City of Manhattan Beach
Community Development

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Photovoltaic Solar Panel Plan Check Guidelines

Updated: 09-14-12

Please attach these forms to approved plans

1. All work must comply with 2010 California Building Code and Electrical Code as well as applicable Manhattan Beach Municipal Code and amendments.

2. Provide engineering calculations and details demonstrating method of attachment of panels and adequacy of supporting members. Include wind uplift effects. Per ASCE 7-05, all calculations and designs to be stamped and signed by the engineer of record.
   Exemption for new Single Family Dwelling or Duplexes built after 1990: engineering calculations are not required, but the following must be provided:
   - Structural framing plans for the existing building
   - Solar panels must be flush mounted on the roof (4" from surface)
   - Pre-fabricated roof systems require plans
   - Structural installation details for the photovoltaic system

   Structural calculations by a licensed Engineer or Architect may be required at plan check, as determined by the Plan Check Engineer.

3. Provide elevation drawings that show heights of the panels and indicate how they comply with the height limit for the property.

4. Per Planning Division requirements:
   - Provide a site plan that shows location of panels and all related equipment, and distances to property lines.
   - Panels and equipment cannot be located in required front or side setbacks or required parking areas.
   - Related equipment may be located where on-site utility meters are permitted. 36" clear of P/L
   - Ground-mounted panels may be located where accessory structures are permitted.
   - Solar panel height must comply with MBMC 10.60.060 A (see page 7).

5. Visually screen all related equipment and conduit in accordance with MBMC 10.60.090.

6. Provide three (3) sets of plans, minimum 18" x 24"; attach all manufacturer's specification sheets, installation instructions and listing.

7. Add notes to plans: "Exterior Remote Disconnect @ Roof Top and @ Inverter/Panel: DC array conductors that are routed and installed completely on the exterior of the building shall be contained in galvanized rigid steel conduit from any PV array rooftop "J" box, fusible combiner box, or fusible DC disconnect @ rooftop to the ground level DC disconnect and/or inverter (integral or separate components). These DC array conductors installed in galvanized rigid steel conduit need to be run entirely on the exterior of the building."

8. Add notes to plans: "Interior Remote Disconnect: DC array conductors that are routed through the building are required to be in galvanized rigid steel conduit from any PV array rooftop "J" box, fusible combiner box, or fusible DC disconnect through any attic. Conduit run through the interior of the building shall be installed a minimum of 18 inches below the roof surface. Note: E.M.T conduit is not approved for exterior use or the interior attic space.

9. Add note to plans: "Inspection required for roof connection mounting assemblies prior to installing solar module."

10. Provide DC array solar panel Voc calculated @ x 1.13 [Temp. Coor.] //Isc calculated @ x 125% [CEC-690] x 125% [UL 1703].

11. Provide complete inverter and solar module manufacturer specification sheet.

12. Show all conduit and conductor sizes, include derating of conductors.

13. Inverter integral AC/DC disconnects are not permitted. The AD/DC disconnects must be the blade-type (not drum-type). Drum-type disconnects are not permitted.

14. AC disconnect between inverter AC output and connection to utility to be a visible blade, lockable type disconnect listed for its use.
Required DC disconnects @ roof top and at entrance of ground mounted inverters, to be visible blade-type listed for its use.

15. Distance between inverter and next downstream AC over current protection device to be maximum 25 feet. AC over current device is required prior to entering the building (line of sight).

16. Verify main electrical service over current device and buss rating. For a dwelling unit the sum of the ampere ratings of the over current devices shall not exceed 120% or the rating of the busbar or conductor.

17. Show existing main electric service equipment and ground electrode system, conduit and conductor size.

18. Provide ground electrode system from inverter to existing main service ground electrode per CEC Article 250.50 through 250.86.

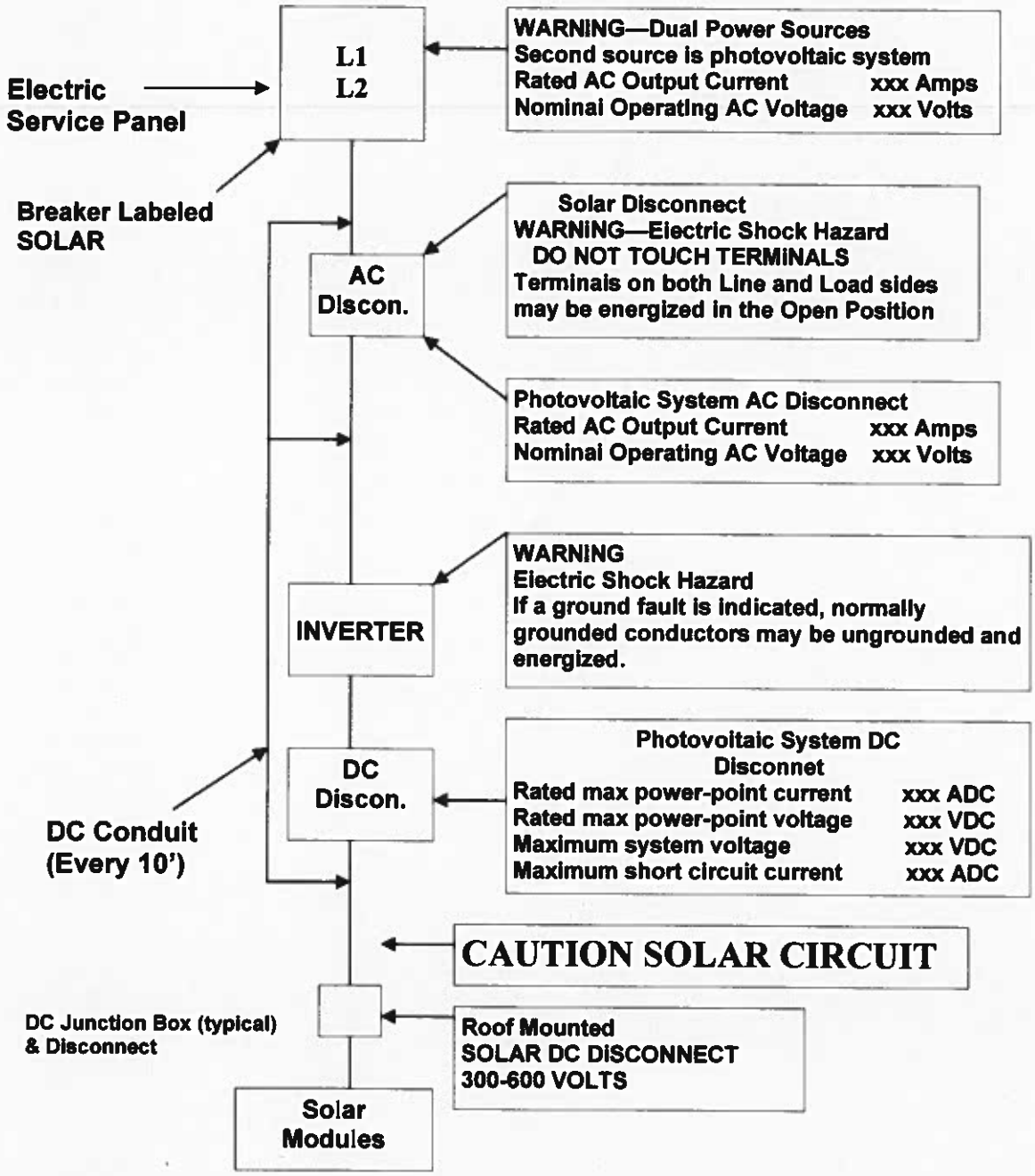
19. Ground electrode conductor from inverter to ground electrode to be minimum protection of bare armor sheathed cable, #8 awg. minimum.

20. Show all signage required per 2010 CEC – Article 690. See **page 3**.

21. Fire Department review is required, comply with all Fire Department requirements, and see Fire Department Guidelines **page 6**.

CITY OF MANHATTAN BEACH

PHOTOVOLTAIC SIGNAGE REQUIREMENTS
Per 2010 CEC—Article 690

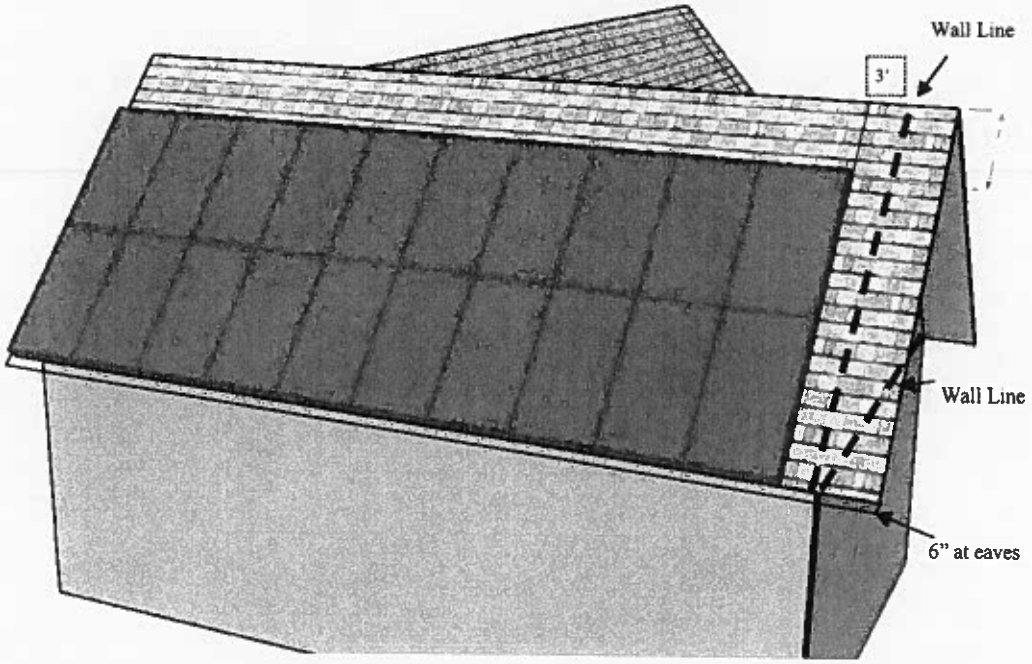


SIGNAGE

Signage material shall be reflective, weather-resistant material suitable for the environment. All signage shall fall within the following format:

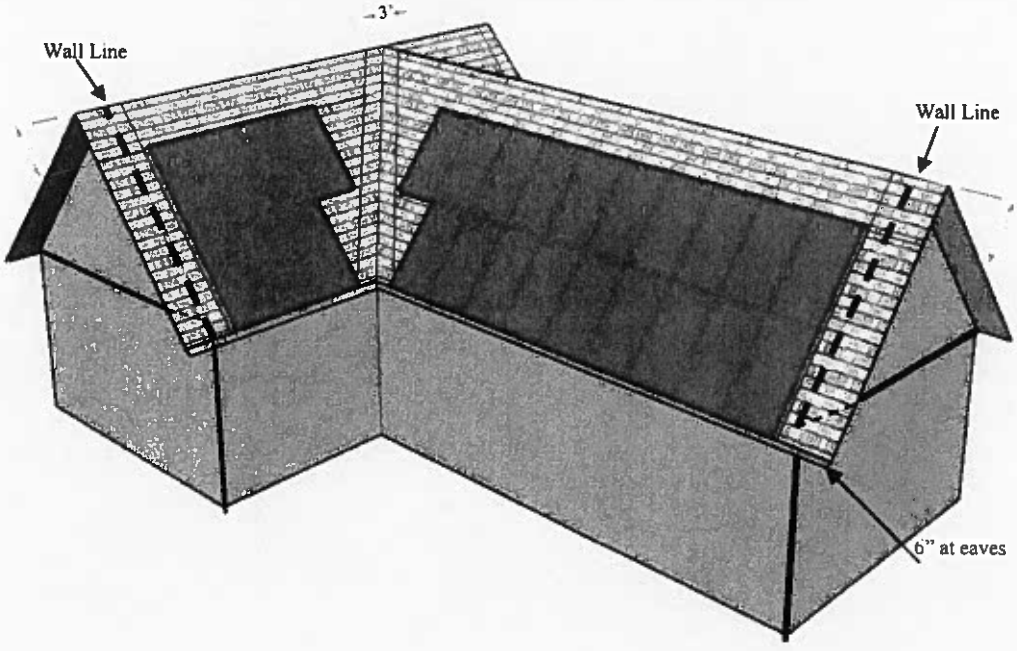
- White Lettering on a Red Background
- Minimum 3/8" Letter Height
- All Letters Shall be Capitalized
- Arial or Similar Font, Non-Bold

RESIDENTIAL DIAGRAM 1: Cross Gable Roof

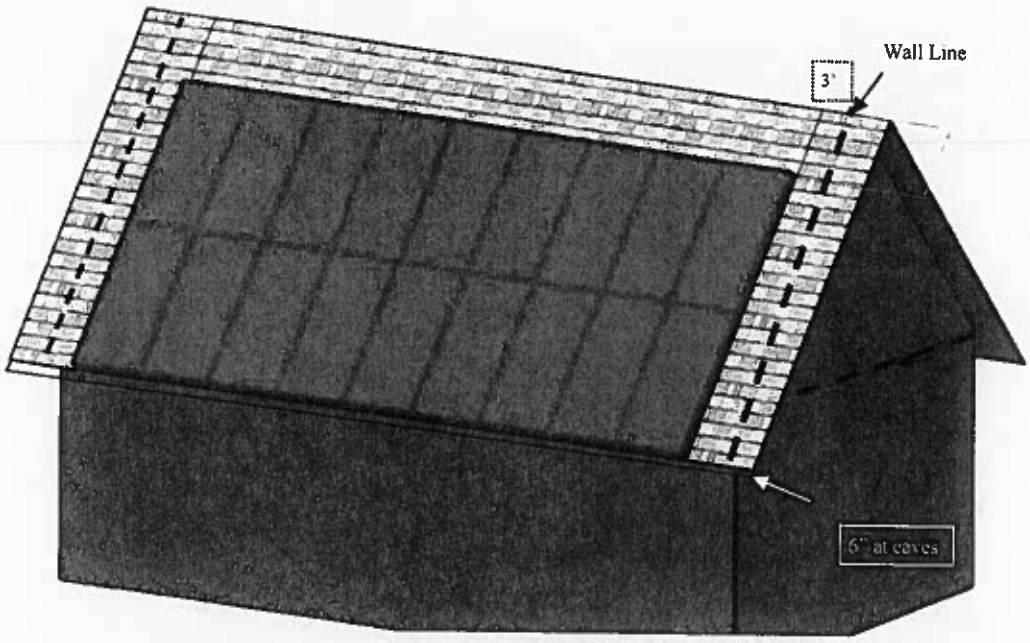


Three feet (3') measured from face of exterior wall line at non-structural eaves.

RESIDENTIAL DIAGRAM 2: Cross Gable with Valley

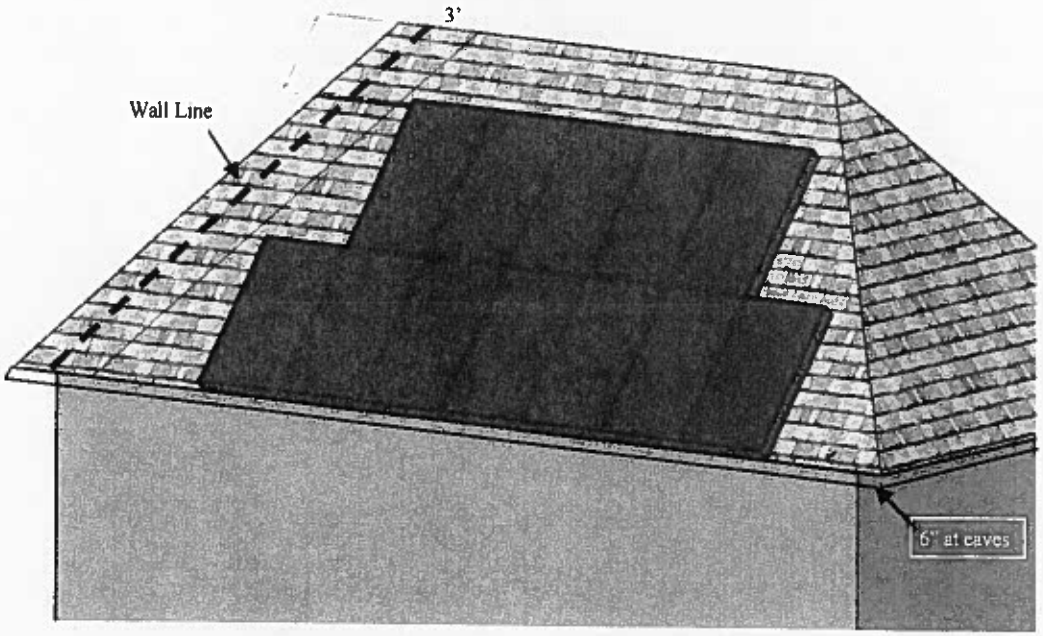


RESIDENTIAL DIAGRAM 3: Full Gable



Three feet (3') measured from face of exterior wall line at non-structural eaves.

RESIDENTIAL DIAGRAM 4: Full Hip Roof



CITY OF MANHATTAN BEACH
FIRE DEPARTMENT
SOLAR PHOTOVOLTAIC (PV) REQUIREMENTS

Solar Photovoltaic arrays on roofs compromise firefighting tactics and operations during a structure fire. The Fire Department requirements provide for firefighter safety by allowing safe access to the roof, safe maneuverability while on the roof, and safe accomplishment of effective ventilation of heat and smoke during a fire.

RESIDENTIAL & COMMERCIAL STRUCTURES

- ACCESSIBILITY
  - Residential panel clusters are limited to a 50 foot by 50 foot (50' x50') area and separated by 3 feet.
  - Commercial or non-residential clusters may be no greater than 150' by 150' with a minimum 8' separation.
  - Commercial access perimeter shall be a minimum 6 ft. wide, clear around the edges of roof.
  - All distances are measured from the wall line
    (a) Residential placement of panels on hip roofs and single ridge layouts shall provide at least one 3' wide clear access pathway from the eave to the ridge on each roof slope.
    (b) Six inch (6") clearance is requested along eaves.
    (c) Residential buildings with a flat roof shall provide a 4' wide perimeter access.
    (d) **See pages 4 & 5 for diagrams.**

  - The access pathway shall be located at a structurally strong location on the building, such as a bearing wall.
  - Hips and Valleys: modules should be located no closer than one and one half feet (1 ½') to a hip or valley.
  - Skylights, access or ventilation hatches require 3' clearance, for residential, around two sides with 3; pathway access. 4' clearance and access for commercial.
  - Provide 4' access and clearance around HVAC systems and other motorized or electric appliances mounted on the roof tops.
  - Alternate methods and means of compliance may be considered, if approved by the Fire Marshal and Building Official.

- VENTILATION ACCESS AREA
  - ALL Roofs MUST have an area, at least 5 feet x 5 feet clear, in order to accomplish firefighting ventilation. Area must be easily accessible and functional so firefighters can safely cut a ventilation hole while performing firefighting efforts.
  - Structures that have installed full fire sprinkler systems may be exempt, by the Fire Marshal, from the ventilation access area. requirements.

- BATTERY STORAGE
  - Battery systems must comply with Fire Code requirements. See Fire Marshal