Solar Panel Installations

SINGLE-FAMILY RESIDENTIAL CHECKLIST

City of Hayward Development Services Department

Revised: 7-09-15

PERMIT REQUIREMENTS

Permits are required for all solar panel installations. This handout covers the basic drawings and some key code items needed for a successful submittal. Flush mounted solar panel installations for single-family homes are reviewed over the counter when submitted on Tuesdays from 9:00 a.m. to Noon as part of Hayward's "Solar Tuesday" program. If not submitted on Tuesday, the application will be reviewed by the following Tuesday.

FEES

Single-family residential solar panel permit fees are subsidized by the City to encourage their installation. There is a total flat fee of **$300** for flush mounted systems. This includes plan review and inspection. For installations that require structural calculations such as non-flush mounted panels or unconventional mounting, additional structural review fees will apply.

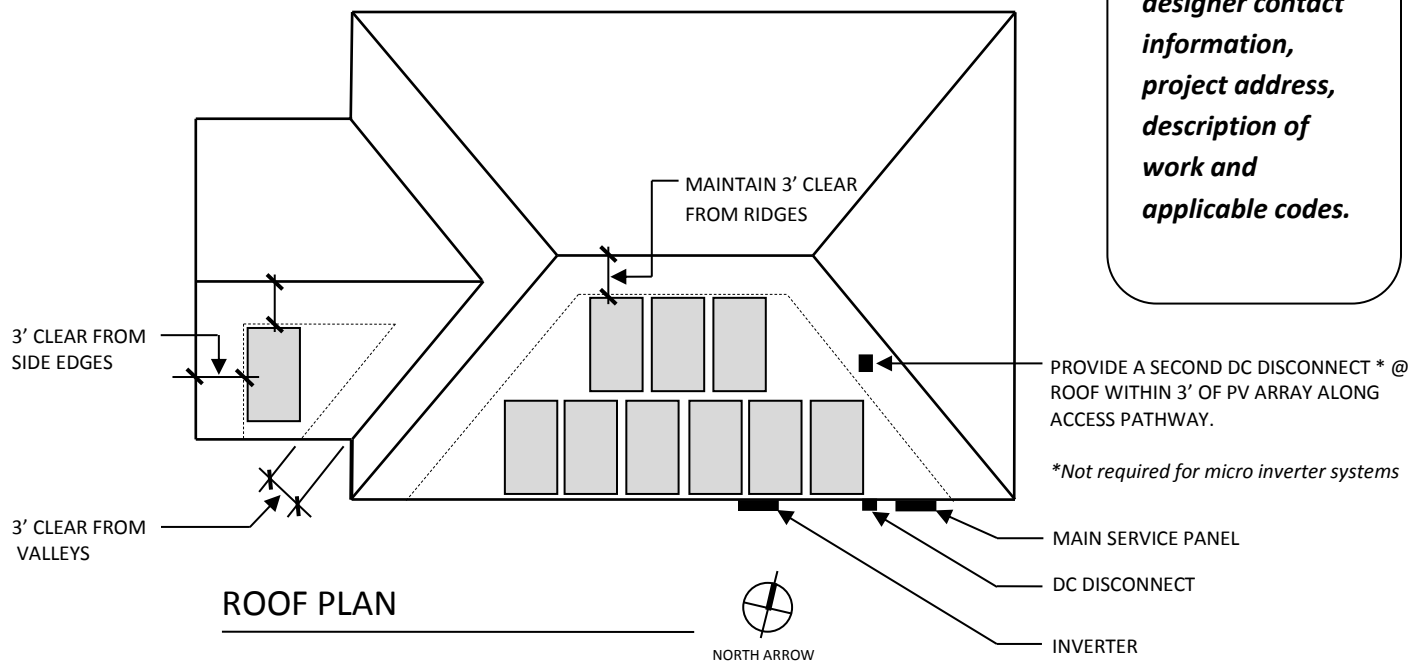
DRAWINGS

Provide the following drawings stapled together in a single set of plans. Also, include cut sheets for all equipment specified in the project. These documents can be separate from the plans. The submittal will require **3 sets of plans**. The plans must contain the following minimum information:

1. ROOF PLAN

The required clearances must be maintained for Fire Department access as shown on the drawing below. Show the location of all system components on the plan such as: disconnects, service panel and the inverter. See notes for requirements.

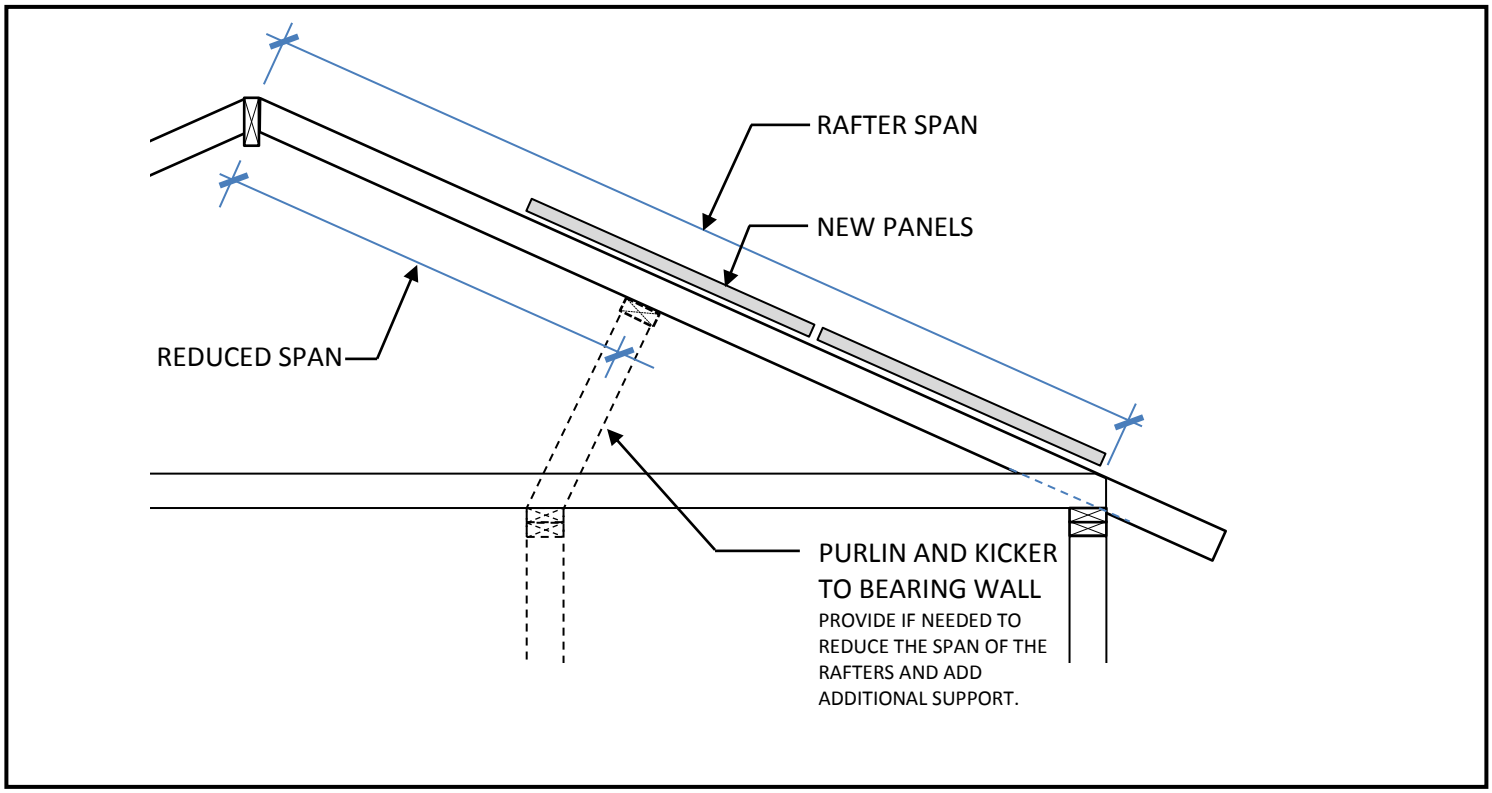
The first sheet of the set must include the designer contact information, project address, description of work and applicable codes.



2. ATTACHMENT DETAILS and STRUCTURAL INFORMATION

- Only use listed mounting hardware.
- Verify that each component is compatible with the system.
- Provide cut sheets for each product and install according to the manufacture's installation instructions.
- Verify flashing, and counter flashing at roof penetrations. Install per manufactures installation instructions.

NOTE: Flush mounted panels as shown in the example drawing below do not require structural calculations. However, **panels that are tilted at a steeper angle than the roof will require structural calculations to verify wind load resistance**. The calculations must be prepared by an engineer and included with the submittal. Calculations must be stamped and signed by the engineer in order to be accepted for review. The City of Hayward will charge hourly plan review fees for residential solar installations that require structural calculations.

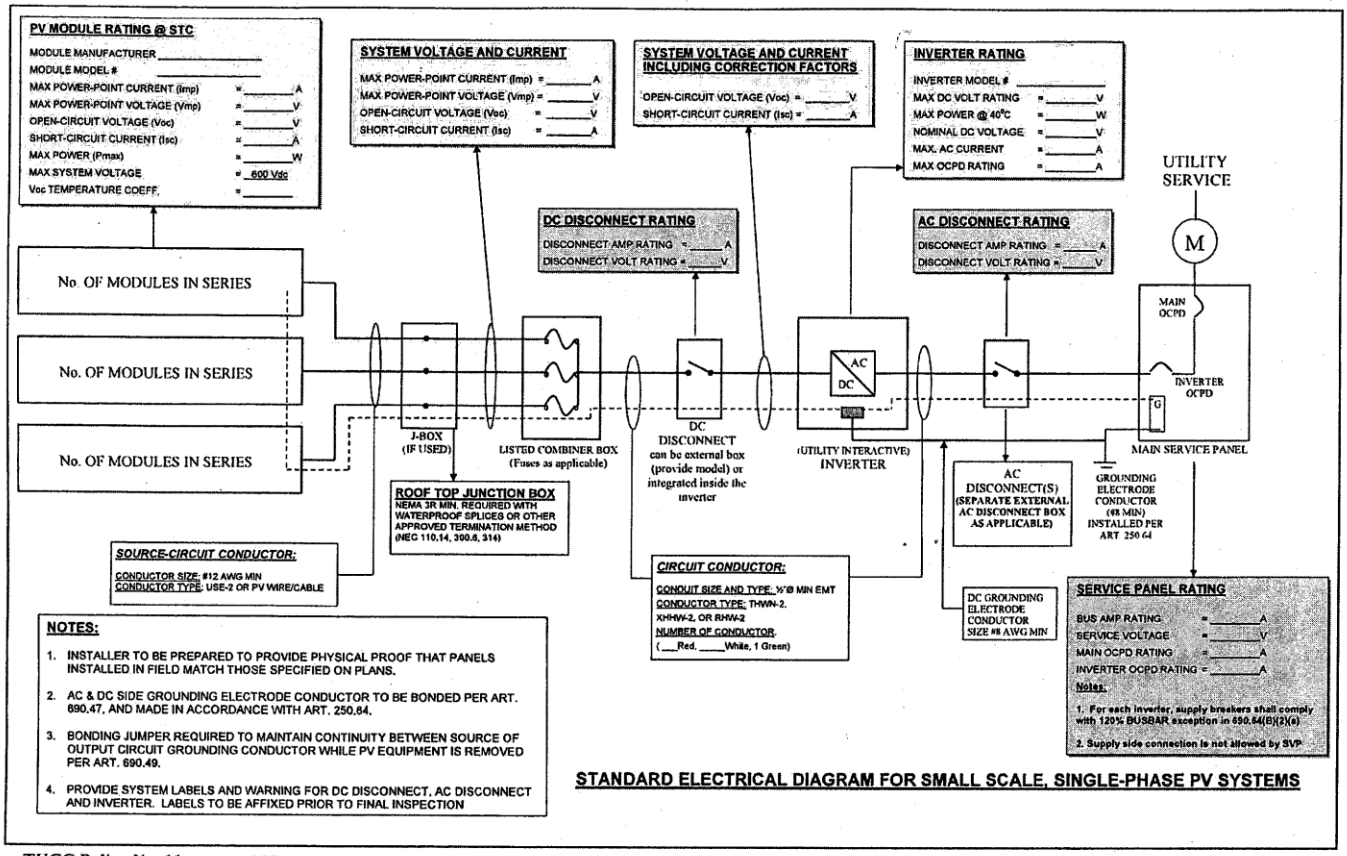


3. SINGLE LINE DIAGRAM

- **NOTE:** It is the contractor's responsibility to fully comply with the requirements of Article 690 in the California Electrical Code. Confirm that all relevant code items are communicated in the single line drawing.
- Provide cut sheets for each component indicated on the single line diagram. This includes: inverters, disconnects and PV modules.

Commonly Missed Code Items *(for a successful project, be sure to address these commonly missed requirements):*

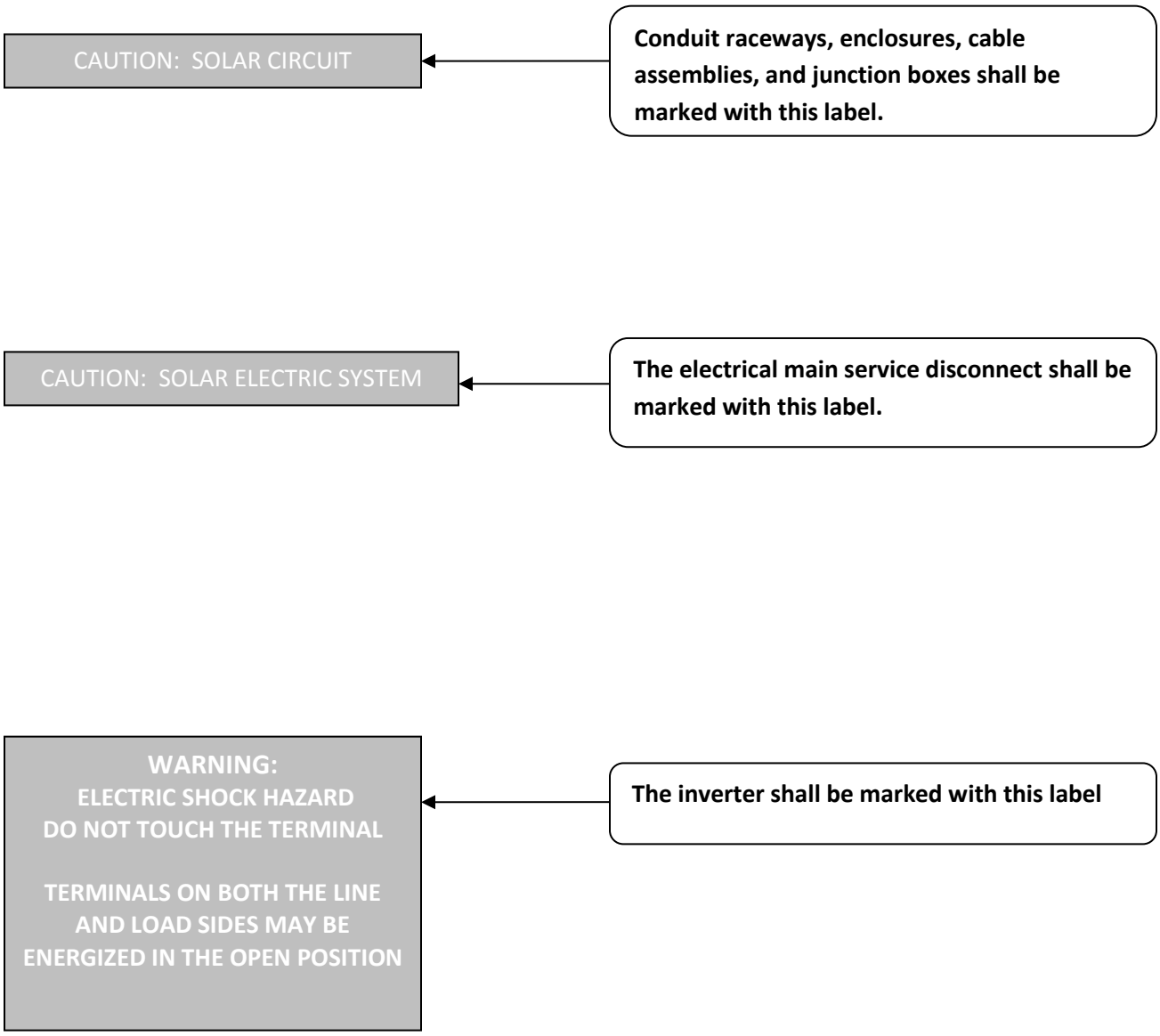
1. **Photovoltaic disconnecting means shall be installed at a readily accessible location at the exterior of the building. See CEC 690.14 (C) (5).**
2. **PV source conductors that penetrate the building shall be installed in a metallic raceway or enclosure to the first readily accessible disconnecting means located at the exterior of the building.**
3. **Size and locate load side tie at main service per CEC Article 690.**
4. **For DC systems, a NEMA 4X or NEMA3R (when mounted vertically) rooftop DC disconnect shall be installed within 3 feet of PV array.**



TUCC Policy No. 11 (Approved 7/8/2010)

4. REQUIRED WARNING LABELS

- Include diagrams of warning labels on the plans per Article 690 of the California Electrical Code. Examples and required locations are shown below.



CHECKLIST

This checklist is a summary of the specific code-related items required for submittal and for the inspection phase. It is intended as a reference for the system designer and contractor.

APPROVED PLANS

The job site copy of the approved drawings and the job card shall be available on site during a scheduled inspection. **The following information shall be part of the approved plan set:**

- ☐ Solar panel locations with required 3 foot clearances from ridges, valleys and side edges.
- ☐ Rooftop DC disconnects within 3ft of solar panel arrays along access pathway.

  EXCEPTION: micro inverter systems do NOT require rooftop DC disconnects.
- ☐ Locations of inverter, main electrical service panel, and main service DC disconnect
- ☐ Attachment details of solar panels to roof
- ☐ Electrical single line diagram
- ☐ All load & conduit fill calculations including de-rating factors
- ☐ Manufactures specification data sheets for all equipment to be installed

INSTALLATION

Installation of the photovoltaic system shall comply with the 2013 California Electrical Code (CEC) in its entirety, specifically articles 690 & 705, Section 605 of the California Fire Code and City of Hayward Fire Code Ordinance.

- ☐ **Start of Work** – The contractor shall not start work on a project without approved plans.
- ☐ **DC Disconnect** - The main service DC disconnect shall be at a readily accessible location on the outside of a building. Rooftop disconnects shall be listed as NEMA type 4X.

  EXCEPTION: NEMA type 3R disconnects may be used if installed vertically as per listing.
- ☐ **The Point of Interconnection** termination on the supply side of the service disconnecting means shall require evaluation by an approved Third Party Testing Agency or shall terminate on the load side at a listed overcurrent protective device per Art. 705.12(A) & (D) of the 2013 (CEC).
- ☐ **Marking and Labeling** - Marking is required on photovoltaic system including all interior and exterior DC conduits, enclosures, raceways, cable assemblies, every 10 feet within 1 foot of all turns or bends and within 1 foot above and below all penetrations of roof/ceiling assemblies and all walls and /or barriers. The materials used for marking shall be reflective, weather resistant and suitable for the environment. Marking shall have all letters capitalized with a minimum height of 3/8 inch white on red background. The marking shall contain the words: **WARNING: PHOTOVOLTAIC POWER SOURCE.**

- ☐ Warning signs shall be placed adjacent to the junction boxes, combiner boxes and disconnects in a location clearly visible from the location where the device is operated. The marking shall contain the words: **WARNING: ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINAL. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.**

- ☐ **Circuit Routing** - Photovoltaic source and photovoltaic output conductors, in and out of conduit, and inside of a building or structure, shall be routed along building structural members such as beams, rafters, trusses, and columns where the location of those structural members can be determined by observation. Where circuits are imbedded in built-up, laminate, or membrane roofing materials in roof areas not covered by photovoltaic modules and associated equipment, the location of circuits shall be clearly marked.
  Conduit, wiring systems, and raceways for photovoltaic circuits should be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes should take the shortest path from the array to the DC combiner box.

- ☐ **Wiring** - DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. Wiring exposed to the weather shall be rated labeled and approved for outdoor use. Where flexible metal conduit (FMC) or metal clad cable (MC) smaller than metric designator 21 (trade size 3⁄4) containing PV power circuit conductors is installed across ceilings or floor joists, the raceway or cable shall be protected by substantial guard strips that are at least as high as the raceway or cable. Where run exposed, other than within 6 feet of their connection to equipment, these wiring methods shall closely follow the building surface or be protected from physical damage by an approved means.

- ☐ **Distance** - Wiring shall not be installed within 10 inches of the roof decking or sheathing except where directly below the roof surface covered by PV modules and associated equipment. Circuits shall be run vertically from the roof penetration point to supports a minimum of 10 inches below the roof decking.

- ☐ **Ground** - Exposed non-current carrying metal parts of module frames, equipment and conductor enclosures shall be grounded regardless of voltage.

INSPECTION

- ☐ **Final Building Inspection** – A final Building Inspection shall be called for before 11:30pm the night before the requested day of inspection.

- ☐ **Safe Roof Access** – The permit holder shall provide a safe ladder, free of defects and rated for a minimum of 250 pounds. The ladder shall extend 3 feet above the roof and shall be secured to the building. Without a safe means to access the roof, the inspection may be failed.

- ☐ **Smoke and Carbon Monoxide Alarms** -- The residence shall be open for the electrical inspection of Smoke & Carbon Monoxide detectors in all locations designated by the California Residential Code. (i.e. halls & bedrooms at each level).
  EXCEPTION: A Smoke and Carbon Monoxide Alarm Self-Certification may be submitted to Building Inspector during Final Inspection.