Multiple Buildings Located on One Lot and Multifamily Residential Complexes

- a. For service installation examples, including multiple buildings located on one lot and multiple services to a single building, see TD-9500P-13, "Gas Service Design." (For access to this document, please see your PG&E Job Owner).
- b. Typically, PG&E installs a single, gas-service pipe to each building, as described in [Gas Rule 16, "Gas Service Extensions."](#)

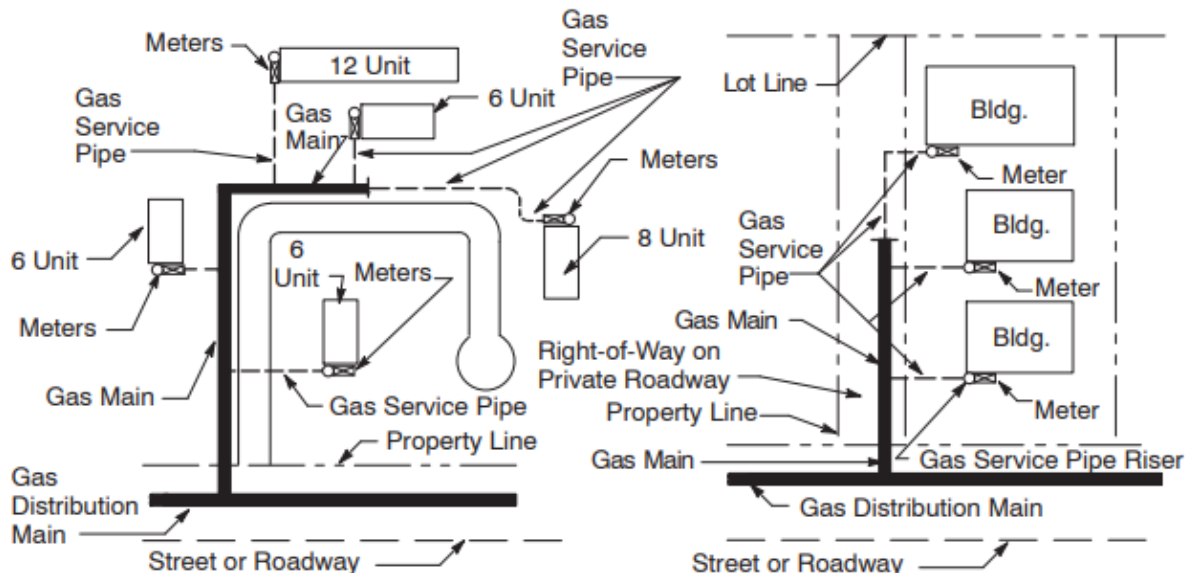


Figure 2-1.
Apartments With Grouped Meter Locations

Figure 2-2.
Individually Metered Buildings

2.3 (continued)

- c. Multifamily residential complexes are subject to a California Public Utilities Commission (CPUC) mandate specifying that each unit is metered individually. Specifically, see [California Code, Public Utilities Code - PUC § 780.5](#) and [Gas Rule 18, "Supply to Separate Premises and Submetering of Gas."](#)
- d. **EXCEPTION:** A single gas meter may serve an entire complex when the gas is used only for central heating systems (i.e., space, water) that supply all tenants in common, and when each individual unit does not use gas appliances that require combustion venting. Refer to [Gas Rule 18, "Supply to Separate Premises and Submetering of Gas."](#)

5. Joint Trench Services

This section describes procedures and key information for joint trenches. For specifications and other detailed information regarding joint trenches, please refer to Gas Design Standard S5453, "Joint Trench" (For access to this document, please see your PG&E Job Owner).

- a. When installing underground electric service, PG&E's gas service is usually installed in a common joint trench with the electric service. The joint trench typically includes telephone and cable television facilities.
- b. Wet utility facilities are not permitted in a joint trench with electric and gas service, meters, and risers.
 - 1) Wet utility piping or facilities include, but are not limited to water, bioswales, storm sewer, sanitary sewer, steam, liquid fuels, oil, diesel, sprinkler, irrigation, spigots, downspouts, drain or leach lines, propane, or lines for other liquids or volatile, heavier-than-air gases.
 - 2) [Gas Design Standard S5453, Exhibit B, "Joint Trench Configurations & Occupancy Guide,"](#) describe the requirements for separating a wet utility from a joint trench.
- c. **Applicants must be aware of the following requirements:**
 - 1) Both a Joint Trench Composite Drawing and Form B, "Job Estimate Authorization for Joint Trench Construction," (For access to this document, please see your PG&E Job Owner) are required when PG&E facilities are located in a trench with other utilities. The joint trench composite drawing must include details of the sizes and quantities, including depth and separation, of all the equipment sharing the trench. **PG&E inspectors must approve the trench after installation is complete.**

2.3 (continued)

- 2) Applicants must submit joint trench drawings to PG&E Job Owner for review, or PG&E can prepare joint trench drawings for applicants at their expense.
 - 3) PG&E must approve the trench's design details **before** trenching begins and facilities are installed. Applicants must discuss the service arrangements and coordinate the final PG&E-approved meter locations and joint trench requirements with PG&E Job Owner. This discussion is typically during the pre-construction meeting with PG&E.
 - 4) [Figure 2-3](#), on Page 2-8, shows the layout of a "Typical Joint-Service Trench."
- d. Separation and clearance details for joint utility service trenches are in [Table 2-1, "Minimum Separation and Clearance Requirements for Trenches,"](#) on Page 2-9. This table is also found in [Electric Design Standard 038193, "Minimum Requirements for The Design and Installation of Electric Conduit, Insulated Cable, and Facilities."](#)
 - e. PG&E does not differentiate between the clearances for casing/conduit and pipe. The clearances and installation requirements are the same.
 - f. For more information on the minimum separation and clearance requirements for service trenches, see the [Gas Design Standard S5453, Exhibit B, "Joint Trench Configurations & Occupancy Guide."](#)
 - g. When installing a joint trench with a gas riser, applicants must ensure that the facilities maintain a minimum horizontal separation of 36 inches from the gas riser where they transition from below ground to above ground. See [Design Standard J-15, "Gas Meter Locations"](#) and [Section 7, "General Metering Information,"](#) for more information.
 - h. Applicants also must ensure that the gas and electric meter locations provide for the minimum separation clearances. Refer to [Section 7, "General Metering Information,"](#) for acceptable electric meter locations.
 - i. When applicants want to install facilities in a joint trench other than those listed in this section, PG&E requires a **written** request that includes a justification for the exception. Applicants must submit their requests to PG&E Job Owner for review and approval **before** beginning work on a joint trench.

2.3 (continued)

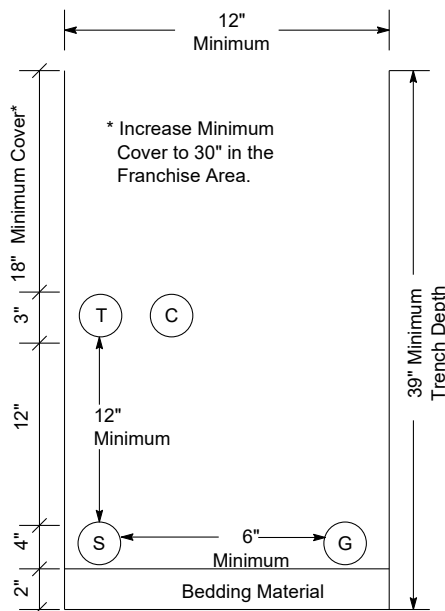


Figure 3 6
Typical Joint Service Trench

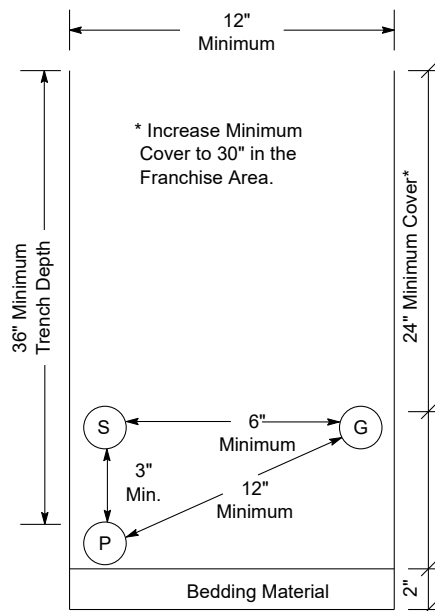


Figure 3 7
PG&E Electric and Gas Service Trench

Figure 2-3. Typical Joint-Service Trench

Notes in reference to [Figure 2-3](#).

1. Trench depth varies depending on the occupant's facility allotment.
2. Soil compaction must meet PG&E's, and any applicable federal, state, county, and local requirements.
2. A joint service trench must meet all separation and clearance dimensions shown in [Table 2-1](#), "Minimum Separation and Clearance Requirements for Trenches," on Page 2-9.
4. For more information on Figure 2-3, see [Design Standard, S5453 Exhibit B, "Joint Trench Configurations & Occupancy Guide"](#).

NOTE

Applicants must ensure that sufficient space below and above ground is always provided between facilities to allow for safe maintenance and operation.

Table 2-1 Minimum Separation and Clearance Requirements for Trenches¹

		G	Duct T	DB T	C	S	P	SL
(In Inches)								
G	Gas	–	12	12	12	6	12	6
T	Telephone (Duct)	12	–	1	1	12	12	12
T	Telephone (Direct Bury)	12	1	–	1	12	12	12
C	CATV	12	1	1	–	12	12	12
S	Electric Secondary	6	12	12	12	1.5	2	1.5
P	Electric Primary	12	12	12	12	2	2	2
SL	Streetlight ²	6	12	12	12	1.5	2	1.5
NE	Foreign Electric Sources, Non-PG&E ³	12	12	12	12	12	12	12

¹ For more information on this table, see [Electric Design Standard 038193, "Minimum Requirements for The Design and Installation of Electric Conduit, Insulated Cable, and Facilities"](#).

² Streetlight circuits **not owned** by PG&E must be installed to meet the requirements in [Gas Design Standard, S5453 Exhibit B, "Joint Trench Configurations & Occupancy Guide"](#). Specifically, applicants must review the requirements for working with a second utility company.

³ Considered a "utility" as defined in Design Standard S5453, "Joint Trench," (For access to this document, please see your PG&E Job Owner)

6. Gas-only trenches

- When independently installing gas facilities (not in a joint trench), follow the trench design in [Gas Design Standard A-03, "Gas Trench Design and Construction"](#) and the cover and clearance requirements of [Gas Design Standard A-04, "Cover and Clearance Requirements for Transmission Lines, Distribution Mains, and Service Lines"](#).
- PG&E must approve the trench's design details before trenching begins and facilities are installed. Applicants must discuss the service arrangements and coordinate the final PG&E-approved meter locations and trench requirements with PG&E. This discussion is typically during the pre-construction meeting with PG&E.
- The trench drawings submitted for approval must include the size and clearance from any other new or planned underground facilities or structures.

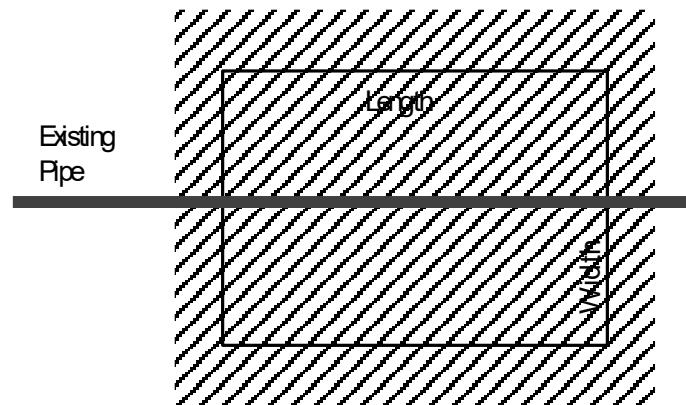
7. Installing gas pipeline and backfill

This section provides references for installing a gas pipe in a casing or in an open trench. For gas installations with cross bores or installing a gas pipe by trenchless construction, please refer to [Section 3, "Underground Electric Service,"](#) Subsection 2.2, "Performing Approved Boring Techniques."

2.3 (continued)

- a. Gas pipe in a casing:
 - 1) PG&E must approve all requests for gas service in a casing before installation. Provide and install an approved casing (i.e., sleeve) under the paving material when the paving will extend over the gas service. Refer to [Gas Design Standard A-75, "Gas Service and Mains in Plastic Casing"](#) for requirements.
 - 2) Applicants must ensure that PG&E employees and equipment have sufficient, safe, and unobstructed access to the casing location with sufficient space to perform any required work.
 - 3) Before installing any type of pavement or concrete, place a minimum 3-inch sleeve around the gas service riser.
- b. Installing a gas pipe in an open trench (both joint trench and gas-only trenches), the requirements listed below (c through i) applies.
- c. Underground warning tape is required for all gas service and main pipeline installations as described in [Gas Design Standard L-16, "Gas Pipeline Underground Warning Tape"](#).
- d. [Figure 2-4, "Typical Gas Bell Hole-Plan View,"](#) and [Figure 2-5, "Typical Bell Hole Depth-Profile View,"](#) show the typical, PG&E-required excavation for a gas bell hole.
- e. Trench shoring may be required per Cal/OSHA requirements. Additional shoring may be required per TD-4621M, "Excavation Safety Manual" for PG&E inspectors or PG&E crew performing tie-in (for access to this document, please see your PG&E Job Owner).
- f. Ensure required shoring is in place before PG&E crew arrives to perform tie-in to limit delays to work.
- g. Adhere to service trench requirements in Section 2.3.5, "Joint Trench Services" or Section 2.3.6, "Gas-only trenches."
- h. For more information on backfill-sand requirements, see [Engineering Material Specification EMS-4123, "Backfill Sand."](#)
- i. Slurry cement or controlled low strength material (CLSM) must not be used as a shading material. Do not allow cement additives such as calcium oxide (quicklime) to come into contact with PG&E pipe, tubing, or fittings. See [Gas Design Standard A-03, "Gas Trench Design and Construction,"](#) for additional details.

2.3 (continued)



(4' Lengthx4' Width, Plastic Pipe)
 (5' Lengthx4' Width, Steel Pipe)

Figure 2-4.
Typical Gas Bell Hole-Plan View

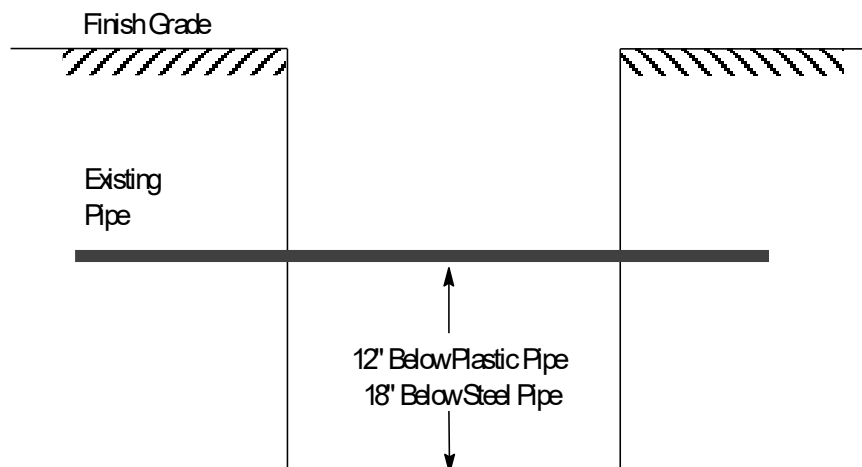


Figure 2-5.
Typical Bell Hole Depth Profile View

Notes in reference to [Figure 2-4](#), and [Figure 2-5](#).

1. All dimensions are the minimum required amounts and PG&E may increase dimensions on a case-by-case basis.

2.4 Applicant-Owned and Installed Gas Service Piping (e.g., Houseline), Valves, and Automatic Shut-Off Devices

1. The applicant is responsible for maintaining the applicant-installed and owned gas service piping, valves, automatic shut-off devices such as earthquake valves, or other piping components on any premises or in any building. These applicant-owned components must be installed downstream of (i.e., after) the gas supply service delivery point. If the applicant's equipment is installed upstream of the gas supply service delivery point, PG&E reserves the right to suspend service until applicant-owned equipment is removed from PG&E meter-set assemblies.
2. Applicants must ensure that after their equipment is installed, the equipment **does not** obstruct the operation or serviceability of PG&E's piping, metering, and pressure-regulating equipment.
3. The houseline at the service delivery point is typically located after the PG&E service tee for residential services, as shown in [Gas Design Standard J-15, "Gas Meter Locations"](#). For residential service, the houseline stub-out must be a minimum of 3/4-inch steel rigid pipe with male national pipe tapered (NPT) threads, adequately supported. Larger gas loads or commercial meter sets may require a flanged connection.

4. Electrically Bonding and Grounding Gas Pipe

Refer to [Gas Design Standard J-15, "Gas Meter Locations"](#) and for electrical clearance restrictions around the meter set.

5. Applicant-Owned Protective Equipment

PG&E's gas metering equipment can be affected adversely when an applicant's equipment causes:

- Pulsations in the gas flow
- Sudden changes in flow rate
- A backflow condition

Applicants must install, at their expense, any equipment necessary to mitigate or eliminate these detrimental effects. PG&E must review and approve these installations before initiating gas service.

Applicants must add any necessary protective equipment when their operations change and those changes could create any of the three adverse conditions described in the bulleted list above.

2.4 (continued)

PG&E may terminate service and refuse to restore that service to any applicant who continues to operate without the proper protective equipment after receiving notification from PG&E per [Gas Rule 11](#).

Applicants are responsible for damages made to PG&E equipment for not installing the proper protective equipment.

6. Back-Pressure Protection

For customers with compression equipment, PG&E typically requires the applicant to install a check valve downstream of the PG&E gas meters set point of connection. This check valve prevents backflow. PG&E determines the need for check valves on a case-by-case basis. The applicant is required to have a maintenance plan and maintain the check valve.

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3. Underground Electric Service

3.1 Underground Overview

1. This section guides applicants on how to connect to PG&E's underground electric distribution system.
2. Residential applicant types include, but are not limited to, single-family residential homes, multi-family homes, townhomes, and Homeowner's Association (HOA) residential homes. For mobile homes, see [Section 1, "General Information," Subsection 1.21, "Installing Utility Service to Mobile Home Parks."](#) [Electric Design Standard 063927, "Methods and Requirements for Installing Residential Underground Electric services 0–600 V to Customer-Owned Facilities"](#) details the different requirements for panels ranging from 100 to 600 amperes (amps).
3. Commercial (nonresidential) types include, but are not limited to, multi-family residential homes (i.e., condos and apartment buildings), retail centers (i.e., strip malls and malls), businesses, office buildings, warehouses, research facilities, education facilities, and telecom infrastructure. [Electric Design Standard 063928, "Methods and Requirements for Installing Non-Residential Underground Electric Services 0–600 Volts to Customer-Owned Facilities"](#) details the different requirements for panels rating from 100 to 4000 amps. For primary services, refer to [Electric Design Standard 094676, "Primary Electric Service Requirements."](#)
4. Agricultural types include, but are not limited to, farming, agri-business, and new irrigation systems. [Electric Design Standard 054619, "Agricultural Underground Service 500 Hp or Less"](#) details different requirements for panels rating from 100 to 600 amps.

3.2 Safety Reminder



WARNING

To avoid potential accidents, do **not** begin excavating before identifying underground facilities. See [Section 1](#) of the Greenbook Manual on how to contact 811 for a USA ticket.



CAUTION

Flame resistant (FR) clothing is required while working on, near, or observing others working on any PG&E facility. See [Section 1](#) of the Greenbook Manual for FR clothing requirements.

3.3 Standard Electric Service Voltage and Load Limitations

1. This section clarifies PG&E's voltage requirements when applicants design services for single-family residential homes, duplex homes, town homes, condominiums, apartment buildings, or commercial (nonresidential) buildings.

3.3 (continued)

2. Single-Phase Service

- a. Unless an applicant qualifies for a three-phase service, the service voltage for a residential building or structure is typically 120/240 V, single-phase, where the size of any single motor does not exceed 7.5 horsepower.
- b. For any single-phase service, the maximum demand, as determined by PG&E, is limited to the capability of a 100-kVA transformer. If the load requires a transformer installation larger than 100 kVA, the service will be three-phase.
- c. PG&E will **not** supply 120/208 V, single-phase service to residential structures or buildings unless **both** of the following conditions are met:
 - 1) A 120/208 V secondary system is established near the requested service location.
 - 2) The rating of the disconnecting means of the service entrance (i.e., the main switch or main disconnect) does not exceed 225 amps.

3. Three-Phase Service

- a. If PG&E determines that an underground service for a **single** residential or nonresidential building or structure justifies either a 75-kVA transformer at 120/208 V or a 10 horsepower or larger motor at 120/240 V, then installing three-phase service is an **option** for the applicant. Applicants requesting the three-phase option must provide space on the property for PG&E to install a dedicated transformer.
- b. If PG&E determines the electric service demand is greater than that which can be supplied by a single-phase, 100-kVA transformer, then PG&E **must** supply three-phase service. Other load limitations and requirements used to determine qualification for three-phase service are contained in PG&E's [Electric Rule 2](#). The appropriate voltage depends on the minimum load requirements and the maximum demand load permitted.
- c. Three-phase service is available in 208Y/120, 240/120, or 480Y/277 voltages.

4. Mixed-Use Projects

- a. Mixed-use projects include both residential and non-residential loads. When designing a mixed-use project where the usage types are in separate buildings, ensure that each building is supplied by a separate transformer. A single-phase transformer supplies the residential unit(s) and a three-phase transformer supplies the nonresidential unit(s).

3.3 (continued)

- b. If mixed-use occurs in the same building, a single transformer is typically installed to supply the building. **The size and selection of the transformer is based solely on PG&E's estimated demand load.** The applicant must provide space on the property for PG&E to install a dedicated transformer.
- c. In some cases where mixed-use occurs in the same building, PG&E may determine that the residential and non-residential loads be supplied by separate transformers and service facilities, including meters and metering facilities. PG&E makes this determination based on the nature or anticipated operation of the nonresidential loads and how they may affect the services. The applicant must provide space for those service facilities on the property.

3.4 Installing Transformers

1. PG&E will specify the type of transformer installations to be constructed on applicants' premises. Applicants may contact their local PG&E Job Owner to obtain specific transformer requirements for their projects.
2. PG&E's standard transformer installations are described below:
 - For residential, commercial, and industrial services: A pad-mounted transformer is required when PG&E determines that the applicant's load requires a 75 kVA or greater transformer.
 - For agricultural services: When requested by applicant or required by applicant's load, a pad-mounted transformer installation is allowed.
3. As described in [Electric Rule 15, "Distribution Line Extensions,"](#) and [Electric Rule 16, "Service Extensions,"](#) requests for the installation of a subsurface transformer are not allowed when it is feasible to install a pad-mounted transformer.

NOTE

Due to safety and reliability standards, PG&E does not allow applicants to install water sprinklers to cool off the transformers.

3.5 "Like-for-Like" vs. Upgrading Electric Facilities

1. Applicants may replace "Like-for-Like" or upgrade electric facilities (i.e. meter panel, switchboard and termination enclosure). See [Table 3-1, "Difference between "Like-for-Like" Replacement vs. Upgrading Electric Facilities."](#)

3.5 (continued)

NOTE

Replacing a main or load breaker in an existing panel is not considered a panel replacement.

2. For existing electric meter panels that are fed from an underground service, regardless of whether there is a change in ampacity rating, the new meter panel must have an isolated cable termination compartment that is separate from the meter socket compartment. New panels without an isolated termination compartment are not allowed. See [Section 7](#), "Figure 7-23, "Typical Underground Service-Termination Enclosure, Combination Meter-Socket Panel (Residential, 0 Amps-225 Amps)," on Page 7-44.
3. At PG&E's discretion, new meter panel installations will not be energized if they do not meet PG&E requirements.

Table 3-1. Difference between "Like-for-Like" Replacement vs. Upgrading Electric Facilities

	Like-for-Like Replacement	Upgrade
Definition	Replacing equipment with same ampacity rating and in same location ^{1,2}	Replacing equipment with an increase in ampacity rating (e.g., 100A to 200A) ³
Clearance to Gas/Water/Obstructions	Must not reduce existing clearances; prohibited if over/near gas meter ³	Must meet all current clearance requirements ³
Service Conductor Compatibility	Must allow existing PG&E conductors to terminate direct to new panel lugs or studs ⁴	New conductors may be required; applicant is responsible for cost ⁵
Meter Panel Shape, Layout, Dimensions, and Number of Sockets	Must match existing ⁶	Can differ from existing; must meet upgrade requirements
Greenbook Compliance	May not need full compliance unless safety, existing clearances, working space, or the panel accessibility is compromised ²	Must meet all current Greenbook requirements ²
Example	200A panel → 200A panel replacement; same location	200A panel → 400A upgrade; new location or layout

¹Meter panels are **not** allowed to be replaced in the same location when structures (e.g., decks, remodeled buildings, planters) are built over, under, or around the existing meter panel.

²See [Subsection 3.5.4. "Relocating Electric Facilities"](#) below if the location of electric facilities changes.

³Residential applicants may replace "Like-for-Like" or upgrade their electric meter panel up to 200A in same location when the edge of the existing electric meter panel is within 36" of the gas riser. See [Section 7](#) for more details and requirements.

⁴Wall-mounted junction boxes, underground splice boxes, or splicing on additional cable is prohibited. If PG&E needs to install a new service conductor or cables to perform the reconnect, the labor and materials are at applicant's cost.

⁵Costs may include, but not limited to, trenching, substructure, and conductor costs when upgrading electrical facilities with an existing underground service or requesting for new underground service.

⁶Regardless of whether there is a change in ampacity rating, if the new meter panel does not match the existing meter panel in shape, layout, dimensions, and number of sockets, the panel replacement will be considered an upgrade and must meet upgrade requirements.

3.5 (continued)

4. Relocating Electric Facilities

- a. When existing electric facilities are relocated, applicants must meet all the current Greenbook requirements. If PG&E's existing service conductor can be used, as determined by PG&E, the panel must be positioned so the service conductor can be reconnected properly. The existing service conductor must be reconnected to the underground electric panel termination lugs.
 - b. If the existing service conductor will not reach the new panel location, then complete service replacement is required, and the applicant is responsible for all costs. PG&E does not accept cable-termination techniques using pin adapters, cable ringing or splicing an additional cable.
 - c. Applicants are permitted to install a wall-mounted junction box enclosure in the original panel location, up to 200 amps. This allows applicants to connect additional load side wires that run to the new electric meter panel location under the following criteria:
 - 1) The wall-mounted junction box enclosure, used only for load side conductors and connections must be certified to applicable standards by the Underwriters Laboratory (UL) or other Nationally Recognized Testing Laboratories (NRTLs), rated for NEC Class I, Division 2 locations, and approved by the local AHJ.
 - 2) The conduit and connectors running from the new electric panel to the wall-mounted junction box enclosure must be metallic and rated for NEC Class I, Division 2 locations.
 - 3) Switches, circuit breakers, electronic components, or any other type of electrical devices are **not** allowed to be inside the junction box enclosure or above the gas meter.
5. [Figure 3-1, "Location of Electric Service – Termination and Meter Facilities"](#) outlines examples of preferred and permitted panel location options for applicants.

3.5 (continued)

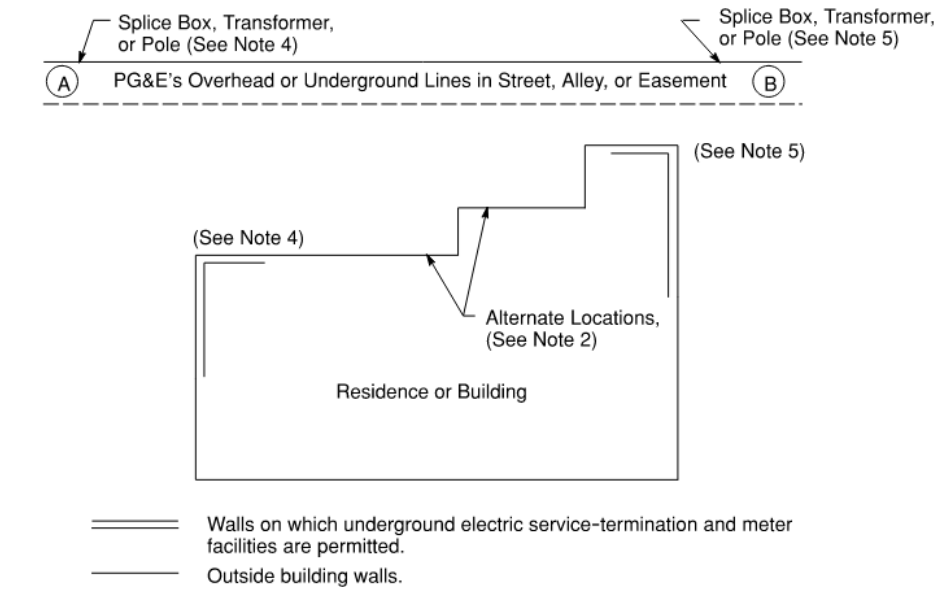


Figure 3-1.
Location of Electric Service-Termination and Meter Facilities

Notes in reference to [Figure 3-1](#).

1. If it is practical, attach the electric service-termination facility and the meter to the wall at a preferred location. Locate the facilities as close to PG&E's service facilities as possible to avoid future operation and maintenance restrictions.
2. PG&E must approve all service locations before they are constructed.
3. Whenever possible, the service-termination facility and meter should be where the meter can be read and serviced without entering a fenced or enclosed location. Applicants must consult local PG&E Job Owner for meter locations.
4. Point A provides examples of permitted locations for electric service-termination and meters.
5. Point B provides permitted locations for electric service-termination and meter facilities.

3.5 (continued)

6. Remote Electric Meter Panel Location

- a. If PG&E allows an electric meter panel to be installed at a remote location (i.e., not attached to, or in, a building or structure), then the panel must be mounted to a permanent wood post or to an outdoor panel board.
- b. Residential panels up to 225 Amps are allowed to be mounted to a permanent wood post. See [Electric Design Standard 054712, "Permanent Wood Post Installation Underground Electric Service"](#) for permanent wood post specifications and requirements.
- c. Commercial panels and residential panels that are 320 Amps and larger must be mounted to an outdoor panel board. See [Electric Design Standard 065374, "Overhead and Underground Panel Board Construction"](#) for panel board specifications and requirements.

3.6 Services for Two or More Buildings on One Lot

1. If more than two dwellings or buildings (e.g. primary home and accessory dwelling units [ADU]) are located on the same lot, applicants must consult their local PG&E Job Owner to determine the acceptable service-termination locations and meter locations before wiring the buildings.
2. PG&E normally provides one service per enterprise, premise or parcel. However, PG&E may provide more than one service under the following conditions:
 - Where it is allowed or required by PG&E's tariff schedules. See [Electric Rule 16, "Service Extensions."](#)
 - At the option of and as determined by PG&E, for its operating convenience.
 - Where it is required by law or local ordinance, for such things as fire pumps, fire alarm systems, etc.
 - When it is installed as special or added facilities in [Electric Rule 2, "Special Facilities"](#), and [Electric Rule 16, "Service Extensions"](#).
3. Requests for additional services (more than two) are considered exceptions and must be approved by the PG&E Tariff department.

3.7 Installing Services from Underground Distribution Systems

1. PG&E serves applicants from an underground service if the site or lot is in an area that is supplied from an existing underground distribution system. PG&E provides underground-to-underground service along the shortest, most practical and available route to the applicant's service-termination facility. PG&E connects the service lateral conductors to the applicant's termination facilities.
2. Typically, the termination facility is on or within the building or structure, as shown in [Figure 3-2, "Underground-to-Underground Service Connection"](#) on Page 3-8.
3. Substructures include conduit, boxes, and transformer pads. Applicants must follow PG&E standards and specifications, including those specified in [Electric Rule 16](#).

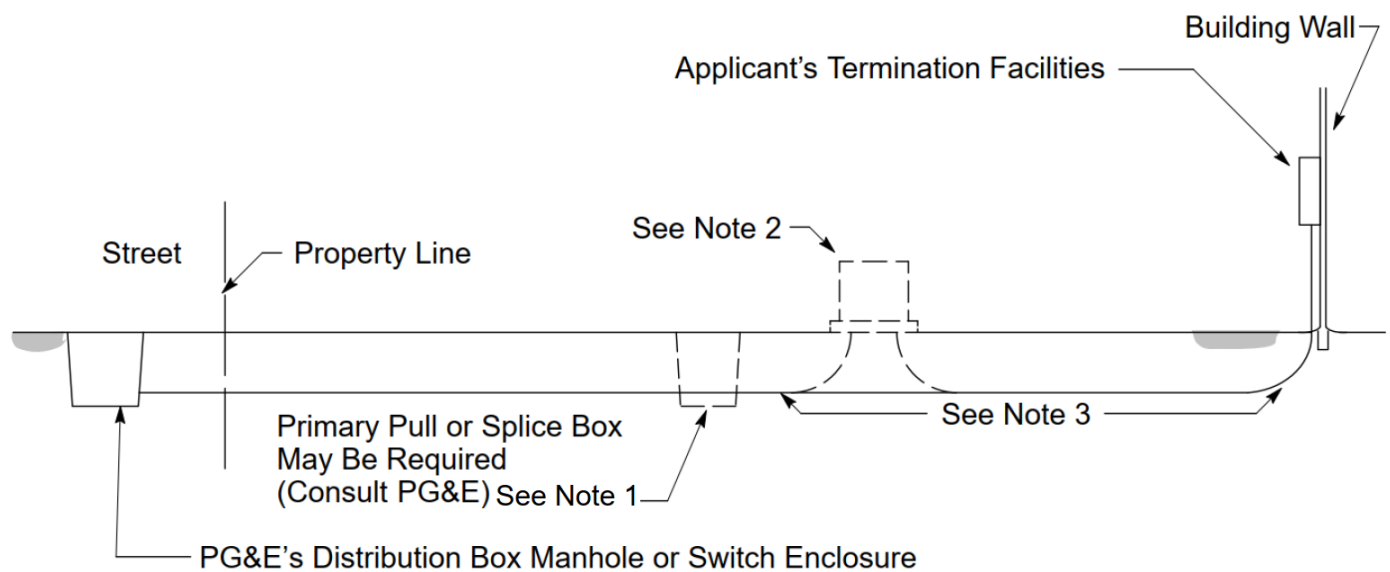


Figure 3-2.
Underground to Underground Service Connection

Notes in reference to [Figure 3-2](#).

1. When the service delivery voltage is the same as the available, primary distribution voltage (i.e., over 2,000 volts), the applicant provides a primary splice box according to PG&E's requirements.
2. Refer to [Section 1, "General Information,"](#) for PG&E and Applicant design and construction responsibilities.
3. PG&E-owned primary and/or secondary conductors.

3.8 Installing Underground Services from Overhead Distribution Systems

1. PG&E provides service from an underground riser that is installed on an existing pole, as shown in [Figure 3-3, "Overhead-to-Underground Service Connection"](#) on Page 3-9 if any of the following requirements are met:
 - The applicant is in an area served by an overhead system and the applicant prefers to have the service installed underground.

3.8 (continued)

- The applicant's load requires a 75 kVA transformer or larger.
 - A local city or county ordinance requires underground service.
2. PG&E allows only one electric underground riser on a pole. Multiple services can be fed from the same riser, but a secondary distribution enclosure should be installed. This secondary enclosure is typically near the base of the pole and is at the applicant's own expense, per [Electric Rule 15](#).
 3. Residential and nonresidential applicants with 200 Amps or smaller electric meter panels may convert their existing overhead service to underground. See [Electric Design Standard 061032, "Residential and Small Commercial Overhead to Underground Electric Service Conversion"](#) for detailed information and requirements. Applicants requesting overhead-to-underground conversions with electric meter panels sizes larger than 200 Amps must consult their local PG&E Job Owner.

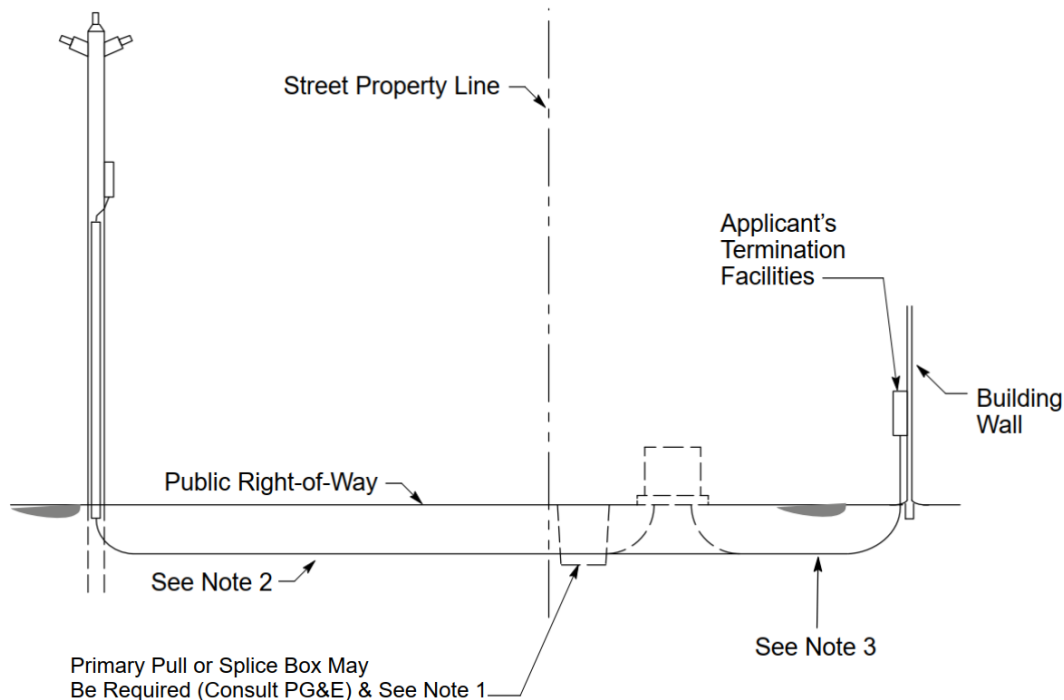


Figure 3-3.
Overhead-to-Underground Service Connection

Notes in reference to [Figure 3-3](#).

1. When the service delivery voltage is the same as the available, primary distribution voltage (i.e., over 2,000 volts), typically the applicant provides a primary splice box according to PG&E's requirements.
2. Refer to [Section 1, "General Information"](#) for PG&E and Applicant design and construction responsibilities.
3. PG&E-owned service lateral conductors.

3.9 Trench and Conduit Installation Requirements

Applicants may trench and install conduit if they have selected either Applicant-Performed or PG&E-Applicant Share work during the application process and are a qualified Applicant Installer. Applicants must ensure the trench and conduit installation is inspected and approved by a PG&E inspector. Trench work buried without approval by a PG&E inspector will be re-opened by applicant.

1. Trenches

- a. Applicants should contact their local PG&E Job Owner in the development stages of their projects for additional details and requirements about using joint trenches. Joint trench is defined as a joint occupancy of PG&E electric and gas service facilities with another utility (i.e. phone, cable, and streetlight) in the same trench. For General Joint Trench requirements, refer to:
 - [Section 2, "Gas Service"](#)
 - [Gas Design Standard S5453, Exhibit B, "Joint Trench Configurations & Occupancy Guide"](#)
- b. If projects require Horizontal Direction Drilling (HDD), applicants or their contractors must contact PG&E during the early design development stage and before work begins. The documents below outline the construction processes that applicants must follow to comply:
 - TD-4135M, "Horizontal Directional Drilling Manual" (for access to this document, please see your PG&E Job Owner)
 - TD-4632P-01, "Gas and Electric Operations-Cross Bore Prevention and Mitigation," (for access to this document, please see your PG&E Job Owner)
 - [Electric Design Standard 038193, "Minimum Requirements for the Design and Installation of Conduit and Insulated Cable"](#)
 - Electric Design Standard TD-038193-B004, "Revised Requirements for Electric Conduits Installed Using Horizontal Directional Drilling (HDD)" (for access to this document, please see your PG&E Job Owner)
- c. When Applicants are responsible for HDD construction, they must take steps to prevent, inspect, identify, report, and address any cross bores that are created during the HDD process.

3.9 (continued)

- d. Electric and gas construction work performed either by or for PG&E is subject to these rules, including PG&E civil work, PG&E-Applicant Shared, or Applicant-Performed work. Find additional information about cross bores at [Sewer Cleaning Safety](#).
- e. Applicants may install PG&E-only service trenches containing only PG&E electric service facilities or PG&E electric and gas service facilities and must ensure they are covered, as required, when those trenches are located on:
 - Private property
 - Designated sidewalks
 - Parkways
 - Driveways
- f. The term "cover" refers to the standard distance between the outer surface of an underground facility and the final grade level. **The actual trench depth must be greater than the cover depth.** Applicants must ensure that the trench depth is sufficient to meet the minimum depth requirements when taking into consideration the following conditions:
 - The required depth of cover
 - The size of the conduit that is being installed (e.g., 3-inch, 4-inch)
 - The necessary bedding materials
 - The size of the electric conduit bends (e.g., 24-inch or 36-inch bends)
- g. Applicants must receive pre-approval from the PG&E inspector when requesting an exception to the minimum-depth requirements. Applicants should contact their local PG&E Job Owner with questions about trench depth.
- h. Applicants should be aware that wet utilities must always be separated from the electric and gas service trench, meters, and risers. Wet utility piping or facilities include, but are not limited to, water, bioswales, storm sewer, sanitary sewer, steam, liquid fuels, oil, diesel, sprinkler, irrigation, spigots, downspouts, drain or leach lines, propane, or lines for other liquids or volatile, heavier-than-air gases.

3.9 (continued)

- i. Refer to the following Electric Design Standards for specific requirements around minimum cover for secondary and primary service conduits:
 - [Electric Design Standard 038193, "Minimum Requirements for the Design and Installation of Conduit and Insulated Cable"](#)
 - [Electric Design Standard 062288, "Underground Conduits"](#)
 - [Electric Design Standard 063927, "Methods and Requirements for Installing Residential Underground Electric services 0–600 V to Customer-Owned Facilities"](#)
 - [Electric Design Standard 063928, "Methods and Requirements for Installing Non-Residential Underground Electric Services 0–600 Volts to Customer-Owned Facilities"](#)
- j. All electric service and secondary conduit must enter PG&E splice boxes or enclosures from the bottom for new construction and not through the boxes' conduit knockouts. If the top of the conduit is not at or below the required minimum conduit depths, the applicant needs to increase the installed depth of the conduit at those locations.
- k. PG&E may require the applicant to provide other means of protecting the service conduits (e.g. cement-slurry cap) in certain circumstances such as, but not limited to:
 - Increased traffic loading
 - Soil erosion
 - Open ditches
 - Where digging machinery or equipment may be used
- l. This increased protection may be required in areas where similar situations exist already or are anticipated.

NOTE

PG&E may require applicants to install conduit one size larger than the required minimum to account for conduit percent fill, for future upgrades, or in circumstances where larger cable is required.

3.9 (continued)

NOTE

PG&E will **not** install its supply cables in conduit that runs beneath any building or structure to serve a different building or structure.

2. Conduits

- a. PG&E requires applicants to install a conduit system for underground service laterals. The conduit system includes conduits, conduit bends, conduit fittings or couplings, and all related components (e.g. end bells and cable protectors). The PG&E design standards and [Table 3-2, "Conduit Requirements"](#) on Page 3-14 below provide details on conduit system requirements:

- [Electric Design Standard 038193, "Minimum Requirements for the Design and Installation of Conduit and Insulated Cable"](#)
- [Electric Design Standard 062288, "Underground Conduits"](#)
- [Electric Design Standard 063927, "Methods and Requirements for Installing Residential Underground Electric services 0–600 V to Customer-Owned Facilities"](#)
- [Electric Design Standard 063928, "Methods and Requirements for Installing Non-Residential Underground Electric Services 0–600 Volts to Customer-Owned Facilities"](#)

NOTE

Substructure installed by applicant prior to issuance of PG&E's approved design is considered an "At-Risk" installation. See [Section 1](#), Subsection 1.13 "At Risk" Install" for more details.

3.9 (continued)

Table 3-2. Conduit Requirements

Category	Requirement
Trench Depth ¹	Preferred maximum depth from final grade to the bottom of the trench is 60 inches. Depth may go up to 120 inches to pass under large utility pipes or drains, then return to proper depth.
Pull Tape Requirements ²	Use polyester standard pull-tape (Code M560154) for cable pulling. Must be securely attached to conduit plugs or caps. If conduit will be vacant for 30+ days, use detectable pull-tape (Code M602679) for future identification.
Conduit Cleanliness ^{2,3}	Conduit must be proven free of dirt, rocks, or obstructions by passing a mandrel test.
Conduit Ends ⁴	To avoid cable insulation damage, the conduit ends must be fitted with caps, plugs, or end bells.
Service Riser Conduit ⁵	Applicant to furnish and install. Must be vertically straight and cannot contain any couplings, offsets, or bends.
Applicant Designed Electric Room Inside a Building	Electric room must use an outside wall as one of its walls. The conduits must not extend more than 20 feet past the outside wall into the room and must terminate inside the room.

¹See [Electric Design Standard 038193, "Minimum Requirements for the Design and Installation of Electric Conduits, Insulated Cable, and Facilities](#), Note 1.

²See [Electric Design Standard 062288, "Underground Conduits](#)", General Information Note 11, Note 12 and Note 13.

³See [Section 3.11, "Mandrels and Proving the Conduit System"](#) for more details.

⁴See [Electric Design Standard 063928, "Methods and Requirements for Installing Non-Residential Underground Electric Services 0–600 Volts to Customer-Owned Facilities](#)", Customer Requirements Note 5.

⁵The service riser conduit connects from the conduit bend out of the ground and into the electric meter panel or service termination enclosure.

b. Replacing Non-Standard Underground Services

- 1) When applicants are relocating or upgrading their electric meter panels and have existing, non-standard Cable-in-Conduit (CIC) or Direct Buried (DB) cable, it must be replaced with new PG&E service cable installed in approved service conduit. The new service and conduit run must extend from the new electric panel or termination enclosure location back to the distribution splice box or transformer.

3.9 (continued)

- c. Certain exceptions may apply for upgraded electric panels. See [Section 7, "General Metering Information,"](#) for exceptions.
- d. **Do not** install a splice box along the path of the existing cable between the PG&E secondary distribution system and the panel or termination location (e.g. to shorten the length of the new service and conduit). Installing boxes along the new service run near the meter panel to prevent the accumulation of excess water in the service conduit system is an allowed exception.

3. Providing Drainage from the Conduit System

- a. Water can enter the cable and conduit system and migrate into the meter panel and/or building if the source side of the service facilities (e.g. secondary splice box) is at an elevation greater than the meter termination facilities.
- b. The applicant must provide a means to discharge any excess water or water pressure from the conduit system. The most common method for discharging water from the conduit is installing an enclosure or splice box outside near the base of the riser to the meter panel. Alternate locations for the drain box may be suggested by the PG&E Inspector or PG&E Job Owner. Any other methods of discharging water will require PG&E's approval **before** construction begins.
- c. For drain box requirements and specifications, see [Electric Design Standard 063927, "Methods and Requirements for Installing Residential Underground Electric Services 0-600 V to Customer-Owned Facilities"](#), Note 17D and [Electric Design Standard 063928, "Methods and Requirements for Installing Non-Residential Underground Electric Services 0-600 Volts to Customer-Owned Facilities"](#), Note 13E.
- d. For indoor electric meter rooms below grade or at grade level, additional methods of water drainage should be incorporated into the design of the meter room(s) to prevent the accumulation of water.

4. Galvanized Rigid Steel Conduit and Couplings

- a. When new galvanized rigid steel (GRS) conduit is used as a riser conduit transitioning from the underground service conduit up to the electric meter panel, the following requirements apply to ensure the new conduit system is robust:
 - All ends of the riser conduit must be threaded to fit together correctly with their associated parts in the conduit system.
 - The top end of the riser (the end that is inside the meter panel) must be threaded and requires a screw-on lock nut.
 - A cable protector is required.

3.9 (continued)

- Do **not** use set screw, compression type, or slip-on couplings on new installations.
- b. The following exceptions apply for existing, rigid-steel conduit risers that will be reused during an electric meter panel change, if applicable:
 - If the riser is not threaded, then a conduit lock nut with a set screw is allowed
 - If a couple with set screws already exists in the riser conduit, then it does not need to be replaced.
- c. All polyvinyl chloride (PVC) and steel couplings, including plastic-to-steel transition couplings, must be installed below grade and must not be exposed above grade. When a coupling is installed inside of a foundation, the top edge of the coupling may be flush with the top of foundation concrete.
- d. New and existing rigid steel conduit does not need to be bonded to the electric panel.
- e. Galvanized rigid steel conduits are required in the following construction:
 - Outdoor panel board, see [Electric Design Standard 065374, "Overhead and Underground Panel Board Construction."](#)
 - Permanent wood post for underground service, see [Electric Design Standard 054712, "Permanent Wood Post Installation Underground Electric Service."](#)
 - Indoor Meter Rooms and High-Rise Buildings with Smart Meter Electric Networks, see [Electric Design Standard 094683, "Smart Meter Electric Network Requirements for Indoor Meter Rooms and High-Rise Buildings."](#)
 - When the conduit will be exposed, installed along walls and low clearance ceilings, and may be subject to damage from vehicles, machinery or tools.

5. Installing Offsets

- a. PG&E's [Electric Design Standard 038193, "Minimum Requirements for the Design and Installation of Conduit and Insulated Cable"](#) limits conduit bends to 315 degrees. Applicants should consult their local PG&E Job Owner to determine whether additional raceway pull-boxes will be required to avoid excessive pulling tension on the service cables.

3.9 (continued)

- b. PG&E does **not** approve short-radius conduit fittings (LBs), also known as service elbows, for use in underground service conduits intending to hold PG&E service conductors. Applicants must ensure that offsets are **not** installed in the following situations:
 - In the service lateral conduit entering the electric service panel or enclosure.
 - In the conduit system because it may prohibit the use of a mandrel to prove the acceptability of the conduit system.
 - In the service conduit because it will increase the pull tension required to install the service conductors.
- c. In some situations, Applicants may be required to perform **both** of the following actions:
 - Install larger conduits and/or additional splice boxes or pull boxes to accommodate the installation of the conductors.
 - Transition to cables appropriately sized for the service capacity.
- d. The following scenarios represent situations where [Subsection 3.9.5c.](#) above may also be required:
 - Construction sites where PG&E determines that larger-than-standard cables or conductors are required to maintain voltage and flicker drop.
 - Construction sites where normal pulling tensions may be exceeded.

3.10 Selecting Backfill

1. See [Table 3-3, "Basics on Backfill."](#) on Page 3-18, for a general overview of Do's and Don'ts to backfilling a utility trench containing PG&E gas and/or electric facilities. Complete and specific backfill requirements can be found in the following PG&E standards and are at the discretion of the PG&E inspector:
 - [Engineering Material Specification \(EMS\) 4123, "Backfill Sand"](#)
 - [Gas Design Standard S5453, "Joint Trench Configurations & Occupancy Guide"](#)
 - [Electric Design Standard 038193, "Minimum Requirements for the Design and Installation of Conduit and Insulated Cable"](#)

3.10 (continued)

Table 3-3. Basics on Backfill

☒ Do's:	☒ Don'ts:
When installing utility facilities, use sand or native soil as smooth bedding	Use backfills containing crushed rock or sharp-edged materials of any kind
Backfill must fill all the voids around the facilities and provide at ≥ 12 inches of cover for the conduit or pipe	Use backfills containing easily breakable dirt clods ≥ 6 inches in diameter
Backfill that contains occasional, rounded rocks that are $\leq 1/2$ inch in diameter are acceptable	Use backfills with rocks ≥ 3 inches in any dimension within 6-inches of the top of the conduit or ≤ 12 -inches below the pavement subgrade
When backfilling trenches on slopes or grades, bags of concrete and red dye may be used on top of the conduit	Allow backfill on slopes or grades run out of intended trench
Place a cement-slurry cap above the conduit where a shallow trench was needed and allowed ¹	Omit adequate mechanical protection in shallow trenches
Soil compaction density must meet PG&E's and any applicable Federal, State, County and local requirements ^{2,3}	Leave backfill loose and unconsolidated

¹A shallow trench must be approved by a qualified PG&E Inspector, PG&E Associate Distribution Engineer (ADE), and the appropriate external jurisdictions. Refer to [Electric Design Standard 038193](#), Note 7, for cement-slurry cap specifications.

²PG&E Requires that trenches that run across or along public roads and streets in the franchise areas must have soil compacted to $\geq 95\%$ density. Trenches that run across private roads and streets in non-franchise areas must have soil compacted to $\geq 90\%$ density.

³When required by PG&E, applicant must obtain compaction test reports for trenches or equipment pads, completed by a qualified testing company. The report must include the testing company's information (i.e., Name, Address, Contact Information).

3.11 Mandrels and Proving the Conduit System

- The following section includes both an overview of and a procedure for using PG&E-approved, flexible steel mandrels to prove conduit systems.

NOTE

For HDD projects, Applicants or their contractors must contact their PG&E Rep before construction begins. See [Subsection 3.9.1b, "Trench and Conduit Installation Requirements"](#) for information about drilling projects.

- Applicants must ensure that conduit systems are not covered or hidden from view before the facilities are inspected visually by a PG&E Inspector. The PG&E Inspector must determine if the conduit system and its installation comply with all PG&E's specifications (e.g., type, size, schedule, radius of bends) and installation requirements before the customer backfills the trench.

3.11 (continued)

3. After the conduit system passes PG&E's Inspector's visual inspection, including verification of the conduit system's materials and bend radius, the applicant must backfill the trench and compact the soil.
4. The following items must be completed and accepted by the PG&E Inspector prior to proving the conduit system:
 - All vaults/boxes/pads have been set to final grades.
 - All conduit trenches (e.g., mainline, roadway crossings, and service stubs) have been completely backfilled, compacted, and graded to within 0.10' (one tenth of one foot) of the pavement subgrade elevation or final grades elevation (including landscape contouring) in non-hardscape areas.
 - All grounding, retaining walls, bollards, and clear-and-level workspace standards have been met.
5. The applicant must provide PG&E with proof (i.e. mandrel test) that the conduit system is free and clear (i.e. without encountering blockages or obstructions) by successfully inserting and pulling an approved, flexible steel mandrel through the entire conduit system with the PG&E Inspector on site per TD-4462M, "Applicant-Installed Facility Inspection Manual for New Business" (for access to this document, please see your PG&E Job Owner) guidelines.
6. The PG&E Inspector or applicant may furnish the mandrel (See [Table 3-4, "Mandrel Information for Schedule 40 PVC and Steel Conduits,"](#) [Table 3-5, "Mandrel Information for Schedule 80 PVC Conduits,"](#) and [Table 3-6, "Mandrel Information for Schedule 80 and SDR 13.5 HDPE Conduits"](#) on Page 3-22 and Page 3-23). The applicant must provide polyester pull-tape (Code M560154) to initiate the cable pulling. For spare conduits that will be vacant for 30 days or longer, install detectable pull-tape (Code M602679) so the spare conduit can be identified during mark and locate field work.
7. Applicant furnished mandrel will need to be inspected, appropriately sized and approved by the PG&E inspector prior to use.
8. If the applicant elects to use a PG&E furnished mandrel, the applicant will need to demonstrate competence and qualification (e.g. qualification records, training records, field demonstration, etc.) to operate the mandrel safely and suitably. The applicant is also responsible for accepting all risks related to the use of PG&E's mandrel. It is also the applicant's duty to inspect PG&E's mandrel prior to use to ensure its safety, suitability and correct operation. PG&E is not responsible for damage or liability for the use of PG&E's mandrel.

3.12 Procedure for Using Mandrels

1. Select the mandrel that is sized properly for the type of conduit to be proven. See [Figure 3-4, "Flexible Steel Mandrel,"](#) on page 3-21 and [Table 3-4](#) through [Table 3-6](#) on Page 3-22 and Page 3-23 for mandrel specifications.
 - a. To pull the mandrel through the conduit, securely tie one end of the 2,500-pound pulling tape to the pulling eye of the mandrel. (The pulling tape was installed in the conduit previously.)
 - b. Securely tie a second section of 2,500-pound pulling tape to the pulling eye located on the other end of the mandrel. This section of tape must be long enough to replace the pre-installed pulling tape completely. This ensures that a run of pulling tape remains in the conduit after the mandrel process is complete. Also, if the mandrel becomes blocked or stuck in the conduit, the second run of pulling tape allows the mandrel to be pulled back out of conduit **and** provides a means of measuring the distance to the point of blockage.
 - c. After both pulling tapes are attached securely to the mandrel, insert the mandrel into one end of the conduit. Slowly start to pull the pulling tape at the opposite end of the conduit. This removes any slack in the pulling tape.
 - d. Slowly pull the mandrel through the conduit by hand or non-mechanically. The rate of the pull should not exceed 100 feet per minute. Both the person pulling the tape and the PG&E Inspector must check the pulling tape for signs of stress (i.e., molten plastic) as the tape comes out of the conduit.

NOTE

The PG&E Inspector may **not** approve a section of the conduit if any portion of the pulling tape shows damage in the form of molten plastic. If the Inspector decides to reject the conduit section, he or she will secure the melted section of pulling tape as evidence.

3.12 (continued)

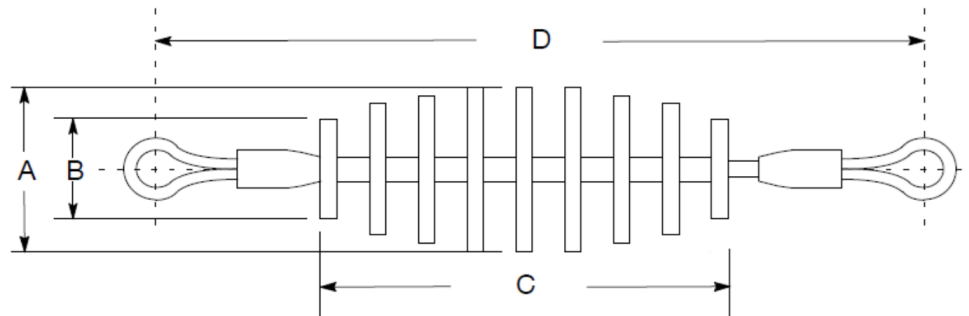


Figure 3-4.
Flexible Steel Mandrel

Notes in reference to [Figure 3-4](#).

1. All mandrels can pass through a 24-inch radius, 90° bend.
2. Discs are 1/2-inch thick.
3. Cable size is 3/8-inch. Cable material is 7x19 Galvanized steel or 6x19 Plow steel.
4. The safe working limit is 4,800 pounds.

e. The mandrel tests must be completed and passed on all conduits before:

- 1) Any final surfacing (e.g., concrete or asphalt) is placed over the trenches.
 - If final surfacing includes chemical treatment (e.g., lime or cement conditioning) of the pavement subgrade or aggregate base layer(s), the mandrel test shall occur after the chemically treated grade has been graded and compacted to within 0.10' of its designed subgrade elevation.
- 2) The insert or pulling of any wire cable takes place on the project.

f. If the conduit fails the mandrel test, then the conduit must be repaired or replaced and all conduits in that run will be retested.

g. If, at any time prior to final inspection acceptance, the PG&E Inspector suspects that conduit may have been damaged by ground disturbing activity near the conduit, the PG&E Inspector may, at their discretion, require the conduits to be re-mandrelled.

3.12 (continued)

Table 3-4. Mandrel Information for Schedule 40 PVC and Steel Conduits

Conduit Nominal Size	Conduit Minimum Inside Diameter	Mandrel Nominal Size	PG&E Material Code	Manufacturer Catalog Number ²	Dimensions at Locations Pointed on Figure 2 (Inches)				
					A	B	C	D ¹	Spacer Length between Discs
2"	2.021"	2"	M202567	08400-200	1.69	0.69	6.5	15.0	0.25
3"	3.008"	3"	M202570	08400-300	2.65	1.65	10.5	23.0	0.75
4"	3.961"	4"	M202571	08400-400	3.57	2.57			
5"	4.975"	5"	M200911	08400-500	4.56	3.56			
6"	5.986"	6"	M202572	08400-600	5.51	4.51			

¹ "D" dimensions are approximate

² The manufacturer for these mandrels is DCD

Table 3-5. Mandrel Information for Schedule 80 PVC

Conduit Nominal Size	Conduit Minimum Inside Diameter	Mandrel Nominal Size	PG&E Material Code	Manufacturer Catalog Number	Dimensions at Locations Pointed on Figure 2 (Inches)				
					A	B	C	D ¹	Spacer Length between Discs
2"	1.881"	2.00"	M202567	08400-200 ²	1.69	0.69	6.5	15.0	0.25
3"	2.820"	3.00"	M202570	08400-300 ²	2.65	1.65	10.5	23.0	0.75
4"	3.737"	3.50"	M206884	08049-400 ³	3.25	2.25	11.25	20.6	
5"	4.713"	5.00"	M206892	08067-500 ³	4.25	3.25			
6"	5.646"	5.00"	M206886	08058-900 ³	4.75	3.75			

¹ D" dimensions are approximate

² The manufacturer for this mandrel is DCD

³ The manufacturer for this mandrel is Condux

Table 3-6. Mandrel Information for Schedule 80 and SDR 13.5 HDPE Conduits

Conduit Size	Conduit Minimum Inside Diameter	Nominal Mandrel Size	PG&E Material Code	Manufacturer Catalog Number	Dimensions at Locations Pointed on Figure 2 (Inches)				
					A	B	C	D ¹	Spacer Length between Discs
2"	1.913"	2.00"	M202567	08400-200 ²	1.69	0.69	6.5	15	0.25
3"	2.864"	2.50"	M206877	08021-925 ²	2.25	1.75	11.25	20.6	0.75
4"	3.786"	3.50"	M206884	08049-400 ³	3.25	2.25			
5"	4.689"	5.00"	M206892	08067-500 ³	4.25	3.25			
6"	5.585"	5.00"	M206886	08058-900 ³	4.75	3.75			

¹ D" dimensions are approximate

² The manufacturer for this mandrel is DCD

³ The manufacturer for this mandrel is Condux.



3.13 Working Space for Underground Equipment

1. For general working space requirements, refer to PG&E's gas and electric design standards:
 - a. [Electric Design Standard 051122, "Clearances and Location Requirements for Enclosures, Pads, and Underground Equipment"](#)
 - b. [Gas Design Standard A-03, "Gas Trench Design and Construction"](#)
 - c. [Gas Design Standard A-04 "Cover and Clearance Requirements for Transmission Lines, Distribution Mains, and Service Lines"](#)
2. Underground electric equipment has required working space clearances in front of and all around the equipment. See [Electric Design Standard 051122, "Clearances and Location Requirements for Enclosures, Pads, and Underground Equipment"](#).
3. Maintain 36" minimum clearance between barrier posts and the edge of the pad in front of the equipment doors so that they do not interfere with opening the doors.
 - a. Barrier posts are not required for pad-mounted equipment when the following minimum setback is met:
 - 1) Residential applicants:
 - Pad-mounted equipment must be located minimum of 3 feet away from the edge of the thoroughfare pavement, where vehicle traffic is considered low (See [G.O. 128, Rule 23.6](#) for the definition of "thoroughfare").
 - 2) Commercial applicants:
 - 9 feet from the edge of the thoroughfare pavement due to high vehicular traffic and frequent truck-backing. The design of the layout may call for an increase or decrease in these dimensions. For example, a 3-foot setback is often adequate for parts of commercial parking lots where traffic flow is constrained and backing perpendicular to the curb is unlikely.
 - b. Use removable posts when:
 - 1) Posts are installed less than 9 feet in front of the equipment's doors, or
 - 2) Where fixed posts would obstruct access for installation or replacement of equipment.



3.14 Installing Equipment Pads

1. If "Applicant-Performed Work" or "PG&E-Applicant Shared Work" was selected during the application process, then applicants or their contractors must construct and install equipment pads, as required in the PG&E-approved design, for underground electric equipment.
2. When constructing a **concrete pad** for a transformer, use [Electric Design Standard 045292, "Concrete Pad for Three-phase, Loop-style, Pad-mounted Transformers"](#).
3. When installing a **box pad** for a transformer, use [Electric Design Standard 064309, "Box-pad for Pad-mounted Transformers"](#).
4. If the PG&E-approved design includes applicant installation of equipment pads for electric facilities **other than** for transformers (e.g., PMH switches), the PG&E Job Owner or PG&E inspector will provide these drawings at the pre-construction meeting.
5. For customer-owned, floor-standing **switchboard pads** (0–600 volts), applicants are to construct according to their applications. [Section 8](#), Figure 8-34 "Service Conduit Layout in the Termination Enclosure or Additional Pull Section (Example of Front View and Top View)", on Page 8-41 and the associated "Notes" provide the placement and arrangement for service conduits inside the utility termination section or pull section.
6. For **primary switchboards pads**, refer to the ground rod and conduit requirements in [Section 8](#), Subsection 8.12, "Specific Requirements for High-Voltage Switchboards" Note N, on Page 8-59, and Figure 8-49, "Primary Switchboard Termination Section Pad Detail," on Page 8-61.

3.15 Installing Ground Rods

1. Applicants are required to install ground rods when PG&E specifically requires them as part of a substructure installation (e.g., when constructing a transformer pad and primary enclosure). Find PG&E-approved ground rods and clamps in [Electric Design Standard 013109, "Corrosion Resistant Ground Rods and Ground Rod Clamps."](#)

3.16 Installing Enclosures

1. Applicants may install enclosures if they are a qualified Applicant Installer and have selected either Applicant-Performed or PG&E-Applicant Share work per [Section 1](#), Subsection 1.5 "Obtain Interactive Training System Qualifications for Gas and Electric."

3.16 (continued)

2. Installing Secondary Enclosures

- a. Applicants may be connected to the distribution system via a secondary enclosure. Secondary enclosures are used for secondary cable and services and cannot be used for primary (high-voltage) electric facilities.
- b. See [Electric Design Standard 028028, "Secondary Electric Underground Enclosures"](#) for the complete specifications, requirements and list of all PG&E secondary enclosures. [Table 3-7, "Commonly Used Secondary Enclosures"](#) below shows the types of secondary enclosures PG&E commonly uses and their familiarly used terms:

Table 3-7. Commonly Used Secondary Enclosures

Enclosure Size
17" x 30" (aka #2 Box)
24" x 36" (aka #3 Box)
3'0" x 5'0" (aka #5 box)

- c. Secondary non-concrete enclosures are the preferred method of terminating 600 V conductors in residential, small commercial applications and in areas where heavy, non-deliberate vehicular traffic is expected. Concrete secondary enclosures should be installed in areas where full-vehicular traffic is expected. [Table 3-8, "Conduct Sweep and Placement"](#) demonstrates how conduits must be swept into the secondary enclosure.

Table 3-8. Conduct Sweep and Placement

New Construction	Re-construction
For new enclosures and new conduits, conduits must be 90-degree bend into one side of the enclosure to achieve maximum cable length to avoid exceeding minimum cable bending radius.	For re-construction with either replacing an existing box or installing new conduits into an existing box, the conduits may only enter the knockouts or duct terminators when having 18"-24" of cover at the entrance of the box. A minimum of 18" conduit entering the side wall must be straight with no bends.

3. Installing Primary Enclosures

- a. Primary enclosures are used for primary (high-voltage) electric facilities (i.e. 200-Amp and 600-Amp distribution cables, subsurface transformers, subsurface switches, etc.).
- b. See [Electric Design Standard 062000, "Primary Electric Underground Enclosures"](#) for the complete specifications, requirements and list of all PG&E primary enclosures. [Table 3-9, "Commonly Used Primary Enclosures"](#) on Page 3-27 shows the types of primary enclosures PG&E commonly uses and their familiarly used terms.

3.16 (continued)

Table 3-9. Commonly Used Primary Enclosures

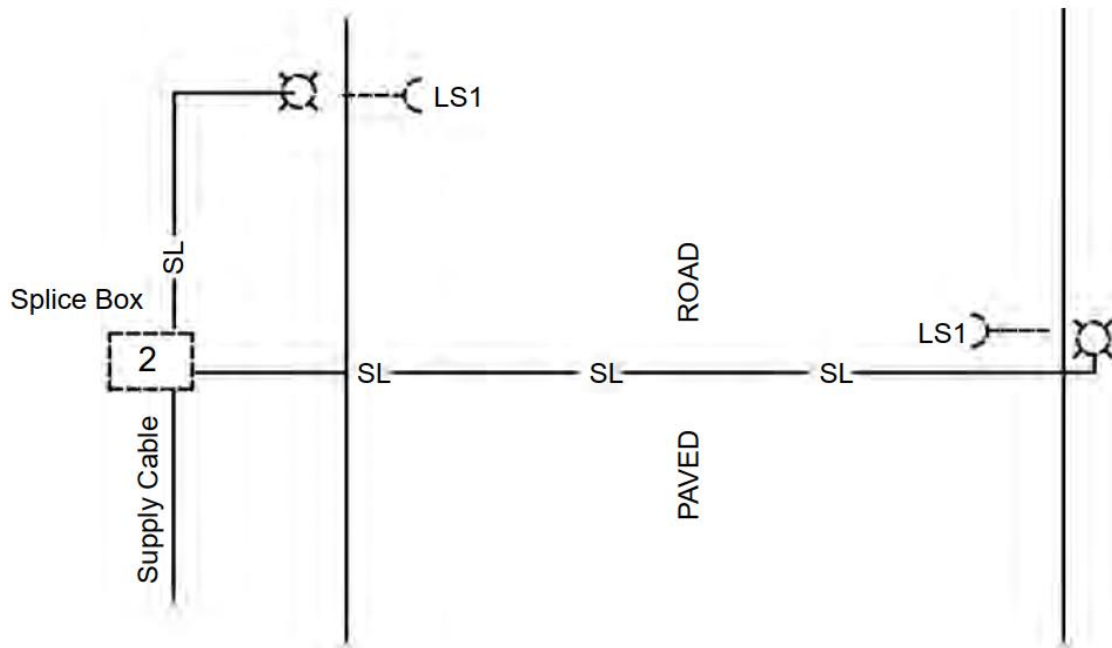
Enclosure Size
3'0" x 5'0" (aka #5 box)
4'0" x 6'6" (aka #6 box)
4'6" x 8'6" (aka #7 box)

3.17 Installing Electric Facilities

1. Applicants may install electric facilities if they are a qualified Applicant Installer and have selected either Applicant-Performed or PG&E-Applicant Share work per [Section 1](#), Subsection 1.5, "Obtain Interactive Training System Qualifications for Gas and Electric."
2. Applicants are required to sign a Non-Disclosure Agreement with PG&E to gain access to TD-2502M, "Electric Underground Construction Manual" to see all requirements when installing electric facilities:
 - TD-2502M-01, "General"
 - TD-2502M-02, "Terminations"
 - TD-2502M-03, "Cable"
 - TD-2502M-04, "Marking"
 - TD-2502M-05, "Splices"
 - TD-2502M-06, "Conduits"
 - TD-2502M-07, "Enclosures"
 - TD-2502M-08, "Connectors"
 - TD-2502M-09, "Switches"
 - TD-2502M-10, "Transformers"
 - TD-2502M-11, "Services"

3.18 Streetlights

1. Underground electric service for streetlights adhere to the same requirements as specified in [Subsections 3.9. "Trench and Conduit Installation Requirements,"](#) on Page 3-10, ["Selecting Backfill"](#) on Page 3-17, and ["Mandrels and Proving the Conduit System"](#) on Page 3-18. [Figure 3-5, "Underground Distribution System – Streetlight,"](#) below, shows an example of PG&E's underground distribution system and how the streetlights are powered from the supply cable to a distribution enclosure to the streetlights. [Figure 3-6, "Streetlight Only Trench Detail,"](#) on Page 3-29 shows the trench detail for a streetlight only trench. [Figure 3-7, "Streetlight Conduit Detail,"](#) on Page 3-29 shows the streetlight conduit detail from a distribution enclosure to the streetlight.
2. When installing street light conduit in a joint trench with PG&E gas or electric facilities, refer to [Gas Design Standard S5453, Exhibit B, "Joint Trench Configurations & Occupancy Guide"](#) for detailed joint trench, conduit, and clearance requirements.



LS1 = PG&E Owned and Maintained Light

**Figure 3-5.
Underground Distribution System – Streetlight**



3.18 (continued)

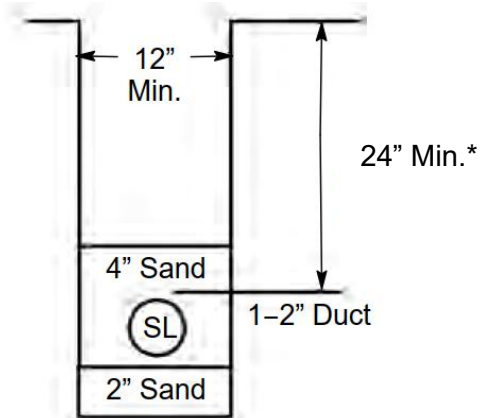


Figure 3-6.
Streetlight Only Trench Detail

*Increase cover to 30" in the street area

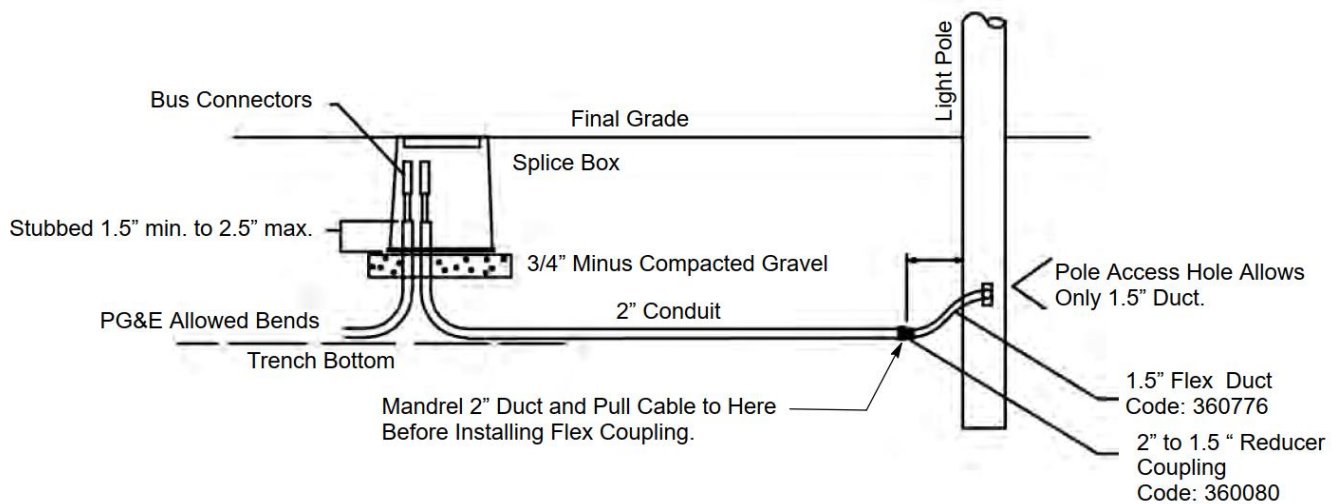


Figure 3-7.
Streetlight Conduit Detail



3.19 Design and Engineering Documents for Underground Electric

Table 3-10. Design and Engineering Documents for Underground Electric

Documents
063927, "Methods and Requirements for Installing Residential Underground Electric services 0–600 V to Customer-Owned Facilities"
063928, "Methods and Requirements for Installing Non-Residential Underground Electric Services 0–600 Volts to Customer-Owned Facilities"
094676, "Primary Electric Service Requirements"
054619, "Agricultural Underground Service 500 Hp or Less"
061032, "Residential and Small Commercial Overhead to Underground Electric Service Conversion"
S5453, Exhibit B, "Joint Trench Configurations & Occupancy Guide"
038193, "Minimum Requirements for the Design and Installation of Conduit and Insulated Cable"
062288, "Underground Conduits"
065374, "Overhead and Underground Panel Board Construction"
054712, "Permanent Wood Post Installation Underground Electric Service"
094683, "Smart Meter Electric Network Requirements for Indoor Meter Rooms and High-Rise Buildings"
EMS 4123, "Backfill Sand"
051122, "Clearances and Location Requirements for Enclosures, Pads, and Underground Equipment"
045292, "Concrete Pad for Three-Phase, Loop-Style Pad-Mounted Transformers"
064309, "Box-pad for Pad-mounted Transformers"
013109, "Corrosion Resistant Ground Rods and Ground Rod Clamps"
028028, "Secondary Electric Underground Enclosures"
062000, "Primary Electric Underground Enclosures"

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4. Overhead Electric Service

4.1 Overhead Overview

1. This section guides applicants on how to determine locations and terminate residential and nonresidential overhead services connected to PG&E's electric distribution system.
2. Residential applicant types include, but are not limited to, single-family residential homes, multi-family homes, townhomes, and Homeowner's Association (HOA) residential homes.
3. Commercial (nonresidential) applicant types include, but are not limited to, multi-family residential homes (e.g. condos, apartment buildings), retail centers (e.g. strip malls, malls), businesses, office buildings, warehouses, research facilities, education facilities, and telecom infrastructure.
4. Agricultural applicant types include, but are not limited to, farming, agri-business, and new irrigation systems.

NOTE

Requirements for installing and attaching PG&E overhead services may be different than local city or county ordinances, as well as national or California electric codes. Contact your local PG&E Job owner if you have questions.

5. The following Electric Design Standards are applicable in this section:
 - [Electric Design Standard 022169, "Clearances for Supply Service Drops"](#)
 - [Electric Design Standard 025202, "Methods of Attaching Services to Customer Premises"](#)
 - [Electric Design Standard 025055, "Requirements for Customer-Owned Poles."](#)
 - [Electric Design Standard 094676, "Primary Electric Service Equipment"](#)
 - [Electric Design Standard 058087, "Agricultural Overhead Service 300 HP or Less"](#)
 - [Electric Design Standard 065374, "Overhead and Underground Panel Board Construction"](#)

4.2 Safety Reminder



CAUTION

Flame resistant (FR) clothing is required while working on, near, or observing others working on any PG&E facility. See [Section 1](#) of the Greenbook Manual for FR clothing requirements.

1. Minimum Safe Working Clearances from Overhead Electric Lines
 - a. The following codes and regulations require that minimum safe working and **travel** distances be maintained from cranes and derricks to overhead electric lines:
 - [California Division of Occupational Safety and Health \(Cal/OSHA\), Title 8, Division 1, "Department of Industrial Relations," Chapter 4, "Division of Industrial Safety," Subchapter 4, "Construction Safety Orders," Article 15, "Cranes and Derricks in Construction," Section 1612, "Power Line Safety."](#)
 - [Cal/OSHA, Title 8, Chapter 4, Subchapter 5, "Electrical Safety Orders," Group 2, "High-Voltage Electrical Safety Orders," Article 37, "Provisions for Preventing Accidents Due to Proximity to Overhead Lines \(Formerly Article 86\), Section 2946, "Provisions for Preventing Accidents Due to Proximity to Overhead Lines."](#)
 - [Table 1, "General Clearances Required from Energized Overhead High-Voltage Conductors" and Table 2, "Material Storage and Boom-type lifting or hoisting equipment clearances required from energized overhead high-voltage lines."](#)
 - b. In support of these regulations, PG&E provides the voltages for overhead lines within two business days of receiving an applicant inquiry. Call the PG&E Building and Renovation Service Center (BRSC) at 1-877-743-7782 or your PG&E Job Owner with any questions about nominal voltage or working near overhead electric lines.

4.3 Overhead Electric Service Requirement

1. PG&E will **not** supply new overhead services to applicants when any of the following conditions exist:
 - a. When buildings or premises are in areas designated either by local jurisdictions or PG&E as underground districts.
 - b. Load requires PG&E to use a 75-kilovolt ampere (kVA) or larger transformer. This usually applies to panels 400 amps or larger.

4.4 Standard Overhead Electric Service Voltage and Load Limitations

1. Refer to [Section 3, "Underground Electric Service,"](#) Subsection 3.3 for "Standard Electric Service Voltage and Load Limitations" on Page 3-1 for single-phase service, three-phase service, and mixed-use projects.

NOTE

For overhead services, if PG&E determines that a single residential or non-residential building or structure justifies a 75-kVA transformer at 120/208 V or a 5 horsepower or larger motor at 120/140 V, then installing a three-phase service is an **option** for the applicant.

4.5 Installing Transformers

1. PG&E will specify the type of transformer installations to be constructed on applicants' premises. Applicants may contact their local PG&E Job Owner to obtain specific transformer requirements for their projects.
2. PG&E's standard transformer installations are described below:
 - For residential, commercial, and industrial services: A pole-bolted transformer in overhead areas is allowed when the applicant's load does not require a 75-kilovolt ampere (kVA) or greater transformer.
 - For agricultural services: A pole-bolted transformer in overhead areas is allowed when the applicant's load does not exceed the capability of PG&E's largest available kilovolt ampere (kVA) overhead transformers for the voltage and phase being served.
3. If required or requested, the installation of a pad-mounted transformer is allowed. See [Section 3, "Underground Electric Service"](#) and consult your local PG&E Job Owner.

4.6 "Like-for-Like" vs. Upgrading Electric Facilities

1. Refer to [Section 3,](#) Subsection 3.5, "Like-for-Like" vs. Upgrading Electric Facilities.
2. **Relocating Electric Facilities**
 - a. When existing electric facilities are relocated, applicants must meet all the current Greenbook requirements. If PG&E's existing service conductor can be used, as determined by PG&E, the panel must be positioned so the service conductor can be properly reconnected. The existing service conductor must be reconnected to the external service-entrance conductors coming out of the weatherhead.
 - b. If the new panel location will require additional service conductor to be installed, then a complete service replacement will be required, and the

4.6 (continued)

applicant is responsible for all costs. PG&E does not allow for splicing on additional conductor.

4.7 Overhead Services for Two or More Buildings on One Lot

1. See [Section 3](#), Subsection 3.6, "Services for Two or More Buildings on One Lot."

4.8 Locating Point of Attachment for Overhead Services (Residential and Nonresidential)

1. PG&E installs an overhead service drop from the distribution line to the Point of Attachment. The Point of Attachment is the location to which PG&E makes its overhead service connection to the applicant's weatherhead. The weatherhead can be attached to the applicant's residence, building or structure, or panel board.
2. **It is highly recommended that applicants request that the PG&E Job Owner specify a location for the Point of Attachment.**
3. Should the applicant decide to specify the location for the Point of Attachment, refer to [Section 4.9, "Overhead Service Drop Clearance Requirements."](#) The following must be considered:
 - a. Radial minimum clearances around the conductor.
 - b. Vertical minimum clearances.
 - 1) Elevation at the Point of Attachment is high enough
 - 2) Conductor sag
 - c. The Point of Attachment must be located so it can be reached with a single span from PG&E's overhead distribution line.
4. **Applicants should contact their PG&E Job Owner as soon as possible in the planning phases of their projects to ensure that any potential problems or exceptions are addressed before any construction begins or before the installation of the building's wiring. PG&E must approve of the location selected for the utility service attachment.** PG&E recommends that applicants do not place electric supply and communication services in the same vertical plane.
5. Recommended Location of Point of Attachment on Structure:
 - a. The Point of Attachment is either on the building wall near the PG&E line or on a periscope fixed to the building's roof, not more than 18 inches behind that wall. [Figure 4-1, "Locations for the Overhead Service Drop Attachment"](#) on Page 4-5 outlines examples of the preferred and permitted Point of Attachment location options for applicants.

4.8 (continued)

- b. Refer to the figures and notes in [Electric Design Standard 025202, "Methods of Attaching Services to Customer Premises"](#) for options of attachment to residential and nonresidential premises.

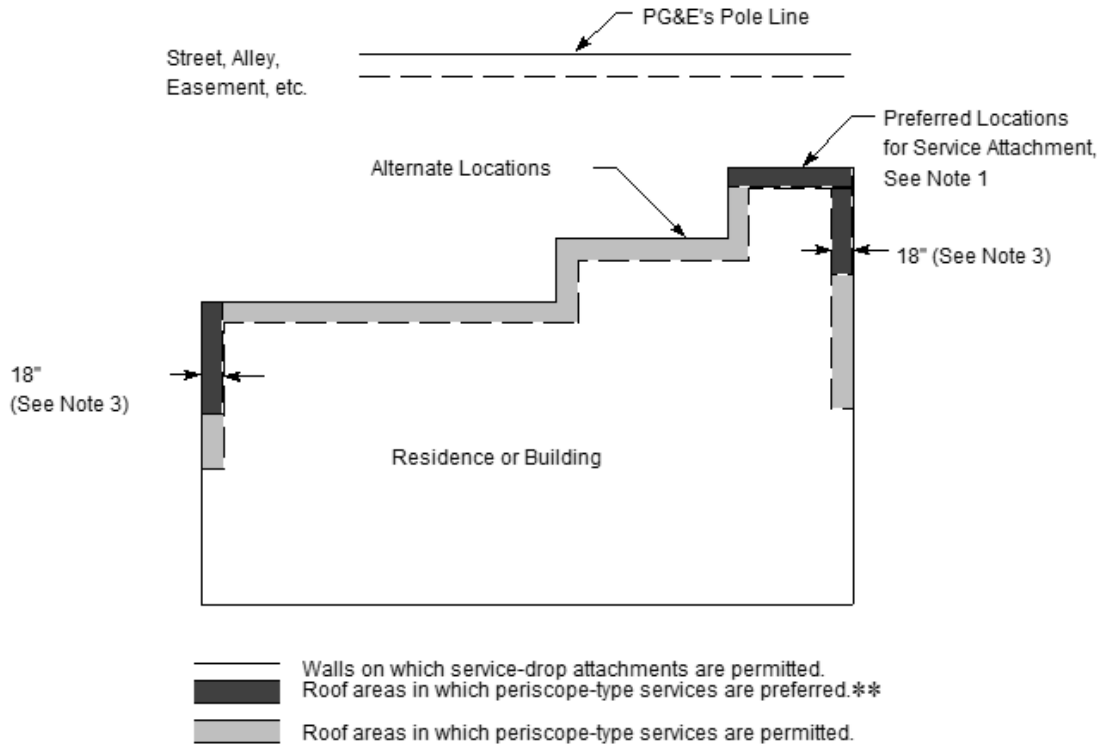


Figure 4-1.
Locations for the Overhead Service Drop Attachment

Notes in reference to [Figure 4-1](#).

1. Applicants can attach service drops to sidewalls if the service-drop conductors do **not** exceed 75 feet. Service-drop conductors must **not** cross over an adjacent property. Applicants must ensure that the required conductor clearances ([Subsection 4.9, "Overhead Service Drop Clearance Requirements"](#)) and accesses to the electric meters ([Section 1](#) and [Section 7](#)) are maintained.
2. For more information on meter location requirements, see [Section 7](#).
3. The **required** maximum setback affects nonresidential applicants only. 18" is the preferred maximum setback.

4.9 Overhead Service Drop Clearance Requirements

1. General Service Drop Clearances

- a. Applicants must maintain adequate clearance around the structure, as per:

- [Electric Design Standard 022169, "Clearances for Supply Service Drops"](#)
- [Electric Design Standard 025202, "Methods of Attaching Services to Customer Premises"](#)

4.9 (continued)

- [CPUC G.O. 95, Table 1, "Basic Minimum Allowable Vertical Clearance of Wires above Railroads, Thoroughfares, Ground or Water Surfaces; Also Clearances from Poles, Buildings, Structures or Other Objects".](#)
- b. The Standards referenced in [Subsection 4.9.1.a](#) provide detailed clearance requirements for the following:
 - Above railroad and overhead trolley wire
 - Above public thoroughfares
 - Above residential properties, buildings, bridges, and other structures
 - Around doors and windows
 - Between service drop wires
 - Customer-owned service poles
 - Above ground clearances for residential and nonresidential installations
 - Nonresidential buildings with or without metal covered roofs
 - Nonresidential buildings using service drop cable or equally insulated open wire services
 - Between PG&E service drops and communications conductors in both open wire and non-open wire construction
- 2. Service Drop Clearance above Private and Public Swimming Pools
 - a. Avoid installing utility service drops above public and private swimming pools, when practical. If no other service drop options exist, applicants must follow the clearance requirements for above private and public swimming pools:
 - [CPUC G.O. 95, Rule 54.4-A3, Supply Line Conductors](#)
 - [CPUC G.O. 95, Rule 54.8-B5, Supply Service Drops](#)

4.10 Overhead Attachment Structures (Service Mast with Periscope Fitting)

1. An attachment structure (i.e. **service mast with a periscope fitting**) is a support that connects the service drop to the applicant's structure. Applicants must ensure that the service drop maintains the required clearance at its Point of Attachment to the periscope, mast, or other attachment structure. These clearances are mandated by the CPUC's G.O. 95, Rule 54.8-B5, Supply Service Drops.

4.10 (continued)

2. PG&E will connect service drops to attachment structures in one of two **methods**:
 - a. **Method A:** By using either spools or insulators that are installed on a building.
 - b. **Method B:** By using a single mast of galvanized rigid pipe or conduit constructed of steel, aluminum, or intermediate metal.
 - c. Applicants must ensure buildings are constructed or reinforced to support the weight of the attachment structure and the weight and pull of service wire. Applicants must also furnish all materials required to install the attachment structure **except** PG&E supplied materials (i.e., the racks, bolts, and insulators that are needed to secure the service conductor). Installation and maintenance of attachment structures are at applicant's expense.
 - d. See [Table 4-1, "Service Attachment Structures – Do's and Don'ts"](#) on Page 4-8 for a general review of the instructions for installing service attachment structures. The complete list of service attachment structure requirements can be found through the following PG&E standards:
 - [Electric Design Standard 022169, "Clearances for Supply Service Drops"](#)
 - [Electric Design Standard 025202, "Methods of Attaching Services to Customer Premises"](#)
 - [Electric Design Standard 025055, "Requirements for Customer-Owned Poles."](#)
 - [Electric Design Standard 058087, "Agricultural Overhead Service 300 HP or Less"](#)
 - [Electric Design Standard 065374, "Overhead and Underground Panel Board Construction"](#)

4.10 (continued)

Table 4-1 Service Attachment Structures – Do's and Don'ts

Do's:	Don'ts:
If Method A: Install a single mast and weatherhead from the electric service termination and metering equipment to the service drop location If Method B: Install a single mast, periscope, and weatherhead from the electric service termination and metering equipment to the service drop location	Install more than one attachment structure per service drop location.
Use heavy-duty, 2-hole pipe strap every 3 feet, secured by 3/8-inch x 3-inch lag screws (minimum size) to structurally support periscope.	Leave attachment structure unsupported.
Use appropriate materials¹: Minimum conduit sizes: • 1-1/4" GRS or IMC • 2" IPS rigid aluminum • Conduit sizes to be determined by NEC code and AHJ depending on the panel size	Use plastic conduits as an attachment structure
Install attachment structures directly above the service termination and metering equipment, vertically upward to the weatherhead location.	Install service mast diagonally or horizontally¹
Use a sealable gutter when installing a new meter panel next to an existing panel and connected to the same overhead service	Install additional masts and weatherheads for new meter panels connected to the same overhead service
Only electric-utility power-supply conductors may be attached to the attachment structure	Attach communication conductors (e.g., telephone or cable TV) to the electric power-service mast or attachment structure.
¹If the meter panel is being relocated away from the gas facilities or to achieve the minimum required working space, then the mast may be installed horizontally to run back to the existing weatherhead and Point of Attachment location. Any horizontal run of mast should not exceed 10 feet and must not be installed on top of the roof.	

4.10 (continued)

e. Periscope Clearances and Bracing Requirements

- 1) Applicants must ensure periscopes and raceway-type service masts extend a maximum of 78-inches and a minimum of 12-inches above any roof or eave they may penetrate.
- 2) Applicants may be required to raise periscopes and raceway-type service masts when using them as attachment structures for obtaining the required clearances for service drop conductors. See notes and figures in [Electric Design Standard 022169, "Clearances for Supply Service Drops"](#) for detailed periscope clearance requirements.
- 3) Applicants may have to brace periscopes that project above the roof or eave. When the periscope structure requires support above the roof, applicants must ensure that it is braced, **not guyed**. Applicants must also ensure that unbraced periscopes projecting above roofs or eaves are continuous **without couplings** from the point where the utility service drop is attached to the periscope to 30 inches below the roof or eave.
- 4) When applicants need to brace periscope structures, the bracing must consist of two galvanized steel members installed at an approximate 90° spread. Braces must consist of a minimum 3/4-inch galvanized steel pipe or 1-1/4-inch x 1-1/4-inch x 1/8-inch galvanized steel angles. [Table 4-2, "Maximum Mast Height Above the Roof Without Bracing"](#) lists the maximum periscope heights that applicants can install without bracing for different types of conduits.
- 5) See [Electric Design Standard 025202, "Methods of Attaching Services to Customer Premises"](#), [Table 4-2, "Maximum Mast Height Above the Roof Without Bracing"](#) and [Figure 4-2, "Unbraced Periscope Structure \(Residential and Nonresidential\)"](#) on Page 4-10 for detailed periscope bracing requirements.

4.10 (continued)

Table 4-2. Maximum Mast Height Above the Roof Without Bracing¹

(IPS) Conduit Size		Maximum Height Without Bracing ⁴
GRS ² or IMC ³	Aluminum	
1-1/4"	2"	42"
1-1/2"	2-1/2"	42"
2"	3"	54"
Larger	Larger	78"

Notes on [Table 4-2](#).

¹See [Subsection 4.14, "Overhead Special Attachments: Heavy Snow Loading"](#), for snow-loading area requirements

²GRS: galvanized rigid steel

³IMC: intermediate metal conduit

⁴Periscope height, without bracing, is limited to 30 inches above the roof if the service drop is installed through trees or if tree branches strike or cause loading on the service drop, per [Electric Design Standard 025202, "Methods of Attaching Services to Customer Premises."](#)

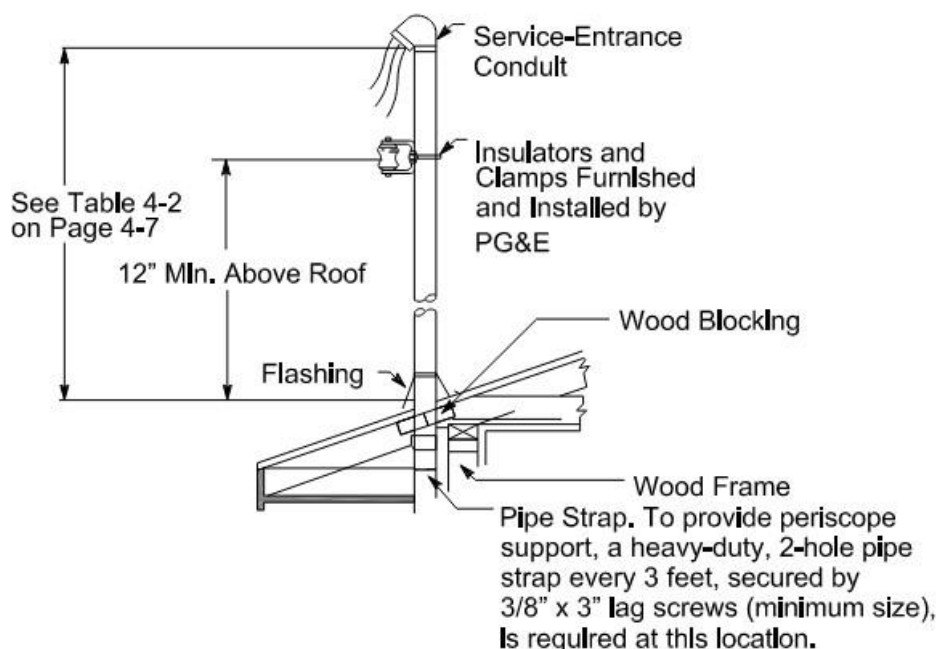


Figure 4-2. Unbraced Periscope Structure (Residential and Nonresidential)

4.11 Overhead Service Weatherhead

1. Typically, applicants should not place the service weatherhead on exterior walls that are less than 2 feet from a common property line.
2. The service weatherhead should be higher than the point of service attachment.
3. Applicable California state laws require applicants to place the service weatherhead so that they maintain the minimum clearances specified in Subsection [4.9, "Overhead Service Drop Clearance Requirements."](#) These minimum clearances also apply to the service drop and the open sites between the service weatherhead and the service drop's Point of Attachment.
4. In some instances, applicants may need to install the service weatherhead and related open wires at an elevation greater than the minimum required clearances. Adding the extra height ensures that the installed service drops maintain the required clearances above the ground and any affected structures. Also, the required clearances may be greater than local electrical codes.
5. A service weatherhead must be located above the service-drop conductor's Point of Attachment; however, the service-drop attachment may be located above the service weatherhead if both of the following conditions are met:
 - If it is impractical to attach the service drop below the level of the service weatherhead.
 - If the attachment point on the service-drop conductor is located less than 24 inches from the service weatherhead.
6. Applicants must ensure that the line length of the open wiring (i.e., drip loop) between the point of service attachment and service weatherhead does not exceed 3 feet.
7. Refer to [Electric Design Standard 022169, "Clearances for Supply Service Drops"](#) for more details.

NOTE

For temporary overhead services, see [Electric Design Standard 025055, "Requirements for Customer-Owned Poles"](#) and [Section 5, "Temporary Power"](#) of the Greenbook Manual.

NOTE

Refer to [Electric Design Standard 094676, "Primary Electric Service Equipment"](#) for technical information on primary services and [Section 8](#) of Greenbook Manual.

4.12 Overhead Service-Entrance Conductors

1. Applicants must furnish, install, and maintain the service-entrance wiring in the applicant's service mast from PG&E's service connections to the applicant's home and all service equipment.
2. PG&E will only connect to one set (run) of service-entrance conductors exiting the mast and weatherhead. Therefore, applicants must install only one set of conductors in the service mast. One set or run is a maximum of three conductors for single-phase and four conductors for three-phase services.
3. When nonresidential applicants plan to install service-entrance wiring larger than specified in [Electric Design Standard 025202, "Methods of Attaching Services to Customer Premises"](#) they must consult a PG&E Job Owner to obtain instructions on attaching the wiring properly before they begin construction.
4. In residential and small nonresidential installations, applicants may install short-radius conduit fittings (i.e. LBs, service elbows) in the overhead service-entrance conduit system. Because this conduit system penetrates the outer building wall, applicants must install the short-radius conduit fittings with covers that prevent water from penetrating the fittings. The covers also must be sealable by PG&E personnel.

NOTE

Short-radius conduit fittings should **not** contain splices or taps.

5. PG&E will not assume any liability for damage to the building caused by roof leakage around such risers or from mechanical failure of the riser, its attachments to the building, or failure of any part of the building.
6. PG&E connects the company's service conductor and an applicant's service-entrance conductor below the service weatherhead.

4.13 Overhead Attachments: Open Wire or Cable

1. PG&E's standard service attachment requirements for residential and nonresidential premises are found in Electric Design Standard 025202, "Methods of Attaching Services to Customer Premises". [Figure 4-3](#) through [Figure 4-5](#) depict attachment methods of PG&E open wire or cable to applicants residential premises. [Figure 4-6](#) depicts the attachment methods of PG&E open wire or cable to applicants nonresidential premises.

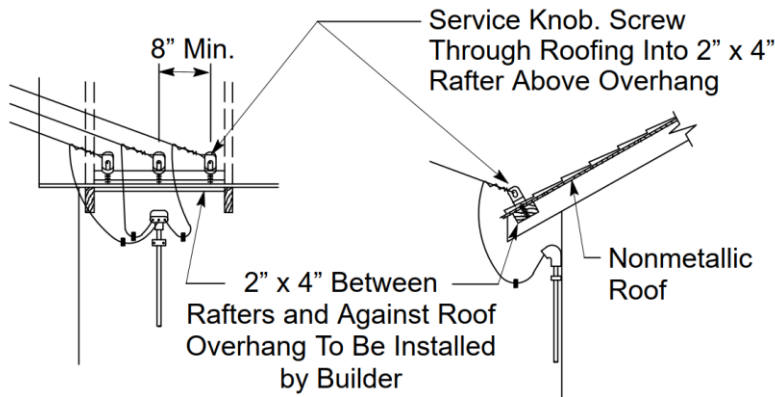


Figure 4-3.
Open Wire

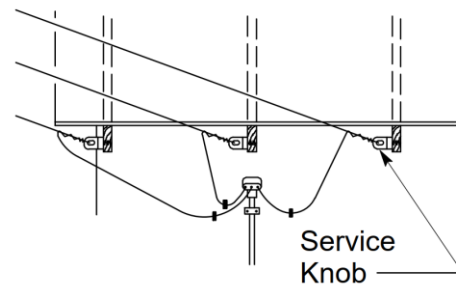


Figure 4-4.
Open Wire
(Open Wire
Shown)

4.13 (continued)

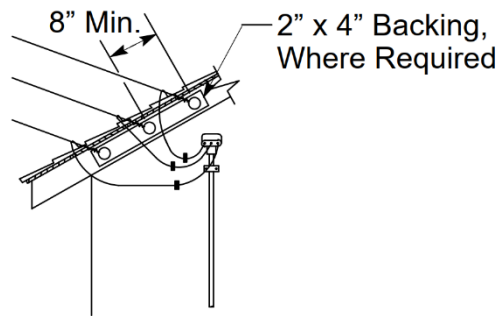


Figure 4-5.
Open Wire or Cable
(Open Wire Shown)

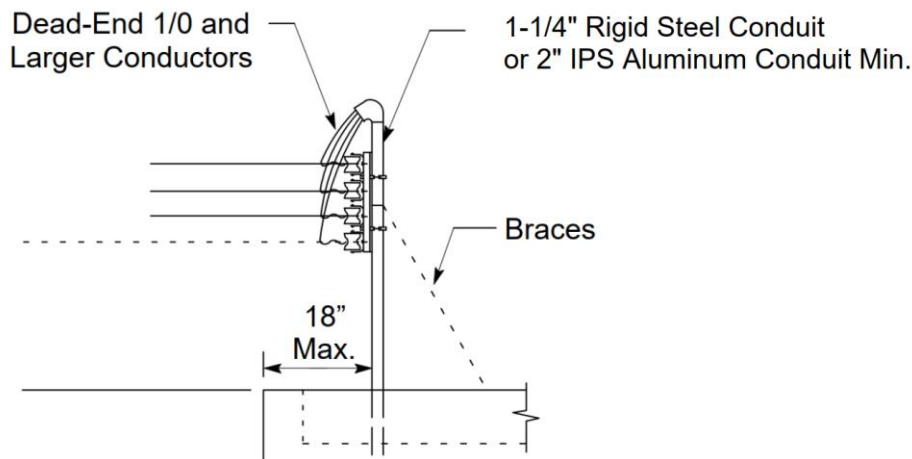


Figure 4-6.
Open Wire Service
#4 to 397.5kcmil Aluminum

4.14 Overhead Special Attachments: Heavy Snow Loading

1. PG&E applies special requirements to service drops installed in snow-loading areas (See [CPUC G.O. 95 Rule 43.1, "Heavy Loading"](#), for definition of "snow-loading area"). PG&E has designed these requirements to minimize storm damage. Position the service weatherhead as high as practical to avoid obstruction by deep snow and [See Electric Design Standard 025202, "Methods of Attaching Services to Customer Premises"](#) for more details.

4.15 Applicant-Owned Wood Poles

1. Applicants must acquire PG&E approval before setting customer owned wood poles.
2. It is critical that applicants who furnish, install, own, and maintain approved wood poles to which PG&E can attach equipment or facilities, or to which PG&E can supply permanent electric service, meet the requirements of Electric Design Standard 025055, "Requirements for Customer-Owned Poles."

4.15 (continued)

3. Applicants must ensure that new poles are branded or tagged. This identification must be either 10 feet from the pole butt for poles less than 55 feet long or 14 feet from the pole butt for poles more than 55 feet long. The brand must include the following four identifiers:
 - a. The manufacturer's name
 - b. The month and year the pole was treated
 - c. The wood species
 - d. The preservative used to treat the pole
4. For poles greater than 40 feet supporting PG&E primary facilities, poles must be through bored at the ground line.
5. PG&E-owned poles that have been removed from service and will no longer be used by PG&E cannot be reused as customer-owned poles.

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5. Temporary Power

5.1 Temporary Power Overview

1. Temporary service is the PG&E electric service with a duration of one year or less.
2. Applicants may elect to use the applicant design option to design temporary facilities normally designed by PG&E in accordance with the applicant design provisions outlined in [Electric Rule 15](#) with charges and refunds under provisions of [Electric Rule 13](#).
3. Applicants must submit their application and follow all AHJ requirements as outlined in [Section 1, "General Information,"](#) prior to energization.
4. The following Electric Design Standards will be used in this section:
 - [Electric Design Standard 025055, "Requirements for Customer-Owned Poles"](#)
 - [Electric Design Standard 036670, "Temporary Underground Electric Service Single-Phase, 120/240 VOLT, 200 Amps Maximum"](#)
 - [Electric Design Standard 062288, "Underground Conduits"](#)

5.2 Temporary Power, 200 Amps or Less ("Express Connections")

1. The following requirements allow applicants to request temporary service under an expedited process known as "Express Connections."
 - a. Single-phase electric service of 200 amperes (A) or less from existing facilities
 - b. For overhead and temporary pole, refer to [Electric Design Standard 025055, "Requirements for Customer-Owned Poles."](#)
 - c. For underground, refer to [Electric Design Standard 036670, "Temporary Underground Electric Service Single-Phase, 120/240 VOLT, 200 Amps Maximum."](#)
2. Submit the following paperwork during the application process:
 - a. A picture of the temporary power pole/post and panel that allows PG&E to see it from ground level to pole top.
 - b. A picture of the PG&E pole or secondary box that will serve the temporary power.

5.2 (continued)

- c. A copy of the city/county permit that includes the project address.
- d. A copy of the approved inspection verification/meter release. A picture of the sticker or tag will suffice only if it includes the project address, date inspection occurred, and inspector who approved.

NOTE

An invoice will be sent after the items above have been received by your PG&E Job Owner.

5.3 Temporary Power, 400 Amps or Greater

- 1. Temporary power for three-phase service rated at 400 amperes (A) or greater shall be processed in accordance with all application requirements as outlined in [Section 1, "General Information."](#)

5.4 Temporary Service Using Permanent Service Panels

- 1. Galvanized Rigid Steel
 - a. To lessen the potential for damage by staples and nails during the construction phase, applicants must use only galvanized rigid steel (GRS) in locations where permanent service facilities will be installed and/or energized before completing the wall. The steel protects the conduit and/or cables from damage.
 - b. Applicants also must protect their grounding conductors against mechanical damage by rigid steel conduit or armor cladding that runs from the main panel to a subterranean location and is embedded in concrete (e.g., garage). The service facilities and the wall must be a permanent and stable structure.
 - c. If couplers are installed, they must be of the same type (GRS) as the conduit. If transitioning from steel to rigid plastic the coupler must not reduce the internal diameter of the conduit. Refer to the steel and steel to plastic couplers located in [Electric Design Standard 062288, "Underground Conduits."](#)
 - d. For the installation requirements of GRS conduit and couplings, see [Section 3, "Underground Electric Services,"](#) Subsection 3.9.4, "Galvanized Rigid Steel Conduit and Couplings."
- 2. As an alternative to constructing a permanent wall to support the meter panel, two flat steel bars that are each a minimum of 1/4 inch thick and 3 inches wide may be permanently cemented into the foundation and run vertically parallel with both sides of the meter panel. The flat side of the steel bars must face the sides of the panel, be long enough to reach the top of the panel and be permanently secured to the panel.

5.5 Temporary Meter Identification and Seals

1. Temporary meter panels, rated up to 200 amps **not** intended for temporary-to-permanent use, may be labeled using handwritten markings, provided the lettering is legible to PG&E or any options listed in [Section 7, "General Metering Information"](#), Table 7-7, "Labeling Options and Requirements," on Page 7-27.
2. All other panels must follow requirements in [Section 7, "General Metering Information"](#), Table 7-7, "Labeling Options and Requirements," on Page 7-27.

5.6 Temporary-Service Metering Pedestal

1. Prior to installing temporary service metering pedestals, applicants must coordinate the location and connection of pedestal service conductors with the assigned PG&E Job Owner and comply with all metering requirements in [Section 7, "General Metering Information"](#) and [Figure 5-1, "Temporary-Service Metering Pedestal."](#)
2. Applicants must install temporary-service metering pedestals as shown below in [Figure 5-1, "Temporary-Service Metering Pedestal."](#)

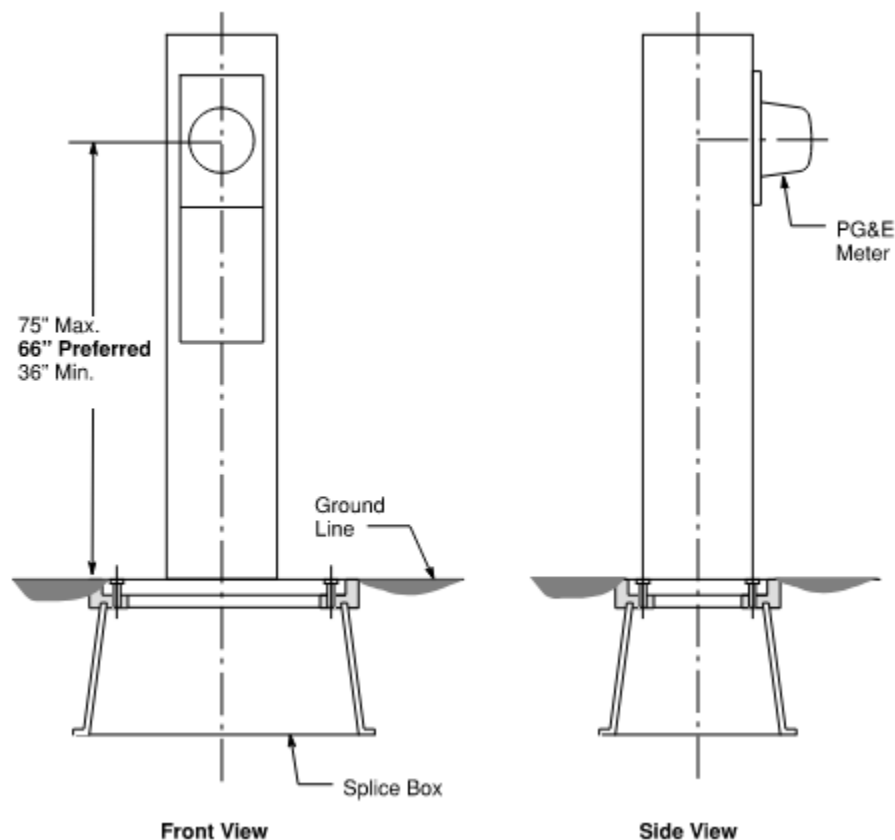


Figure 5-1.
Temporary-Service Metering Pedestal

5.7 Temporary Plug-In Service

1. For temporary plug-in service, Applicants must install per [Figure 5-2, "Plug-In Temporary Service."](#) and [Figure 5-3, "Typical Plug-In Adapter."](#) below.

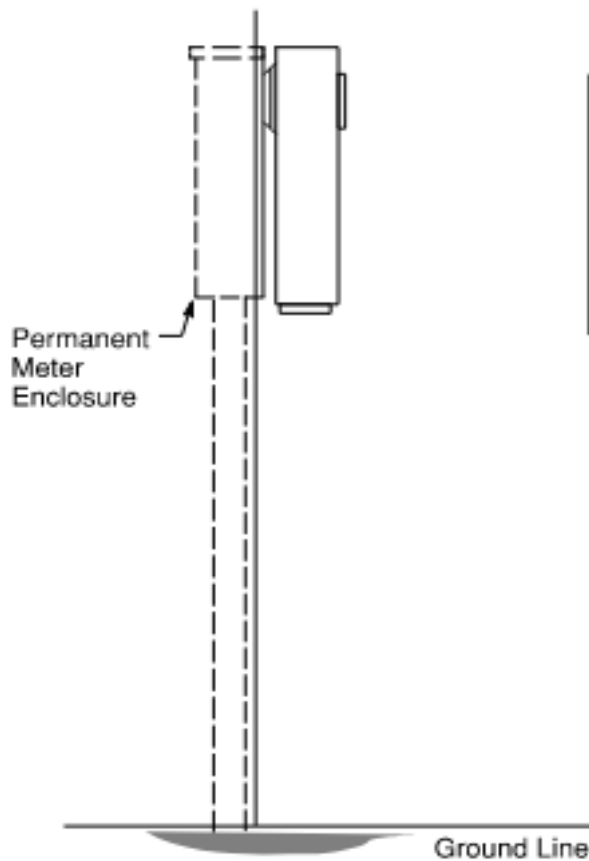
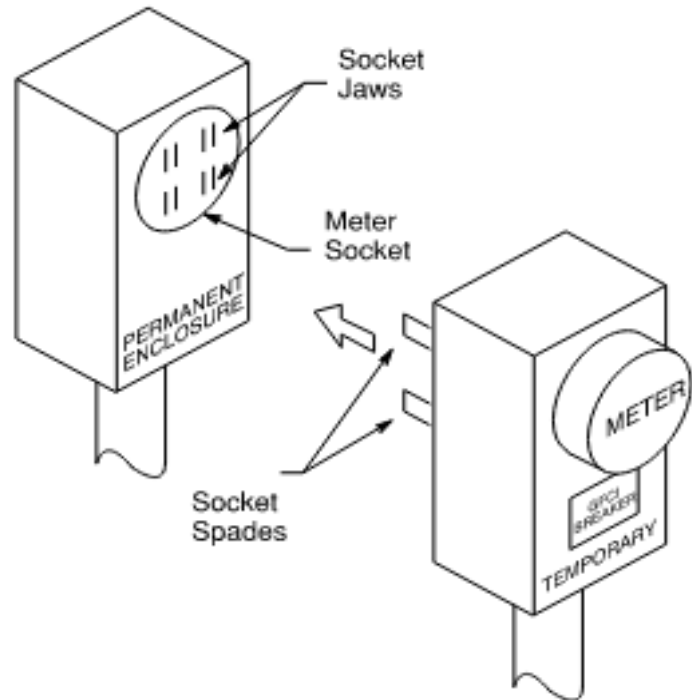


Figure 5-2
Plug-In Temporary Service



Note: Make a neutral connection by attaching a pigtail directly to the neutral with a #4 copper wire.

Figure 5-3
Typical Plug-In Adapter

5.8 Temporary Power Removal

1. To request temporary power removal, contact the assigned PG&E Job Owner or the Building and Renovation Services at 1-877-743-7782.



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6 Electric Generation Interconnection (EGI)

6.1 Electric Generation Interconnection (EGI) Overview

1. Applicants may install customer-owned generation facilities through PG&E's Electric Generation Interconnection (EGI) program.
2. All applicant-generating equipment (examples in [Table 6-1, "Examples of DG and Backup Generation Facilities"](#)) connected either to PG&E's equipment or applicant's equipment must comply with all requirements as outlined in this Greenbook and [Electric Rule 21](#).

Table 6-1. Examples of DG and Backup Generation Facilities

Renewable Resources:	Nonrenewable Resources:
Solar	Natural Gas
Wind	Fossil Fuels for Conventional Engines, Turbines, and Fuel Cells
Water Power	
Farm Waste	

3. Switchboard drawings for **all** co-generation and self-generation installations are submitted to the local PG&E Job Owner for review and approval by the PG&E electric metering department **before** the switchboard is constructed or built.
4. For detailed information and requirements for installing portable or permanent sources of customer generation, see the list below:
 - [Electric Design Standard 060559, "Disconnect Switch Requirements for Distributed Generation Customers"](#)
 - [Electric Design Standard 076249, "Virtual Net Energy Metering Installations"](#)
 - [Electric Design Standard 094670, "Supply Side Interconnection Requirements for Distribution Generation"](#)
 - [Electric Design Standard 094684, "Green Meter Adapter \(GMA\) for Customer Generation"](#)
 - [TD-2306M, "Distribution Interconnection Handbook"](#)

6.2 Connecting Non-Utility Power Sources to Utility Services:

1. The following legislation prevents electricity generated by permanent or portable electric generators from back-feeding into a utility's electrical distribution system, "unless positive means are used to prevent the transmission of electric premises wiring system, or beyond any intentionally segregated parts of such system except when a utility authorizes the interconnection":

6.2 (continued)

- [California Health and Safety Code, Division 104, "Environmental Health," Part 15, "Miscellaneous Requirements," Chapter 5, "Electrical Hazards," Sections 119075 through 119090.](#)
 - [California Code of Regulations \(CCR\) Title 8, Section 2320.9, "Backfeeding or Interconnection"](#)
2. A **positive means** is defined as a device that, when used or operated, interrupts or prevents the flow of current to or from the electrical system. Positive means provides the device operator or user with a visual or definite indication of the existing condition or state of the electrical system.
 3. Applicants must refer to PG&E's [TD-2306M, "Distribution Interconnection Handbook,"](#) for all requirements. See your PG&E Job Owner for access to this document.
 4. For questions related to applicant-owned and operated generator, see [Table 6-2, "EGI Contact List"](#) below.

Table 6-2 EGI Contact List

Generator Type	Contact
Operates in parallel (back feeds) with PG&E's system, or has any battery storage capabilities	rule21gen@pge.com
Will never operate in parallel with PG&E's system or is fueled by natural gas connected to PG&E's gas meter	1-877-743-7782
Will not run in parallel with PG&E's system, do not have battery-storage, and are not fueled by natural gas connected to a PG&E gas meter	800-743-5000

NOTE

See [Electric Design Standard 060559, "Disconnect Switch Requirements for Distributed Generation Customers,"](#) when customer generation systems are installed on their premises.

6.3 Specific Interconnection Requirements for Services Up to 600V

1. Residential and small commercial applicants with generating facilities on their premises who want to take advantage of PG&E's standard net energy metering (NEM) program must meet the following requirements.
2. Small Power Generators (Qualifying Facilities) and Co-Generation Interconnections (Including NEM Interconnection Installations)
3. [Table 6-3, "Requirements for AC Disconnect Switches"](#) on Page 6-3 outlines the requirements for an AC disconnect.

6.3 (continued)

Table 6-3. Requirements for AC Disconnect Switches

Inverter-Based Generators	Phase(s)	AC Disconnect Required
Self-Contained Meter Panel, Socket-Based, 320 Amps or Less (Continuous Current Rating) ¹	Single	No ²
All Other Self-Contained or Transformer-Rated Meter Panels	All	Yes
Non-Inverter-Based Generators	Phase(s)	AC Disconnect Required
All Self-Contained and Transformer-Rated Meter Panels	All	Yes

¹ An ac disconnect is required for all K-base meter panels of any ampacity rating.

² If an ac-disconnect switch is installed, it must be PG&E approved.

- a. A fusible AC disconnect switch is required for generator interconnections ahead of the main breaker (line/supply side connection) and after the meter. Also required is an engraved placard (signage), indicating there is a line/supply side connection, installed on the metering equipment.
- b. A non-fusible AC disconnect switch may be installed if the generation is connected to a dedicated, alternative generation breaker that came manufactured (e.g., solar ready) with the meter panel. For specific requirements, refer to PG&E's [Electric Design Standard 094670, "Supply Side Interconnection Requirements for Distributed Generation."](#)
- c. As specified in [Electric Rule 21, "Generating Facility Interconnections,"](#) and as required by PG&E, the generating facility must have an AC disconnect switch that meets the requirements described in [Electric Design Standard 060559, "Disconnect Switch Requirements for Distributed Generation Customers"](#)
- d. For additional information on disconnect switches and distributed generation requirements, see PG&E's [TD-2306M, "Distribution Interconnection Handbook."](#)

6.4 Virtual Net Metering – VNEM (NEMW)

1. This program allows qualified participants to install a single solar system to cover the electricity load of both common and tenant-metered areas connected at the same service delivery point.
 - a. The metering requirements and interconnection methods described in the [Electric Design Standard 076249, "Virtual Net Energy Metering Installations"](#) may also be applied to renewable electrical generating facilities enrolled in the Net Energy Metering Aggregation (NEMA) or Net Billing Tariff Aggregation (NBTA) programs subject to the requirements identified in Special Condition 3 of NEM, NEM2, and NBT tariffs pertaining to the additional service allowance for the Generating Account.
 - 1) Review PG&E [Electric Rate Schedules](#) website for the latest information
2. Requirements for Generators That Are Not Permanently Connected (i.e., Temporary Connections)

Portable electric generators used as a temporary (nonroutine or nonscheduled) or emergency source of power must be connected in accordance with [California Health and Safety Code, Division 104, Part 15, Chapter 5, Section 119075\(b\)](#).

Connect any portable electric generator that is used periodically as a source of power, either on an as-needed or scheduled basis, as described in [Section 6.3.3., "Requirements for Permanently or Periodically Connected Generators Operating in Non-Parallel with the PG&E System"](#) below. An example would be a generator used to provide backup power for equipment maintenance.
3. Requirements for Permanently or Periodically Connected Generators Operating in Non-Parallel with the PG&E System
 - a. Generators falling under this category must have a disconnect switch that is accessible to, and in a location approved by, the serving utility.
 - 1) These generators must be connected in accordance with [PG&E Electric Rule 2, "Description of Service," Item E.6](#), and [California Health and Safety Code, Division 104, Part 15, Chapter 5, Section 119075\(c\)](#). These rules state that any generator capable of being permanently connected to an applicant's electrical system must be connected only by means of a double throw switch (see [Figure 6-4, "Transfer Switch"](#) on Page 6-5). The switch must isolate the applicant's electrical system from that of the electrical corporation or state or local agency.
 - 2) **Exception:** Generators designed to operate in parallel with the serving utility's system, and approved by that utility, are exempt from these requirements.

6.4 (continued)

- 3) The required double throw switch may be either a manual or automatic transfer switch meeting UL Standard 1008, "Transfer Switch Equipment." Also, see [Figure 6-5, "SLD Manual Transfer Switch"](#) on Page 6-6, the switch may be integral to the generator assembly or the service equipment and must be approved by the AHJ.
- b. For additional information, visit "[Backup Power](#)."

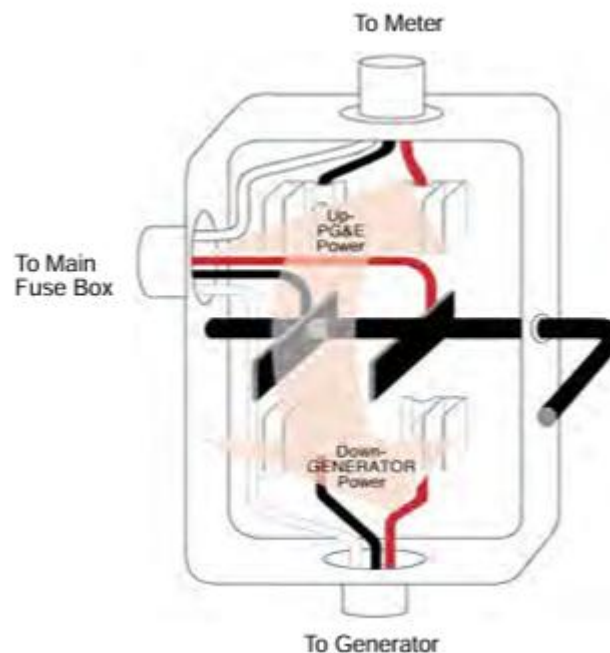


Figure 6-4
Transfer Switch

NOTE

Ensure that the transfer switch is installed after the meter panel on the customer's side, not before the meter panel on PG&E's side.

6.4 (continued)

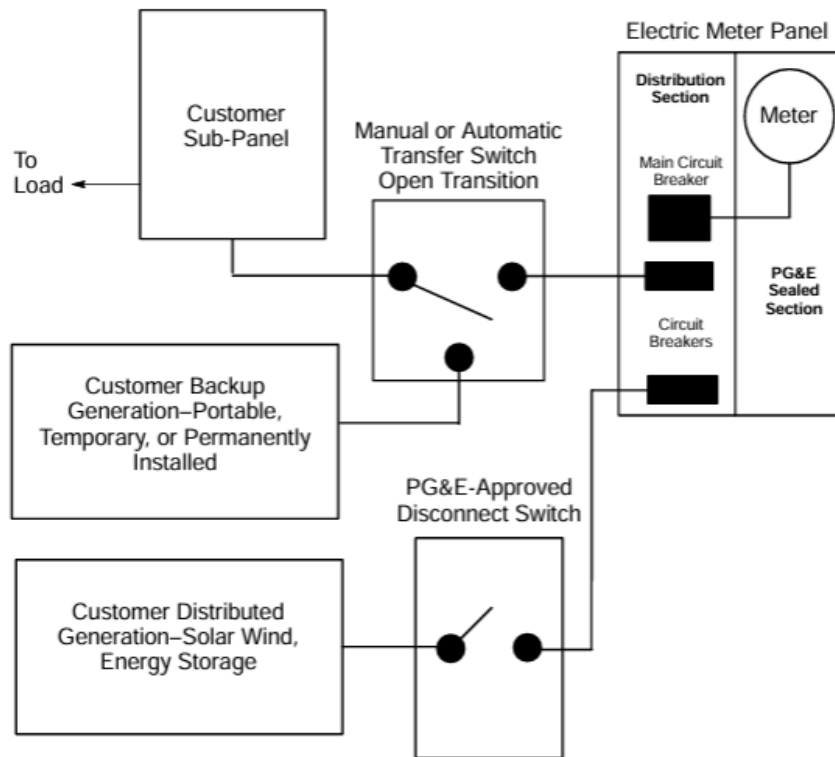


Figure 6-5.
SLD Manual Transfer Switch

Notes in reference to [Figure 6-5](#).

1. Ensure that the automatic or manual transfer (safety) switch is a double-pole, double-throw switch certified to Underwriters Laboratories (U.L.) Standard 1008, "Transfer Switch Equipment."
2. Do not reroute or modify line-side (supply) cables or busing coming from the meter compartment to the distribution section of the panel. Do not modify PG&E-sealed sections.
3. A disconnect switch is required to be installed between the transfer switch and meter panel. The disconnect switch may be exempt from being installed if one of the following conditions are met.
 - If a manual transfer switch is installed, the blades have a visible air gap when switched to the "off" position.
 - If an automatic transfer switch is installed, the transfer scheme is a "break before make" open transition.
 - For some meter panels, a disconnect switch may need to be installed between the transfer switch and customer generation.
4. Requirements for NEM Revenue Metering With a 4-Wire System at the Point of Common Coupling

NEM revenue metering that has a 4-wire system at the point of common coupling also must have a NEM meter panel configured for a 4-wire system (three phases and a neutral). When the normal source of voltage supplying PG&E co-generation metering potentially can be interrupted, PG&E, at its option, may install metering with an auxiliary source of power at the applicant's expense.

6.4 (continued)

5. Requirements for Generators Powering 10 kW (or Less), Stand-Alone, Field-Installed Telecommunication Facilities and Special Applications
 - a. Applicants can own 10 kW (or less) generators used for stand-alone, field-installed, telecommunication facilities and special applications. However, PG&E field personnel performing maintenance and routine testing on electric supply and meter facilities must be able to perform these functions even when applicants are unable to be present.
 - b. Applicants must provide a positive means to prevent their generators from back-feeding into the utility system. This requires installing special equipment, as described in [TD-2306M, "Distribution Interconnection Handbook."](#)
 - c. Usually, these equipment installations are performed in the field. The generator or alternate power source either is integrated with or is made a part of stand-alone equipment and metering facilities. For example, an applicant could install a double throw switch to isolate his or her equipment and power supply and prevent electricity from flowing into the electric metering and supply system.

6.5 Plug-In Electric Vehicle (PEV) Interconnections

1. Residential customers may connect Electric Vehicle Supply Equipment (EVSE) under PG&E's existing [Electric Schedules](#). See PG&E's website [Electric Vehicles](#) or contact us at 1-877-743-7782 for more information.

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7. General Metering Information

7.1 Meter Classifications, Connections, and Electric Service Rating

1. PG&E Meter Panel Amperage Classification.
 - a. PG&E has the current amperage classifications for meter and meter panels:
 - Self-contained meter: 125 amps are Class 100 ampere meters (does not apply to new residential construction)
 - Self-contained meter: 225 amps are Class 200 ampere meters.
 - Self-contained meter: 400 amps/320 amp continuous are Class 320 ampere meters
 - Current-transformer (CT) rated meter: Above 400 amps to maximum of 4,000 amps
2. Meter Connections (Socket Requirements)
 - a. When service cable connections are made at residential or nonresidential customer overhead or underground meter panel, termination enclosure, or pull section, whether the service is left energized or de-energized, the following requirements apply:
 - 1) Cover and seal all meter sockets with an approved blank-off cover (i.e., pie plate) or set the electric meter(s). PG&E material codes for electric meter covers are M249425 and M249559.
 - 2) Seal all sealable covers on the customer-owned service termination and metering equipment using PG&E-approved seals. Do not energize meter panels and sockets unless blank-off meter covers are installed on vacant meter sockets.
 - b. Applicants should use [Table 7-1, "Meter Socket Requirements \(Number of Jaws\)."](#) on Page 7-2, to find specific meter-socket requirements and to ensure they provide the proper equipment.

7.1 (continued)

Table 7-1. Meter Socket Requirements (Number of Jaws)

Service			0-225 Amperes	226-320 Amperes ¹	400 Amperes and Above
Voltage (delta conf. unless noted as Wye)	Phase	No. of Wires	Self-Contained	Self-Contained	Transformer Rated
120/240	1	3	4	4	6
120/208 ²	1	3	5	—	—
120/208Y	3	4	7	—	Min 13 or 15
240 ³	3	3	5	5	8
120/240	3	4	7	—	Min 13 or 15
277/480Y	3	4	7	—	Min 13 or 15

1. A socket-based, Class 320-ampere (continuous) meter will be installed on a Class 400 amp rated meter panel, rated at 80% continuous (i.e., 320 amps). Do not use class 400 K-based (i.e., bolt-in) meters when designing new installations. Services that need 400 amps (continuous) require CT facilities.
2. Single-phase loads that exceed the capacity of a 225-ampere main switch or service-entrance rating usually are supplied with a 120/208Y-volt, three-phase, 4-wire service.
3. Not applicable for new installations.

7.1 (continued)

3. [Figure 7-1, "Connection Diagrams for Self-Contained Meter Sockets,"](#) and [Figure 7-2, "Connection Diagrams for CT Meter Sockets,"](#) below, show the required connections for self-contained and CT meters.

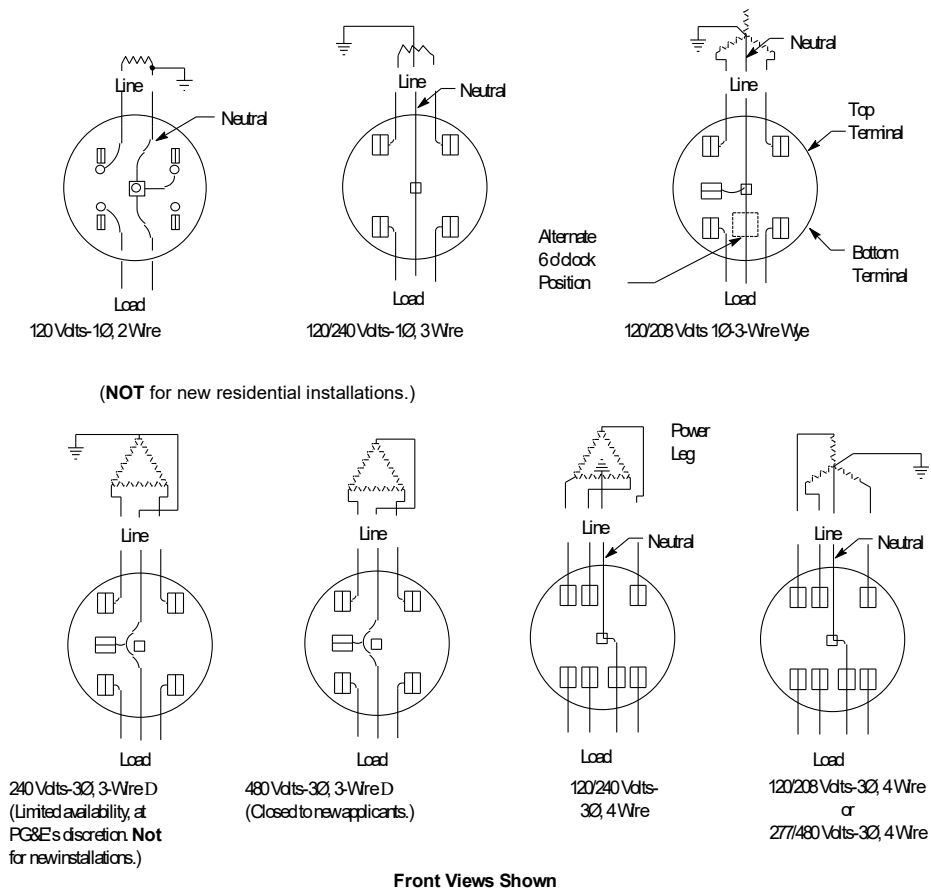


Figure 7-1. Connection Diagrams for Self-Contained Meter Sockets

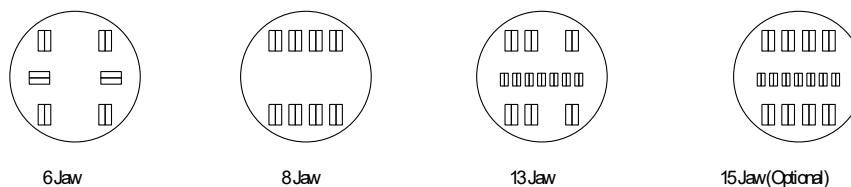


Figure 7-2. Connection Diagrams for Transformer-Rated Meter Sockets

Note: PG&E is responsible for wiring transformer-rated meter sockets.

7.1 (continued)

4. Determining the Electric Service Rating

- a. **PG&E Service Rating:** The current rating in amperes of the electrical enclosure where PG&E terminates and connects its supply facilities and conductors. This electrical enclosure or equipment may be known as the service-termination section, pull can, service section, meter panel, or service-termination enclosure. For overhead services, the service rating is the rating of the electrical enclosure or equipment connected to the weatherhead and mast.
- b. **Enclosure Nameplate Labeling and Rating:** Electrical enclosures must list on their manufacturers' main labels (nameplate) a maximum current rating, in amperes, allowed for the equipment. The label must show the following information:
 - 1) Maximum rating written as a numerical value (e.g., 125, 800, 2,500) and must be acceptable to PG&E
 - 2) Voltage, number of phases, and additional electrical information.
 - 3) Be rate for ultraviolet (UV) radiation and exposure of outdoor environments.
 - 4) Accessible and permanently attached to the outside front of the equipment enclosure and, when applicable (e.g., switchboard), on each individual section.
 - 5) May be attached to the inside of the enclosure's outer door.
- c. For pad-mounted (i.e., free-standing) enclosures, this information typically is listed on the main nameplate labels as the "Supply" rating. See [Figure 7-3, "Nameplate Rating Label Example: Pad-Mounted Electrical Switchboard or Termination Enclosure,"](#) on Page 7-8.
 - 1) When multiple sections are physically connected form a switchboard or switchgear, the supply rating listed on each section, whether bussed or cabled, should typically be the same. A "Section" rating also should be provided as a numerical value on each individual section label. See [Section 8](#), Figure 8-32 on Page 8-39, as an example of one type of switchboard.
- d. Switchboards with a higher bus rating than their supply rating are allowed. However, the PG&E service rating is still the supply rating.

7.1 (continued)

- 1) For wall-mounted panelboards and termination enclosures, the maximum ampacity rating is for the entire enclosure and must be listed on the main rating label independently from any individual component (e.g., main bus, meter socket, main disconnect) rating. See [Figure 7-4, "Label Example: Wall-Mounted Electrical Meter Panel or Termination Enclosure,"](#) on Page 7-9 for an example. The maximum ampacity rating may be titled on the label in any of the following ways:

- Maximum Amps
- Maximum Utility Rating
- Maximum Equipment Rating

- e. If a maximum ampacity rating is not included on the electrical enclosure label, PG&E uses the individual component (e.g., main bus, meter socket, main disconnect, current transformer-mounting bracket) with the greatest rating as the service rating.
- f. If there are multiple ratings or conflicting ratings either on a single electrical enclosure or on multiple enclosure sections that are physically connected (i.e., switchboard, switchgear), PG&E uses the greatest rating as the service rating.

5. Main Service Disconnect

- a. For installations supplying a single main-disconnecting means (i.e., main breaker or main disconnect switch), or for installations without a single disconnecting means (e.g., a service with no main disconnect and only individual disconnects), the rating of the PG&E service to be supplied is the rating of the electrical enclosure where PG&E terminates and connects its service conductors and not the rating of the main service disconnect.
- b. For switchboards, the PG&E service rating is typically listed as the supply rating. For panelboards, the service rating is the maximum ampacity of the panel if listed on the label. If a maximum ampacity is not listed, then the service rating is the greatest rating for any individual component (e.g., main bus, meter socket) in the panelboard. For more information, see [Subsection 7.1.4.a., "Determining the Electric Service Rating,"](#) on Page 7-4.
- c. When a main service disconnect (i.e., switch, fuse, or breaker) is installed, the continuous current (i.e., ampere) rating should not exceed the rating of the electrical enclosure or the rating of the section where it is installed. The main service disconnect may have either the same rating or a lower rating than the electrical enclosure.

7.1 (continued)

6. Overhead Service to Multiple Wall-Mounted Meter Panels or Meter Boxes

- a. When more than one meter panel or meter box is connected to a separate, sealable gutter or other unrated raceway with power supplied from a PG&E overhead service, the PG&E service rating is the aggregate of all meter panel or meter box ratings.
- b. **Example:** Three meter panels rated at 200 amps, 100 amps, and 100 amps would have an aggregated rating of 400 amps (200+100+100).
- c. For illustrations of these types of installations, refer to one of the following two figures:
 - Section 7, "Electric Metering: Residential," [Figure 7-44, "Overhead Service, Grouped-Meter Installation Without a Main Switch \(400 Amps Max, 1Ø or 3Ø\)."](#) on Page 7-67.
 - Section 7, "Electric Metering: Nonresidential, Industrial, and Agricultural," [Figure 7-65, "Overhead Service, Grouped-Meter Installation Without a Main Switch."](#) on Page 7-93.

NOTE

Applicants can use PG&E approved termination enclosures that are manufactured for overhead or underground services and have a maximum ampacity listed on the nameplate labels. The maximum ampacity will be the PG&E service rating. **If a termination enclosure is installed, then do not add up the ratings of the meter panels.**

- d. **Existing Enclosures:** If an existing electrical enclosure where PG&E terminated and connected its supply facilities and conductors does not have a visible rating, then the service rating is the maximum rating of the single main-disconnecting means (e.g., main circuit breaker) or of the aggregated maximum ratings of all the service breakers or disconnects if a main-disconnecting means is not present.
- e. **Agricultural Services:** For agricultural services with a pump motor as the largest load, PG&E recommends that customers install a Variable Frequency Drive (VFD) or similar controller that uses a soft start (SS) system. These types of pump controllers help compensate for in-rush current.
 - 1) For service termination and metering equipment with a main breaker or individual breakers built into the enclosure, refer to the requirements in [Subsection 7.1.5, "Main Service Disconnect,"](#) on Page 7-5.

7.1 (continued)

- 2) For service termination and metering equipment without a main breaker or individual breakers built into the enclosure, PG&E recommends the following types of equipment be installed externally to serve as the main disconnecting means and circuit protection for customer equipment. The following requirements apply.
- **Class R, Dual-Element, Time-Delay Fuses:** These types of fuses also compensate for in-rush current. When Class R fuses are installed, size them to the pump load but do not exceed the PG&E service rating by more than 125%.
Example: A meter panel rated at 200 amps can have one main service disconnect with Class R fuses rated up to 250 amps ($200 * 1.25$). A meter panel rated at 400 amps can have one main service disconnect with Class R fuses rated up to 500 amps ($400 * 1.25$).
 - **Electronic Circuit Breaker:** The electronic breaker rating must not exceed the PG&E service rating. The breaker trip settings can be set to compensate for the in-rush current. See [Subsection 7.8.3, "Electronic Trip Circuit Breakers,"](#) on Page 7-30.
Example: A meter panel rated at 600 amps can have one main electronic circuit breaker rated up to 600 amps ($600 * 1.00$).
 - **Thermal or Magnetic Circuit Breaker:** When a standard circuit breaker is installed as the main disconnect and protective device for the customer circuit, the breaker's maximum rating must be 125% or less of PG&E's service termination and metering equipment rating.
Example: A meter panel rated at 400 amps can have one main thermal or magnetic circuit breaker rated up to 500 amps ($400 * 1.25$).

7.1 (continued)

- When a main disconnect is not installed, and only individual service disconnects are installed on customer equipment, the aggregate total ampacity rating of all the individual service disconnects is allowed to exceed the PG&E service rating by a maximum of 125%.

Example: A meter panel rated at 400 amps can have multiple individual service disconnects with an aggregated rating up to 500 amps. If there are three disconnects, the individual ratings could be 200 amps, 200 amps, and 100 amps or a combination that is 500 amps or less. If there are five disconnects, the individual ratings could be 50 amps, 75 amps, 75 amps, 100 amps, and 200 amps or a combination that is 500 amps or less

Manufacturer	
Switchboard	
Volts	
Phase 3 Wire 4	
Frequency	Section No. 1 of 3
	Date:
Current Ratings—Amperes	
Supply 2000	Neutral 2000
Section 1600	Neutral 2000

Figure 7-3.
Nameplate Rating Label Example: Pad-Mounted
Electrical Switchboard or Termination Enclosure

7.1 (continued)

Manufacturer Name	
Catalog/Model Number	
Maximum Utility Rating	125
Main Breaker	125
Meter Socket	125
Bus	200

Figure 7-4.
Nameplate Rating Label Example: Wall-Mounted
Electrical Meter Panel or Termination Enclosure

Note in reference to [Figure 7-4](#).

As described in [Subsection 7.1.4.B.2](#), on Page 7-4, use the maximum rating listed on the nameplate label for the whole electric meter panel to determine the PG&E service rating. If a maximum panel rating is not listed, then use the greatest rating for any component (e.g., bus) in the panel.

7.2 Applicant's Meter Panel Requirements

1. Applicants must provide, install, own, and maintain the following equipment and structures listed below:
 - a. Ring-type meter sockets, enclosures, switchboards, metering transformer cabinets, switchboard service sections intended for utility use only, and other metering equipment approved by PG&E and EUSERC.
 - Ensure that sockets meet the requirements of UL Standard UL-414, "Standard for Meter Sockets."
 - Ensure that the meter manufacturer designs and fabricates CT meter sockets that are installed on hinged panels for back connection.
 - When CT meters are installed for multiple applicants, there must be a separate service section for each installed meter and its associated service switch.
 - b. For underground service: conduit and electric meter panel manufactured for PG&E's underground service conductors.
 - c. Maintain a satisfactory termination facility on or within the building or structure to be served. PG&E will **not** install services supplied from different electrical sources in the same termination facility unless the services are separated using suitable barriers. When two or more services are in one termination facility, the minimum dimensions of each compartment created by the barriers must be the same as if each compartment were a separate termination facility.

7.2 (continued)

- d. For overhead service: overhead meter panel, service entrance conductors, conduit, and a weatherhead to the point of attachment to PG&E's overhead service conductors.
- e. The use of LB (service elbow) is not preferred on the line side of the service termination. If it is used, it should be accessible and have sealable provisions. Consult a local meter shop for approval.
- f. Applicant Wiring that extends from the distribution section (i.e., branch circuits) must not pass through any PG&E-sealed section.
- g. For 400-amps or larger (Ag, Commercial/Non-Residential) specifically:
 - For Current-Transformer Panels and Switchboards: Lugs, an underground service-termination pull box, and a separate current-transformer cabinet and meter box.
 - Single-metered applicants with single-phase services above 400 amps should consider installing a switchboard.
- h. Meter Socket Adapter Devices

2. Customer Owned Meter Socket Adapter Devices

- a. When using a Meter Socket Adapter for Overhead-to-Underground Conversion, applicants may use approved meter socket adapters to convert existing services but may not use them to establish new service. The applicant must ensure that the meter socket adapter's grounding strap is connected to the grounded wire within the meter panel.
 - For more information, see [Electric Design Standard 061032, "Residential and Small Commercial Overhead to Underground Electric Service Conversion."](#)
 - For Customer-Owned Meter Socket Adapter Devices, see [Figure 7-5, "Customer Owner Meter Socket Adapter Device"](#) on Page 7-11)
- b. MSAs are customer-owned devices that sit between the customer's meter socket and PG&E's electric meter and are approved devices. See [Electric Rule 31, "Customer-Owned Meter Socket Adapter Devices."](#) for eligibility and installation requirements. IF the applicant's work is not approved/cleared, or is deemed unsafe by the AHJ, please refer [Section 1](#), "General Applicant Roles and Responsibilities," on page 1-7.

7.2 (continued)

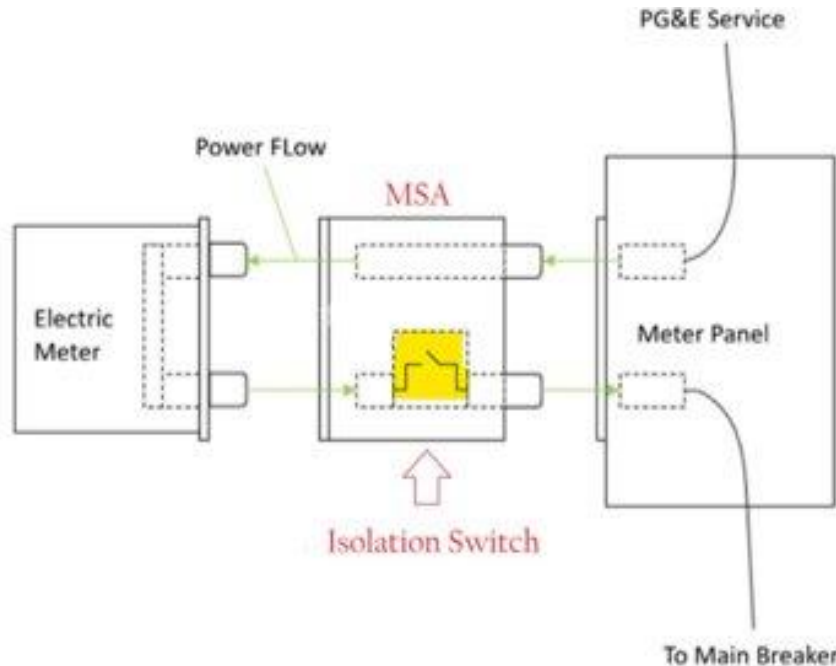


Figure 7-5.
Customer Owner Meter Socket Adapter Device

7.3 Meter Heights and Cabinet Enclosure Clearances

1. Pole-, Pad-, and Wall-Mounted Meter Height and Depth
 - a. **PG&E's preferred meter height is 66 inches** for all individual service-termination and meter-panel installations with **a maximum of 75 inches (includes a 2-inch elevated concrete pad, as required by Authority Having Jurisdiction)**.
 - b. The meter height must be measured from finished grade level to the center of the meter socket. Minimum height is listed below in [Table 7-2, "Minimum Installed Meter Height Requirements"](#) on Page 7-12.

7.3 (continued)

Table 7-2. Minimum Installed Meter Height Requirements

Meter Heights	Height Requirements	
Up to 400 amp (class 320)	48 inches minimum	75 inches maximum
400 amp or higher (CT), This applies to wall-mounted and panel board construction	60 inches minimum	75 inches maximum
Pole-mounted communication equipment	72 inches minimum	84 inches maximum
Indoor self-contained panels, CT panels, and outdoor vertical multi meter stacks	36 inches minimum	75 inches maximum
In locations where snow accumulates, PG&E may require the minimum installed meter height to be increased. Specific meter-height requirements depend on the meter's location. Ask your local PG&E Job Owner to consult the electric meter department for specific meter-height requirements in snow-accumulation areas. ¹		

Notes in reference to [Table 7-2](#):

1. The platform must be made of metal and must include a staircase and safety railing. The platform should follow all minimum California building code requirements and must be approved by the local authority having jurisdiction (AHJ).
2. Refer to [Section 7.2, "Applicant's Meter Panel Requirements,"](#) on page 7-9 for additional meter panel requirements.

2. Meter Enclosure Requirements

- a. The enclosure and service equipment must comply with local code requirements.
- b. **Meter** enclosures are required to have **adequate working space** around the **meter** shown in [Table 7-3, "Meter Enclosure Clearance Dimensions,"](#) below and [Figure 7-6, "Meter Cabinet Enclosure Clearances,"](#) on Page 7-13. The enclosure requires a side-hinged door that can be latched open at 90-degrees or more.

Table 7-3. Meter Enclosure Clearance Dimensions

Item	Dimension
A	11-inch minimum / 15-inch maximum. See Note 1 below.
B	9-inch minimum to the edge of the access opening.
C	10-inch minimum to the edge of the access opening.
D	8-inch minimum from the meter centerline to the top of any protrusion below the meter or to the bottom of the enclosing cabinet.

¹ The 11-inch minimum for Dimension A may be reduced to 8 inches only for residential, wall-mounted, meter cabinet enclosures.

7.3 (continued)

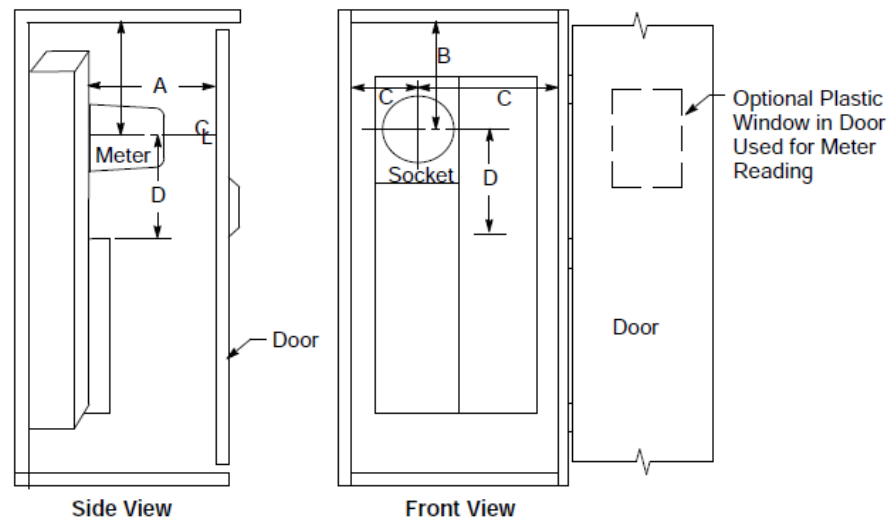


Figure 7-6.

Meter Cabinet Enclosure Clearances

- c. Applicants also must ensure that meter enclosure is maintained and working properly. In corrosive areas a fiberglass enclosure is recommended to help prevent deterioration of the metallic equipment.
 - d. Applicants must ensure that when a meter base is installed on a pad-mount, a 3-foot clearance is maintained between the edge of the pad and the base of the pole.
 - e. For customers who need to install metering equipment less than 300 feet away from biowaste, the new wall-mounted equipment in a NEMA 3X or 4X enclosure provides the internal clearances listed in the above [Figure 7-6, "Meter Cabinet Enclosure Clearances"](#) and [Table 7-3, "Meter Enclosure Clearance Dimensions"](#) on Page 7-12.
3. Communication Service and Meter Equipment.

Applicants must ensure that meter panels installed for communication equipment meet all applicable Greenbook requirements. For metering equipment installed on poles with communication equipment, refer to the requirements specified below.

7.3 (continued)

- a. **Wood Pole Mounted Communication Equipment:** Applicants must ensure that communication service and meter equipment installed on PG&E or joint poles is placed a minimum of 7 feet to a maximum of 8 feet from the finished grade, but below PG&E's equipment. If it is not possible to meet the height requirements, install an electric meter pedestal. For installation requirements, refer to [Electric Design Standard 027911, "Installation Details for Service to Pole-Mounted Communication Equipment."](#) for specific requirements.
- b. **Pad-Mounted Communication Equipment:** When meter panels are attached to communication equipment, they must meet the minimum 48-inch meter height requirements described in [Subsection 7.3.1., "Pole-, Pad-, and Wall-Mounted Meters."](#) on Page 7-11. The upper and lower areas on the back of the meter panel must be securely attached to the equipment using all manufactured mounting holes.
- c. **Steel, Pole-Mounted Communication Equipment:** Before attaching communication equipment to PG&E-owned steel poles, review [Electric Design Standard 094677, "PG&E Metered Electric Service to Antenna and Communication Equipment on Company Owned Steel Streetlight Poles."](#) For service to municipality owned steel streetlight poles that are on a LS-2 rate schedule, review [Electric Design Standard 094678, "PG&E Electric service to Antenna and Communication Equipment on Municipality Owned Steel Streetlight Poles."](#)

7.4 Meter Working Space

1. An applicant must consult a PG&E Job Owner during the initial construction phase of his or her project to determine the appropriate meter panel and current-transformer (CT) cabinet (if installed) location and to ensure that adequate space is provided for the metering equipment.
2. PG&E **does not accept** cable-termination techniques using pin adaptors, cable ringing, or splicing on additional cable.
3. When a sealable gutter protrudes beyond the meter-mounting surface by more than 4 inches, applicants must maintain 10 inches of clearance from the centerline of the meter face. Otherwise, applicants must have a minimum 4-1/4 inches of vertical clearance.
4. All customer-owned metering/equipment will need to be placed outside of PG&E easements and not under PG&E's facilities (OH) and they need to be at least 10' from the outer edge of the pole line per [Electric Design Standard 025055, "Requirements for Customer-Owned Poles"](#) and [Electric Design Standard 065374, "Overhead and Underground Panel Board Construction"](#).
5. When determining an appropriate location, applicants must ensure:
 - a. **Adequate Access to Meters:** PG&E has an unobstructed pathway to meters, accessible 24/7, and properly maintained to ensure safety of PG&E Personnel.

7.4 (continued)

- b. **Proper Working Space Dimensions:** A working space permits access to the equipment and provides a safe working environment for PG&E Personnel. Working space is defined as the whole area in front of the meter panel, the meter enclosure, the CT section, the service-conductor pulling or termination enclosure, or associated equipment. **The working space must always be clear, level, and unobstructed.** See [Figure 7-7, "Enclosed Meter Installation"](#) on Page 7-16 or [Figure 7-8, "Pad-Mounted Equipment"](#) on Page 7-17 for more information.

- 1) Depending on the type of installation, the working space requirement is listed in [Table 7-4 "Metering Working Space Dimensional Requirements"](#) below.

Table 7-4. "Metering Working Space Dimensional Requirements"

Voltage (Volts)	Meter/Service Equipment Type	Minimum Dimensions (Inches)		
		Width	Depth	Height ³
0-600	Wall-Mounted	See Note 2	36	75
	Wall-Mounted Inside Closet	See Note 1	48	75
	Pad-Mounted ⁴ Pedestals (0–200 Amps)	See Note 2	36	75
	Pad-Mounted ⁴ Switchboards, Pedestals (> 200 Amps), Termination Enclosures	See Note 2	48	75
601-25,000	Pad-Mounted ⁴	See Note 2	96	75

Notes in reference to Table 7-4.

1. Closet doors must open a minimum of 90 degrees and not reduce the working space in front of the meters and metering equipment. The concrete (or improved surface) working space may extend to the outside past the closer doors.
2. The width of the working space is the width of all service-termination and metering equipment (connected or stacked) or 30 inches – whichever is greater.
3. The minimum working space height is 12 inches above the top of the pad-mounted equipment, but not less than 75 inches.
4. Ensure all clearances from any obstructions are met.

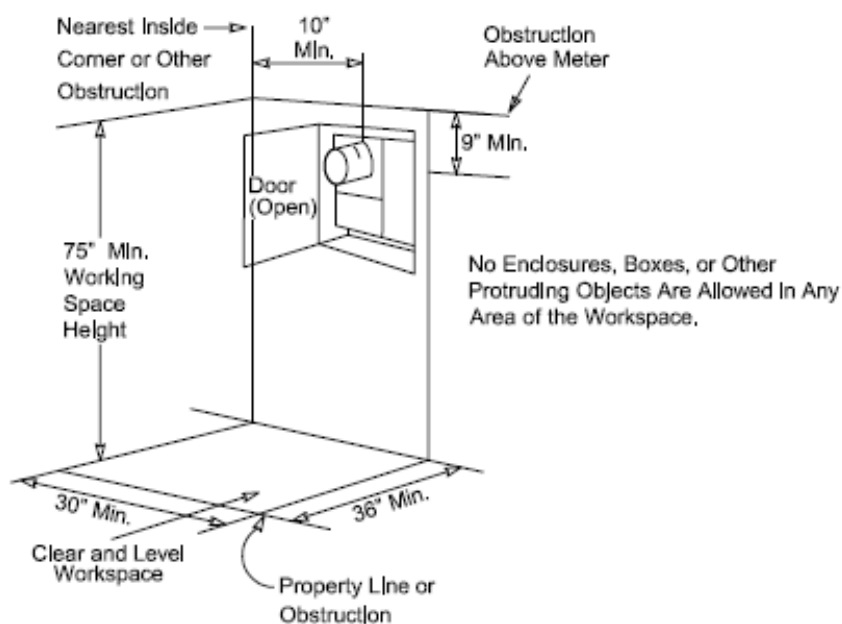
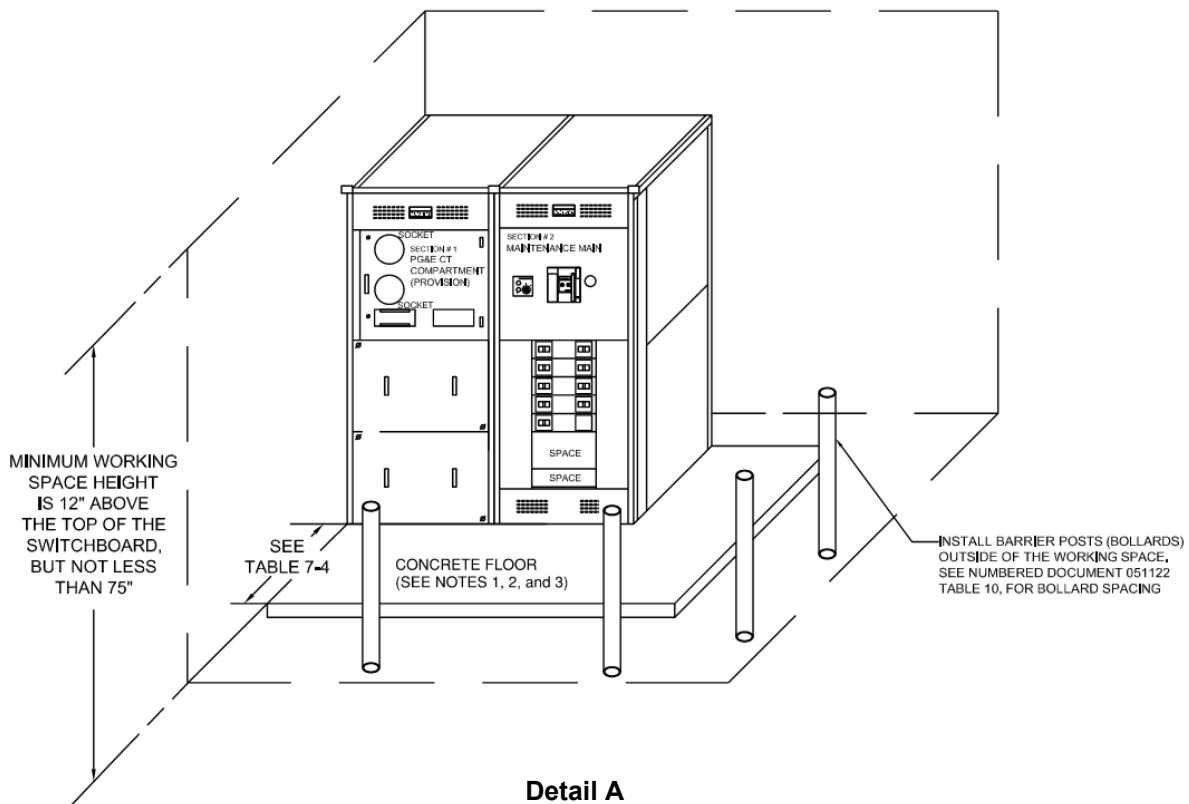


Figure 7-7.
Enclosed Meter Installation

7.4 (continued)



(See Detail A and Note 2)

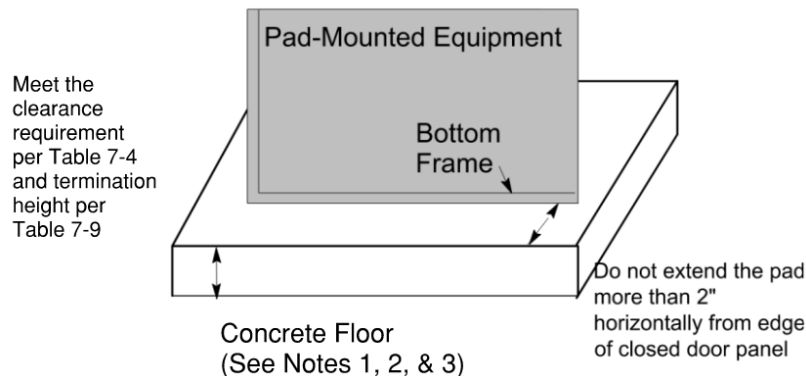


Figure 7-8.
Pad-Mounted Equipment

Notes in reference to [Figure 7-8](#).

1. A level, concrete structure (e.g., floor, pad) must extend out the minimum-required distance in front of all sections to which PG&E requires access. This structure is used for floor-standing equipment (e.g., switchboard, pedestals greater than 200 amps, termination enclosure).
2. The pad-mounted equipment must be set back less than 2 inches from the front edge of a raised pad. The meter height, including the pad, must be 75' or less.
3. For the finished surface type, see [Subsection 7.4, "Meter Working Space,"](#) starting on Page 7-14.

7.4 (continued)

- 2) In areas where either the meters and service termination equipment or the working spaces are exposed to vehicles or hazardous conditions, a permanent barricade outside of the working space is required.
- 3) A suitable barricade for vehicular traffic is concrete-filled steel pipes, either 3 inches or 4 inches in diameter, securely set in an adequate concrete footing for support. Permanently installed posts are required. Do not use removable barrier posts or bolt-down-type barrier posts for metering and service-termination equipment. Within 3 feet of the following areas:
 - Single-family residential driveways or parking areas (including garage areas)
 - Thoroughfares
 - Multifamily or non-residential (i.e., commercial or industrial) driveways or parking areas
 - Commercial refuse container locations
 - Loading docks and freight-handling areas
 - Paved areas without curbs

Within an area that has, in PG&E's judgement, an unusually high risk of vehicular damage, the applicant must install a system of barrier posts (bollards). For information on ordering and installing bollards, see [Electric Design Standard 051122, "Clearances and Location Requirements for Enclosures, Pads, and Underground Equipment," Page 25 through Page 27.](#)

- c. **Level Working Space:** PG&E provides level working space requirements in [Table 7-5, "Level Working Space Requirements"](#) on Page 7-19 to avoid trips and falls using improved surfaces.

7.4 (continued)

Table 7-5. Level Working Space Requirements

Premise Type	Residential (i.e. Single Family)	Non-Residential and Multi-Residential (i.e. Apartment Complex)
Surface Requirement	PG&E requires an improved surface and may be required for safety needs.	Wall-mounted meter panels or pad-mounted, single-metered pedestals up to 200 amps constructed with the same material for the improved surface
Improved Surface Materials Options	Applies to all options below: Width is the same dimensional width of equipment section. Concrete: Minimum 3,000 pounds per square inch (psi), precast pad allowed. Poured concrete must be a minimum of 3 inches thick and have wire mesh or rebar. Stone Pavers: Minimum 3 inches thick, spaced not more than 1/4-inch apart. Asphalt: 2 inches thick on top of 2 inches of angular gravel. Compacted Gravel: Aggregate sized at 1/4 inch to 1/2 inch diameter without sharp edges, compacted to 90% density, surrounded either by a galvanized metal or pressure-treated wood border on each side and connected together.	
Leveling Requirements	Selected improved surface must extend a maximum of 1 inch above grade. All improved surfaces must be completely level, free of all vegetation, and tripping hazards. PG&E may require elevated platforms with permanent safety rails in flood plains or other unstable areas.	

6. Ensure Adequate Clearance Between Electric and Gas Meter Sets

- a. For existing construction (or "reconstruction"), properties constructed prior to the current codes and regulations, applicants are "legacied-in."
 - 1) In situations where an electric meter panel is within 36 inches from the center of the gas riser ("restricted clearance area"), applicants may replace their existing panel with another panel in the same location, up to 200 amps, under the following criteria:

7.4 (continued)

- No new sources of ignition can be placed within a 36-inch radius of the gas regulator vent. A continuous, metallic conduit from a meter socket adapter (See [Electric Rule 31](#)) may run outside the 36 inch radius from the adapter to a new electrical device outside the "restricted clearance area."
- For residential service only, which includes but is not limited to a single detached, multi-family dwelling and HOA complexes with single family or multi-family dwellings, up to 200 amps.
- Single-phase overhead or underground electric service (120/240V with 3 wire and 120/208V with 3 wire).
- For indoor room with electric meter panels and gas meters, applicants must follow gas meter set clearances as stated in [49 Code of Federal Reg 192.353, "Customer meters and regulators: Location."](#) Sources of ignition must be greater than 36 inches from the gas meter.
- Existing conduits (2" min.) and cables are adequate to accommodate the new load. If any trenching is required to provide sufficient underground equipment for the required load, the new meter panel must be relocated to a location that meets all current standards and is considered "new construction". **Field verification by PG&E Job Owners, PG&E Inspectors, or PG&E Qualified Electric Workers(QEWs) may be necessary to verify existing size and type of conduit and cable if the information is not available in PG&E's GIS system. Field verifications are encouraged even if the conduit and cable specifications are available in PG&E's GIS system.** Reusing existing conduit is allowed but there is a potential for conduit failure or collapse. If this happens, then trenching and new conduit installation would be required and applicant must relocate electric meter panel 36" away from the gas regulator vent.

Exception: If the existing cable is directly buried (DB) or cable-in-conduit (CIC), then the panels may be replaced in the same location up to 125 amps, instead of 200 amps. Any panels over 125 amps must be installed with new conduits, require trenching, and considered "new construction" to meet all current standards.

- Gas meter and/or service are not being upgraded.
 - No additional reduction in clearance between the gas meter set and electric meter panel or working space.
- b. For "new construction," applicants are required to build to Greenbook Standards. In this section, "new construction" refers to trenching; upgrades to infrastructure (i.e. cable, conduit, wires); panels that have never been energized or gas meters have never been pressurized; relocation of facilities; and upgrading facilities (see above for exceptions).

7.4 (continued)

- 1) In situations where applicants are installing new electrical equipment not behind the meter (i.e. Meter Socket Adapters, see [7.2.2, "PG&E-Owned Meter Socket Adapter Devices"](#) on Page 7-10), Applicants must follow [Figure 7-9, "Electric and Gas Meter Set Separation Dimensions and Clearances,"](#) below for minimum clearances per [Gas Design Standard J-15, "Gas Meter Locations"](#). This applies to, but is not limited to, communication equipment, non-utility electrical devices, wires, and conduit.

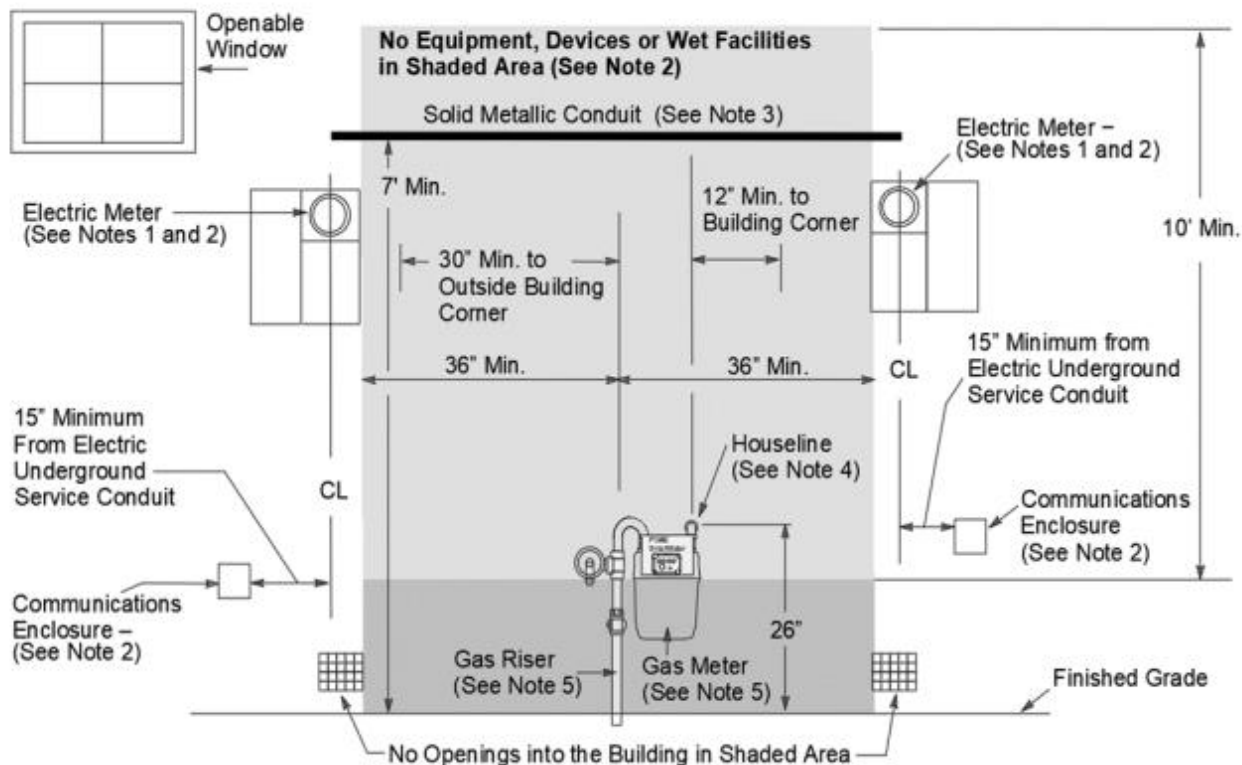


Figure 7-9.
Electric and Gas Meter Set Separation Dimensions and Clearances

Notes in reference to [Figure 7-9](#).

1. Electric meter panel locations are subject to utility approval and must comply with the applicable code requirements. Electric meter clear and level workspace will be enforced per the Greenbook
2. Applicants must not install any sources of ignition or electrical devices or equipment, including wires, cables, metering enclosures, telecommunication enclosures, bond wires, clamps, or ground rods within the shaded area around the gas meter.
3. A solid and continuous metallic conduit without couplings, joints, or connections is allowed to run completely through the shaded area at 7 feet or higher above the finished grade. The continuous conduit may curve outward and out of the top of the shaded area. Service conduit from the electric meter panel to the weatherhead location must not run horizontally along the top of the roof.
4. Place the gas service riser 6 inches to 9 inches from the finished wall. The completed customer houseline at the service delivery point extends 4 to 9 inches out from the finished wall where the meter is to be set and 26 inches above the finished grade.

7.4 (continued)

5. Do not place gas meter sets under display platforms or show windows in commercial buildings. This includes any permanent, elevated display floors or platforms associated with the window, where the purpose of the window is to present a display to the public.
6. Applicant must not install new pressurized or non-pressurized wet facilities (e.g. water spigots, water lines, cleanout drain lines, gutter systems, downspouts, etc.), above-ground or below-ground within 36 inches, as measured in a straight, horizontal line of any gas facilities or electric meter panel and facilities in the shaded area.
7. New above-ground water lines, sprinkler systems, and other objects above grade are not allowed in any part of the working space in front of the electric meter panel and must not protrude outward into the working space farther than the electric meter panel.
8. For a large meter set or multimeter manifold, the minimum separation requirement for sources of ignition, opening to buildings or wet facilities, extend 12 inches beyond the farthest PG&E metering facilities and 10 feet above the highest regulator vent.
9. The minimum dimensions and clearances are good for single diaphragm gas meters up to the 1000 class.
10. No openings into the building within the shaded area around the gas meter.
11. The meter set and regulator vent must not be within any location under building overhangs, where the overhang can direct gas into a building opening or any electrical devices under the overhang.

7.5 Meter Installation Locations

1. PG&E requires applicants to install electric service and metering equipment outdoors, unfenced areas; or mounted on or recessed in an exterior building wall, nearest to PG&E's distribution facilities.
2. Indoor Electric Room Requirements
 - a. **Unobstructed Clearance:** Electric rooms must be clear of obstructions and located inside of buildings on the ground floor or no more than one story below the ground floor. Applicants are allowed to install either stairs or a ramp. The stairs or ramp must start at grade on the outside of the building and continue directly to the meter room.
 - 1) Electric rooms must have a doorway that opens 90 degrees or more directly to the outside of the building that is available to the public (not restricted by locked doors, gates, security personnel, or other forms of restriction).
3. Applicants must consult their local PG&E job owner during the initial construction phase (before installation) of their projects to determine the appropriate meter and current-transformer cabinet locations and ensure that adequate space is provided for the metering equipment. Additionally, the following **specific** location requirements apply to nonresidential metering:
 - a. Locate meters on exterior, ground-floor walls or other permanent structures nearest PG&E's distribution facilities. When outdoor meter locations are **not** practical, PG&E will approve interior locations if they are accessible during PG&E's typical working hours **and** if the interior location meets PG&E's access requirements, as described in [Subsection 7.4, "Meter Working Space,"](#) on page 7-14.
 - b. Group meters for multiple-occupancy buildings at one common location; however, PG&E allows the following **exceptions** to this requirement:

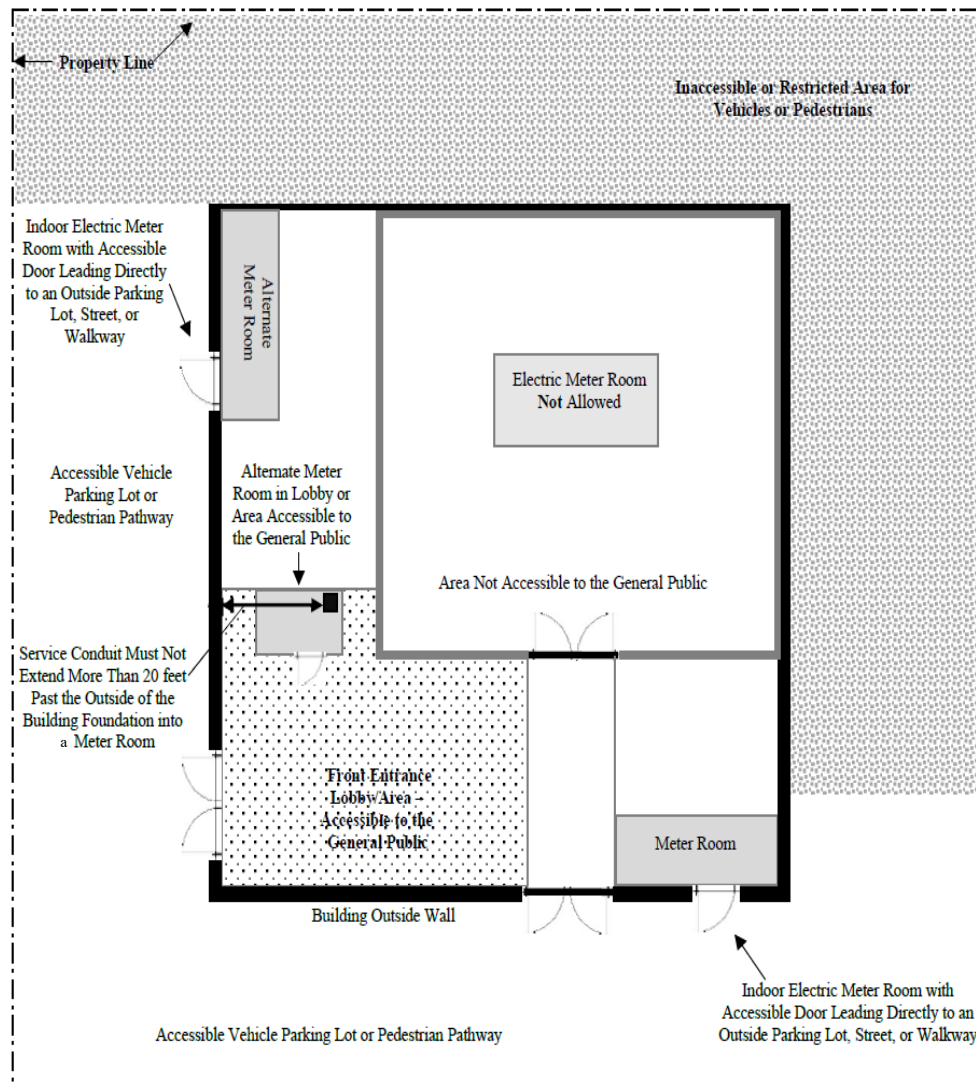
7.5 (continued)

- 1) Installations comply with all applicable codes. When buildings contain unmetered wiring, applicants must place that wiring in PG&E-approved conduit and/or in sealable wireways.
4. PG&E does not permit metering equipment to be located more than 10 feet away or out of the line of sight from the service disconnect means, allowing the applicants to separate the metering equipment and service disconnect means remotely. **Remote metering is not allowed but may be used under excruciating circumstances. Any exceptions must be approved by the local PG&E meter shop before applicants locate meters away from (i.e., remote from) termination enclosures.**
 - a. Submit a drawing that shows the distance (in feet), the accessible path to the remote meter location, and describe the size and type of conduit used to attach to the remote meter.
 - b. Provide clearances and working space, as described in [Subsection 7.4, "Meter Working Space,"](#) on Page 7-14 for both the meter and metering transformer installations.
 - c. Supply and install rigid steel conduit for the meter wiring between the meter and the metering transformers. The conduit must be 1-1/4-inch minimum diameter and must be limited to 50 circuit feet with a maximum of three 90° bends, **unless** sealable, accessible, exposed conduits are furnished. When meters are separated by more than 50 circuit feet, PG&E requires a special review and approval for the installation.
5. Locate the meters and metering equipment either in outdoor, unfenced areas or mount them on, or recess them in, an exterior building wall. Do not mount metering equipment on, or recess metering equipment in, single family residences or inside garages.
6. Locate the meters and metering equipment in a meter room that is accessible through an outside doorway.
7. For a multifamily or residential building, locate the meters and metering equipment in a meter room either on the ground floor or in the basement level (or other acceptable location). The installation must be accessible directly from a public area.
8. In large, multifamily, multistory, high-rise residential buildings where the walking surface of the highest tenant-occupied floor is over 75 feet high, PG&E may, at its option, approve grouped meter locations on one or more upper floors.
9. An applicant who plans to install metering equipment on any floor above the ground floor in a multistory building must contact a PG&E Job Owner as early as possible during the initial stages of the project. Except for qualified high-rise buildings, PG&E will not approve of any equipment location that is above the building's ground level.
10. When meters will be installed indoors see [Electric Design Standard 094683, "Smart Meter Electric Network Requirements for Indoor Meter Rooms and High-Rise Buildings."](#)

7.5 (continued)

11. **Electric Room Design:** Electric rooms must be designed for electric panels (See [Figure 7-10, "Electric Room Design"](#) on Page 7-25) and meet the following requirements:
 - a. Not include gas meters but can be used for communication equipment.
 - b. Install permanent lighting in the room with a minimum illumination of two lights (combined brightness of 30-foot candles).
 - c. Adequately discharge any excess water that may enter the room from the conduit system. Below-grade electrical rooms must eliminate all water intrusion into the room, including through the service entrance conduit system.
 - d. Run PG&E service outside directly into the electric room. The service may not run through multiple rooms/spaces before terminating into the electric room.
 - e. The PG&E service must not extend more than 20 feet past the building's outer foundation into an electric room.
 - f. The doors or doorways should follow the following requirements:
 - 1) **Personnel Doors:** The door(s) should open in the direction of egress and be equipped with panic hardware. For more additional egress requirements, adhere to the IBC and IFC.
 - 2) **Electrical Room Marking:** The outer door(s) should be marked with a plainly visible and legible sign stating, "ELECTRICAL ROOM," large enough to read from 30 feet away.
 - g. May be locked if the applicant provides PG&E with independent unrestricted access to the room 24/7 (i.e. lock box, See [Section 1](#) for more details about acceptable lock boxes).

7.5 (continued)



**Figure 7-10.
Electric Room Design**

Notes in Reference to [Figure 7-10](#).

1. If the electric rooms are located below grade, then the applicant must ensure that an accessible, permanent, and unrestricted walking ramp or stairs is provided starting at grade outside of the building and continuing directly to the meter-room door. Additional doors or gates are not allowed along the walking ramp between the outside and the meter room door.
2. If the electric meter room(s) is located inside a vehicle garage area, either at grade or below grade, and has building entrance gates or locked doors, then the applicant must ensure that the building is accessible to PG&E through a driveway entrance into the garage that is shared with the building occupants, and PG&E is granted access to any locked entrance gates and doors. A shared garage driveway is secondary access and does not eliminate the requirements for a meter room door directly to the outside of the building or a walking ramp (see Note 1 above) to a below-grade electric room.
3. Applicants must ensure that electric rooms are not located in the interior of a building connected by hallways, corridors, or other internal passages. This is not considered direct access from the electric room to the outside.

7.6 Prohibited Meter and Service Equipment Locations

- To reduce the risk of serious injuries and fatalities, PG&E requires all Applicants to factor the conditions listed below ([Table 7-6, "Hazardous Energy Conditions and Prohibited Equipment Locations"](#)) when locating and constructing PG&E facilities avoid future safety incidents.

Table 7-6. Hazardous Energy Conditions and Prohibited Equipment Locations

High Energy Condition	Examples include, but not limited to:
Mechanical: Rotation, vibration, or motion of equipment, machinery, materials, or tools	Equipment in motion
Chemical/Radiation: Exposure to chemicals or chemical reactions in the environment or workplace	Outdoor areas less than 300 feet away from biowaste, toxic, corrosive, or a similar-type of unsafe substances that could be released into the air (not referring to natural gas). Any water source less than 3 feet away
Gravity: Force that attracts the mass of objects towards the earth	Directly above or below any stairway, ramp, or steps where materials could drop
Motion: Change in position of objects or substances	Elevator shaft In traffic medians or areas where there is traffic on both sides of the meter
Pressure: Force per unit area that is exerted by a gas, liquid, or solid	Next to propane tanks
Biological: Living organisms that pose health, safety, or security hazards	Areas where entry may be restricted or controlled because of medical, health, environmental, or other safety-related issues Underground vaults or enclosures making exit difficult
Electrical: Presence or flow of an electrical charge or current	Any area where personnel may contact either exposed, high-voltage conductors
Noise: Sound that is undesired or interferes with hearing	Any area where hearing protection is necessary
Thermal: Temperature of objects or environments (hot or cold)	Any flammable area or excessive heat that can be trapped

7.7 Meter Identification and Meter Protection

1. Properly Identifying and Marking Meters

Table 7-7. Labeling Options and Requirements.

Labeling Options	- An identification plate attached by screws, rivets, or weatherproof adhesive. For outdoor meters, the marking material must have an ultraviolet (UV) protection rating. - Paint that cannot be removed using common solvents. Apply the paint using a stencil. - Acceptable Indoor only: Manufactured decals that will not peel or fade. Unacceptable for Permanent Installation, but acceptable for temporary construction for panels up to 200-amps: Tape-type and label-maker stick-on labels; hand-written lettering (sharpie, paint stick, etc.).
Labeling Requirements	- For multi meter applications, if the street address remains the same, individual meters must be labeled with the appropriate unit number. The street address is required at the termination enclosure or main disconnect. - Applicants must ensure that each individual meter position, its service disconnecting means, and the unit or dwelling being served is marked with the permanent address, the location, or, when applicable, the area being served is marked at each meter location. For meters serving agricultural pumps or other large equipment, mark the ampacity rating of the main service disconnecting means (i.e., breakers, fuses) along with the type of equipment and the nameplate rating. For multiple individual disconnects with a main disconnect, mark the aggregate rating for all of the disconnects installed. - Customers who install distributed generation (e.g., solar, wind, battery storage) that is connected to the electric meter panel are required to install permanent signage affixed to the panel indicating an alternative source of generation is interconnected. If applicants intend to interconnect their generation facilities to PG&E's power system, they must refer to the PG&E Distribution Interconnection Handbook. Signage and maps also are required at the meter panel for the alternating current (ac) disconnect switch location when it is more than 10 feet away and out of the line of sight from the meter panel.

2. Meter Protection

- a. Applicants must ensure that all meters and metering equipment are enclosed in a protective cabinet in the following situations:
 - 1) For all installations, when the meter is 36 inches tall minimum, as measured from center of the meter socket to the finishing grade level (standing ground).

7.7 (continued)

- 2) When the meter is mounted on, or recessed in, any wall at a school or similar establishment and public safety is an issue.
 - 3) When environmental problems are anticipated.
 - 4) When corrosion problems are anticipated or present.
 - 5) When anticipating vandalism.
 - b. When a fence or surrounding structure is approved to be built around service termination and metering equipment (e.g., switchboard, switchgear), the doors or gates leading into the structure must open outward away from the equipment being installed and are expected to be located on the front of the structure.
 - c. If the door(s) or gate(s) into the structure are on the sides or the back of the service termination and metering equipment, the working space depth in front of the equipment is required to be increased to twice (e.g., 4 feet times 2 = 8 feet) the distance. If there are doors on the back of the switchboard or switchgear with PG&E equipment inside, or if there are multiple switchboards inside the enclosed structure, the same requirements apply.
3. Sealing Meters and Metering Equipment
- a. PG&E seals all meters and enclosures for utility meters, metering equipment, and service-entrance equipment using PG&E's seals.

NOTE

Applicants cannot locate or install equipment within meter sections, meter panels, switchboard sections or equipment enclosures with existing PG&E seals unless they receive authorization from the PG&E Electric meter group.

EXCEPTION: Equipment that provides access for replacing over-current protection fuses is exempted.

7.8 Main Service Disconnects and Switching Sequences

1. Main Service Disconnects
 - a. Applicants must furnish and install a fusible switch, circuit breaker, or other approved disconnecting means for controlling all (and only) the energy registered to each installed meter in compliance with applicable codes, local ordinances, and PG&E requirements below:
 - Applicants must place the main service disconnect switch adjacent to the meter(s), not more than 10 feet away and within line of sight.

7.8 (continued)

- All CTs and all three-phase installations must have provisions for sealing or locking all the main service switches or breakers in a permanent (off) position. When installing service equipment of any phase or ampacity that contains multiple service (disconnect) switches, the applicant must ensure that provisions for locking each individual service (disconnect) switch are provided.
- b. If the main breaker or service disconnects are installed in an enclosure, the door(s) for the enclosure also must have locking provisions that accept a PG&E lock or other locking mechanism and can accommodate more than one lock. Do not use a keyed lock handle (e.g., T-handle) to secure enclosures.
- c. The applicant must ensure that the locking mechanism is a permanent installation and that the clip, with a hole for the lock shaft, is made of a rigid metal. The breaker or switch covers can be nonmetallic. Finally, the applicant must ensure that these provisions are sealable and lockable with a padlock having a 5/16-inch lock shaft. See [Figure 7-11, "Circuit Breakers with Locking Provision"](#) below for an example.
- d. Should customers not be able to meet the requirement above, PG&E may exercise [Electric Rule 16](#) and not energize the Applicant.



Figure 7-11.
Circuit Breakers with Locking Provision

7.8 (continued)

2. Main Service Disconnect Switch Rated for Amperes Interrupting Capacity (AIC)

- a. State and local codes require the service equipment's main disconnect switch and fuse, or the circuit breaker, to be rated at the available short-circuit current value.
- b. PG&E designs its facilities so that the short-circuit duty at the service termination will not exceed 10,000-amperes symmetrical for new, single-family, residential applicants that are supplied by an individual service drop or lateral that is rated at 225 amperes or less. This service includes mobile homes and duplexes.
- c. For short-length service drops or laterals rated at 225 amperes or less that are constructed from the PG&E distribution system to the service termination equipment, it is not practical for PG&E to design its facilities to limit the short-circuit duty to 10,000 amperes.

For short-service installations and for all service termination equipment rated greater than 225 amperes, PG&E provides, on request by the applicant, the maximum-available short-circuit current based on the service equipment's capacity. If the applicant increases the service equipment's capacity, the maximum-available short-circuit current may be higher.

3. Electronic Trip Circuit Breakers

- a. Electronic circuit breakers using a trip unit are programmable devices that measure the current flowing through the circuit breaker and initiate a trip signal, when appropriate. An electronic trip unit has multiple dials that can be adjusted to various settings. See [Figure 7-12, "Circuit Breakers with Electronic Trip Unit,"](#) on Page 7-31.
- b. The IR setting is the continuous current value and must not exceed the ampacity rating of the enclosure. It is similar to the capacity or ampacity rating on thermal or thermal magnetic circuit breakers. The IR settings must be indicated on the trip unit. The IR settings typically are lettered and identified on a chart with the corresponding ampacity values. Electronic trip units are available with multiple ratings for each standard frame size.
- c. The circuit breaker frame is the housing that contains the current-carrying and current-sensing components, along with the tripping and operating mechanism. The frame size (e.g., 800, 1,200, 1,600 amperes) is the largest ampere rating available in a group of circuit breakers of similar physical configuration. Other types of breakers may have different frame sizes.
- d. Adjustable electronic trip circuit breakers must not be readily accessible (without use of a specialized tool or equipment) or else must include provision for adjustment settings to be covered and sealed off by PG&E.

7.8 (continued)

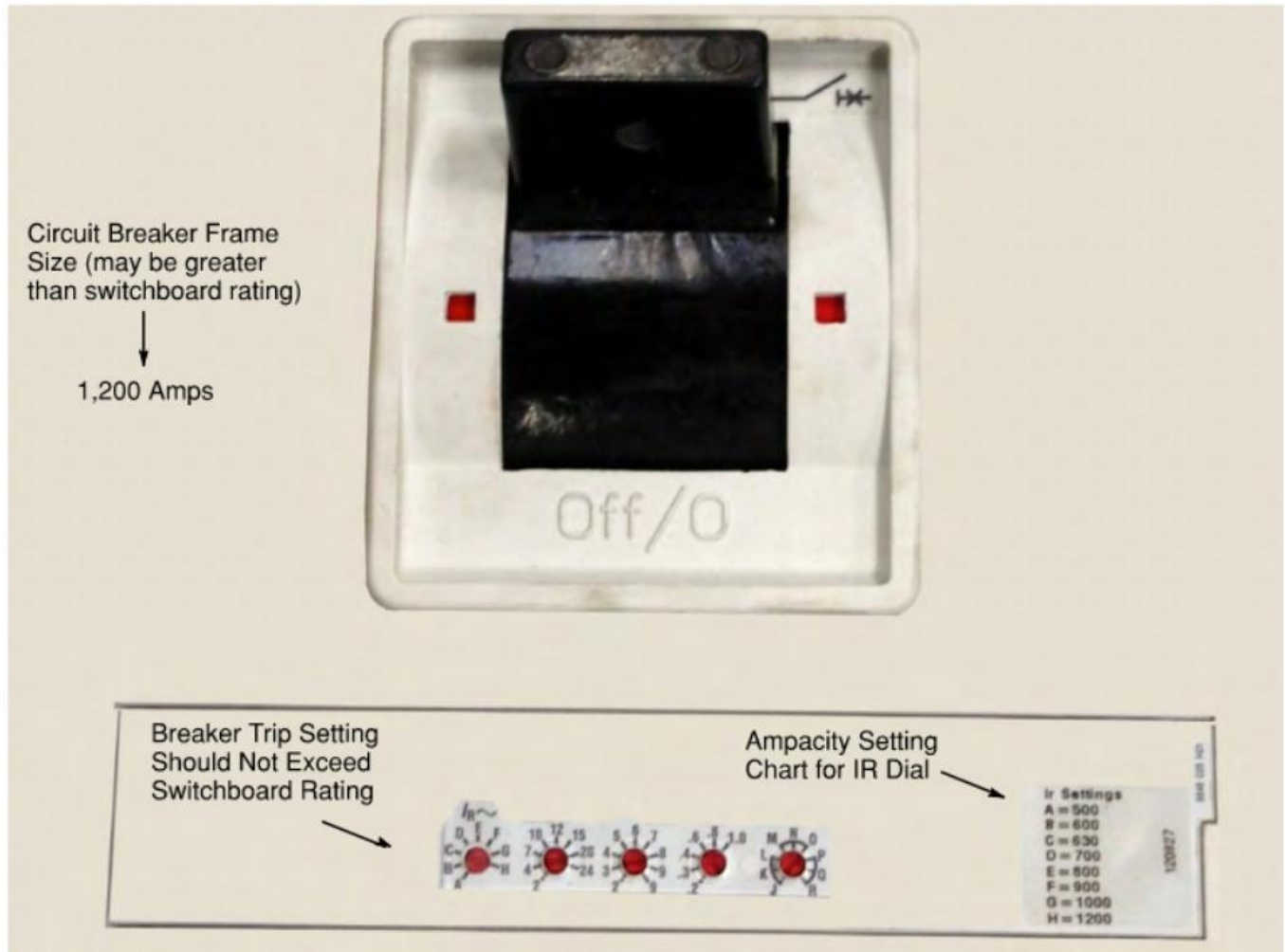


Figure 7-12.
Circuit Breakers with Electronic Trip Unit

Note in reference to [Figure 7-12](#):

1. Match the letter on the IR dial to which the arrowhead is pointing with the letter on the IR setting chart to determine the ampacity setting for the breaker.

7.8 (continued)

4. Meter and Main Service Switch Sequence

- a. PG&E places its meters and metering equipment ahead of (i.e., on the supply side of) the applicant's main service disconnecting means. The following figures on Page 7-33 provide examples of this type of installation:

- 1) [Figure 7-13, "Single Meter with Main Service Switch,"](#)
- 2) [Figure 7-14, "Single Meter with Multiple Service Switches,"](#)
- 3) [Figure 7-15, "Multimeter Disconnect Without Main Switch."](#)

- b. [Figure 7-17, "Multiple Remote Switchboard or Meter Panel Locations,"](#) on Page 7-34, also provides an example of meter and main service switch sequences for large projects with multiple meter rooms or buildings.

Only when the National Electric Code requirements apply, then the applicant's main service disconnect can be installed ahead of PG&E's metering and metering equipment. [Figure 7-16, "Multimeter Installation with Main Disconnect Switch,"](#) on Page 7-33 provides an example of this type of installation. In these instances, an individual disconnect switch also must be installed on the load side of each meter.

- c. PG&E requires a main service disconnect for multimeter installations with more than six meters or individual service disconnects as outlined in NEC. If the circuit protection rating exceeds 125%, PG&E has the authority to not energize per [Electric Rule 16](#) as it may compromise PG&E facilities.
- d. In large meter rooms (i.e. additional metered switchboards may be electrically connected after the main switchboard, or where wall-mounted meter stacks are electrically connected to a tap section of a switchboard), a map and signage indicating where the main service breaker is located are required on each connected switchboard or meter stack.

7.8 (continued)

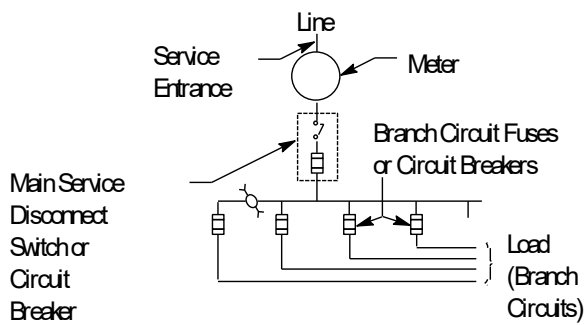


Figure 7-13.
Single Meter with Main Service Switch

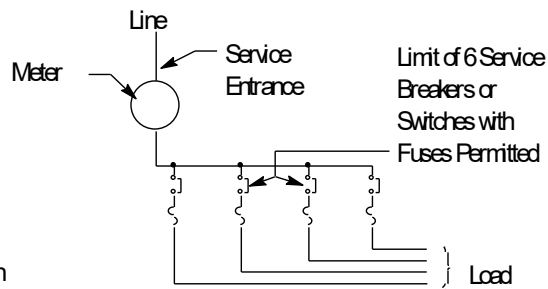


Figure 7-14.
Single Meter with Multiple Service Switches

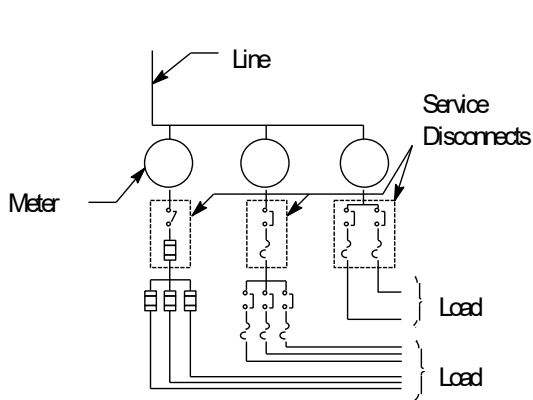


Figure 7-15.
Multimeter Installation without Main Disconnect Switch

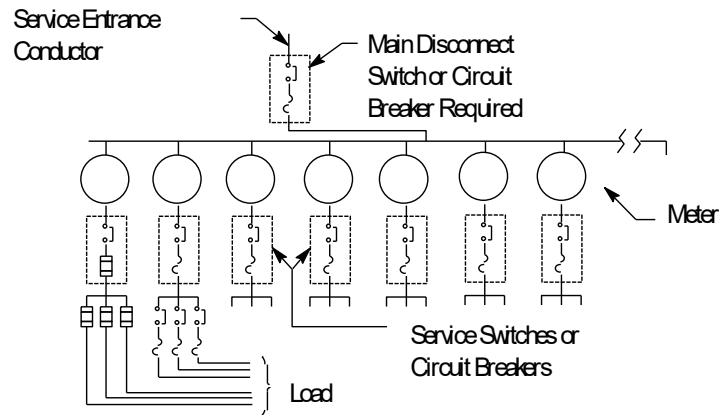


Figure 7-16.
Multimeter Installation with Main Disconnect Switch

7.8 (continued)

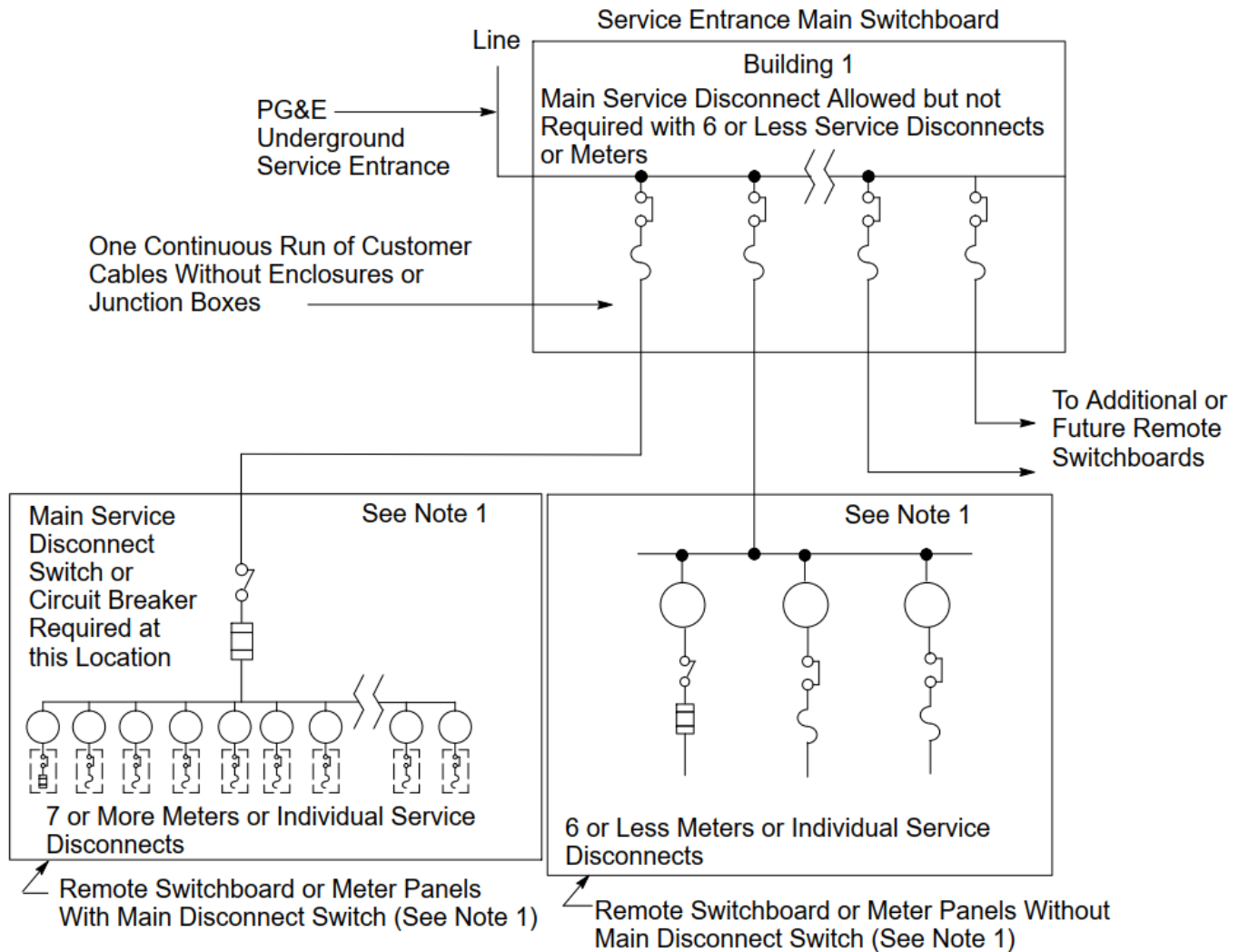


Figure 7-17.
Multiple Remote Switchboard or Meter-Panel Locations

Notes in reference to [Figure 7-17](#):

1. When a switchboard or meter panel is in a different room, floor, or building from the main switchboard, it is considered remote.
2. Customer services installed from the main switchboard to remote switchboards or meter panels must be one continuous run of cables without any entering enclosures or junction boxes along the path.

7.9 Grounding

1. Applicants must bond and ground their electric services and metering equipment as required by applicable electrical codes (i.e. NEC 250.8a and NEC 250.12), local ordinances, and PG&E requirements.
2. Applicants must ensure that a grounded neutral connection, which is required for **safety** and metering purposes, exists in the PG&E-sealed section and is terminated in the same enclosure as the grounding electrode conductor.
3. **Applicants must locate the terminations (e.g., ground terminal) for their grounding electrode conductors outside of any section that PG&E seals.**
Applicants must ensure that their terminations are designed to permit their grounding systems to be isolated, when necessary, from PG&E-supplied services. See Notes in reference to [Figure 7-18, "Grounding Outside of the Sealed Section-Self-Contained Meter"](#) and [Figure 7-19 "Grounding Outside of the Sealed Section-Transformer Rated Meter,"](#) on Page 7-36, specifically Note 3, "Equipment Bonding," which requires a continuous bond wire when grounding outside of the PG&E sealed section.
4. Applicants must **not** perform the following with grounding:
 - a. Use any part of PG&E's gas facilities as part of the electrical grounding system
 - b. Locate their grounding electrodes, grounding electrode conductors, or grounding ring conductors inside or near any PG&E electrical distribution equipment, enclosures, or vaults.
 - c. Attach the bonding and grounding attachments for communication equipment on or near any PG&E sealed sections of the meter panel that would restrict access to the panel doors and meter.
5. Should applicants not be able to meet the requirements above, PG&E may exercise [Electric Rule 16](#) and not energize the electrical facilities.

Table 7-8 Grounding Requirements for Wall-Mounted Panels

	Material			
	Neutral Wire	Customer Cables to Disconnect Switch	Ground Rod and Wire	Bond Wire
Allowed to be Terminated Inside Sealed Sections of Meter Panel	Yes	Yes	No	Yes

7.9 (continued)

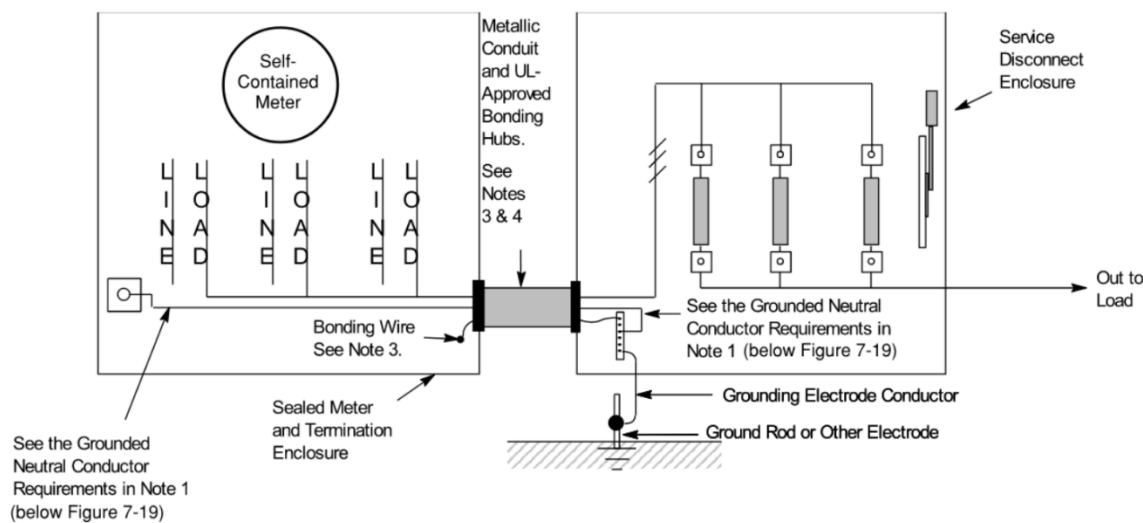


Figure 7-18.
Grounding Outside of the Sealed Section-Self-Contained Meter

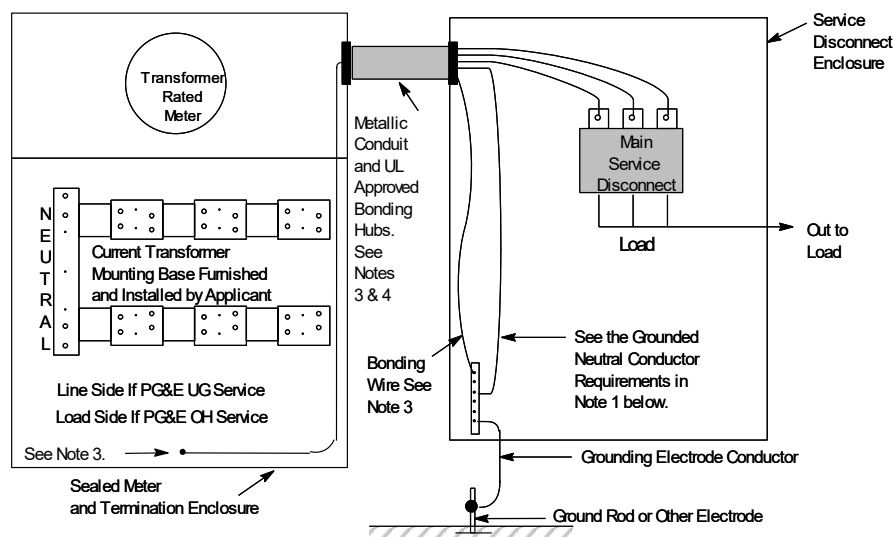


Figure 7-19.
Grounding Outside of the Sealed Section-Transformer Rated Meter

Notes in reference to [Figure 7-18](#) and [Figure 7-19](#):

1. Neutral Conductor: PG&E requires that the neutral conductor be grounded. Ground the neutral conductor by using the preferred methods described in Note 2 and Note 2.a. Or use the nonpreferred method described in Note 3.
2. **Service Disconnect Enclosure:**
 - a. Extend the neutral conductor from the meter panel to the service disconnect enclosure and terminate it to a grounded (i.e., non-insulated) ground/neutral terminal bus as shown in Figure 7-18, "Grounding Outside of the Sealed Section–Self-Contained Meter," and Figure 7-19, "Grounding Outside of the Sealed Section–Transformer-Rated Meter," both above.
 - b. The service disconnect switch and its enclosure must be within 10 feet or less from the service termination and metering equipment and within the line of sight.
 - c. The grounding electrode conductor's termination point and the ground/neutral terminal bus must be in the service disconnect and cannot be in gutters or raceways.

7.9 (continued)

3. **Equipment Bonding:** Install equipment grounding conductor (EGC) between the PG&E service termination enclosure (e.g., meter panel) and the service disconnect enclosure. The EGC is required in this layout. Run the EGC (i.e., bonding wire) through metallic conduit and attach it to the inside of each enclosure. Use Myers hub fittings to connect the conduit with the enclosures. These fittings are Underwriters Laboratories (UL) certified for bonding and are required to connect the conduit with the enclosures. PG&E and the local authority having jurisdiction must approve the conduit and fittings. The customer bond wire must be insulated and is allowed to terminate in a manufactured bond lug installed at the bottom of meter panel.
4. **Conduit:** The conduit diameter size connected to the meter panel must be equal to, or larger than, the diameter of the maximum knockout manufactured in the panel. The approved bonding hubs should not extend out past the edges of the meter panel.

7.10 Smart Metering

1. **SmartMeter Antenna Provision:** Install, own, and maintain a separate, nominal, 2-inch diameter conduit with pull tape inside. The conduit and pull tape must extend from the meter panel or switchboard and terminate in a NEMA 3R, 6-inch x 6-inch x 6-inch enclosure located 8 feet to 10 feet above grade on the outside surface of the building. For more information, refer to [Electric Design Standard 094683, "Smart Meter Electric Network Requirements for Indoor Meter Rooms and High-Rise Buildings."](#)

See [Figure 7-20, "SmartMeter Antenna for indoor meter panels,"](#) on Page 7-38 illustrating an example of the 2-inch conduit route into the 6-inch x 6-inch x 6-inch enclosure with additional working space requirements.

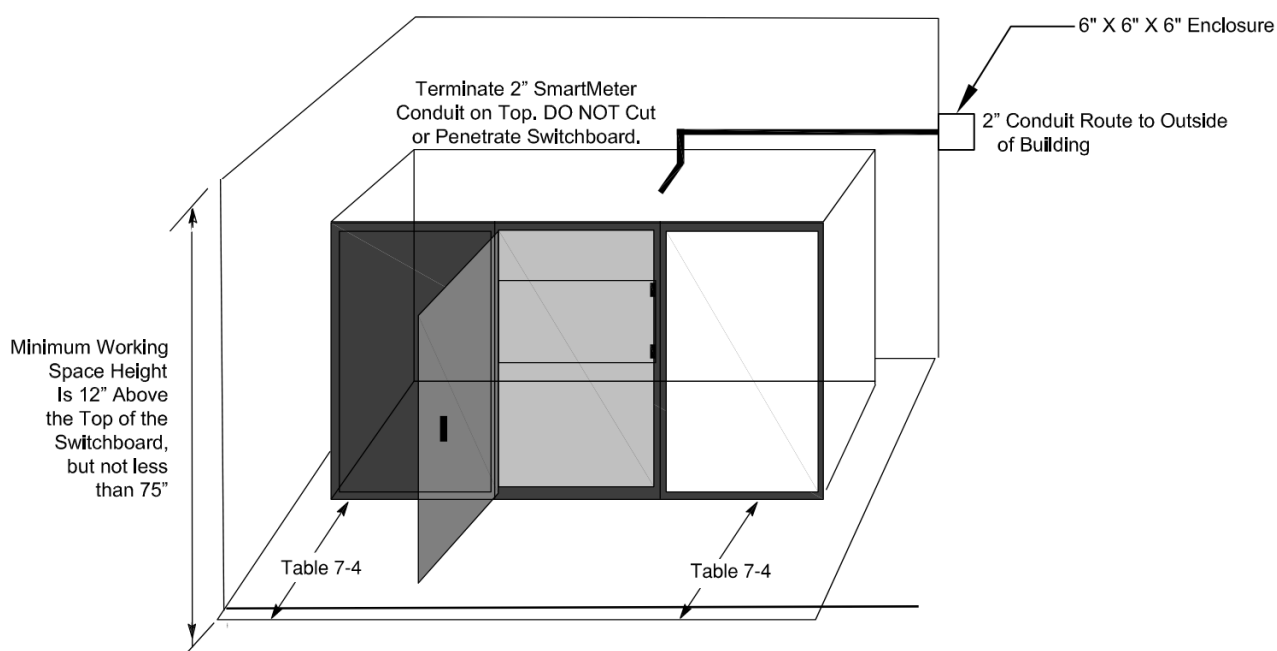


Figure 7-20.
SmartMeter Antenna for indoor meter panels

7.11 Residential Metering

This section includes specific information that is not covered by the basic requirements in [Section 7.4, "Meter Working Space."](#)

1. Specifications and Requirements
 - a. PG&E typically provides electricity for residential and commercial applicants served on a domestic rate schedule with 3-wire, 120/240-volt, single-phase, 60-hertz (Hz), alternating current (AC) service.
 - b. However, the PG&E can supply 3-wire, 120/208-volt, single-phase, 60 Hz, AC service at some locations. This service is limited to a service-entrance rating of 225 amperes (amps). Applicants should contact their local PG&E Job Owner and ask about the type of services that are available for their specific locations.
2. Service Classes
 - a. The 125-amp-rated panels are classified as Class 100. The 225-amp-rated panels are classified as Class 200.
3. Electric Meter Socket Covers and Seals
 - a. When service cable connections are made at residential or nonresidential customer overhead or underground meter panel, termination enclosure, or pull section, whether the service is left energized or de-energized, the following requirements apply:
 - 1) Cover and seal all meter sockets with an approved blank-off cover (i.e., pie plate) or set the electric meter(s).
 - 2) Seal all sealable covers on the customer-owned service termination and metering equipment using PG&E-approved seals.
 - b. Do not energize meter panels and sockets unless blank-off meter covers are installed on vacant meter sockets.
 - c. Test-Bypass Facilities: Both test blocks and test-bypass facilities are used for self-contained metering exclusively.
 - 1) Test-bypass facilities are required for any of the following installations:
 - Single-family residential Service Class 320 meter, or residential meter panels that are larger than 225 amp, 120/240 volt, single phase, 3-wire.
 - Live-work homes, housing, or buildings.
 - Residential meter panels of any size or phase that supply power to elevators.

7.11 (continued)

NOTE

Single-family homes may be exempt if the elevator system has integrated safety features with a backup battery system acting as an emergency power supply.

- All common and tenant area meter panels of any size or phase, at multi-residential and live-work buildings with 2 to 5 units, that supply power to fire alarms or equipment, security alarms, laundry rooms, or significant interior lighting. Significant interior lighting is for hallways, storage rooms or areas, and garage areas.
- All common and tenant area meters at multi-residential and live-work buildings with 6 or more units.

2) Test Blocks for Self-Contained Metering, 0 Amps Through 225 Amps

Test block is a specific type of test-bypass **device**. A test block differs from a test-bypass **facility**, which is any mechanism used to bypass meter sockets.

Applicants must ensure that bypass facilities meet the following requirements and dimensions in [Figure 7-21, "Bypass Facilities for Self-Contained Metering, 0 Amps-225 Amps,"](#) on Page 7-41.

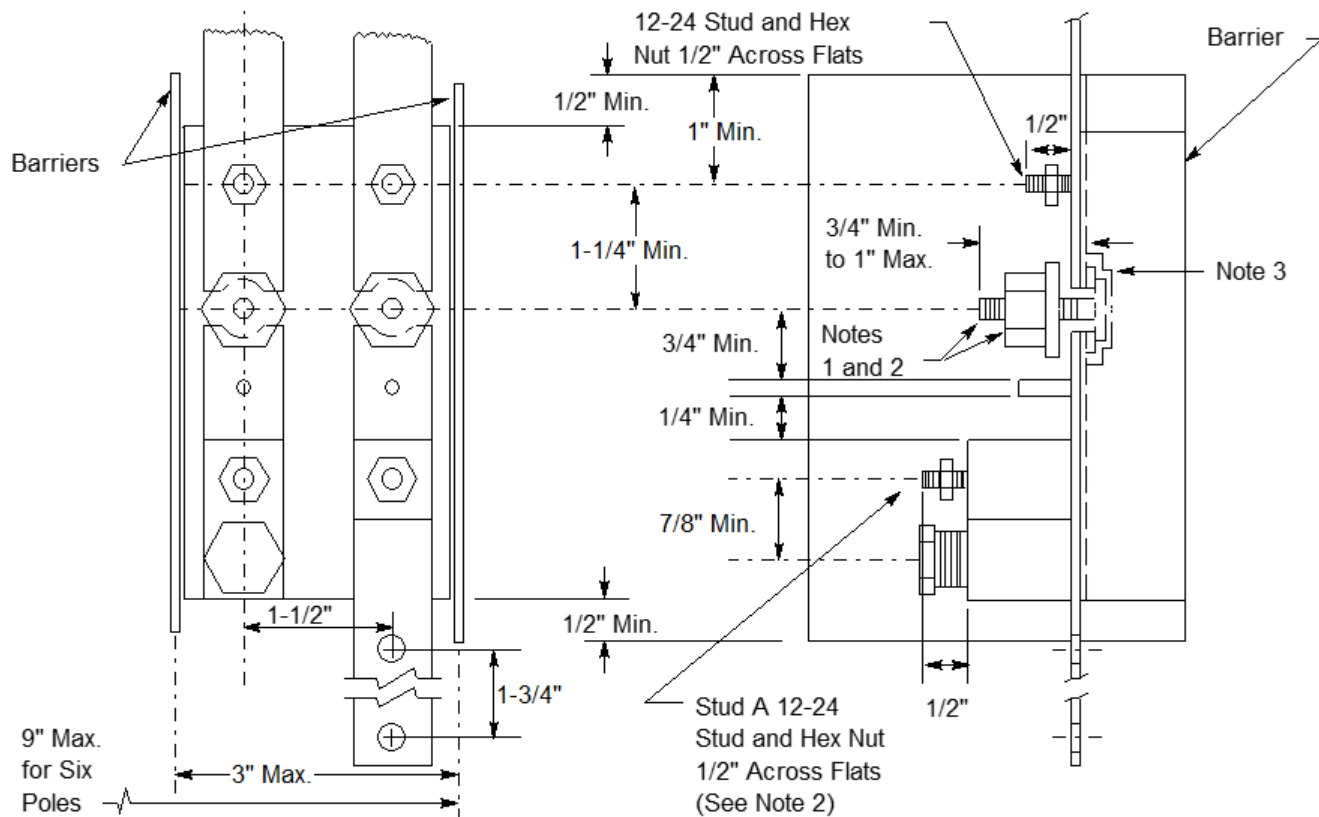


Figure 7-21.

Bypass Facilities (Test Blocks) for Self-Contained Metering, 0 Amps-225 Amps

Notes in reference to [Figure 7-21](#).

1. A hex nut (i.e., 5/8-inch across flats with a copper washer attached) de-energizes the meter socket when backed off.
2. Stud A, located at each conductor terminal, permits PG&E to bypass the applicant's load current. Locate Stud A in the clear area between the terminating lug and the circuit-closing nut. Stud A may be positioned on the terminal body, the terminal screw, the bus member, or incorporated as part of the wire stop.
3. Terminals must be aluminum-bodied and suitable for copper and aluminum conductors. The terminal screw may be an Allen-type (i.e., 3/16-inch across flats for 100-amp meters or 5/16-inch across flats for 200-amp meters). If Stud A is part of the terminal screw, the terminal screw must be a 5/8-inch hex.
4. Do not use an automatic bypass or manual lever bypass. These types of test blocks are not allowed.

7.12 Test Switch Mounting Base Detail

[Figure 7-22, "Removable Test Switch Mounting-Base Detail,"](#) on Page 7-42, shows the base dimensions for mounting a removable test switch.

7.12 (continued)

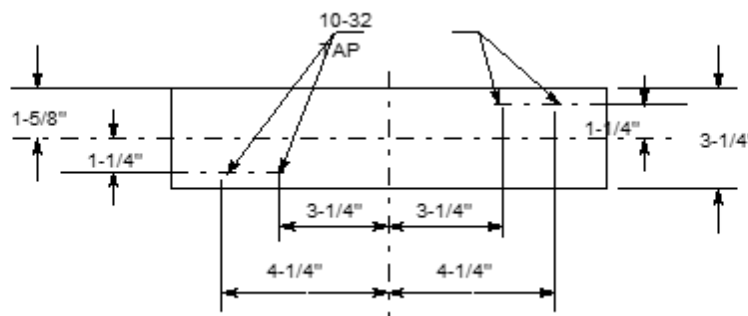


Figure 7-22.
Removable Test Switch Mounting-Base Detail

7.13 Services

Applicants must ensure that all residential service installations comply with the specific conductor, lug, and termination requirements based on their service type and ampere rating. Table 7-9, "Requirements for Amps, Lugs, and Conductors," below, outlines the minimum range for conductor sizes and the necessary lug and termination specifications for underground, overhead/underground combinations, and current transformer (CT) rated services

Table 7-9. Requirements for Amps, Lugs, and Conductors

Service Type	Ampere Rating (Service Class)	Conductor Size Requirements (Minimum Range)	Lug and Termination Requirements
Single Meter: Underground	0 – 125 Amps (Class 100)	#6 AWG to 1/0 AWG	1-1/2" radial clearance from hot bus terminals, and the ground or neutral surfaces ¹
Single Meter: Underground	126 – 225 Amps (Class 200)	#2 AWG to 250 kcmil	1-1/2" radial clearance from hot bus terminals, and the ground or neutral surfaces ¹
Single Meter: OH/UG Combination	226 – 320 Amps (Class 320)	#1 AWG to 600 kcmil	Aluminum-bodied mechanical lugs; range-taking; secured to ensure vertical alignment
Single Meter: CT-Rated (UG/OH)	201 – 600 Amps (1Ø) or 400 Amps (3Ø)	Consult PG&E Job Owner ³	CT mounting base required; includes termination bolts, Belleville washers, and nuts on line and load sides
Multiple Meters (Grouped)	Per Unit (typically 100A or 200A)	Matches individual single-meter requirements	Units follow single-applicant requirements; minimum 7-1/2" horizontal and 8-1/2" vertical center spacing

Notes in reference to [Table 7-9](#):

1. Use separate, independently supported, service-termination lugs that extend from the socket, and connect to it, using a bus bar. The termination facilities cannot be side- or angle-mounted in relation to the front of the panel.
2. Ensure that all cable-termination lugs are suitable to use with both aluminum and copper conductors. The lugs must be compatible with a range of conductor sizes.
3. Applicants must consult their local PG&E Job Owners when single-phase services exceed 400 amps. Applicants may need to install three-phase service to conform to PG&E's [Electric Rule 2, "Description of Service,"](#) requirements.

7.13 (continued)

1. **Single Meter: Underground Service**a. **Services, 0 Amps Through 225 Amps, Single Phase (i.e. most single-family residential homes)**

[Figure 7-23, "Typical Underground Service-Termination Enclosure, Combination Meter-Socket Panel \(Residential, 0 Amps-225 Amps\),"](#) on Page 7-44, illustrates a single, underground, residential, single-phase meter panel (i.e., 4 jaw for a 120/240-volt service and 5 jaw for a 120/208-volt service).

The list below describes an applicant's requirements when designing these types of underground services:

- 1) Design the socket and enclosure for underground service conductors.
- 2) Ensure that enclosures designed for either overhead or underground service entry meet all the requirements for **both** types of service.
- 3) Ensure that the socket enclosure has a separate lug in the sealable section. Use this lug exclusively for terminating PG&E's neutral conductor. If the neutral terminal is insulated from the enclosure, PG&E will provide the applicant with a bonding screw or jumper.
- 4) Ensure that the applicant-owned wiring that extends from the distribution section (i.e., branch circuits) does **not** pass through the sealable section(s).
- 5) Locate the applicant's service-grounding electrode conductor outside of the sealable section and design it to permit the applicant's grounding system to be isolated easily from PG&E's neutral, when necessary.

7.13 (continued)

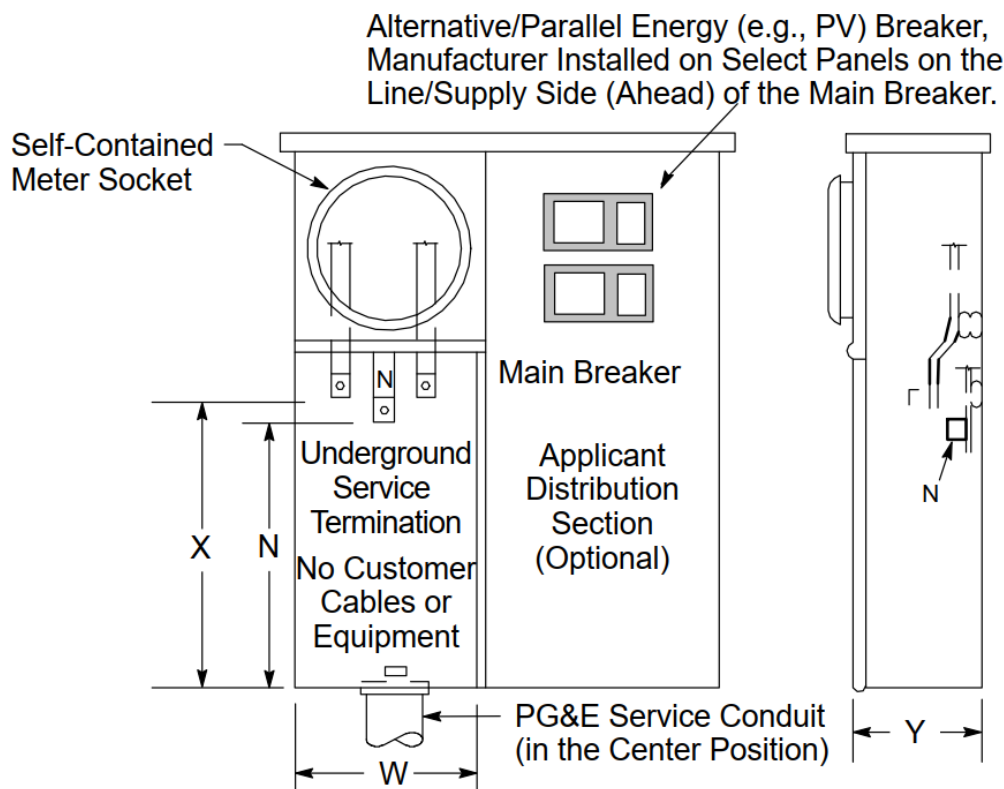


Figure 7-23
Typical Underground Service-Termination Enclosure, Combination Meter-Socket Panel
(Residential, 0 Amps-225 Amps)

Notes in reference to [Figure 7-23](#):

1. These panels are allowed with or without a manufactured-installed alternative energy breaker on the line (supply) side of the main breaker.

Table 7-10. Residential (0 Amps–225 Amps) Enclosure

Rating in Amps	X	Y	N	W	Conduit
	Minimum Dimensions (In Inches)				
Up to 125	8	4	6	6.5	2 – 3
126 to 225	11	5	8-1/2	6.5	

b. Services, 226 Amps Through 320 Amps, 120/240 Volts, Single Phase, Residential

[Figure 7-24, "Typical Service-Termination Enclosure, Combination Meter-Socket Panel for a Class 320 Meter \(Residential, 120/240-Volt, 226-Amp Through 320-Amp Service\),"](#) on Page 7-45, illustrates a single, underground, residential, single-phase, 120/240-volt, Class 320-amp meter panel. For additional images on class 320 panels, refer to [Subsection 7.13.4. "Class 320 Meter Panels,"](#) on page 7-55.

7.13 (continued)

Applicants must ensure that the panel:

- 1) Conforms to the requirements for underground-fed, 320-amp metering equipment
- 2) Is designed with test-bypass facilities and has provisions for using manual bypass links.
- 3) Is marked with either a rating of "320 Amperes Continuous" or "400 Amperes Maximum (320 Amperes Continuous)."

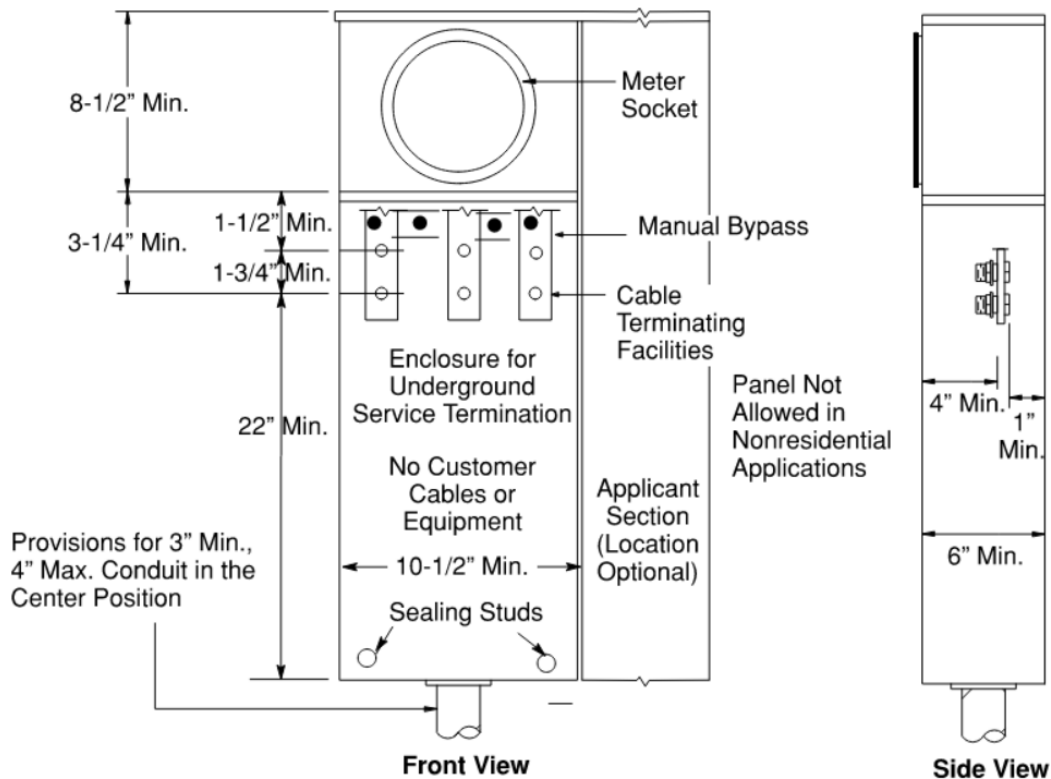


Figure 7-24.

Typical Service-Termination Enclosure, Combination Meter-Socket Panel for a Class 320 Meter (Residential, 120/240 Volt, 226-Amp Through 320-Amp Service)

c. **Services, 201 Amps Through 600 Amps, Single Phase or 400 Amps Three Phase with Current Transformers**

[Figure 7-25, "Underground Combination Meter and Current-Transformer Cabinet \(201 Amps–400 Amps; 1Ø or 3Ø\)."](#) on Page 7-46, illustrates a single-metered, underground, residential meter panel.

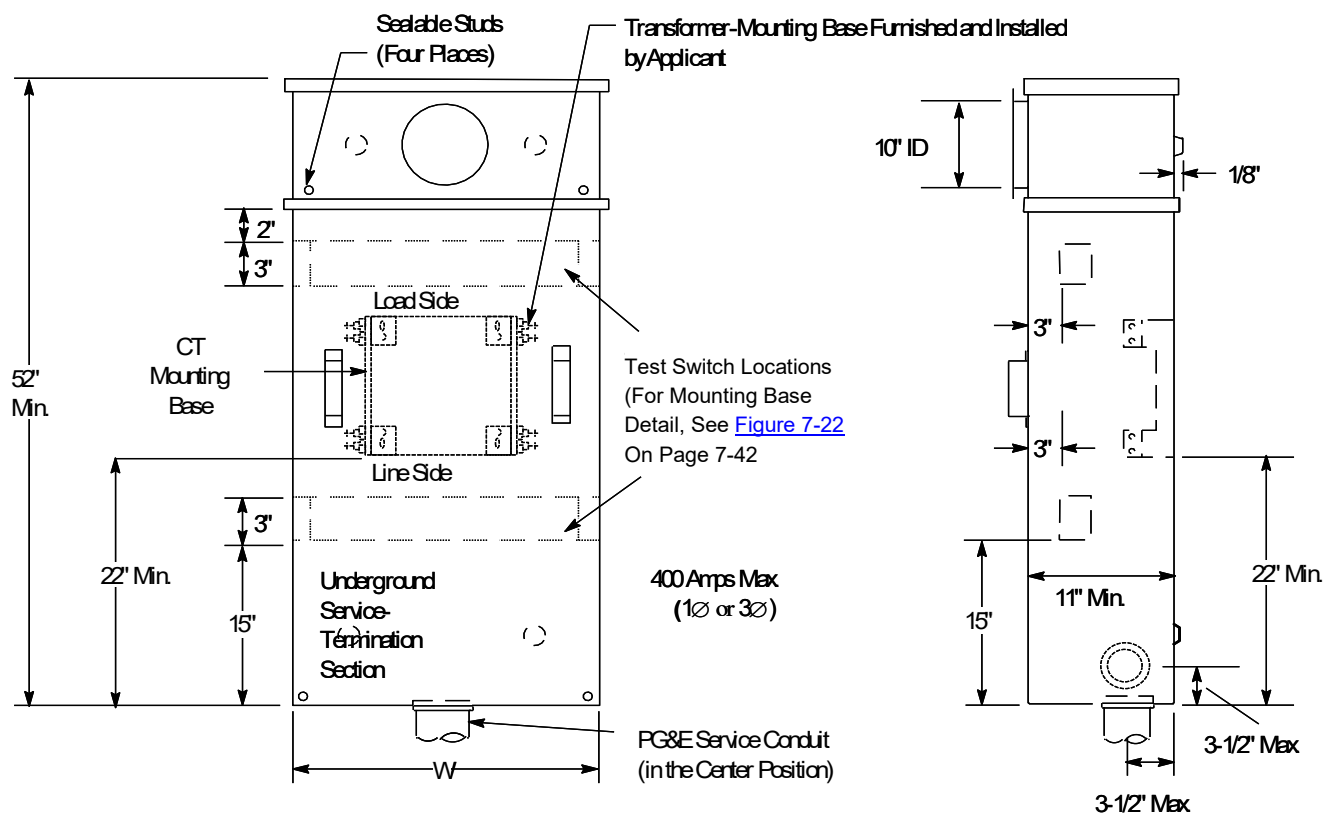
[Figure 7-26, "Typical Underground, Separate-Bused, Current-Transformer Cabinet and Safety-Socket Meter Box Assembly, 201 Amps–400 Amps, 3Ø and 201 Amps–600 Amps, 1Ø."](#) on Page 7-47, illustrates how service and metering components can be separated into individual enclosures.

7.13 (continued)

Applicants **must** consult their local PG&E Job Owner when single-phase service exceed 400 amps. Applicants may need to install three-phase service to confirm to PG&E's [Electric Rule 2, "Description of Service,"](#) requirements.

Applicants must ensure:

- 1) Applicant's service-entrance conductors are installed before PG&E installs the current transformers.
- 2) The current-transformer mounting base must include termination bolts, Belleville washers, and nuts on the line and load sides necessary to connect the PG&E current transformers and service conductors to the line side.
- 3) The applicant conductors must be terminated on the top (load side) of the current-transformer mounting base or termination enclosure busing. Applicant conduit must not be installed within 2 inches of the PG&E service entrance conductors. Applicant conductors must be routed properly to ensure they do not cross in front of or behind the PG&E conductors and conduit and do not obstruct the PG&E current-transformers or test switch areas.



WDimensions:
 3-Wire 1Ø = 24" Min.
 4-Wire 3Ø = 36" Min.

Figure 7-25.
Underground Combination Meter and Current-Transformer Cabinet
(201 Amps-400 Amps, 1Ø or 3Ø)

7.13 (continued)

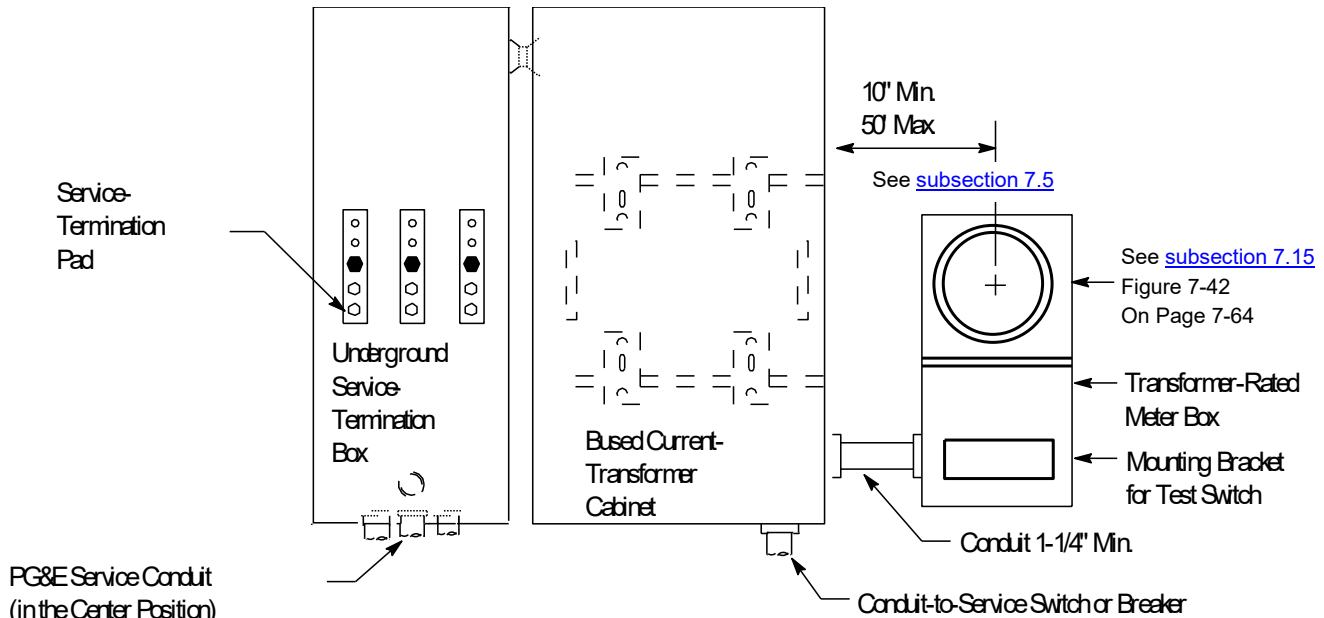


Figure 7-26.

Typical Underground, Separate-Bused, Current-Transformer Cabinet and Safety-Socket Meter Box Assembly (201 Amps-400 Amps, 3Ø and 201 Amps-600 Amps, 1Ø)

2. Single Meter: Overhead Service

a. Services, 0 Amps Through 225 Amps, Single Phase

[Figure 7-27, "Combination Meter Socket Load Center,"](#) on Page 7-48, illustrates the 4-terminal, 120/240-volt and 5-terminal, 120/208-volt overhead service and meter panel. Individual meter socket boxes that do not have a main breaker as part of the panel are not allowed.

7.13 (continued)

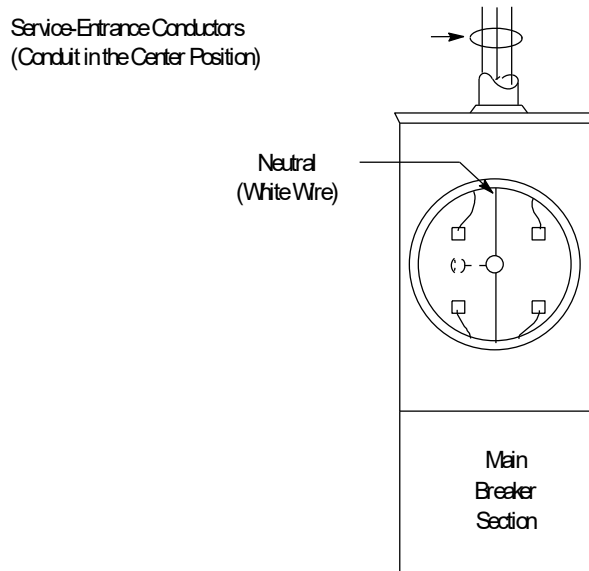


Figure 7-27.
Combination Meter Socket Load Center

Notes in reference to [Figure 7-27](#):

1. Allowed only for single-family residential homes.

b. Services, 226 Amps Through 320 Amps, 120/240 Volts, Single Phase

See [Figure 7-28, "Typical Combination Meter and Service Termination Panel for a Class 320 Meter \(Residential, 120/240-Volt, 226-Amp Through 320-Amp Service\)"](#) on Page 7-49 for illustration.

Applicants must ensure that the panel:

- Conforms to the requirements for overhead-fed, 320-amp metering equipment.
- Is designed with test-bypass facilities and has provisions for using manual bypass links.
- Is marked with either a rating of "320 Amperes Continuous" or "400 Amperes Maximum (320 Amperes Continuous)."
- Is used only with residential services.

7.13 (continued)

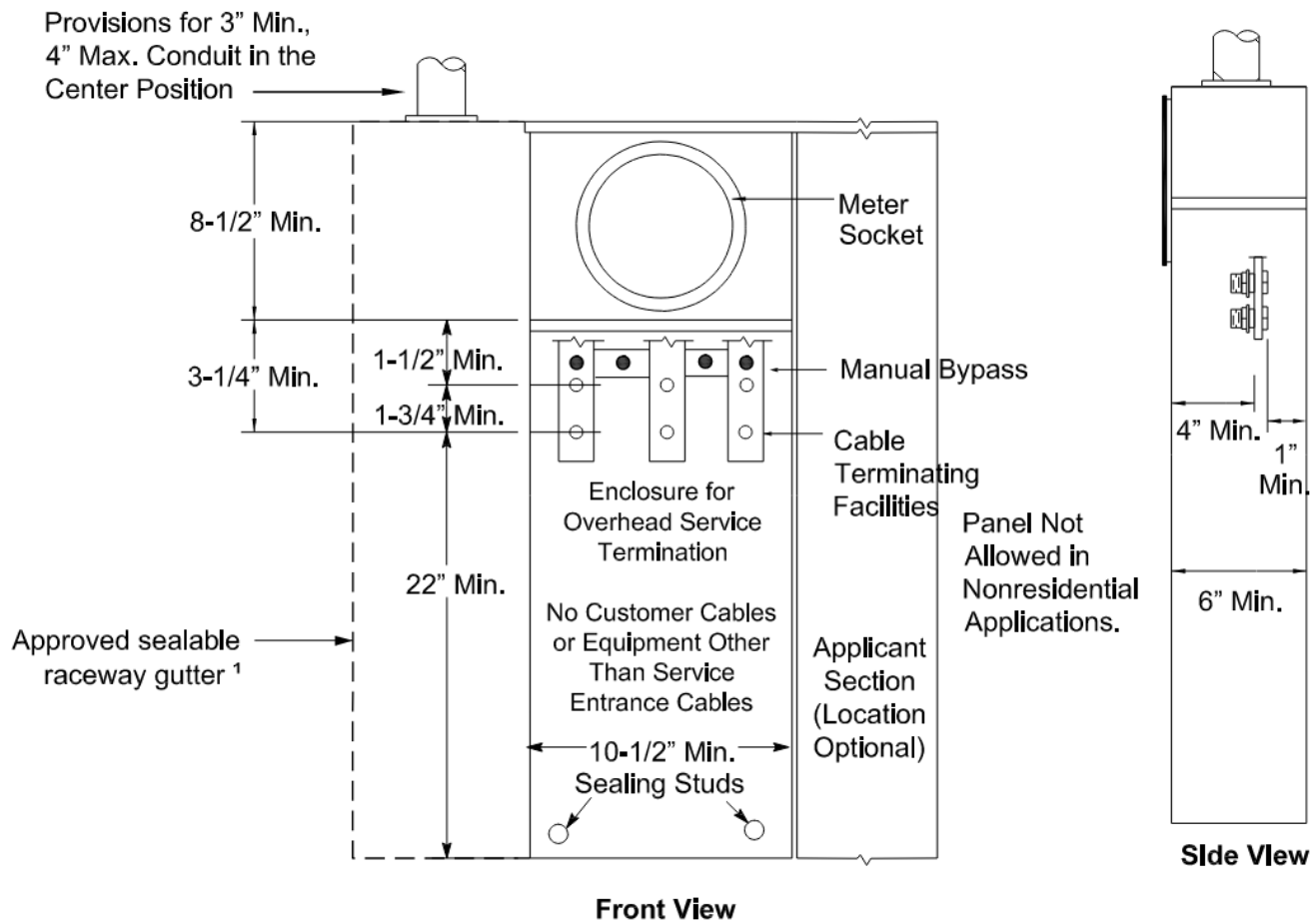


Figure 7-28.
Typical Combination Meter and Service Termination Panel for a Class 320 Meter
(Residential, 120/240-Volt, 226-Amp Through 320-Amp Service)

Notes in reference to Figure 7-28.

1. For additional images on class 320 panels, refer to [Subsection 7.13.4, "Class 320 Meter Panels,"](#) on page 7-55.

c. Services, 400 Amps, Single Phase or Three Phase, with a Current Transformer.

Applicants **must** consult their local PG&E Job Owner when single-phase service exceed 400 amps. Applicants may need to install three-phase service to confirm to PG&E's Electric Rule 2, "Description of Service," requirements.

[Figure 7-29, "Overhead-Fed Combination Meter and Current-Transformer Cabinet, \(201 Amps-400 Amps, 1ø or 3 ø\),"](#) on Page 7-51, illustrates a single-metered, overhead, residential meter panel.

7.13 (continued)

[Figure 7-30, "Overhead-Fed, Separate-Bused, Current-Transformer Cabinet and Meter Box \(201 Amps-400 Amps, 1 \$\phi\$ or 3 \$\phi\$ \),"](#) on Page 7-52, illustrates a single, overhead, residential, single-phase or three-phase service and meter panel with current transformers.

Applicants must ensure:

- Applicant's service entrance conductors are installed before PG&E installs the current-transformers.
- The service entrance conductors are connected to the line and load sides of the current-transformer mounting base.
- The current transformer mounting base must include termination bolts, Belleville washers, and nuts on the line and load sides necessary to connect the PG&E current transformers. See [Subsection 7.14 "Electric Metering Components and Cable Terminating Facilities,"](#) for details about these internal components.
- The applicant's service entrance conductors must be terminated on the top (line side) of the current-transformer mounting base or termination enclosure busing.
- The applicant's load conductors must be terminated on the bottom (load side) of the current-transformer mounting base or termination enclosure busing.
- Applicant conduit must not be installed within 2 inches of any corner of the cabinet.
- Applicant's conductors must be routed properly, ensuring they do not obstruct the PG&E current-transformers or test switch areas.

7.13 (continued)

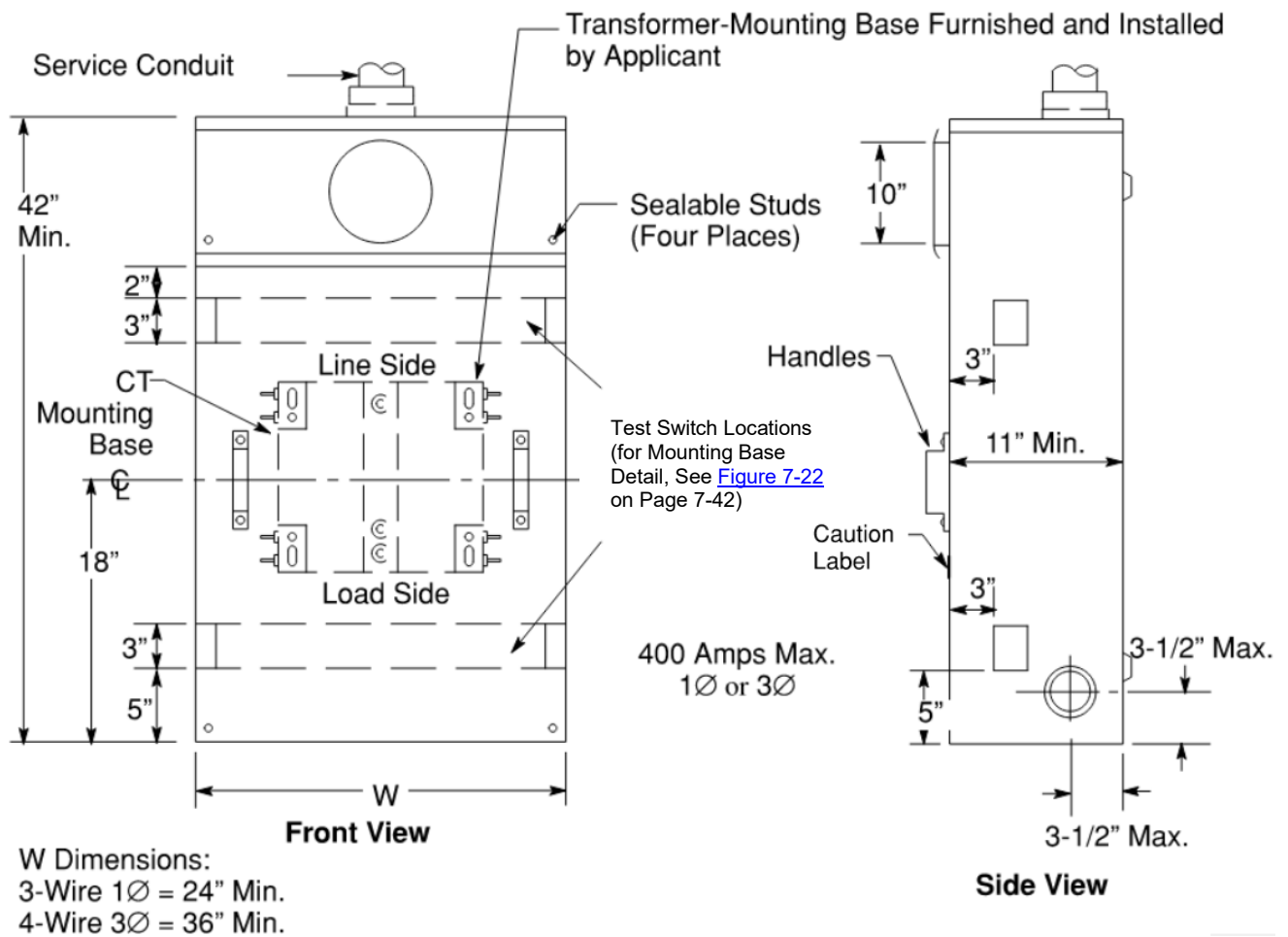


Figure 7-29.
Overhead-Fed Combination Meter and Current-Transformer Cabinet (201 Amps-400 Amps, 1Ø or 3Ø)

7.13 (continued)

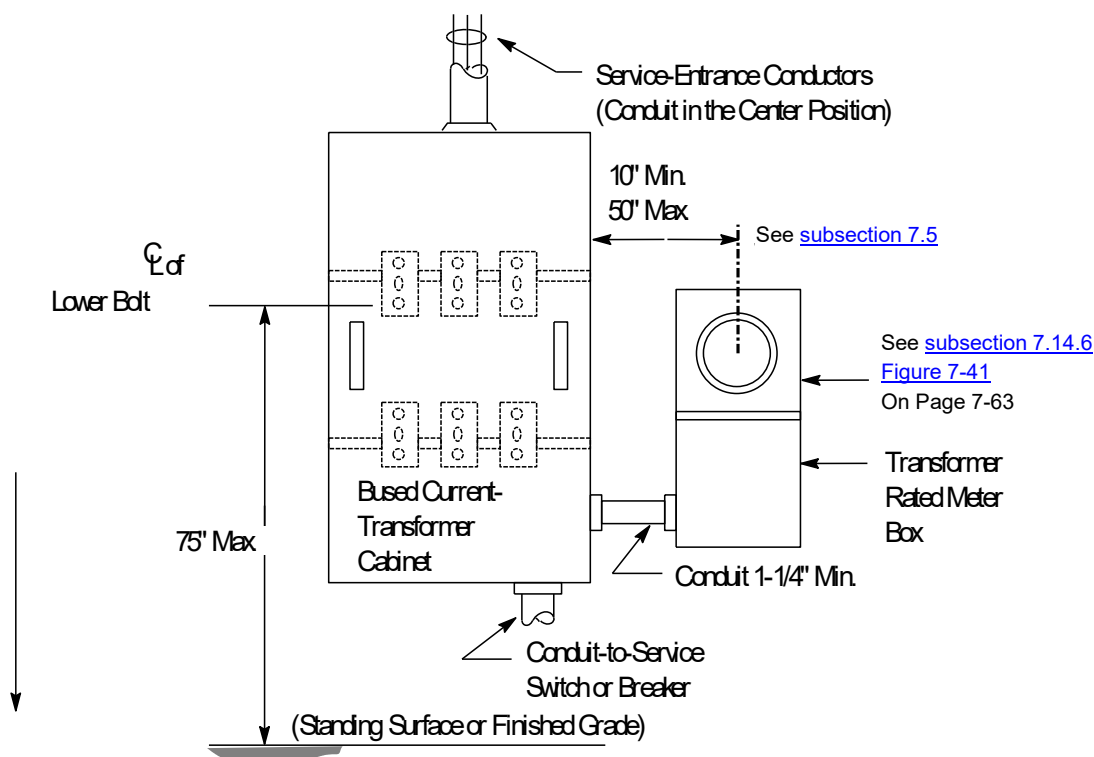


Figure 7-30.
Overhead-Fed Separate-Bused, Current-Transformer Cabinet and Meter Box (400 Amps, 1 ϕ or 3 ϕ)

3. **Single Meter: Combination Overhead and Underground Service Equipment**

See [Figure 7-31, "Overhead- or Underground-Fed Combination Meter and Service-Termination Panel \(255 Amps, Single Phase\),"](#) on page 7-53 and [Figure 7-32, "Overhead or Underground Service-Termination Meter Panel with Manual Bypass Studs \(320 Amps, 120/240 Volt, Single Phase\)"](#) on page 7-54 for additional requirements.

Enclosures designed for a combination of either overhead or underground service entrance conductors must meet **all** requirements for both types of conductor entries.

- a. See the requirements in [Subsection 7.13.1, "Single Meter: Underground Service,"](#) on Page 7-43, and [Subsection 7.13.2, "Single Meter: Overhead Service,"](#) on Page 7-47.
- b. For overhead services, applicants must ensure the service entrance conductors are long enough to provide a bending radius that is equal to or greater than 10 times the diameter of the conductors.
- c. Overhead service panels must have a manufactured raceway built for the panel to isolate the service entrance conductors.

7.13 (continued)

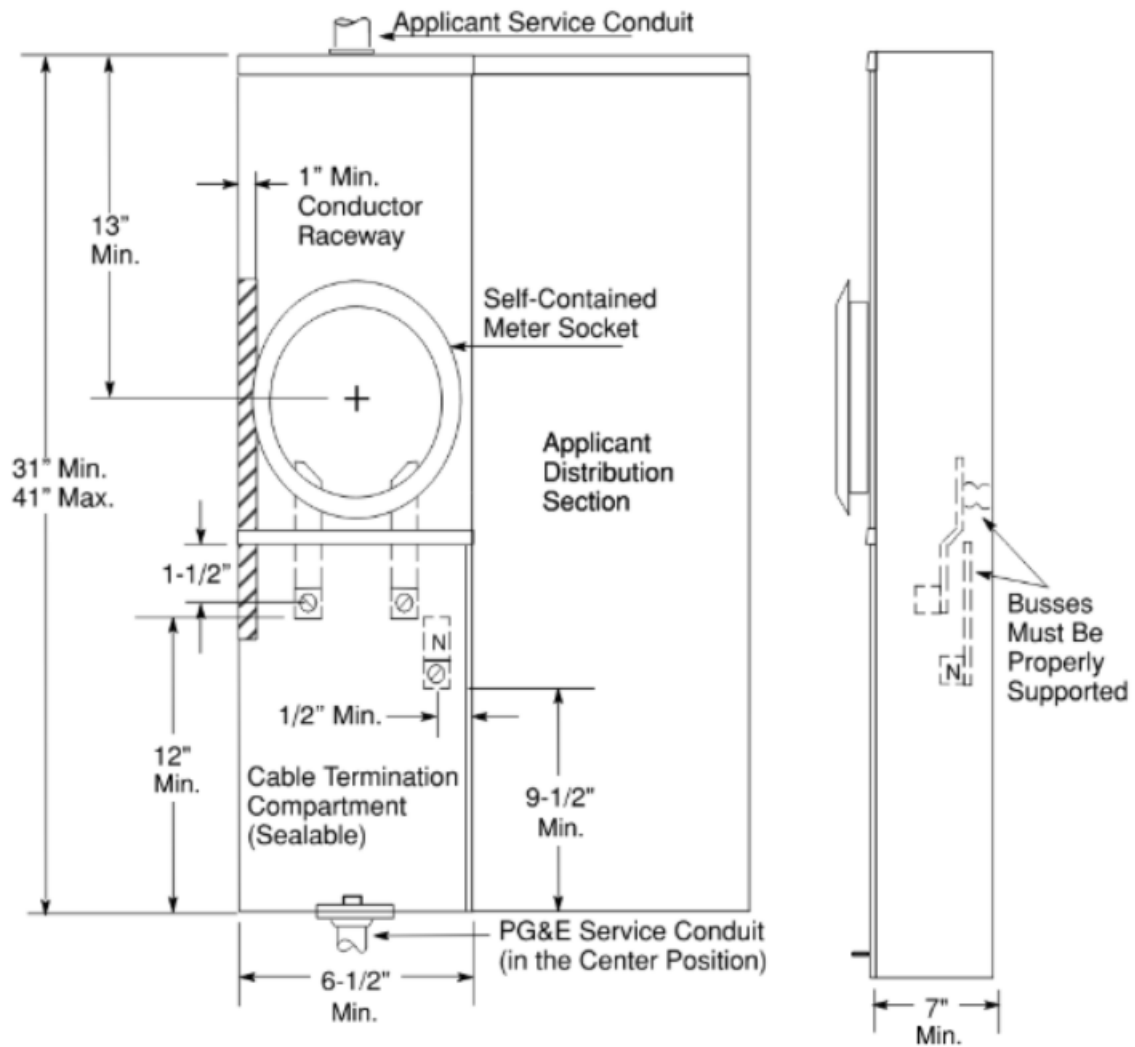


Figure 7-31.
Overhead- or Underground-Fed Combination Meter and Service-Termination Panel (255 Amps, 1Ø)

7.13 (continued)

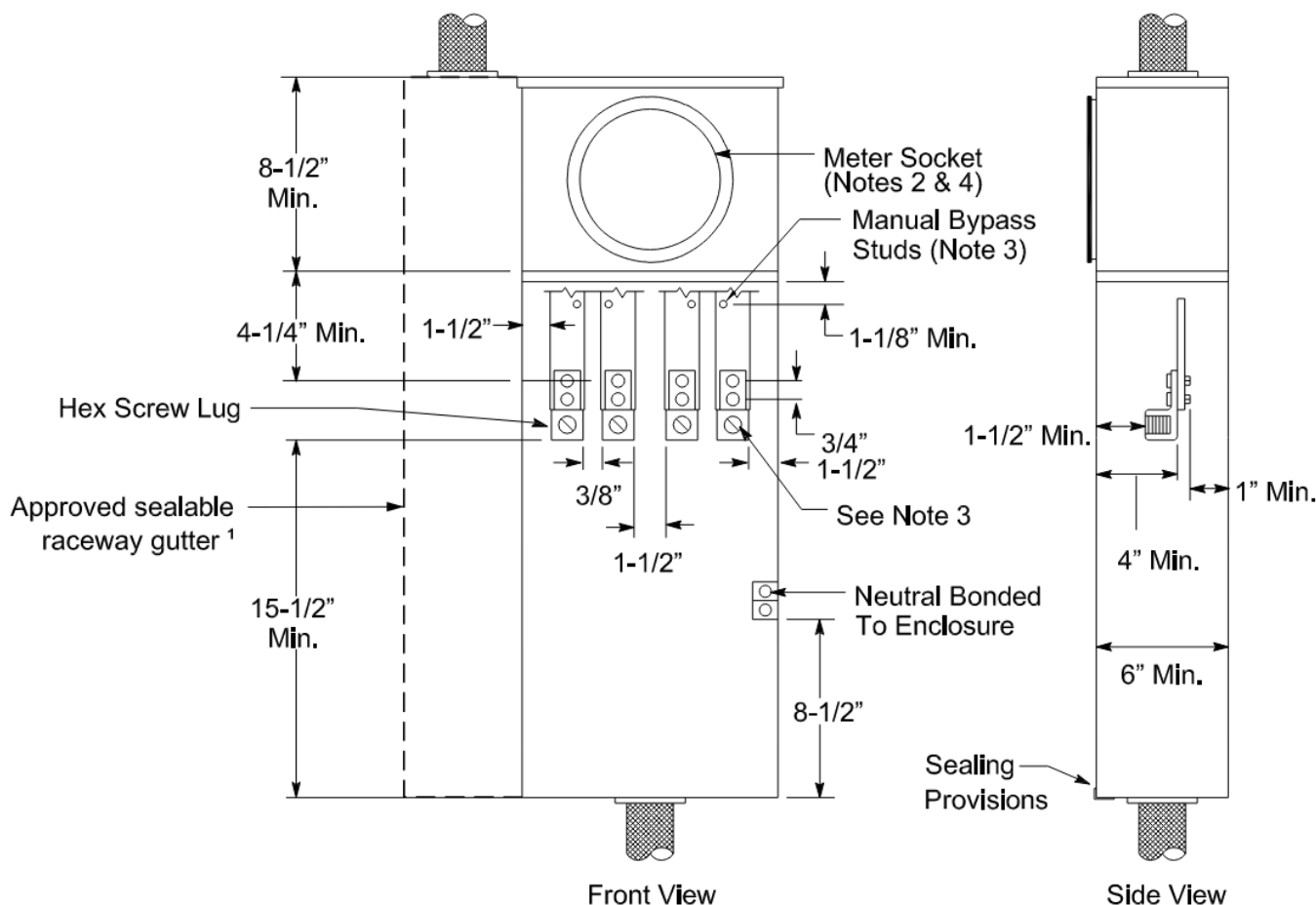


Figure 7-32.

Overhead or Underground Service-Termination Meter Panel with Manual Bypass Studs (320 Amps, 120/240-Volt, 1Ø)

Notes in Reference to [Figure 7-32](#):

1. Ensure that this service equipment is marked with a continuous amp rating of 320 amps. Alternatively, service equipment can be marked "400 amp" (320 amps continuous).
2. Each phase bus section must include 12-24 bypass studs, 1/2 inches in height with 1/2-inch hex nuts (measured across the flat). The studs must have a horizontal spacing of 1-1/2 inch (measured from the centers) between the line- and load-bus sections and must be offset from the line-side termination lugs to permit cable to enter from the top without interfering with the utility-provided manual bypass links.
3. Terminations for service conductors must be aluminum-bodied mechanical lugs with a range-taking ability of #1 American Wire Gauge (AWG) through 600 thousand circular mils (kcmil). The lugs must be secured to ensure vertical alignment. Line-side lugs must be offset from the face of the bus to permit cable to enter from the top. The line and load positions must be identified in 3/4-inch high block letters.
4. Wires must have a clear bypass link and make connections on bottom of lug. Wires must not impede or block the bypass studs. Manual bypass must remain free and open.

7.13 (continued)

4. **Class 320 Meter Panels**

Below are images to display class 320-meter panel manual bypass, cable terminating facilities, and bypass studs. For additional information, see [Subsection 7.13.1.b, "Single Meter: Underground Services, 226 Amps Through 320 Amps, 120/240 Volts, Single Phase, Residential,"](#) on page 7-43 and [Subsection 7.13.2.b, "Single Meter: Overhead Services, 226 Amps Through 320 Amps, 120/240 Volts, Single Phase,"](#) on page 7-48.



7.14 Electric Metering Components and Cable Terminating Facilities

1. Separate CT Cabinet, Single Phase and Three Phase

Applicants must ensure that cabinets meet the following requirements:

- All covers are sealable.
- Outdoor current-transformer cabinets (CT) are weatherproof.
- Grounding lugs are provided.
- CT cabinets are **not** used as splicing chambers.
- CTs are **not** tapped off to supply other meters or used by applicants for any other purposes.
- PG&E's underground service-lateral conductors do **not** terminate in CT cabinets.

2. Separate CT Cabinet, 400 Amps and Above, Single Phase and Three Phase

See the following figures on Page 7-57 for different cabinet cover configurations:

- 1) [Figure 7-33, "Cabinet Showing Stud-Mounted Cover"](#)
- 2) [Figure 7-34, "Cabinet Showing Flanged Cover Fastened by Sealable Rivet Latches"](#)
- 3) [Figure 7-35, "Cabinet Showing Hinged Front Cover."](#)

7.14 (continued)

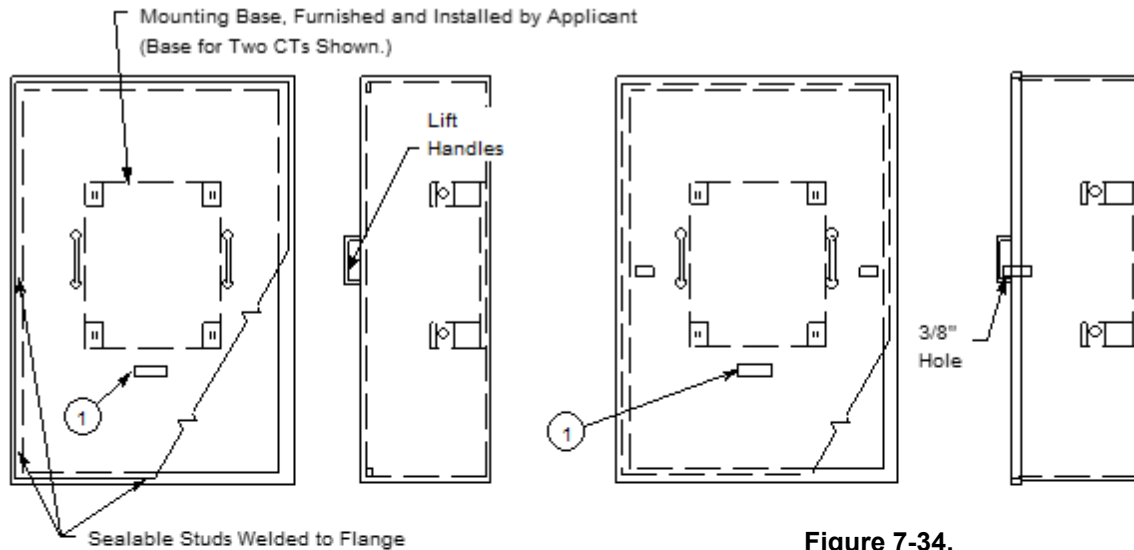


Figure 7-33.
Cabinet Showing Stud-Mounted Cover

Figure 7-34.
Cabinet Showing Flanged Cover Fastened by Sealable Rivet Latches

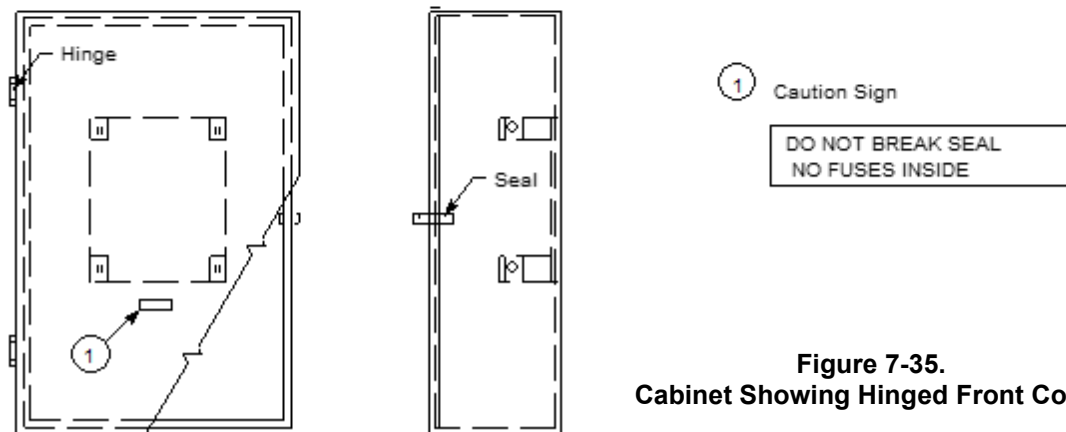


Figure 7-35.
Cabinet Showing Hinged Front Cover

Table 7-11. CT Cabinet Minimum Dimensions

Type of Service	Cabinet Size (in Inches)	CT Mounting Base	CT Cabinet
3-Wire, 1Ø	24w x 48h x 12d	Figure 7-36	Figure 7-38
4-Wire, 3 Ø	36w x 48h x 12d	Figure 7-37	Figure 7-39

7.14 (continued)

3. CT Mounting Base, 400 Amps

Applicants must ensure that all the required bolts are furnished and that conductors are connected to the line and load terminals on the CT mounting base. Also, the ampacity rating of the mounting base must equal the PG&E service rating.

See [Figure 7-36, "3-Wire, Single-Phase Service Mounting Base,"](#) and [Figure 7-37, "4-Wire, Three-Phase Service, Mounting Base,"](#) below for additional requirements.

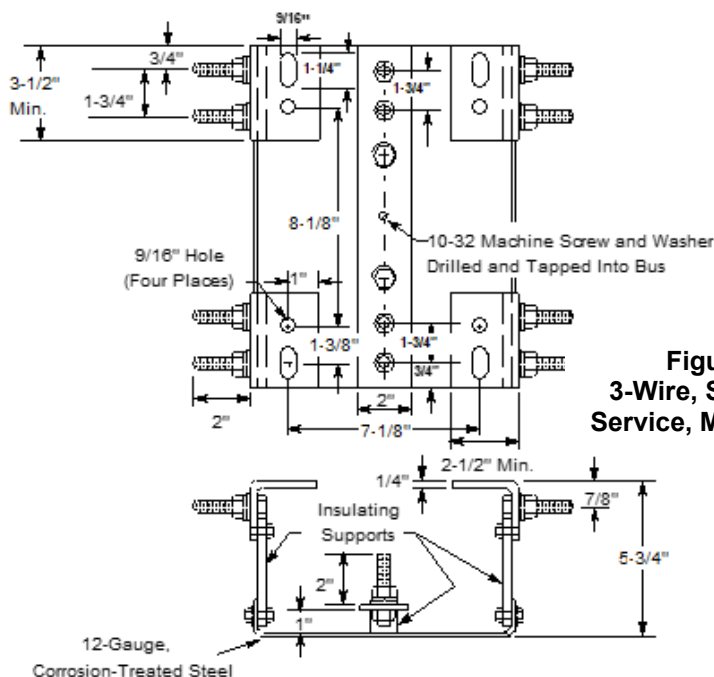
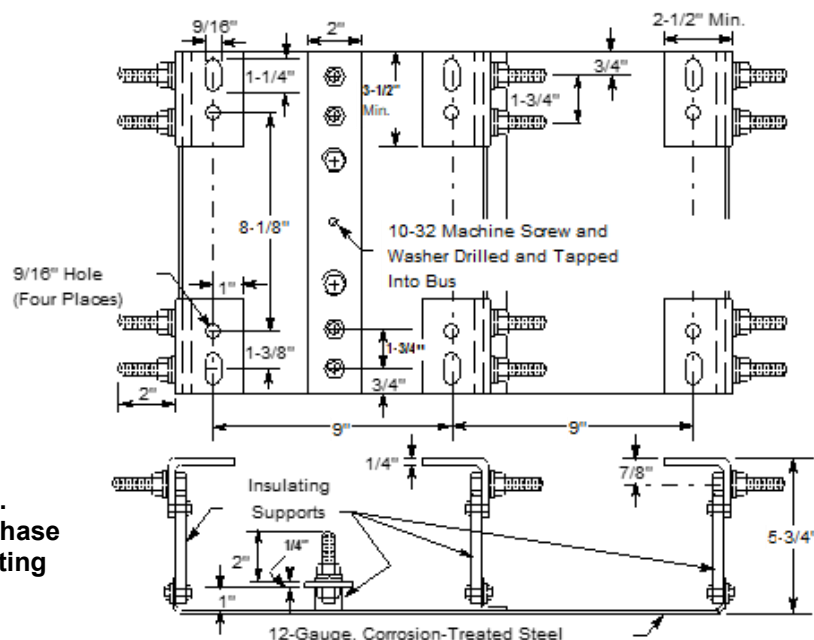


Figure 7-36.
3-Wire, Single-Phase
Service, Mounting Base

Figure 7-37.
4-Wire, Three-Phase
Service, Mounting
Base



7.14 (continued)

4. Alternate CT Mounting Base, One Phase or Three Phase

Applicants must ensure that mounting bases meet the following requirements:

- a. Insulated supports are rated for the serving voltage and have sufficient mechanical strength for the application.
- b. Mounting bases only accept bar-type CTs.
- c. Two 1/2-inch steel, Grade 5 bolts are provided for each cable-terminating and CT-mounting position. Each bolt must be furnished with appropriately sized Belleville washers and nuts or flat washer, split-ring washer, and nuts. Bolts must be secured in place and spaced as shown in all figures. All parts must be plated to prevent corrosion.
- d. Applicants must ensure that all the required bolts are furnished and that conductors are connected to the line and load terminals on the CT mounting base. Also, the ampacity rating of the mounting base must equal the PG&E service rating.

[Figure 7-38, "CT Mounting Base \(Single Phase, 3-Wire, 400 Amps-600 Amps, 0 Volts-600 Volts\),"](#) on page 7-60 and [Figure 7-39, "CT Mounting Base \(Three Phase, 4-Wire, 400 Amps-800 Amps, 0 Volts-600 Volts\),"](#) on page 7-61 for additional requirements.

7.14 (continued)

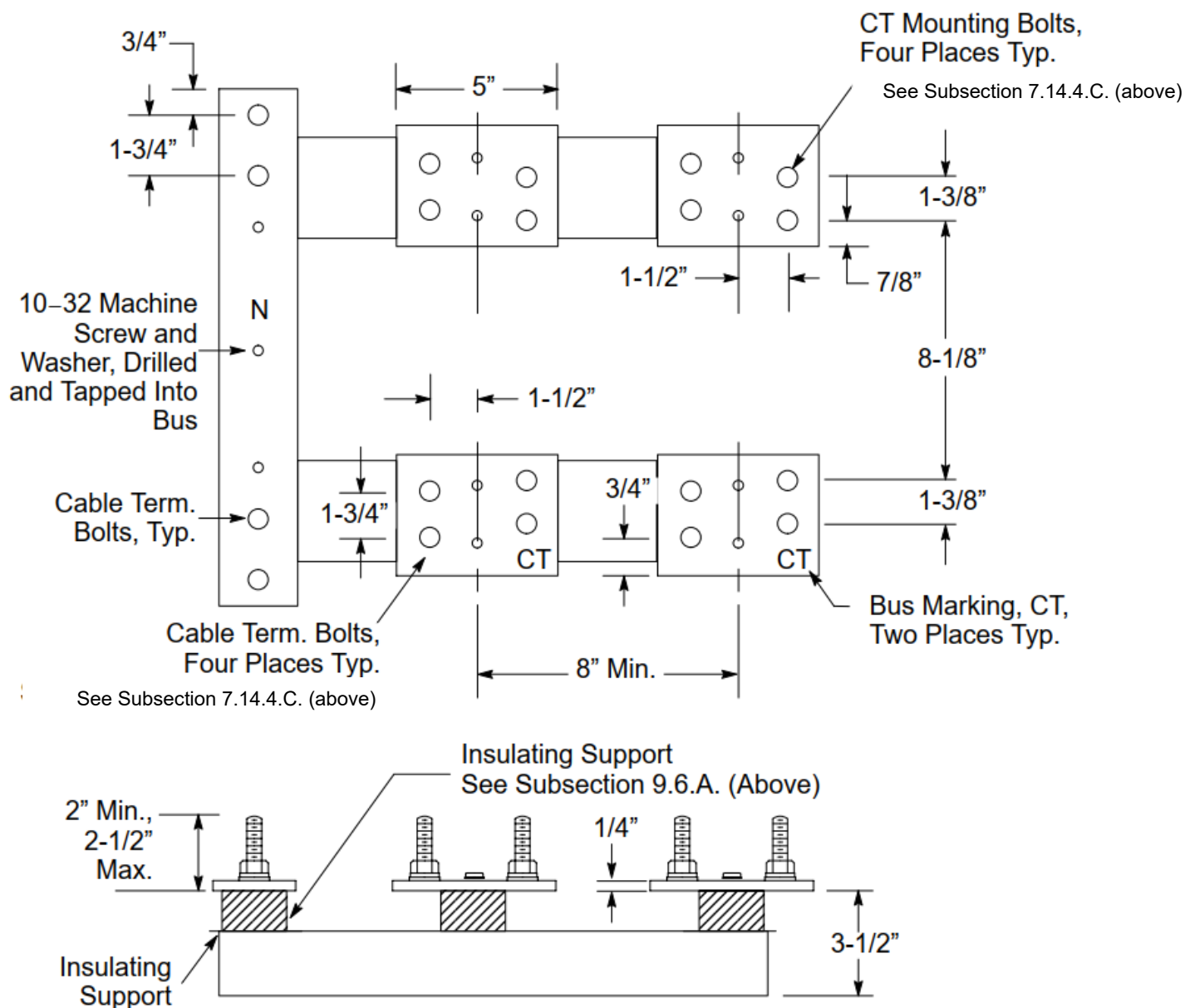


Figure 7-38.
CT Mounting Base
 (Single-Phase, 3-Wire, 400 Amps-600 Amps, 0 Volts-600 Volts)

7.14 (continued)

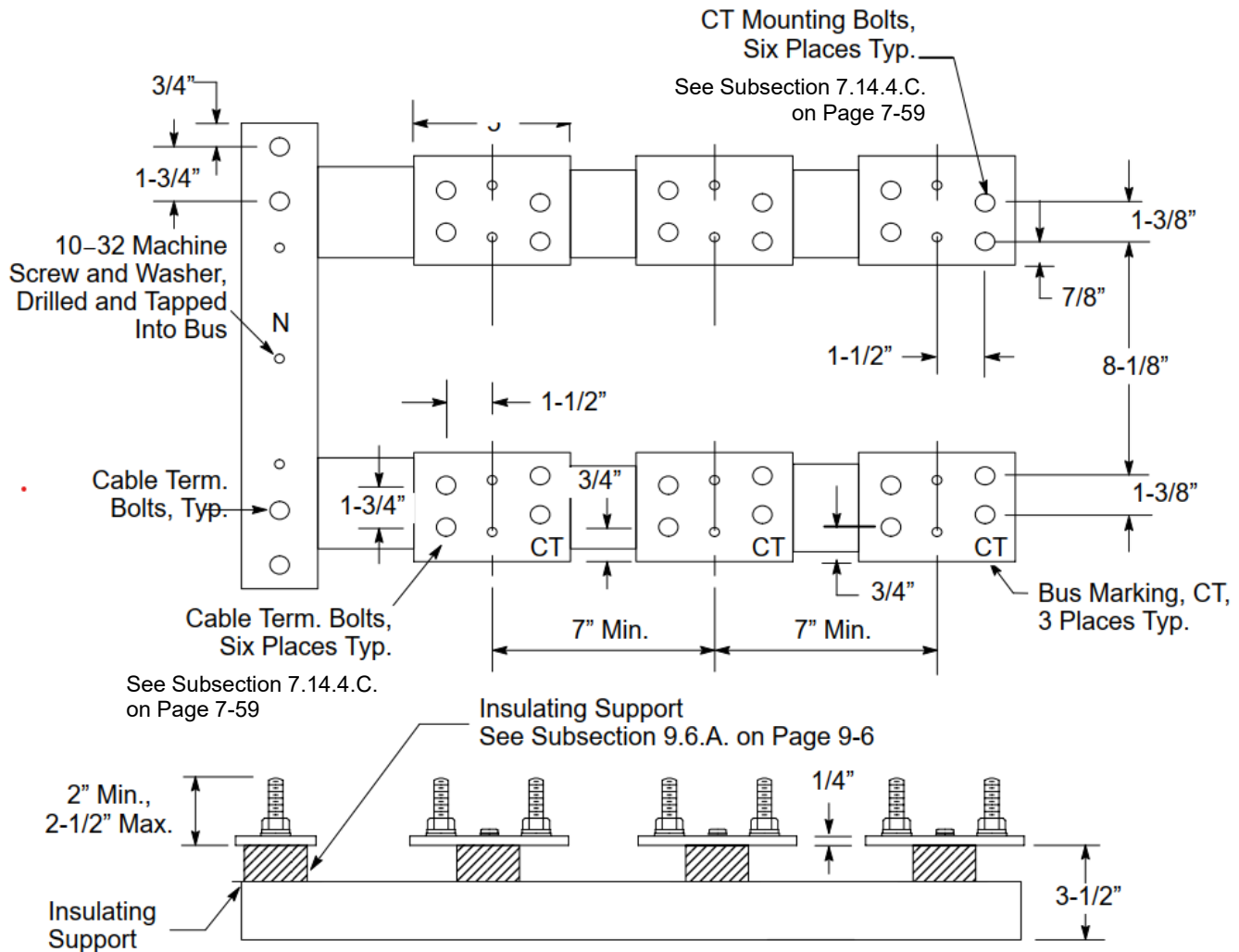


Figure 7-39.
CT Mounting Base
(Three-Phase, 4-Wire, 400 Amps-800 Amps, 0 Volts-600 Volts)

Note in reference to [Figure 7-38](#) and [Figure 7-39](#):

1. CT mounting bases rated for 600 amps and 800 amps are allowed only for select types of wall-mounted and pad-mounted service termination and metering equipment.

7.14 (continued)

5. Bused CT Cabinet, 3-Wire Service, 201 Amps Through 600 Amps

Applicants must ensure that cabinets meet the following requirements:

- For Virtual Net Energy Metering (VNEM) and Net Generation Output Meter (NGOM) applications only, CT cabinets rated at 600–800 Amps may be allowed, including multiple cables per phase on the line and load-side of this CT cabinet.
- Limited to a maximum of 400 Amps for overhead services.

See [Figure 7-40, "Bused CT Cabinet, 3-Wire Service, 400 Amps–600 Amps,"](#) below.

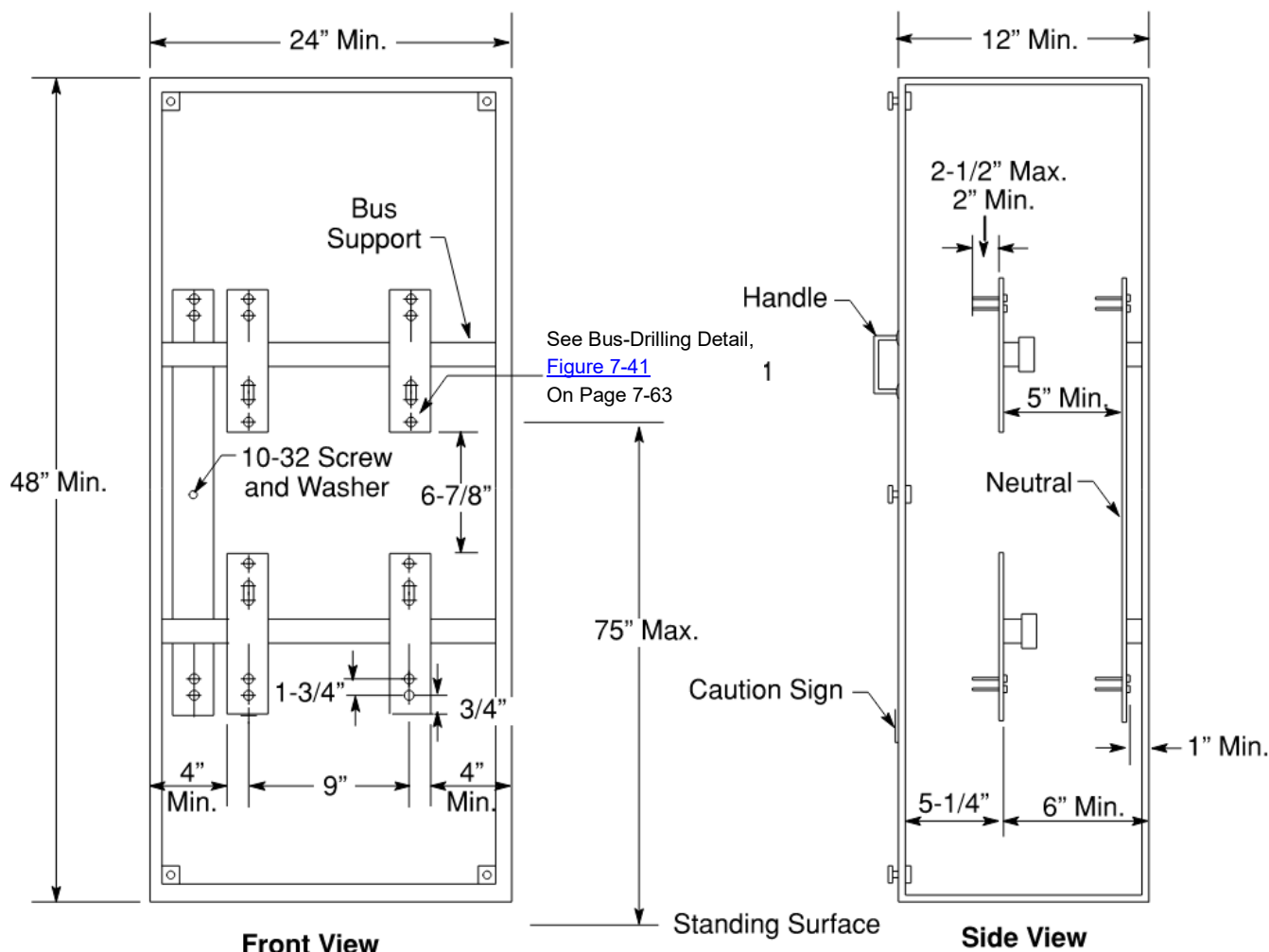


Figure 7-40.
Bused CT Cabinet, 3-Wire Service, 400 Amps-600 Amps

7.14 (continued)

6. Bused CT Cabinet, 4-Wire Service, 400 Amps

Applicants must ensure that their cabinets meet the following requirements:

- PG&E's underground service lateral conductors do not terminate in CT cabinets.
- For VNEM and NGOM applications only, CT cabinets rated at 600–800 Amps may be allowed, including multiple cables per phase on the line and load-side of this CT cabinet.

See [Figure 7-41, "Bused CT Cabinet \(4-Wire Service, 400 Amps Max\),"](#) below.

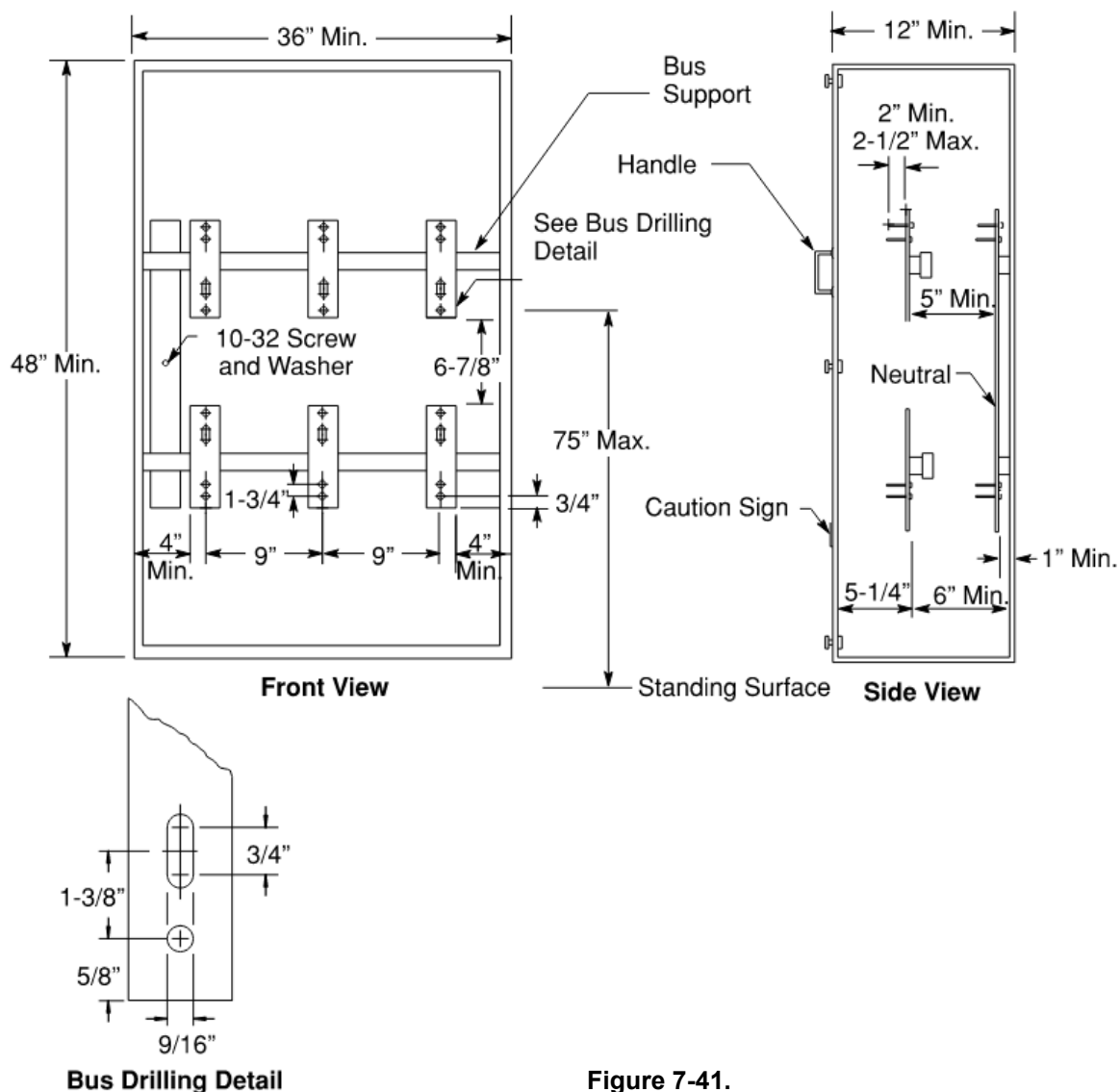


Figure 7-41.
Bused CT Cabinet (4-Wire Service, 400 Amps Max)

7.15 Meter Box for Transformer-Rated Metering

Applicants must ensure that meter socket jaw requirements and connections are made according to the rules in [Subsection 7.1, "Meter Classifications, Connections, and Electric Service Rating"](#) on Page 7-1.

See below [Figure 7-42, "Meter Box for Transformer-Rated Metering \(Single-Phase or Three-Phase Installations\)"](#) on Page 7-64 and [Figure 7-43, "Remote Metering Cabinet \(Three-Phase Installations\)"](#) on Page 7-65 for more details on installing CTs.

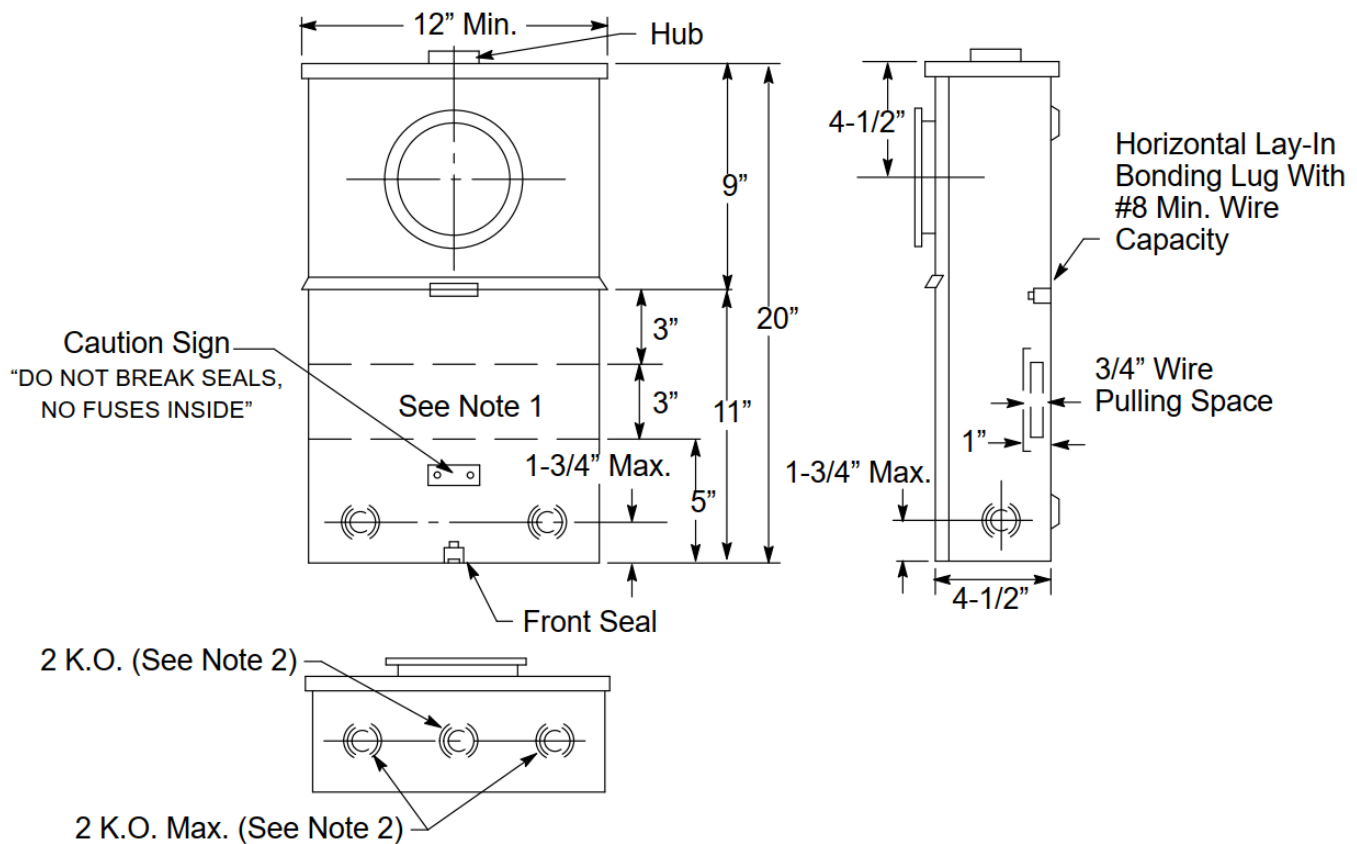


Figure 7-42.
Meter Box for Transformer-Rated Metering (Single-Phase or Three-Phase Installations)

Notes in reference to [Figure 7-42](#):

1. Location of mounting bracket for test switch.
2. K.O. -knock out

7.15 (continued)

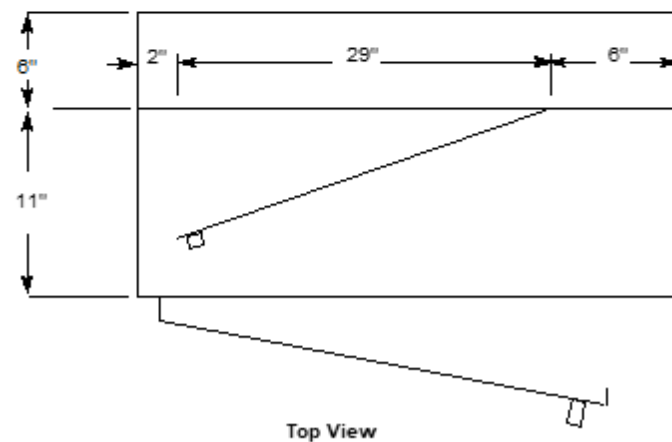
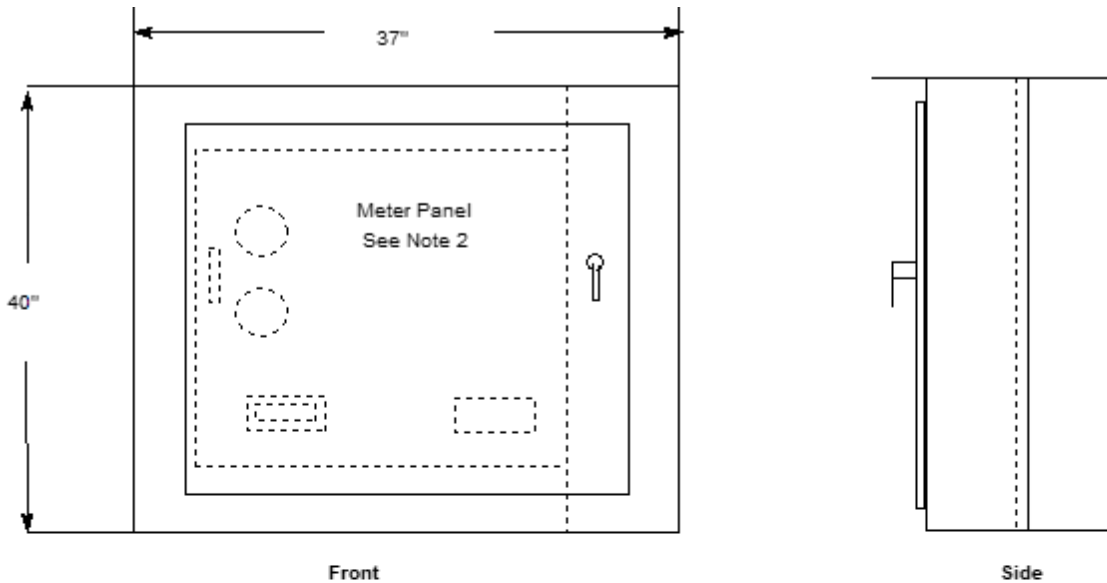


Table 7-12. Hinged Meter Panel Requirements

Service Voltage	Switch Rating	Hinged Panel Required
277/480V 3Ø, 4-Wire	401 Amps and Above,	Yes
120/240V 3Ø, 4-Wire	801 Amps and Above	Yes
120/208V 3Ø, 4-Wire	1,001 Amps and Above	Yes

Figure 7-43.
Remote Metering Cabinet (Three-Phase Installations)

Notes in reference to [Figure 7-43](#):

1. The enclosure must be:
 - a. Equipped with a device to secure the door in the open position at 90° or more.
 - b. Secured in the closed position with a handle-operated latching mechanism and lockable with a padlock having a 5/16" lock shaft.
2. Remote metering must be approved by the local meter shop before installation.

7.16 Multiple Meters

PG&E requires grouped, single-meter installations for multifamily residential buildings. This requirement excludes row-type condominiums where each unit is considered a single-family residence and is metered individually. Row-type condominiums must meet the applicable metering requirements described in the following subsections:

1. Grouped-Meter Installation Ampacity Ratings

The information below describes how to determine the ampacity rating of a grouped-meter installation:

- a. For installations without a main switch or breaker, the service rating will be the rating of the electrical enclosure or service termination section, pull can, or other service-termination enclosure where PG&E terminates and connects its supply facilities and conductors.
- b. For installations with a main switch or breaker, the rating of the service to be supplied is the rating of the termination section, pull can, service section, or main service switch continuous current rating, typically whichever is greater.

2. Grouped Meter-Socket Spacing

PG&E requires a 7-1/2-inch horizontal and 8-1/2-inch **minimum** vertical center spacing between meter sockets.

3. Individual Meter Sockets with Wiring Raceway/Gutters

- PG&E accepts meter sockets with wiring gutters as shown in [Figure 7-44, "Overhead Service, Grouped-Meter Installation Without a Main Switch \(400 Amps Maximum, 1Ø or 3Ø\)"](#), and [Figure 7-45, "Underground Service, Grouped-Meter Installation Without a Main Switch,"](#) on Page 7-67.
- PG&E will accept individual meter sockets in combination with a wiring gutter **only** for an applicant's service-entrance conductors and **only** when unmetered service-entrance conductors and metered-load conductors are **not** installed in the same conduit, raceway, or wiring gutter.

7.16 (continued)

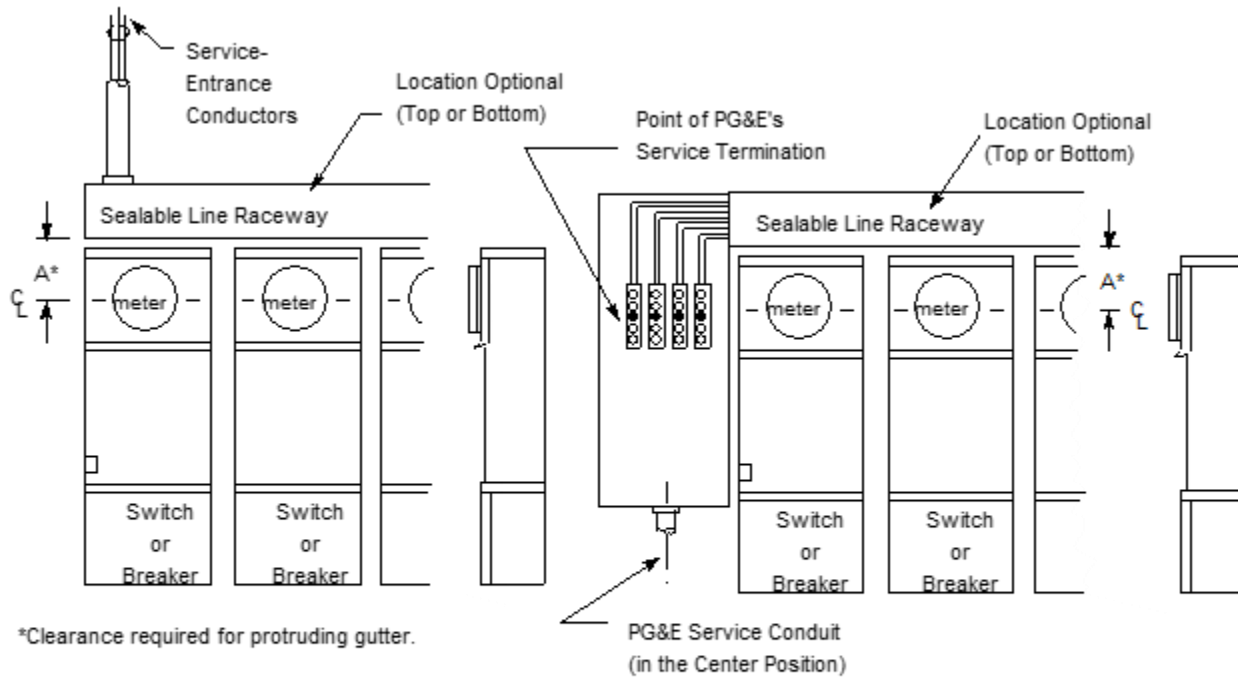


Figure 7-44.
Overhead Service, Grouped-Meter Installation
Without a Main Switch (400 Amps Max, 1Ø or 3Ø)

Figure 7-45.
Underground Service, Grouped-Meter Installation
Without a Main Switch

4. Combination Multimeter Installation

A combination multimeter installation consists of the following equipment:

- A main switch (if one is installed or required by local jurisdiction)
- If no main switch is installed, a maximum of six individual circuit breakers is allowed.
- Unmetered wiring gutter
- Multiple meter sockets

Examples of PG&E-approved, combination, multimeter installations are included in [Figure 7-46, "Typical, Manufactured, Combination, Multimeter Installation: Seven Meters or More,"](#) on Page 7-68, and [Figure 7-47, "Clearances for a Typical, Manufactured, Combination, Multimeter Installation,"](#) on Page 7-69.

7.16 (continued)

Applicants must ensure that all multimeter installations meet the following requirements:

- a. Individually metering multiple apartments in one building. Separate metered and unmetered conductors.
- b. Use factory (or factory-equivalent), harness-style wiring or bus between the unmetered wiring gutter and the line terminals of each meter socket. Harness-style wiring or bus also must be used between the load terminals of each meter socket and the line side of the corresponding circuit breaker.
- c. Ensure that the panels are designed to permit any individual meter socket block or jaw assembly to be replaced. Applicants must not mount more than two meters on a single, removable panel. Removable meter-panel covers must not exceed 6 square feet in area.
- d. Ensure that the panel's design and construction meets the clearance requirements provided in [Figure 7-47, "Clearances for a Typical, Manufactured, Combination, Multimeter Installation,"](#) on Page 7-69.
- e. Ensure that panels are removable so that PG&E personnel can perform wiring inspections

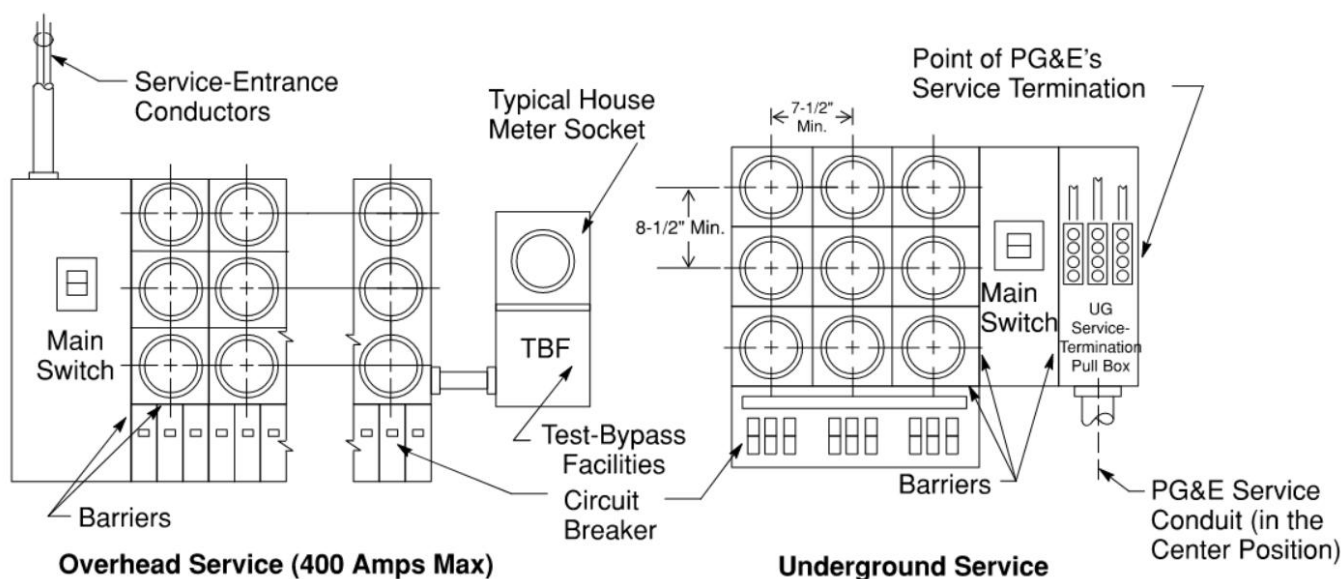


Figure 7-46.
Typical, Manufactured, Combination, Multimeter Installation: Seven Meters or More

7.16 (continued)

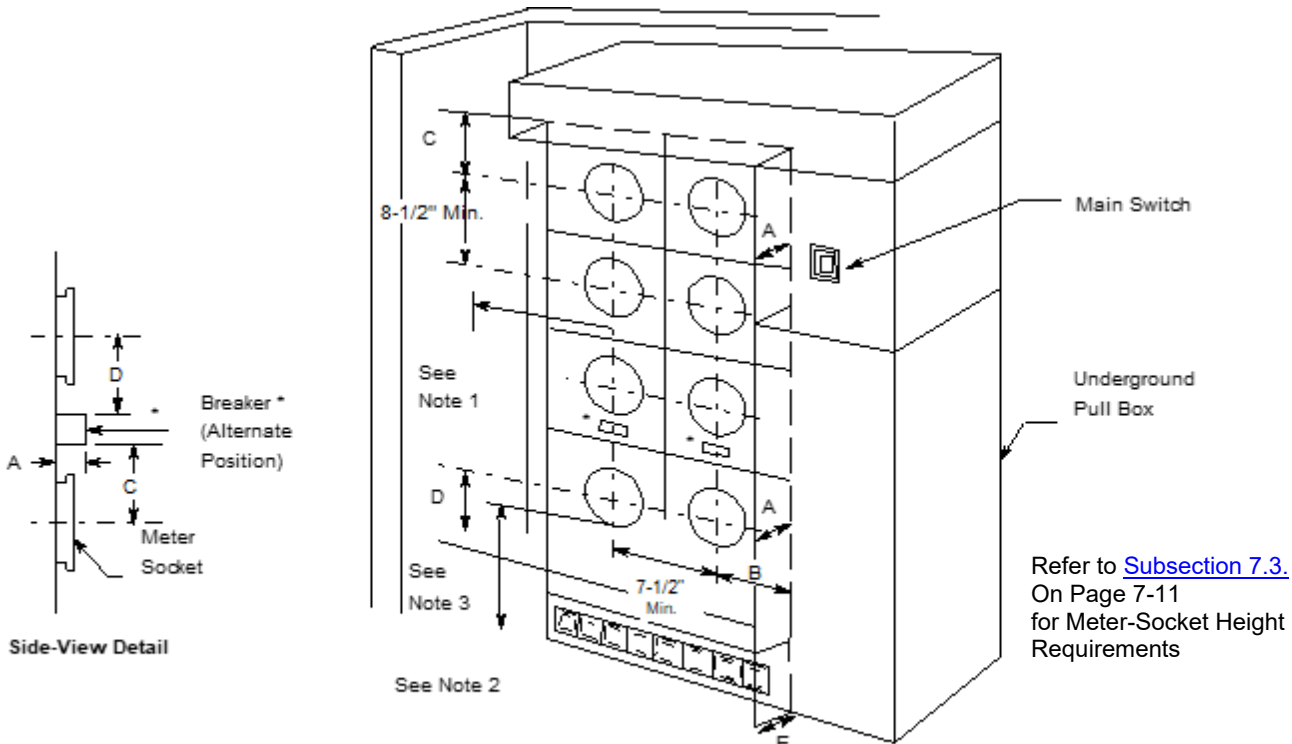


Figure 7-47.
Clearances for a Typical, Manufactured, Combination, Multimeter Installation

Notes in reference to [Figure 7-47](#):

1. Where an adjacent wall or other obstruction extends more than 11-inches perpendicular from the face of the meter panel, a 10-inch minimum dimension to the meter sockets axis is required. For obstructions extending 11 inches or less from the meter panel, the side clearance must conform to that of Dimension B.
2. The requirements described in [Subsection 7.4, "Meter Working Space,"](#) on Page 7-14 must always met.
3. From the floor surface up to the bottom of the lowest row of meter sockets, protrusions, and equipment must not extend past the front face of the meter panels and sockets.

Table 7-13. Dimension Specifications for Multimeter Installations

A-Protrusions (in Inches)	B	C	D	E
	All Measurements Are Minimum Dimension (in Inches)			
0 (No Protrusion)	3-3/4	4	4-3/4	See Note 3 for Figure 7-47
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 (Maximum)	6-1/4	10	8	

7.16 (continued)

5. Meter Trough Installations

PG&E does **not** accept new installations of meter troughs but does accept single-meter installations only for reconstructing and adding to existing installations. In addition to meeting the general requirements for meter sockets, applicants must ensure that meter troughs meet the following general requirements. For any additional requirements, consult a local meter shop.

[Figure 7-48, "Horizontal Meter Trough Installation: Six Meters or Less"](#) and [Figure 7-49, "Vertical Meter Trough Installation: Five Meters or Less"](#) below illustrate meter trough installations served by underground or overhead service.

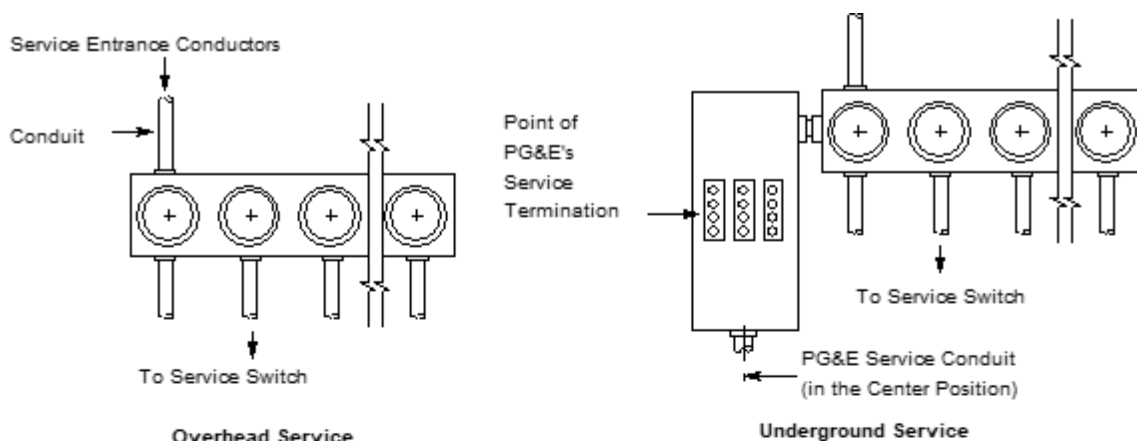


Figure 7-48.
Horizontal Meter Trough Installation: Six Meters or Less

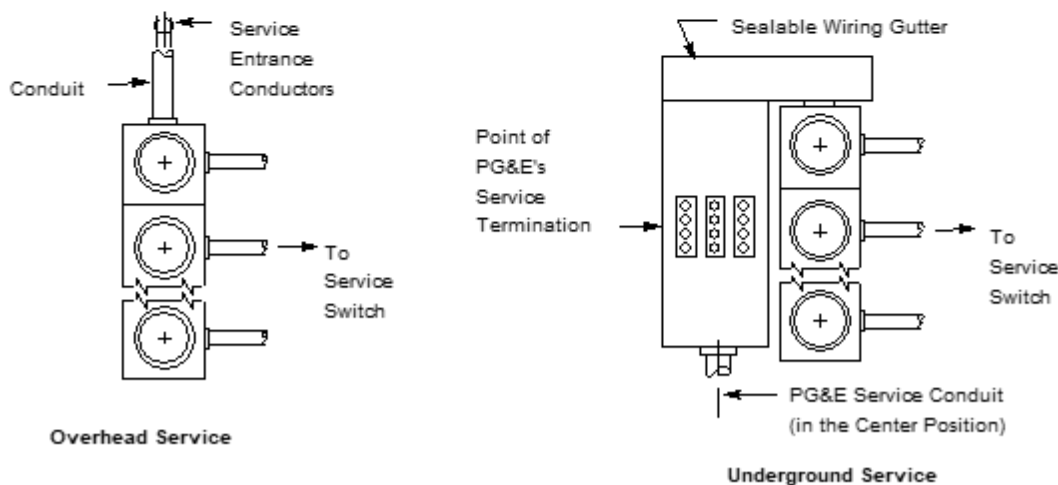


Figure 7-49.
Vertical Meter Trough Installation: Five Meters or Less

7.17 Underground Service Cable-Termination Compartments or Sections

Applicants must ensure that underground service-termination compartments or sections meet the following requirements:

- a. The termination compartment covers must be removable, sealable, provided with two lifting handles, and limited to a maximum size of 9 square feet.
- b. The cover panel can be sealed using two drilled stud-nut and wing-nut assemblies on opposite sides of the panel. Ensure that all security screws are captive.
- c. The minimum dimensions specified in [Table 7-14, "Minimum Wall-Mounted Pull-Section Dimensions: Residential and Nonresidential, Single-Phase or Three-Phase,"](#) on Page 7-72, are used when the service conduit enters the bottom of the termination compartment or termination enclosure and all load conductors exit above the terminals. When the service conduit enters from the side or back of the pull box, use the X dimensions from the closest portion of the conduit to the nearest termination bolt.

See [Figure 7-50, "Typical Underground Service Termination Section and Pull Box, Wall-Mounted or Pad-Mounted,"](#) on page 7-74 for details about this equipment. Refer to [Table 7-14, "Minimum Wall-Mounted Pull-Section Dimensions: Residential and Nonresidential, Single-Phase or Three-Phase,"](#) on Page 7-72 and [Table 7-15, "Minimum Pad-Mounted \(Floor-Standing\) Switchboard Pull-Section Dimensions: Residential and Nonresidential, Single-Phase and Three-Phase,"](#) on Page 7-73, for additional dimension requirements.

For additional bus stub requirements, see [Figure 7-51, "Detail of Clearance Requirements for Adjacent Termination Bus Stubs,"](#) and [Figure 7-52, "Detail of Aluminum, Termination Bus Stubs, Residential,"](#) on page 7-75.

- d. A PG&E Job Owner is contacted when developing 401-amps-and-above services. Applicants must ensure that they meet PG&E's requirements for underground service-termination pull section:
 - 1) Installing multiple sets of utility service cables.
 - 2) Provide stacking provisions (i.e., bolts) to terminate cables in any three-phase installation that is 1,200 amps or greater.
 - 3) Providing additional space (i.e., depth, width, and termination height), when required, in any section of switchboard, panel board, or wall mounted termination cans intended as a termination point for PG&E's service cables. This additional space will provide mandatory clearances between phases and grounded surfaces, as well as accommodate the installed service cables.

7.17 (continued)

4) Applicants must not use wall-mounted service-termination and pull enclosures for three-phase, nonresidential installations rated 401 amps through 2,500 amps. See [Table 7-15, "Minimum Pad-Mounted \(Floor-Standing\) Switchboard Pull-Section Dimensions: Residential and Nonresidential, Single-Phase and Three-Phase,"](#) on Page 7-73, and [Section 8, Table 8-6, "Minimum Bottom-Fed Pull Section Dimensions"](#) and [Table 8-7, "Pull Section Dimensions \(Minimums\) Below Ground Level"](#) for requirements.

- e. See [Electric Design Standard 063928, "Methods and Requirements for Installing Non-Residential Underground Electric Services 0–600 Volts to Customer-Owned Facilities,"](#) for the appropriate conduit and cable requirements to use when designing nonresidential service installations.
- f. See additional requirements for pad-mounted switchboards in [Section 8, Subsection 8.5, "Underground, Service-Termination Pull Section \(Located Below Ground Level\),"](#) on Page 8-35. The information and figures describe additional requirements for applicants who install these facilities.

Table 7-14. Minimum Wall-Mounted Pull-Section Dimensions: Residential and Nonresidential, Single-Phase or Three-Phase

Service Rating (Amps)	Minimum Access Opening "W"		X		Y	
	3-Wire	4-Wire	Bottom Entry	Side/Rear Entry	Bottom Entry	Rear Entry
	All Measurements in Inches					
0-225	10-1/2	14	11	36	6	15
226-400	10-1/2	14	22	42	6 ²	24
401-600	24	30	26	48	11	24
601-800	See footnote 1	30	30	48	11	24

Notes in reference to [Table 7-14](#):

- 800-amp single phase is not allowed.
- The minimum depth is 11 inches, for more clearance requirements see [Figure 7-56, "Underground Combination Meter and Current-Transformer Cabinet \(201 Amps-400 Amos, Single Phase or Three Phase,"](#) on page 7-83 and [Figure 7-62, "Overhead-Fed Combination Meter and Current-Transformer Cabinet, \(400 Amps Maximum, Single Phase or Three Phase,"](#) on page 7-88.

7.17 (continued)

**Table 7-15. Minimum Pad-Mounted (Floor-Standing) Switchboard Pull-Section Dimensions:
Residential and Nonresidential, Single-Phase and Three-Phase**

Service Rating (Amps)	Minimum Inside Access Opening “W”		Termination Height “X” ⁴
	3-Wire	4-Wire	
	All Measurements in Inches		
321-400 ⁵	24	24	42 Minimum-73 Maximum (see Note 3 below)
401-800 ⁶	—	24	
801-1,200 ⁶	—	30	
1,201-2,000 ⁶	—	35	
2,001-2,500 ⁶	—	42	60 Minimum-73 Maximum

Notes in reference to [Table 7-14](#) and [Table 7-15](#).

1. If termination bus-landing stubs are installed perpendicular to the back of the board, a wider enclosure dimension will be required to accommodate the installation of PG&E's cables.
2. Dimension W is the minimum width of the pull section access opening. When flanges are necessary, ensure they do not intrude into service-conductor space.
3. The minimum termination height is 40-1/4 inches for bottom-fed service sections only as shown in [Figure 7-60](#), "[Separate Pull Box](#)" on Page 7-87 and [Section 8](#), Figure 8-28 on Page 8-34.
4. The X-dimension is measured from the bottom of the enclosure to the first phase bolt.
5. Single phase or three phase only.
6. Three phase only.

7.17 (continued)

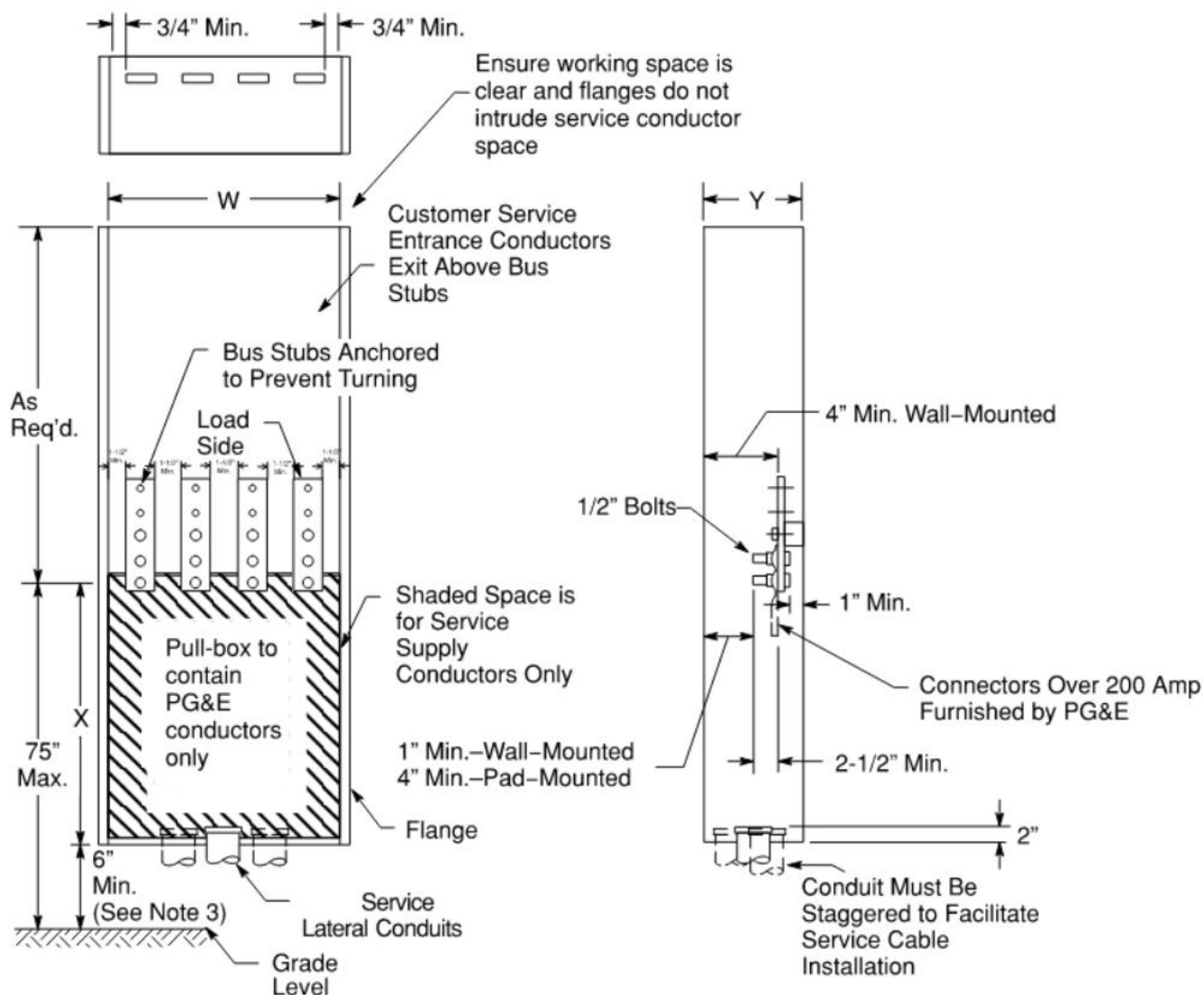


Figure 7-50.
Typical Underground Service Termination Section and Pull Box, Wall-Mounted or Pad-Mounted (Floor-Standing)

Notes in reference to [Figure 7-50](#):

1. Lugs for terminating the customer's ground wire (or other grounding conductors) must be located outside of the sealable section.
2. For pad-mounted switchboards, the ground bus, when provided, must be located at the rear of underground terminating enclosures (i.e., pull boxes and pull sections).
3. Switchboard pull and termination sections must not contain line/supply side cable tap connections. A dedicated tap section or a dedicated termination enclosure must be installed.

7.16 (continued)

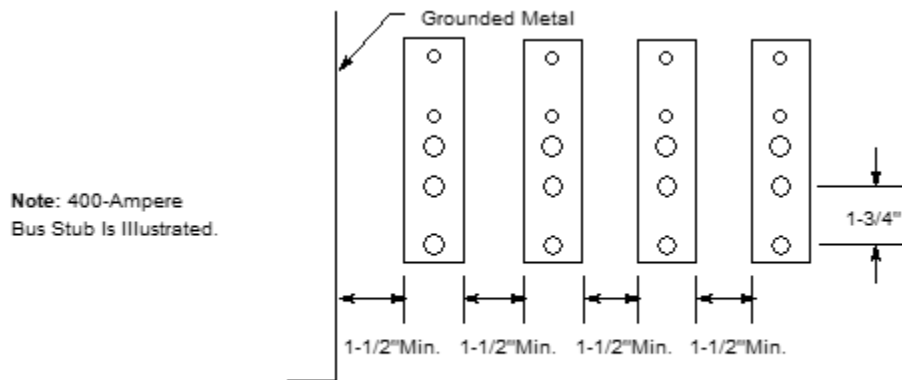


Figure 7-51.
Detail of Clearance Requirements for Adjacent Termination Bus Stubs

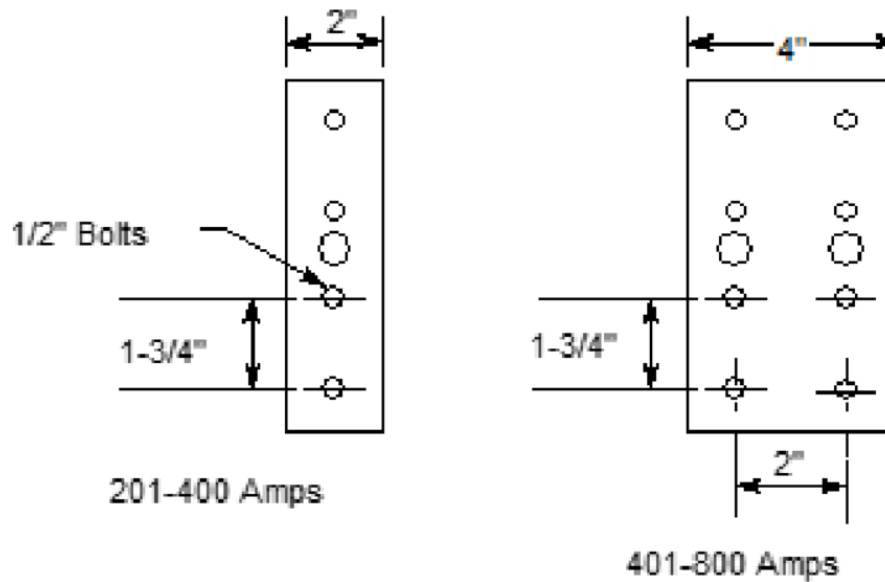


Figure 7-52.
Detail of Aluminum, Termination Bus Stubs, Residential

7.18 Approved Service-Terminal Conductor Connectors

Applicants must observe the following requirements when they plan to install approved, service-terminal conductor connectors.

1. Applicants must furnish and install PG&E-approved, range-taking connectors, suitable for aluminum conductors, for enclosures rated at 0 through 225 amps. See [Figure 7-53, "Service-Terminal Conductor Connector,"](#) below for additional requirements.
2. PG&E must furnish and install approved, cable-to-flat-bar connectors on the termination bus stub, as specified in [Table 7-16, "Approved, Compression-Type Service-Terminal Connectors,"](#) on Page 7-77, for enclosures rated above 225 amps. **For a Class 320-amp panel, cable-to-flat-bar connectors on the termination bus stub are preferred; however, 320-amp-rated meter panels with hex lug terminations are acceptable also.**
3. Applicants may use one-bolt, bus attachment connectors for 0- through 225-amp services if the connectors are anchored to prevent the connector assembly from twisting.
 - a. Applicants must **not** use pin termination connectors to install cables larger than those intended for the range-taking connectors in their service panel or service enclosure.

NOTE

Do **not** peel stranded cables to fit conductors into termination connectors.

4. See [Electric Design Standard 015251, "Connectors for Insulated Cables Underground Distribution Systems," Table 28, "Specifications for Terminal Connectors-Aluminum Cable-to-Flat-Bar," Page 26](#) for more information.

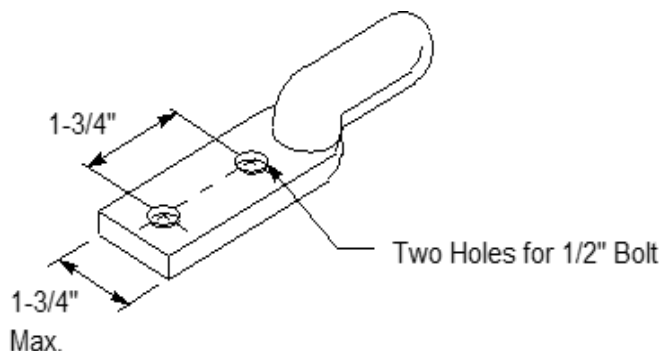


Figure 7-53.
Service-Terminal Conductor Connector

7.18 (continued)

Table 7-16. Approved, Compression-Type, Service-Terminal Connectors

Conductor Size: AWG or kcmil	Manufacturer and Catalog Number						Tool Index Number
	Mac	Homac	Burndy	Electrical Specialty	3M Company	Code	
4/0	NLRB4/0-8N	AL-4/0-NTN	YAK28A-2G2	—	—	303759	4/0 AS
	MLB4/0-8N	—	YA28-A5	AHL-4/0-BNTP	40145	—	4/0 A
350	NLRB350-8N	AL-350-NTN	YAK31A-2G2	—	—	303758	350 A
	MLB350-8N	—	YA31-A3	AHL-350-BNTP	40156	—	350 A
700/750	NLRB750-8N	AL-750-NTN	YAK39A-2G2	—	—	303833	700/750 A
	MLB750-8N	—	YA39-AM2	AHL-750-BNTP	40172	—	700/750 A
1,000	NLRB1,000-8N	AL-1,000-SSN	YAK44A-2NG7	—	—	303834	1,000 A
	MLB1,000-8N	—	YCAK44A-2G2	AHL-1,000-BNTP	40178	—	1,000 A

7.19 Requirements for Installing Secondary Terminations (0-600 Volts) in Metering Equipment Requiring CTs

1. All non-PG&E personnel (e.g., applicant installers) who install, inspect, or supervise the installation of PG&E services, and all PG&E personnel who schedule, install, inspect, or supervise the installation of services and metering work, must follow the new construction requirements for installing secondary terminations at customer switchboards or meter panels when 600 V metering CTs have not been installed.
2. Non-PG&E personnel installing approved PG&E service-entrance conductors must contact the local PG&E project coordinator and request that the CTs be installed before the service-entrance conductors are installed (usually 1–2 weeks before).
3. To ensure the safety of field metering personnel, CTs must be installed on new services before the service conductors are terminated in the utility pull section. To prevent the secondary voltage from being energized inadvertently before the CTs are installed, all personnel should know and follow the safety requirements for installing secondary terminations.

7.19 (continued)

4. Refer to the following PG&E documents for detailed instructions about installing secondary terminations (0–600 volt) in metering equipment requiring CTs:
 - TD-2424P-01, "Distribution Transformer Operations" (for access to this document, please see your PG&E Job Owner)
 - TD-6301P-01, "Electric Metering—Safe Work Procedures," Attachment 1, "Installing 600 Volt Current Transformers" (for access to this document, please see your PG&E Job Owner)

7.20 Electric Metering: Nonresidential, Commercial, and Agricultural

1. Service Specifications and Requirements

The following subsections describe service specifications and requirements for commercial, industrial, and agricultural electric meters.

a. Permitted Types of Electric Service

PG&E does not permit overhead service connections in areas zoned for underground service by local ordinance, or where underground service is required by [California Public Utilities Commission](#) (CPUC) approved tariffs.

b. Required Test-Bypass Facilities

Test-bypass facilities are required, regardless of the panel ampacity, for both single-phase and three-phase, nonresidential installations. Applicants must furnish, install, and maintain a meter socket with PG&E-approved, manual, test-bypass facilities. This equipment also is used for the following types of services

- All three-phase, non-residential services **without exception**.
- All single-phase, non-residential services. See the exceptions in [Subsection 7.20.2, "Required Approvals for Meter Equipment Without Test-Bypass Facilities,"](#) below.

c. Refer to [Figure 7-54, "Bused Safety-Socket Meter Box for Self-Contained Metering \(0 Amps-125 Amps\),"](#) on Page 7-81, and [Figure 7-55, "Bused, Safety-Socket Meter Box for Self-Contained Metering \(126 Amps-200 Amps\),"](#) on Page 7-82.

2. Required Approvals for Meter Equipment Without Test-Bypass Facilities

- a. PG&E requires approval **before** installing meter equipment without test-bypass facilities. If approved, the meter equipment may be exempt only when all the conditions are met in Item [Subsection 7.20.2.b](#) on Page 7-79.

7.20 (continued)

- b. Single-phase, nonresidential service when the following conditions are all met:
 - The main disconnect switch's rating does not exceed 200 amps.
 - Service to another meter or service will not be interrupted when de-energizing the meter socket without test-bypass facilities.
 - The metered service is used exclusively for temporary power or nighttime lighting loads.

3. General Requirements

Applicants must ensure that cabinets meet the following requirements:

- a. When planning a single, underground or overhead, single-phase or three-phase service, applicants must furnish, install, own, and maintain combination meter and current-transformer cabinets.
- b. All panels and covers must be sealable and all securing screws must be captive.
- c. Outdoor current transformer cabinets are weatherproof.
- d. A neutral is bonded to the enclosure.
- e. Current transformer cabinets are not used as splicing chambers.
- f. The applicant's conductors entering or exiting the cabinet must be routed and formed properly to allow PG&E to pull their service laterals without encountering any obstructions. The applicant's conductors must not run downward to the middle or bottom of the enclosure, cross in front of or behind the PG&E device entrance conduit, and must not obstruct the PG&E current transformer and test switch areas.
- g. The applicant's conduit and conductors leaving the cabinet must not be installed within 2 inches of any corner of the cabinet or within 2 inches of the PG&E service-entrance conduit location.
- h. The current transformer mounting base must be rated for the exact ampacity as the PG&E service. The mounting base and bus bars must include termination bolts, Belleville washers, and nuts on the line and load sides to connect the current transformers. See [Section 8](#) for details about these internal components.
- i. The applicant must run a green bond wire between the sections. See [Subsection 7.9, "Grounding,"](#) on Page 7-35 for more information on grounding.

7.20 (continued)

4. Services

a. Services, 0 Amps Through 200 Amps, Single Applicant, Overhead and Underground

Applicants must meet the following requirements when installing services:

- 1) PG&E's service conductors must be pulled into the enclosure and connected to the bypass-test facility's line-termination lugs.
- 2) One conductor per phase of load conductors must be routed and formed to allow PG&E to pull their service laterals without encountering obstructions.
- 3) For overhead service, applicants must provide and install service-entrance conductors from the weatherhead to the enclosure. Applicants must connect the conductors to the bypass-test facility's line-termination lugs.
- 4) The C-phase (right most side), test-bypass blocks (i.e., two poles) are identified as the power leg (i.e., high leg or stinger leg) for metering three-phase, 4-wire, delta service. The power leg is identified by using the color orange.
- 5) All section covers can be removed independently; however, after the meter is in place, the upper cover must not be removable. After the meter is in place, the lower cover must be sealable.
- 6) For meter socket jaw requirements, refer to [Subsection 7.1., "Meter Classifications, Connections, and Electric Service Rating"](#) on Page 7-1.
- 7) Install range-taking lugs from #6 American wire gauge (AWG) to 1/0 AWG for services up to 125 amps, and #2 AWG to 250 thousand circular miles (kcmil) for services rated from 126 amps through 200 amps.
- 8) See [Figure 7-54, "Bused, Safety-Socket Meter Box for Self-Contained Metering \(0 Amps–100 Amps\)"](#) on Page 7-81 and [Figure 7-55, "Bused, Safety-Socket Meter Box for Self-Contained Metering \(101 Amps–200 Amps\)"](#) on Page 7-82 for more details.
- 9) For all agricultural overhead services, install a cable protector around the service-entrance conductors entering the wall-mounted or panelboard-mounted meter panel. Order using either [Material Code 382034](#) or [Material Code 382045, found in Electric Design Standard 062288, "Underground Conduits," Table 14.](#)

7.20 (continued)

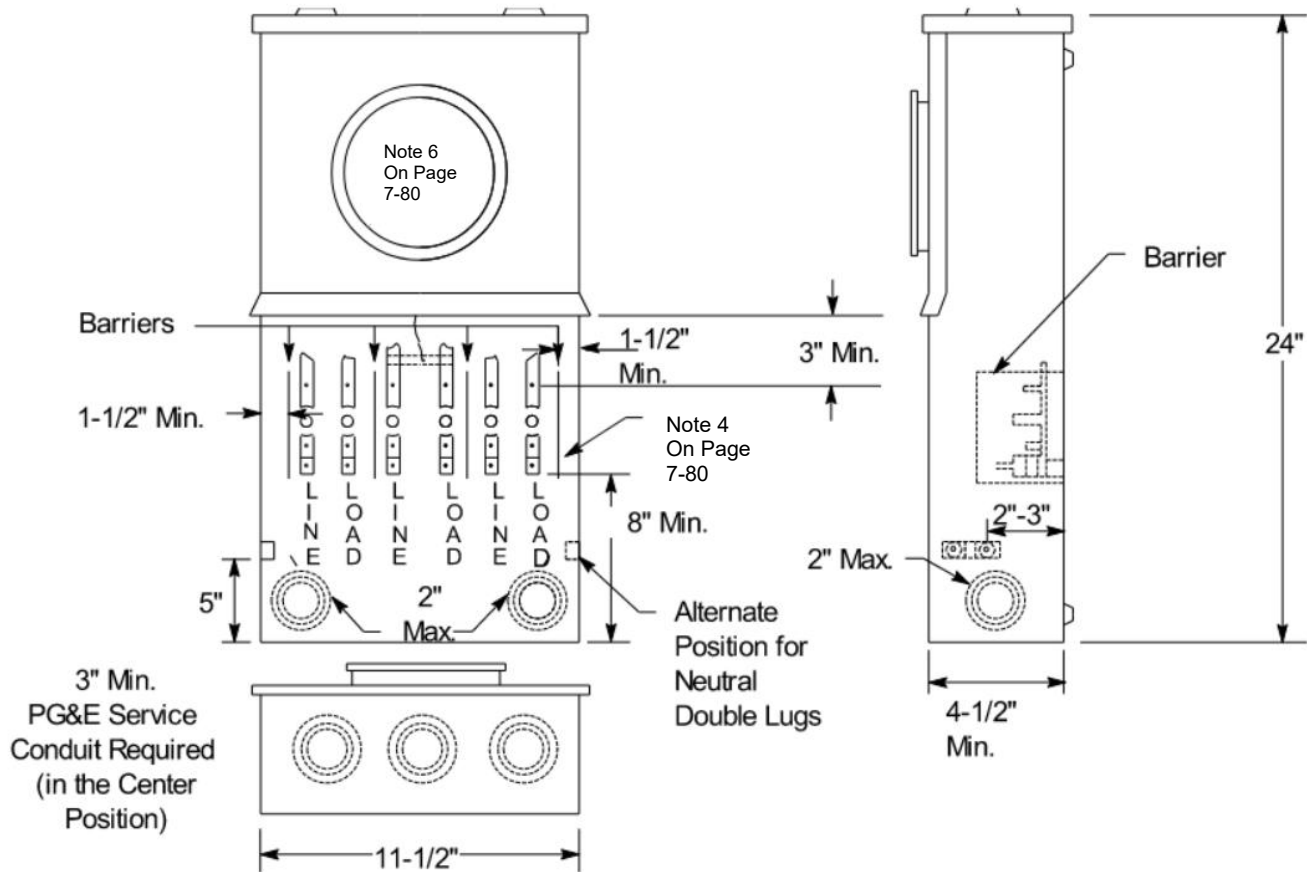


Figure 7-54.
Bused, Safety-Socket Meter Box for Self-Contained Metering (0 Amps-100 Amps)

7.20 (continued)

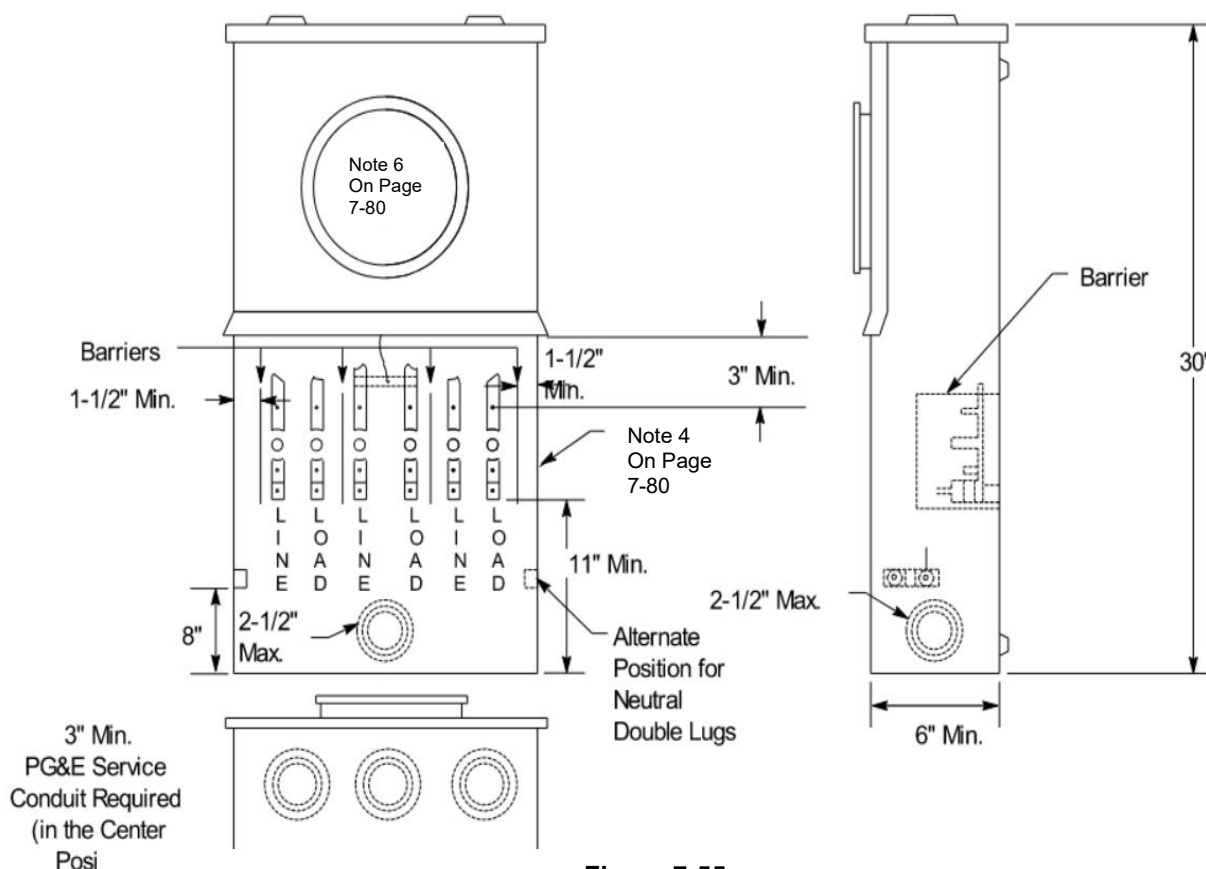


Figure 7-55.
Bused, Safety-Socket Meter Box for Self-Contained Metering (101 Amps–200 Amps)

b. Services, Over 200 Amps, Single Applicant, Underground

- 1) Applicants must meet the following requirements when installing services and equipment:

Services, 400 Amps Maximum, Single-Phase and Three-Phase

- For more information, refer to [Figure 7-56, "Underground Combination Meter and Current-Transformer Cabinet \(201 Amps-400 Amps, single phase or three phase\)."](#) on Page 7-83 for more information.
- The applicant's conductor must be terminated on the top (load side) of the current-transformer mounting base or termination enclosure busing.
- Applicants must ensure that provisions are made for the underground service neutral when installing an insulated, bondable termination in the current-transformer cabinet.

7.20 (continued)

- Applicants must install one conductor per phase of load conductors before PG&E installs the current-transformers.
- Applicants must mark the C-phase (right most side), as the power leg (i.e., high leg or stinger leg) of a 240/120-volt, three-phase, 4-wire delta service by using the color "orange." This is for metering purposes.

NOTE

See [Subsection 7.14, "Electric Metering Components and Cable Terminating Facilities,"](#) for details about internal components.

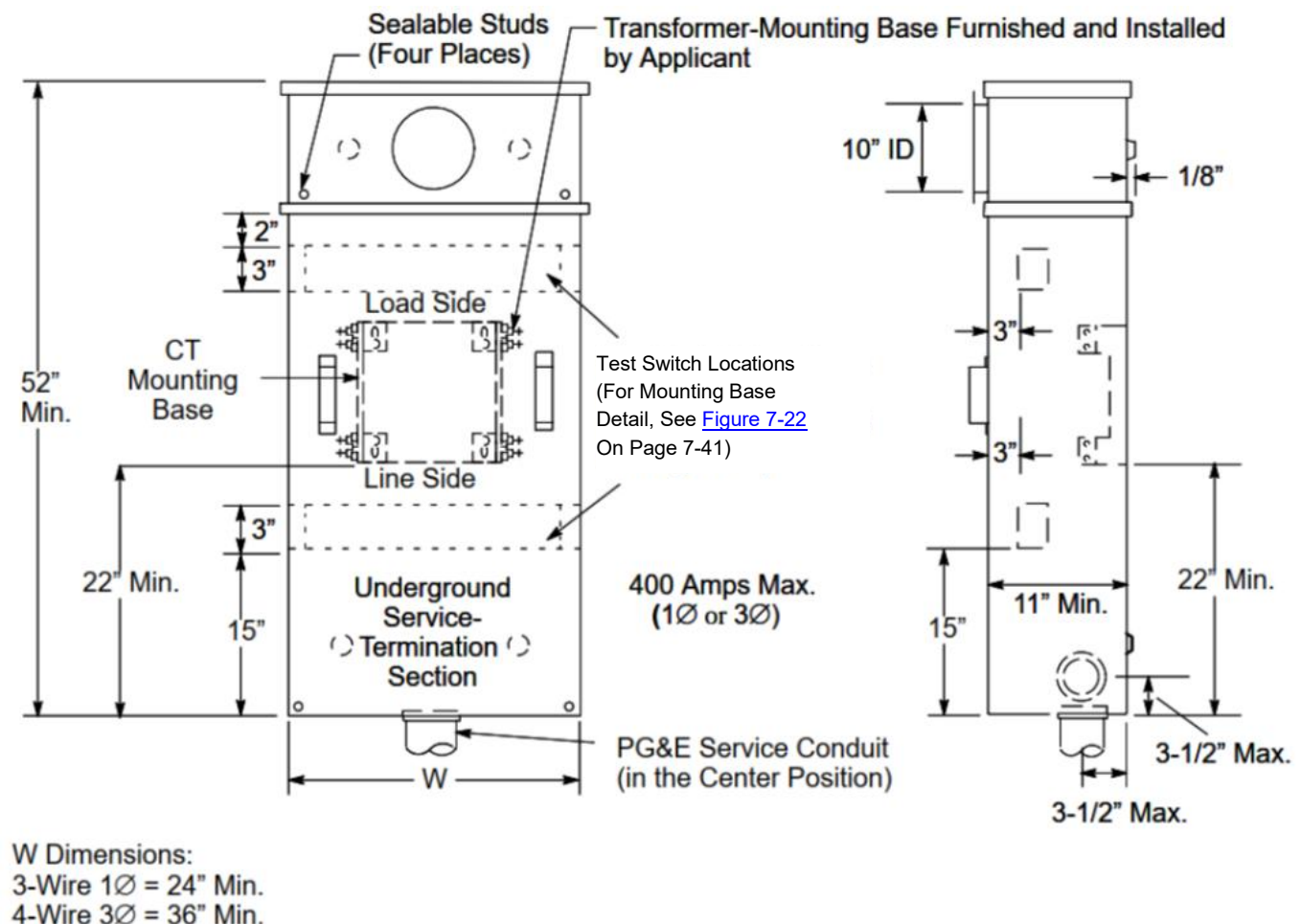


Figure 7-56.

Underground Combination Meter and Current-Transformer Cabinet (201 Amps-400 Amps, 1Ø or 3Ø)

7.20 (continued)

- 2) Services, 201 Amps through 400 Amps, Three-Phase, and 201 Amps through 600 Amps, Single-Phase, Current-Transformer Metering in Bused, Current-Transformer Cabinets:
 - For more information, refer to [Figure 7-57, "Separate-Bused Current-Transformer Cabinet and Meter Box with Underground Service-Termination Pull Box \(201 Amps-400 Amps, three phase, and 201 Amps-600 Amps, single phase\)." below.](#)
 - Applicants must furnish and connect a maximum of one conductor per phase of service-entrance conductors to the line and load sides of the current-transformer mounting base and to the load side of the termination facilities in the underground, service-termination pull box.
 - PG&E pulls and terminates its service-entrance conductor directly to the applicant-furnished, service-termination facility in the underground service-termination pull box.
 - The applicant installs one conductor per phase of service-entrance conductors that enter the current-transformer cabinet and terminate on the top (line side) of the current-transformer mounting bus bars.

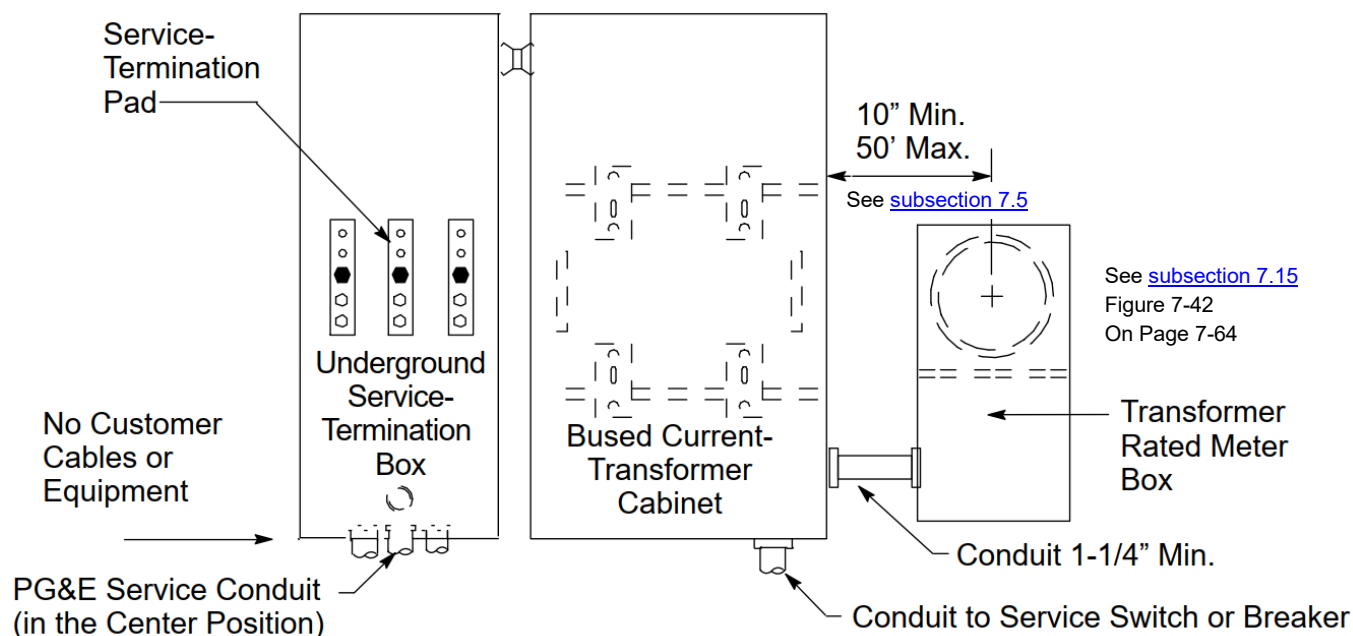


Figure 7-57.

Separate-Bus Current-Transformer Cabinet and Meter Box with Underground Service-Termination Pull Box (201 Amps-400 Amps, 3 ϕ and 201 Amps-600 Amps, 1 ϕ)

7.20 (continued)

- 3) Services, 600 Amps Through 800 Amps, Single Phase or Three Phase, Current-Transformer Metering in Bused, Current-Transformer Cabinets.
 - For more information, refer to [Figure 7-58, "Underground Service Combination Meter and Current-Transformer Cabinet \(600 Amps, 1Ø or 3Ø, 800 Amps 3Ø\)." on Page 7-86.](#)
 - This enclosure is allowed in wall-mounted applications connected to an underground service. The enclosure must be installed so the bottom is between 6 inches to 9 inches above grade or above the working space area.
 - Applicants must install and connect no more than three load-side conductors per phase to the current transformer mounting base.
 - The applicant's conductor must be terminated only on the top (load side) of the current transformer mounting base.
 - The applicant's conduit and load conductors must be installed so they leave the enclosure (cabinet) either out of the top or exit out of the right or left side, no less than 12 inches from the top of the enclosure.
 - Applicants must ensure that provisions are made for the underground service neutral when installing an insulated, bondable termination in the current transformer cabinet.
 - For metering purposes, applicants must mark the C-phase (right most side), as the power leg (i.e., high leg or stinger leg) of a 240/120-volt, three-phase, 4-wire delta service by using the color "orange."

7.20 (continued)

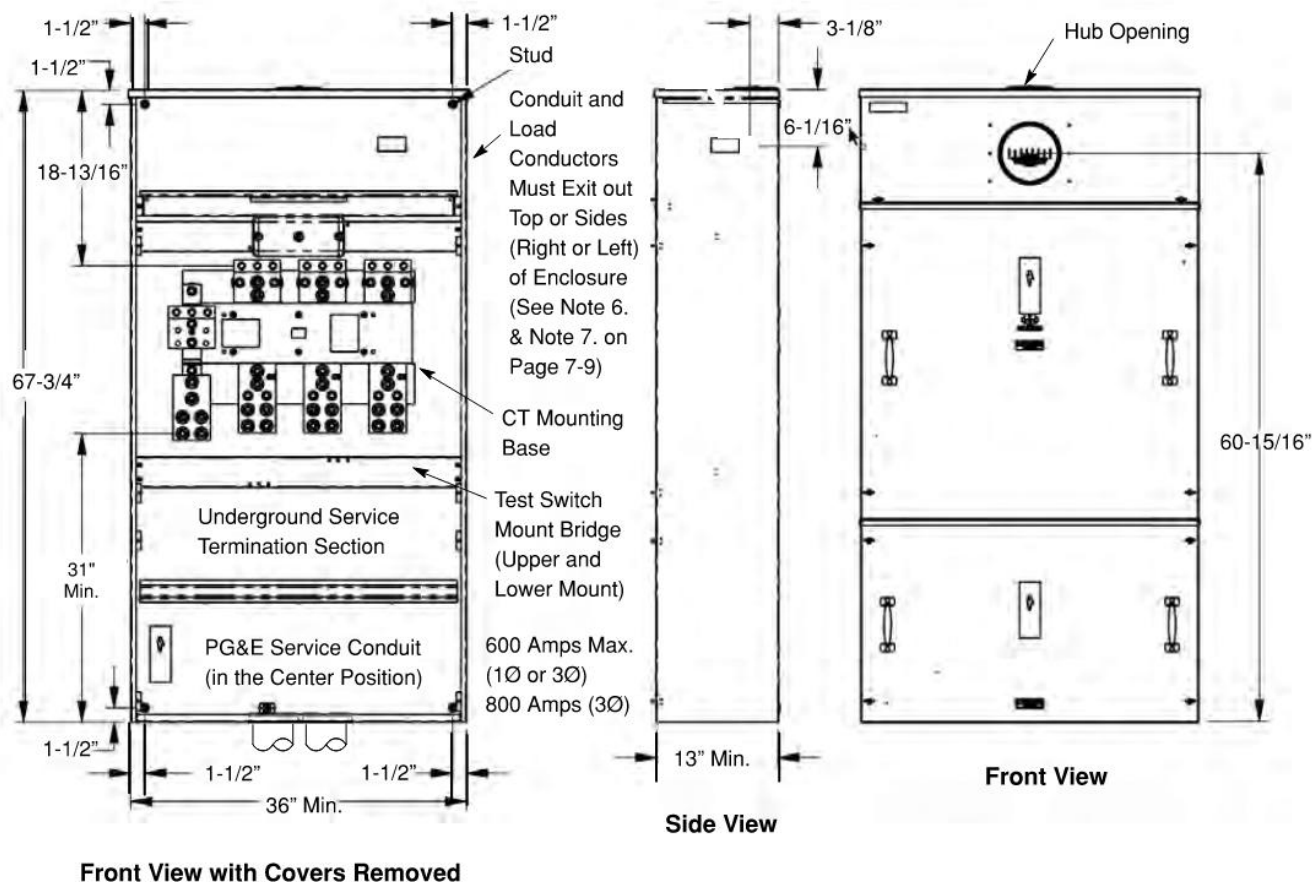


Figure 7-58.
Underground Service Combination Meter and Current-Transformer Cabinet
(600 Amps, 1Ø or 3Ø, 800 Amps 3Ø)

Notes in reference to Figure 7-58.

1. This enclosure must be installed so the bottom is between 6 inches to 9 inches above grade or above the working space area.
- 4) Services, 201 Amps and Above, Current-Transformer Metering in Switchboard Service Sections.
 - [Figure 7-59, "Switchboard Pull Section,"](#) [Figure 7-60, "Separate Pull Box,"](#) and [Figure 7-61, "Bottom-Fed Service Section"](#) on Page 7-87 illustrate typical arrangements of the switchboard service sections that are used in conjunction with a pull section or pull box for underground service-conductor termination.
 - PG&E pulls and terminates its service conductors directly to the applicant-furnished service-termination facilities in the underground service-termination pull section, pull box, or service section.

7.20 (continued)

NOTE

See [Section 8](#), Subsection 8.2, "Electric Switchboards: 0 Volts Through 600 Volts," for details.

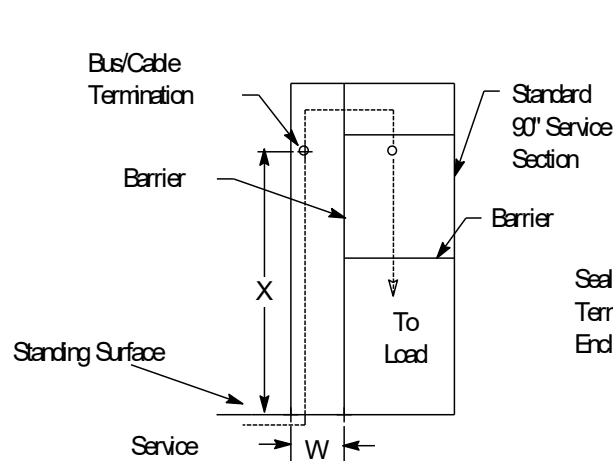


Figure 7-59.
Switchboard Pull Section

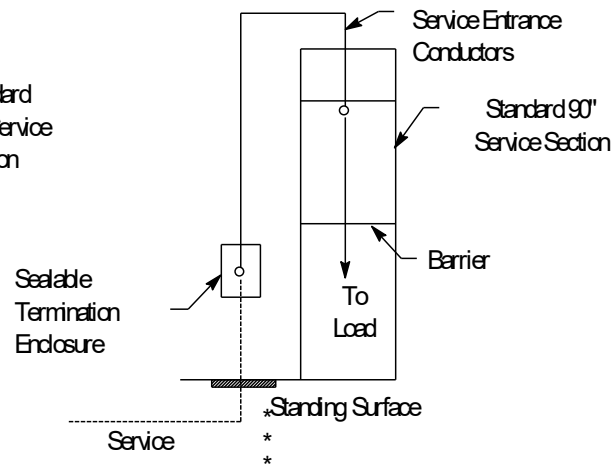


Figure 7-60.
Separate Pull Box

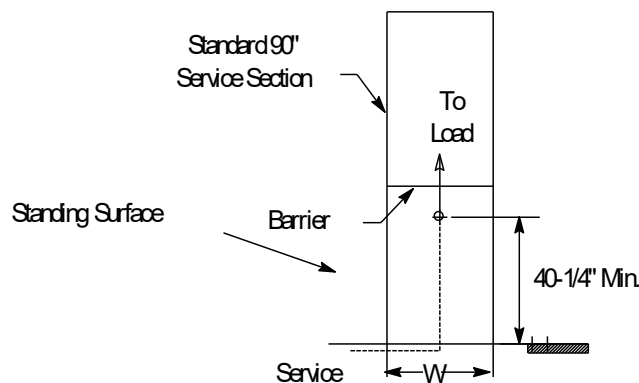


Figure 7-61.
Bottom-Fed Service Section

Notes in reference to the figures above:

1. Refer to [Table 7-15](#) on Page 7-73 for more information on dimensions.

c. Services, 400 Amps Maximum, Single Applicant, Overhead

Applicants must meet the following requirements when installing single-applicant, overhead services that are 400 Amps maximum:

- Applicants must connect the service entrance conductors to the line and load sides of the current-transformer mounting base.

7.20 (continued)

- Applicants must install one conductor per phase of service-entrance conductors before PG&E installs the current-transformers. Also applicants must connect the service entrance conductors to the line and load sides of the current-transformer mounting base.
- The applicant's service entrance conductor must be terminated on the top (line side) of the current-transformer mounting base or termination enclosure busing.
- The applicant's load conductor must be terminated on the bottom (load side) of the current-transformer mounting base.
- See [Figure 7-62, "Overhead-Fed Combination Meter and Current-Transformer Cabinet \(400 Amps Max., 1Ø or 3Ø\)"](#) below.

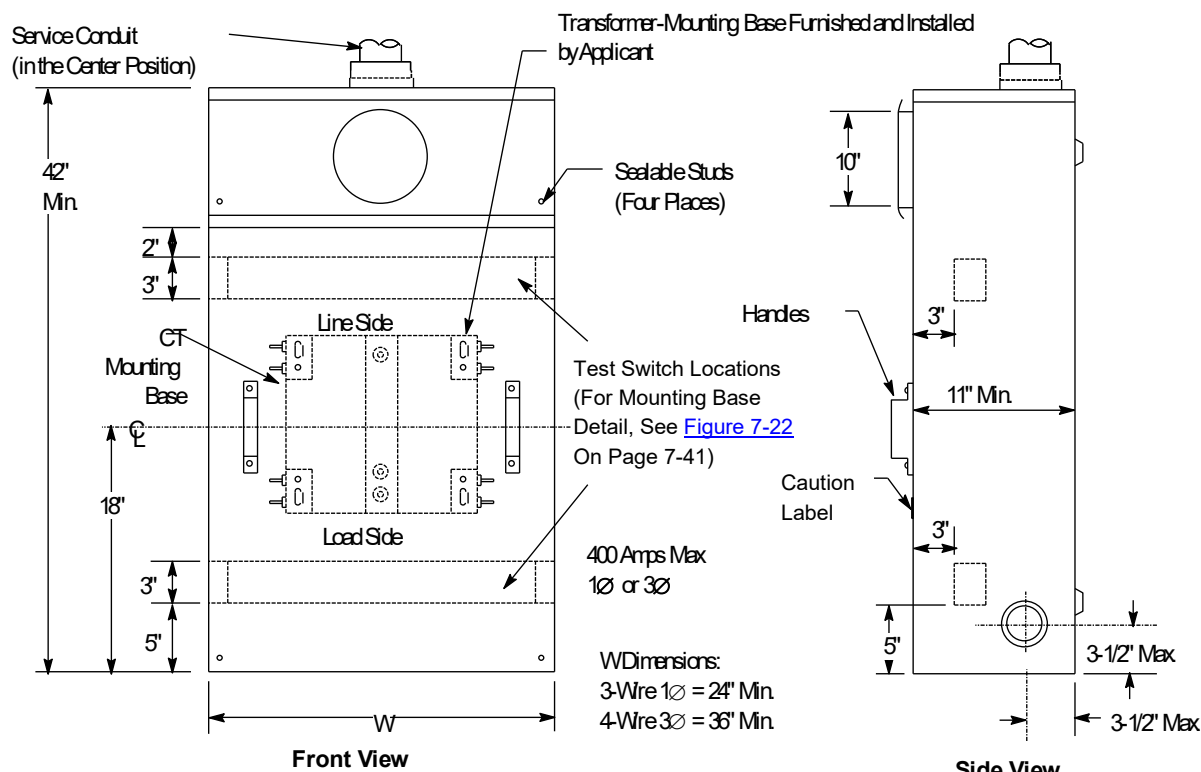


Figure 7-62.
Overhead-Fed Combination Meter and Current-Transformer Cabinet (400 Amps Max., 1Ø or 3Ø)

7.20 (continued)

- 1) Services, 400 Amps, Single Phase or Three Phase, with Current-Transformer Metering.
 - See below [Figure 7-63, "Overhead-Fed Separate-Bused, Current-Transformer Cabinet and Safety-Socket Meter Box \(400 Amps Max., 1 \$\phi\$ or 3 \$\phi\$ \)"](#)
 - Connect the service-entrance conductors to the line side of the current-transformer mounting bus bars and load the conductors to the load side of the current-transformer mounting bus bars.
 - Applicants must install one conductor per phase of line-side conductors and one set of load-side conductors before PG&E installs the current transformers. Connect the service-entrance conductors to the line side of the current-transformer mounting bus bars and load the conductors to the load side of the current-transformer mounting bus bars.

NOTE

See [Subsection 7.14, "Electric Metering Components and Cable Terminating Facilities,"](#) on Page 7-56 for details about internal components.

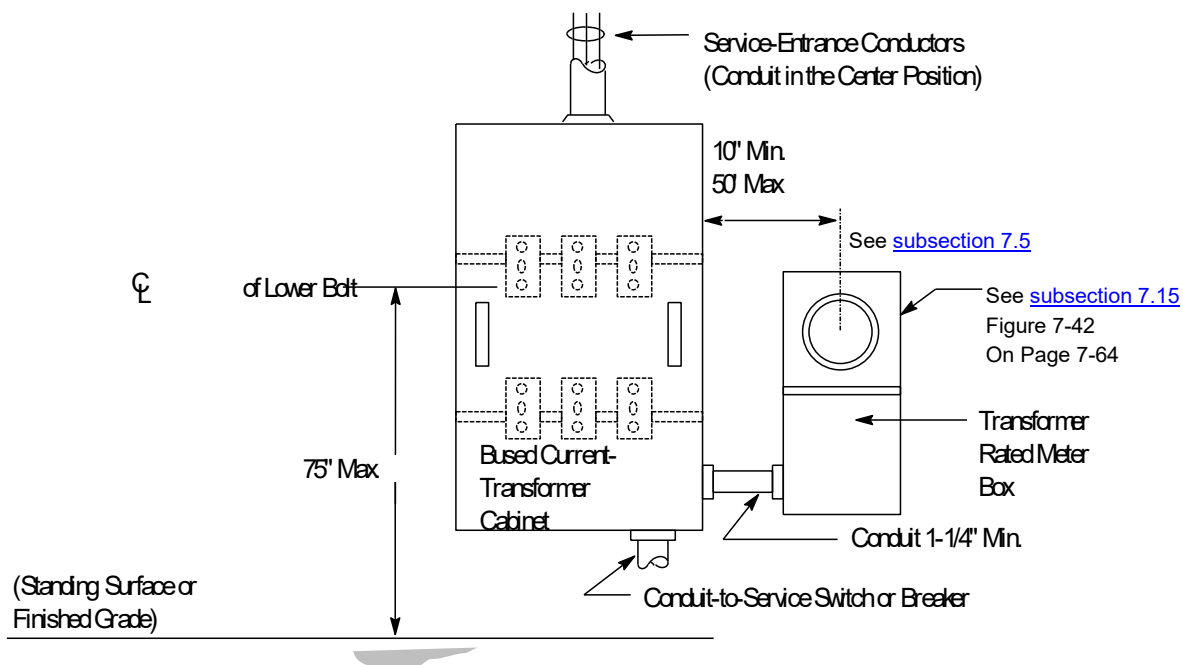


Figure 7-63.
Overhead-Fed Separate-Bused, Current-Transformer Cabinet and Safety-Socket Meter Box (400 Amps Max., 1 ϕ or 3 ϕ)

7.20 (continued)

- 2) Services, 400 Amps Maximum, Single-Phase or Three-Phase, Current-Transformer Metering in Switchboard Service Sections.
 - Typical switchboard service-section arrangements are illustrated in [Figure 7-64, "Overhead, Service-Termination, Standard Switchboard Service Section \(0 Volts-600 Volts\),"](#) on Page 7-91.

NOTE

See [Section 8](#), Subsection 8.2, "Electric Switchboards: 0 Volts Through 600 Volts," on Page 8-12 for details.

- Applicants must furnish and install service-entrance conductors and either cable or bus bars, as described below.
- When switchboards are served through bus-bar conductors, the conductors must enter through the top or at the side or back in the upper 10-inch section.
- When switchboards are served through cable conductors, the conductors must enter through the top of the switchboard. [Figure 7-64, "Overhead, Service-Termination, Standard Switchboard Service Section, 400 Amps Maximum \(0 Vots-600 Volts\),"](#) on Page 7-91, illustrates an extension that allows for horizontally incoming conduits from the side or rear of the standard switchboard service section.
- Applicants must ensure that the service-entrance conductors feed from top to bottom. Load conductors must leave below the metering compartment barrier. Applicants must ensure that service entrance conductors are connected to the busing in the service sections with lugs approved for the type of conductors used.

7.20 (continued)

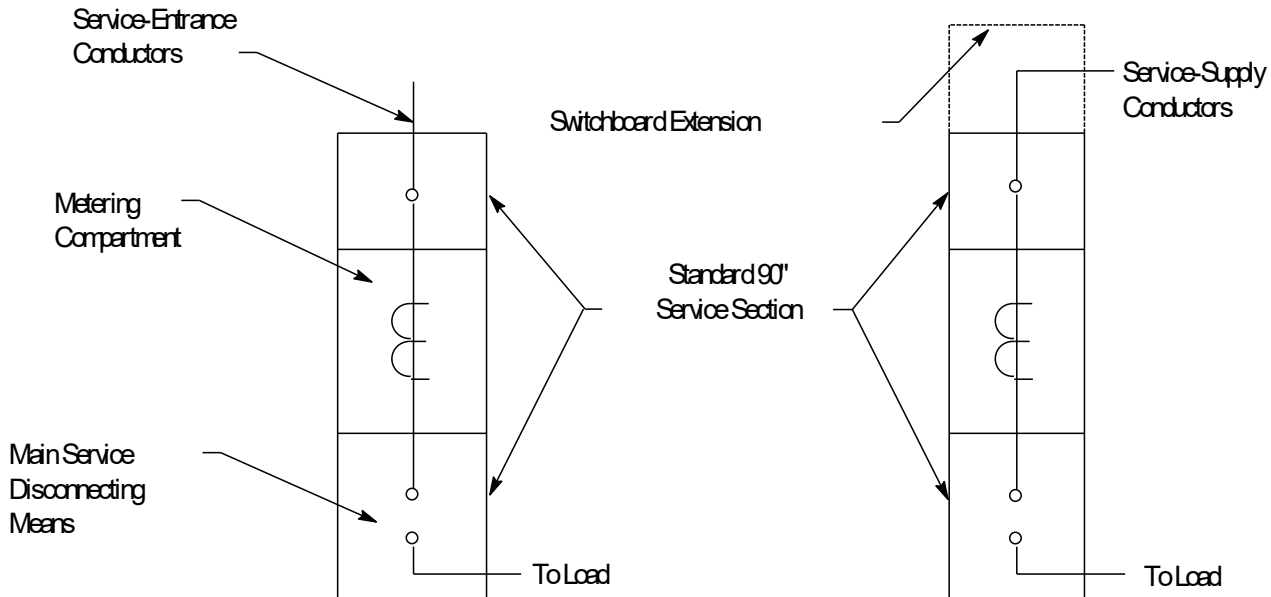


Figure 7-64.
Overhead, Service-Termination, Standard Switchboard Service Section, 400 Amps Maximum (0 Vots-600 Volts)

5. Multi-Applicant Meter Installations

Applicants must meet the following requirements when installing multi-applicant meters.

- a. Applicants must install grouped meters for multi-applicant buildings where each occupant is metered individually.
- b. Each unit of a multi-applicant installation must be considered a single applicant and must meet the metering requirements described in [Subsection 7.20.4.a, "Services, 0 Amps Through 200 Amps, Single Applicant, Overhead and Underground,"](#) on Page 7-80.
- c. Applicants must ensure that service entrance conductors for multi-applicant installations extend from PG&E's service termination point to the line side of the meter socket jaw of each socket.
- d. Applicants must ensure that the minimum centerline spacings between meter sockets are 7-1/2 inches horizontal and 8-1/2 inches vertical. Refer to [Figure 7-47](#) on Page 7-69 and [Table 7-14](#) on Page 7-72 for multi-meter spacing and clearances.

7.20 (continued)

- e. For multimeter installations, PG&E determines the ampacity rating of a grouped multimeter installation using one of the following two methods.
 - For installations **without** a main switch or breaker, the service rating will be the rating of the electrical enclosure or service-termination section, pull can, or other service-termination enclosure where PG&E terminates and connects its supply facilities and conductors.
 - For installations **with** a main switch or breaker, the rating of the service to be supplied is the rating of the termination section, pull can, service section, or main service switch continuous current rating (typically whichever is greater).
- f. For grouped-meter installations without a main switch, refer to [Figure 7-65, "Overhead Service, Grouped-Meter Installation Without a Main Switch \(Max. 400 Amps, Single Phase or Three Phase\),"](#) and [Figure 7-66, "Underground Service, Grouped-Meter Installation Without a Main Switch \(Max. 400 Amps, Three Phase, or 600 Amps, Single Phase\)"](#) on page 7-93 for additional information.
- g. For grouped-meter installations with a main switch, refer to [Figure 7-67, "Grouped-Meter Installation With a Main Switch \(Max. 400 Amps, Three Phase, 600 Amps, Single Phase\),"](#) on page 7-94 for additional information.

7.20 (continued)

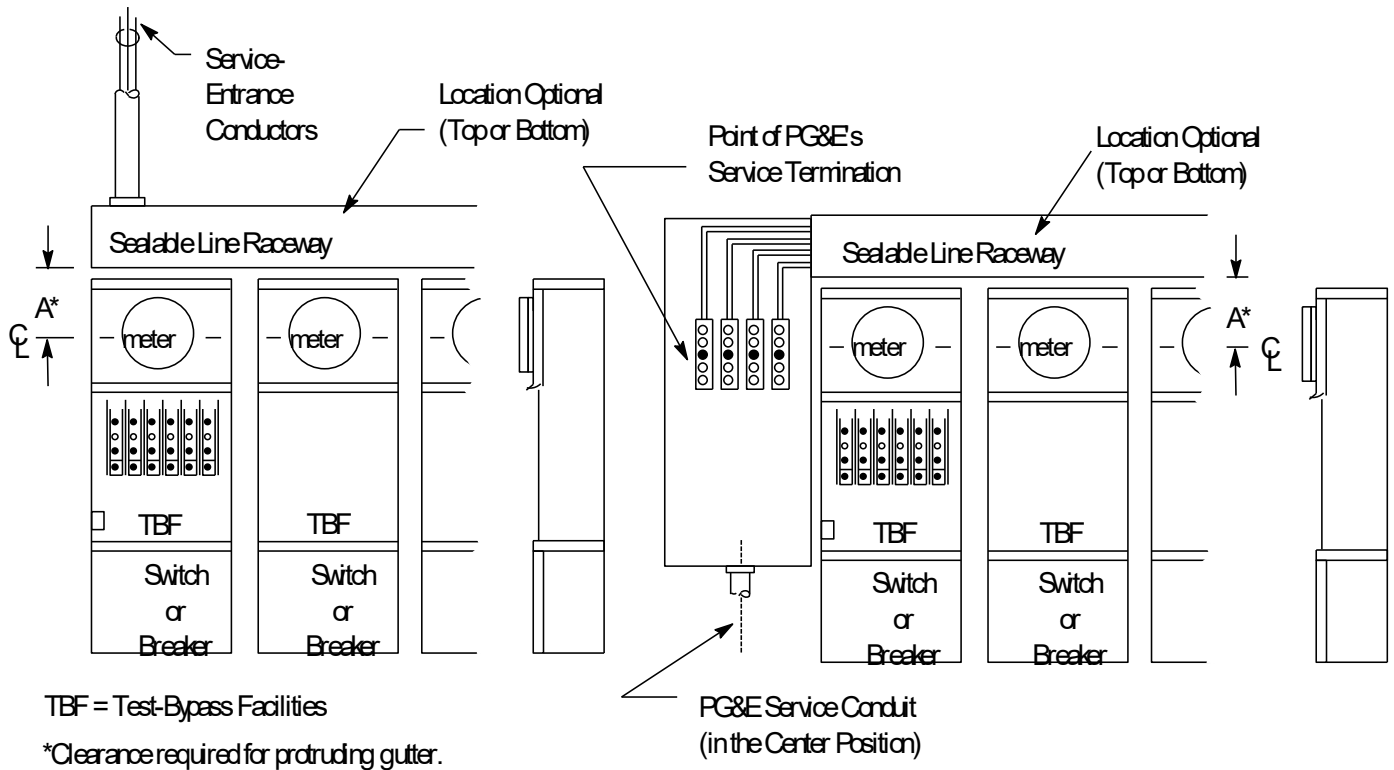


Figure 7-65.
Overhead Service, Grouped-Meter
Installation Without a Main Switch (Max. 400
amps, 1ø or 3ø)

Figure 7-66.
Underground Service, Grouped-Meter
Installation Without a Main Switch (Max. 400
amps, 3ø, or 600 Amps, 1ø)

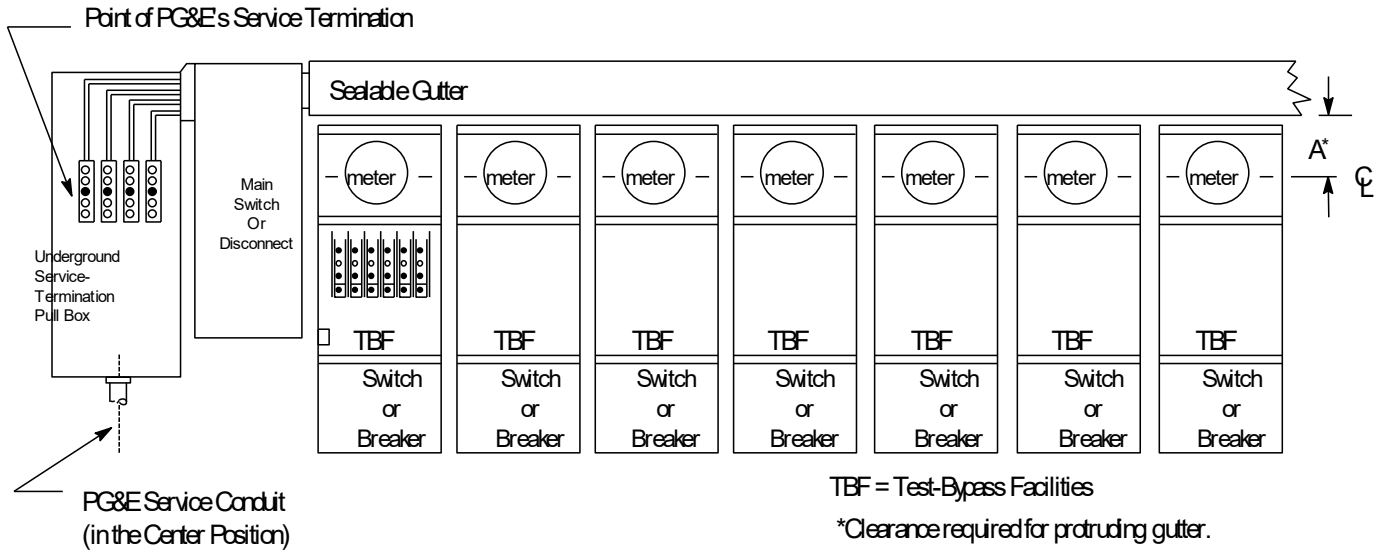


Figure 7-67.
Grouped-Meter Installation with a Main Switch (Max. 400 Amps, 3Ø, 600 Amps, 1Ø)

7.20 (continued)

6. Fire-Pump Connections

PG&E allows the following types of service connections to new and existing switchboards and fire-pump meter panels. The requirements are described below:

- a. All fire-pump service connections must be approved by the local city, county, or state inspecting Authority Having Jurisdiction (AHJ). Site plans and equipment drawings must be submitted to PG&E for approval.
- b. The service disconnect, meter panel, switchboard, or switchgear for the fire pump must be located in the same electrical room as the main service meter panel, switchboard, or switchgear, as well as the utility termination section. They cannot be located in another room or building. When installed outdoors, the equipment must be located next to each other.
- c. For switchboards rated up to 600 volts (i.e., secondary), the following types of connections are allowed.
 - Preferred connection for new switchboards: A fire-pump service connected in a dedicated tap section installed in the main switchboard. See Option #1 in [Figure 7-68, "Fire-Pump Equipment Location and Service Connection Options,"](#) on Page 7-96. If allowed, the local AHJ **could** require the tap section to be located away from the main breaker on the opposite side of the termination section.
 - Alternative connection for new or existing switchboards: A fire-pump service connected to the load side (i.e., after the main breaker) of the main switchboard. See Option #2 in [Figure 7-68, "Fire-Pump Equipment Location and Service Connection Options,"](#) on Page 7-96.
- d. For switchgear (i.e., primary) rated between 601–25,000 volts, applicants can use the following types of connections.
 - A fire-pump service connected in a dedicated tap section of the switchgear.
 - A fire-pump service connected to the load side (i.e., after the main breaker) of the main switchgear.
- e. For main switchboard or switchgear service termination equipment rated between 0–25,000 volts, applicants can use the following type of connection.
 - A separate and dedicated utility service that is connected directly to the fire-pump meter panel, switchboard, or switchgear. Usually, this is referred to as a second PG&E service. See Option #3 in [Figure 7-68, "Fire-Pump Equipment Location and Service Connection Options,"](#) on Page 7-96.

7.20 (continued)

- f. Do not place a fire-pump service tap or connections in the utility termination, instrument transformer, or metering sections.
- g. Ensure that the wiring configurations for fire-pumps (either 3-wire or 4-wire) are the same as the wiring configurations for the main switch.
- h. Ensure that required access panels and required signage for meter panels and switchboards serving fire pumps are installed.
- i. Ensure the ampacity rating of the fire pump switchboard or meter panel does not exceed the ampacity rating for main service termination equipment (e.g., main switchboard, meter panel).

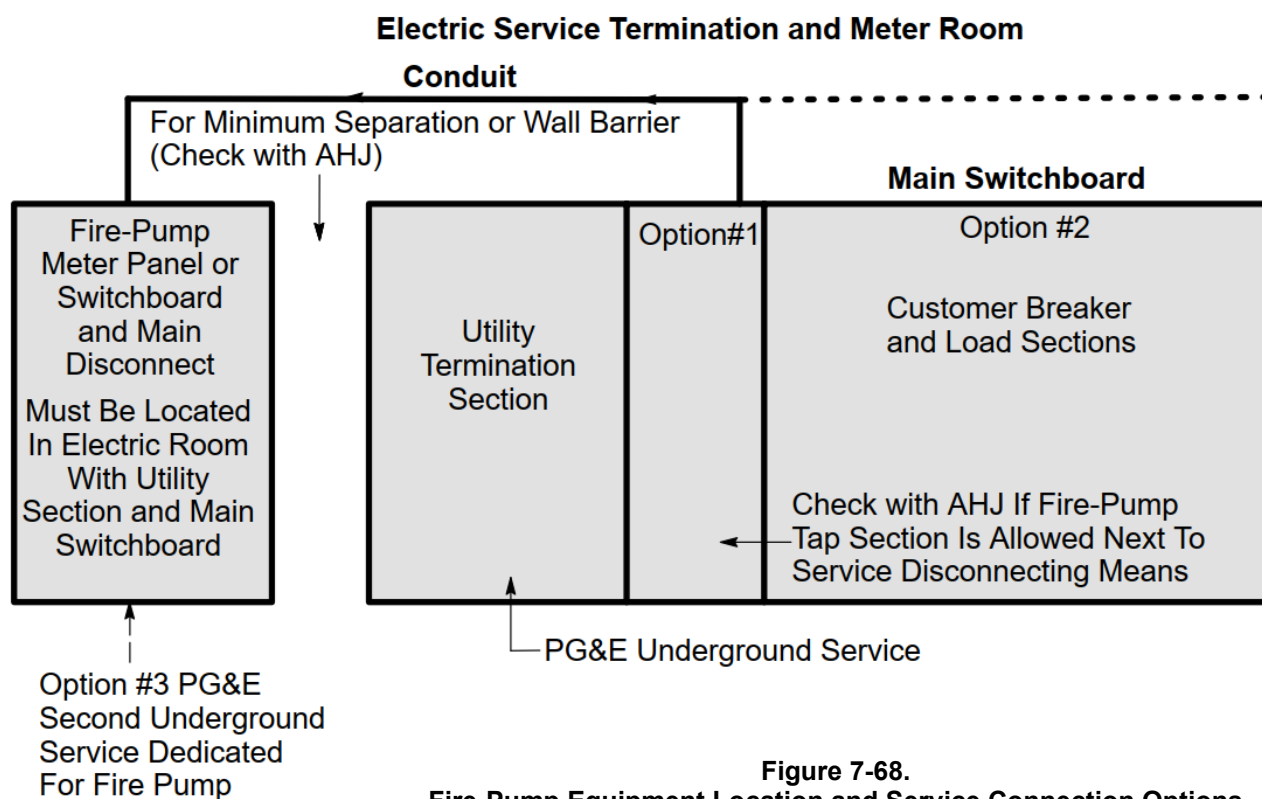


Figure 7-68.
Fire-Pump Equipment Location and Service Connection Options

7. Underground Service Cable-Termination Compartments or Sections

For more requirements, see [Subsection 7.17 "Underground Service Cable-Termination Compartments or Sections,"](#) on page 7-71 and [Figure 7-69, "Detail of aluminum, Termination Bus Stubs,"](#) on Page 7-97.

7.19 (continued)

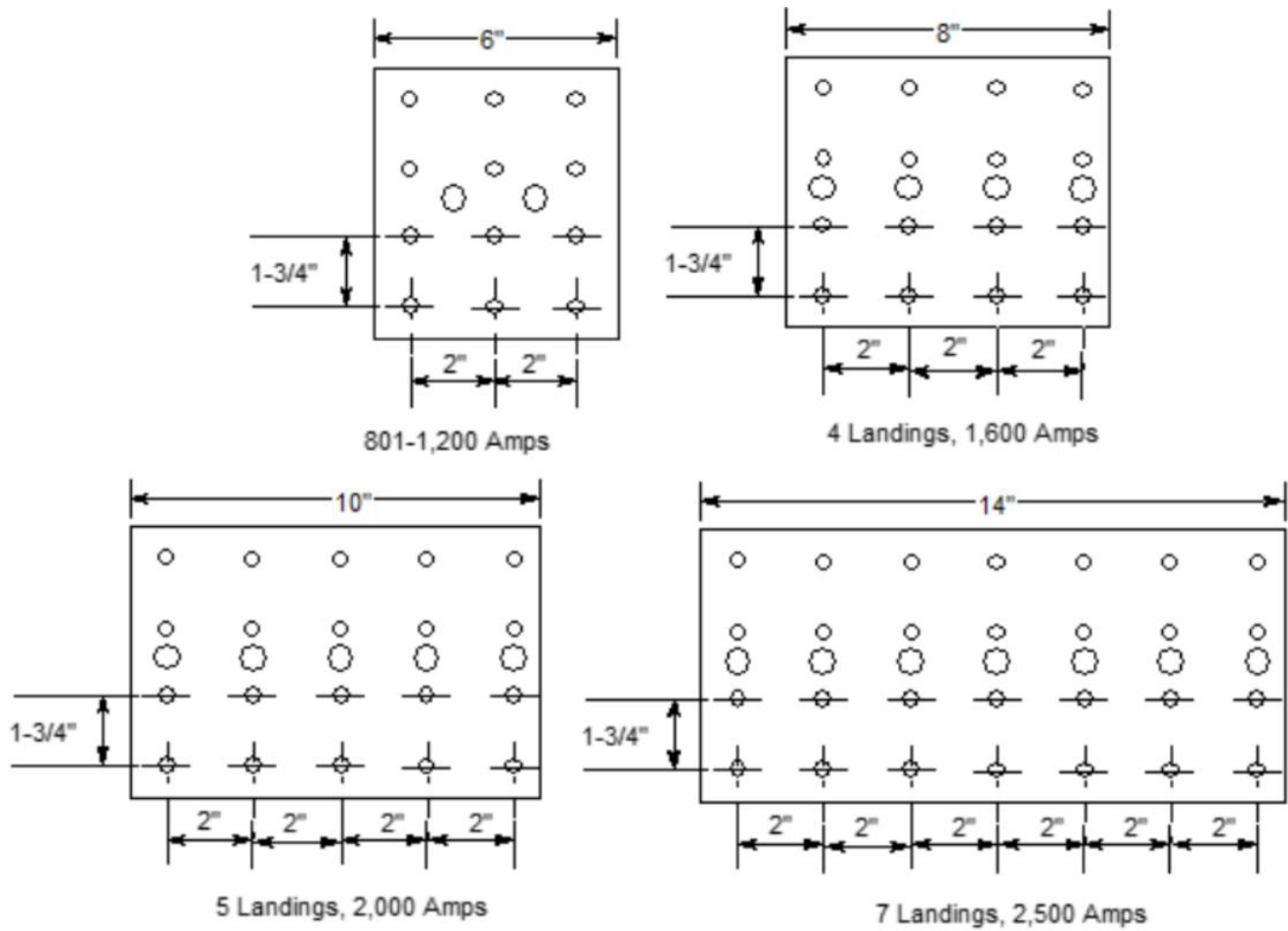


Figure 7-69.
Detail of Aluminum, Termination Bus Stubs, Commercial

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8. Electric Metering Pedestals and Electric Switchboards: 0 Volts Through 27,000 Volts, and Primary Services

8.1 Electric Pedestals

This section provides the design and installation requirements for electric metering pedestals in the PG&E service territories. **Only the PG&E-approved metering pedestals described in this section can be installed.**

1. Residential Electric Metering Pedestals

Residential electric meter pedestals, as shown in [Figure 8-1, "Residential Electric Metering Pedestal,"](#) on Page 8-1, must have a minimum rating of 100 amps and a maximum rating of 200 amps. The pedestal also must meet the requirements specified in the [Electric Utility Service Equipment Requirements Committee \(EUSERC\) Manual](#), Drawing 307.

For authorization to attach telephone and cable television terminating facilities to the post, contact your local PG&E Job Owner.

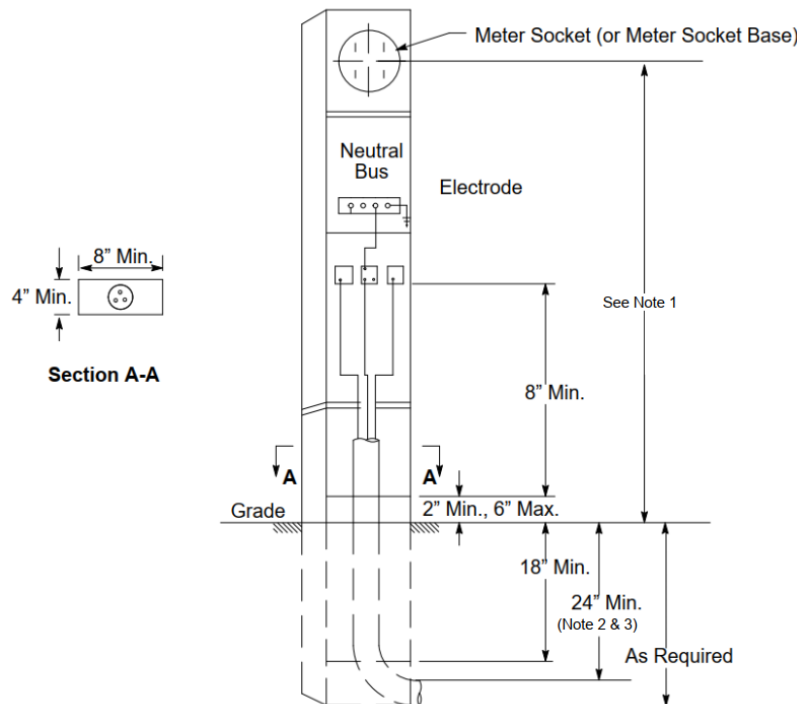


Figure 8-1
Residential Electric Metering Pedestal

Note in reference to [Figure 8-1](#).

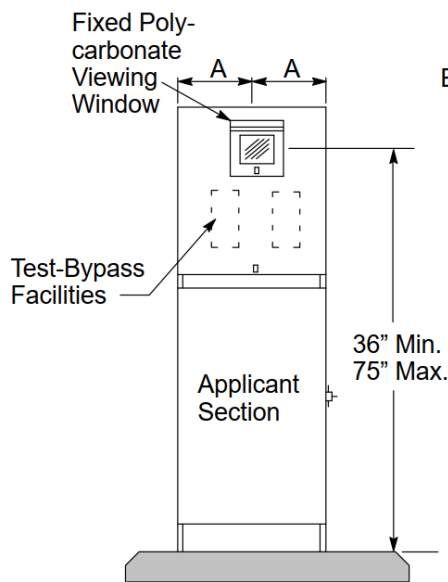
1. See Subsection 7.3. "Meter Heights and Cabinet Enclosure Clearances" on Pages 7-11 through 7-14.
2. The PG&E-Required conduit cover and depth is greater than [EUSERC Manual](#), Drawing 307.
3. See [Electric Design Standard 063927, "Methods and Requirements for Installing Residential Underground Electric Services 0 – 600 V to Customer-owned Facilities"](#).

8.1 (continued)

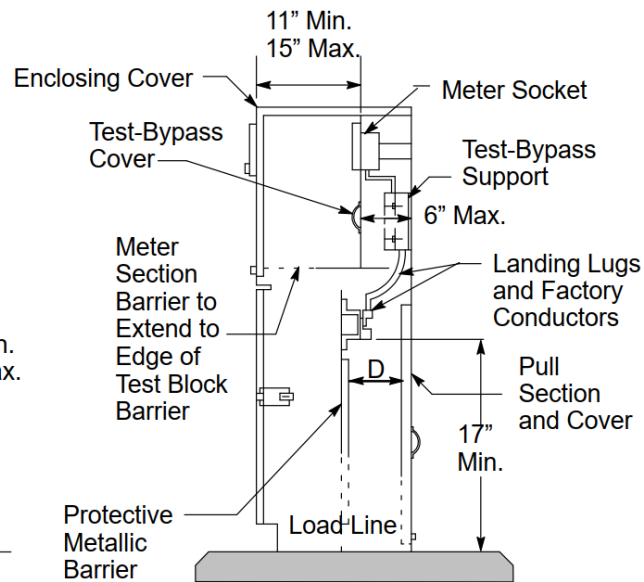
2. Nonresidential Single-Meter Service Pedestals, 100–200 Amps
 - a. Applicants must meet the following requirements:
 - 1) **Metering Compartment:** The meter socket must be mounted on a support, attached to the meter panel, and provided with a sealing ring. Enclose the metering compartment with an exterior hood.
 - 2) **Exterior Hood:** An enclosing cover that is hinged to allow the front, sides, and top of the hood to rotate upward and back, 90 degrees or more, as one unit to expose the internal metering compartment. Refer to [Figure 8-7, "Direction Views,"](#) on Page 8-5 for more information.
 - Ensure that the lifting force required to open the hood does not exceed 25 pounds.
 - Ensure the hood has a locking device to prevent it from closing while in the open position.
 - Install with a lifting handle (2 handles if cover is more than 16-inches wide).
 - Provide a fixed poly-carbonate viewing window.
 - Ensure the area in front of the meter sockets and test bypass is not blocked with side panels, enclosure walls, or other obstructions. This provides additional safety for personnel in the event of an arc flash.
 - b. Test-bypass blocks with rigid barriers are furnished, installed, and wired according to [Section 7](#), Subsection 7.11.3.d, Test Bypass Facility for Self-Contained Metering, 0 Amps Through 225 Amps," on page 7-39.
 - c. Utility compartment covers (i.e., exterior hood, pull section, and metering compartment) are sealable and lockable using a padlock with a 5/16-inch lock shaft.
 - d. Secure internal equipment (attached to the outer walls of the enclosure) in place with devices that cannot be loosened from the outside.
 - e. The terminating pull-section of the pedestals:
 - 1) Comply with the minimum dimensions illustrated in [Table 8-1, "Minimum Dimensions: Inches,"](#) on Page 8-4.
 - 2) Accept a minimum 3-inch conduit.
 - 3) Have covers equipped with lifting handles.

8.1 (continued)

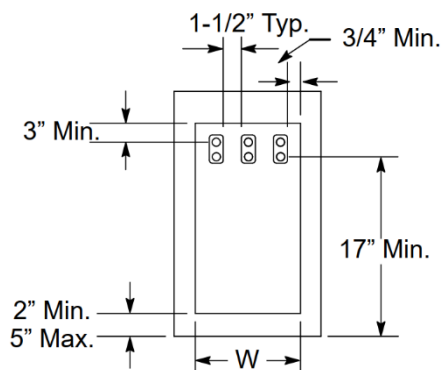
- 4) Are equipped with aluminum-bodied mechanical lugs, ranging from #6 AWG through 250 kcmil, for terminating the service conductors.
- 5) Have insulated cables or buses installed between the termination lugs and the test-bypass facilities.
- 6) Have protective metallic barriers, 16-gauge minimum, provided between the pull sections and their (the applicants') distribution sections.
- 7) Have a 1/4-inch minimum clearance between the applicants' section walls and the barriers to prevent screws and bolts from protruding into the pull sections.



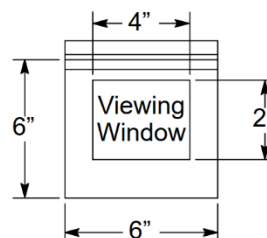
**Figure 8-2.
Front View**



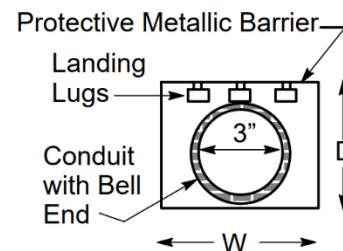
**Figure 8-3.
Side View**



**Figure 8-4.
Service Cable
Termination Section**



**Figure 8-5.
Fixed Polycarbonate
Viewing Window**



**Figure 8-6.
Service Cable Termination
Section—Top View**

8.1 (continued)

Table 8-1 Minimum Dimensions (Inches)¹

Service	W	A	D
Single Phase	10-1/2	10	4.5
Three Phase	12-1/2		

1. Applies to [Figures 8-2](#) through [Figures 8-6](#) on Page 8-3.

NOTE

The above figures represent generic design configurations. To submit other designs for review and approval, contact your local PG&E Job Owner (JO). The JO consults with PG&E's electric standards and electric metering departments.

3. Nonresidential Dual-Meter Service Pedestals, Single Phase or Three Phase, 100–400 Amps
 - a. The pedestals have two self-contained meter sockets; each rated for up to a maximum of 200 amps. The cable termination (i.e., pull section) may be located on the back or side of the pedestals.
 - b. Applicants must meet the requirements listed in [Subsection 8.1.2](#), (A-E), the requirements in [Figure 8-7, "Directional Views,"](#) through [Figure 8-12, "Front View-Interior: Cover Removed,"](#) on Page 8-5 through Page 8-8, and [Subsection 8.1.3.c](#) below:
 - c. The terminating pull-section of the pedestals:
 - 1) Comply with the minimum dimensions illustrated in [Table 8-2, "Minimum Dimensions: Inches,"](#) on Page 8-6.
 - 2) Accept a minimum 4-inch and a maximum 5-inch conduit.
 - 3) Have covers equipped with lifting handles.
 - 4) Are equipped with aluminum-bodied mechanical lugs, ranging from 4/0 through 750 kcmil, for terminating the service conductors. 1-1/2 inch minimum spacing will be provided between the energized lugs or bussing. The 1-1/2 inch spacing may be reduced if rigid insulating barriers (1/16-inch minimum thickness) are provided that extend a minimum of 1/2 inch beyond any exposed, energized part when the maximum wire size is installed.
 - 5) Have insulated cables or busses installed between the termination lugs and the test-bypass facilities.
 - 6) Have protective metallic barriers, 16-gauge minimum, provided between the pull sections and their (the applicants') distribution sections.
 - 7) Have a 1/4-inch minimum clearance between the applicants' section walls and the barriers to prevent screws and bolts from protruding into the pull sections.

8.1 (continued)

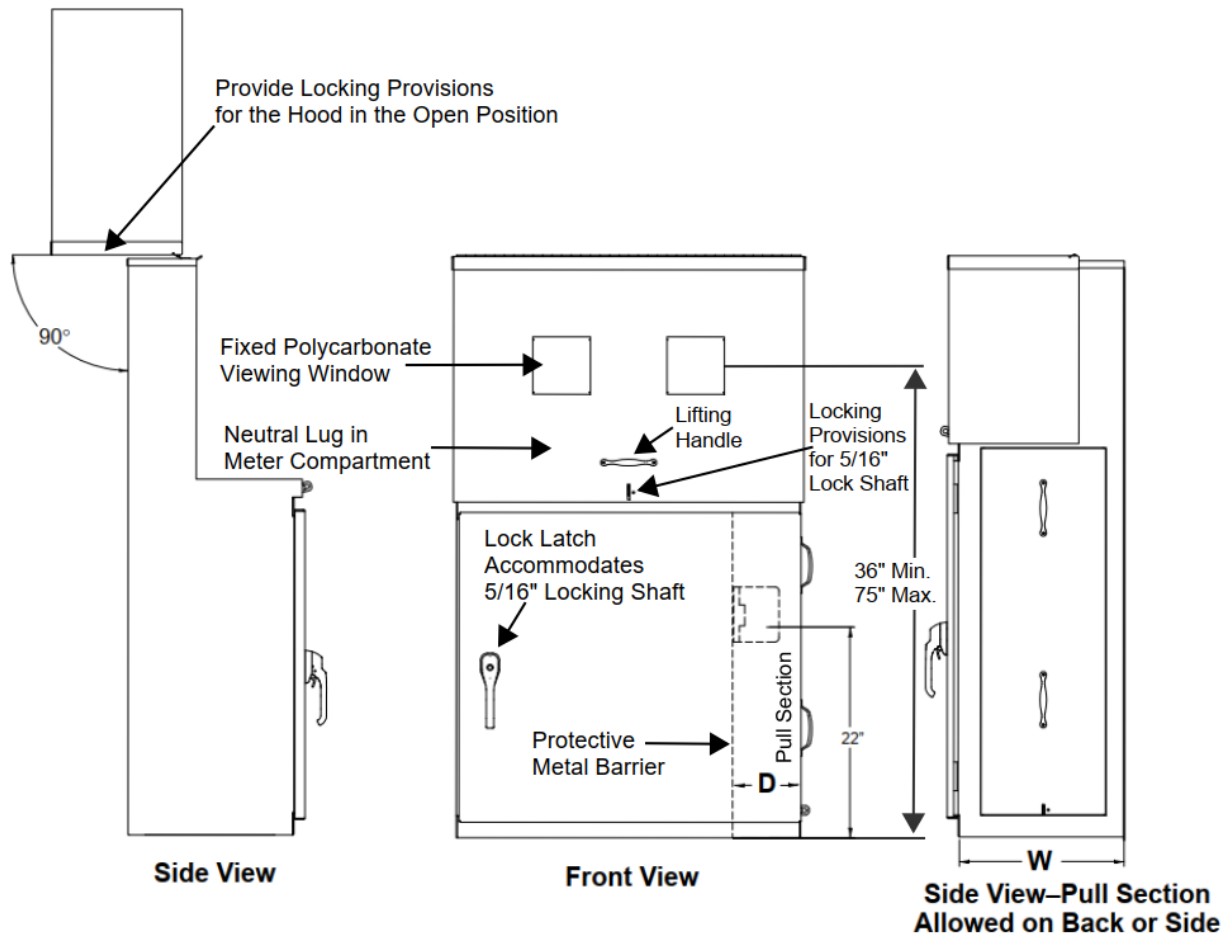


Figure 8-7.
Directional Views

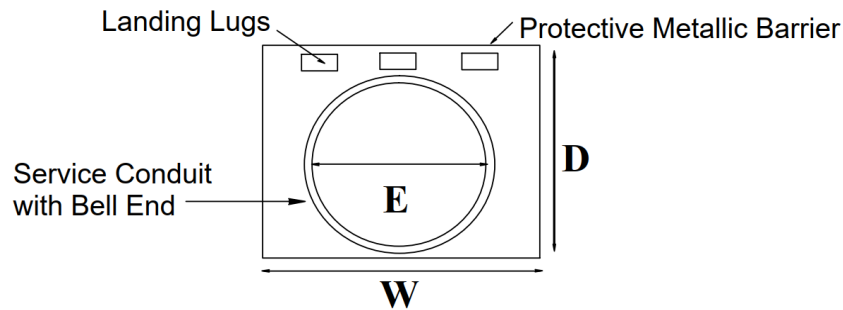


Figure 8-8.
Service Cable Termination Section – Top View

8.1 (continued)

Table 8-2. Minimum Dimensions (Inches)¹

Service	A	B	C	D	E	W
Single Phase	6	4.5	12	6	4	12
Three Phase	6	4.5	12	7	5	16

1. Applies to [Figure 8-7](#) through [Figure 8-10](#) on Pages 8-5 through 8-7.

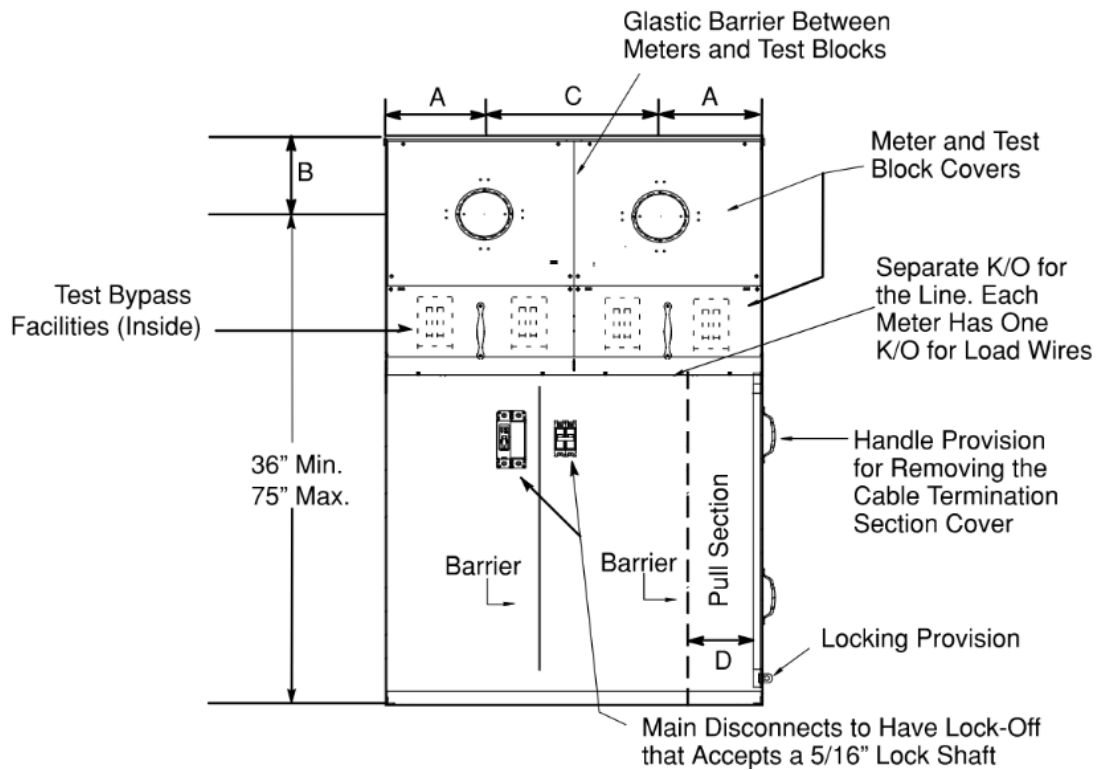


Figure 8-9.
Front Inside

8.1 (continued)

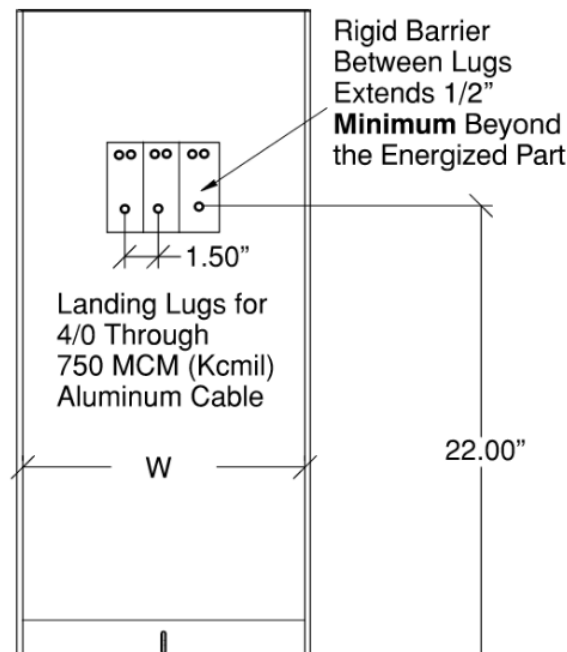


Figure 8-10
PG&E Service Cable Termination (Pull Section)

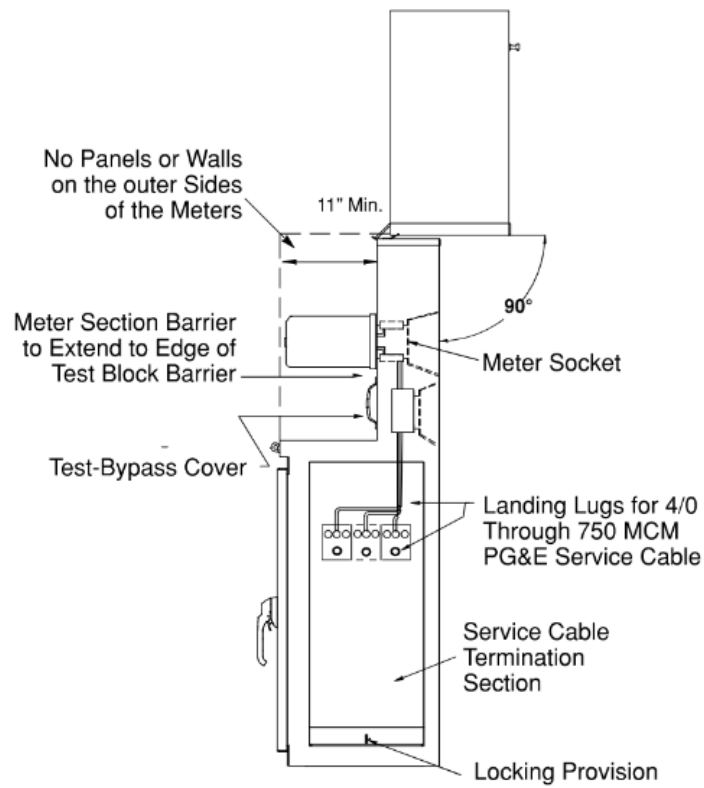


Figure 8-11
Side View: Cover Removed

8.1 (continued)

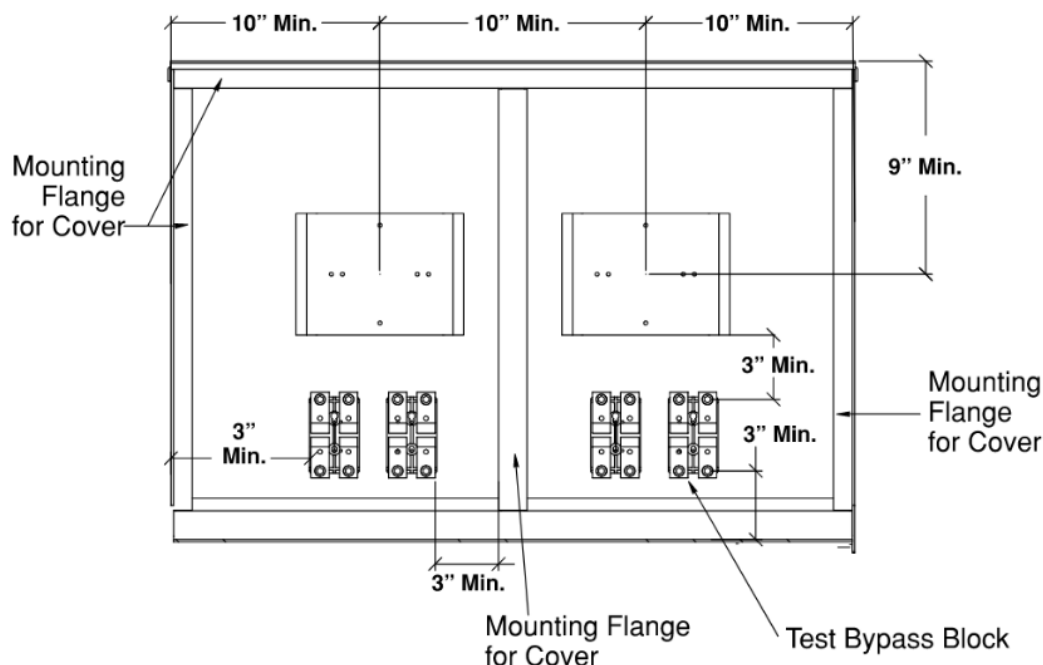


Figure 8-12
Front View-Interior: Cover Removed

4. Nonresidential Current-Transformer Rated Pedestals, 400-600 Amps Single-Phase or Three-Phase, 800 Amps Three-Phase
 - a. This subsection provides information on single-metered, current-transformer (CT)-rated metering pedestals from 400 amps up to 800 amps. These pedestals are built with the utility cable termination compartment on the back and with the metering compartment on the front top (above the customer section), or a meter panel connected to the side of the pedestal.
 - b. Refer to [Figure 8-13, "CT Pedestal \(400 – 600 Amps 1Ø or 3Ø, 800 Amps 3Ø\),"](#) on Page 8-9, and [Figure 8-14, "CT Pedestal – Side Mount Meter Panel \(400 – 600 Amps, 1Ø or 3Ø, 800 Amps 3Ø\),"](#) on Page 8-10. These pedestals are listed in [Table 8-3, "CT Pedestal Approved Manufacturer's Model Numbers, and Figures"](#) below.

Table 8-3 CT Pedestal Approved Manufacturer's Model Numbers and Figures^{2, 3}

Manufacturer	Model/Catalog Numbers		Figure
Milbank	CP3 Series ¹		8-13 & 8-14
Tesco Controls	24-412CTSBXB	24-418CTSBXB	8-13

¹Full model numbers are not listed due to numerous variations. Pedestals must meet all PG&E requirements. Final approval is in the field.

²These pedestals are only approved for a single meter socket at specific voltages and amperages. These pedestals do not require a dual meter socket door as required for switchboards.

³For low-profile switchboards, refer to [Figure 8-40, "Low-Profile Switchboard Service Section, with CT Compartment, for Underground Service,"](#) on Page 8-47.

8.1 (continued)

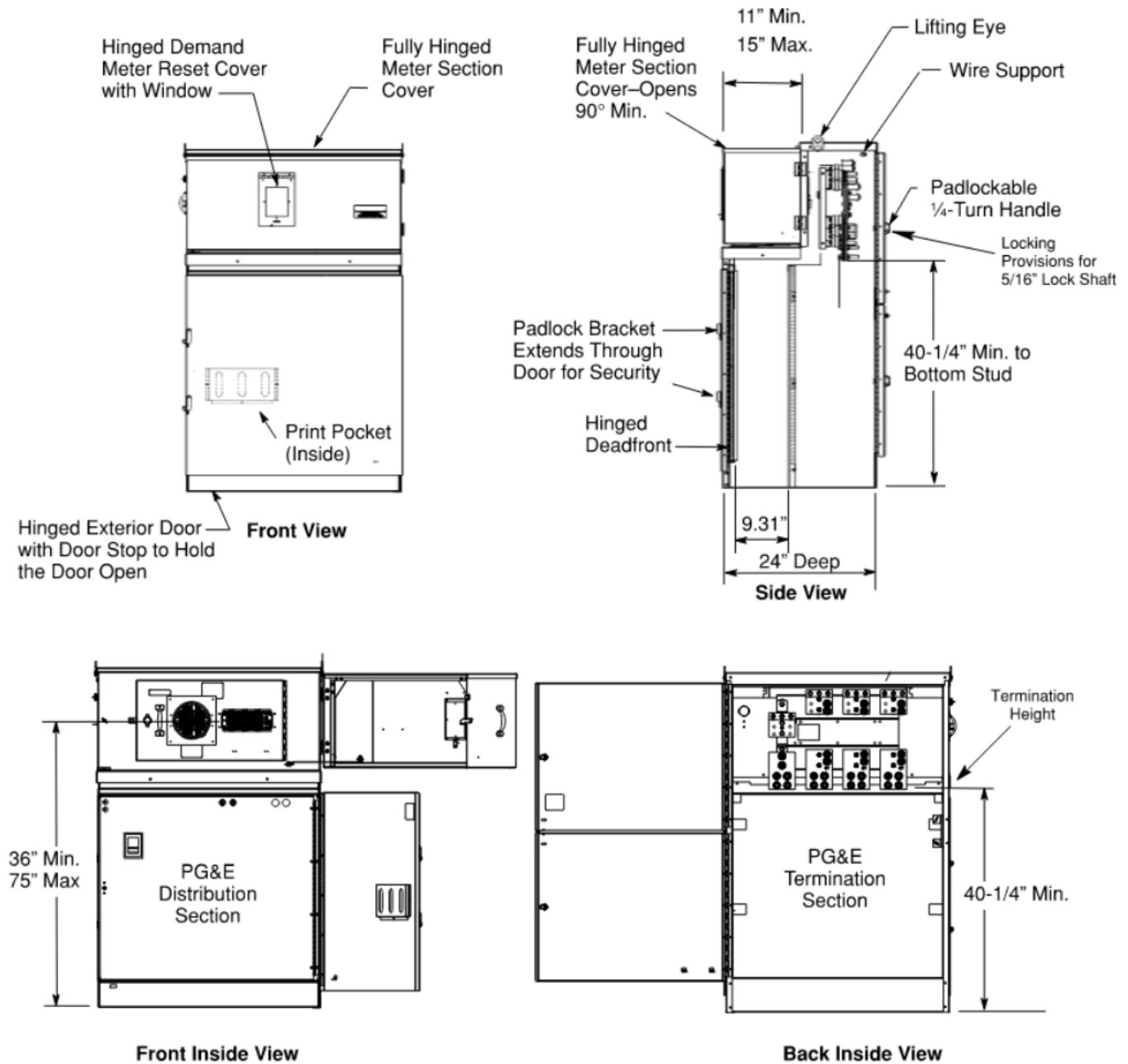
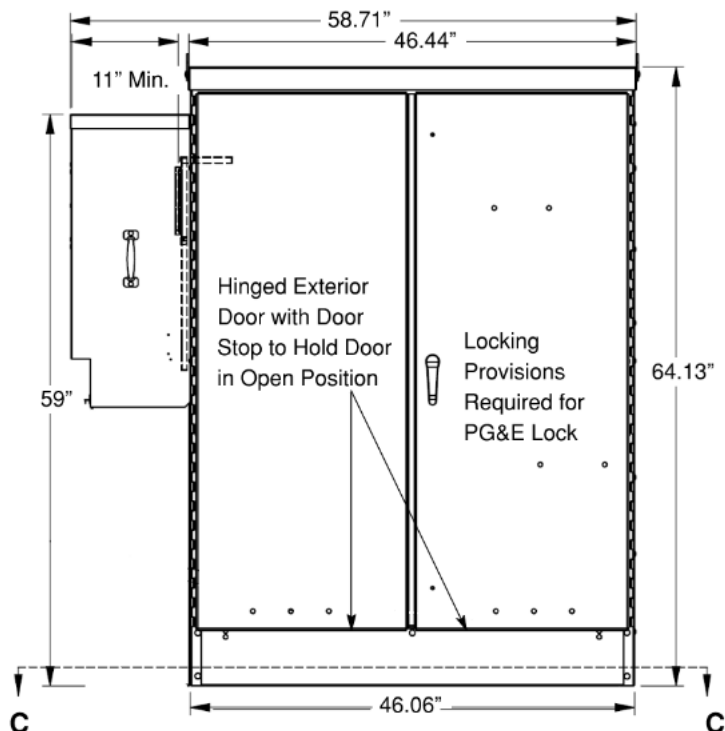


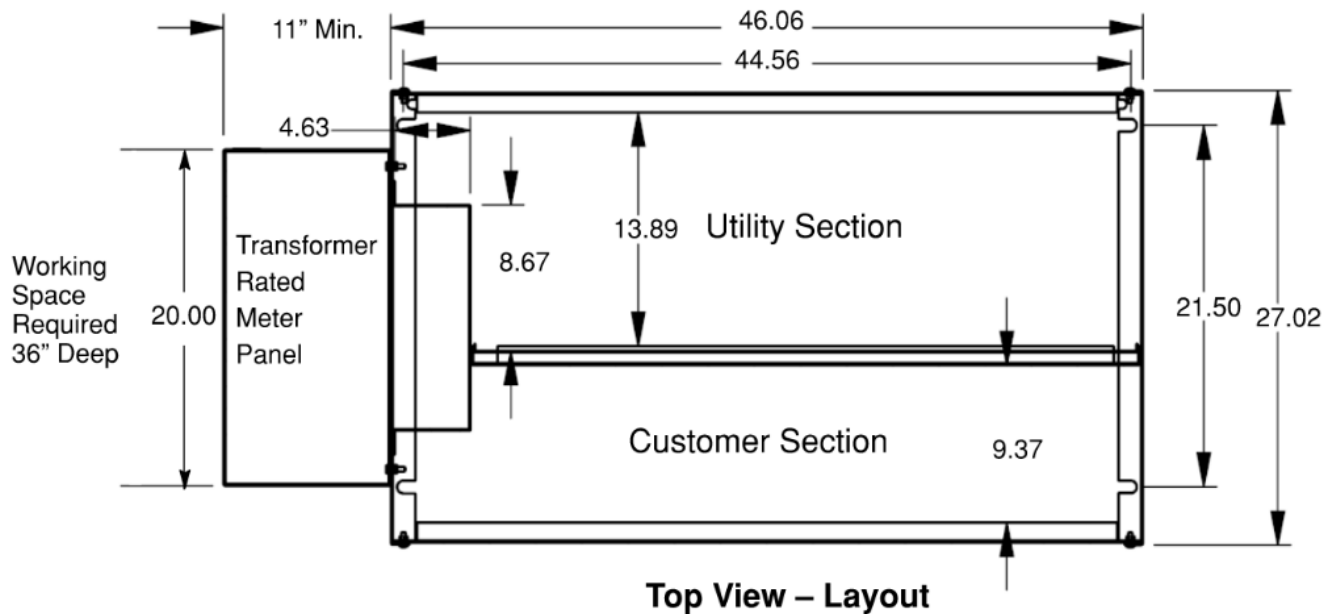
Figure 8-13
Nonresidential CT Pedestal
(400-600 Amps Single-Phase or Three-Phase, 800 Amps Three-Phase)

8.1 (continued)



Front View – Load Compartment

Working Space Required 48" Deep



Top View – Layout

Figure 8-14
Nonresidential CT Pedestal – Side Mount Meter Panel
(400-600 Amps, Single-Phase or Three Phase, 800 Amps Three Phase)

8.1 (continued)

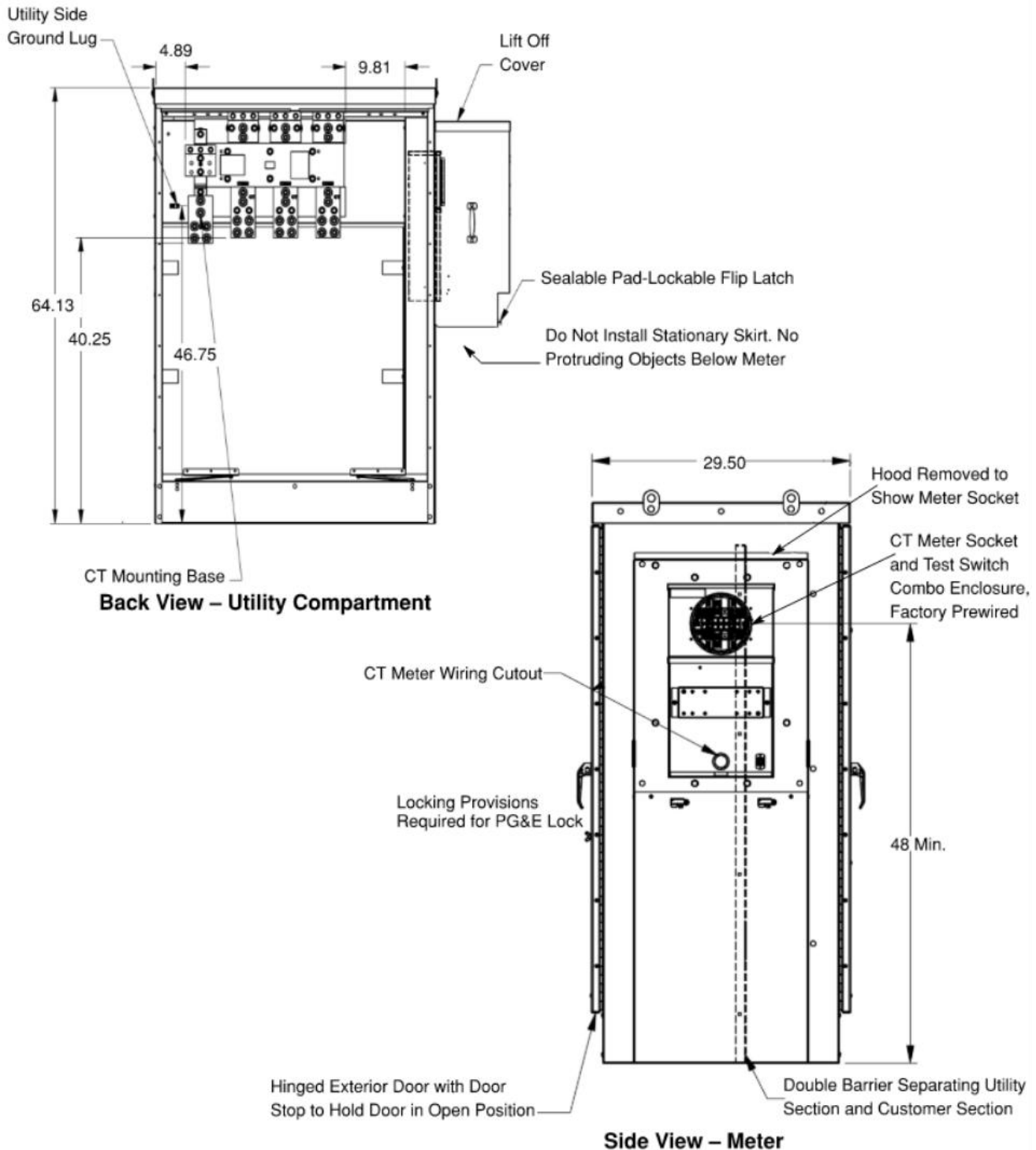


Figure 8-14 (continued)
Nonresidential CT Pedestal – Side Mount Meter Panel
(400-600ps, Single-Phase or Three-Phase, 800 Amps Three Phase)

8.2 Electric Switchboards: 0 Volts Through 600 Volts

This section provides specific dimensions and details for service and meter equipment that is assembled by the manufacturer in freestanding, self-supporting switchboards.

1. General Requirements

- a. PG&E provides and installs meters, metering transformers, test switches, and all secondary wiring from the metering transformers to the meter.
- b. PG&E will locate meters and metering equipment ahead of (i.e., on the supply side) the applicant's main switch and fuse or circuit breaker. Exceptions to this normal sequence are permitted only when required by electric codes and as allowed by PG&E.
- c. Applicants must meet the below requirements (1-13) when they plan to install electric switchboards:
 - 1) Ensure that switchboard service and meter equipment is built to the requirements of this section.
 - 2) Ensure that metering switchboard and panelboard drawings, with current ratings of **320 amperes or above**, are submitted to PG&E for review and approval. Drawings must contain specific [EUSERC Manual](#) or Electric and Gas Service Requirements (Greenbook) drawings and sheet numbers for reference purposes. Refer to [Section 1](#), "General Information" Subsection 1.12., "What do I Need to Do to Get Service From PG&E (PG&E's Application Process)," for detailed requirements.
 - 3) Ensure that drawings submitted for PG&E's review and approval include the following information:
 - The contractor's name and address
 - The applicant's name
 - The job location
 - Phase, voltage, number of wires, and ampacity rating
 - Energy Reduction Maintenance Switch (ERMS) and associated component's location
 - 4) Consult local PG&E Job Owner or PG&E Inspector regarding the following specific general utility requirements before authorizing the manufacture of a switchboard:
 - Bus-bar requirements

8.2 (continued)

- Meter Socket requirements to determine the applicable rate schedule
 - Service-termination location
 - Switchboard and/or meter location(s)
- 5) Ensure that separation exists between the meters and metering transformers to ensure meter accessibility, prevent metering inaccuracies, and prevent unacceptable environmental conditions.
 - 6) Ensure that Service-entrance conductors must enter the metering transformer compartment from one end and leave from the opposite end. The direction of the feed may be either from the top or the bottom of the compartment.
 - 7) Load conductors must **not** reenter or pass through a current transformer (CT) compartment or any PG&E-sealed compartment or section. **Even if** the conductors are inside a raceway.
 - 8) Ensure there is a separate service section for each installed meter and its associated service switch when transformer-rated meters are installed for multiple applicants.
 - 9) When applicants install totalized metering, they must install, own, and maintain nominal 1-1/4-inch metal conduits between the switchboard metering facilities.
 - 10) Group self-contained meters and switches **only** when they meet the following conditions:
 - Unmetered service entrance conductors and metered load conductors are not run in the same conduit raceway or wiring gutter.
 - Each meter position and each service switch or breaker is marked clearly and permanently by the building owner, or a representative of the building owner, to indicate the occupancy being served.

8.2 (continued)

- 11) Ensure that an Energy Reduction Maintenance Switch (ERMS) and its associated components are not installed in PG&E sections, when required to be installed. If components of the ERMS are installed in an unmetered bus location, they must be covered and barred off from the bus and a label must be affixed indicating the National Electric Code (NEC) rule number requiring the ERMS equipment (e.g., ERMS NEC 240.87).
- 12) Ensure that [Subsection 8.9 "Adding New Metering Equipment to Existing Switchboards,"](#) on Page 8-52, is followed before connecting a new meter panel or meter section to an existing switchboard.
- 13) For the attachment of meter wiring, ensure 10-32 taps are attached as follows:
 - One tap on each upper and lower phase bus unit with a 10-32 screw and washer provided for each phase bus in either the upper or lower position.
 - One tap on the neutral bus as shown, or when the compartment is supplied from cross-bussing, a tap may be provided on the neutral cross-bus, or on a bus bar extension provided from the neutral cross-bus. A 10-32 screw and washer shall be provided for the neutral bus.
 - Tap locations shall be centered between phase bus units, or at either side, and shall be readily accessible under energized conditions and with the current transformers in place.

2. Metering Transformer Compartments

- a. The following requirements apply to applicants who are installing metering transformer compartments:
 - 1) Bus the CT compartments using a rectangular bus bar. See [Figure 8-16](#) through [Figure 8-20](#) on Pages 8-20 through 8-25 for more information.
 - 2) Use a copper or aluminum bus bar on both the line sides and load sides of all CTs. When links and supports are required for through-type CTs, ensure that the bus and removable links are constructed of compatible material.
 - 3) Do **not** use PG&E's CTs for any purpose but metering.
 - 4) Do **not** use the bolts required for connecting a CT to attach other conductors.

8.2 (continued)

3. Switchboard Service Section

- a. A switchboard service section is the section of an applicant's switchboard provided specifically for terminating the service conductors and for housing the metering transformers (if required), revenue meters, test facilities, and service switch or breaker.

4. Standard Switchboard Service Section

Applicants must ensure that:

- a. The manufacturer submits drawings, in triplicates, to PG&E for approval for all switchboard service sections with current ratings of 400 amps or above. See [Figure 8-26, "Switchboard Pull Section,"](#) on Page 8-34, for more information.
- b. Switchboard drawings for **all** co-generation and self-generation installations are submitted to a local PG&E Job Owner for review and to the PG&E electric metering department for approval before the switchboard is constructed or built.

5. Specifically Engineered Switchboard Service Section

- a. A switchboard design that does **not** conform to the Greenbook requirements and [EUSERC](#) standards is considered specially engineered. Typical examples are:
 - Switchboards over 3,000 amps.
 - Switchboards with service-breaker ratings too large for the standard switchboard service section.
 - Multimeter service sections.
- b. The general arrangement of the specially engineered switchboard service sections must follow, the requirements for standard switchboard service sections, as described in [Subsection 8.2.5, "Standard Switchboard Service Section,"](#) above, and the requirements described in [Subsection 8.2.6, "Requirements for All Switchboard Service Sections,"](#) below.

6. Requirements for All Switchboard Service Sections

- a. This subsection describes the general requirements (1—26 below) for all switchboard service sections and applies to all applicants:
 - 1) The general arrangement and spacing of CTs and the methods of mounting CTs must conform as closely as possible to the illustrations in [Figure 8-16, "Bus Drilling Detail,"](#) through [Figure 8-20, "Standard Switchboard, CT Compartment, 3001 Amps and Larger, Three Phase, 3-Wire or 4-Wire Service,"](#) on Pages 8-20 through 8-25.

8.2 (continued)

- 2) Mount the socket meters that are used with metering transformers on hinged panels. Mount the self-contained meters on nonhinged panels.
- 3) When a hinged meter panel is located behind an enclosure door, leave a clear space of at least 11 inches between the meter panel and the door. That is the minimum space required to mount the meter.
- 4) The hinged meter panels and outer doors must be allowed to open to a minimum of 90° and can be secured in the open position after the meters and test facilities are in place. If needed, applicants must increase the width of the section to meet these requirements.
- 5) Applicants must provide a clear space in the back of a meter panel door for the secondary wiring and associated equipment.
- 6) For **hinged meter panel doors**, applicants must provide at least the minimum dimensions between the facility's meter panel and the nearest bus, as shown in [Figure 8-17, "Standard Switchboard, CT Compartment, 0 Amps-600 Amps, Single Phase"](#) through [Figure 8-20 "Standard Switchboard, CT Compartment, 3,001 Amps and Larger, Three Phase, 3-Wire or 4-Wire Service,"](#) on Pages 8-21 through 8-25.
- 7) Applicants must ensure that the minimum clearance be maintained between meters as shown in [Figure 8-25, "Standard Section for Self-Contained Meter Sockets, 0 Amps-225 Amps, Installed in Switchboards: Nonresidential,"](#) on Page 8-32, and [Figure 8-26, "Pull Section,"](#) on Page 8-34.
- 8) Applicants must **not** mount more than two self-contained meters on any removable meter panel.
- 9) Applicants must ensure that panels providing access to metering transformers or a service-terminating pull section are no larger than 9 square feet in area, removable, sealable and have two lifting handles.
- 10) Applicants must ensure that the front edge of the CT bus bars are located in the same switchboard section, and in the same vertical plane.
- 11) Applicants must use either one-bolt or four-bolt connections for switchboards that are rated 1,001 amps through 3,000 amps and have 4-inch busses installed. For switchboards that are rated 3,001 amps or larger with 5-inch busses, use either two-bolt or six-bolt connections. For current transformer removable link assemblies, please refer to [Subsection 8.2.9, "Current Transformer Removable Link Assemblies,"](#) on page 8-26.
- 12) Switchboard manufacturers must provide accessories, such as additional bolts, washers, and nuts at the time of delivery and/or installation. For more information, refer to [Table 8-4, "CT Bus Link and Hardware Specifications,"](#) on page 8-19.

8.2 (continued)

- 13) Applicants must ensure that buses are securely supported in the metering transformer compartment to withstand the mechanical stresses of a short circuit and to resist movement. The bus service must not interfere when CTs either are installed or are removed. Do not use CTs to support the buses.
- 14) Applicants should ensure that the buses and CT mountings are designed so that each of the CTs can be removed from its mounting position directly through the access panel without disturbing any other CT. When using multi-leaf busses, orient the busses so that they appear "edgewise" when viewed from the access panel.
- 15) When using an aluminum bus, applicants must ensure that the aluminum bus bar is **plated** to prevent corrosion.
- 16) Applicants must ensure that all electric meter panels and all equipment doors or panels that are intended to provide access to potential transformers (PTs) and CTs are permanently marked or labeled to indicate the service voltage being supplied.
- 17) **In switchboards rated over 800 amps, applicants must ensure that the bus bars extend from the termination section and service landing lugs into the CT compartment.** In switchboards with multiple meters, the bus bars must extend from the termination section and service landing lugs to the meter sockets in multimeter boards.
- 18) Applicants must ensure that bus arrangements and supports are provided. An **exception** is the neutral bus, which may be located on either sidewall.
- 19) Applicants must locate the CT compartment on the supply side of the service-section main switch or breaker.
- 20) Applicants must ensure that only metering conductors pass through this CT compartment.
- 21) Applicants must ensure that a neutral, bus-bar extension is provided in the instrument transformer compartment above the lower CT bus support when the service-section phase buses are supplied from the horizontal cross busing.
- 22) Applicants must ensure that the flanges for the lower- and upper-meter panel supports do not project more than 3/4 inch up or down from the adjacent switchboard panels.
- 23) Applicants must ensure that each bus has a connector that accepts a stranded conductor with the amp capacity of the service-section main switch or breaker.

8.2 (continued)

- 24) Applicants must ensure that the power-leg bus for a 4-wire delta service is identified.
 - 25) Applicants must ensure that a removable link is installed in the right-side phase bus when using the service section for three-phase, 3-wire service.
 - 26) Applicants must ensure that each switchboard service section is completely barriered from other service sections, pull sections, service switches, or disconnects by installing sidewalls. The vertical sidewalls must be made of either steel or similar metallic material and the same gauge as the other section walls.
- b. The vertical sidewalls may have an opening to allow unmetrated conductors to pass between sections. The clearance between the bus bar and cutout for through bus must be a maximum of 3 inches. A barrier **is not required** between individual phases and the neutral. See [Figure 8-15, "Switchboard Wall Opening Between Sections,"](#) below.

NOTE

Nonconductive plastic (fiberboard) may be used to reduce clearance between the sidewall cutout and through bus.

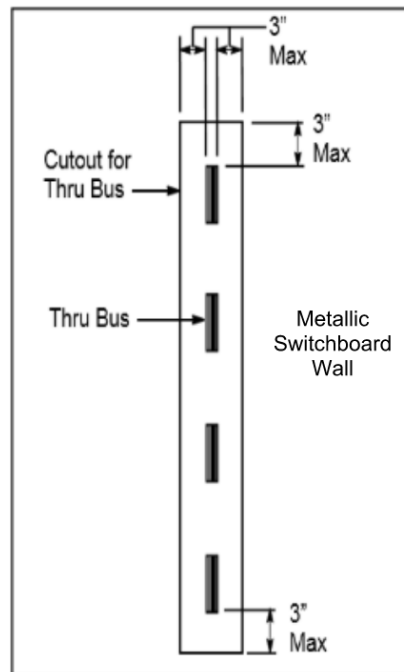


Figure 8-15.
Switchboard Wall Opening Between Sections

8.2 (continued)

Table 8-4. CT Bus Link and Hardware Specifications

Phase/Service Type	Ampacity Rating	Bus Size	Bolts	Washer and Nut
Single-Phase or Three Phase, 3-Wire and 4-Wire	0 Amps Through 1,200 Amps	Minimum of 1/4 inch by 2 inches and a maximum of 3/4 inch by 2 inches	Secure the removable bus link to the upper- and lower-CT bus units using 1/2-inch hex-head (Grade 5) steel bolts	Appropriate size Belleville Washer and Nut OR Flat Washer, Split-Ring, and Nut
Single Phase or Three Phase, 3-Wire and 4-Wire	1,001 Amps Through 3,000 Amps	Maximum permissible bus unit of four 1/4-inch by 4-inch bars spaced 1/4 inch apart	Secure the removable bus link to the upper- and lower-CT bus units using 1/2-inch hex-head (Grade 5) steel bolts	1 Bolt Connection: 2-1/4-inch diameter Belleville washer and nut
				4 Bolt Connection: 4-1/2 inch hex-head (Grade 5) steel bolts with flat washer and nut
Three Phase, 3-Wire and 4-Wire	3,001 Amps and Larger	Maximum permissible bus unit of four 1/4-inch by 5-inch bars spaced 1/4 inch apart	Secure the removable bus link to the upper- and lower-CT bus units using 1/2-inch hex-head (Grade 5) steel bolts	2 Bolt or 6 Bolt Connection: Flat Washer, Split-Ring Washer, and Nut

7. Standard Switchboard CT Compartment, 0 Amps Through 1,200 Amps, Single-Phase or Three-Phase, 3-Wire and 4-Wire Services
 - a. Applicants must ensure that the following requirements are met for those that apply specifically to this type of CT compartment:
 - 1) The barrier must be made of insulating, non-tracking material. Ensure that openings in the barrier and clearances to the outer edges do not exceed 3/8 inch. Use non-conductive fasteners to attach the barrier.
 - 2) A clear, unobstructed workspace is provided around the current transformer bus units as measured from the inside edge of the compartment access opening.

8.2 (continued)

- 3) The minimum clearance between the inside of the meter panel door and the 2-inch current transformer bus, has the following requirements:
 - 6.5 inches up to 800 Amps
 - 7.0 inches up to 1,000 Amps
 - 7.5 inches for 1,200 Amps
 - If these clearances are not possible, use a 4-inch bus design. Be aware that the maximum permissible bus unit consists of four 1/4-inch by 4-inch bars spaced 1/4 inch apart
- 4) For minimum clearance and dimensions between the meter panel or socket and bus, as well as the minimum clear working access space into the CT compartment, please refer to [Figure 8-17, "Standard Switchboard, CT Compartment, 0 Amps-600 Amps, Single Phase,"](#) on page 8-21, and [Figure 8-18, "Standard Switchboard, CT Compartment, 400 Amps-1,200 Amps, Three Phase,"](#) on page 8-22.

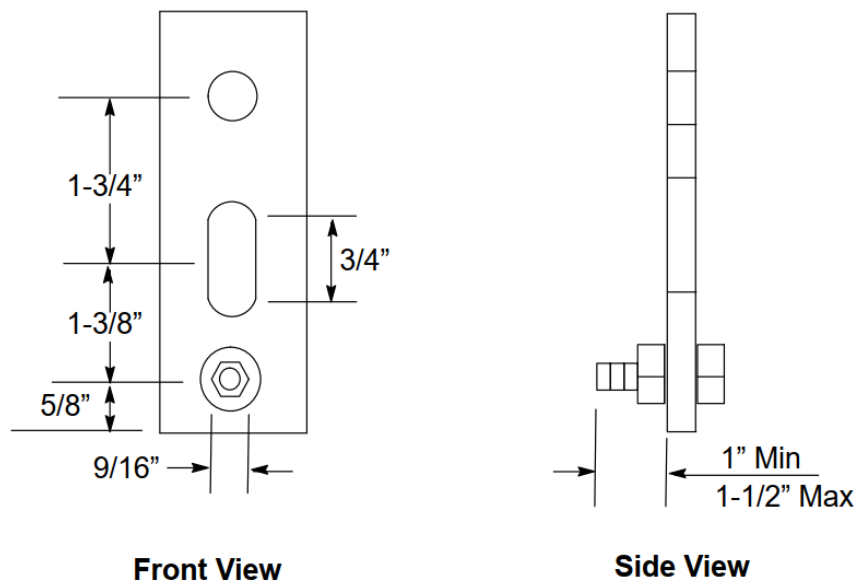


Figure 8-16.
Bus Drilling Detail

8.2 (continued)

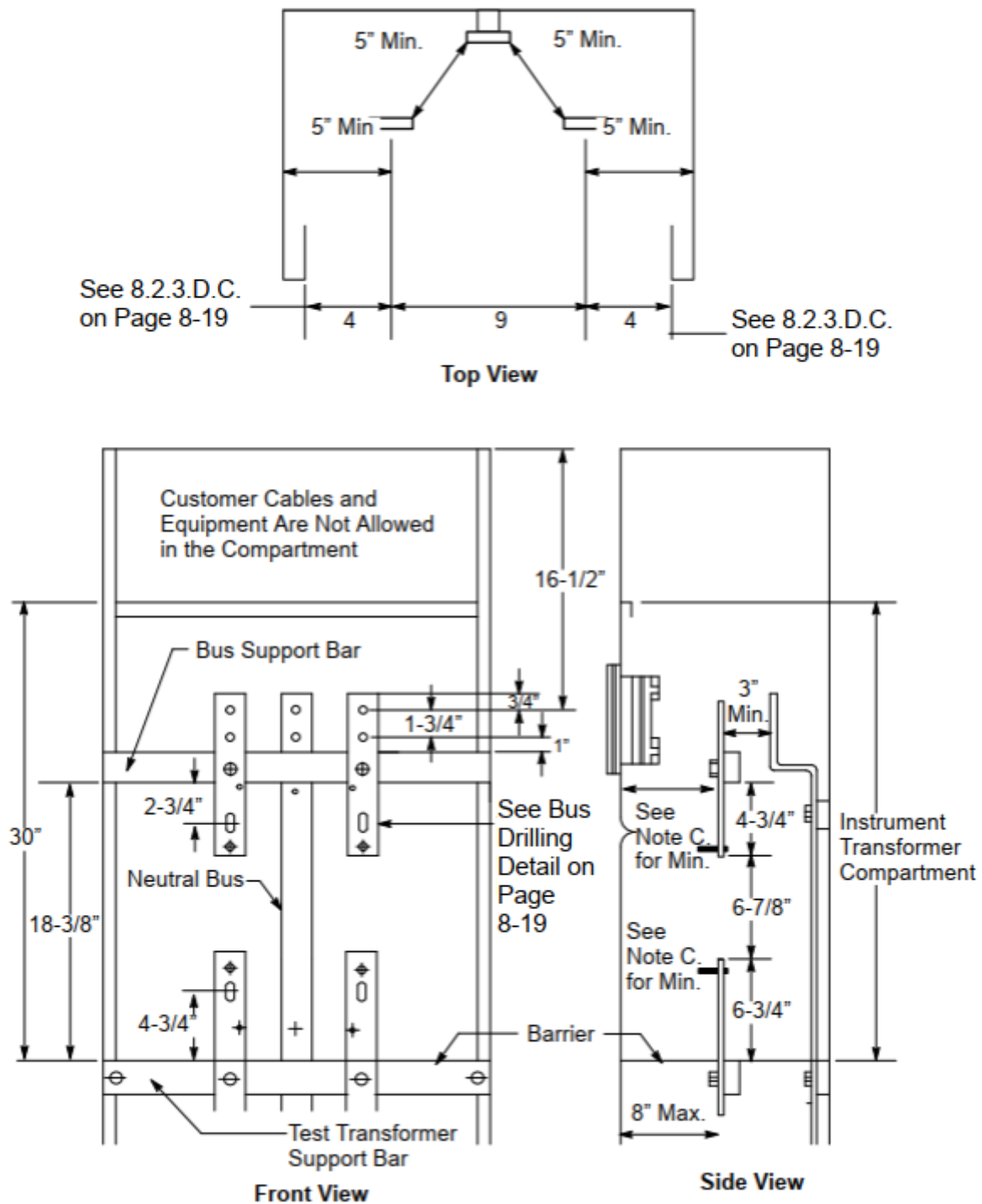


Figure 8-17.
 Standard Switchboard, CT Compartment,
 0 Amps-600 Amps, Single Phase

8.2 (continued)

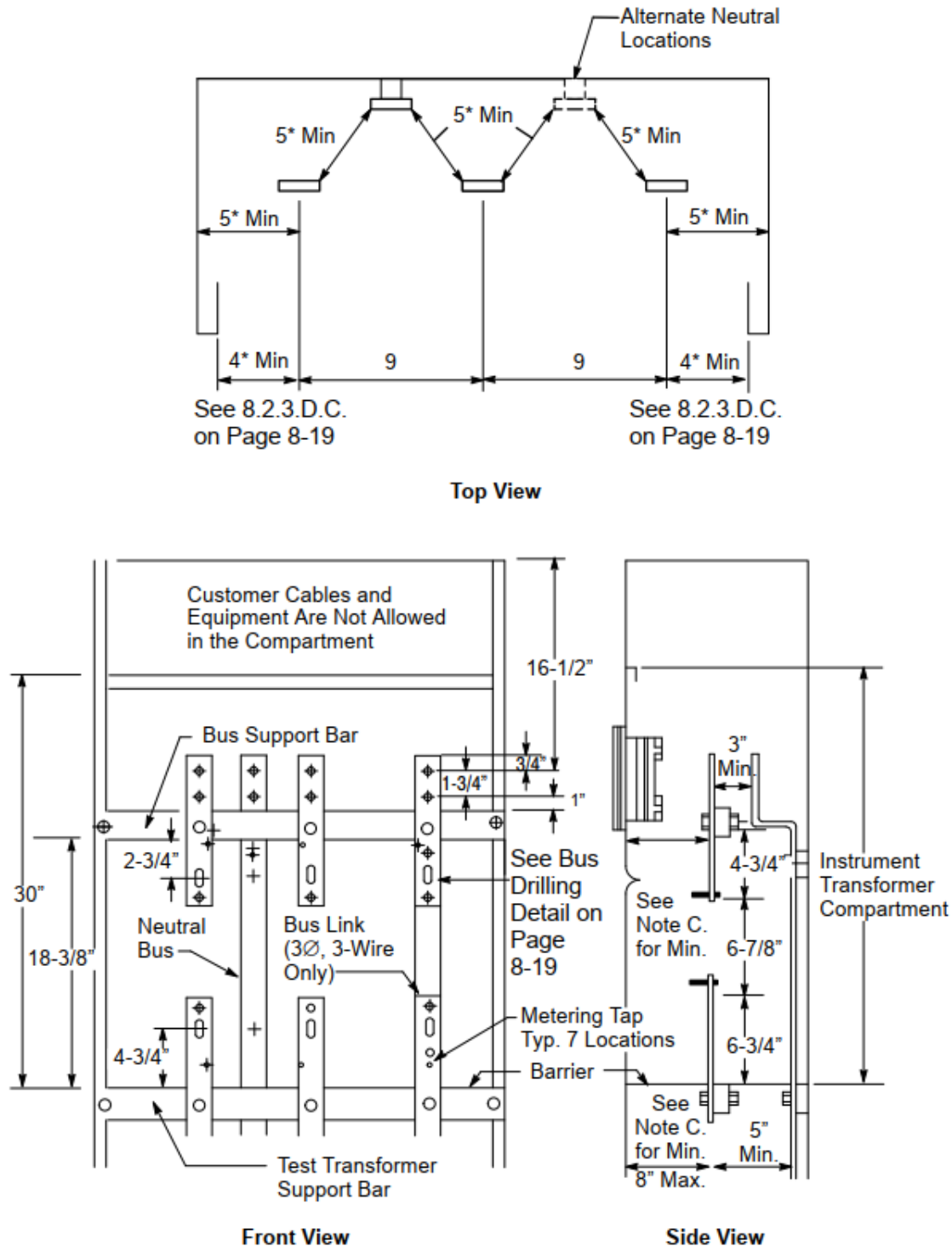


Figure 8-18.
Standard Switchboard, CT Compartment,
400 Amps-1,200 Amps, Three Phase

8.2 (continued)

8. Standard Switchboard CT Compartment, 1,0001 Amps or Larger, Single-Phase or Three-Phase, 3-Wire and 4-Wire Services
 - a. The following requirements specifically apply to the CT compartments shown in [Figure 8-19, "Standard Switchboard, CT Compartment, 1,001 Amps–3,000 Amps, Three-Phase, 3-Wire and 4-Wire Service,"](#) on page 8-24 and [Figure 8-20, "Standard Switchboard, CT Compartment, 3,001 Amps and Larger, Three-Phase, 3-Wire or 4-Wire Service,"](#) on page 8-25.
 - b. Applicants must:
 - 1) Ensure that the buses are anchored so that they will remain in position when the removable section is out.
 - 2) Ensure that the bus corners are rounded to prevent damaging the insulation.
 - 3) Ensure that the buses extend into the pull section for underground services.
 - 4) Ensure that the barrier is a minimum of 45 inches and a maximum of 50 inches above the standing surface.
 - 5) Ensure that openings in the barrier and clearances to the outer edges do not exceed 3/8 inch. Use nonconductive fasteners to attach the barrier.

8.2 (continued)

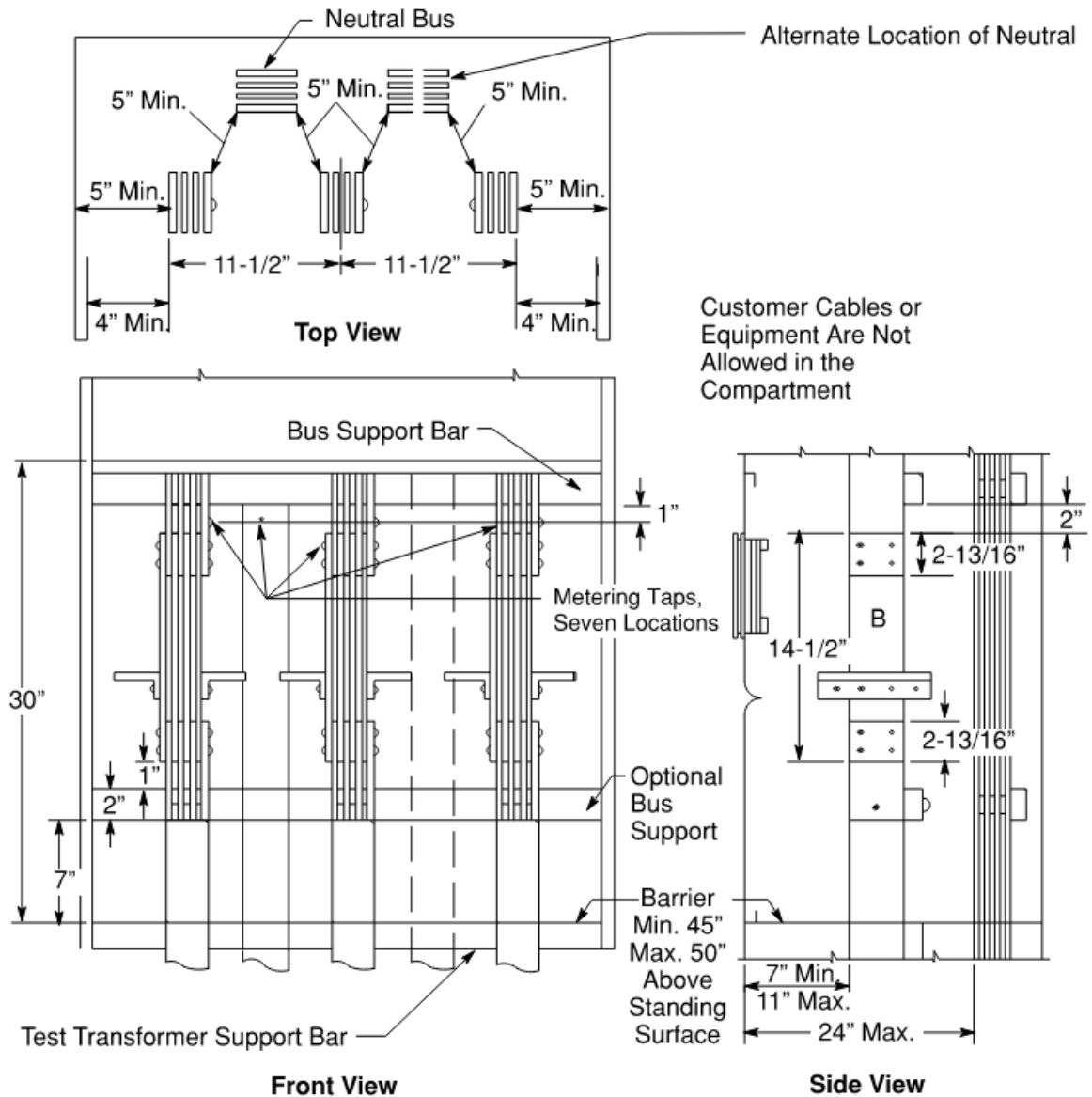


Figure 8-19.
Standard Switchboard, CT Compartment, 1,001 Amps-3,000 Amps,
Three Phase, 3-Wire and 4-Wire Service

8.2 (continued)

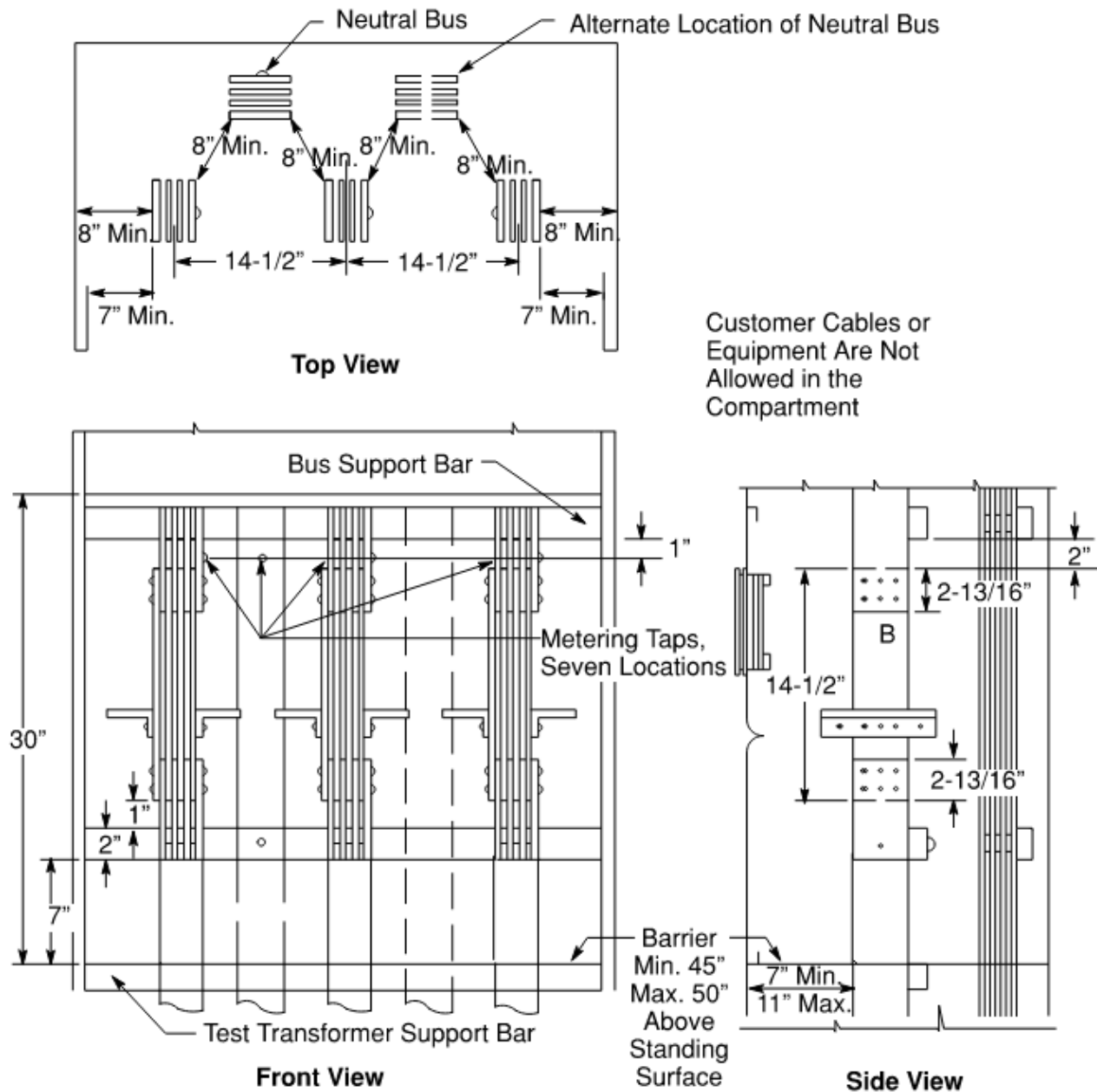


Figure 8-20.
Standard Switchboard, CT Compartment,
3,001 Amps and Larger, Three Phase, 3-Wire or 4-Wire Service

8.2 (continued)

9. Current Transformer Removable Link Assemblies

- a. The removable link assemblies for 0-volt through 600-volt CT compartments from 1,001 amps through 3,000 amps, and 3,001 amps and larger, are shown in [Figure 8-21](#) through [Figure 8-24](#) on Page 8-27 through Page 8-30. See [Table 8-5, "Removable Link Assemblies, Switchboards Ampacity by Connection Configuration and Busses Installed,"](#) below for Switchboard Ampacity by Connection Configuration and Busses Installed.

Table 8-5 Removable Link Assemblies, Switchboards Ampacity by Connection Configuration and Busses Installed

	Switchboards, 0 Volts–600 Volts, CT Compartment, 1,001 Amps–3,000 Amps, Removable Link and CT Support		Switchboards, 0 Volts–600 Volts, CT Compartment, 3,001 Amps and Larger, Removable Link and CT Support	
Connection Configuration	One-Bolt	Four-Bolt	Two-Bolt	Six-Bolt
Buses Installed	4-inch	4-inch	5-inch	5-inch
See:	Figure 8-21 , Page 8-27	Figure 8-22 , Page 8-28	Figure 8-23 , Page 8-29	Figure 8-24 , Page 8-30

8.2 (continued)

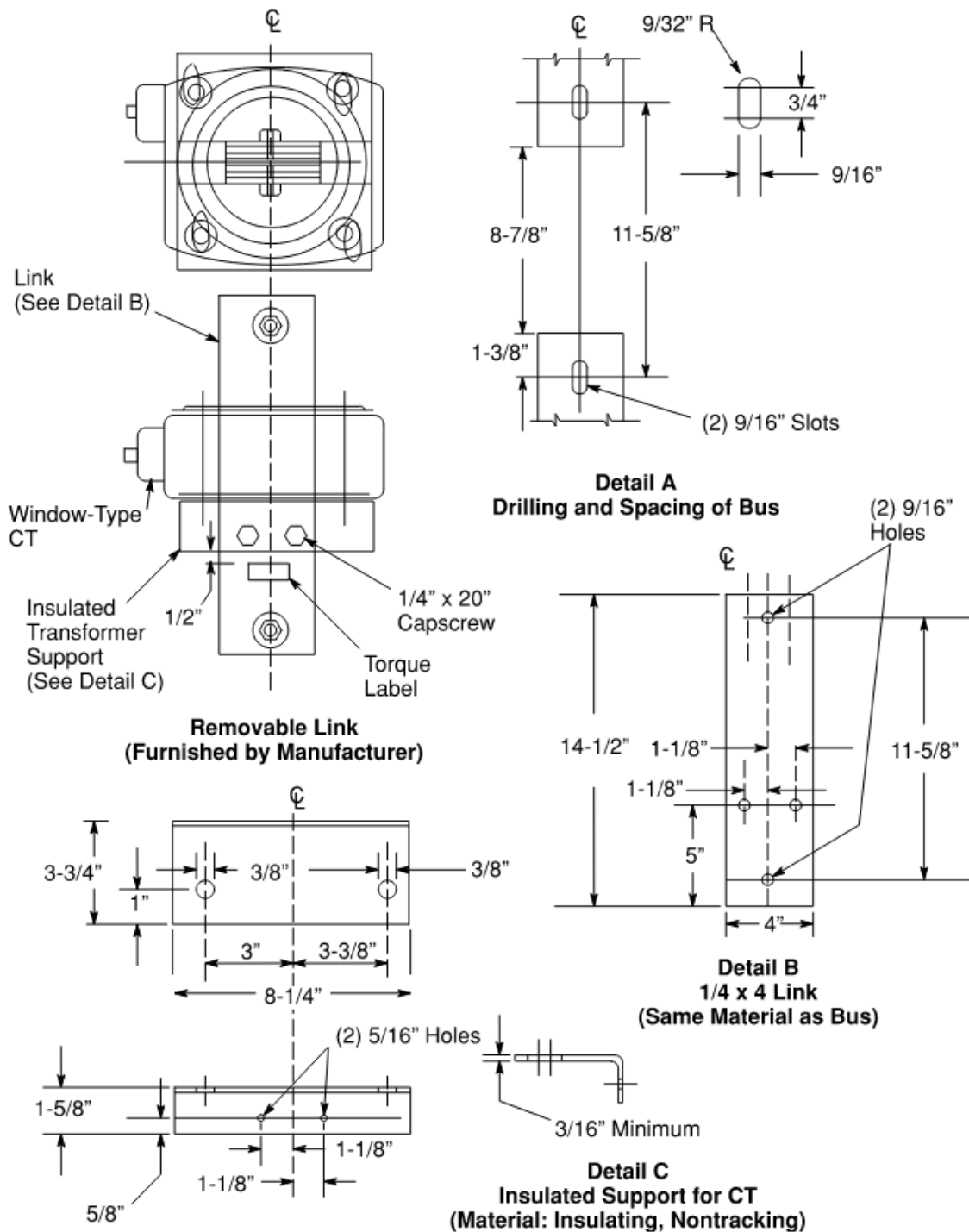


Figure 8-21
 Switchboards, 0 Volts–600 Volts, CT Compartment, 1,001 Amps–3,000 Amps, Removable Link and CT Support (One-Bolt Configuration)

8.2 (continued)

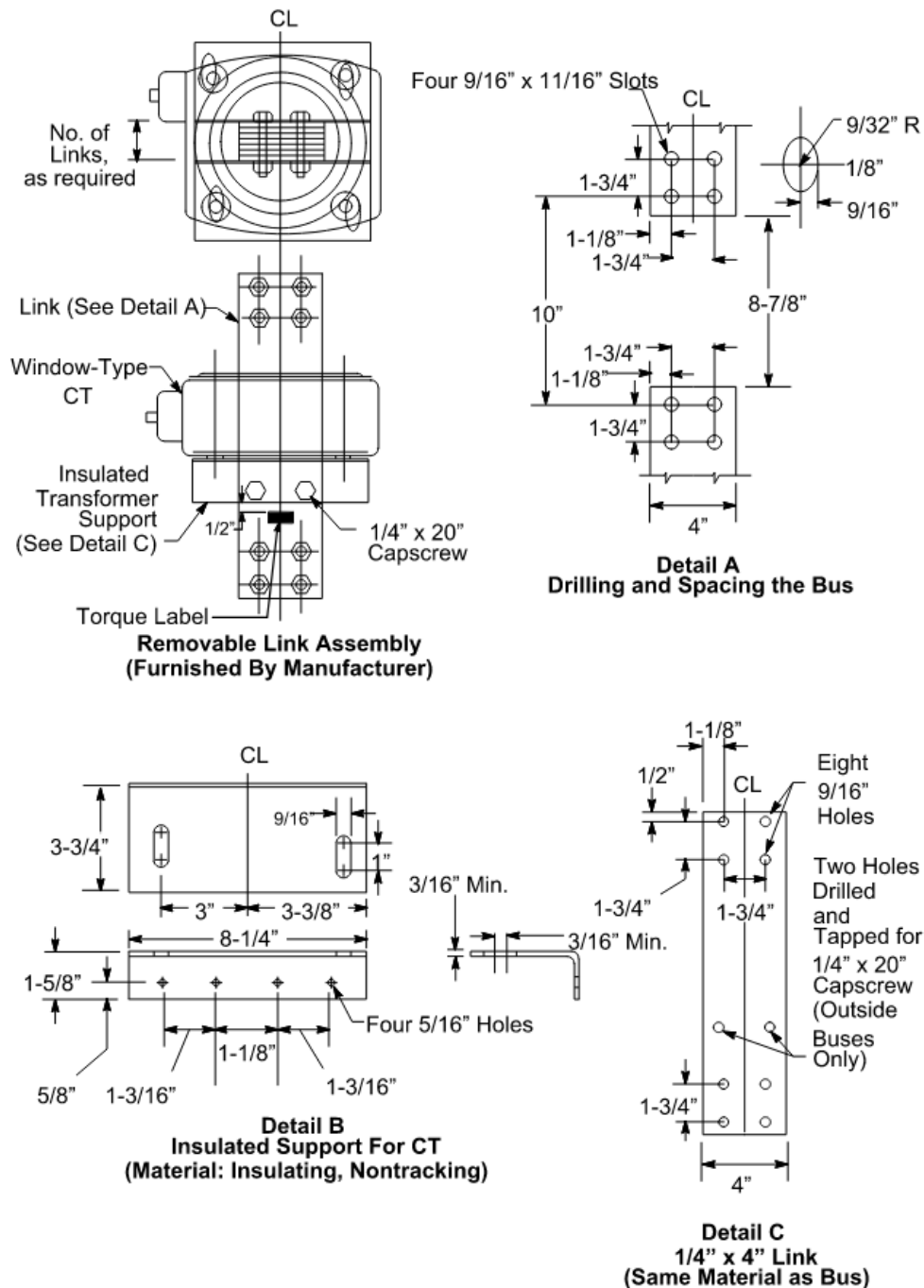


Figure 8-22
Switchboards, 0 Volts–600 Volts, CT Compartment,
1,001 Amps–3,000 Amps, Removable Link and CT Support (Four-Bolt Configuration)

8.2 (continued)

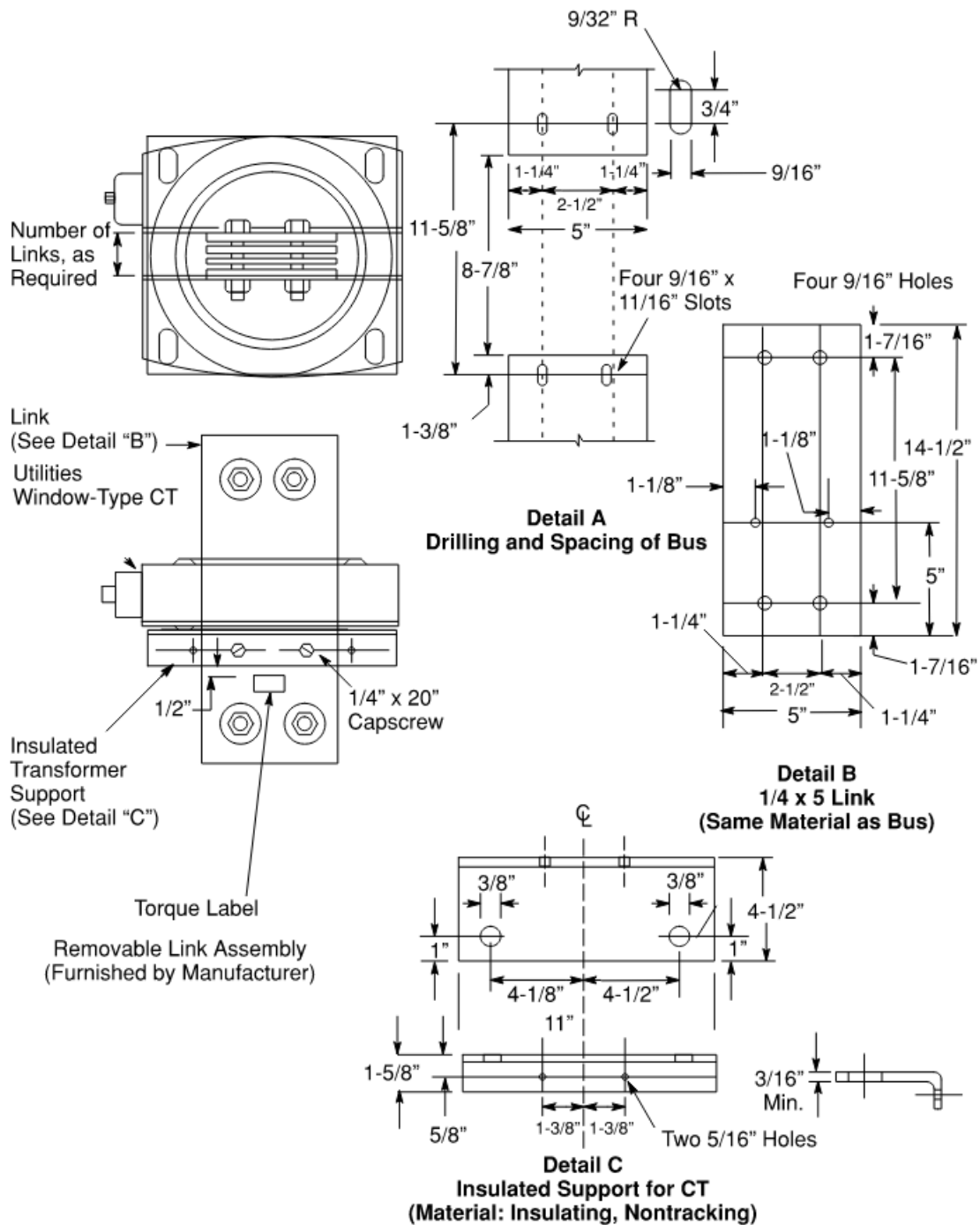


Figure 8-23
 Switchboards, 0 Volts–600 Volts, CT Compartment, 3,001 Amps and Larger, Removable Link and CT Support (Two-Bolt Configuration)

8.2 (continued)

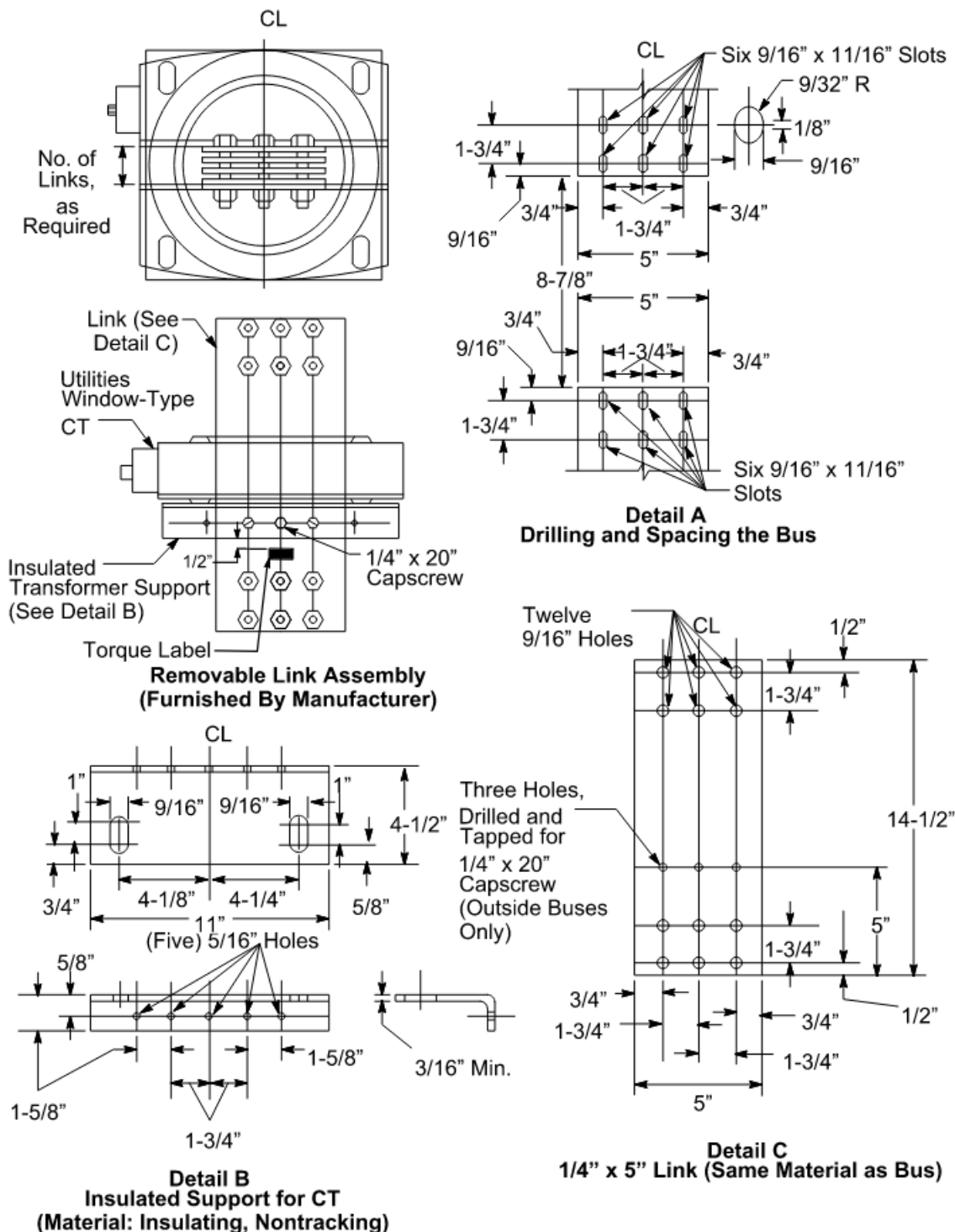


Figure 8-24
Switchboards, 0 Volts-600 Volts, CT Compartment,
3,001 Amps and Larger, Removable Link and CT Support (Six-Bolt Configuration)

8.3 Standard Section for Self-Contained Meter Sockets, 0 Amps Through 225 Amps, Installed in Switchboards: Nonresidential

1. These requirements apply specifically to switchboard service sections for nonresidential, 0-amp through 225-amp meter sockets. Applicants must:
 - a. Ensure that the manufacturer furnishes, installs, and wires or buses the test-bypass blocks to the meter socket with four, rigid, insulating barriers. Test blocks must conform to the requirements described in [Section 7](#), Subsections:
 - 7.13, "Single Meter: Underground Service," on Pages 7-43 through Pages 7-64
 - 7.14, "Meter Box for Transformer-Rated Metering," on Pages 7-65 through Pages 7-66
 - 7.16, "Underground Service Cable-Termination Compartments or Sections," on Pages 7-73 through Pages 7-77
 - 7.17, "Approved Service-Terminal Conductor Connectors," on Pages 7-78 through Pages 7-79.
 - b. Ensure that the metered conductors do not pass through the adjacent metering compartments, except in enclosed wireways.
 - c. Ensure that the meter panels are removable with a maximum of two meters per panel. However, they must not be removable when the meter is in place. Ensure the meter socket is attached to the meter panel and yet is supported independently from the meter panel. Ensure that all meter panels are sealable and all securing screws are captive.
 - d. Ensure that the cover panels for the test-bypass block are sealable and fitted with handles. Panels more than 16 inches wide must have two handles.
 - e. Ensure that outdoor or rain-tight enclosures are used, as shown in [Figure 8-44](#) through [Figure 8-47, "Outdoor or Rain-Tight Enclosures for Switchboards,"](#) on Page 8-51.
 - f. Ensure that an insulated neutral terminal is provided behind each test-bypass cover panel, when a neutral is required for metering or testing. The terminal must be readily accessible when the cover panel is removed and must be individually connected to the neutral bus with a minimum Size #8 American wire gauge (AWG) copper wire.
 - g. Ensure that factory-installed, full-width, insulating barriers are located at the bottom of each test-bypass compartment. The insulating barrier must deflect a 1/2-inch maximum from a 25-pound downward force.

8.3 (continued)

- h. **For three-phase, 4-wire service:** Ensure that the seventh jaw is connected to the body of the neutral lug with an AWG #12 copper wire. The neutral #12 copper wire must be free and routed away from any busing.
- i. **For three-phase, 4-wire delta-connected service:** Ensure that the right-hand, test-bypass block (i.e., two poles) is identified as a power leg.
- j. **For three-phase, 3-wire service:** Ensure that the bus is installed to connect the line and load poles together at the top of the center test-bypass block and the fifth jaw is connected to this bus using an AWG #12 copper wire.
- k. **For single-phase, 3-wire service:** Ensure that the center test-bypass block is omitted.
- l. **For single-phase, 3-wire, 120/208-volt service:** Ensure that the center test-bypass block is omitted and the fifth jaw is connected to the body of the neutral lug with an AWG #12 copper wire.
- m. Ensure that each line and load position is identified clearly by using 3/4-inch (minimum) block-letter labeling.

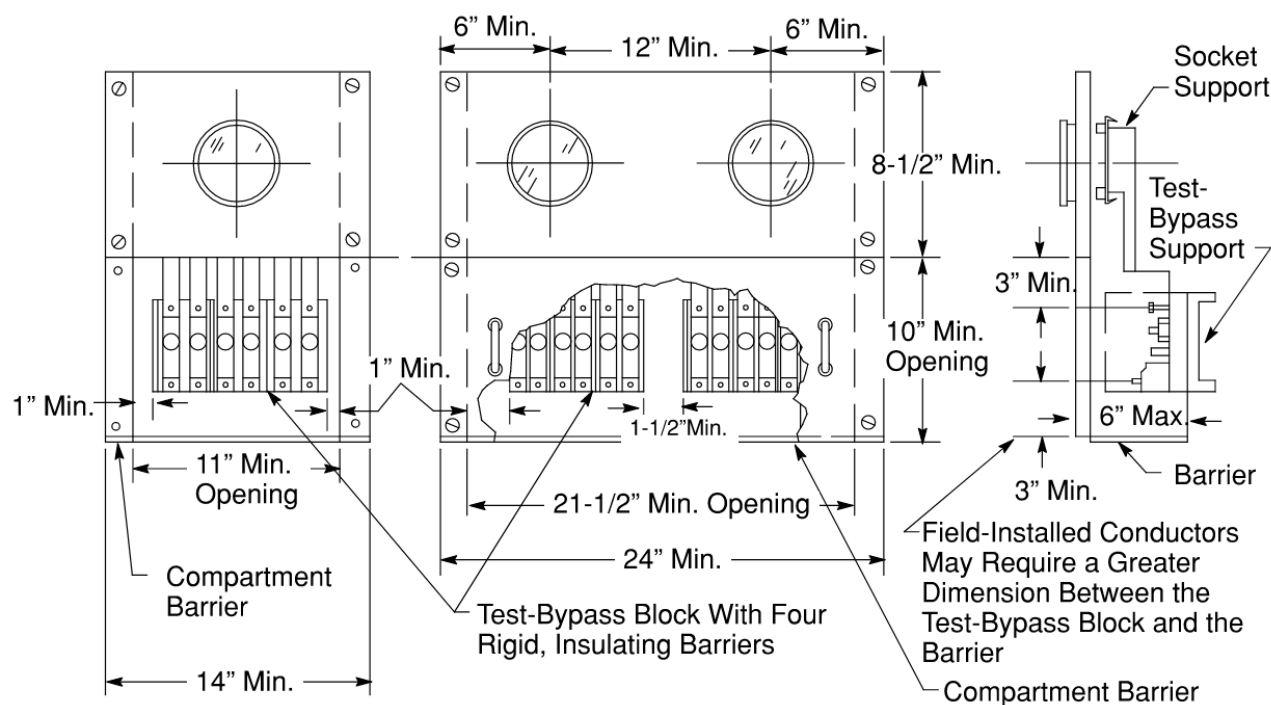


Figure 8-25.
Standard Section for Self-Contained Meter Sockets,
0 Amps–225 Amps, Installed in Switchboards: Nonresidential

8.4 Service Terminations for Underground Services

NOTE

For overhead services where conductors go into the bottom-fed termination section, the applicant must connect the service-entrance conductors to the line side of the bus stubs in the metering-transformer compartment.

1. PG&E will pull and terminate its service conductors to terminating facilities as shown in [Figures 8-26](#) through [Figure 8-28](#) on Page 8-34.
2. Applicants must meet the following **requirements for PG&E to pull and terminate service**:
 - a. When the service section is served from a pull section, ensure that the bus or cable conductors enter in one of the following two ways:
 - 1) Enter through the side or back in the sealable section above the CT compartment, as shown in [Figure 8-26](#) on Page 8-34.
 - 2) Enter by means of horizontal cross-busing in the back of the metering compartment.
 - b. Ensure that all pull and terminating sections provide full-front access.
 - c. Ensure that the power leg for a 4-wire delta-connected service is identified effectively at the point of termination before making the service connection. The power leg is identified by using orange.
 - d. Ensure that the minimum width of the pull section has the dimensions specified in [Table 8-6, "Minimum Bottom-Fed Pull-Section Dimensions,"](#) on Page 8-34.

8.4 (continued)

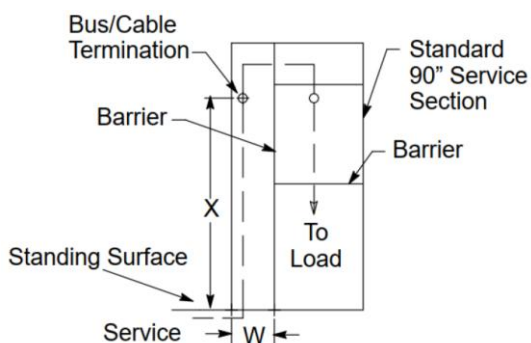


Figure 8-26.
Switchboard Pull Section

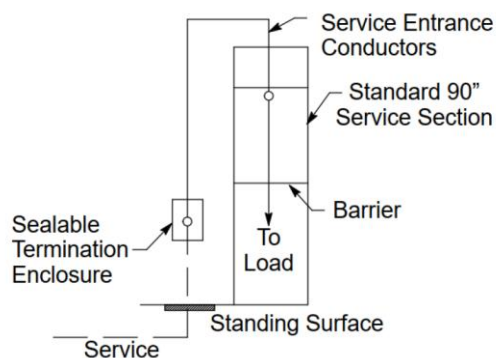


Figure 8-27.
Separate Pull Box

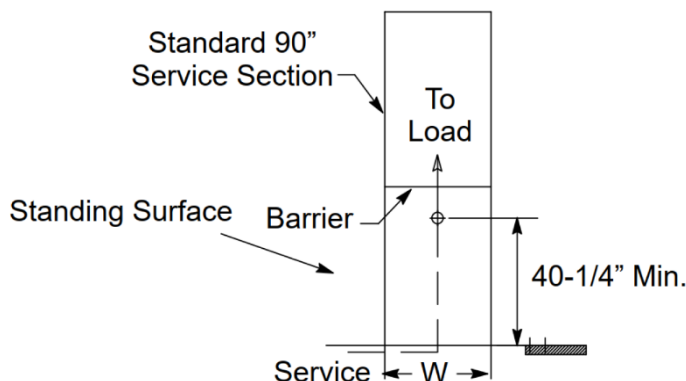


Figure 8-28.
Bottom-Fed Service Section

*The minimum width of the pull section must meet the requirements specified in [Table 8-6](#), below.

Table 8-6. Minimum Bottom-Fed Pull-Section Dimensions

Switchboard Rating (Amps)	Minimum Access Opening Dimension (W) ²		Termination Height X
	3-Wire	4-Wire	
Below 400	Consult Serving Agency (All Measurements in Inches)		
400–800	24	24	42 Min. ¹ –72 Max.
801–1,200	24	30	
1,201–2,000	30	35	60 Min.–72 Max.
2,001–2,500	—	42	
2,501–4,000	Bus Duct		

¹See [Figure 8-28, "Bottom-Fed Service Section,"](#) above, for the minimum termination height of a bottom-fed service section.

²If the landing stubs in the termination bus are installed perpendicular to the back of the board, PG&E requires the enclosure dimensions to be wider to accommodate the cable installation.

8.5 Underground, Service-Termination Pull Section (Located Below Ground Level)

1. Applicants must follow the requirements (a-g) in this subsection when underground, service-termination pull sections are located below the ground level:
 - a. **Back Entry:** When a service must enter the back of a switchboard pull section, the pull space must have the required "X" dimension above or below the cable-terminating facilities as well as the required "W" dimension. See [Figure 8-29, "Switchboard Pull Section, High Entry,"](#) on Page 8-37 and [Table 8-7, "Pull Section Dimensions \(Minimums\) Below Ground Level,"](#) located on Page 8-38.
 - b. **Side Entry:** When a service enters the side of a switchboard pull section, the pull-space must have the required "X" dimension above or below the cable-terminating facilities as well as the required "W" dimension. See [Figure 8-29](#) and [Figure 8-30 "Switchboard Pull Section, Low Entry,"](#) on Page 8-37, and [Table 8-7, "Pull Section Dimensions \(Minimums\) Below Ground Level,"](#) on Page 8-38.
 - c. **Additional or Extended Section Entry:** When it is not possible to meet the requirements of dimension "X" because the service cannot enter the upper or lower areas of the switchboard pull section, or because additional space is needed, another enclosure can be attached to the termination section enclosure.
 - 1) The following three figures show how another enclosure provides additional space for the cables to enter the termination section either low enough or high enough to meet the "X" dimension and facilitate proper cable termination:
 - [Figure 8-31, "Extended Top on Switchboard Pull Section,"](#) on Page 8-38
 - [Figure 8-32, "Additional Side or Back Switchboard Pull Section-High Entry,"](#) on Page 8-39
 - [Figure 8-33, "Additional Side or Back Switchboard Pull Section-Low Entry,"](#) on Page 8-40
 - 2) PG&E recommends that applicants submit drawings for review **before installing an additional enclosure**. Applicants must attend a pre-inspection meeting.
 - d. **Conduit:** Service conduit installed in the franchise area (i.e., public property) must not be at a depth greater than 60 inches. The conduit entering the switchboard must be grouped in a maximum of two rows and centered horizontally between the pull-section side walls. Refer to [Figure 8-34, "Service Conduit Layout in the Termination Enclosure or Additional Pull Section \(Example of Front View and Top View\)"](#) on Page 8-41.

8.5 (continued)

- e. "X" Dimension: The "X" dimension is the measured distance between the first bolt on the termination bus to the closest service conduit installed in the pull section for [Figure 8-29](#) through [Figure 8-31](#) on Page 8-37 through Page 8-38.
 - 1) When an additional pull section is used, as shown in [Figure 8-32](#) on Page 8-39 and [Figure 8-33](#) on Page 8-40, the "X" dimension is measured between the first bolt on the termination bus to the closest position where the service cable will enter into the termination section.
- f. **Water Drainage System:** To prevent water from accumulating in meter rooms (or other types of wet facilities), applicants must ensure the following actions are performed:
 - 1) Design and construct the electrical meter room to discharge any water that may enter the switchboard and below-grade electrical meter room.
 - 2) Contact PG&E before construction begins to ensure the method(s) for discharging and removing water are approved.
- g. **Cable Support Hanger:** The cable hanger provides support for the cables and increases the cable height above the conduits. This creates a drip loop feature that stops water from dripping onto any exposed, live energized parts. The cable hanger must be structurally strong enough to support the weight of the type (i.e., aluminum [Al] or copper [Cu]) and the maximum number of cables that could be installed for all phases.
 - 1) For large switchboards this could be up to 28 copper cables, mostly sized at 1,000 thousand circular mils (kcmil), with a total weight of about 1,000 pounds. See [Electric Design Manual 063928, "Methods and Requirements for Installing Non-Residential Underground Electric Services 0–600 Volts to Customer-Owned Facilities."](#) for the appropriate conduit and cable requirements for nonresidential service installations.
 - 2) If the cables rest on or touch the support hanger, it must be made from, or wrapped in, a nonconductive material rated for a minimum 600 volts that provides electrical insulation and physical protection for the cables.

8.5 (continued)

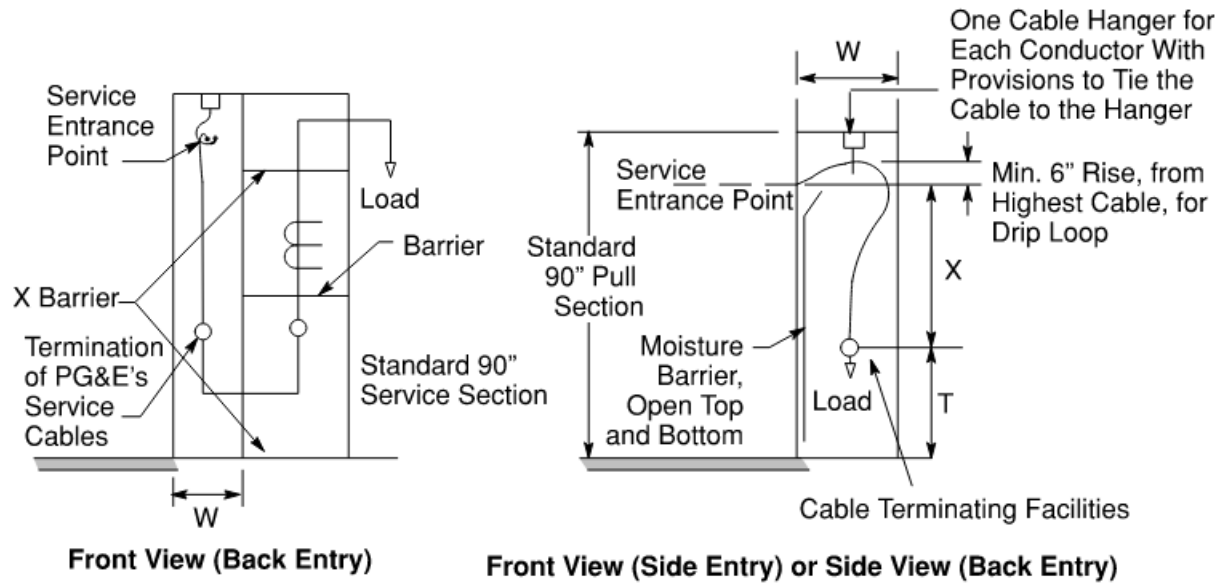


Figure 8-29.
Switchboard Pull Section-High Entry

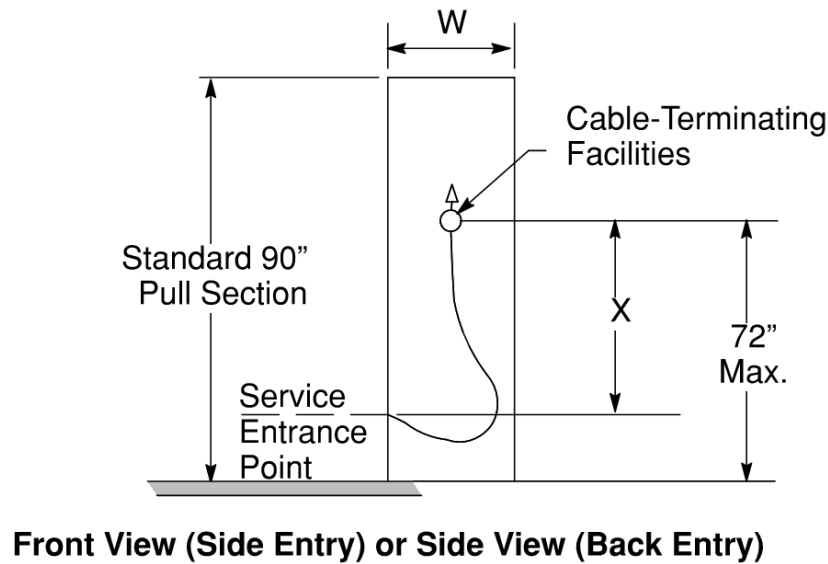


Figure 8-30.
Switchboard Pull Section-Low Entry

8.5 (continued)

Table 8-7 Pull-Section Dimensions (Minimums) below Ground Level

Switchboard Rating in Amps	W ^{1, 2}		X ³	T
	1Ø 3-Wire	3Ø 4-Wire	Side or Back Entry	Termination Height
	Measurements in Inches			
201–800	24	24	42	24
801–1,200	24	30	42	24
1,201–2,000	30	35	45	24
2,001–2,500	—	42	60	18
2,501–4,000	Bus Duct			

¹Ensure that the dimension (i.e., width, depth, and height) of the additional pull section are exactly the same as the terminating section.

²If the landing stubs in the termination bus are installed perpendicular to the back of the board, PG&E requires the enclosure dimensions to be wider to accommodate cable installation.

³See Item E., "X Dimension," in [Figure 8-30](#) on Page 8-37.

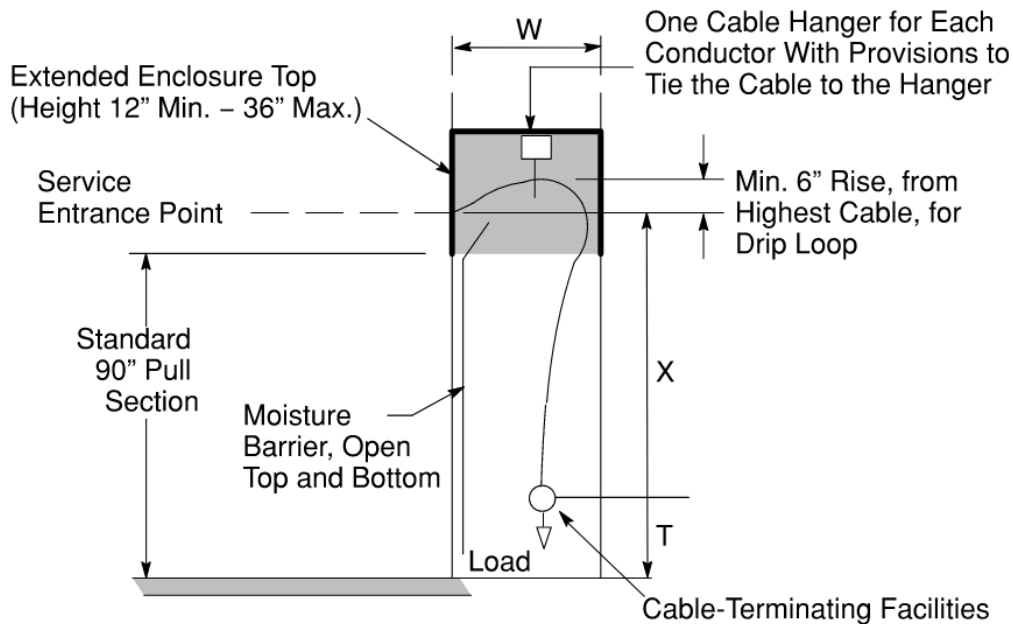


Figure 8-31.
Extended Top on Switchboard Pull Section
Front View (Side Entry) or Side View (Back Entry)

8.5 (continued)

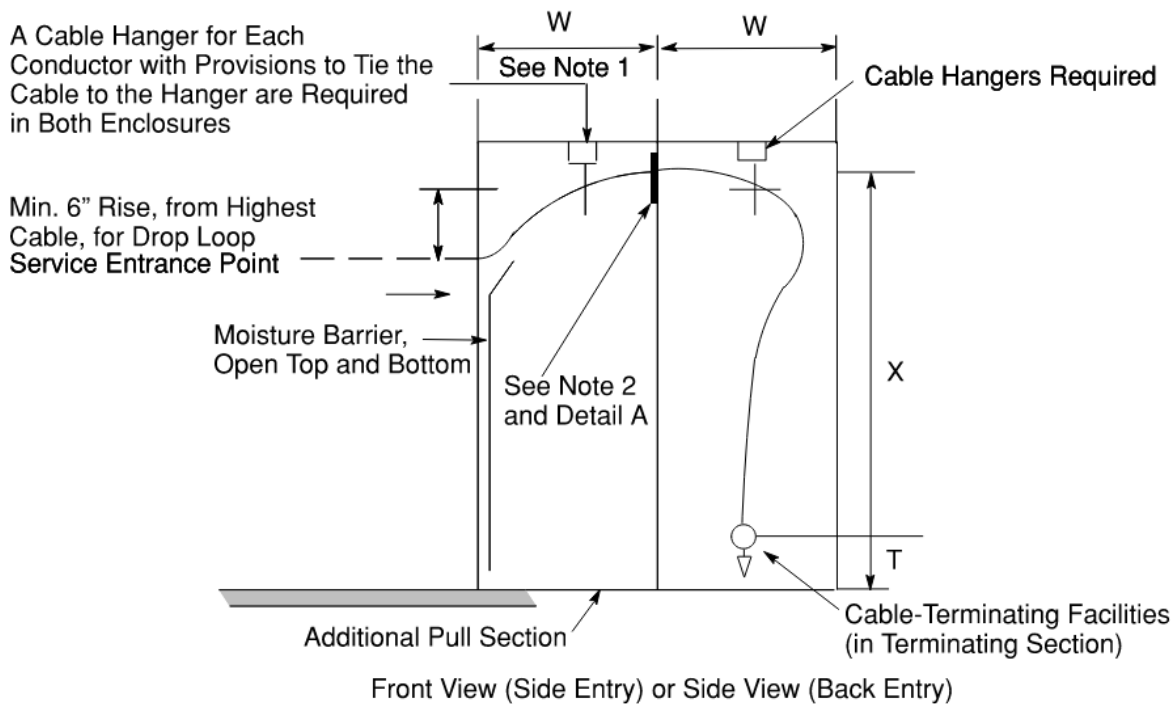
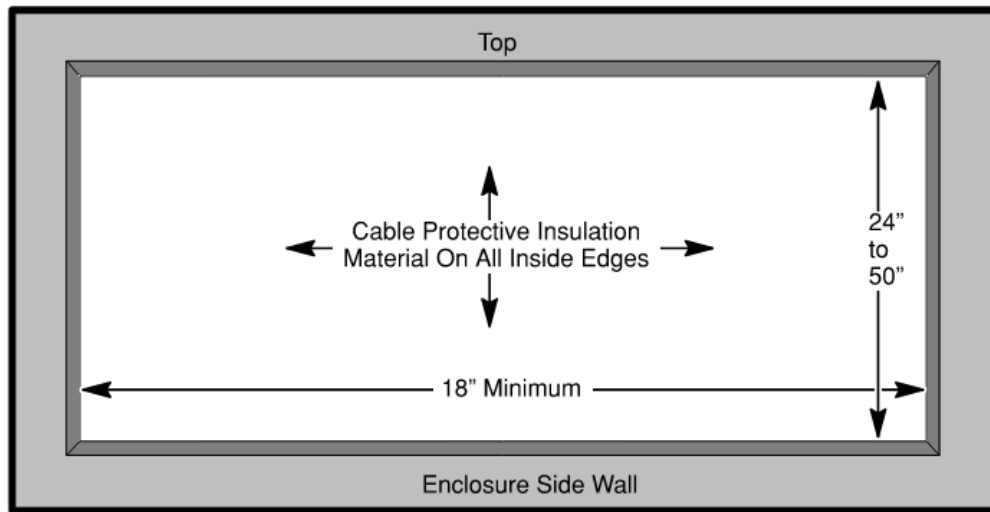


Figure 8-32.
Additional Side or Back Switchboard Pull Section-High Entry

Notes in reference to [Figure 8-32](#).

1. Ensure that the dimensions (i.e., width, depth, and height) of the additional pull section are exactly the same as the terminating section.
2. The height of the cable entrance window must be between 24 inches to 36 inches and the width must be a minimum of 20 inches. The edges of the window opening must be insulated to prevent damaging the cables. See Detail A in [Figure 8-33](#) on Page 8-40.

8.5 (continued)



Detail A—Cable Entrance Window

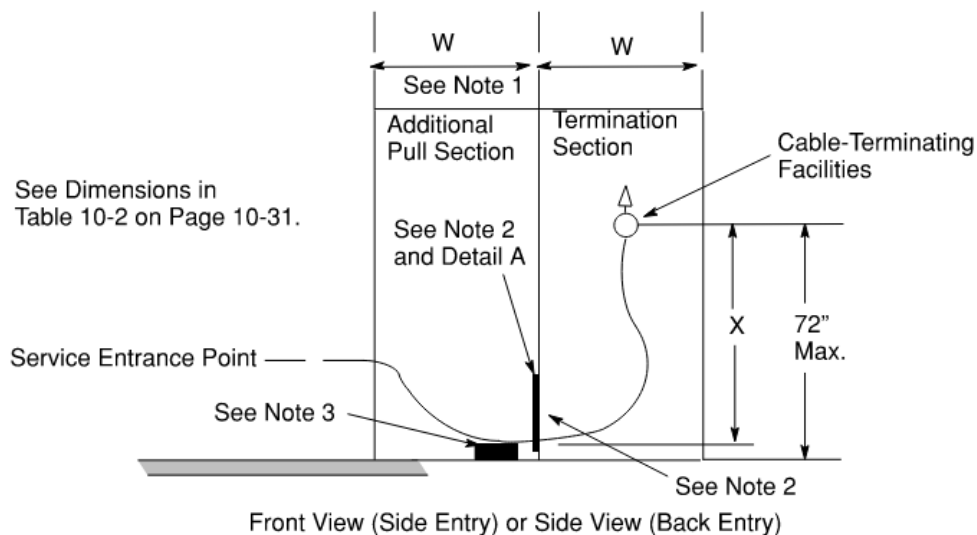


Figure 8-33.
Additional Side or Back Switchboard Pull Section-Low Entry

Notes in reference to [Figure 8-33](#).

1. Ensure that the dimensions (i.e., width, depth, and height) of the additional pull section are the same as the terminating section.
2. The height of the cable entrance window above the top of the pad is 3 inches maximum. Ensure that the window size is between 24-inches to 50-inches tall and the width is a minimum of 18 inches. Insulate the edges of the window opening to prevent damage to the cables. See Detail A above.
3. Cables must not lie on the ground. The applicant must provide a cable support system to keep cables off the ground. Otherwise, the applicant must supply cable blocks using PG&E Material Code M362118.

8.5 (continued)

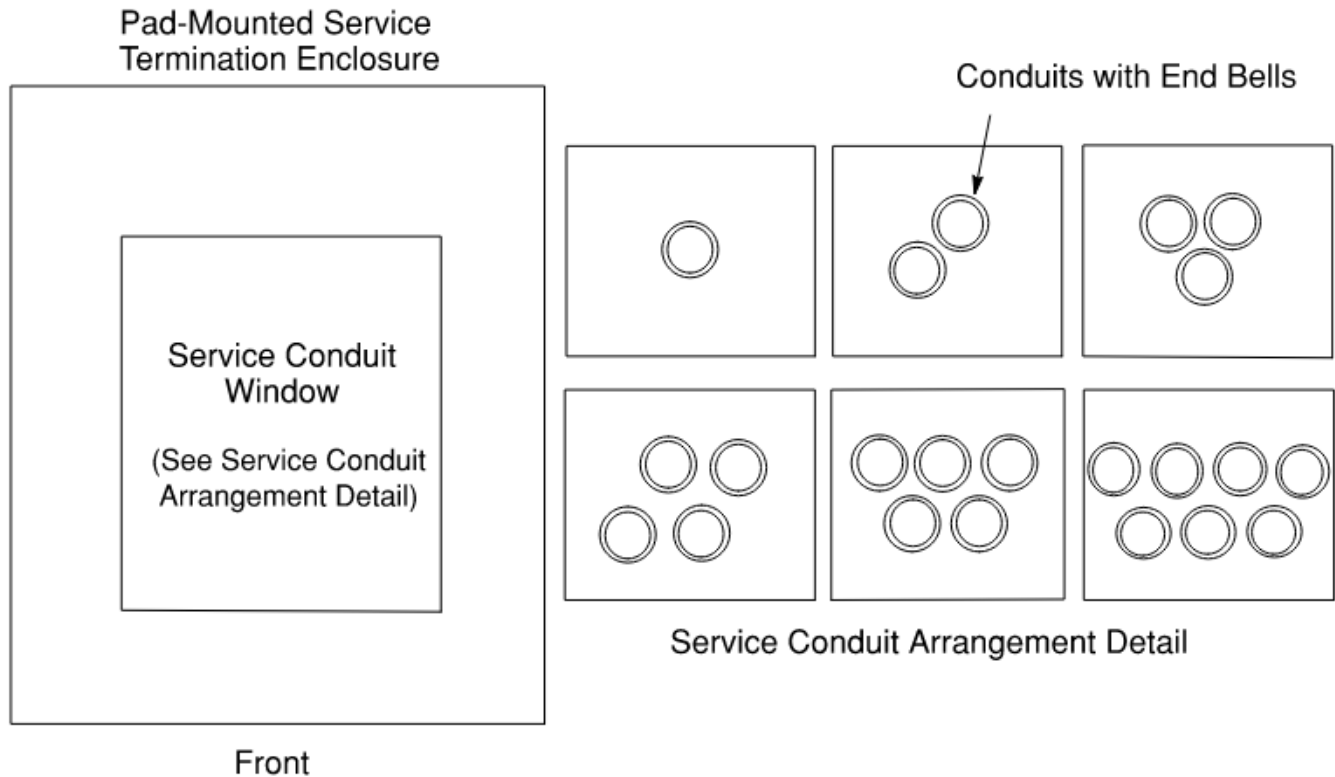


Figure 8-34
Service Conduit Layout in the Termination Enclosure or Additional Pull Section
(Example of Front View and Top View)

Notes in reference to [Figure 8-34](#).

1. Group the conduits at the service termination (i.e., pull section) enclosure as shown in the "Service Conduit Arrangement Detail."
2. Center the conduits under the cable termination bus or bus stubs.
3. Conduits should be separated from each other by approximately 1 inch.
4. Ensure the top of each conduit is 2 inches above the concrete pad or floor of the switchboard.
5. Permanently install end bell fittings on all conduits.
6. Temporarily plug or cap all conduits.
7. Grout conduit windows with non-shrink grout. **Do not use asphalt or blacktop to grout windows.**
8. For primary service conduit installations, see [Subsection 8.11, "Specific Requirements for High-Voltage Switchboard"](#) on Page 8-57 and [Figure 8-49, "Primary Switchboard Termination Section Pad Detail"](#) on Page 8-61.

8.6 Underground, Cable-Terminating Facilities in Pull Boxes or Pull Sections

1. See [Electric Design Manual 063928, "Methods and Requirements for Installing Non-Residential Underground Electric Services 0–600 Volts to Customer-Owned Facilities,"](#) for the appropriate conduit and cable requirements for nonresidential service installations.
2. [Figure 8-35](#) through [Figure 8-38](#), all on Page 8-44, provide diagrams and required dimensions for cable-terminating facilities in the pull boxes or pull sections.

NOTE

The utility point of service (i.e., service point) is defined as the approved enclosure and the terminated or spliced connections.

3. Applicants must follow the requirements (A-I) in this subsection when installing underground, cable-terminating facilities in pull boxes or pull sections:
 - a. Ensure that one landing position per phase is available for each 400 amps of service capacity, as shown in [Figure 8-35, "Landing Terminal Detail,"](#) on Page 8-44, and ensure that provisions have been made for stacking lugs.
 - b. Ensure that bolts are provided with nuts, flat washers, and pressure-maintaining spring washers.
 - c. Ensure that all parts are plated to prevent corrosion.
 - d. Ensure that bolts are secured in place unless working access is provided on both sides of the mounting bus. If both sides of the bus are accessible, one set of bolts may be used to provide two terminal-mounting positions, one on either side of the bus.

NOTE

"Secured in place" means the stud will not turn, back out, or loosen in any manner when subjected to normal, UL-approved torques while tightening or loosening terminal nuts. This includes cross-threaded situations.

- e. In the terminal-mounting area, ensure that a radial clearance of 1-1/2 inches is provided between any bus (including bolts) and any other bus (including horizontal cross-busing) or grounded surface, as shown in [Figure 8-36, "Spacing Requirements,"](#) on Page 8-44.

The following are **exceptions** to these requirements:

- 1) The minimum clearance to the back of the pull section or to the front of the pull-section cover may be 1 inch.

8.6 (continued)

- 2) The neutral bus or termination may have a minimum clearance of 1 inch from any grounded surface.
- 3) Service cables passing over horizontal cross busing must have a minimum 2-1/2-inch radial clearance. This distance may be reduced to 1 inch if the horizontal bus is fully insulated.
- f. Ensure that each cable-mounting position has at least 8 inches of unobstructed space in front of the entire mounting surface when all of the conductors are in place. This space must be accessible from the front of the pull section.
- g. Ensure that the bus stubs are firmly secured to prevent bus misalignment and movement when the cables are installed. See [Figure 8-37, "Busses Accessible from One Side \(Bolts Must Be Secured in Place\),"](#) and [Figure 8-38, "Busses Accessible from Either Side \(Mounting Surfaces on Both Sides of Bus\),"](#) both on Page 8-44, for bus stub details through 2,500 amps.
- h. Install multiple sets of service conduits for nonresidential services, either single or three phase, 600 amps and above. Additionally, PG&E will require applicants to supply stacking lugs for terminating its cables in any installation that is rated nonresidential, three phase, 1,200 amps or greater.
- i. Account for additional space (i.e., depth, width, and termination height) requirements in any section of switchboard, panelboard, or other enclosure used to terminate PG&E service cables for nonresidential services. This additional space may be necessary to provide proper clearances between phases and grounded surfaces, as well as to accommodate the installation of service cable.
4. PG&E does not allow applicants to install wall-mounted cable termination and pull enclosures for nonresidential, three-phase installations rated at 401 amps through 2,500 amps. For those installations, PG&E requires a switchboard pull section or enclosure meeting the requirements shown in [Section 7](#), Subsection 7.17, Table 7-15, "Minimum Pad-Mounted (Floor-Standing) Switchboard Pull-Section Dimensions: Residential and Nonresidential, Single-Phase and Three-Phase," on Page 7-74, and [Table 8-6, "Minimum Bottom-Fed Pull-Section Dimensions,"](#) on Page 8-34, for bottom entry. Also, see [Table 8-7, "Pull Section Dimensions \(Minimums\) Below Ground Level,"](#) on Page 8-38, for side or back entry.
5. Additional requirements can be found in [Section 7](#), Subsection 7.17, "Underground Service Cable-Termination Section or Pull Box," on Page 7-72. The information, tables, and figures provide additional requirements for applicants who install wall-mounted and pad-mounted cable-termination and pull-section equipment.

8.6 (continued)

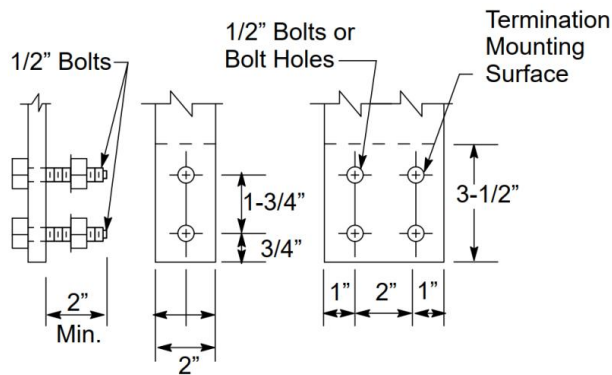


Figure 8-35.
Landing Terminal Detail

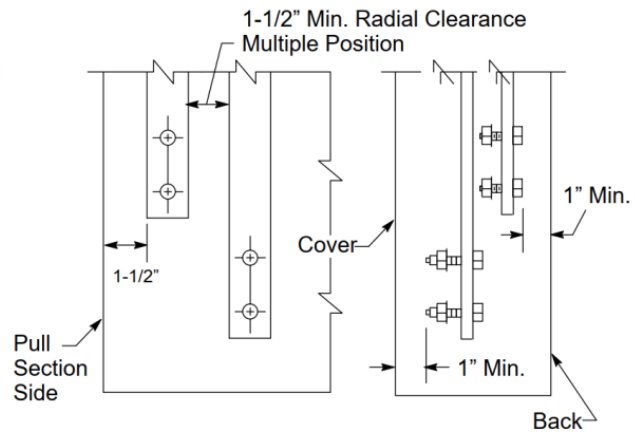


Figure 8-36.
Spacing Requirements

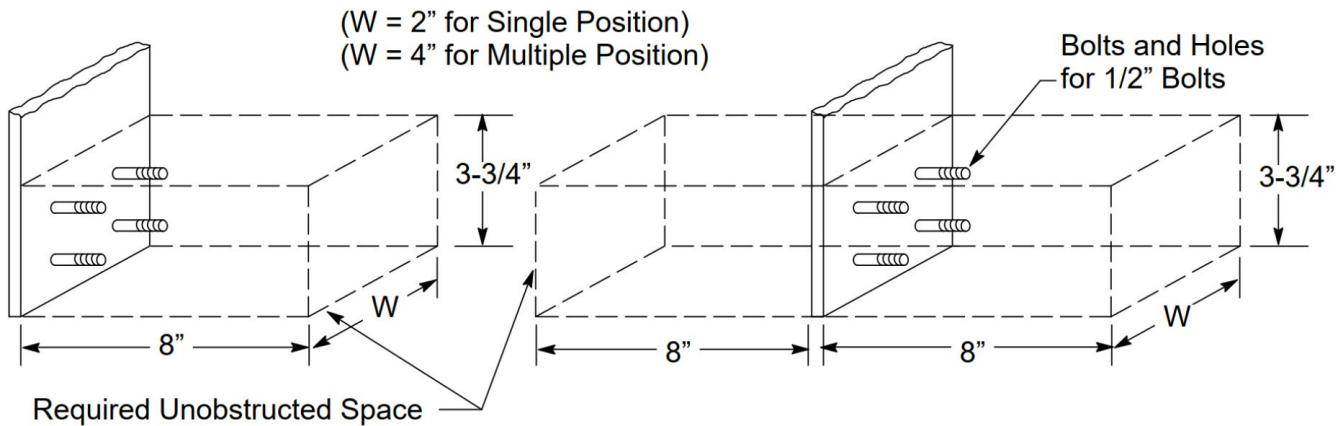


Figure 8-37.
Buses Accessible from One Side (Bolts must be Secured in Place)

Figure 8-38.
Buses Accessible from Either Side (Mounting Surfaces on Both Sides of Bus)

8.7 Meter Panel

The following requirements apply to applicants who are installing meter panels:

- a. Except for remote metering enclosures, use only hinged meter panels in front of a metering transformer compartment. The meter panel must be hinged next to the test facilities.
- b. Ensure that a 30-inch tall dual-socket meter panel door is provided in pad-mounted switchboards supplying a demand load of 400 kilovolt amperes (kVA) or more. See [Table 8-8, "Dual-Socket Hinged-Meter Panel Requirement,"](#) below and [Figure 8-42, "Standard Switchboard Service Section, 30-Inch Hinged Panel for Socket Meter and Test Switch"](#) on Page 8-49.
- c. Two 15-inch meter panel doors are allowed for switchboards with voltage and ampacities not listed in [Table 8-8](#) below. Refer to [Figure 8-41, "Standard Switchboard Service Section, 15-Inch Hinged Panel for Socket Meter and Test Switch,"](#) on Page 8-48, for a 15-inch tall meter panel door. The two panel doors must come bolted together so they can swing open and close together. The bolts and nuts must be removable so the doors can also be opened or closed independently.
- d. Ensure that meter panels are sealable, hinged, and reversible.
- e. Note that the width of meter panels may sometimes require the service section to be wider than the minimum-allowable width of the transformer compartment.
- f. For switchboards that come with dual sockets, **a test switch cover plate must be installed on the spare test switch location.**

Table 8-8 Dual-Socket, Hinged, Meter-Panel Requirement

Service Voltage	Switchboard Supply Rating	30-Inch Meter Panel Door Required ¹	Dual Meter Socket Required
277/480V 3Ø, 4-Wire	401 Amps and Above	Yes	Yes
120/240V 3Ø, 4-Wire	801 Amps and Above	Yes	Yes
120/208V 3Ø, 4-Wire	1,001 Amps and Above	Yes	Yes

¹Two 15-inch-tall doors are not allowed on these switchboards.

8.7 (continued)

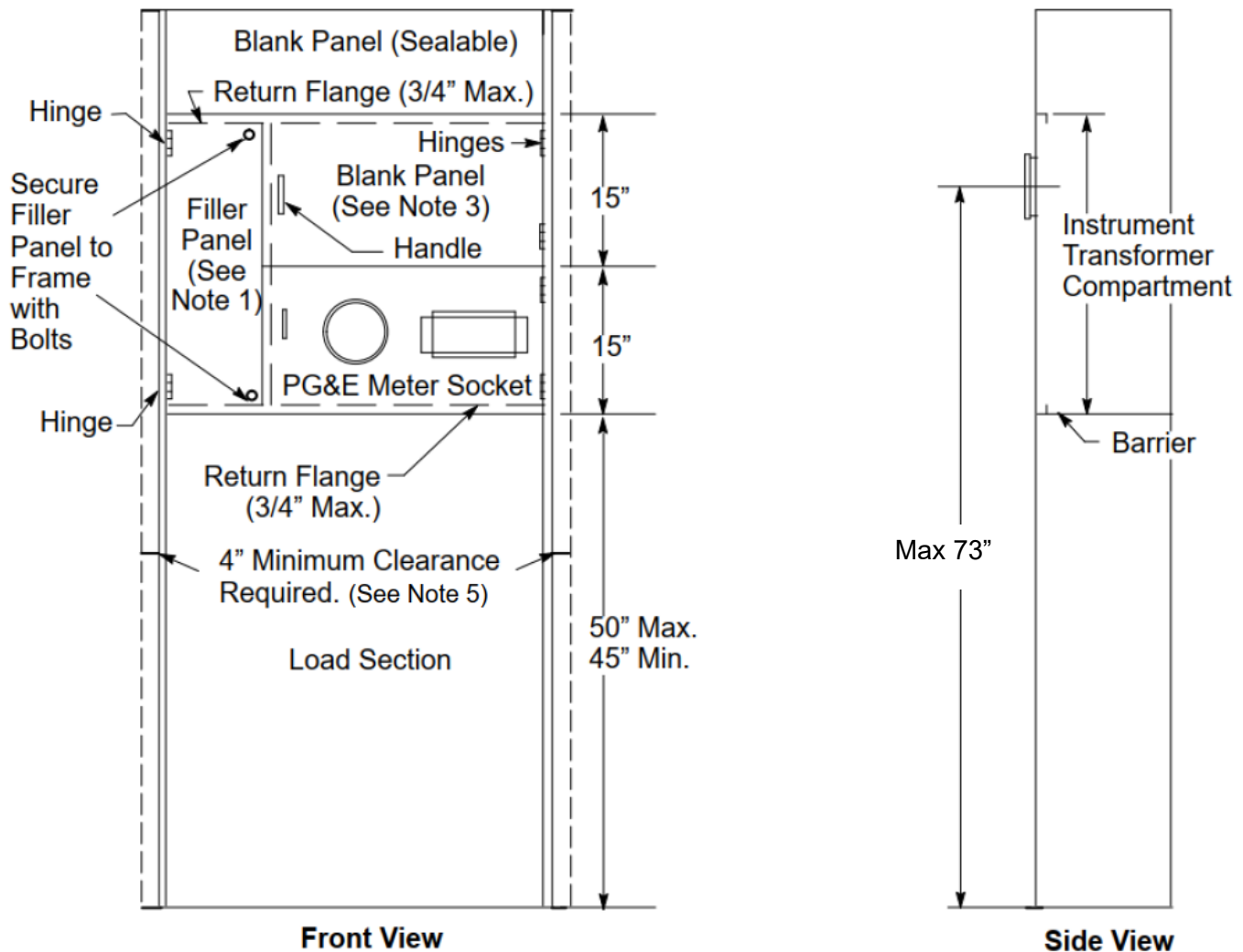


Figure 8-39.
Standard Switchboard Service Section with
CT Compartment and Filler Panel,
0 Volts-600 Volts

Notes in reference to [Figure 8-39](#).

1. Use filler panels where the switchboard width exceeds the allowable meter panel width. It is allowed to hinge meter panels to hinged filler panels only if the filler panel is bolted to the switchboard in both corners of the filler panel opposite the hinges.
2. Make the grounding connection in the main switch or breaker compartment.
3. In a split-panel arrangement, mount the kilowatt-hour (kWh) meter panel in the lower position.
4. Equip meter panels and filler panels with stops to prevent the panels from swinging inward beyond the front surface of the switchboard.
5. Ensure that the meter panels can open 90° with the meter and test facilities in place. Ensure there is at least 4 inches of minimum clearance on the side where the meter panel door opens outward.

8.7 (continued)

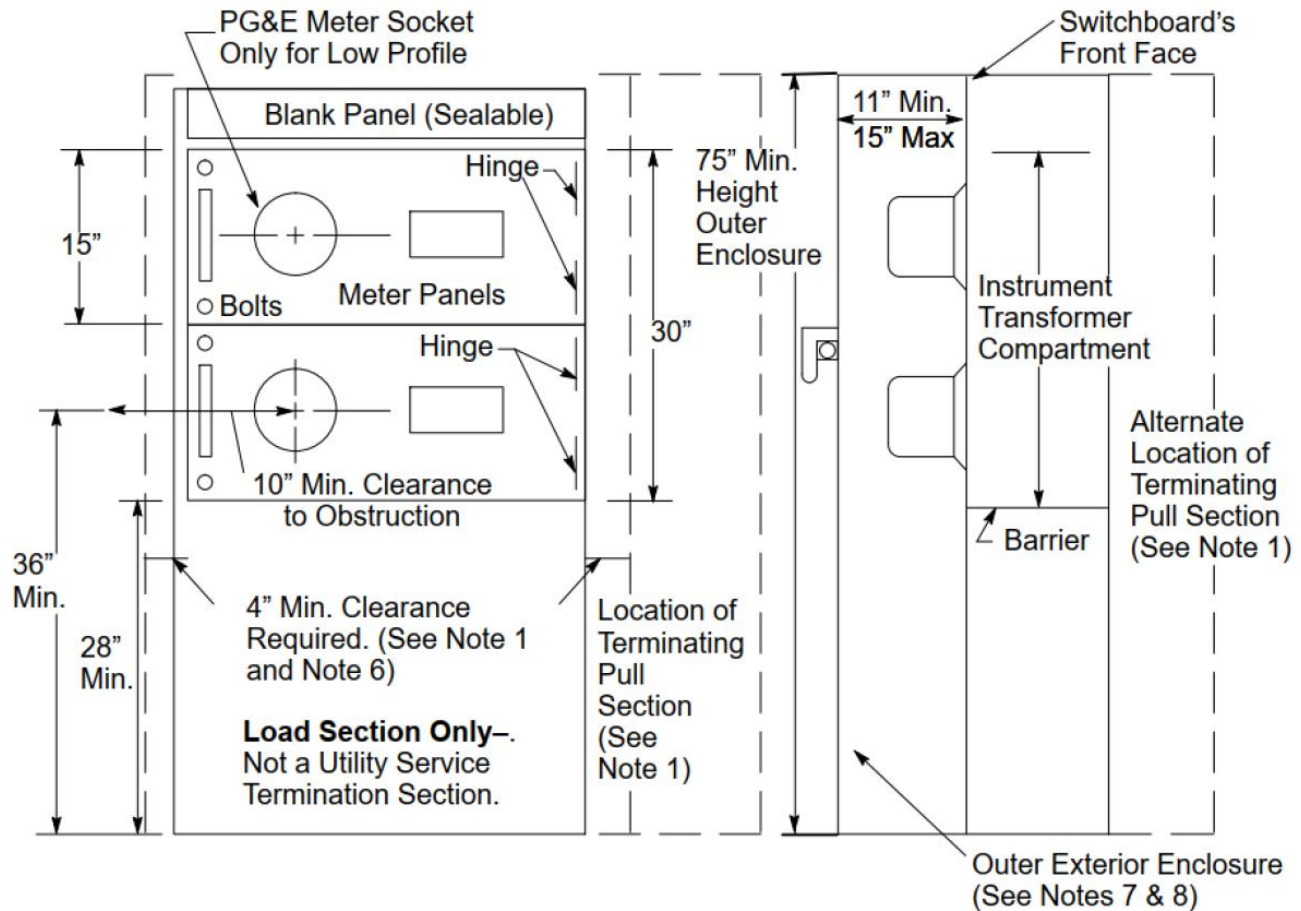


Figure 8-40.
Low-Profile Switchboard Service Section,
With CT Compartment, for Underground Service

Notes in reference to [Figure 8-40](#).

1. Locate the terminating pull section beside or behind the metering and current transformer (CT) compartment. The metering and CT compartment must not be recessed back into the switchboard.
2. Use filler panels where the switchboard width exceeds the maximum-allowable meter panel width. It is allowed to hinge meter panels to hinged filler panels only if the filler panel is bolted to the switchboard in both corners of the filler panel opposite the hinges.
3. Make the grounding connection in the main switch or breaker compartment.
4. Equip meter panels and filler panels with stops to prevent the panels from swinging inward beyond the front surface of the switchboard.
5. Low-profile switchboards installed in outdoor applications require an outer enclosure that is a minimum of 75 inches tall. This is the required minimum working space height.
6. Ensure that the meter panels can open 90° with the meter and test facilities in place. Ensure there is at least 4 inches of minimum clearance on the side where the meter panel door opens outward.
7. Preferably low-profile switchboards should only be installed indoors.
8. Only for low-profile switchboards. Place the PG&E meter socket on the top panel.

8.7 (continued)

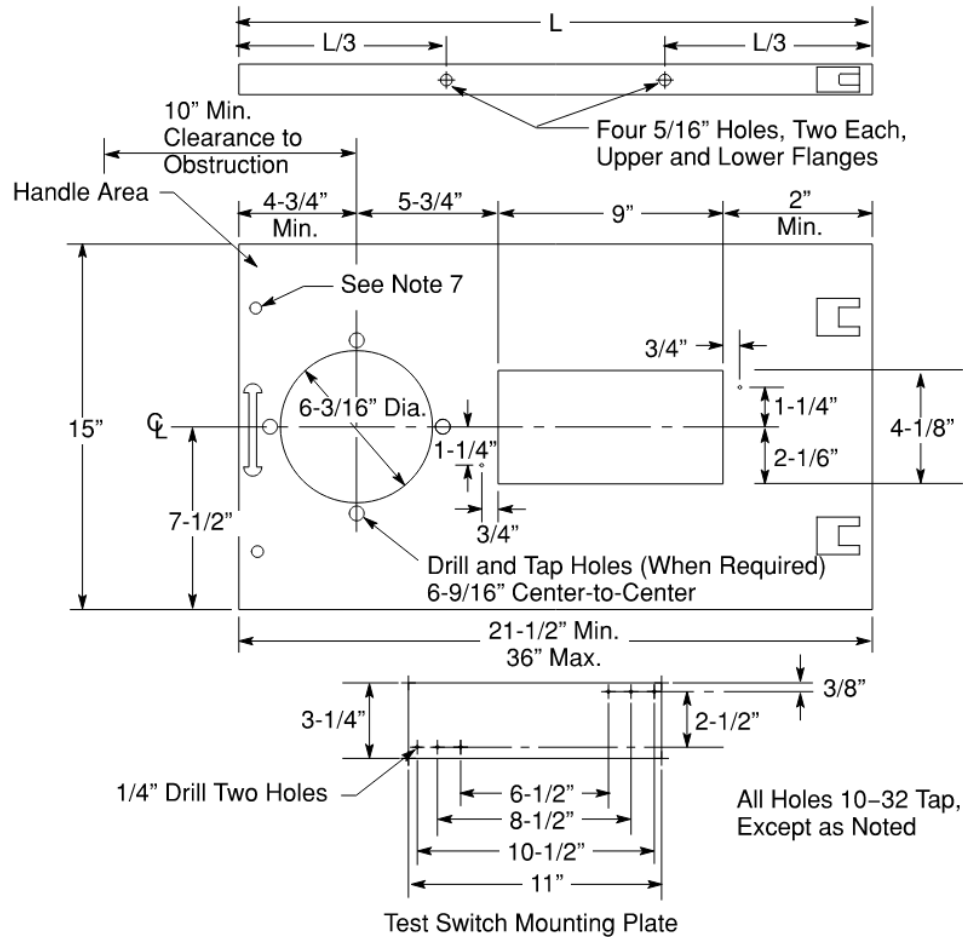


Figure 8-41.
Standard Switchboard Service Section,
15-Inch Hinged Panel for Socket Meter and Test Switch

Notes in reference to [Figure 8-41](#).

1. Ensure that the switchboard manufacturer drills, taps, and slots the panel for the secondary test switch, as shown. Also, ensure that the switchboard manufacturer furnishes and installs the socket with a sealing ring.
2. Design the meter sockets to be installed on hinged panels for back (rear) connection.
3. Use the outdoor or rain-tight enclosures shown in [Figure 8-44](#) through [Figure 8-47](#) on Page 8-51.
4. Attach a handle at the unsupported end of the meter panel. Leave a minimum clearance of 1 inch from the handle to the meter socket.
5. Ensure that hinges can support a 25-pound load applied at the unsupported end with a maximum 1/8-inch sag when the panel is open.
6. Secure removable plates to the rear of the panel using screws that do **not** protrude through the face of panel.
7. Ensure that the meter panels can open 90° with the meter and test facilities in place.
8. Ensure that all securing screws and sealing screws on the panels are captive. Studs and wing nuts must be sealable when they are used.
9. Ensure that hinges are interchangeable and can be used on either the right side or the left side of the meter panels. When using clevis-type or removable pin-type hinges, ensure that the pin can be removed from the top of the meter panel.

8.7 (continued)

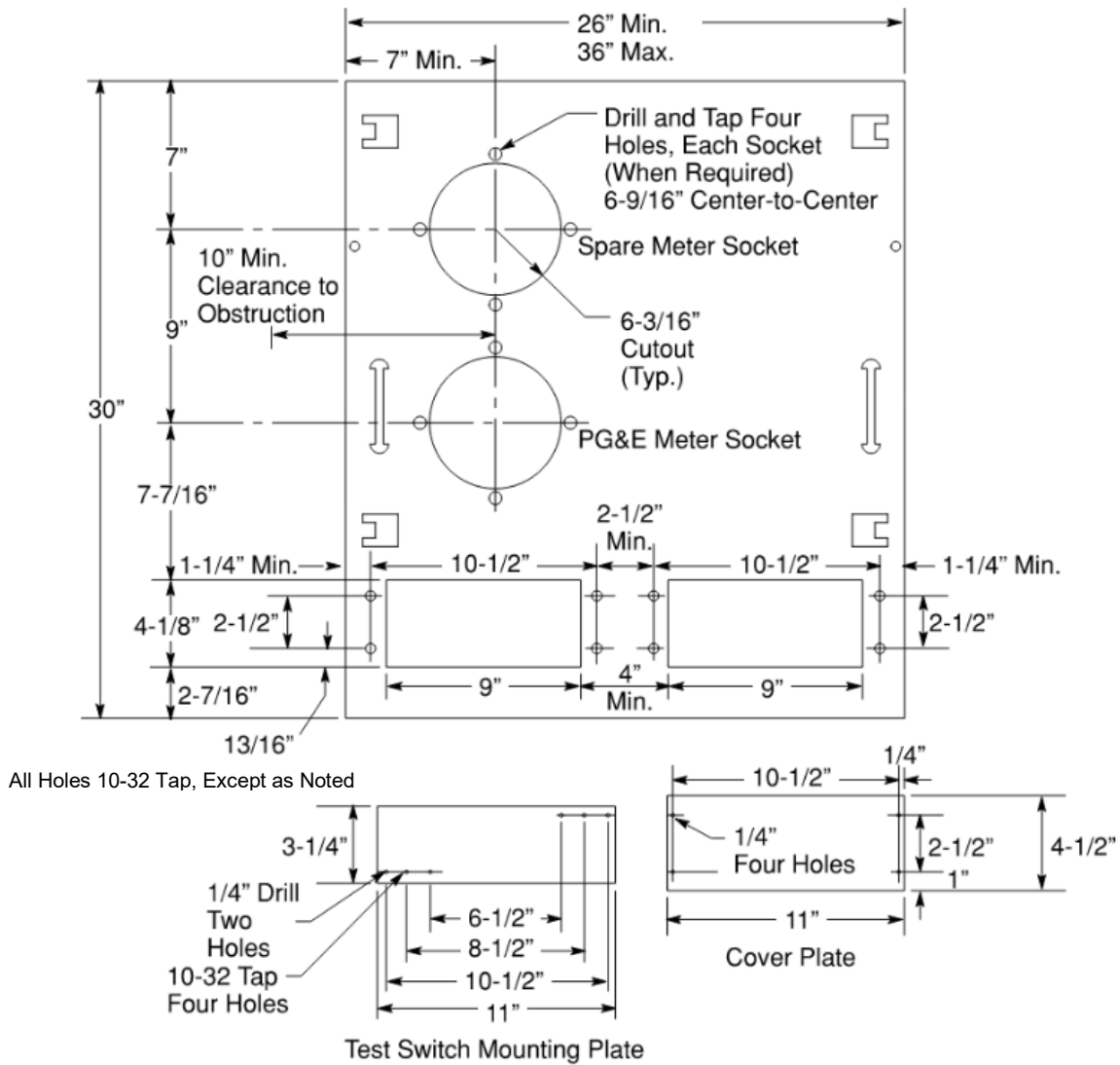


Figure 8-42.
Standard Switchboard Service Section,
30-Inch Hinged Panel for Socket Meter and Test Switch

8.7 (continued)

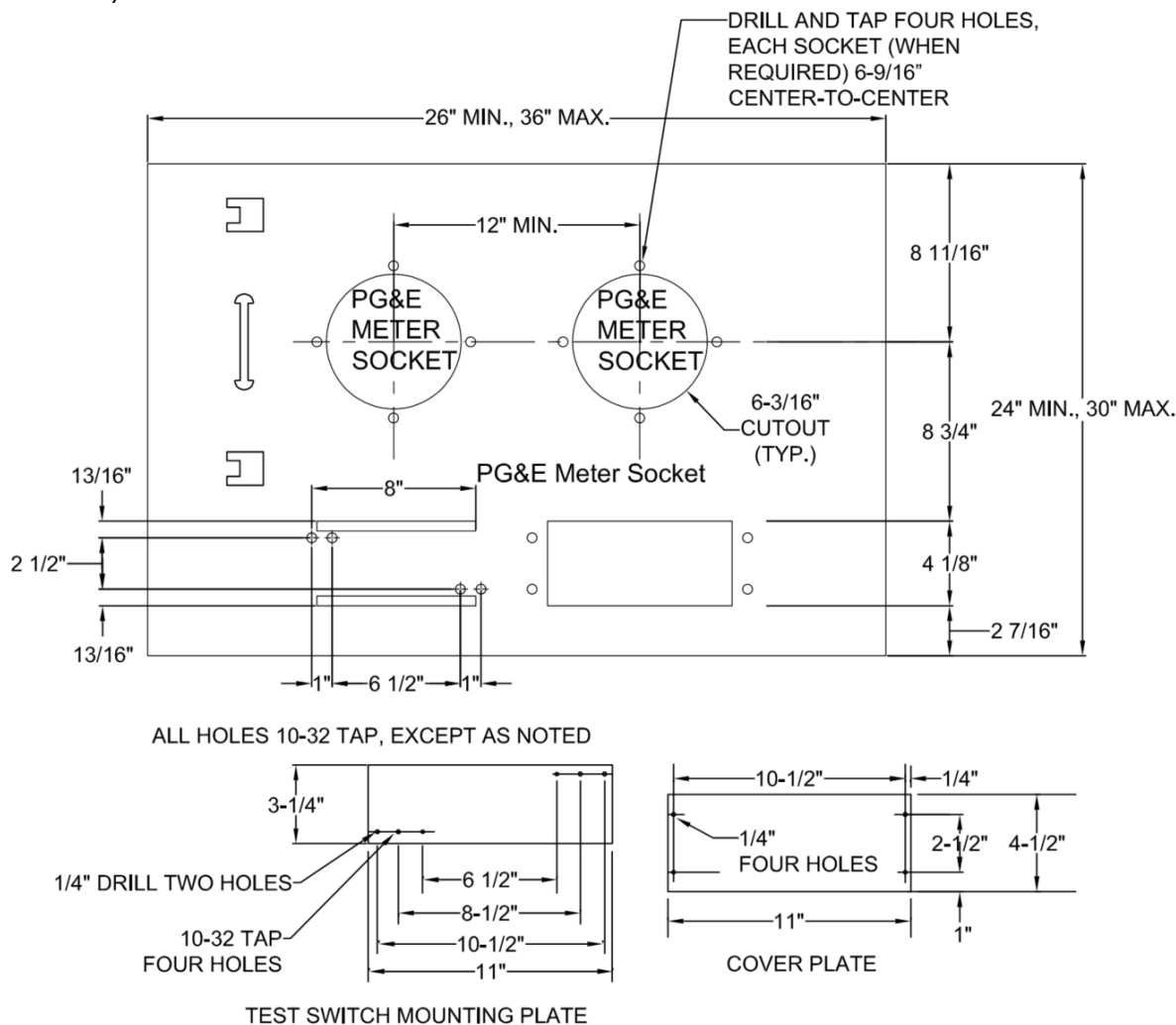


Figure 8-43.

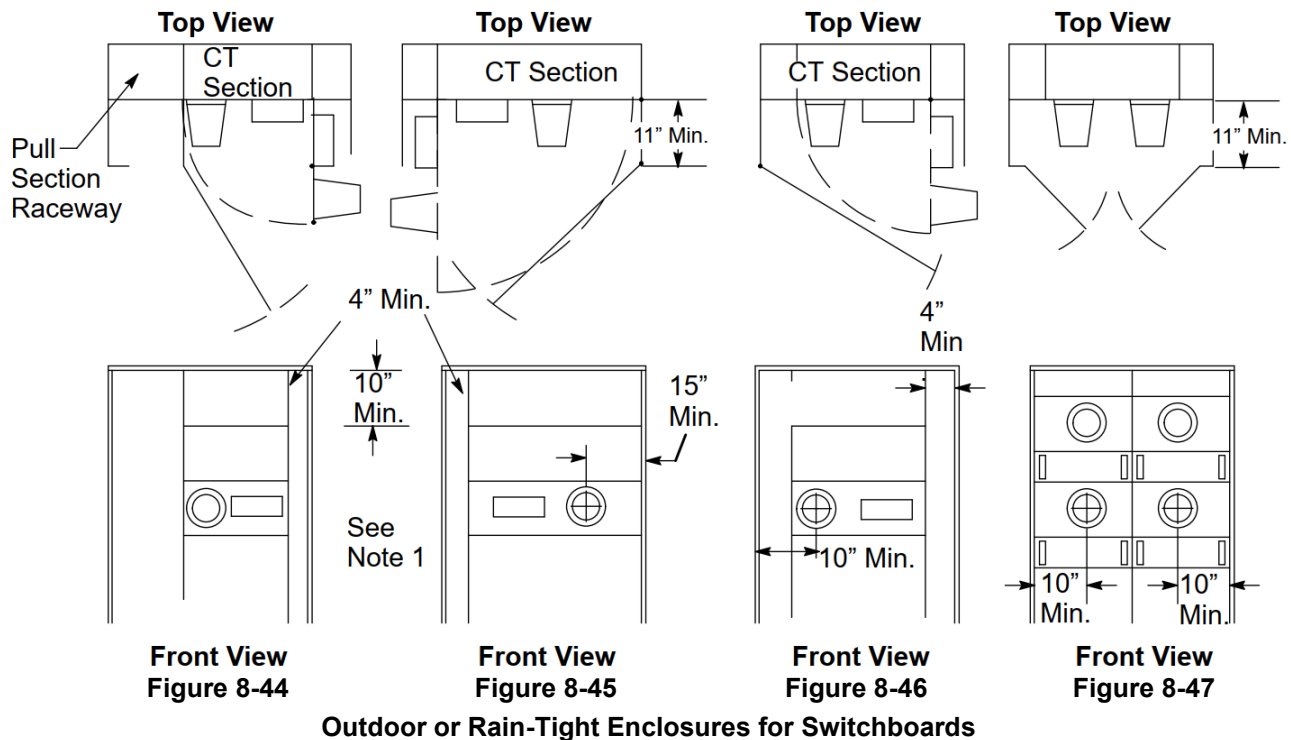
Alternate Switchboard Service Section, 30-Inch Hinged Panel for Socket Meter and Test Switch

Notes in reference to [Figure 8-42](#) on page 8-49 and [Figure 8-43](#) above.

1. Meter socket openings may be on either the right or the left side of the panel.
2. Ensure that the switchboard manufacturer drills, taps, and slots the panel for the secondary test switch, as shown. Ensure that the switchboard manufacturer furnishes and installs the socket with a sealing ring.
3. Paint the removable plates and attached them to the panel.
4. Construct meter panels of 12-gauge steel (minimum). Ensure they are hinged and sealable.
5. Ensure that hinges are interchangeable and can be used on either the right side or the left side of the meter panels. When using clevis-type or removable pin-type hinges, ensure that the pin can be removed from the top of the meter panel.
6. Ensure that hinges can support a 25-pound load applied at the unsupported end with a maximum 1/8-inch sag when the panel is open.
7. It is allowed to hinge meter panels to hinged filler panels only if the filler panel is bolted to the switchboard in both corners of the filler panel opposite the hinges.
8. Ensure that a hinged meter panel can be opened 90° with the meter and test facilities in place. When working with either recessed or enclosed meter panels, see Figure 8-44 below.
9. Ensure that the panel has a handle attached on both sides.
10. All securing screws and sealing screws on the panel must be captive. Stud and wing nuts must be sealable when they are used.
11. Design the meter sockets to be installed on hinged panels for back (i.e., rear) connection.
12. For panel widths of less than 26 inches, consult your local PG&E meter shop.

8.8 Transformer-Rated and Self-Contained Switchboards

For individually metered, multiple occupancies supplied from one service, applicants may use switchboards consisting of a main disconnect (if required), individual meter sockets, and associated circuit breakers or switches. [Figure 8-44](#), [Figure 8-45](#), and [Figure 8-46](#), below, show standard switchboard service-section detail for transformer-rated meter sockets. [Figure 8-47](#), below, shows standard switchboard service-section detail for self-contained meter sockets rated from 0 amps through 225 amps.



Notes in reference to [Figure 8-44](#), [Figure 8-45](#), [Figure 8-46](#), and [Figure 8-47](#) above.

1. For hinged meter panel designs, see [Figure 8-39](#) on Page 8-46 and [Figure 8-40](#) on Page 8-47.
2. Enclosure doors must open to at least 90° and secured in the open position.
3. When panel doors are open at 90°, the minimum egress is 24" of space is required.
4. For approved enclosure-locking provisions, see [Section 7](#), Subsection 7.5, "Meter Installation Locations," on Page 7-22.
5. Ensure that outdoor or rain-tight enclosures are used.

8.9 Adding New Metering Equipment to Existing Switchboards

1. Load Side Interconnections
 - a. When applicants want to install a new meter panel or meter section and connect to the load side of an existing switchboard, the required method is to extend the bussing from the last meter or load section of the existing switchboard into a new meter section. See [Figure 8-48, "Existing Switchboard,"](#) below, as an example of how to extend the switchboard bussing.
 - b. If the applicant is adding a new meter panel or section to a switchboard that has an existing master main breaker, the ampacities for all meter sections and meter panels do not have to be added up to the total service ampacity. This requirement **only** applies when interconnecting to the load side on the inside of the master main compartment.

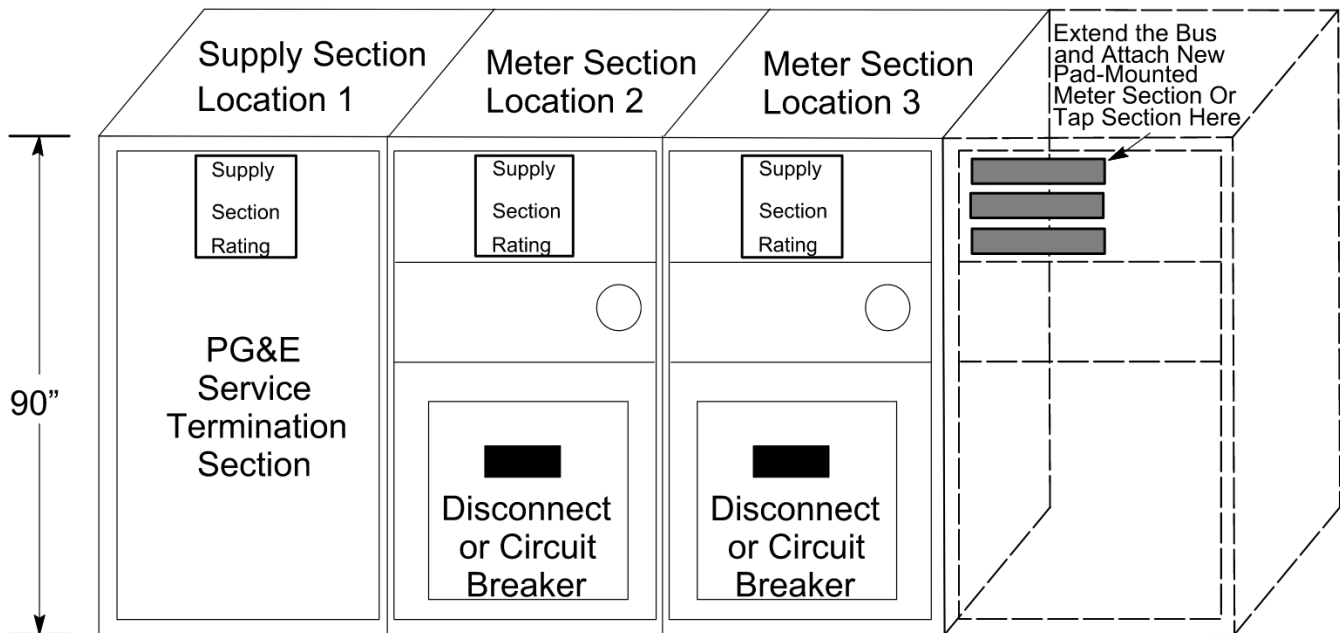


Figure 8-48.
Existing Switchboard

8.9 (continued)

2. Line Side Interconnections

- a. Contact your PG&E Job Owner before interconnecting and adding load. PG&E Job Owners must ensure that the existing PG&E facilities are upgraded, when necessary.
- b. If the new meter panel or meter section cannot be connected to the end of the switchboard, interconnection may be allowed, at PG&E's discretion, in the utility termination section of the switchboard only if all of the conditions below (1-4) are met:
 - 1) The total aggregated ampacity of the new panel or new section plus the existing switchboard metering sections is not greater than the existing switchboard's total (supply) ampacity rating. See [Table 8-9, "Adding Up Meter Section Ampacities,"](#) on Page 8-54 and [Figure 8-48, "Existing Switchboard,"](#) on Page 8-52, to calculate the ampacities.
 - 2) PG&E calculates the new total demand load and, if needed, installs the additional service conductors required to meet that load. A larger transformer may also be required because of the new total demand load.
 - 3) PG&E identifies available spare landing positions on the terminating facilities. The spare landing positions are in addition to the number of landing positions required in [Subsection 8.6, "Underground, Cable-Terminating Facilities in Pull Boxes or Pull Sections,"](#) on Page 8-42, that must be reserved for existing and future installation of additional cables.
 - 4) The utility service termination section (typically 90 inches high) does not contain a main breaker compartment or a metering compartment. This termination section is dedicated only for terminating PG&E service cables. See [Figure 8-48, "Existing Switchboard"](#) on Page 8-52.
- c. If all the conditions described above are met and PG&E approves the installation of the new meter panel or meter section, applicants must follow the applicable instructions provided in Item 5) and Item 6) below:
 - 5) **Overhead Service:** Applicants must locate the taps in a sealable compartment that is located above and separated from the CT and/or metering equipment compartment.
 - 6) **Underground Service:** Applicants must ensure that the taps are located in the underground service-termination pull section or pull box. In this instance, the applicant must ensure that the bus conductors terminate in a suitable, approved manner. Also, the applicant must ensure that the bus conductors are positioned so that the customer's incoming, service-entrance conductors and the tap connections do not encroach into PG&E's pulling area or interfere with PG&E's pull and termination facilities for service-lateral conductors.

8.9 (continued)

NOTE

Due to various types of configurations and arrangements of switchboard compartments in some termination sections, the interconnection may not meet all the requirements listed above and will be denied. One example is when the PG&E metering compartment or the customer's main breaker compartment is directly above the utility termination section. See [Figure 8-39, "Standard Switchboard Service Section with CT Compartment and Filler Panel, 0 Volts-600 Volts"](#) on Page 8-46.

Table 8-9 Adding Up Meter Section Ampacities¹

Example	Supply Section (Loc 1) Ampacity Rating	Meter Section, (Loc 2) Ampacity Rating	Meter Section, (Loc 3) Ampacity Rating	Aggregated Ampacity of All Metering Selections, and Panels	New Meter Equipment Tap Allowed?
1	2,000	1,200	800	$1,200 + 800 = 2,000$	No. The Total Aggregated Ampacity in Column 5 is not less than Column 2.
2	2,000	1,000	600	$1,000 + 600 = 1,600$	Yes. The Total Aggregated Ampacity in Column 5 is less than Column 2. A new meter panel less than or equal to 400 amps is allowed.

¹ Only two meter sections are shown as an example. Add up the ampacities for all meter sections and meter panels connected to the switchboard.

8.10 Electric Switchgear: 601 Volts Through 27,000 Volts, and Primary Services

This section of the manual provides application and installation details for high-voltage switchboard metering equipment ranging from 601 volts to 27,000 volts.

1. General Requirements

- a. The following general requirements apply when installing high-voltage electric switchboards and primary services.
- b. Find reference information for interconnections and primary services in [Subsection 8.11, "Interconnection Requirements and Primary Services,"](#) on Page 8-57.
 - 1) The specific switchboard voltages represented in this section are:
 - 2,400
 - 4,160
 - 12,000
 - 17,200
 - 20,780
 - 2) Applicants must ensure that manufacturers contact PG&E before fabricating the switchboards and request the specific information listed below:
 - Service voltage, phase, and wiring
 - Meter panel requirements for the applicable rate schedule.
 - Service-termination location.
 - Switchboard and/or meter location.
 - Size and number of service conductors.
 - Other information and specifications necessary for fabricating switchboards (e.g., EUSERC Manual, Section 400 requirements).
 - 3) A manufacturer must submit three sets of drawings of the proposed equipment to PG&E for pre-approval before manufacturing the equipment. The drawings must include the contractor's name and address, the applicant's name, and the job location. The job location must be specific and can be the service address or Global Positioning System (GPS) coordinate's location. Field-design changes are not permitted without obtaining PG&E's approval before making the changes.

8.10 (continued)

- 4) PG&E employees perform a field inspection of the switchboard at the jobsite. The switchboard is approved only when it meets all of the specified requirements.

NOTE

Potential transformers (PTs) are also called voltage transformers (VTs). The two terms are used interchangeably in Section 8.

- 5) PG&E must furnish and install the following equipment:
 - Revenue meters
 - Metering transformers
 - Fuses for PTs
 - Test switches
 - All secondary wiring from the metering transformers to the meters
- 6) When more than one switchboard is required, install a separate service section. Ensure that it is separated completely (i.e., barriered) from other service sections, pull sections, or service switches and disconnects.
- 7) Submit a termination section drawing detail on all switchboard drawings submitted to PG&E. The drawing detail must show the position and details such as size, wire gauge, and measurements (separations where applicable) of the conduit(s), conduit window, ground rods, ground wire, rigid ground bus, lugs, and additional internal components.
- 8) Ensure that each section of the primary switchgear has been certified to all applicable standards by the Occupational Safety & Health Administration's (OSHA's) Nationally Recognized Testing Laboratory (NRTL) Program. The equipment also must meet the requirements of the EUSERC Manual, as well as all applicable Greenbook requirements, and be approved by PG&E. Also, see [Section 1](#), Subsection 1.11.6, "Approved Metering and Service-Termination Equipment," on Page 1-10. The following requirements also apply:
 - i. A certification label(s) must be affixed to the switchgear by its manufacturer (if qualified for self-certification) or by a qualified third-party agency (i.e. Underwriters Laboratories [UL] or other NRTL), indicating that the switchboard meets all applicable design and test conditions standards.

8.10 (continued)

- ii. Due to the capacity of PG&E distribution circuits, primary switchgear must not have an ampacity rating greater than 600 amps. The maximum ampacity rating must be listed on the switchgear's nameplate label. Refer to [Section 7](#), Subsection 7.1.4, "Determining the Electric Service Rating," on Page 7-4.

8.11 Interconnection Requirements and Primary Services

1. When new or existing applicants request services above 600 volts, refer to [Electric Design Manual 094676, "Primary Electric Service Equipment,"](#) for technical information about primary services.
2. If applicants intend to interconnect their generation facilities to PG&E's power system, they must refer to the [PG&E Distribution Interconnection Handbook](#).

8.12 Specific Requirements for High-Voltage Switchboards

1. When installing high-voltage switchboards, the applicant must ensure that the equipment described below is provided and the construction requirements below are followed:
 - a. Provide and install the insulation barrier between the potential transformer (PT) disconnect switches and the PT section.
 - b. Ensure that the insulated cables and conductors are made available so PG&E personnel can make connections between the PT fuse holders and metering PTs.
 - c. Provide an individual pulling eyebolt (shouldered type) above each of the current transformer (CT) positions to aid CT lifting (200 Lb. Min. Strength). Shouldered eyebolts are required due to their rating for angular loading capacity.
 - d. Ground buses: The following requirements apply to ground buses:
 - 1) Ensure that all ground buses are solid bus bars with dimensions of at least 1/4-inch x 2 inches. Ground buses must be constructed from either copper or aluminum.
 - 2) Do not use flex braid on any section of ground buses.
 - 3) Ensure that a ground bus bar is used for the PT disconnect.
 - 4) Ensure that ground buses do not obstruct internal compartments, openings, conduits, access to utility facilities, equipment, or extended work areas.
 - 5) Ensure that the rigid ground bus is located on the right or left side towards the front of the section to provide better accessibility for any work to be performed. This includes the PT, CT, and termination sections.

8.12 (continued)

- e. Mechanical Lug Connectors: Ensure that the requested size and number of lay-in lugs are provided on the rigid ground bus in each of the following sections. Each lug must be accessible and installed towards the front of the section.
 - 1) Three lugs in the PT section to terminate the neutral circuit connected to the ground bus in the CT compartment. The lugs should accept a wire range between #6 to #10 American Wire Gauge (AWG).
 - 2) Two lugs in the termination section to terminate CT and PT ground wires. The lugs should accept a wire range between #8 to #12 AWG.
 - 3) One lug in the termination section for the primary service concentric neutral ground wire. The lugs should accept a wire range between #2 AWG through 250 thousand circular mils (kcmil).
- f. PT Disconnect Switch: The following requirements apply to the PT disconnect switch.
 - 1) Only use a gang-operated, "no-load" type, disconnect.
 - 2) The disconnect switch must have grounds in a blade-and-jaw configuration when it is opened.
 - 3) Do not use fused-drawer disconnect devices or fused, removable, section-type disconnect devices.
 - 4) Ensure that the maximum amount of operating force required to open and close a PT disconnect switch is no more than 50 foot-pounds.
 - 5) Ensure the PT disconnect-switch door has a viewing window, so the switch blades are visible.
 - 6) An interlocking system is required to ensure the PT disconnect is locked open fully before the PT compartment door can be opened and entered.
 - 7) Apply a label near the switch handle stating, "Meter & PT Disconnect Switch. Does Not De-Energize Load."
 - 8) The voltage disconnect switch handle must be visible when the outer door of the switchboard is opened.
- g. Ensure that PG&E's working space and clearance requirements are met. Confirm that there is an unobstructed, 8-foot area cleared in front of all access doors (i.e. termination, CT, PT, and metering sections). This area is required for installing and removing PG&E's safety grounds and other equipment. Ensure this clearance area is always maintained.

8.12 (continued)

- h. Ensure the requirements in [Section 7](#), Subsection 7.2, "Applicant's Meter Panel Requirements," on Page 7-2, are followed.
- i. Ensure that permanent marking or labeling, indicating the service-voltage rating of the switchgear being supplied, is included on the exterior of all electric meter panels and all equipment doors or panels that provide access to the service terminations, PTs, and CTs.
- j. Provide a bare bus that is 4 inches above and below the CTs. PG&E will use this bare bus as a safety ground.
- k. Ensure that the primary taps for the PTs are connected only to the line side of the metering CTs.
- l. Alternatively, applicants are allowed to mount the meter panel in front of the CT termination compartment if, when the meter panel is open, the compartment is isolated fully by a removable or hinged barrier. This barrier must be sealable using stud and wing assemblies.
- m. Attach safety grounds by installing ball studs (1/2-inch through 13-inch threads with insulating covers) on the line and load side of the CT bus units. Locate the studs less than 7-inches from the end of the bus unit and orient them towards the compartment access opening. Additionally, install two ball studs on the ground bus inside the CT compartment.
- n. Ground Rods and Wire: Install 2 ground rods, ground wire, and conduits for the primary service as shown in [Figure 8-49, "Primary Switchboard Termination Section Pad Detail,"](#) on Page 8-61. These two ground rods are in addition to the already installed grounding system.

Connect a bare copper ground wire to both ground rods and to the switchgear rigid ground bus. Use #2 solid copper ground wire for 200 amp-rated services (#2 and 1/0 primary cables) and 250 kcmil copper ground wire for services rated greater than 200 amps and up to 600 amps (4/0 and larger primary cables).

For switchgear installed indoors in an electrical room only, where there is a basement, garage, or other room in the building directly below the electrical room, applicants may use a concrete-encased grounding electrode from the building's grounding system (Ufer) instead of installing a ground rod inside the termination section. The concrete-encased grounding electrode typically may use electrically conductive steel reinforcing bars (rebar). The five following requirements apply:

- 1) The rebar must be connected to the switchgear's grounding system.
- 2) The rebar must be extended upward vertically out of the building's concrete floor or pad into the termination section a minimum of 6 inches to a maximum of 9 inches above the switchgear floor.
- 3) The rebar must be placed and extended out of the switchgear floor the same as the ground rod shown in [Figure 8-49, "Primary Switchboard Termination Section Pad Detail,"](#) on Page 8-61.
- 4) A second grounding electrode (ground rod) must be installed outside below grade and away from the building or its foundation.

8.12 (continued)

- 5) Connect the two grounding electrodes (rebar and ground rod) together with a ground wire as described above and in [Figure 8-49, Note 3](#) on Page 8-61.
- o. Install a transparent, insulated, inner door as a safety barrier in front of the termination section, and CT section (if separate) for all switchboards 601 volts through 27,000 volts.
 - 1) Construct the safety door from a solid piece of clear acrylic that is a minimum 6 millimeters (or 1/4-inch) thick and resistant to damage by impact or puncture.
 - 2) Ensure the acrylic is rated for the voltage served.
 - 3) The safety door must extend from the top to the bottom and side-to-side to cover the entire open area of the section, including all energized parts.
 - 4) A metallic frame or parts may be used to support the door, but metallic parts should be limited to maximize the amount of visibility through the door.
 - 5) Maintain all clearances.
 - 6) The acrylic door must be operable with hinges on one side, and a handle and provisions to secure the door in the open and closed positions on the opposite side.
 - 7) Identify the door on all switchboard drawings submitted to PG&E.
- p. Meter Panel Door: The primary switchgear meter panel door is required to have a minimum of two sockets and a maximum of three sockets, excluding the California Independent System Operator (ISO) socket, as shown in [Figure 8-50, "Hinged Meter Panel with Multiple Sockets for 2,400-V to 27,000-V Service,"](#) on Page 8-63, and [Figure 8-51, "Hinged Meter Panel with Dual Socket for 2,400-V Through 27,000-V Service,"](#) on Page 8-64. Consult PG&E for meter-socket questions. If requested, PG&E will furnish and install test switches and wiring for the additional, manufacturer installed meter sockets.
- q. The PG&E metering circuit must not be extended into other sections of the switchboard.
- r. Heating Equipment: Manufacturer-installed heaters or heating equipment that prevent moisture buildup inside the switchgear are allowed if they are placed in the back of the section(s) and do not interfere with PG&E equipment or obstruct the working area around the equipment.
- s. Concrete floors or pads must extend out in front of the whole area a minimum of 96 inches, as measured from the outside of the equipment's outer doors. See the requirements in [Section 7, "General Metering Information,"](#) Subsection 7.4, "Meter Working Space," on Page 7-14.

8.12 (continued)

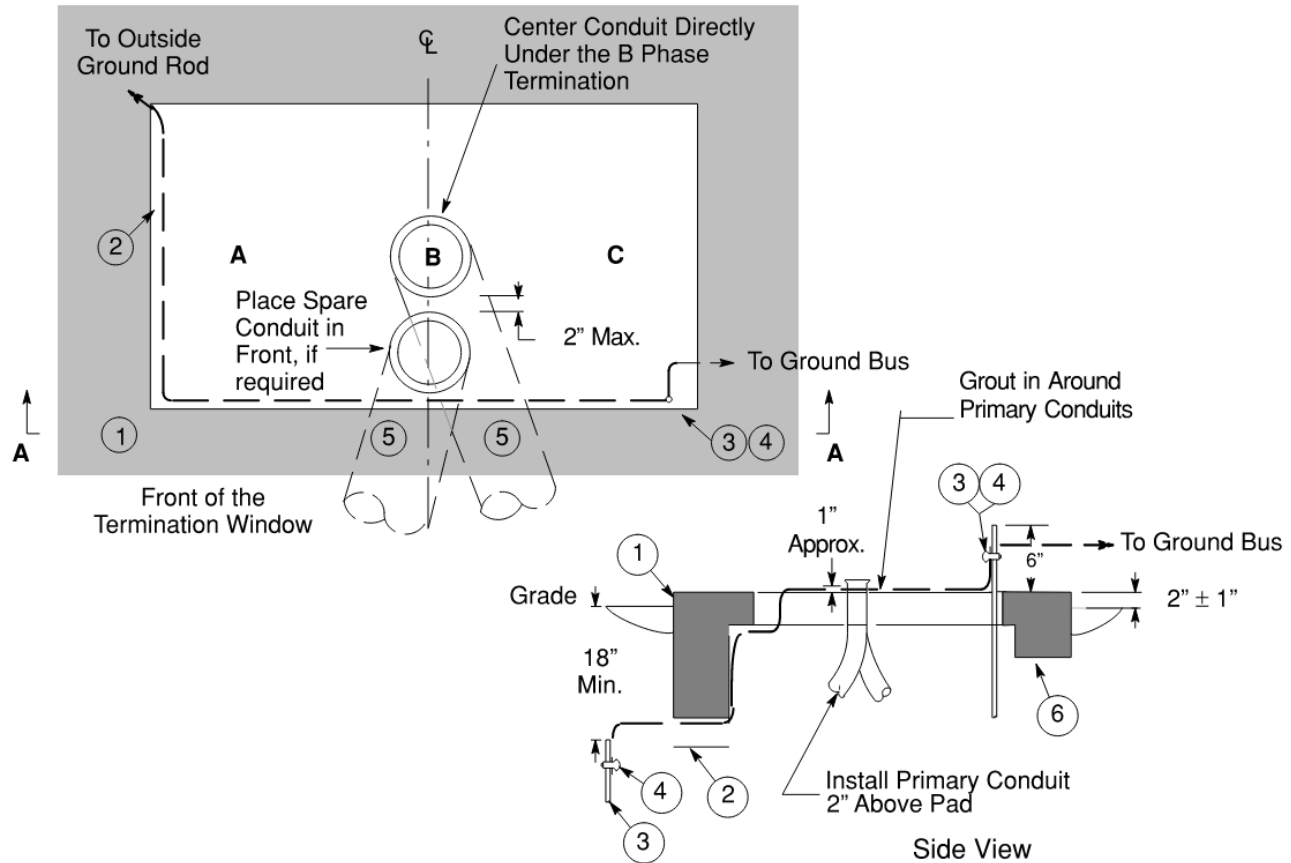


Figure 8-49.
Primary Switchboard Termination Section Pad Detail

Notes in Reference to [Figure 8-49](#):

1. Primary conduits must be centered in the window, as shown.
2. Maintain a 6-foot minimum separation between ground rods.
3. The ground wire must be a continuous wire that attaches to the outside ground rod (buried in the ground or in the pad), runs to the inside of the termination section, continues on the inside running above the pad and through the primary window, connects to the inside ground rod, and finally attaches to a mechanical lug on the switchboard ground bus inside the termination section. The mechanical lug must accept wire between #2 AWG through 250kcmil.
4. On switchgear termination sections that have a raised floor above the concrete pad, ensure the ground rod installed inside the termination section extends 6 to 9 inches above the switchgear section floor.
5. Install a spare conduit only when required by PG&E.

8.12 (continued)

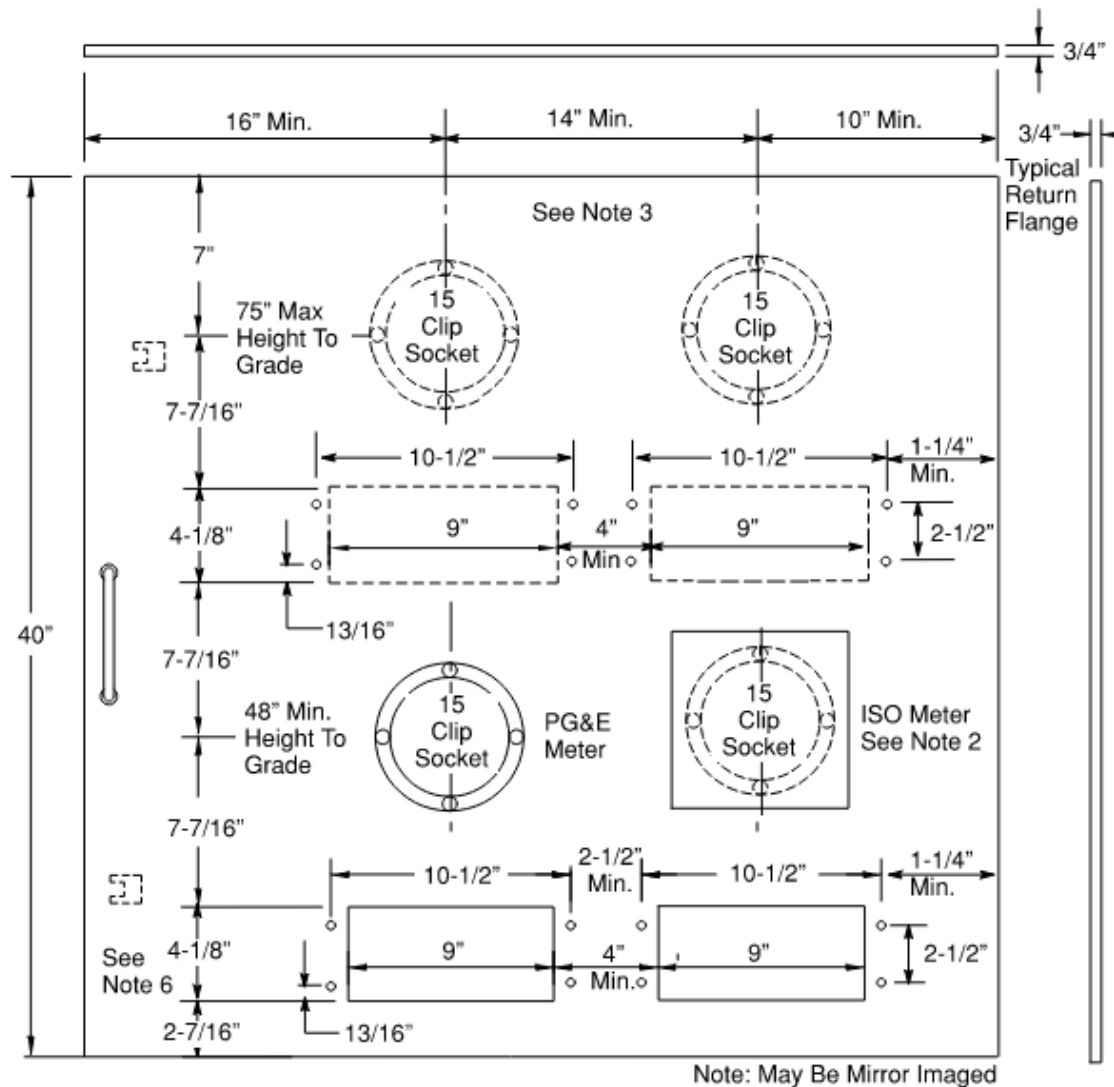
Table 8-10 Bill of Materials for Concrete Pad

Item	Quantity	Description	Code	Doc. No
1	1	Pad, Concrete, Reinforced (size as required)	-	-
2	As required	Wire, #2 AWG, Solid, Soft Drawn, Bare Copper ¹ , or	-	-
		Wire, 250 kcmil, Stranded Medium Hard Drawn ¹	187013	013109
3	2	Ground Rod, 5/8" x 8', Copper Clad ²	187013	
4	2	Clamp, Ground Rod (use with #2 Cu Ground Wire), or	187012	015251
		Two Bolt Connector, Ground Rod (use with 250 Cu Ground Wire)	305432	
5	As required	Conduit, Type and Size (as required)	-	062288
6	As required	Compacted Backfill	-	-

¹See [Item n.](#) on Page 8-59 to determine the required ground wire size.

²Refer to [Item n.](#) on Page 8-59 for a description of when rebar connected to the switchgear grounding system can be used instead of a ground rod inside the termination section.

8.12 (continued)



All Holes 10-32 Tap, Except as Noted

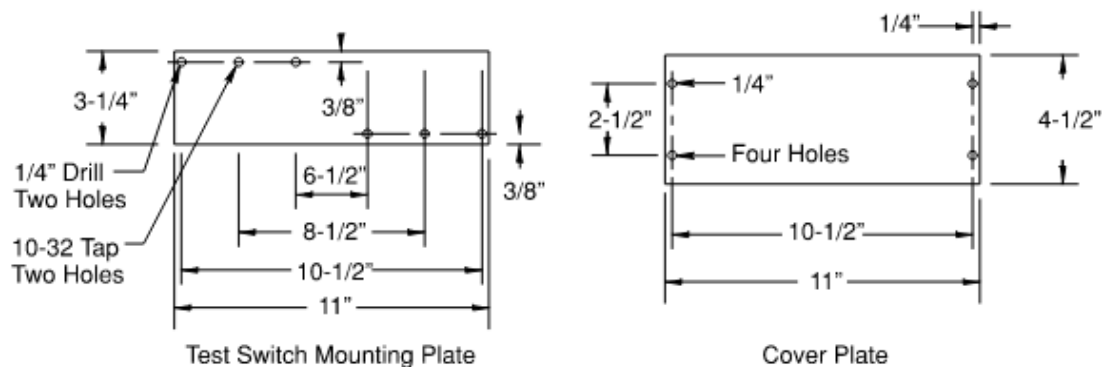


Figure 8-50.
Hinged Meter Panel with Multiple Sockets for 2,400-V Through 27,000-V Service

8.12 (continued)

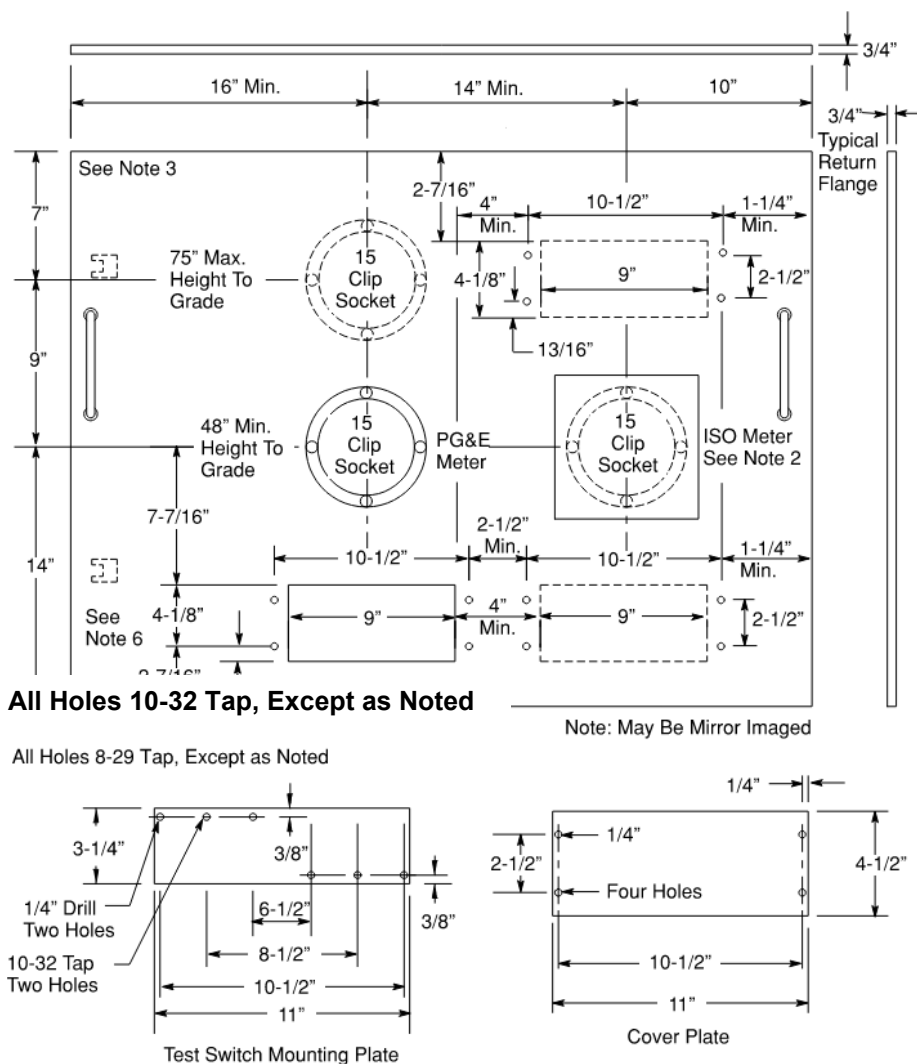


Figure 8-51.
Hinged Meter Panel with Dual Sockets for 2,400-V Through 27,000-V Service

Notes in reference to [Figure 8-50](#) on Page 8-63 and [Figure 8-51](#) above.

1. The panel must be constructed using 12-gauge (minimum) steel and furnished with meter sockets, sealing rings, slotted openings, and a removable plate for installing a secondary test switch. The slotted opening and removable plate edges must be smooth to prevent damaging the meter wiring.
2. Provide an ISO Meter Cast Ring Mounting Blank Cover. When a cast meter-mounting ring is provided, the screws used to attach to the meter panel must provide a minimum 1/8-inch clearance between the screw heads and the back of the ring.
3. Auxiliary power connections are not allowed.
4. The removable plates must be attached to the rear of the panel with screws that do not protrude through the face of the pane.
5. Meter sockets must be designed to connect from the back. A maximum of 4-meter sockets are allowed.
6. The panel must be equipped with hinges. The hinges must permit the panel to open to 90 degrees. Hinges must be located on the same side as the PG&E meter socket. Usually, the meter socket panel does not need to be interchangeable, right or left, unless it causes an unsafe egress or other safety-related issue.
7. When fully opened, the panel must support a 25-pound load applied at the unsupported end, with a maximum sag of 1/8 inch.
8. Consult PG&E before using a panel with a width of more than 40 inches.
9. The meter panel is required to have a minimum of two sockets and a maximum of four sockets including the ISO socket. Consult PG&E for meter-socket requirements.

8.12 (continued)

Table 8-11. Dimensions for High-Voltage Meter Enclosures

Specifications	Switchgear Voltage Rating			
	2,400	4,160/4,800	7,200/15,000	17,000/27,000
	(In Inches)			
Minimum, Bare-Bus Clearance $\emptyset$ to Ground	3-1/2	3-1/2	6	7-1/2
Minimum, Bare-Bus Clearance $\emptyset$ to $\emptyset$	5	5	7-1/2	9
Dimension A	5 Min. 10 Max.	5 Min. 10 Max.	5 Min. 10 Max.	30 Min.
Dimension B ¹	24 Min.	24 Min.	24 Min.	-
Dimension C ¹	24 Min.	24 Min.	24 Min.	30 Min.
Dimension E ¹	36 Min.	48 Min.	60 Min.	60 Min.
Dimension F	42 Min. 48 Max.	42 Min. 48 Max.	42 Min. 48 Max.	-
Dimension G	36 Min.	36 Min.	36 Min.	48-3/4
Dimension H Fuse-Mounting Clip: Center	8-1/2	8-1/2	11-1/2	16-1/8
Dimension H Fuse Ferrule Diameter	1-5/8	1-5/8	1-5/8	1-5/8
Dimension I To Bottom of Fuse Clip or Bus Extension (Whichever Is Lowest)	18	18	18	32
Maximum Dimension J to Top of Fuse Clip or Bus Extension	30	30	30	49
Dimension K Insulated, Inner Safety Barrier Door, Minimum Clearance ²	6	6	6	15

¹ Clearance to any part of the enclosure, including flanges and inner walls.

² Uninsulated inner door material, parts, and hardware increase clearance to 8 inches minimum.

8.12 (continued)

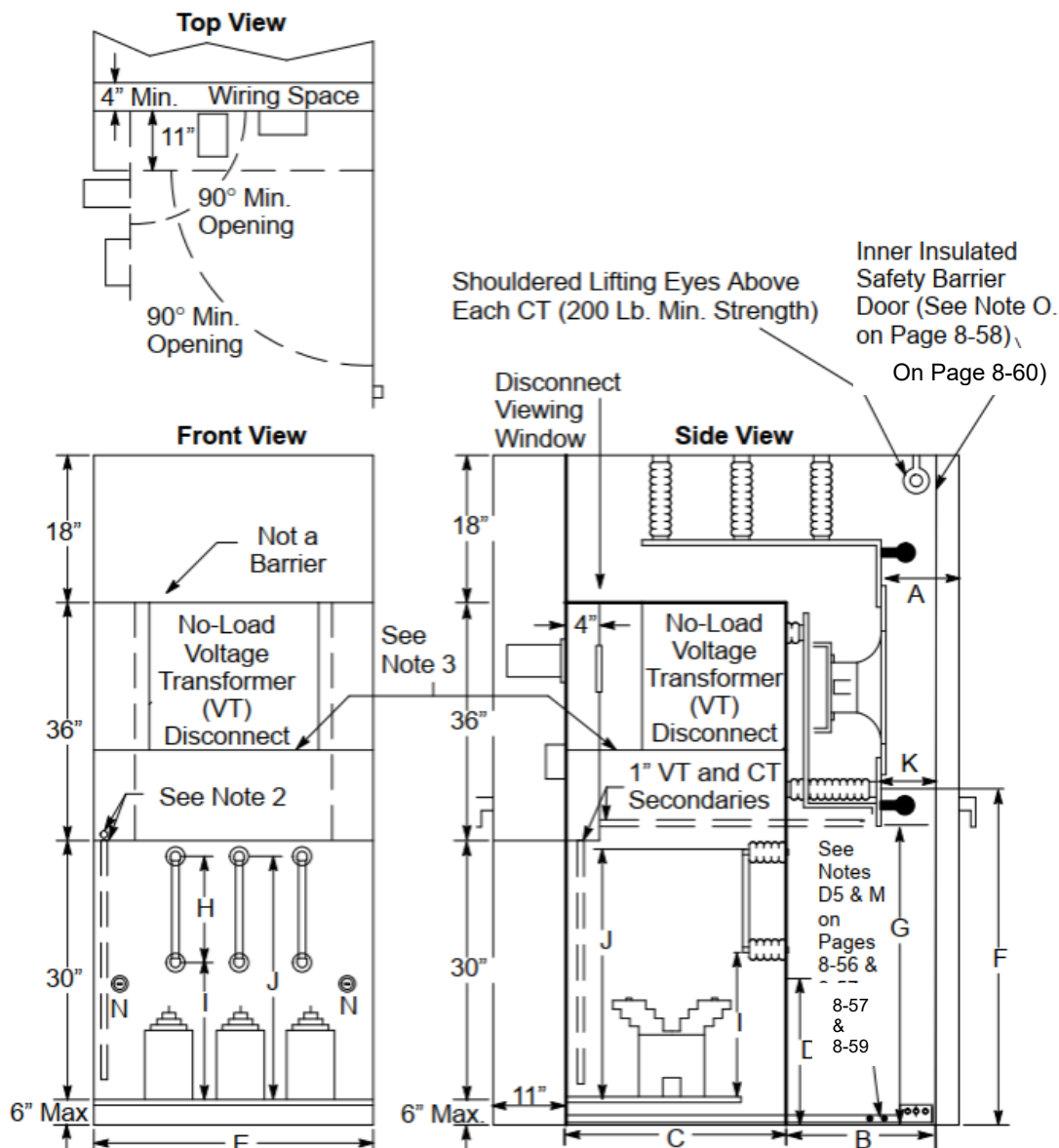


Figure 8-52.
Typical, High-Voltage Metering Enclosure: 2,400-V Through 15,000-V Service

Notes in reference to [Figure 8-52](#) above:

1. For VT Mounting rail materials and installation details, refer to the [EUSERC Manual](#), Drawing 407.
2. Locate the 1-inch, non-metallic VT and CT secondary conduits on the same side as the meter's panel hinges.
3. Electrically insulated barrier.
4. Install the meter's panel hinge on the opposite side from the enclosing door hinge on a weatherproof unit. This allows the meter panel to be opened a full 90°.
5. Ensure that the grounding bus extends on either the left or right sides of the CT compartment access area. Also, ensure that the ground terminals are two aluminum-bodied mechanical lugs accepting a range of #6 AWG through 250 kcmil conductors. Finally, ensure that they are identified with a label reading, "Safety Grounding Point for Utility Use Only."
6. Do not install the neutral insulator bushing in the PT compartment unless requested by PG&E.
7. Applicants must ask the local PG&E Job Owner to contact PG&E's electric meter department to ensure that the types and models of instrument transformers they intend to install (i.e., VTs and CTs) are approved for use in high-voltage switchgear.

8.12 (continued)

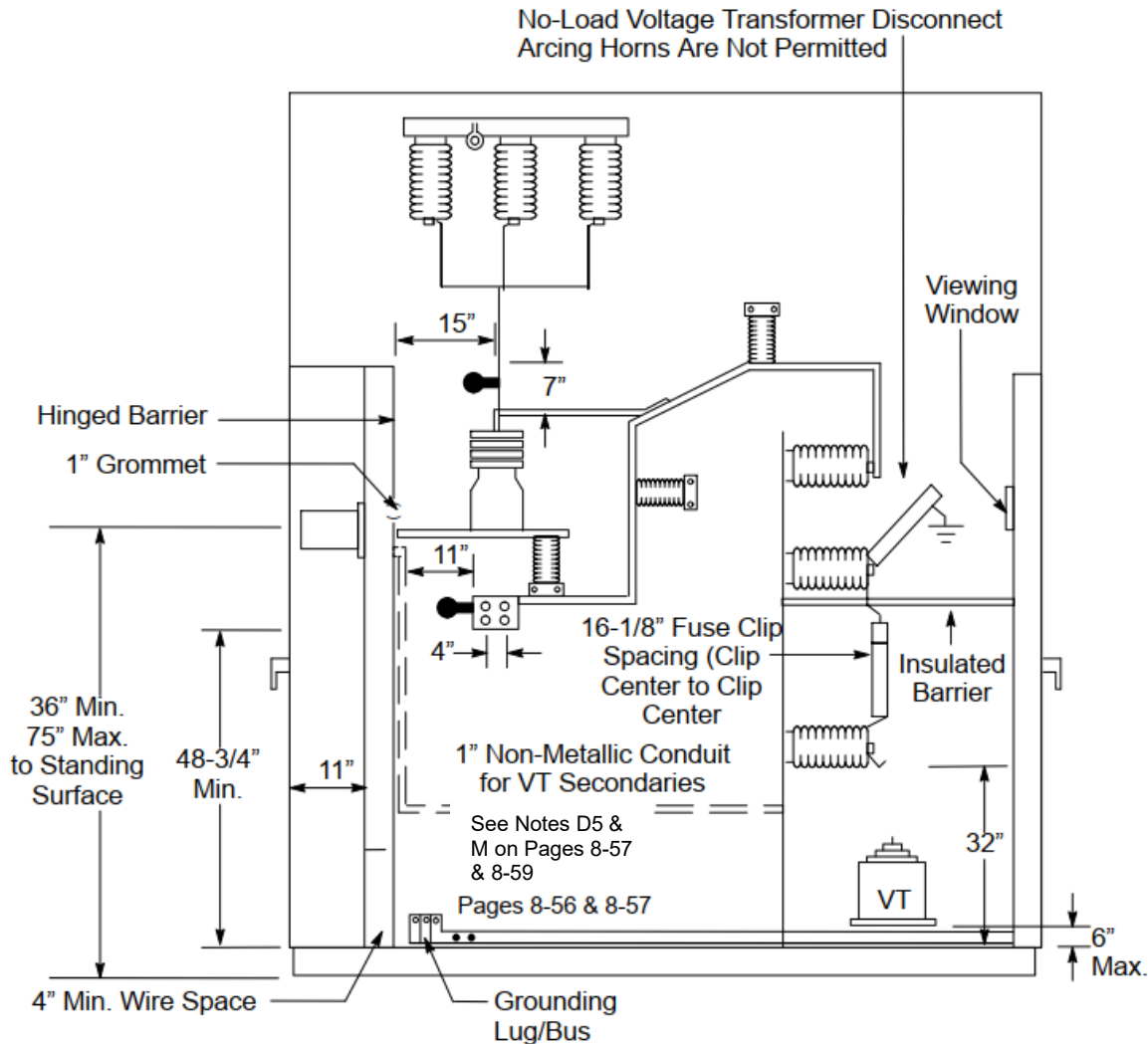


Figure 8-53.
Typical, High-Voltage Metering Enclosure: 17,001-V Through 27,000-V Service

Notes in reference to [Figure 8-53](#) above and [Figure 8-54](#) on Page 8-68.

1. For rear access to the door, refer to the [EUSERC Manual](#), Drawing 400, Sheet 2, Note 7.
2. Connect the primary taps for VTs to the line-side of metering CTs.
3. When switchgear is mounted on rails, include a permanent platform, level with the bottom of the enclosure, in the switchgear installation to provide a clear and level working space in front of the metering compartment.
4. Ensure that the ground bus extends on either the left or right side of the CT compartment's access area. Also, ensure that the grounding terminals are 2 aluminum-bodied mechanical lugs accepting a range of 6 American Wire Gauge (AWG) through 250 thousand circular mils (kcmil) conductors. Finally, ensure that they are identified with a label reading "SAFETY GROUNDING POINT FOR UTILITY USE ONLY."
5. Clearance to any part of the enclosure, including flanges and inner walls.
6. For VT Mounting rail materials and installation details refer to the [EUSERC Manual](#), Drawing 407.
7. Do not install the neutral insulator bushing in the PT compartment.

8.13 Primary Switchgear Located Below Ground Level

1. When applicants want to install primary switchgear in an electrical meter room below the ground level, applicants must follow all of the requirements in this subsection. Switchgear must not be installed more than one level below grade. If the following requirements in this section cannot be met, then the switchgear must be installed at ground level.
2. PG&E requires a nonstandard design for switchgear, at all primary voltage levels, when installed below grade. This nonstandard design incorporates an additional pull section for the cable to ensure there is adequate separation between the cable terminations and the service entrance point into the switchgear to reduce the potential of water intrusion into the switchgear's termination section.
3. PG&E requires that applicants submit drawings for review during the initial design stage of their project and before procuring a primary switchgear.
4. The following additional requirements apply:
 - a. **Additional Pull Section:** Below-grade primary switchgear must have a separate independent pull section that is next to and connected with the termination section. The primary conduits stop at this pull section and the cables run through the pull section into the termination section. The pull section must be the same height and depth as the termination section. The wall separating the two sections must have a window for the cables to run through from the pull section to the cable termination bus stubs inside the termination section. The following items are required in the pull section:
 - Cable hanger provisions at the top of the pull section
 - Moisture barrier to contain possible water intrusion
 - Cable blocks or support system on the bottom of the switchgear floor to ensure cables are elevated and not touching the floor or pad
 - b. **Back or Side Entry:** The conduit and service entering the switchgear must enter the upper back or upper side of the additional pull section no lower than 18 inches from the top of the section.
 - c. **Conduit:** The primary service conduit installed in the public property (franchise) area must not be at a depth below grade greater than 60 inches. Conduit may not extend more than 20 feet past the building foundation and into the electric meter room. The conduit must be continuous without breaks or junction boxes in between. Conduit entering the switchgear must enter the upper side or back of the additional pull section.
 - d. **Water Drainage System:** To prevent water from accumulating in meter rooms, applicants must ensure they design and construct the electrical meter room to quickly discharge any water that may enter the switchgear and the below-grade electrical meter room.

8.13 (continued)

- e. **Cable Termination Height:** PG&E requires a nonstandard design with higher cable terminations for switchgear installed below grade. The elevated terminations allow for the cables to be bent, installed, and attached correctly. The cable terminations must be between 60 inches to 72 inches. This is measured from the first bolt on the termination bus to the bottom of the cable entrance window.
- f. **Reference Figures:** The minimum cable termination heights and section widths are shown in [Figure 8-55, "Additional Side or Back Switchgear Pull Section-High Entry,"](#) and Detail A, "Cable Entrance Window," on Page 8-71.
 - [Figure 8-55](#) presents the design of the additional pull section and illustrates how the pull section adjoins the termination section.
 - Detail A shows the window in the wall between the two sections.

8.13 (continued)

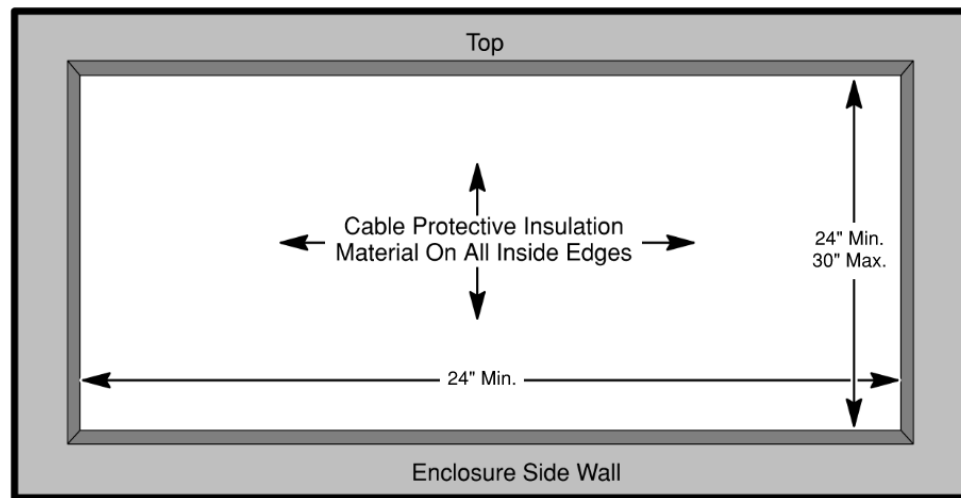
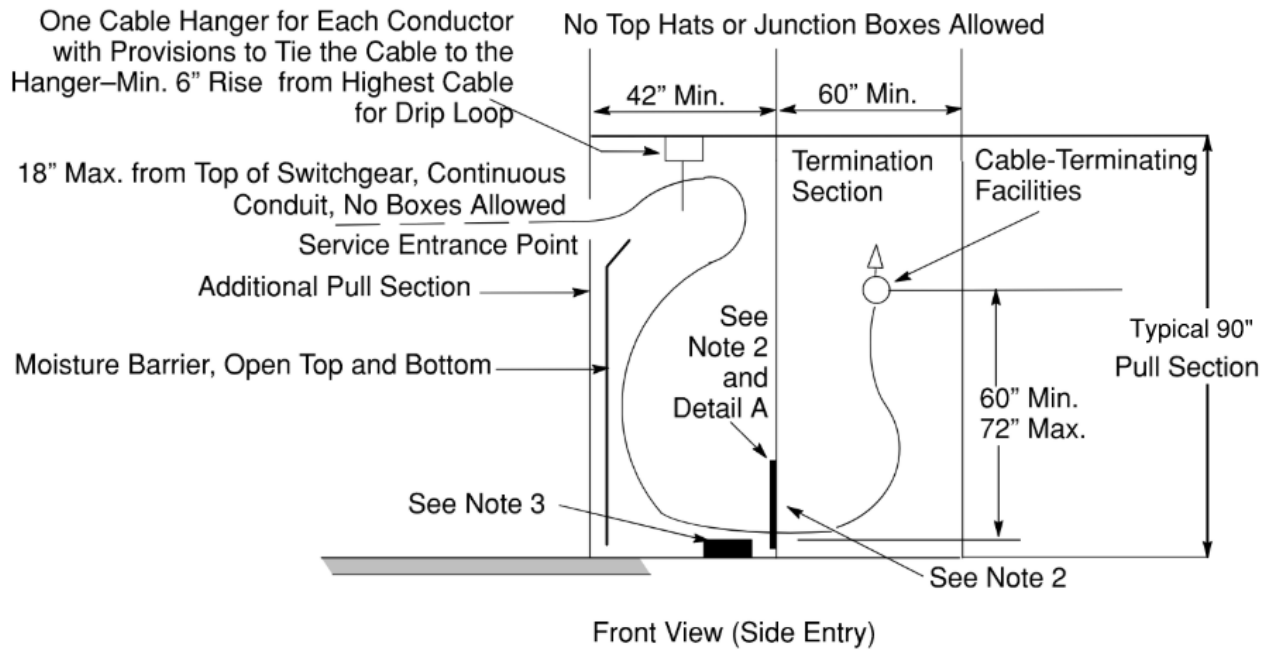


Figure 8-55.
Additional Side or Back Switchgear Pull Section—High Entry

Notes in reference to [Figure 8-55](#) above:

1. Ensure that the height and depth of the additional pull section are the same as the terminating section. The width must be a minimum of 42 inches.
2. The height of the cable entrance window above the top of the pad is 3 inches maximum. Ensure that the window size is 24 inches minimum by 24 inches minimum to 30 inches maximum tall. Insulate all inside edges of the window opening to prevent damage to the cables. Refer to Detail A above.
3. Cables must not lie on the concrete pad or ground. The applicant must provide a cable support system to keep the cables off the floor. Otherwise, the applicant must supply cable blocks using PG&E Material Code M362118.

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Appendix A

Acronyms and Glossary

Acronyms

A	Ampere, Amps
AC	Alternating Current
AHJ	Authority Having Jurisdiction
AIC	Amperes Interrupting Capacity
ANSI	American National Standards Institute
AWG	American Wire Gauge
BTU	British Thermal Unit
CCR	Code of California Regulations
CDF	California Department of Forestry and Fire Protection
CGT	California Gas Transmission
CL	Centerline
CPUC	California Public Utilities Commission
CT	Current Transformer
DA	Direct Access
DASMMMD	<i>Direct Access Standards for Metering and Meter Data</i>
DASR	Direct Access Service Request
DC	Direct Current
DG	Distributed Generation
DOT	U.S. Department of Transportation
EFV	Excess Flow Valve
ESP	Energy Service Provider
EUSERC	Electric Utilities Service Equipment Requirements Committee
G.O.	General Order
GRS	Galvanized Rigid Steel
GT&D	Gas Transmission and Distribution
HDD	Horizontal Directional Drilling
HDPE	High-Density Polyethylene
HZ	Hertz
ID	Inside Diameter

Acronyms (Continued)

IMC	Intermediate Metal Conduit
IPS	Iron Pipe Size
K	Kilo (1,000)
KCMIL	Thousand Circular Mils
K.O.	Knock Out
KVA	Kilovolt Ampere
MDMA	Meter Data Management Agent
MSP	Meter Service Provider
NEC	National Electric Code
NEM	Net Energy Metering
OH	Overhead
OSHA	Occupational Safety and Health Administration
PCC	Point of Common Coupling
PSIG	Pounds Per Square Inch Gauge
PRC	California Public Resource Code
PT	Potential Transformer
PUE	Public Utility Easement
PVC	Polyvinyl Chloride
SCFH	Standard Cubic Feet Per Hour
SRA	State Responsibility Areas
SS	Soft Start
TBF	Test-Bypass Facility
TVSS	Transient Voltage Surge Suppressor
UG	Underground
UI	Underwriters Laboratories
U.S.	United States
USA	Underground Service Alert
UV	Ultraviolet
V	Volts
VFD	Variable Frequency Drive
VT	Voltage Transformer
W	Watt
WC	Water Column

Glossary

Applicant: This word is used generically throughout the manual to refer to the Pacific Gas and Electric Company (PG&E) customer, or to the person or persons representing the PG&E customer in the application/construction process, including a contractor, design consultant, or installer. The word "customer" will be used only when the word "applicant" is not appropriate. Also, PG&E will sometimes be referred to as the "Company" throughout this manual.

Attachment Structure: A support that connects the service drop to the structure while maintaining the clearances required for the service drop.

Back-Pressure Protection: A check valve between the downstream (i.e., after) section of the meter and the upstream section of the applicant's piping. This check valve prevents back-flow.

Barricade (Pedestrian Traffic): A suitable barricade to help ensure the safety of pedestrians is a heavy, wire-mesh fencing that is securely supported and is capable of protecting people from the hazards created by the moving parts of stationary machinery.

Barricade (Vehicular Traffic): A suitable barricade for vehicular traffic is concrete-filled steel pipes, 3 inches or greater in diameter, securely set in an adequate concrete pour for support. Also allowed only for some job types is a sleeve-mounted vehicle barricade where the sleeves are set in concrete.

Branch Service Pipe: A pipe that branches off from a gas service pipe to serve two or more applicants.

Conduit System: A system that includes conduits, conduit bends, conduit fittings, and all related components (e.g., bell ends and cable protectors) that are needed to install PG&E cables and conductors.

Cover: The standard distance between the outer surface of an underground facility and the final grade level.

Double Throw Switch: A switch that isolates the applicant's electrical system from that of the electrical corporation or state or local agency.

Drip Loop: A minimum 18 inches of service-entrance wiring that extends out from the service weatherhead.

Excess Flow Valve (EFV): A device installed in a gas service line at or near the main. An EFV is used to stop the flow of gas if the velocity of the gas passing through the valve creates a pressure difference across the valve that is greater than a specified design limit.

High-Voltage Power Lines: Generally, high-voltage power lines are any overhead lines that connect from pole to pole. These lines typically are 600 volts and greater.

LB: Short-radius conduit fitting. Also known as a service elbow.

Low-Growth Zone: Applicants must establish a 15-foot low-growth zone on both sides of all new, electric, high-voltage lines. The zone under the electric power lines should be a low-growth, tree-planting zone and/or a shrub- and flower-planting zone.

Glossary (continued)

Main Service Disconnect: A fusible switch, circuit breaker, or other approved disconnect means for controlling all of (and **only**) the energy registered by that meter. When the governing code or ordinance permits, the disconnect means may consist of a group of fusible or circuit-breaker disconnects.

Metering and Service Termination Equipment: Refers to meter panels, pedestals, panelboards, and switchboards that are wall-mounted, pad-mounted, pole-mounted, or on panelboard construction.

Mixed-Use Projects: Construction projects that include both commercial and residential loads.

Non-Utility Facilities: Subsurface facilities not owned by any person, corporation, partnership, business, trust, or public agency belonging to a regional, one-call notification system.

Pad-Mounted (Floor Standing) Equipment: Service termination and metering equipment that are manufactured to be installed and attached to permanently installed, ground-mounted concrete pads or floors.

Point of Attachment: In areas served from overhead lines, PG&E will install an overhead service drop from the Company's distribution line to a point of attachment on the applicant's residence, building, or structure. The point of attachment may be either on the building wall near the PG&E line or on a periscope fixed to the building's roof, usually not more than 18 inches in back of that wall.

Positive Means: A device that, when used or operated, interrupts or prevents the flow of current to or from the electrical system. Also, a positive means provides the device operator or user with a visual or definite indication of the existing condition or state of the electrical system.

Residential: Class of customers commonly served at either 120/240 volts or 120/208 (network) with amperage ranging from 100 amperes to 320 amperes. Mobile homes installed on foundations also are classified as residential customers.

Secured In Place: The stud will not turn, back out, or loosen in any manner when subjected to normal, UL-approved torques while tightening or loosening terminal nuts. This includes cross-threaded situations.

Service Delivery Point (Electric Supply): The point where PG&E's service drop wires/conductors connect to the applicant's service-entrance conductors for an overhead service. For an underground service, either the point where PG&E's service cables/conductors connect to the applicant's electric meter panel, switchboard, or service termination equipment; or the point where PG&E's service cables/conductors connect directly to applicant's service-entrance conductors.

Service Delivery Point (Gas Supply): The point where PG&E's facilities connect to the applicant's house pipe (i.e., houseline). For **residential** and **small commercial** meter sets, the service delivery point is the point where the male threads of the applicant's houseline connect to the female threads of PG&E's gas service tee fitting. Some **commercial** and **industrial** installations do **not** have service tees installed; therefore, the gas supply service delivery point is the first weld or fitting **after** the PG&E-installed bypass valve downstream of (i.e., after) the meter.

Service Elbow: Short-radius conduit fitting. Also known as an LB.

Glossary (continued)

SmartMeter Advanced Meter Reading System: A meter using the latest radio frequency technology to transmit meter reads automatically from the gas and electric meters. This allows PG&E's applicants to monitor their daily usage information.

Standard Delivery Pressure: The gas service pressure provided to the service delivery point at 7 inches of water column (WC). This is approximately 1/4 pounds per square inch gauge (psig), as measured at the gas meter outlet.

Switchboard Service Section: The section of an applicant's switchboard provided specifically for terminating the service conductors and for housing the metering transformers (if required), revenue meters, test facilities, and service switch or breaker.

Tariff: A schedule of rates or charges of a business or a public utility.

Test Block: A test block is a specific type of test-bypass **device**. A test block is used for self-contained metering exclusively.

Test-Bypass Facility: Any mechanism used to bypass meter sockets. A test-bypass facility is used for self-contained metering exclusively.

Utility Point of Service (i.e., Service Point): The approved enclosure and the terminated or spliced connections.

Wall-Mounted Equipment: Service termination and metering equipment that are manufactured to be installed and attached to the sides of permanent structures. Wall-mounted equipment include building walls, panelboard structures, poles, posts, and communication pedestals.

Wet-Utility Piping or Facilities: Includes, but is not limited to, water, bioswales, storm sewer, sanitary sewer, steam, liquid fuels, oil, diesel, sprinkler, irrigation, spigots, downspouts, drain or leach lines, propane, or lines for other liquids or volatile, heavier-than-air gases.

Working Space: An area in front of the meter, the meter enclosure, and the service-conductor termination and pulling facilities. A working space permits access to the equipment and provides a safe working environment for personnel.

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