



# RESIDENTIAL ROOFTOP SOLAR ENERGY INSTALLATIONS ELECTRONIC SUBMITTAL REQUIREMENTS

## STRUCTURAL CRITERIA FOR: RESIDENTIAL FLUSH-MOUNTED SOLAR ARRAYS

### SOLAR ARRAY STRUCTURAL CRITERIA

- A. Flush-mounted Solar Array:
  - 1. Plane of the modules (panels) are parallel to the plan of the roof
  - 2. There is a 2" to 10" gap between underside of module and the roof surface
  - 3. Modules do not overhang any roof edges (ridges, hips, gable ends, eaves)
- B. Modules plus support components weigh less than 4 psf for photovoltaic array
- C. Total array area covers less than half of the total roof area (all roof planes)
- D. Solar support component manufacturer's project-specific completed worksheets, tables with relevant cells circled, or web-based calculator results attached.
- E. Module and anchor layout is per Figure 1 (see Page 2)
- F. Wind Uplift Check (Anchor Fastener criteria):
  - 1. Anchor fastener per Figure 2 (see Page 2)
  - 2. 5/16" diameter lag screws with 2.5" embedment into the rafter used, OR the anchor fastener meets the manufacturer's guidelines, whichever is more stringent.

## ACCESS PATHWAYS CRITERIA FOR: ROOF SLOPES STEEPER THAN 2:12

### ACCESS PATHWAYS CRITERIA

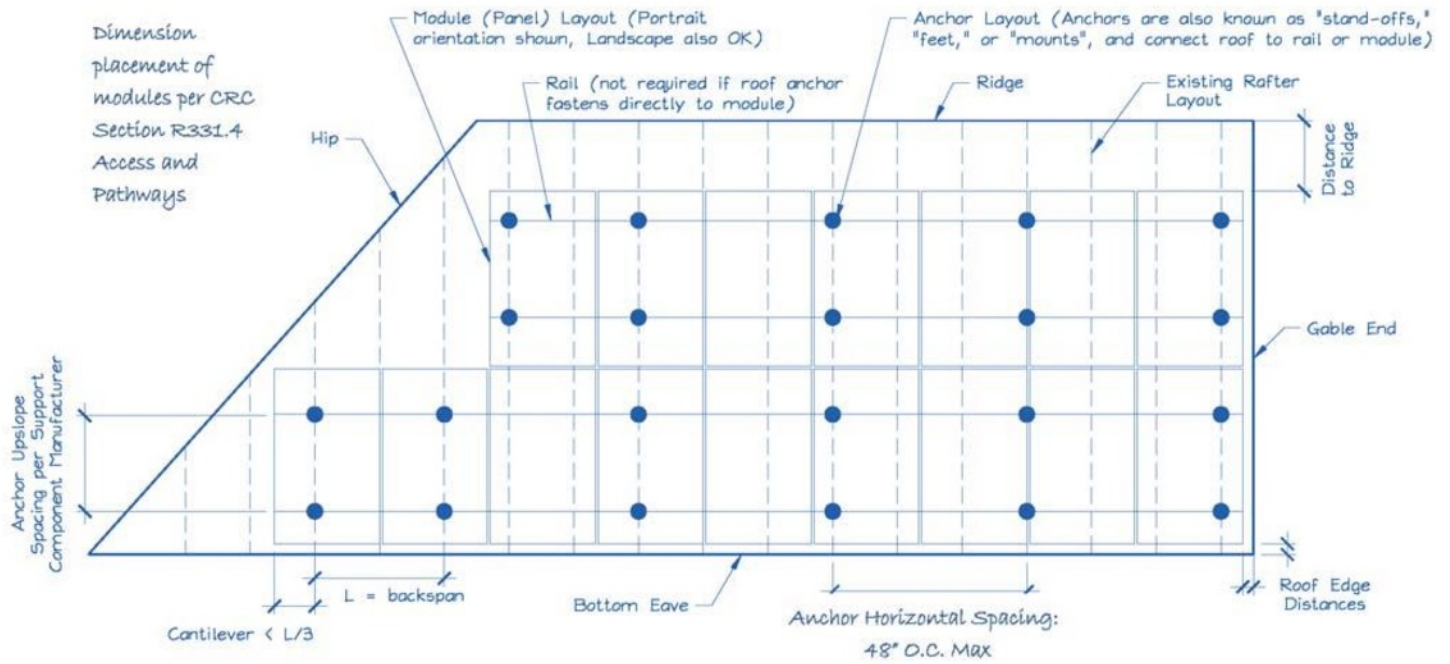
No fewer than two 36" wide pathways on roof planes from eave to ridge required. One path required on the driveway or street side. Pathway may be on same roof plane as PV array, adjacent plane, or straddling the same and adjacent roof plane.

An 18" ridge setback allowed when PV arrays occupy no more than 33% of total roof area. A 36" ridge setback required when PV arrays occupy more than 33% of total roof area.

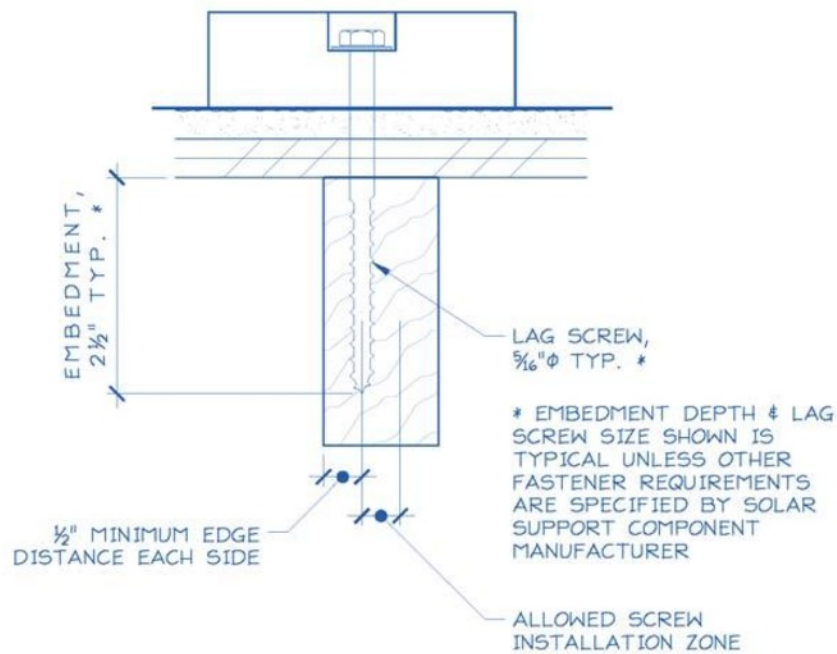
Dwellings with a fire sprinkler system: An 18" ridge setback allowed when PV arrays occupy no more than 66% of total roof area. A 36" ridge setback required when PV arrays occupy more than 66% of total roof area.

A 36" minimum wide pathway is required on PV array roof portions below an emergency escape and rescue opening.

# RESIDENTIAL ROOFTOP SOLAR ENERGY INSTALLATIONS



**Figure 1. Sample Solar Panel Array and Anchor Layout Diagram (Roof Plan).**



**Figure 2. Typical Anchor with Lag Screw Attachment.**



## RESIDENTIAL PHOTOVOLTAIC GENERAL NOTES

Do not remove these notes from the plans.

[BASED ON 2022 CBC AND 2022 CEC]

### INSPECTION

1. Inspector to verify existing field conditions. Modifications to existing photovoltaic (PV) systems include verification of existing grounding system, bonding requirements, electrical panel size and over current protection.
2. Contractor to be present for first and final inspections.
3. **First required inspection shall be for module rack support bases. Module rack support bases shall be installed per manufacturer's installation instructions.**
4. Ladder shall be provided and secured to structure for inspection purposes.

### PLANNING

5. All solar energy system appurtenances such as, but not limited to, electrical conduit, junction boxes, water tanks, supports, and plumbing shall be screened to the maximum extent possible without compromising the effectiveness of the solar collectors, and shall be painted a color similar to the color of the surface upon which they are mounted. Solar collectors (modules, inverters and rails) are exempt from the screening and color provisions of this subsection.
6. All roof-mounted solar collectors can be mounted at an optimum angle to the sun for maximum energy production. The maximum height of a solar collector shall be two feet, measured perpendicular to the roof surface, and may not exceed the maximum overall building height. The remainder of the solar energy system shall be below the level of the solar collector(s).

### FIRE PROTECTION

7. Rooftop mounted PV systems shall be tested, listed and identified with a fire classification in accordance with UL 1703. The fire classification shall be class A as required per CBC 1505.1 and City of Irvine code amendments.
8. Replacement roofing under solar module panels shall have a Class A fire rating per City of Irvine code amendments as well as comply with CBC Section 7A criteria where applicable.
9. Per Orange County Fire Authority (OCFA), metallic raceways shall be minimum 18" below roof assembly when measured parallel to the surface of the roof.

### EQUIPMENT FUNCTION

10. Listed and labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling per Art. 110.3(B) of the California Electrical Code (CEC).
11. WEEB clips by Wiley Electronics/Burndy to be installed per manufacturer's installation instructions per CEC Art. 110.3 (B).
12. Maintain proper working clearances for solar equipment per CEC Art. 110.26 & CEC Table 110.26(A)(1).
13. Center grip of disconnects shall be no more than 6'-7" above adjacent floor or grade per CEC Art. 240.24(A).



# RESIDENTIAL PHOTOVOLTAIC GENERAL NOTES

Do not remove these notes from the plans.

14. Avoid covering plumbing vent openings with solar panels.
15. All equipment used shall be labeled and listed by a nationally recognized testing laboratory (e.g. UL). No field fabrication of components is permitted.
16. Combining listed components to create a new listed component is not allowed (e.g. placing listed fuse holders or pulls inside a listed junction box does not make a listed combiner box).
17. Disconnects on DC side shall be rated for DC and seriesing of blades may be required for a 600 Vdc rating.
18. Interconnection PV breaker shall be the same brand as service panel.
19. Ground lugs for grounding roof modules and rails are listed for only a single ground wire.

## BONDING AND GROUNDING

20. Any splice in a solar module rail system shall have bonding jumper per CEC Art. 250.
21. Electrode grounding system shall be bonded back to service's electrical system per CEC Art. 250.50. AC service shall have a GEC system and be bonded to metallic water piping.
22. When more than one grounding electrode exists, all grounding electrodes are to be bonded together per CEC Art. 250.50 to form a grounding electrode system. Bonding jumper size to be the larger of CEC Table 250.66 (for AC) and CEC Art. 250.166 (for DC).
23. New electrodes shall be embedded in direct contact with soil a minimum of 8'-0" feet with 10'-0" x ¾" diameter rods where attachment is made above grade. CEC Art. 250.53(A)(4). Space electrodes min. 6'-0" apart per CEC Art. 250.53(B).
24. Bonding between supplemental and service electrodes shall be no larger than #6 AWG per CEC Art. 250.53(E). Bonding jumper to be connected to electrodes per CEC Art. 250.70.
25. Grounding Electrode Conductor (GEC) smaller than 6 AWG shall be protected in rigid metal conduit, intermediate metal conduit, rigid non-metallic conduit, electrical metallic tubing, or cable armor. 6 AWG GEC free from exposure to physical damage shall be permitted to run along surface of building construction without metal covering or protection if securely fastened to construction. 4 AWG GEC shall be protected where exposed from physical damage. CEC Art. 250.64(B).
26. GEC shall be installed in one continuous length without joint or splice. Splicing shall be permitted only by irreversible compression-type connectors listed as grounding and bonding equipment or by the exothermic welding process per CEC Art. 250.64(C)(1). Note: If exception is used, inspector is to field verify attachment from existing GEC to UFER.
27. Microinverters: #6 AWG GEC (free from physical damage) shall be installed in one continuous length without joint or splice from all microinverters to electrode; and ground for all modules and railing to be continuous. GEC shall not be broken at bus bar. CEC Art. 250.64(B) & (C). Splicing shall be permitted only by irreversible compression-type connectors listed as grounding and bonding equipment or by exothermic welding process per CEC Art. 250.64(C)(1).
28. Each end of ferrous raceways enclosing the GEC shall be bonded per CEC Art. 250.64(E).

# RESIDENTIAL PHOTOVOLTAIC GENERAL NOTES

Do not remove these notes from the plans.

29. GEC shall be #6 AWG for services larger than 125A. #8 AWG okay for 100A service or less. Per CEC Table 310.16; CEC Table 250.66 & CEC Art. 250.66(A).
30. EMT to be bonded at each end of raceway where encountering eccentric or concentric knockouts per CEC Art. 250.97.
31. For Grounding of modules and rails, Equipment Grounding Conductors (EGC) smaller than 6 AWG shall be protected from physical damage by a raceway or cable armor except where run in hollow spaces of walls of partitions, where not subject to physical damage, or where protected from physical damage per CEC Art. 690.45 and CEC Art. 250.120 (C).

## CONDUCTORS AND RACEWAYS

32. Conductors 8 AWG and larger shall be stranded where installed in raceways and conduit per CEC Art. 310.3(C).
33. Conductors shall be listed **for wet locations per CEC Art. 310.10(C)**.
34. PVC raceways require expansion fittings and support straps (attached to mounting surface with two fasteners) per CEC Art. 352.30 and CEC Art. 352.44 and manufacturer's **installation instructions**.
35. EMT shall be shall be fastened every 10 feet and within 3 feet of boxes, cabinets and/or terminations per CEC Art. 358.30(A) and supported every 3 feet per CEC Art. 358.30(B).
36. Where inside buildings, PV system dc circuits exceeding 30 volts or 8 amps shall be contained in metal raceways per Art. 690.31(D).

## MODULE RACK SUPPORT BASES

37. Field verify existing framing member depth will meet prescribed lag screw embedment.

## MARKINGS / LABELS

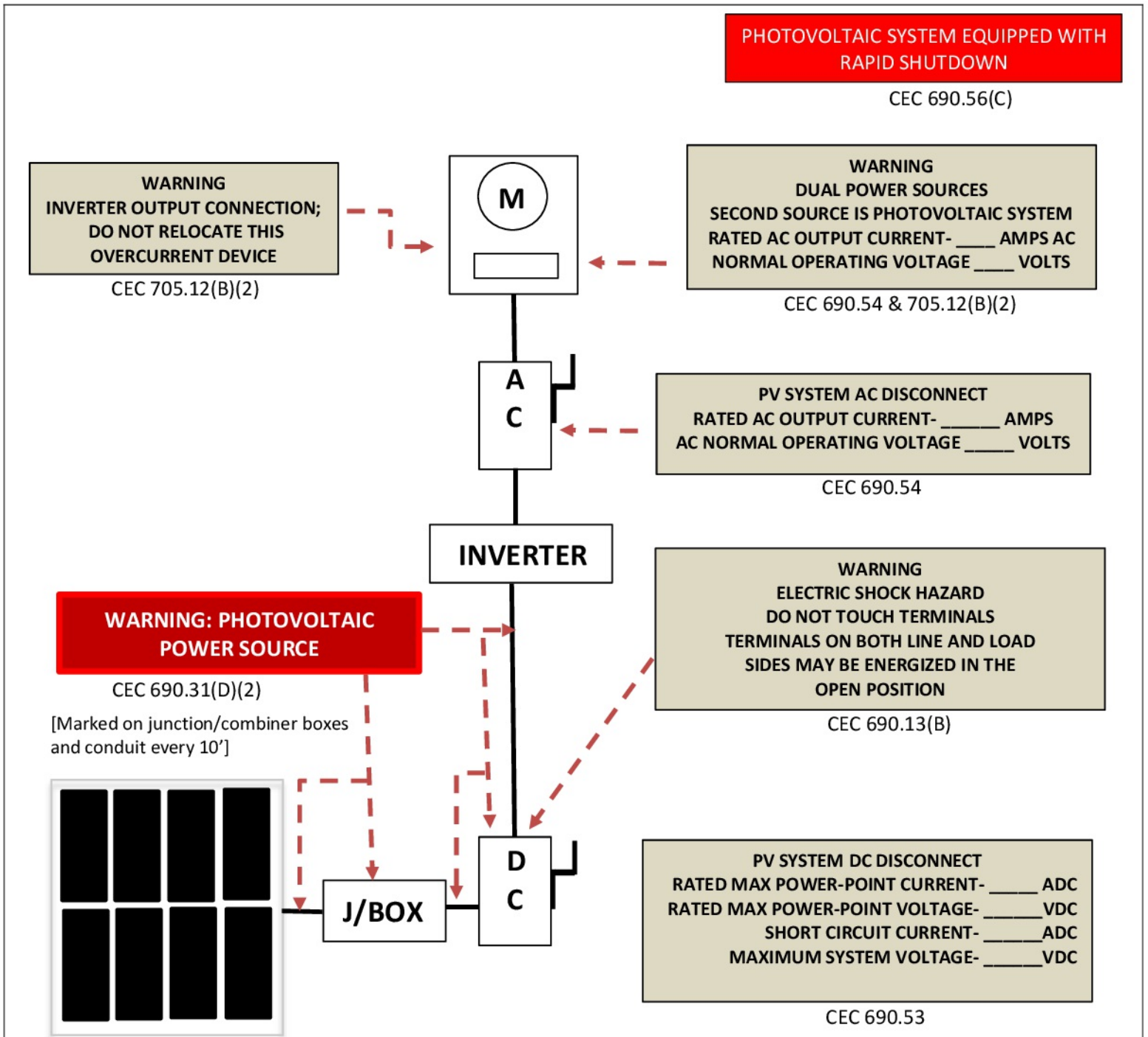
38. PV working placards are to be 3/8" high capitalized white letters on red background per CEC Art. 690.31(D)(2).
39. Provide a directory denoting all electric power sources on or in the premises. Directory shall be installed at each service equipment location and at locations of all electric power production sources capable of being interconnected per CEC Art. 705.10.

## RAPID SHUT DOWN

40. PV systems shall be installed with listed rapid shut down equipment per Art. 690.12 and labeled per Art. 690.56

# CENTRAL INVERTER LABELING

Do not remove these notes from the plans.



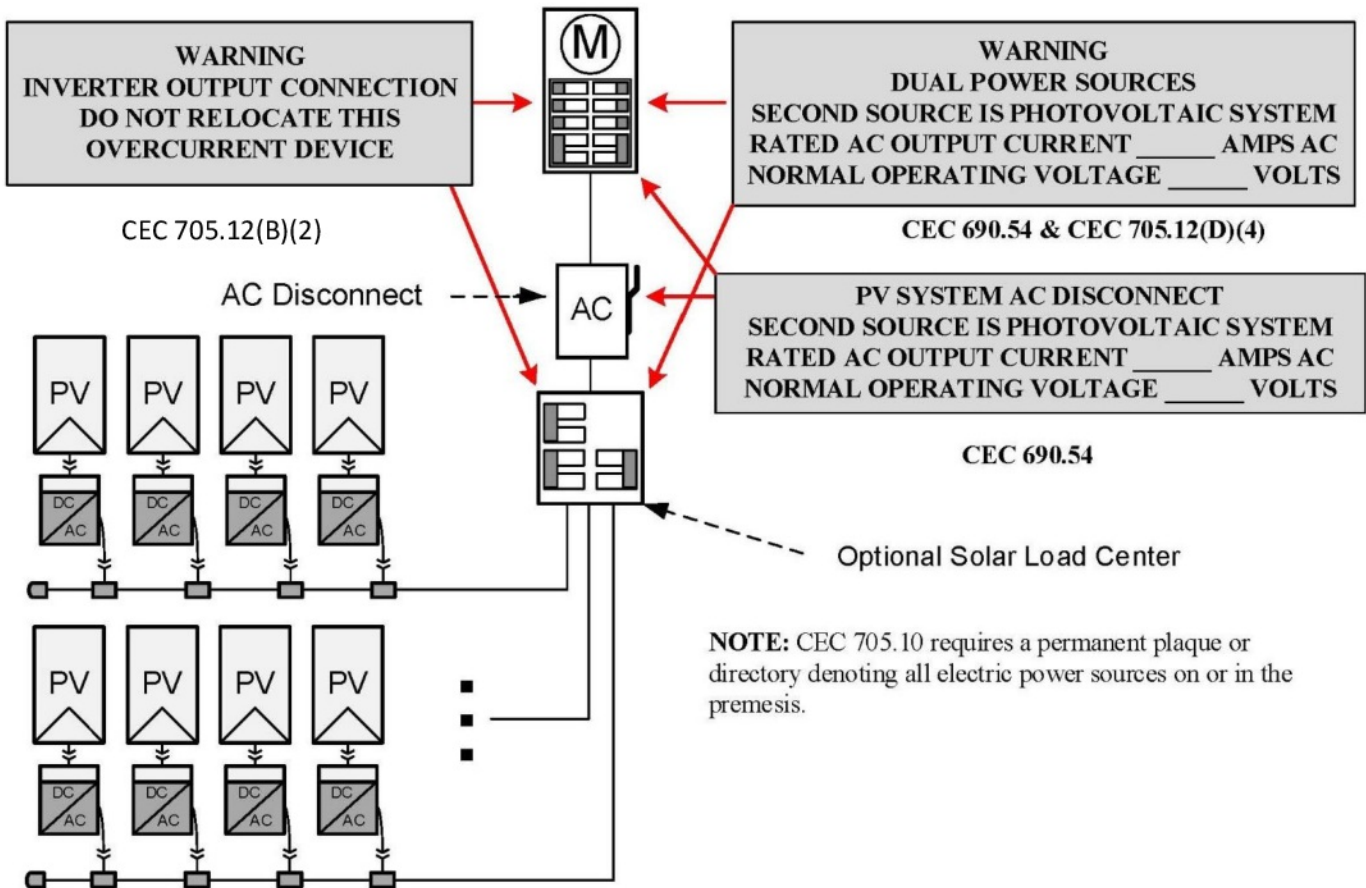
Code Abbreviations:  
California Electrical Code (CEC)

Informational note: ANSI Z535.4 provides guidelines for the design of safety signs and labels for application to products. A phenolic plaque with contrasting colors between the text and background would meet the intent of the code for permanency. No type size is specified, but 20 point (3/8") should be considered the minimum.

CEC 705.12 requires a permanent plaque or directory denoting all electric power sources on or in the premises.

# MICROINVERTER LABELING

Do not remove these notes from the plans.



Code Abbreviations:

California Electrical Code (CEC)

Informational note: ANSI Z535.4 provides guidelines for the design of safety signs and labels for application to products. A phenolic plaque with contrasting colors between the text and background would meet the intent of the code for permanency. No type size is specified, but 20 point (3/8") should be considered the minimum.

CEC 705.12 requires a permanent plaque or directory denoting all electric power sources on or in the premises.



# STANDARD STORMWATER POLLUTION PREVENTION NOTES

---

Do not remove these notes from the plans.

Stormwater pollution prevention devices and practices shall be installed and/or instituted as necessary to ensure compliance to the City of Irvine Water Quality standards contained in Chapter 3. Water, of Division 8 of Title 6 of the Irvine Municipal Code and any Erosion Control Plan associated with this project. All such devices and practices shall be maintained, inspected and/ or monitored to ensure adequacy and proper function throughout the duration of the construction project.

Compliance to the Water Quality standards and any Erosion Control Plan associated with this project includes, but is not limited to the following requirements:

1. Effective combination of erosion and sediment control BMPs shall be implemented to protect the exposed portions of the site from erosion and to prevent sediment discharges.
2. Sediments and other pollutants shall be retained on site until properly disposed of, and may not be transported from the site via sheet flow, swales, area drains, natural drainage courses or wind.
3. Stockpiles of earth and other construction-related materials shall be protected from being transported from the site by the forces of wind and water flow.
4. Fuels, oils, solvents, and other toxic materials shall be stored in accordance with their listing and are not to contaminate the soil and surface waters. All approved storage containers are to be protected from the weather. Spills must be cleaned up immediately and disposed of in a proper manner. Spills may not be washed into the drainage system, nor be allowed to settle or infiltrate into soil.
5. Excess or waste concrete may not be washed into the public way or any other drainage system. Provisions shall be made to retain concrete wastes on site until they can be disposed of as solid wastes.
6. Trash and construction solid wastes shall be deposited into a covered receptacle to prevent contamination of rainwater and dispersal by wind.
7. Sediments and other materials may not be tracked from the site by vehicular traffic. The construction entrance roadways must be stabilized so as to inhibit sediments from being deposited into the public way. Accidental deposits shall be swept up immediately and may not be washed down by rain or other means.
8. Stormwater pollution prevention devices and /or practices shall be modified as needed as the project progresses to ensure effectiveness.