Town of Paradise
Community Development Department
Building Resiliency Center
6295 Skyway
Paradise, CA 95969
(530) 872-6291 x411

# Checklist for Residential Roof Mount Photovoltaic/Solar Systems Submittals

**DESIGN CRITERIA:**

- Seismic Zone D for 2025 CBC, $D^0$ for 2025 CRC
- Basic velocity 95 mph, 3 second gust, exposure C or provide wind speed calculations from California Registered Engineer
- 2025 editions of the California Residential Code (CRC) and the California Electrical Code (CEC) Article 690
- Climate Zone 11
- Roof Snow loads: Minimum design snow load and roof live load shall be thirty (30) pounds per square foot.

**DRAWING CRITERIA:**

- Drawing sizes shall be a minimum of 11" x 17" inches and all pages shall be the same size. Plans must be clear and legible; non-legible plans **will not be accepted**. Scale shall be ¼" inch per foot for structural and architectural 1" inch = 20 feet for site plans
- **Plans must be wet-signed by the preparer on each page. Architects/Engineers must affix their seal and wet-sign (cover sheet of supporting documents to be wet-signed).**
- Two complete stapled plan sets

**PLANS PREPARED BY:**

- California Registered Architect, California Registered Engineer, Owner, Licensed General Contractor, Electrical Contractor, Plumbing Contractor, Swimming Pool Contractor, Solar Contractor
- Structural Plans Included – Stamped and Signed (original) by a California Registered Engineer

**CONTENTS OF PACKET:**

- Photovoltaic Checklist (2 pages – complete and submit with permit) **Note: all forms must be signed or initialed (as indicated) by the appropriately authorized party**
- Sample One-Line Diagram for PV System including derating load calculations
- Sample Site Diagram
- Solar Panel Dead Weight Loading Calculation (complete and submit with permit)
- Verification of Wire Size for PV System Calculation form (complete and submit with permit)
- CEC Table 310.15 (B)(16) included for reference
- PV Roof Clearance drawing
- PG&E Greenbook Figure 2-19 (Minimum Meter Set Clearance Requirements)

# Residential Photovoltaic Checklist

**Based on the 2025 California Residential Code (CRC) and the 2025 California Electrical Code (CEC) Article 690**
**Residential PV system shall be installed in accordance with the current adopted edition of the (CRC) and CEC Article 690 and any other applicable articles or codes adopted by the jurisdiction.**

☐ **Simple plot plan showing:**

_____Lot lines
_____Structure and septic system locations
_____Main service panel location
_____PV module array configuration shown on a roof layout (or lot if ground mounted system)
_____% of coverage of roof area (If more than 50% a review by the fire department is required)
_____Distance from ridge to array(s) - (minimum of 3' required by CRC)
_____Distance from valley/ hip to array(s) - (minimum of 18" by CRC)
_____PV equipment locations, Solar arrays, DC combiner boxes, conduit and conductor location, Inverter, AC combiner box, AC disconnect

☐ **Roof Information (for roof mounted systems):**

_____Type of roof structure and slope. If rafters, provide size and spacing of existing roof framing members
_____Existing roofing material

☐ **PV Equipment Manufacturer's Specifications:**

Provide cut sheets on all components including but not limited to those shown below; including make, model, listing, size, weight, etc. *Highlight project specific information on the cut sheets.*

_____PV modules UL 2703 listed (R907.4)
_____Inverter with GFCI & AFCI protection
_____Mounting System (if using substitution parts to any listed/certified system, or mixing components of different mounting systems, additional engineering shall be required addressing the withdrawal and lateral capacities)
_____Disconnects
_____Combiner Box (if used) AC and DC Combiner boxes

☐ **Inverter:**

_____Model number
_____Integrated disconnect – Equipped with rapid shutdown
_____A visible external A/C disconnect within 5' of the main service panel

☐ **Mounting System for Panel Installation:** *Highlight project specific information on the cut sheets*

_____Indicate the style, diameter, length of embedment of bolts into framing members and location of attachments
_____Indicate number of bolts per panel
_____Provide mounting details and certified engineering or listed mounting installation
_____Complete "Solar Panel Dead Weight Loading Calculation" form
_____If ground mounted, provide details for the foundation

☐ **Photovoltaic Modules:**

_____Open-circuit voltage (Voc) from listed cut sheet
_____Maximum system voltage from listed cut sheet
_____Short-circuit current (Isc) from listed cut sheet
_____Maximum fuse rating from listed cut sheet
_____Maximum power- panel wattage from listed cut sheet

☐ **Electrical Schematic:**

_____System inter-tie with utility company or stand alone
_____Indicate the system KW rating
_____Indicate if the system has battery backup
_____Single line drawing of electrical installation which includes:
- _____Array
- _____PV power source short circuit rating
- _____Conductor size and type
- _____Conductor locations and runs
- _____Equipment bonding points and sizes – Per *CEC 250.122
- _____Inverter location
- _____AC & DC disconnect locations – Per *CEC 690.13
- _____Batteries; number, size and locations (if applicable)
- _____Point of connect to existing main electrical service panel
- _____Size and number of electrical service meters – Per *CEC 705.12 (D)(2) exception
- _____Location of required signage
- _____Complete attached 'verification of wire sizes' sheet
- _____Provide Rapid Shutdown of PV per 690.12

☐ **Proper Signage and Labeling:** Signage (see attached)

☐ Indicate system type below and show location of each required sign on one line diagram (see electrical):

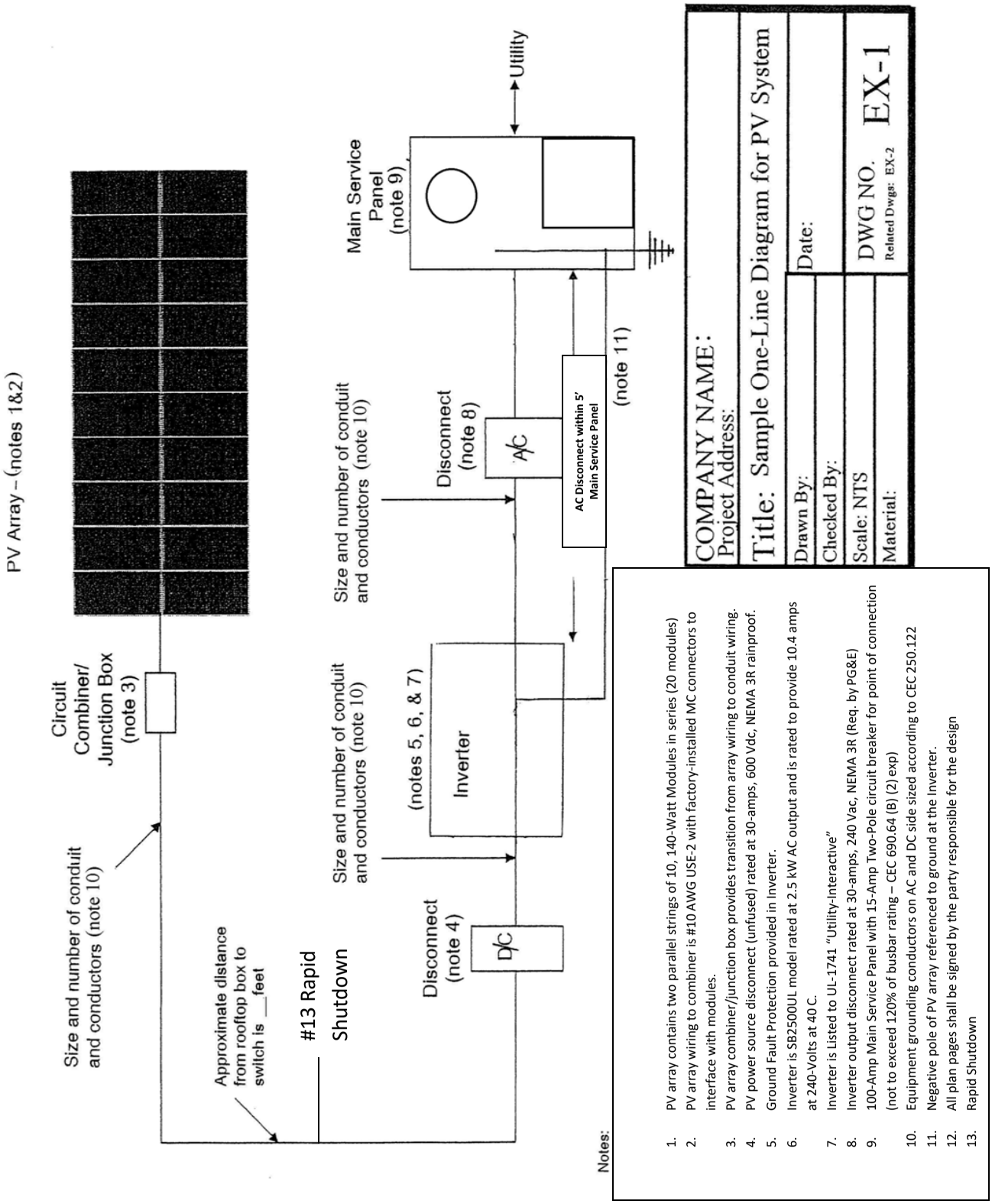
- ☐ **SINGLE PV ARRAY SYSTEM**
- ☐ **PV ARRAY SYSTEM W/ BATTERY BACKUP**
- ☐ **MULTIPLE PV ARRAY SYSTEMS**

***CEC 690.17 - Switch or Circuit Breaker.** The disconnecting means for ungrounded conductors shall consist of a manually operable switch (es) or circuit breaker(s) complying with all of the following requirements:

(1) Located where readily accessible
(2) Externally operable without exposing the operator to contact with live parts
(3) Plainly indicating whether in the open or closed position
(4) Having an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals of the equipment

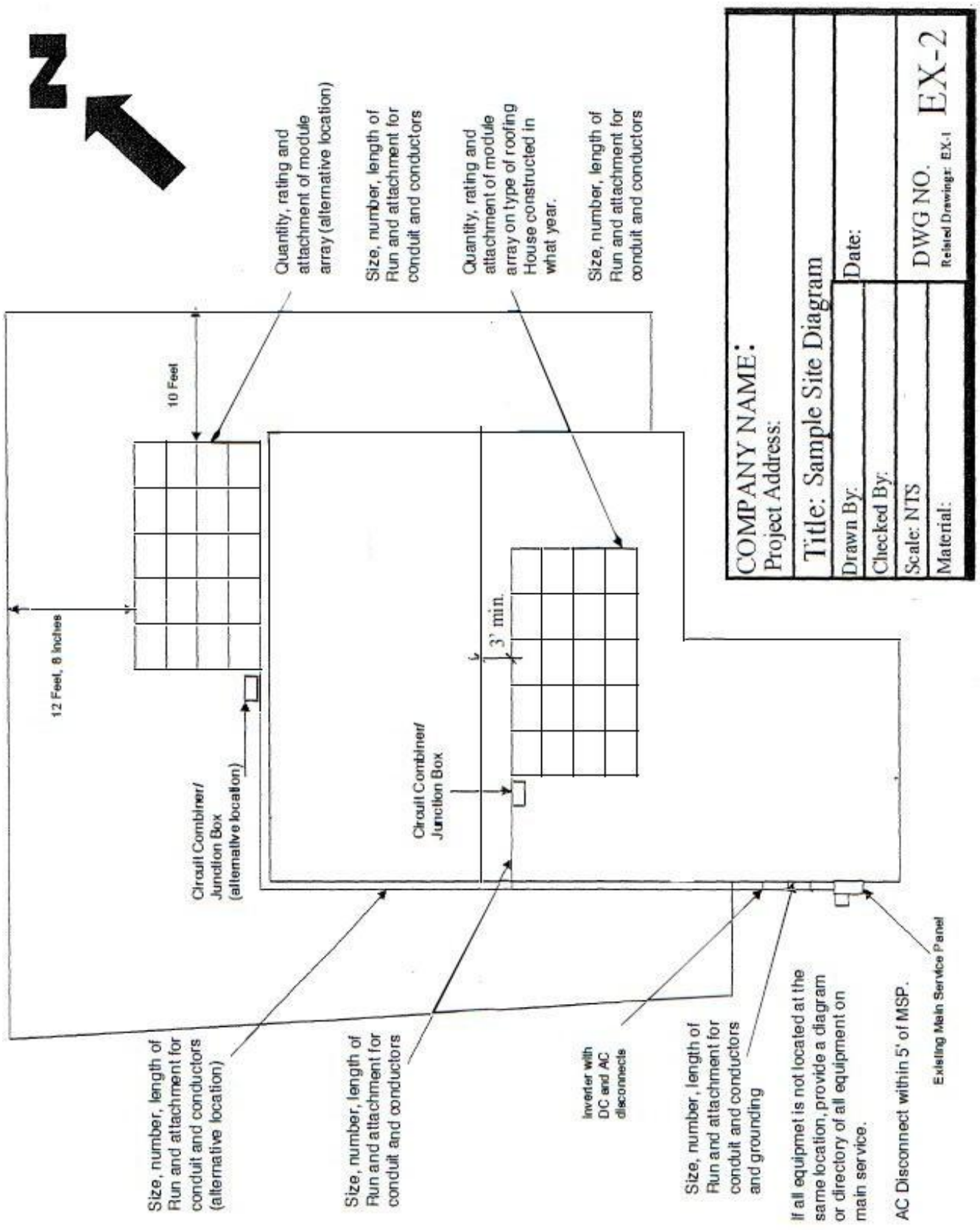
***CEC 250.122 – Size of Equipment Grounding Conductors**. Copper, aluminum, or copper-clad aluminum equipment grounding conductors of the wire type shall not be smaller than shown in Table 250.122 but shall not be required to be larger than the circuit conductors supplying the equipment.
***CEC 690.46 – Grounding for AC/DC Systems.** #6, in conduit or protected from damage
***CEC 690.13 (E) – Grouping.** The photovoltaic system disconnecting means shall be grouped with other disconnecting means for the system to comply with 690.14(C)(4). A Photovoltaic disconnecting means shall not be required at the photovoltaic module or array location.
***CEC 705.12 (D)(2) exception - Load Side**. A photovoltaic power source shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises, provided that (exception) the sum of the ampere ratings of the overcurrent devices shall not exceed 120% of the rating of the bus bar or conductor.

Residential PV EX-1 drawing




<Must be accessible from Public way. <Do Not Locate Aux metering equipment on Utility side of Panel.

Residential PV EX-1 drawing


N
Quantity, rating and attachment of module array (alternative location)
Size, number, length of Run and attachment for conduit and conductors
Quantity, rating and attachment of module array on type of roofing House constructed in what year.
Size, number, length of Run and attachment for conduit and conductors
10 Feet
12 Feet, 8 inches
3' min.
Circuit Combiner/ Junction Box (alternative location)
Circuit Combiner/ Junction Box
Size, number, length of Run and attachment for conduit and conductors (alternative location)
Size, number, length of Run and attachment for conduit and conductors
Inverter with DC and AC disconnects
Size, number, length of Run and attachment for conduit and conductors and grounding
If all equipmet is not located at the same location, provide a diagram or directory of all equipment on main service.
AC Disconnect within 5' of MSP.
Existing Main Service Panel
COMPANY NAME:
Project Address:
Title: Sample Site Diagram
Drawn By:
Date:
Checked By:
Scale: NTS
DWG NO. EX-2
Material:
Related Drawings: EX-1
Residential PV EX-2 drawing

## SOLAR PANEL DEAD WEIGHT LOADING CALCULATION

**System:**

Solar panel consists of _____ solar modules

Mounting system has _____ points of connection with the roof

t

**Panel Weight Calculation:**

Solar Module Weight = _____ lbs.

Mounting System Weight =_____ lbs.

Total Panel Weight = ((# of modules) x (module wt.))+ (mounting system wt.)

= (_____x_____) +_____=_____lbs.

**Point Load Calculation:**

Point Load = (total panel wt. ) _____

---------- = ---------- =_____ (lbs.)

(# of points of connection) _____

**Distributed Load Calculation:**

Solar Module Area = length" x width" =_____x_____=_____ft2

---------- = ----------

144 144

Total Solar Module Area = (# of modules) x (solar mod. area)

=_____x_____=_____ft2

Inter-module Spacing =_____in.

Total Spacing Area =

(# spaces bet. modules) x (inter-mod spacing) x (panel length or width) =_____x_____ x_____=_____ft2

---------- ----------

144 144

Total Panel Area = (total solar modular area) + (total spacing area)

=_____+_____=_____ft2

Distributed Load = (total panel wt.) _____

---------- = =_____lbs./ft2

(total panel area ) _____

**The point loading and distributed loading should be below building department requirements for structural analysis. Distributed loading - Max. 5 lbs/ft2**

# Verification of Wire Sizes for PV System Calculation Form

Checking the wire size from the modules to the inverter (D/C):

**Total PV System Rating:** = (Module wattage off cut sheet) x (# of modules in array)

= _____x_____=_____Watts

**Max. PV System Voltage:** **=** (Voc (v) off cut sheet) x (# of modules) x CEC Factor

= _____x_____x 1.13 =_____Volts

**Max. Circuit Current:** **=** CEC Factor x (Total system wattage/ total system voltage)

= 1.25 x_____/_____ =_____Amps

Using CEC Table 310.15(B)(16): In temperature column copper, 75° C, find the amperage allowed, them read over the size column for the minimum wire size. **Minimum wire size from Table 310.15(B)(16) #** _____

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Checking the wire size from the inverter to the service panel (A/C):

**Max Inverter AC Power Output:** **=** (Max AC Output off cut sheet)

= _____Watts

**Max Service Voltage:** **=** (110/240 V)

= _____Volts

**Max Circuit Current:** **=** CEC Factor x (max inverter AC Power Output / 240)

= 1.25 x_____/_____=_____Amps

Using CEC Table 310.15(B)(16): In temperature column copper, 75° C, find the amperage allowed, them read over the size column for the minimum wire size. **Minimum wire size from Table 310.15(B)(16) #** _____

Note: The smaller the wire size number, the larger the wire thickness.

**ARTICLE 310 -CONDUCTORS FOR GENERAL WIRING**

Table 310.15(B)(16) (formerly Table 310.16) Allowable Ampacities of Insulated Conductors Rated Up to and Including 2000 Volts, 60°C Through 90°C (140°F Through 194°F), Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)*

| Size AWG or kcmil | Temperature Rating of Conductor [See Table 310.104(A).] | | | | | | Size AWG or kcmil |
|---|---|---|---|---|---|---|---|
| | 60°C (140°F) | 75°C (167°F) | 90°C (194°F) | 60°C (140°F ) | 75°C (167°F) | 90°C (194°F) | |
| | Types TW, UF | Types RHW, THHW,THW, THWN, XHHW, USE, ZW | Types TBS, SA, SIS, FEP, FEPB, MI, RHH,RHW-2, THiil , THHW,THW- 2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW-2 | Types TW, UF | Types RHW, THHW,THW, THWN, XIIBW, USE | Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2 | |
| | COPPER | | | ALUMINUM OR COPPER-CLAD ALUMINUM | | | |
| 18** | ..... | — | 14 | — | — | — | — |
| 16** | —— | — | 18 | —— | — | — | — |
| 14** | 15 | 20 | 25 | -.. | ·· - | ——— | — |
| 12** | 20 | 25 | 30 | 15 | 20 | 25 | 12** |
| 10** | 30 | 35 | 40 | 25 | 30 | 35 | 10** |
| 8 | 40 | 50 | 55 | 35 | 40 | 45 | 8 |
| 6 | 55 | 65 | 75 | 40 | 50 | 55 | 6 |
| 4 | 70 | 85 | 95 | 55 | 65 | 75 | 4 |
| 3 | 85 | 100 | 115 | 65 | 75 | 85 | 3 |
| 2 | 95 | 115 | 130 | 75 | 90 | 100 | 2 |
| J | 110 | 130 | 145 | 85 | 100 | 115 | 1 |
| *110* | 125 | 150 | 170 | 100 | 120 | 135 | 1/0 |
| 2/0 | 145 | 175 | 195 | 115 | 135 | 150 | 2/0 |
| 3/0 | 165 | 200 | 225 | 130 | 155 | 175 | 3/0 |
| *410* | 195 | 230 | 260 | 150 | 180 | 205 | 4/0 |
| 250 | 215 | 255 | 290 | 170 | 205 | 230 | 250 |
| 300 | 240 | 285 | 320 | 195 | 230 | 260 | 300 |
| 350 | 260 | 310 | 350 | 210 | 250 | 280 | 350 |
| 400 | 280 | 335 | 380 | 225 | 270 | 305 | 400 |
| 500 | 320 | 380 | 430 | 260 | 310 | 350 | 500 |
| 600 | 350 | 420 | 475 | 285 | 340 | 385 | 600 |
| 700 | 385 | 460 | 520 | 315 | 375 | 425 | 700 |
| 750 | 400 | 475 | 535 | 320 | 385 | 435 | 750 |
| 800 | 410 | 490 | 555 | 330 | 395 | 445 | 800 |
| 900 | 435 | 520 | 585 | 355 | 425 | 480 | 900 |
| 1000 | 455 | 545 | 615 | 375 | 445 | 500 | 1000 |
| 1250 | 495 | 590 | 665 | 405 | 485 | 545 | 1250 |
| 1500 | 525 | 625 | 705 | 435 | 520 | 585 | 1500 |
| 1750 | 545 | 650 | 735 | 455 | 545 | 615 | 1750 |
| 2000 | 555 | 665 | 750 | 470 | 560 | 630 | 2000 |

*Refer to 310.15(B)(2) for the ampacity correction factors where the ambient temperature is other than 30°C (86°F).

**Refer to 240.4(D) for conductor overcurrent protection limitations

2022 California Electrical Code 70-161 Residential PV Table 310.15(8)(16)

# REQUIRED LABELS FOR RESIDENTIAL SOLAR ELECTRIC (PV) SYSTEMS

(SEE DRAWING PV-1)

- LABELS SHALL BE MADE OF RED PLASTIC MATERIAL WITH ENGRAVED WHITE LETTERS.
- LETTERS SHALL BE A MINIMUM 3/8" IN SIZE.
- THE LABELS SHALL BE PERMANENTLY ATTACHED TO THE APPROPRIATE PANEL.
- AC & DC CONDUIT, RACEWAY, ENCLOSURES, CABLE ASSEMBLIES AND JUNCTION BOXES SHALL BE RED BACKGROUND MATERIAL WITH WHITE LETTERING MADE OF DURABLE ADHESIVE , REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT PER UL 969; TO ALERT FIRE SERVICE TO AVOID CUTTING THEM OFF.

**WARNING!**
**DUAL POWER SUPPLY**
**SOLAR ELECTRIC SYSTEM**

THIS TAG TO BE ATTACHED TO METER PANEL

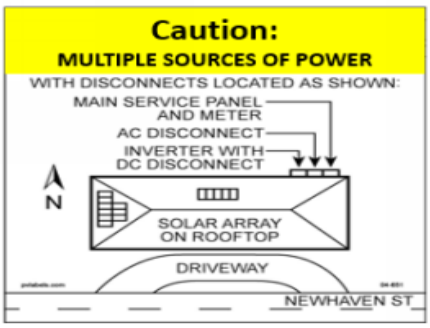
**WARNING!**
**DUAL POWER SUPPLY**
**SOLAR ELECTRIC SYSTEM**
**DISCONNECT**

THIS TAG TO BE ATTACHED TO PV DISCONNECT DEVICE

**CAUTION:**
**SOLAR ELECTRIC CIRCUIT**

THIS TAG TO BE ATTACHED TO AC AND DC CIRCUIT EQUIPMENT

THIS TAG TO BE ATTACHED TO EXTERIOR SERVICE PANEL




DRAWING PVT-I

# REQUIRED LABELS FOR RESIDENTIAL SOLAR ELECTRIC (PV) SYSTEMS *W/* BATTERY BACK-UP

(SEE DRAWING PV-2)

- LABELS SHALL BE MADE OF RED PLASTIC MATERIAL WITH ENGRAVED WHITE LETTERS.
- LETTERS SHALL BE A MINIMUM 3/8" IN SIZE.
- THE LABELS SHALL BE PERMANENTLY ATTACHED TO THE APPROPRIATE PANEL.
- AC & DC CONDUIT, RACEWAY, ENCLOSURES, CABLE ASSEMBLIES AND JUNCTION BOXES SHALL BE RED BACKGROUND MATERIAL WITH WHITE LETTERING MADE OF DURABLE ADHESIVE, REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT PER UL 969; TO ALERT FIRE SERVICE TO AVOID CUTTING THEM OFF.

**WARNING!**
**DUAL POWER SUPPLY**
**SOLAR ELECTRIC SYSTEM**
**CRITICAL LOAD MUST BE**
**DISCONNECTED SEPARATELY**

THIS TAG TO BE ATTACHED TO METER PANEL

**WARNING!**
**DUAL POWER SUPPLY SOLAR ELECTRIC SYSTEM**
**DISCONNECT**

THIS TAG TO BE ATTACHED TO PV DISCONNECT DEVICE

**CAUTION:**
**SOLAR ELECTRIC CIRCUIT**

THIS TAG TO BE ATTACHED TO AC AND DC CIRCUIT EQUIPMENT

**CRITICAL LOAD DISCONNECT**

THIS TAG TO BE ATTACHED TO BATTERY BANK DISCONNECT

DRAWING PVT-2

# REQUIRED LABELS FOR RESIDENTIAL MULTI - SOLAR ELECTRIC (PV) SYSTEMS

(SEE DRAWING PV-3)

- LABELS SHALL BE MADE OF RED PLASTIC MATERIAL WITH ENGRAVED WHITE LETTERS.
- LETTERS SHALL BE A MINIMUM 3/8" IN SIZE.
- THE LABELS SHALL BE PERMANENTLY ATTACHED TO THE APPROPRIATE PANEL.
- AC & DC CONDUIT, RACEWAY, ENCLOSURES, CABLE ASSEMBLIES AND JUNCTION BOXES SHALL BE RED BACKGROUND MATERIAL WITH WHITE LETTERING MADE OF DURABLE ADHESIVE, REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT PER UL 969; TO ALERT FIRE SERVICE TO AVOID CUTTING THEM OFF.

**WARNING!**
**DUAL POWER SUPPLY**
**2 - SOLAR ELECTRIC SYSTEMS**
**2 - DISCONNECT DEVICES**

THIS TAG TO BE ATTACHED TO METER PANEL

**WARNING!**
**DUAL POWER SUPPLY**
**SOLAR ELECTRIC**
**SYSTEM DISCONNECT 1**

**WARNING!**
**DUAL POWER SUPPLY**
**SOLAR ELECTRIC**
**SYSTEM DISCONNECT 2**

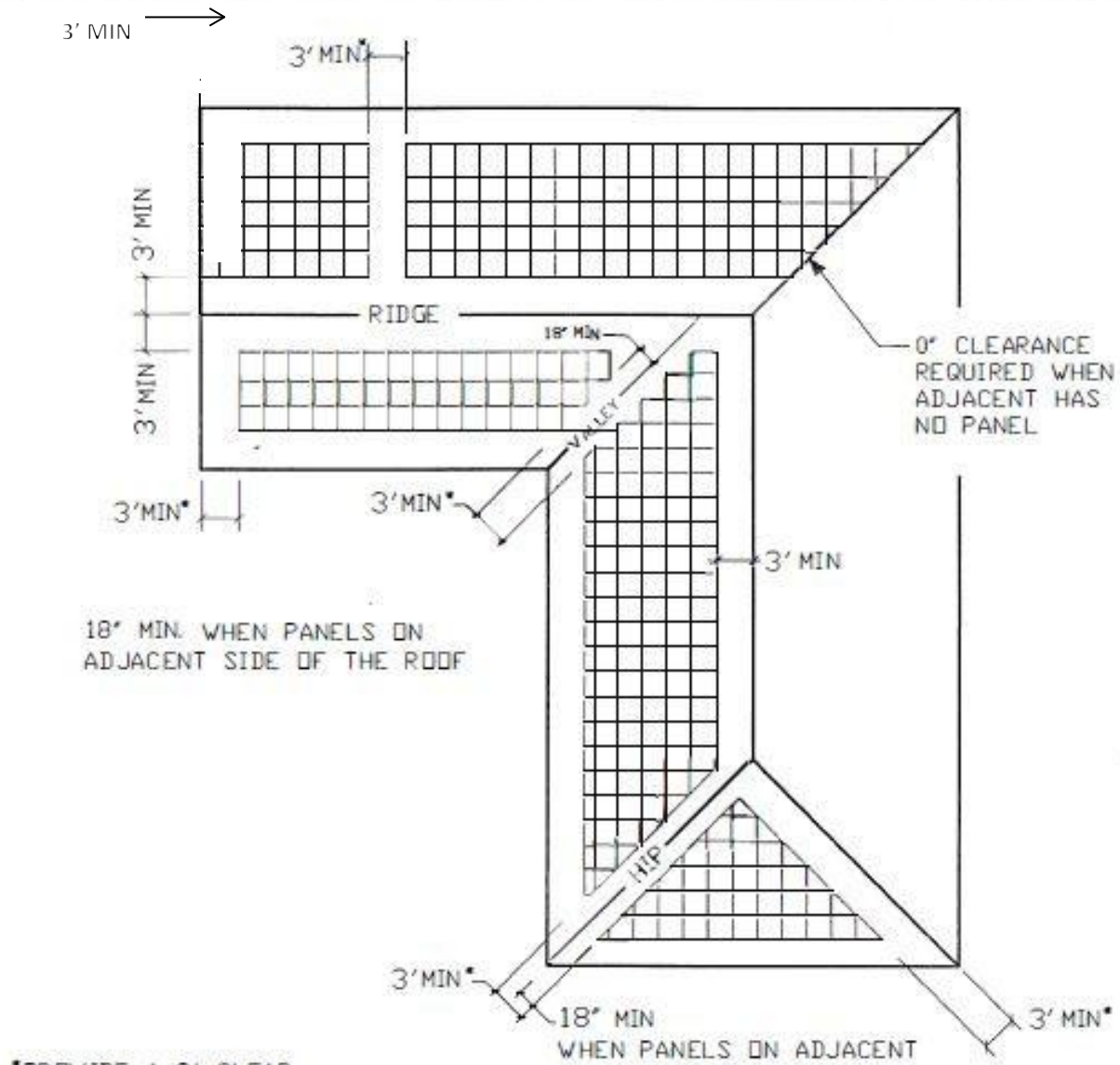
THIS TAG TO BE ATTACHED TO PV DISCONNECT DEVICES

**CAUTION:**
**SOLAR ELECTRIC CIRCUIT**

THIS TAG TO BE ATTACHED TO AC AND DC CIRCUIT EQUIPMENT

DRAWING PVT-3

# Residential Photovoltaic



## Minimum Meter Set Clearance Requirements

- Figure 2-19, “Electric and Gas Meter Set Separation Dimensions and Clearance,” below; Figure 2-20, “Gas Meter Set Clearance From Building Openings,” on Page 2-32; and figure 2-21, “Gas Regulator Set Clearance Requirement From Sources of Ignition,” on Page 2-33, all represent various metering facilities’ clearance requirements. If applicants install enclosures on their premises, the enclosures must meet the specifications provided in these illustrations.

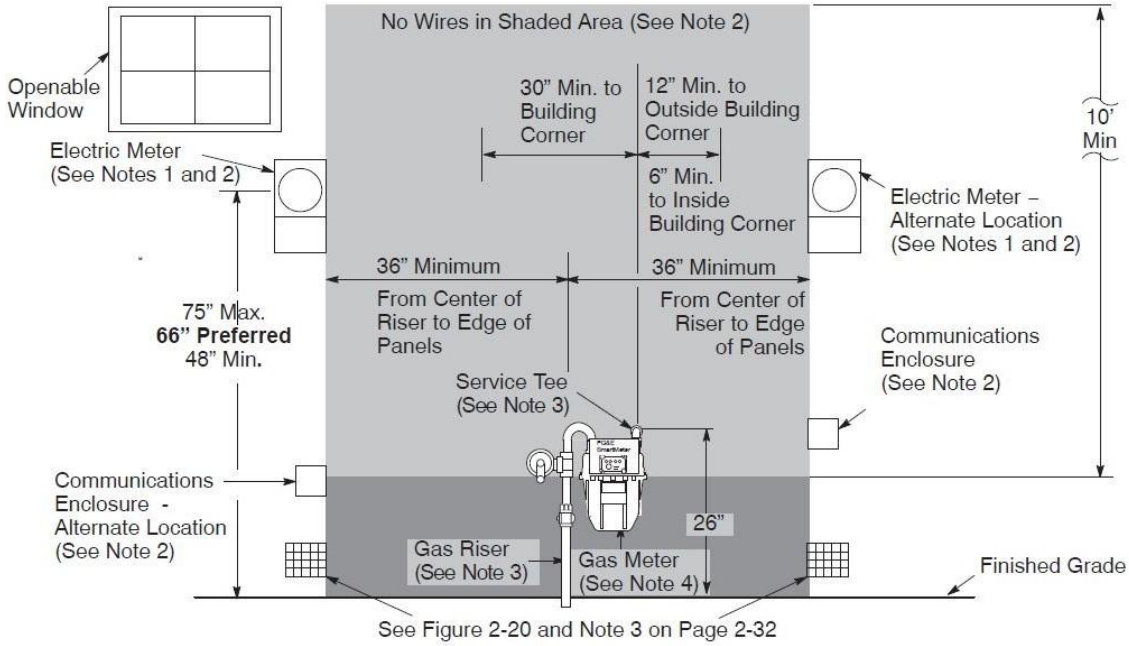



**Figure 2-19**
**Electric and Gas Meter Set Separation Dimensions and Clearances**

Notes in Reference to Figure 2-19.

1. Electric meter panel locations are subject to utility approval and must comply with the applicable code requirements. PG&E does **not** have specific requirements for the distance from the electric panel to the outside building corner. See Section 5, “Electric Metering: General,” for properly locating the electric meters. See Subsection 5.4.4, “Working Space,” on Page 5-11, for electric meter working space.

2. Applicants must **not** install any 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. The 36-inch distance can be reduced to 18 inches for electrical devices or equipment certified for NEC Class I, Division 2 locations.

3. Place the gas service riser 6 inches to 9 inches from the finished wall. The completed customer houseline at the service delivery point must extend a minimum of 4 to 6 inches from the finished wall where the meter is to be set, and must be 26 inches above the finished grade. See Figure 2-14 on Page 2-26, Figure 2-15 on Page 2-27, and Subsection 2.5 on Page 2-42.

4. The minimum dimensions and clearances in figure 2-19 are good for gas meters up to the 1,000 class. See Figure 2-15 on Pages 2-26 and 2-27 for illustrations of clear and level working space in front of the gas meter.