



# County of Modoc Building & Safety

## Residential Solar Photovoltaic (PV) System Plan Submittal Requirements

1. Submit two (2) sets of plans (minimum 8.5" x 11" & maximum 24" x 36") which are drawn to scale (or fully dimensioned). Please keep in mind all plans, notes and details shall be clear and legible.
2. Cover sheet with the following information: project address, owners name/address/phone number, name/address and phone number of contractor and person preparing plans, clear scope of work, sheet index, legend of symbols, abbreviations and notations used in the drawings.
3. Basic site plan showing the location of the structure, North arrow, equipment, disconnects, inverters and any other related components of the PV system. (Cover sheet and site plan may be part of the same sheet if complete and legible; common for small residential lots).
4. Array configuration indicating placement of equipment and modules on the roof including junction boxes and other related electrical equipment. Configuration shall also show required fire clearances per the 2013 CA Fire and Residential Codes.
5. Electrical single line diagram including:
  - Amperage size and location of the main electrical panels and subpanels
  - Grounding/bonding conductor sizes/types for structure (main ground, water bonding, gas bonding, etc.)
  - Equipment grounding conductor size, type and location for circuits and module/rack grounding
  - Combiner/junction box locations
  - AC/DC disconnect types, sizes and locations
  - Conduit sizes/types from the array to the power source
  - Inverter string or micro inverter branch circuit details
  - Conductor wiring types and sizes, system and solar panel
6. Required signage for panels, disconnects, conduits, junction boxes, etc. Permanent labels with red background and white lettering resistant to fading pursuant to CA Electrical code Article 690.
7. Provide cut sheets for all PV equipment and mounting systems including but not limited to: PV modules, rack mounting system with complete details, mounting brackets, grounding hardware, module fire rating and inverters.
8. PV system mounting hardware shall meet minimum Modoc County Structural Design Criteria including snow loading requirements depending on project location. Minimum roof mount support spacing shall be as follows unless separate design is submitted by CA licensed engineer:
  - 0-40lb snow load: 4ft o.c. spacing
  - 40-70lb snow load: 2ft o.c. spacing
  - Over 70lb snow load: Project shall be designed by CA licensed engineer

### Ground Mount Solar Projects:

1. Items 1-7 as shown above including a more detailed site plan showing array size, setbacks to structures/property lines, location of all existing structures on the site, location of new underground utilities, etc.
2. PV system mounting hardware and foundation shall meet minimum Modoc County Design Criteria including snow loading requirements depending on project location. Foundations shall meet general engineered practices; where there is less than a 50lb snow load, general engineered foundation/support tables and calculations may be used if the calculations include the applicable snow loading. If snow load

data is not given in the general calculation and /or the project is subject to a snow load of 50lbs or more the structural components shall be wet stamped and signed by a CA licensed engineer.

## **Solar PV Requirements in the 2013 California Fire, Electrical & Residential Codes**

### **Wiring/Circuit Installations:**

1. Direct current (DC) conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes and disconnects shall be labeled per the following:
  - Labels shall be reflective, water resistant and can withstand the environment; lettering shall be a minimum 3/8" in height with white on red background.
  - Labels shall state, "WARNING: PHOTOVOLTAIC POWER SOURCE".
  - Labels shall be placed at every service disconnect; also on every DC conduit, raceways, enclosures, etc. at 10ft o.c. and within 1 ft. of turns, bends and penetrations.
2. Conduit, raceways and wiring systems shall be run as close as possible to ridges, hips, valleys, etc.; they shall also be installed in such a manner to limit trip hazards and maximize ventilation opportunities. DC wiring in enclosed spaces shall be installed in metallic conduit; conduit shall be run along the bottom of load bearing members.
3. PV source and output circuits inside a building shall be routed along building structural members where the members can be observed (accessible attics, etc.). If circuits are embedded in areas (not accessible) that are not covered by PV modules, those areas shall be clearly marked indicating their locations.
4. DC circuits ran inside a building 80 volts or greater shall be protected by a listed arc-fault circuit interrupter.
5. Where multiple inverters are installed and not grouped a clear location directory shall be provided at each AC & DC disconnect location.
6. FMC 3/4" or smaller, MC conduit 1" or smaller or exposed wiring installed across ceiling joists or floor joists shall be protected by guard strips.

### **Access & Pathways:**

1. Residential structures shall be designed with a maximum PV array axis of 150ft x 150ft.
  - Residential Hip Roof Layouts: Minimum 3ft clear walkway from eave to ridge on side of roof mounted PV modules
  - Residential with Single Ridge: Minimum of two (2) 3ft clear walkways from the eave to the ridge or each roof slope.
  - Residential with Hips & Valleys: Modules installed no closer than 10' to the hip or valley when modules are installed on each side of the hip/valley.
  - All Residential Roofs: Modules shall not be installed within 3ft of the ridge for fire department ventilation.
2. Roof access shall be available that doesn't require placement of ladders over windows, doors, etc. and located at strong points of the building construction that allow unobstructed access.
3. Commercial Access: A minimum 6ft wide clearance shall be provided around the parameter of the roof unless the longest building axis does not exceed 250ft.
4. Commercial Roof Pathways: Structurally sound centerline pathways shall be provided a minimum of 4ft wide and 4ft clear to skylights, hatches, standpipes, parapets and/or roof edges.
5. Commercial Smoke Ventilation Requirements: Array shall be no greater than 150ft x 150ft in size; a minimum 8ft clear space (*see code for alt. clearance between arrays*).
6. Ground Mount Arrays: A minimum 10ft clear "brush-free" area around the array shall be provided.

### **Fire Rating:**

1. Modules shall be tested, listed and identified with the fire classification based on the specific type of building construction. (See California Building Code (CBC) Table 1505.1 for specific classification requirements)