



*County of Santa Barbara*

## Structural Criteria for Residential Rooftop Solar Energy Installations

### Use of this document

This toolkit document includes a one-page list of structural criteria for expedited plan check review flush-mounted solar arrays installed on the roofs of wood-framed one- and two- family dwellings. This document applies to “Flush-mounted” means the modules are installed parallel to, and relatively close to, the roof surface (see the “Solar Array Check” section of the Structural Criteria for specific qualifying requirements). This list is intended to be a simple pre-installation check to gain reasonable assurance that the design of the solar array complies with the structural provisions of the 2016 California Building Code (CBC) and 2016 California Residential Code (CRC). It is not intended to provide post-installation inspection criteria.

# STRUCTURAL CRITERIA FOR RESIDENTIAL FLUSH-MOUNTED SOLAR ARRAYS

## 1. ROOF CHECKS

A. Visual Review/Contractor's Site Audit of Existing Conditions:

- 1) Is the roof a single roof without a reroof overlay?  Y  N
- 2) Does the roof structure appear structurally sound, without signs of alterations or significant structural deterioration or sagging, as illustrated in Figure 1?  Y  N

B. Roof Structure Data:

- 1) Measured roof slope (e.g. 6:12): \_\_\_\_\_:12
- 2) Measured rafter spacing (center-to-center): \_\_\_\_\_ inch
- 3) Type of roof framing (rafter or manufactured truss):  Rafter  Truss

Wind Region

	Yes	No
1- Is the dwelling farther than 200 yards from the ocean or a large coastal bay		
2- Is the dwelling in Gaviota Special wind zone, if yes answer following two questions:		
A) Is the dwelling in an urban, suburban or wooded area, and <u>not</u> within 500 yards of open fields and grasslands?		
B) Is the dwelling in a relatively flat area (grade less than 5%) and not within 500 yards of the crest of a tall hill?		

## 2. SOLAR ARRAY CHECKS

A. Flush-mounted Solar Array:

- 1) Is the plane of the modules (panels) parallel to the plane of the roof?  Y  N
- 2) Is there a 2" to 10" gap between underside of module and the roof surface?  Y  N
- 3) Modules do not overhang any roof edges (ridges, hips, gable ends, eaves)?  Y  N

B. Do the modules plus support components weigh no more than:

4 psf for photovoltaic arrays or 5 psf for solar thermal arrays?  Y  N

C. Does the array cover no more than half of the total roof area (all roof planes)?

Y  N

D. Are solar support component manufacturer's project-specific completed worksheets, tables with relevant cells circled, or web-based calculator results attached?

Y  N

E. Is a roof plan of the module and anchor layout attached? (see Figure 2)

Y  N

F. Roof slop does not exceed 6 to 12?

Y  N

G. Horizontal and vertical spacing of anchor does not exceed 4'-0" on center?

Y  N

H. Wind Uplift Check (Anchor Fastener Check):

1) Anchor fastener data (see Figure 3):

a. Diameter of lag screw, hanger bolt or self-drilling screw: \_\_\_\_\_ inch

b. Embedment depth of rafter: \_\_\_\_\_ inch

c. Number of screws per anchor (typically one): \_\_\_\_\_

d. Are 5/16" diameter lag screws with 2.5" embedment into the rafter used, OR does the anchor fastener meet the manufacturer's guidelines?  Y  N

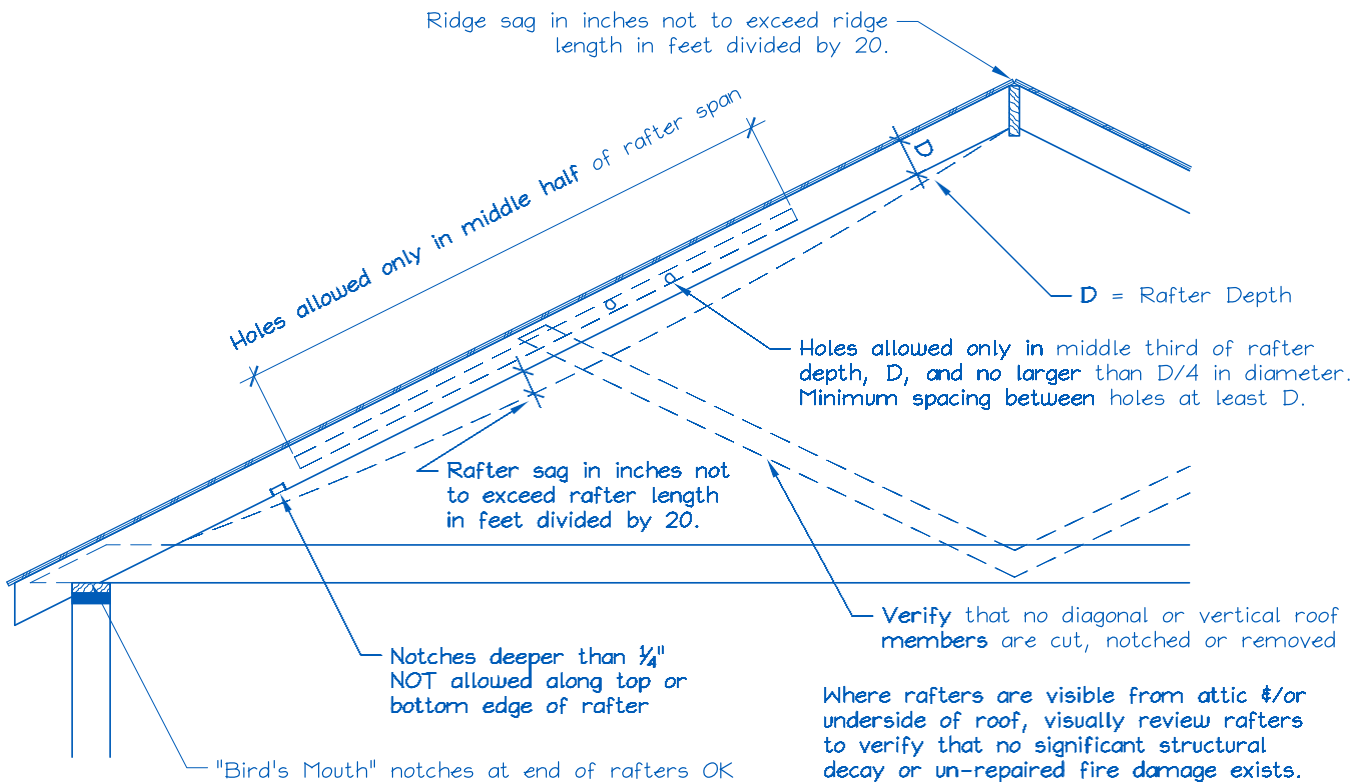
## 3. SUMMARY

- A. All items above are checked YES. No additional calculations are required.
- B. One or more items are checked NO. Attach project-specific drawings and calculations stamped and signed by a California-licensed civil or structural engineer.

Job Address: \_\_\_\_\_ Permit #: \_\_\_\_\_

Contractor/Installer: \_\_\_\_\_ License # & Class: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_ Phone #: \_\_\_\_\_

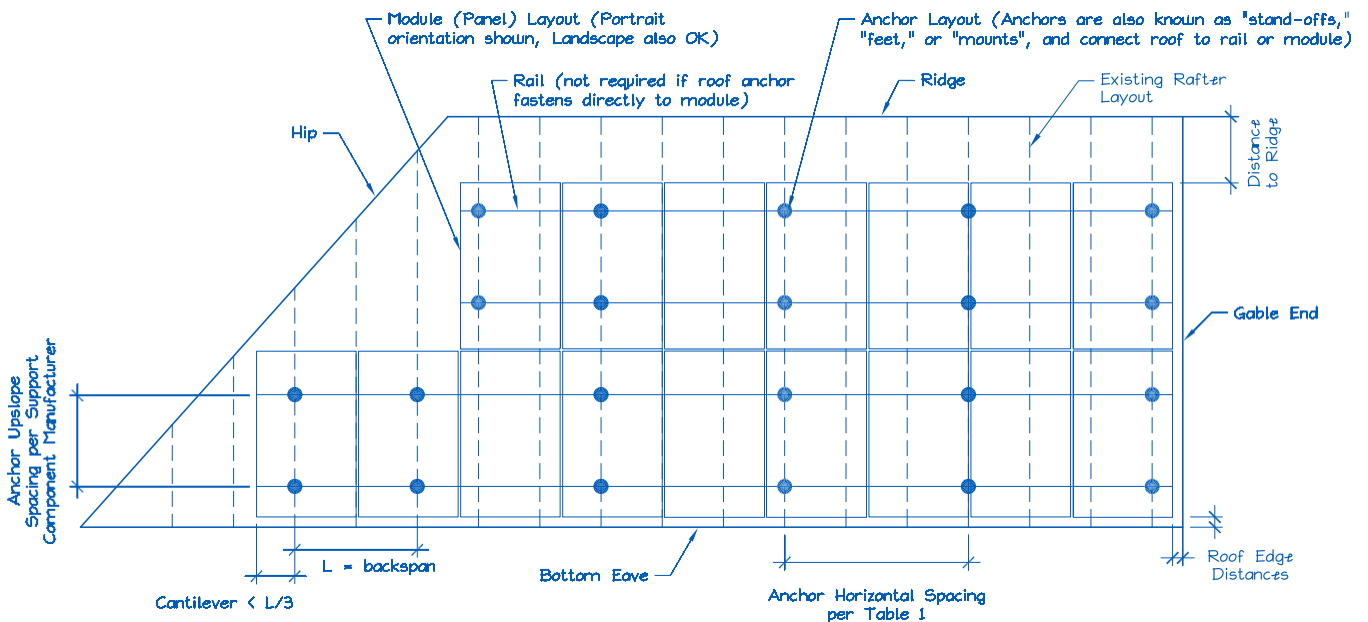


**Figure 1. Roof Visual Structural Review (Contractor's Site Audit) of Existing Conditions.**

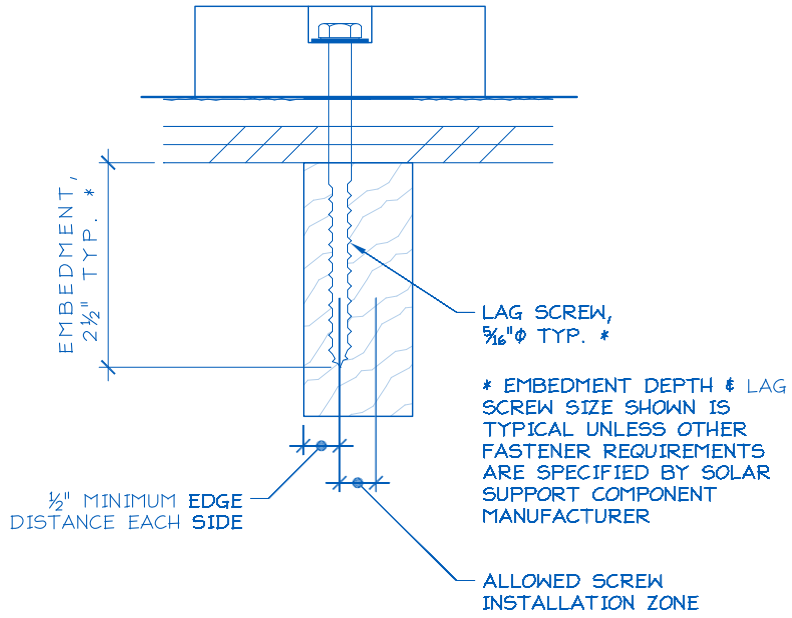
The site auditor should verify the following:

1. No visually apparent disallowed rafter holes, notches and truss modifications as shown above.
2. No visually apparent structural decay or un-repaired fire damage.
3. Roof sag, measured in inches, is not more than the rafter or ridge beam length in feet divided by 20.

Rafters that fail the above criteria should not be used to support solar arrays unless they are first strengthened.



**Figure 2. Sample Solar Panel Array and Anchor Layout Diagram (Roof Plan).**



**Figure 3. Typical Anchor with Lag Screw Attachment.**