

## Section 4 Electric Service: Overhead

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### 4.1. Scope

This section provides instructions and minimum clearance requirements for attaching permanent, overhead services to residential and nonresidential properties. The term “residential” includes mobile homes installed on foundations in locations other than mobile home parks.

**NOTE:** For overhead, temporary services, refer to Document [025055](#), “Requirements For Customer-Owned Poles,” in [Appendix B](#).

**NOTE:** Refer to Bulletin Number [2004pgm-11](#), “Technical Requirements For Electric Service Interconnection At Primary Distribution Voltages,” in [Appendix B](#), for technical information on primary services.

### 4.2. General

PG&E will *not* supply new overhead services to applicants when either of the following conditions exist.

- A. When buildings or premises are located in areas designated either by local jurisdictions or by Pacific Gas and Electric Company (PG&E) as underground districts.
- B. When buildings or premises are located in areas zoned for commercial or residential use and the installed service equipment and/or load requires PG&E to use a 75-kilovolt ampere (kVA) or larger transformer.

#### 4.2.1. Safety Reminder



**CAUTION**

Flame Resistant (FR) clothing is required while working on, working near, or observing others working on any PG&E facility.

### 4.3. Locating Overhead Services

#### 4.3.1. 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. PG&E follows the guidelines listed below to ensure the service is installed safely and efficiently.

- A. The point of attachment must be located so it can be reached with a single span from PG&E’s facilities.
- B. The span should *not* cross over adjacent property, if possible.
- C. The span must maintain the required, vertical, clearance-to-ground.

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. Figure 4-1, "Preferred and Alternate Locations for the Overhead Service Drop Attachment," below, provides more information about the point of attachment.

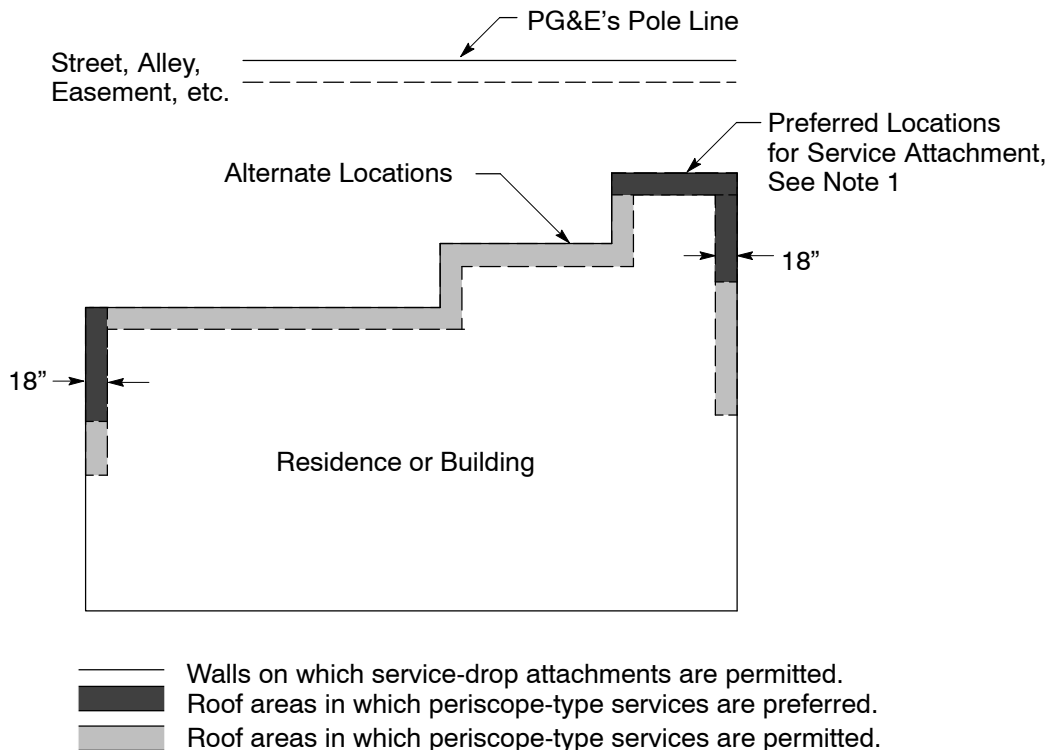
Applicants must consult PG&E *before* installing the building's wiring. PG&E must approve of the location selected for the utility service attachment.

#### 4.3.2. Two or More Buildings on One Lot

If more than two dwellings or buildings are located on the same lot, applicants must consult PG&E to determine acceptable service attachments and meter locations *before* wiring the buildings.

Typically, PG&E installs only one service lateral to a single building on one premise, or to one enterprise (with either one building or multiple buildings) on a single premise. However, PG&E may provide more than one service lateral under the following circumstances.

- Where it is allowed or required by PG&E's tariff schedules.
- For PG&E's convenience.
- Where it is required by ordinance.
- When it is installed as a special facility.



**Figure 4-1**  
**Preferred and Alternate Locations for the Overhead Service Drop Attachment** (see Note 2)

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Notes in reference to Figure 4-1.

1. Applicants may attach service drops to sidewalls. Applicants must ensure that the service-drop conductors do *not* exceed 75 feet and do *not* cross over either the buildings being served or the adjacent property. Finally, applicants must ensure that the required conductor clearances and accesses to the electric meters are maintained.
2. For more information on meter location requirements, see [Section 5](#), “Electric Metering: General;” [Section 6](#), “Electric Metering: Residential;” and [Section 7](#), “Electric Metering: Commercial and Industrial” (as applicable). For available short-circuit current information and requirements, see Subsection 5.7.2., “Main Service Disconnect Switch Rated for Amperes Interrupting Capacity (AIC),” found on Page 5-14.

#### 4.4. Service Drop Clearances

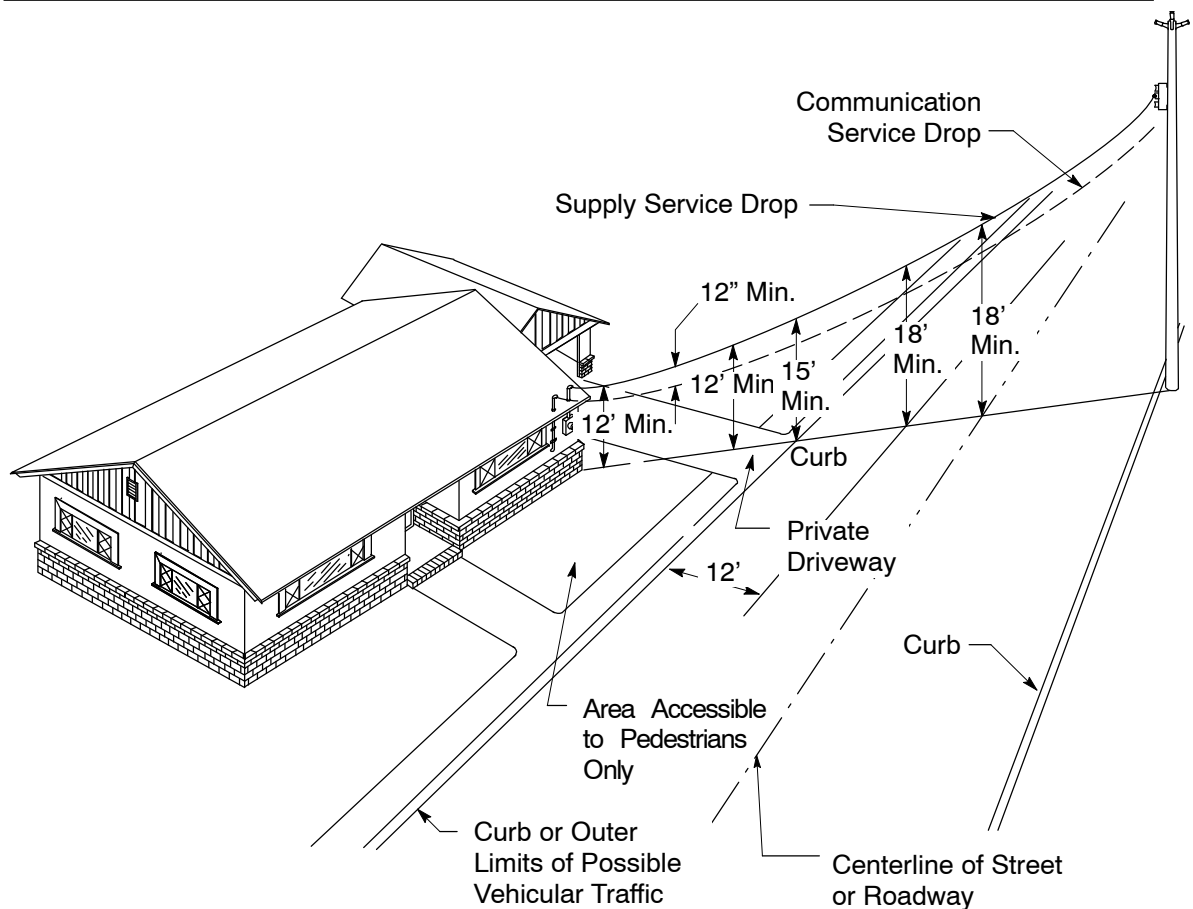
**NOTE:** See the “2011 Service Planning Contact Information” at the front of this manual on Page iv for specific contact numbers listed by area.

Applicants can request a PG&E service planner to specify a location for the service drop attachment. When PG&E selects the location, applicants are assured that the service conductors will maintain the required clearances above thoroughfares and structures, as well as the required clearances away from windows, doors, and building exits.

The minimum clearances from the ground, structures, and other objects for overhead service drops are specified in the California Public Utilities Commission’s (CPUC’s) [General Order \(G.O.\) 95](#), “Rules for Overhead Electric Line Construction.” Figure 4-2 through Figure 4-20 list and illustrate these minimum clearances.

Applicants must ensure that the elevation at the point of attachment is high enough to maintain all of the required vertical clearances. Applicants should allow for normal conductor sag when determining these vertical clearances.

[G.O. 95](#) allows the vertical clearance restrictions for service drops to be reduced in certain instances. PG&E’s review and approval is required before any reductions in vertical clearances are allowed. ***Applicants should contact PG&E as soon as possible in the planning phases of their projects to ensure that any potential problems or exceptions are addressed before construction begins.***



**Figure 4-2**  
**Ground Clearances for Supply Service Drops, 0 Through 750 Volts, Residential Installations**  
**(Required by the CPUC)**

#### 4.4.1. Vertical Clearance for Residential, Overhead Service

##### A. Clearance Above Rails

Applicants must ensure that the following clearances are maintained when requesting electric service that will be placed over train or trolley tracks.

1. Crossing above railroad tracks *without* overhead trolley wire: 25 feet.
2. Crossing above railroad tracks *with* overhead trolley wire:
  - Above rails where freight cars are transported: 26 feet.
  - Above rails where freight cars are not transported: 23 feet.

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## **B. Clearance Above Thoroughfares in Public Areas and in Private Communities of 10 or More Residences**

Applicants must ensure that the following clearances are maintained when requesting electric service that will be placed above thoroughfares in public and private communities with more than 10 residences.

1. Crossing above the center portion between points 12 feet horizontal from curbs: 18 feet.
2. Crossing at the curb line (from the level of the street, not the sidewalk): 16 feet.
3. Crossing where there are no curbs: applicants must consider the curb line as the outer limit of possible vehicular traffic: 16 feet.

## **C. Clearance Over Residential Property**

Applicants must ensure that the following clearances are maintained when requesting electric service to be placed over residential property.

1. Crossing over private roads and other areas accessible to agricultural equipment: 15 feet.
2. Crossing over agricultural equipment: maintain 16 feet, if possible.
3. Crossing over private driveways or other areas accessible to vehicles: 12 feet.
4. Crossing over areas accessible to pedestrians only: 12 feet.

## **D. Clearance From Communication Service Drops**

Applicants must ensure that the following clearances are maintained when requesting electric service to be placed over communication service drops.

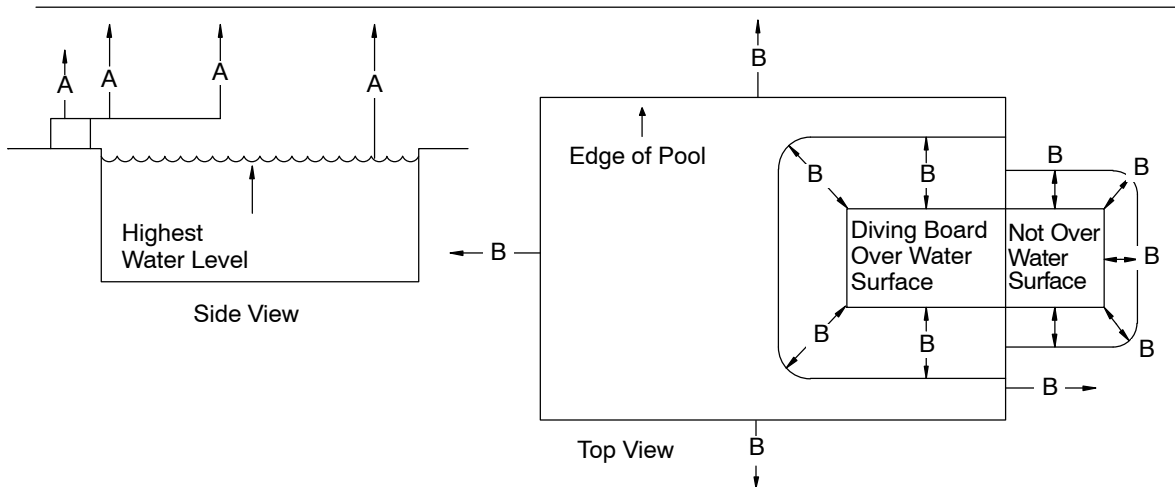
1. Normal radial clearance: a minimum of 24 inches.
2. Within 15 feet of the point of attachment on a building or structure: the normal radial clearance may be reduced to a minimum of 12 inches.

## **E. Clearance From Swimming Pools**

Avoid installing utility service drops above public and private swimming pools, when practical.

The CPUC, not local agencies or codes, regulates, by its adoption of [G.O. 95](#), the installation and clearances of utility-owned, operated, and maintained supply lines and service drops. [G.O. 95](#) contains specific requirements for installing and maintaining utility supply-line and service-drop clearances above swimming pools. Figure 4-3, “Minimum Clearance for All Drops Above or Adjacent To Swimming Pools,” on Page 4-6, illustrates the minimum-permitted clearances mandated by [G.O. 95](#) where utility service drops are installed above swimming pools.

**NOTE:** Table 4-1, “Minimum Clearances Over Swimming Pools,” on Page 4-6, also provides clearance information for drops above or adjacent to swimming pools.



**Figure 4-3**  
**Minimum Clearance for All Drops Above or Adjacent To Swimming Pools**

**Table 4-1 Minimum Clearances Over Swimming Pools**

Minimum Vertical and Radial Clearances	A	B
	Vertical	Radial
	(In Feet)	
<b>Unprotected Line Conductors—Vertical Over the Highest Water Level and Radial From the Top Edge of the Pool Walls:</b>		
1. 0 through 750 volts	20	20
2. Above 750 volts through 22,500 volts	25	25
3. Above 22,500 volts through 300 kilovolts (kV)	30	30
<b>Service Drops—Vertical Over the Highest Water Level and Radial From the Top Edge of the Pool Walls:</b>		
4. Pools: public and commercial	16	16
5. Pools: residential	12	12
<b>Service Drops (Over Diving Boards or Platforms)</b>		
6. Portion of the board or platform that is over the water's surface	16	8
7. Portion of the board or platform that is <i>not</i> over the water's surface	12	3
<b>Guys—Ungrounded Portions:</b>		
8. Over the highest water level and from the top edge of the pool walls	18	18
9. Over the diving board or platform (the portion that is over the water's surface)	18	8
10. Over the diving board or platform (the portion that is <i>not</i> over the water's surface)	12	6
<b>Guys—Grounded Portions:</b>		
11. Over the highest water level	16	—
12. Over the diving board or platform (the portion that is over the water's surface)	16	8
13. Over the diving board or platform (the portion that is <i>not</i> over the water's surface)	8	3

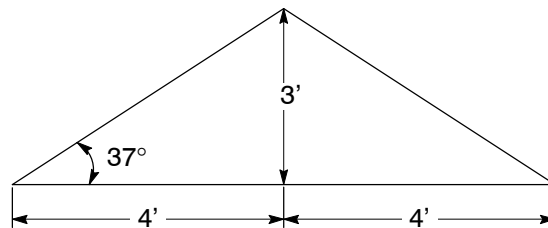
### 4.4.2. Clearance Above Buildings

Table 4-2, “Minimum Allowable Clearance of Service Drops From Buildings–0 Volts Through 750 Volts,” found below, lists the required clearances for buildings that are receiving electric service.

**Table 4-2 Minimum Allowable Clearance of Service Drops From Buildings–0 Through 750 Volts**

	Minimum Clearance From Buildings
	Insulated Conductors (See Note 1) 0 Volts Through 750 Volts
<b>Vertical Clearances Above:</b>	
1. All portions of buildings including metallic or nonmetallic cornices, decorative appendages, eaves, roofs, or parapet walls of the building being served.	See Notes 2 and 3
2. Metallic or nonmetallic, “nonwalkable” overhang, patio cover, or other structure.	See Notes 2 and 3
3. Other buildings on the same premises.	2 Feet
4. Buildings on other premises.	8 Feet (See Note 4)
<b>Horizontal and Radial Clearances:</b>	
1. From fire escapes, exits, windows, and doors.	3 Feet

- 1 Weather-resistant, covered conductors are *not* used in new installations.
- 2 Not less than 1/2 inch.
- 3 An applicant must ensure that the service drop’s point of attachment for industrial and commercial premises is no more than 18 inches. Take this measurement from *behind* the front face of the building wall facing the pole line from which the service drop originates.
- 4 Reduce to 2 feet for nonmetallic roofs when the roof slope exceeds 9 inches of rise per 12 inches of run. (See Figure 4-4, “Nonmetallic Roof,” below.)



**Figure 4-4  
Nonmetallic Roof**

#### 4.4.3. Clearance at the Residential Point of Attachment

PG&E recommends that applicants do *not* locate electric supply and communication services in the same vertical plane. Figure 4-11, one of the “Clearance at the Residential Point of Attachment” illustrations, found on Page 4-9, shows the recommended arrangement for the communication service drop.

Typically, the service drop is attached *below* the level of the service weatherhead; however, it may be attached *above* the service weatherhead, as shown in Figure 4-7 and Figure 4-9, *both* of which are located on Page 4-9, if both of the following situations exist.

- A. It is impractical to attach the service drop below the level of the service weatherhead.
- B. The service-drop conductor’s attachment point is located 24 inches or less from the service weatherhead.

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.

Applicants must ensure that utility service drops (i.e., 0 through 750 volts) are *not* attached directly to metal roofs. The service-drop cable must clear metal roofs by a minimum distance of 1 foot.

PG&E will *not* attach services to periscope structures made of plastic.

Figure 4-5 through Figure 4-11, all representing “Clearance at the Residential Point of Attachment,” provide examples of clearances for overhead service-drop installations and terminations. These seven figures are located on Page 4-9.

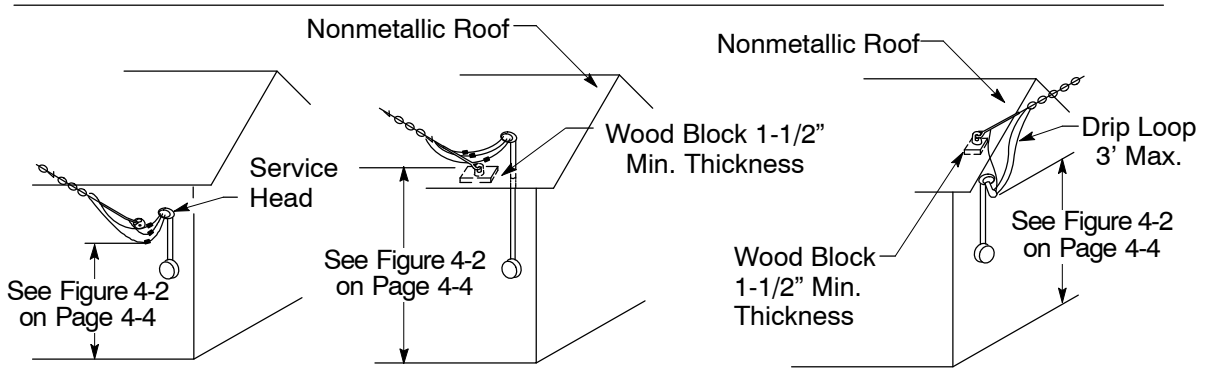


Figure 4-5

Figure 4-6

Figure 4-7

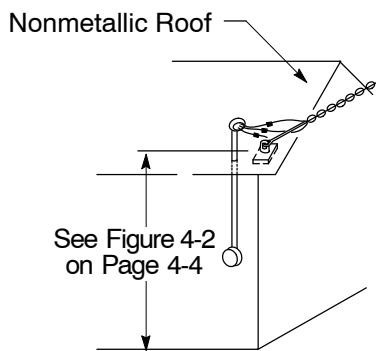


Figure 4-8

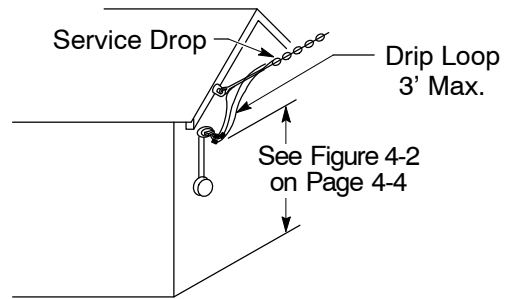


Figure 4-9

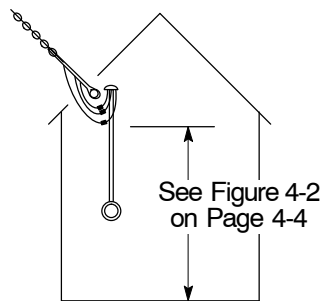


Figure 4-10

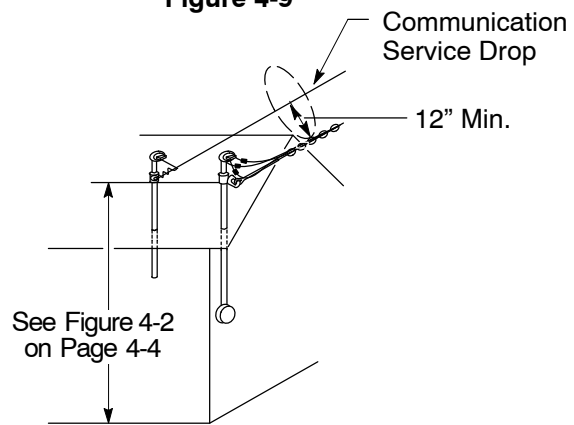


Figure 4-11

**Clearance at the Residential Point of Attachment**

#### 4.4.4. Vertical Clearance on Nonresidential Property

Table 4-3, “Vertical Clearance From the Ground on Nonresidential Property,” located below, provides the minimum vertical distance (in feet) from the ground on nonresidential property.

Applicants must ensure that periscope attachment structures are constructed with one of the following, approved materials.

- A. 1-1/4-inch minimum, galvanized rigid steel (GRS) or intermediate metal conduit (IMC) rigid steel.
- B. 2-inch minimum rigid aluminum conduit measured in iron pipe size (IPS) dimensions.

PG&E will *not* attach a span to plastic periscope structures.

Periscope extensions projecting above the roof may require bracing against the pull of the service-drop conductors, as shown in Figure 4-39, “Unbraced Periscope Structure (Residential and Nonresidential),” found on Page 4-23.

Typically, the service drop is attached *below* the level of the service weatherhead; however, it may be attached *above* the service weatherhead if *both* of the following situations exist.

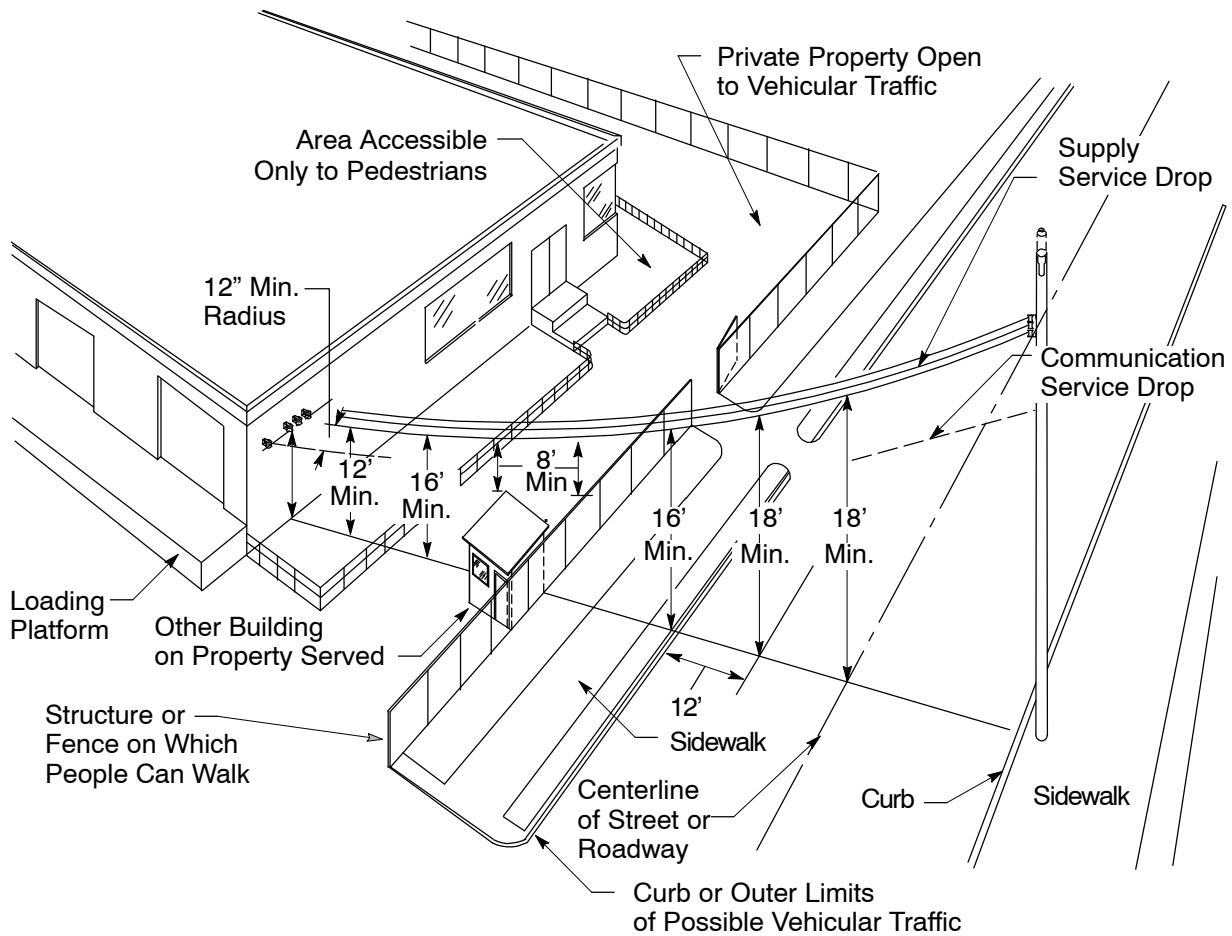
- A. It is impractical to attach the service drop below the level of the service weatherhead.
- B. The attachment point on the service-drop conductors is located less than 24 inches from the service weatherhead.

Ensure the length of the open-wire drip loop does *not* exceed 3 feet.

PG&E will connect the Company’s service conductor and an applicant’s service-entrance conductor *below* the service weatherhead.

**Table 4-3 Vertical Clearance From the Ground on Nonresidential Property**

Description	Minimum Vertical Distance (In Feet)
Over private driveways, lanes, and other areas (e.g., alleys and parking lots) accessible to vehicles.	16
Over areas accessible to pedestrians only.	12
Over buildings and bridges, or over structures (attached or unattached) that do <i>not</i> ordinarily support conductors and on which people can walk.	8



**Figure 4-12**  
**Ground Clearances for Supply Service Drops, 0 Through 750 Volts,**  
**Industrial and Commercial Installations (Required by the CPUC)**

Figure 4-13 through Figure 4-20, all representing “Clearances for Nonresidential Buildings Using Insulated Conductors” and all located on Page 4-13, show overhead service drops and vertical clearances, as measured from the ground, for commercial and industrial installations and large residential buildings.

**4.4.5. Clearances for a Nonresidential Building Service Drop Using Cable or Equally Insulated, Open-Wire Service Conductors**

Applicants can use the clearances shown in Figure 4-13 through Figure 4-20 only when they use Type N-SD service-drop cable, or equally insulated cable, open-wire service conductors. Applicants must *not* use weatherproof-rated conductors.

Figure 4-12, “Ground Clearances for Supply Service Drops, 0 Through 750 Volts, Industrial and Commercial Installations (Required by the CPUC),” located above, provides the required clearances from a service drop to the ground.

Figure 4-21, “Clearance Around Windows,” and Figure 4-22, “Clearance Around Doors,” both located on Page 4-14, provide applicants with the required clearances from fire escapes, exits, windows, doors, and other locations where people could be present.

Applicants must use a 1-1/4-inch minimum GRS or IMC rigid steel, or 2-inch minimum rigid aluminum conduit (IPS dimensions) for all periscope attachment structures. See Figure 4-13, Figure 4-14, Figure 4-15, Figure 4-19, and Figure 4-20, all representing “Clearances for Nonresidential Buildings Using Insulated Conductors,” found on Page 4-13, for examples.

The clearances shown in Figure 4-14 and Figure 4-17 only apply to 300-volt maximum services over nonmetallic roofs or decorative appendages. These open, service-entrance, conductor-clearance requirements are found in the *State Building Standards Electrical Code*.

The special 24-inch minimum clearance, illustrated in Figure 4-20, is applicable only to service-drop cable.

Either brace the periscope attachment structures as shown, or ensure that the structures are supported using similar, acceptable methods. For more information on bracing periscope attachment structures, see Figure 4-34 and Figure 4-35, both representing “Service to Nonresidential Premises,” and both found on Page 4-18. Also, see Figure 4-38, “Braced Periscope Attachment Structure,” found on Page 4-20, and Table 4-5, “Maximum Mast Height Above the Roof *Without* Bracing,” found on Page 4-22.

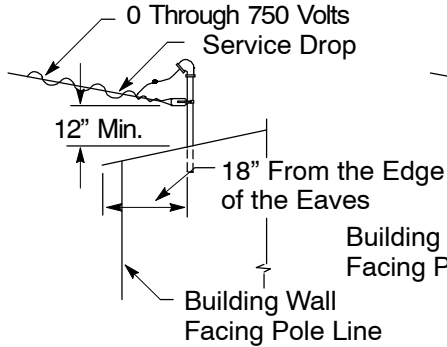


Figure 4-13

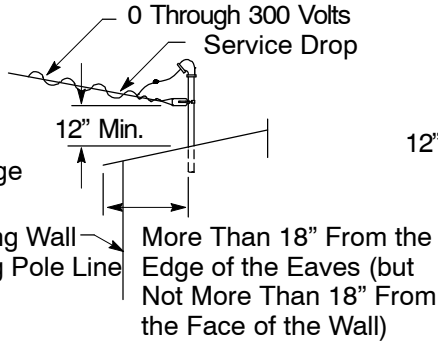


Figure 4-14

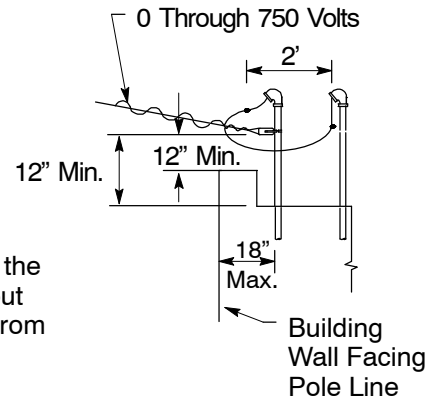


Figure 4-15

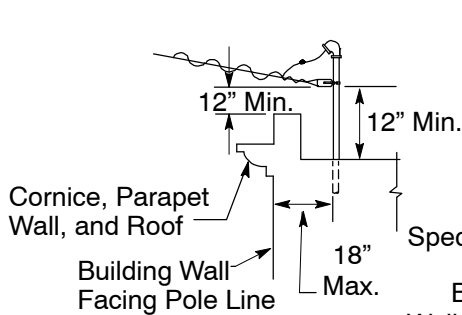


Figure 4-16

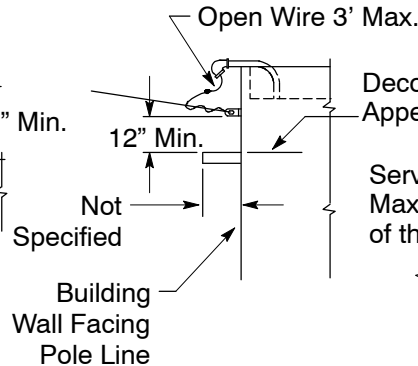


Figure 4-17

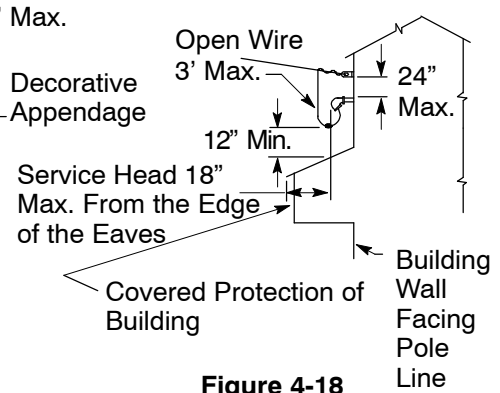


Figure 4-18

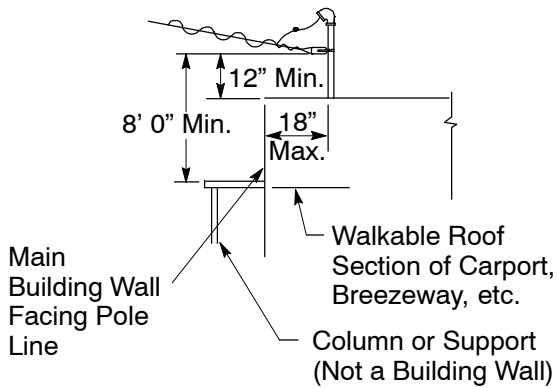


Figure 4-19

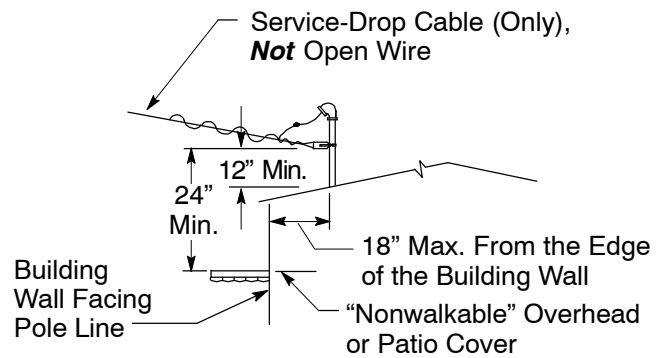


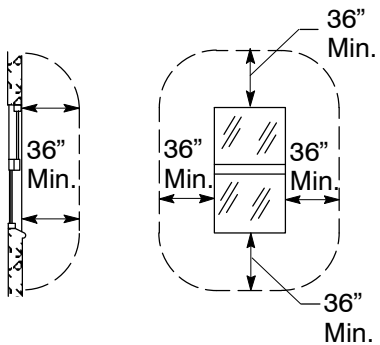
Figure 4-20

**Clearances for Nonresidential Buildings Using Insulated Conductors**

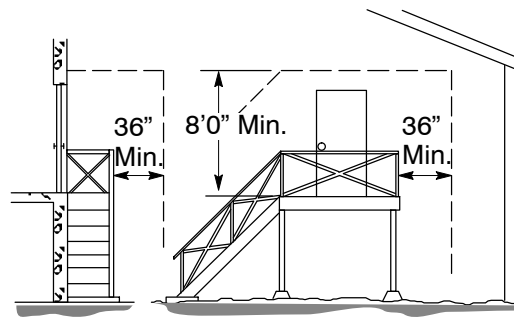
#### 4.4.6. Clearances Around Doors and Windows

Service drops are not required to clear *buildings* by any specified horizontal distance; however, applicants must ensure that the service weatherhead, the service drop, and the open wires between the service weatherhead and the service drop maintain the following clearances from fire escapes, balconies, stairways, exits, doors, windows, and other locations where people could be present.

- A. Wires that are either at or below the level of the top of exits, doors, windows, and other openings *must* have a radial clearance from the boundaries of such openings of not less than 3 feet, as shown in Figure 4-21 below.
- B. Wires less than 10 feet above, or 3 feet below, the surface levels of fire escapes, balconies, porches, stairways, and walkways *must* have a minimum horizontal clearance of at least 3 feet from such surfaces, as shown in Figure 4-22 below.



**Figure 4-21**  
Clearance Around Windows

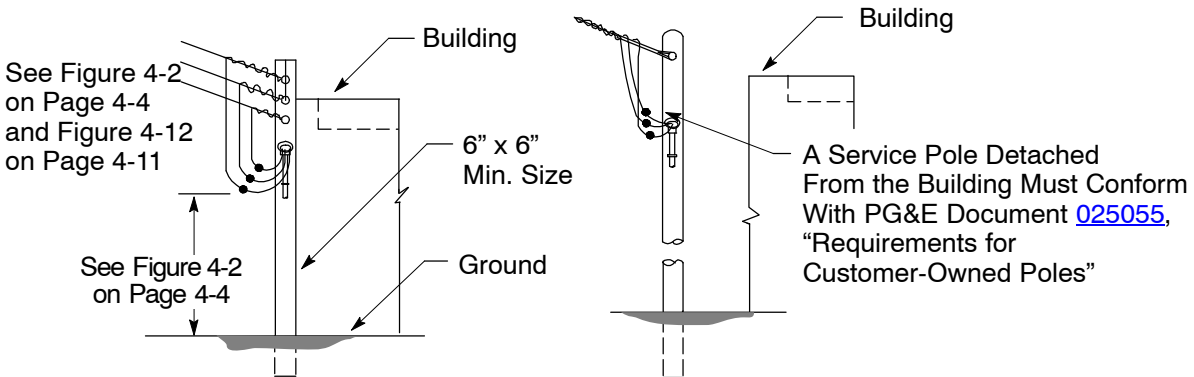


**Figure 4-22**  
Clearance Around Doors

#### 4.4.7. Clearance Between Service Drop Wires

The minimum-allowable radial clearance between service drop sites (i.e., 0 through 750 volts) in the span from the pole to the building, and a point of attachment to the building, is 3 inches. Applicants must ensure that wire supports at the building are spaced 8 inches apart, where practical.

#### 4.4.8. Clearance From Applicant-Owned Service Poles



**Figure 4-23**  
**Service Attachment Structure or**  
**Service Pole Secured to a Building**

**Figure 4-24**  
**Service Pole Detached**  
**From a Building**

### 4.5. Service Attachments

Applicants must ensure that utility service drops (i.e., 0 through 750 volts) are *not* attached directly to metal roofs. Service drop cable must clear metal roofs by a minimum of 12 inches.

#### 4.5.1. Attaching Low-Voltage, Residential, Overhead Service Drops

Applicants must ensure that the service drop's point of attachment to the building is high enough to provide the minimum legal clearances shown in Figure 4-2 on Page 4-4.

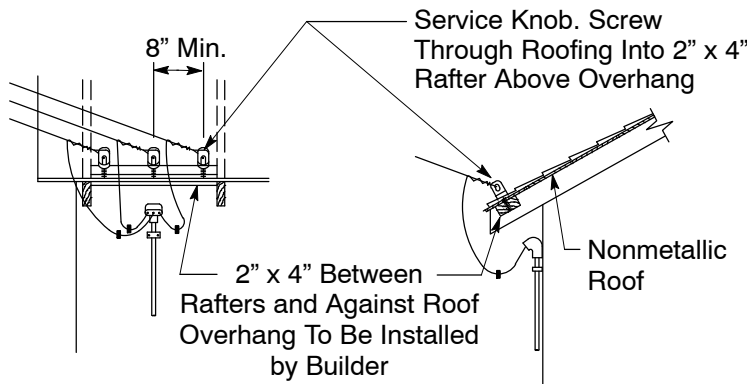
Subsection 4.6., "Attachment Structures (Periscopes)," found on Page 4-21, provides information on installing and using periscopes as attachment structures.

Whenever practical, attach the service drops below the level of the service weatherhead, as shown in Figure 4-29, "Cable," and Figure 4-30, "Open Wire or Cable (Cable Shown)," both of which are found on Page 4-16, and Figure 4-39, "Unbraced Periscope Structure (Residential and Nonresidential)," found on Page 4-23.

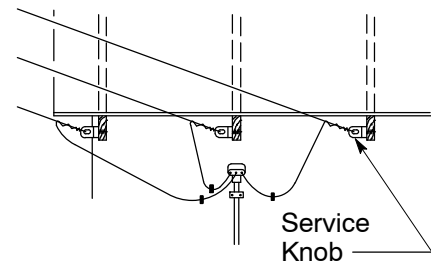
In all installations, PG&E will connect to the applicant's service-entrance conductor *below* the level of the service weatherhead. Drip loops are included at the entrance of each conductor to the service weatherhead. These drip loops prevent moisture from penetrating the installations.

The standard service attachments shown in Figure 4-25 through Figure 4-30, all representing "0- Through 300-Volt Service at Residential Premises" and found on Page 4-16, are designed according to the CPUC's *State Building Standards Electrical Regulations*, to California electrical code, and to PG&E requirements. Local authorities may have additional requirements.

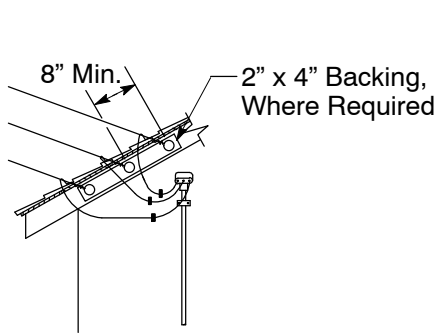
**NOTE:** PG&E will attach a service knob to a stud, if possible. PG&E will *not* mount the service knob directly to the roof or attach it to corner trim or roof trim. Figure 4-36, “Building Attachment–Service Knob,” Detail A, found on Page 4-20, provides the requirements for attaching service knobs.



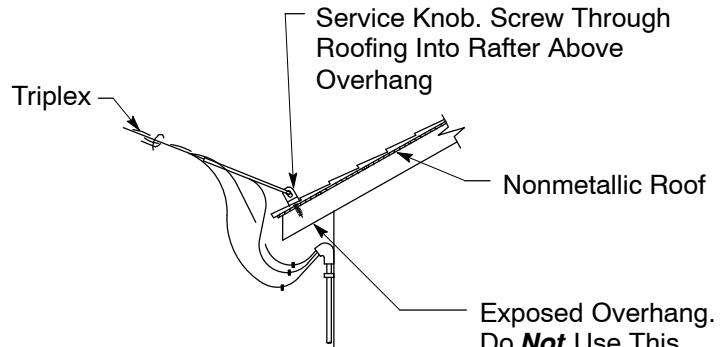
**Figure 4-25**  
Open Wire



**Figure 4-26**  
Open Wire or Cable  
(Open Wire Shown)

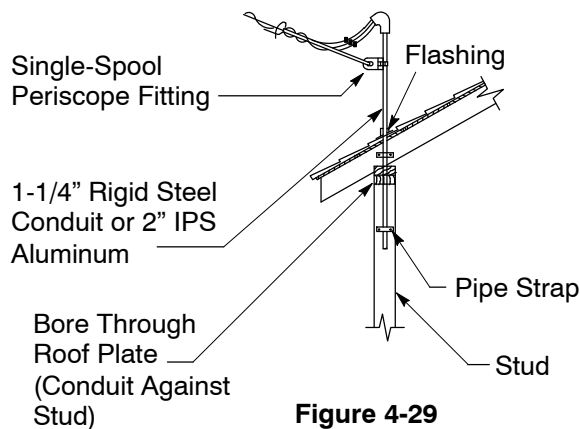


**Figure 4-27**  
Open Wire or Cable (Open Wire Shown)

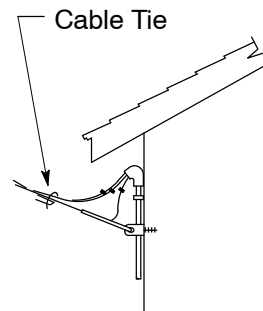


**Figure 4-28**  
Cable (Using Triplex)

Exposed Overhang. Do **Not** Use This Construction Where Overhang Is Boxed In



**Figure 4-29**  
Cable (Single Spool)



**Figure 4-30**  
Open Wire or Cable  
(Cable Shown)

**0- Through 300-Volt Service at Residential Premises**

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#### 4.5.2. Attaching Low-Voltage, Nonresidential, Overhead Service Drops

When applicants plan to install service-entrance wiring larger than that shown in Figure 4-31 through Figure 4-34, all representing “Service to Nonresidential Premises” and found on Page 4-18, they must consult PG&E *before* they begin construction to obtain instructions on attaching the wiring properly.

Figure 4-31, “Service Drop Cable, 4/0 and Smaller, Triplex or Quadruplex,” shows applicants how to attach the wiring using service knobs in either concrete or masonry walls. Service knobs must be screwed into wood-frame walls.

Figure 4-32, “New Wall, 1/0 kcmil to 397.5 kcmil Aluminum,” shows applicants how to attach the wires using insulated clevises on concrete walls. For wood-frame walls or masonry walls (e.g., brick, hollow tile, cinder block), applicants must bolt the attachments through the wall. Where service is attached to masonry walls, applicants must install bracing or attachment structures.

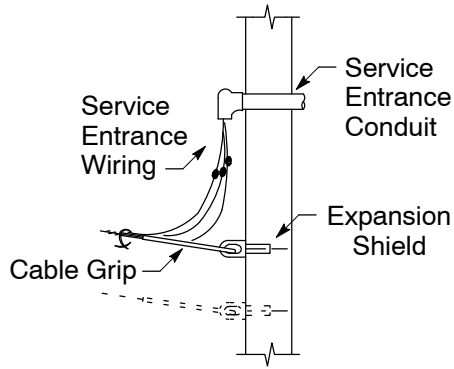
When it is practical to do so, applicants must attach service drops *below* the level of the service weatherhead.

PG&E will furnish the bolts and insulators needed to secure the service drop to the building or attachment structures. Applicants can attach the service drop to the walls or to periscope structures either horizontally or vertically.

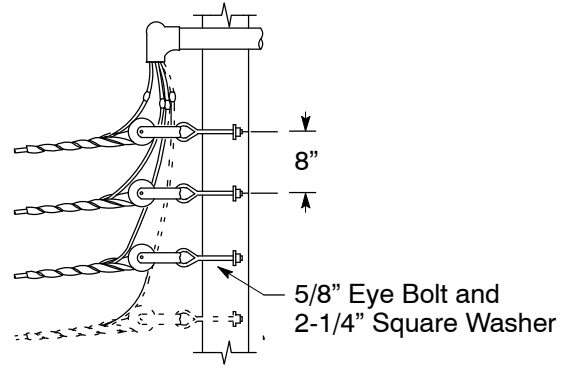
The wire sizes shown in Figure 4-31 through Figure 4-35 refer to service drops, not to service-entrance wires.

Open wiring, or drip loop, installed between the service drop attachment and the service weatherhead, must *not* exceed 3 feet.

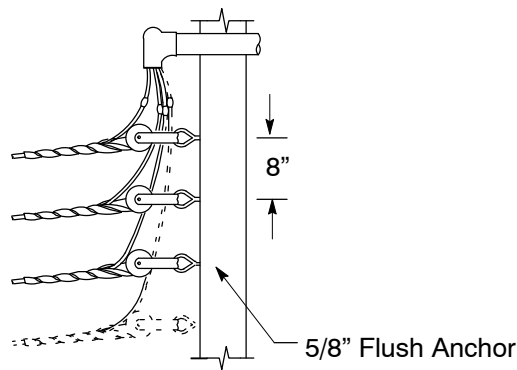
Applicants must install periscope structures as illustrated in Figure 4-39 on Page 4-23. See Subsection 4.6. on Page 4-21 for additional information on installing periscopes and using periscopes as attachment structures.



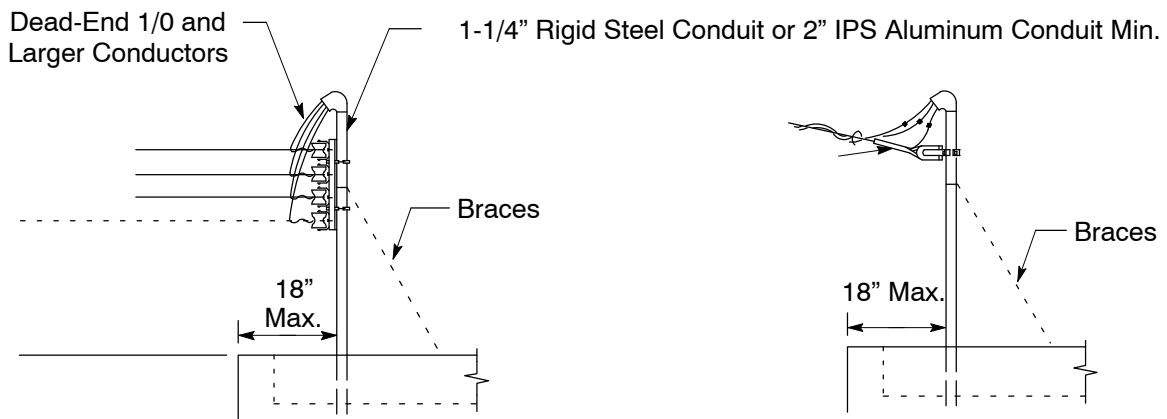
**Figure 4-31**  
Service Drop Cable, 4/0 and Smaller,  
Triplex or Quadruplex



**Figure 4-32**  
New Wall, 1/0 kcmil<sup>1</sup> to 397.5 kcmil Aluminum



**Figure 4-33**  
New or Existing Wall, 1/0 kcmil<sup>1</sup> to 397.5 kcmil Aluminum



**Figure 4-34**  
Open Wire Service, #4 to 397.5 kcmil<sup>1</sup> Aluminum

**Figure 4-35**  
Service Drop Cable

**Service to Nonresidential Premises**

Notes in reference to Figure 4-32.

1. kcmil: a thousand circular mils

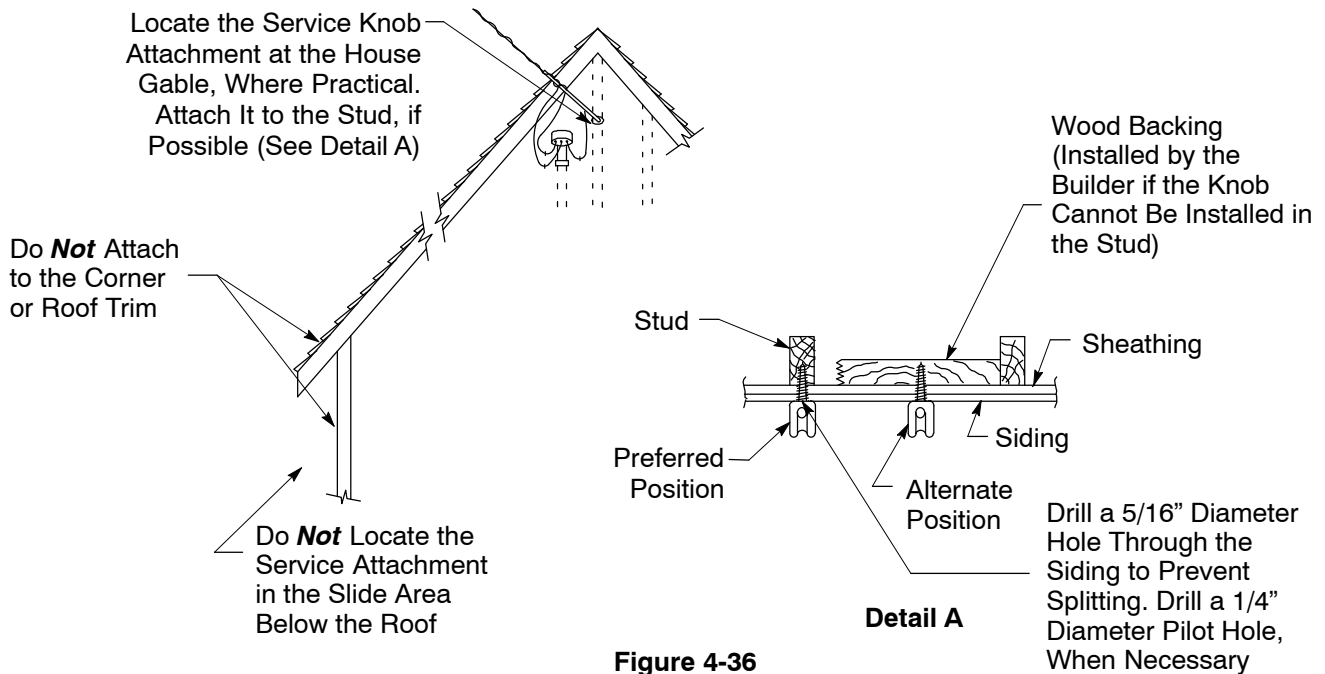
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**4.5.3. Special Service Attachment Requirements: Areas Subject to Heavy Snow Loading**

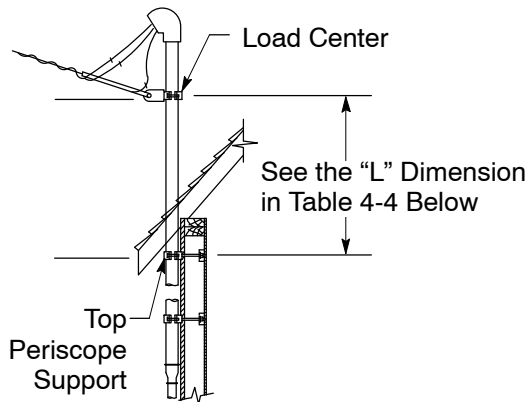
The following special requirements apply to service drops installed in snow-loading areas. PG&E has designed these requirements to minimize storm damage.

- A. Applicants must ensure that the span length of triplex or quadruplex service drop cable used in snow-loading areas is 125 feet or *less*.
- B. Applicants should locate the service weatherhead as high as practical to keep the weatherhead clear of deep snow.
- C. Applicants should try to attach service drops to house gables, where practical. This type of attachment protects the service and meter equipment from being impacted by snow and ice as it slides off the roof.
- D. PG&E will attach a service knob to a stud, if possible. PG&E will *not* mount the service knob directly to the roof or attach it to corner trim or roof trim. Figure 4-36, “Building Attachment–Service Knob,” Detail A, found on Page 4-20, provides the requirements for attaching service knobs.
- E. Applicants should install a self-supported, periscope attachment structure according to the requirements specified in Subsection 4.6. on Page 4-21 and Table 4-4, “Maximum Distance ‘L’ (Inches From the Service Attachment to the Top Periscope Support),” found on Page 4-20.

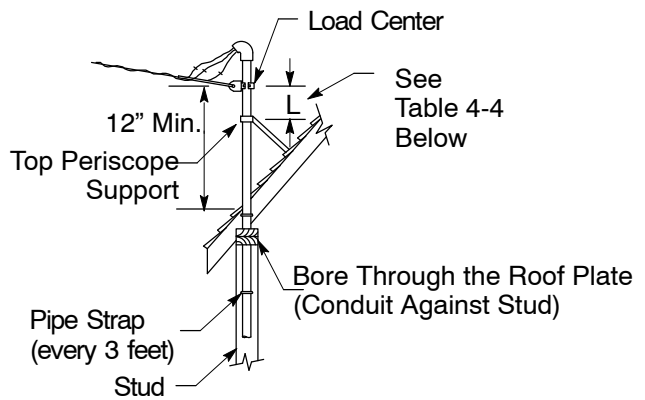
Typically, periscope attachment structures that are installed as specified in Subsection 4.6. and Table 4-5, “Maximum Mast Height Above the Roof *Without* Bracing,” found on Page 4-22, will provide a sufficiently rigid service-drop support to withstand the expected snow loading. In areas above 3,000 feet, use the construction methods shown in Figure 4-36, where practical.



**Figure 4-36**  
**Building Attachment-Service Knob**



**Figure 4-37**  
**Self-Supported Periscope Attachment Structure**



**Figure 4-38**  
**Braced Periscope Attachment Structure**

**Table 4-4** Maximum Distance "L" (Inches From the Service Attachment to the Top Periscope Support)

Type of Service Periscope	IPS Size of Service Periscope (In Inches)					
	1-1/4 <sup>3</sup>	1-1/2 <sup>3</sup>	2 <sup>3</sup>	2-1/2	3	4
GRS <sup>1</sup> or IMC <sup>2</sup>	5	7	11	22	36	57
Aluminum	Not Permitted		4	9 <sup>3</sup>	14	26

<sup>1</sup> GRS: galvanized rigid steel

<sup>2</sup> IMC: intermediate metal conduit

<sup>3</sup> Brace the periscope as shown in Figure 4-38 to maintain a sufficient clearance over the roof.

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#### 4.6. Attachment Structures (Periscopes)

An attachment structure is a support that connects the service drop to the structure while maintaining the clearances required for the service drop. 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](#).

Applicants can connect service drops to attachment structures in either one of two ways.

A. Connect by using either spools or insulators that are installed on a building.

B. Connect by using a mast constructed of one of the following materials.

- Rigid, galvanized steel pipe or conduit
- Galvanized angle iron
- Wood
- Other suitable material

To provide structural support for periscopes, applicants should use a heavy-duty pipe strap every 3 feet, secured by 3/8-inch x 3-inch lag screws (minimum size). Structural support is required at the location shown in Figure 4-39 on Page 4-23.

When applicants must install attachment structures to maintain the required clearances, they must contact PG&E for approval *before* constructing the structures. PG&E must ensure that attachment structures meet all of the applicable legal requirements.

Applicants must install and maintain these attachment structures at their expense.

The attachment structures must be strong enough to support the service drop wires and service attachments. Applicants may use service-entrance conduit as attachment structures. In this case, the periscope must be a minimum 1-1/4-inch GRS conduit or IMC, or 2-inch IPS rigid aluminum conduit. Applicants may *not* use plastic conduit as an attachment structure. Subsection 4.5.3., "Special Service Attachment Requirements: Areas Subject to Heavy Snow Loading," on Page 4-19, provides applicants with additional requirements when using attachment structures in snow-loading areas.

When applicants use attachment structures, either on exterior walls or on roof structures, they must ensure the attachment structures provide the required clearances. Additionally, applicants must ensure that buildings are constructed or reinforced to support the weight of the attachment structure and fitting. Buildings must be able to withstand the pull of the service wires. Applicants must furnish all of the materials required to install the attachment structures *except* the racks, bolts, and insulators needed to secure the service wires. PG&E will supply those parts.

Applicants may *not* attach communications conductors, such as those used for telephone or cable television service, to the electric supply's power-service mast or attachment structure. Applicants can attach *only* electric-utility, power-supply, service-drop conductors to the electric-supply, power-service masts or attachment structures.

#### 4.6.1. Periscope Clearances and Bracing Requirements

Applicants must ensure that periscopes and raceway-type service masts extend at least 12 inches above any roof or eave they may penetrate. Applicants may be required to raise periscopes and raceway-type service masts when using them as attachment structures and/or to obtain the appropriate clearances for service drop conductors. For more information, see Figure 4-13 through Figure 4-16, all found on Page 4-13. Also, see Figure 4-34, “Open Wire Service, #4 to 397.5 kcmil Aluminum,” and Figure 4-35, “Service Drop Cable,” both found on Page 4-18. Finally, see Figure 4-36 through Figure 4-38, all found on Page 4-20.

Applicants may have to brace periscopes that project above the roof lines, as shown in Figure 4-39 and Table 4-5. An acceptable method of bracing is illustrated in Figure 4-34 and Figure 4-35. Table 4-5 lists the maximum periscope heights that applicants can install *without bracing* for different types of conduit.

The periscope (i.e., mast) height without bracing is limited to 30 inches above the roof in either of the following two locations.

- Where the service drop is installed through trees.
- Where trees or tree branches may strike or cause unplanned loading on the service drop.

Applicants must 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. When the periscope structure requires support above the roof, applicants must ensure that it is braced, *not guyed*, as shown in Figure 4-38. The brace must be located as described in Table 4-4. 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.

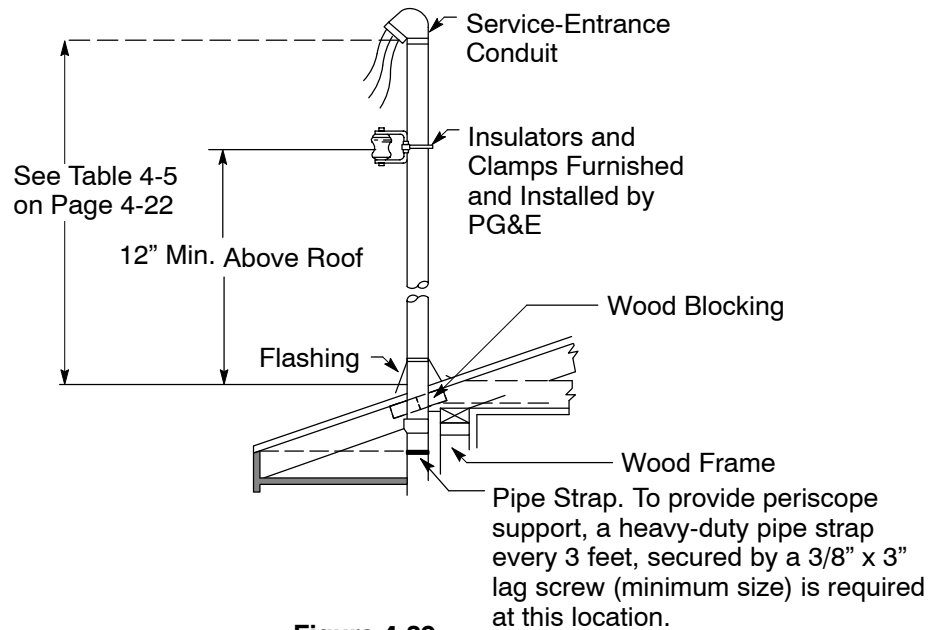
**Table 4-5 Maximum Mast Height Above the Roof *Without* Bracing<sup>1</sup>**

(IPS) Conduit Size		Maximum Height <i>Without</i> Bracing
GRS <sup>2</sup> or IMC <sup>3</sup>	Aluminum	
<b>All Measurements in Inches</b>		
1-1/4	2	42
1-1/2	2-1/2	42
2	3	54
Larger	Larger	78

<sup>1</sup> See Subsection 4.5.3. on Page 4-19 for snow-loading area requirements.

<sup>2</sup> GRS: galvanized rigid steel

<sup>3</sup> IMC: intermediate metal conduit



**Figure 4-39**  
**Unbraced Periscope Structure (Residential and Nonresidential)**

#### 4.7. Service Weatherheads

Typically, applicants should *not* locate the service weatherhead on exterior walls that are less than 2 feet from a common property line. The service weatherhead should be higher than the point of service attachment.

Applicable California state laws require applicants to locate the service weatherhead so that they maintain the minimum clearances specified in Subsection 4.4., “Service Drop Clearances,” found on Page 4-3, through Subsection 4.5., “Service Attachments,” found on Page 4-15. 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.

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.

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.

- A. If it is impractical to attach the service drop below the level of the service weatherhead.
- B. If the attachment point on the service-drop conductor is located less than 24 inches from the service weatherhead.

Ensure that the length of the open-wire drip loop does *not* exceed 3 feet.

#### 4.8. Service-Entrance Conductors

Applicants must furnish, install, and maintain the service-entrance wiring and service equipment beyond the point where it attaches to PG&E's overhead service drop.

The type and size of service-entrance wires must conform to applicable legal requirements and must be PG&E-approved service-entrance cable or, for nonresidential installations, PG&E-approved service bus duct. If applicants use an approved service-entrance cable, they must ensure that the service-entrance wires are enclosed either in continuous metallic tubing or in rigid conduit of a type and size to conform to applicable requirements, but preferably 1-1/4 inches or more.

**NOTE:** On periscope-type installations, use a minimum 1-1/4-inch GRS or IMC, or 2-inch IPS, rigid aluminum conduit.

If applicants use SE-type service-entrance cables between the service weatherhead and meters, they must ensure that the SE-type cables are *not* concealed. Also, applicants must ensure that service entrances are rain tight by using approved fittings.

In residential and small commercial 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.

The drip loop is the length of exposed wire between the service weatherhead and the service drop. Applicants must *not* use more than 3 feet of exposed, open wiring to form the drip loop.

To create drip loops, an applicant should install a minimum 18 inches of service-entrance wiring that extends out from the service weatherhead. In cases where the service-entrance open conductors pass over a roof or firewall with a minimum clearance of 12 inches, applicants must provide enough wire for PG&E to connect to the service drop and to obtain the required 12-inch minimum clearance above the building.

PG&E will connect the Company's service conductors and the applicants' service-entrance conductors below the weatherhead.

PG&E will furnish and install connectors for joining the service-entrance conductors to the service drop. Drip loops must *not* extend around the corner of a building; however, the service weatherhead may be located on the same face of the building as the service-drop attachment. The service-entrance conduit or cable may be extended around the corner of the building to the meter and service switch.

Do *not* install conductors other than service-entrance conductors in the conduit leading to the meter.

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#### 4.9. Applicant-Owned, Installed, or Furnished Wood Poles

PG&E service planners will explain the requirements of Electric T&D Engineering and Technical Support Bulletin [2004-08](#), “Inspection of Customer/Contractor Provided Poles,” (filed as “For Reference Only”) to ensure that applicants are familiar with the requirements for installing and using the wood poles.

After meeting with service planners and finalizing their installation plans, applicants must notify the local PG&E service planner *before setting* wood poles. It is critical that applicants who own, install, or furnish wood poles to which PG&E can attach equipment or facilities, or to which PG&E can furnish or supply permanent electric service, meet the requirements of Document [025055](#). PG&E field inspectors will approve the installation of poles that meet Company requirements.

PG&E field inspectors will verify the following, specific requirements for applicant-furnished poles before approving their installation.

- A. The poles must be supplied and treated by a PG&E-approved supplier.
- B. The applicant must obtain and provide PG&E with a copy of a “Certificate of Treatment” from the pole supplier. That certificate must indicate that the pole was treated according to the requirements of both the American Wood Preserver’s Association and the American National Standards Institute (ANSI).
- C. 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.
  - The manufacturer’s name
  - The month and year the pole was treated
  - The wood species
  - The preservative used to treat the pole
- D. Poles greater than 40 feet long that will support PG&E primary facilities must be through-bored at the ground line.
- E. PG&E must inspect and approve of used poles *before* they are reused (i.e., PG&E facilities are reinstalled on the poles). The PG&E field inspector must verify that the poles meet the dimensional and test requirements for reused poles. These requirements are described in PG&E’s Utility Work Procedure [WP2325-01](#), “Wood Poles – Testing, Restoring, Reinforcing, and Reusing”.

When installing **overhead temporary services**, refer to Document [025055](#) in [Appendix B](#).

## 4.10. Required Vegetation Clearances

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

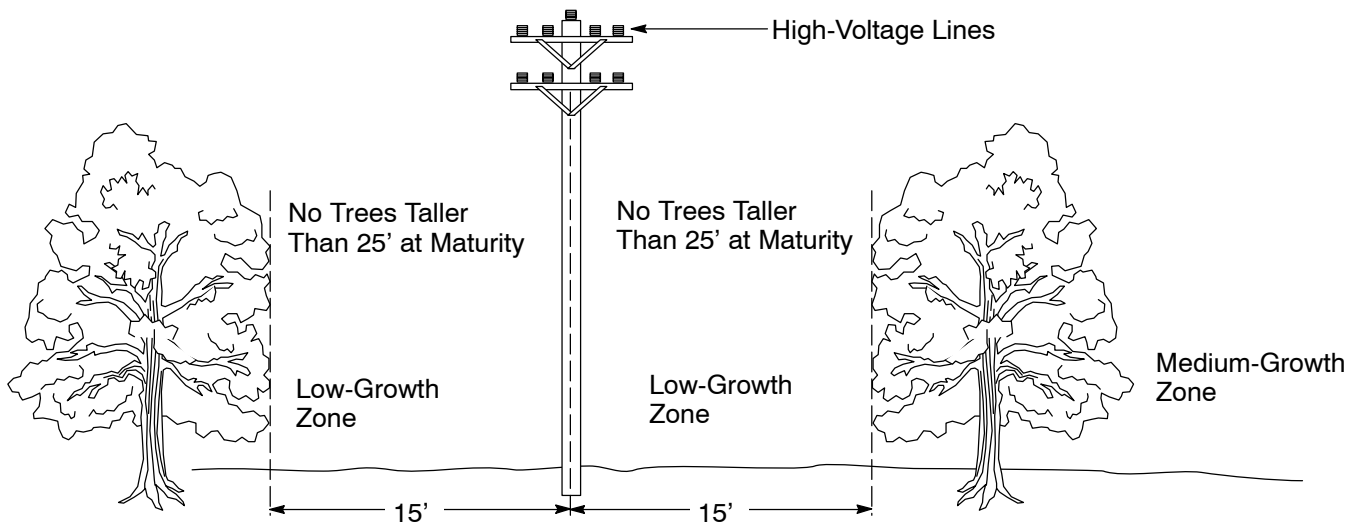
**NOTE:** PG&E may determine that the distribution line should be installed underground, or that trees should be removed, if the planned line extension does *not* meet the recommended clearance requirements between existing trees and overhead electric lines.

### 4.10.1. General Requirements

When establishing new, high-voltage, overhead service, applicants must research planting regulations and follow the rules established here.

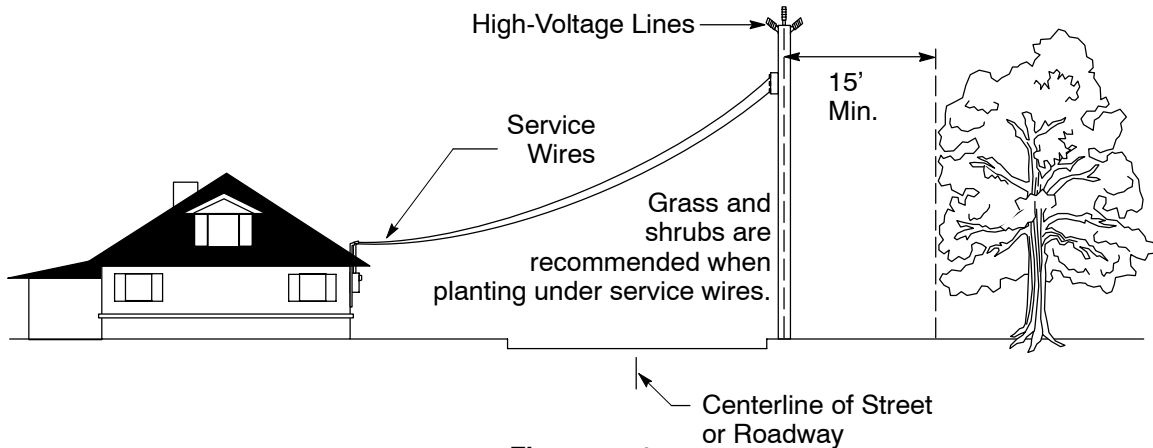
**NOTE:** Applicants must consider safety and access for repairs when planting near an overhead electric service.

- A. Where required, applicants must establish clearances as described in [California Public Resource Code \(PRC\) 4292](#). PG&E can exempt applicants if the vegetation around power poles at the completed construction site will be well irrigated, low growing, and not highly flammable.
- B. 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. *PG&E recommends planting shrubs and flowers in low-growth zones to ensure compliance.* Figure 4-40 below illustrates a low-growth zone.



**Figure 4-40**  
**Illustration of 15-Foot Clearance, Low-Growth Zone**

- C. Applicants must **not** plant trees that exceed 25 feet at maturity under or within 15 feet of the power pole. In general, do **not** plant trees near power poles. Figure 4-41 below illustrates required planting zones for poles with service wires connected to a residence.

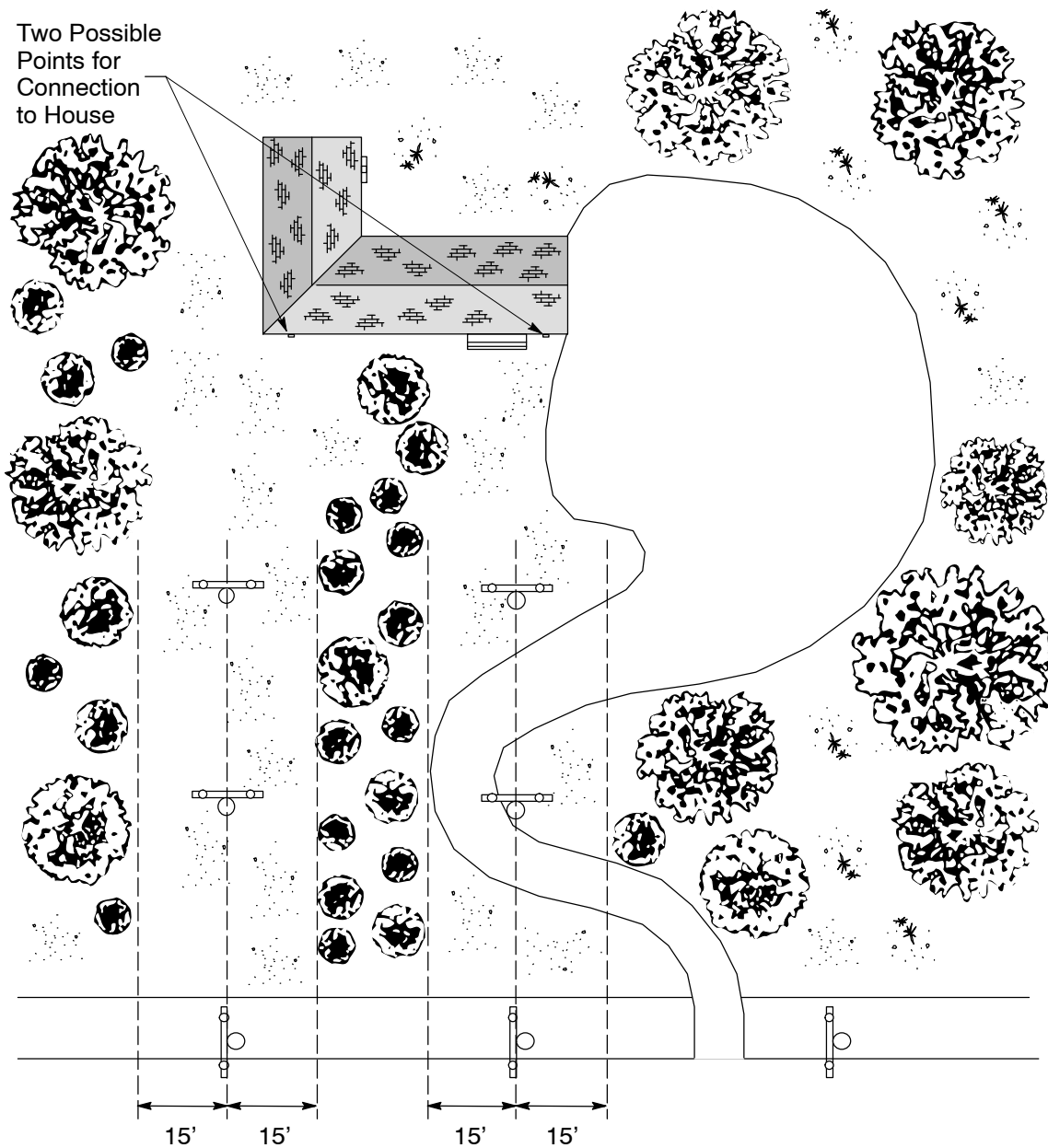


**Figure 4-41**  
**Grass and Shrubs Recommended Under Service Wires**

- D. Applicants must ensure that a thorough inspection is made of proposed construction areas. Dead, dying, diseased, or hazard trees near the proposed power lines must be removed. Hazard trees are defined as any tree having a structural defect that may cause the tree, or a portion of the tree, to fall either on someone or on something of value.
- E. Applicants can contact PG&E’s vegetation management personnel to obtain more information about codes or regulations and to schedule field inspections for construction sites. Vegetation management personnel perform field inspections to identify clearance requirements or hazard trees.

#### 4.10.2. Planning Requirements

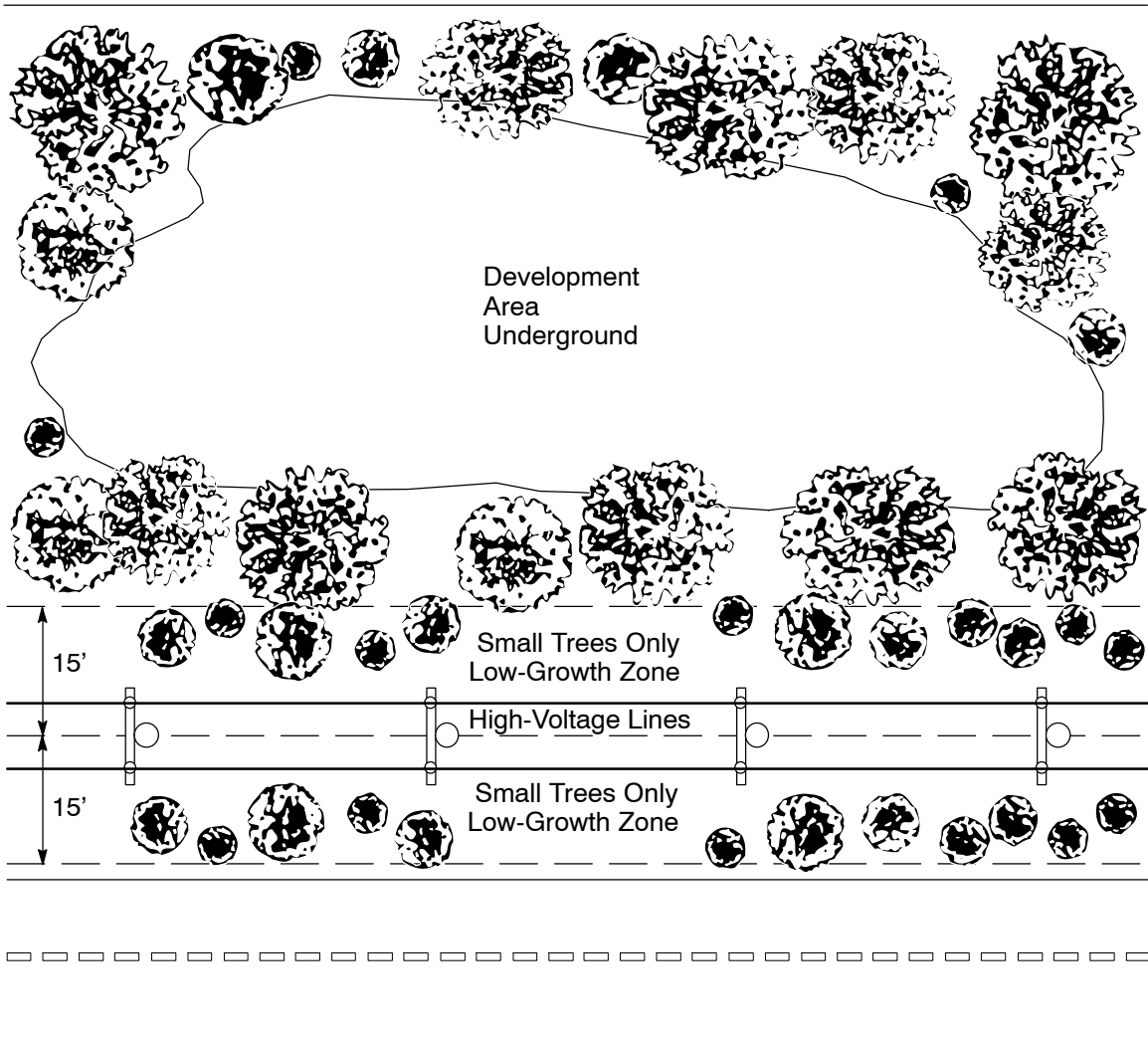
When planning and routing high-voltage overhead electric lines, applicants must avoid areas with heavy tree growth. Building plans should indicate where overhead lines pass within the boundaries of the construction and landscape areas, as shown Figure 4-42, “Alternative Routes to a House Showing High-Voltage Lines and Tree-Clearance Zones,” on Page 4-28, and Figure 4-43, “Development Area,” on Page 4-29.



**Figure 4-42**  
**Alternative Routes to a House Showing High-Voltage Lines and Tree-Clearance Zones**

### 4.10.3. Existing Overhead Lines Adjacent to Developments

Most new developments are designed to ensure that power lines are built underground. However, one or more sides of the construction area may be bordered by existing power lines. When planning landscape improvements, applicants must plant only lower-growing tree species under and near overhead electric lines.



**Figure 4-43**  
**Development Area**

#### 4.10.4. Line Extensions

Line extensions must be constructed with a 15-foot clearance on either side of high-voltage power lines. Applicants must clear the area from one end of the line extension to the final connection point before construction on the line extension begins. Figure 4-42 on Page 4-28 illustrates an approved method for clearing affected areas. Also, any hazard trees identified during the PG&E inspection that are located outside of the 15-foot clearance zone on either side of the power lines should be removed before construction begins on the line extension. PG&E will *not* connect new lines to the existing distribution system until the applicant provides adequate clearance from the trees.

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#### 4.10.5. Removing Vegetation Near Existing, High-Voltage, Energized Lines



### CAUTION

**Because safety is the Company’s highest priority, PG&E recommends that all vehicles, equipment, tools, and people maintain a minimum 10-foot distance from all high-voltage power lines.**

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).

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 **1-800-743-5000**.

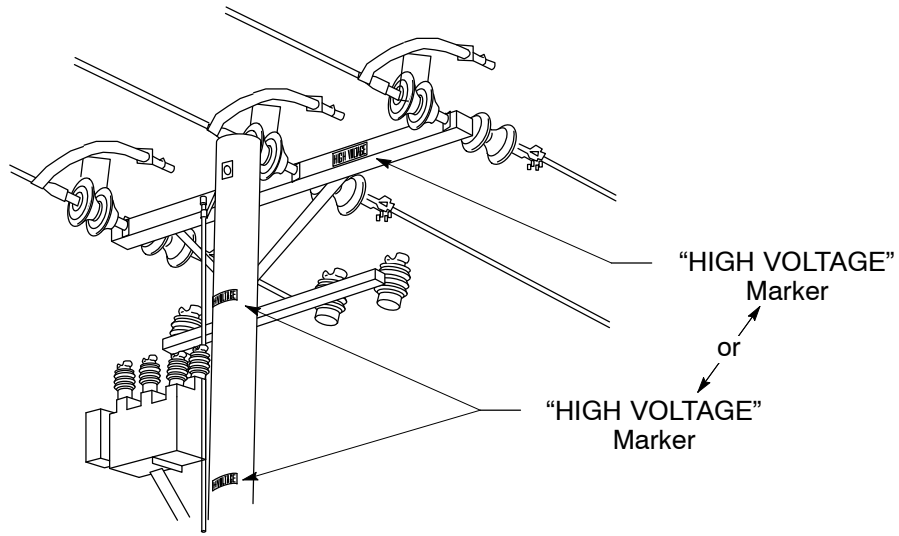
Generally, high-voltage power lines are any overhead lines that connect from pole to pole. These lines typically are 600 volts and greater. Post a “HIGH VOLTAGE” sign on the poles or crossarms, as shown in Figure 4-44, “High-Voltage Marker on Poles and Crossarms,” on Page 4-31. However, applicants should contact PG&E for assistance if a line’s voltage is unknown, and should *always assume that lines are high voltage*.

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.

If it is necessary to trim a tree that is closer than 10 feet from an overhead power line *before* PG&E’s normal tree-trimming schedule, applicants may hire a contractor qualified to perform high-voltage line clearances to prune the tree to a safe distance away from the electric lines. Again, unqualified persons should *not* perform this job. Applicants should contact PG&E to obtain the tree-trimming schedules for their areas.

There are regulations and statutes that dictate the requirements for working around high-voltage power lines. The [California Occupational Safety and Health Administration \(Cal/OSHA\)](#) requires that persons working within certain distances of overhead power lines be qualified and trained properly. 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](#) and [Article 38](#).

In addition, the [California Penal Code](#) makes it a *crime for any person to work within 6 feet of a high-voltage power line*. For details and additional information about this misdemeanor, see the California Penal Code, [Part 1, Title 10, Section 385\(b\)](#).



**Figure 4-44**  
**High-Voltage Marker on Poles and Crossarms**

For PG&E-recommended and prohibited trees, see the “Tree Planting Matrix Tables” in [Appendix B](#).

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