



**BUILDING CODE MANUAL
COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY DIVISION
Based on the 2014 LACBC**

**#161
6807
Article 1
04-04-16
Page 1 of 4**

EXPEDITED PERMITTING FOR SMALL RESIDENTIAL ROOFTOP SOLAR ENERGY SYSTEMS

The County of Los Angeles is committed to provide an expedited, streamlined permitting process to encourage the use of small residential rooftop solar energy systems. Chapter 68-Expedited Permitting for Small Residential Rooftop Solar Energy Systems provides for expedited permit processing of small residential rooftop solar energy systems on one- or two-family dwelling that involves either a photovoltaic system that is no larger than 10 kilowatts alternating current or a solar thermal system that is no larger than 30 kilowatts thermal.

Permit Application and Plan Review

This information is intended for projects that comply with the checklists and standard plans as developed in substantial conformance with the California Solar Permitting Guidebook adopted by the Governor's Office of Planning and Research.

Rooftop solar energy systems shall not be installed on structures constructed without permits as required by the Building Code. Applicants submitting an application for expedited permit processing shall be informed accordingly and shall acknowledge by completing Form A (Affidavit for Contractor), Form B (Affidavit for Owner-Builder), or Form C (Affidavit for Contractor Only) that they are aware of the County of Los Angeles policy that a rooftop solar energy system shall not be installed on any unpermitted structure on the property. Refer to Attachments A, B, H, J, and K, submittal requirements and eligibility checklists for processing solar energy systems permit applications.

Solar Photovoltaic System

Solar photovoltaic (PV) submitted plans shall comply with the Eligibility Checklist (Attachment B), the appropriate Solar PV Standard Plan (Attachment C or D), and the Structural Criteria (Attachment E) which have been developed in substantial compliance with the California Solar Permitting Guidebook.

Solar Domestic Water Heating System

Solar domestic water heating submitted plans shall comply with the Eligibility Checklist (Attachment J), the Solar Domestic Water Heating Standard Plan (Attachment L) and the Structural Criteria (Attachment N) which have been developed in substantial compliance with the California Solar Permitting Guidebook.

Solar Pool Heating System

Solar pool heating submitted plans shall comply with the Eligibility Checklist (Attachment K), the Solar Pool Heating Standard Plan (Attachment M) and the Structural Criteria (Attachment N) which have been developed in substantial compliance with the California Solar Permitting Guidebook.

Inspection

A combination inspection shall be conducted to inspect the structural, electrical, and plumbing components of the installation of small residential rooftop solar energy systems. One inspection shall be sufficient for the system when satisfactory evidence is submitted to verify that the installation and labeling of components meet requirements of the Building, Electrical, and Plumbing Codes. However, if any of the critical components of the system are concealed during installation, the installer shall provide photographs or video evidence at the time of inspection showing all items that have been concealed, including, but not limited to the following:

1. Fastening of roof mounting systems to structural framing members
2. Grounding and bonding of panels
3. Nameplates of modules and inverters
4. Clearance from bottom of roof in attic for conduits installed in this area (18 inch minimum required).

Supersedes BCM 6807 Article 1 dated 09-01-15

- Attachments:
- A – Submittal Requirements for PV Systems for One- and Two-Family Dwellings
 - B – Eligibility Checklist for Expedited Solar Photovoltaic Permitting for One- and Two-Family Dwellings
 - C – Solar PV Standard Plan – Simplified Central/String Inverter Systems for One- and Two-Family Dwellings
 - D – Solar PV Standard Plan – Simplified Microinverter and ACM Systems for One- and Two-Family Dwellings
 - E – Structural Criteria for PV Systems for One- and Two-Family Dwellings
 - F – Inspection Guide for PV Systems for One- and Two-Family Dwellings
 - G – Submittal Requirements for Solar Domestic Water Heating Installations for One- and Two-Family Dwellings
 - H – Submittal Requirements for Solar Pool Heating Installations for One- and Two-Family Dwellings
 - J – Eligibility Checklist for Expedited Solar Domestic Water Heating Permitting for One- and Two-Family Dwellings
 - K – Eligibility Checklist for Expedited Solar Pool Heating Permitting for One- and Two-Family Dwellings
 - L – Solar Domestic Water Heating Standard Plan for One- and Two-Family Dwellings
 - M – Solar Pool Heating Standard Plan for One- and Two-Family Dwellings
 - N – Structural Criteria for Residential Rooftop Solar Energy Installations for One- and Two-Family Dwellings

P – Inspection Guide for SDWH Systems for One- and Two-Family Dwellings

Q – Inspection Guide for Solar Pool Heating Systems for One- and Two-Family Dwellings

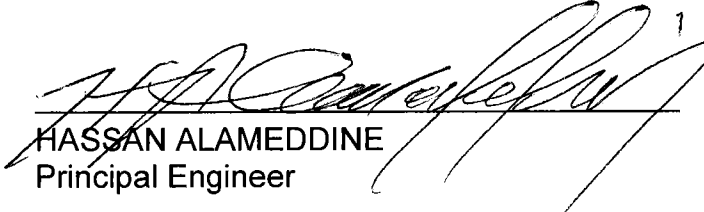
- Appendices:
- Appendix A – Example of photograph to readily identify location of project
 - Appendix B – Photograph example of structural connections, array of mounting, and flashing/sealing of roof penetrations
 - Appendix C – Photograph example of PV panel label
 - Appendix D – Photograph example of grounding/bonding of rack and modules
 - Appendix E – Photograph example of conduit installation (clearance) in attic

- Forms:
- Form A – Affidavit for Contractor
 - Form B – Affidavit for Owner-Builder
 - Form C – Affidavit for Contractor Only

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APPROVED BY:



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Principal Engineer



Submittal Requirements for PV Systems for One- and Two- Family Dwellings

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This information bulletin is published to guide applicants through a streamlined permitting process for small residential rooftop solar photovoltaic (PV) projects 10 kW in size or smaller. This bulletin provides information about submittal requirements for plan review, required fees, and inspections.

1. Approval Requirements

A combined solar energy permit, which includes building and electrical work, is required to install a solar PV system with a maximum power output of 10 kW.

2. Submittal Requirements

- a) Completed permit application form. This permit application form can be downloaded at <http://dpw.lacounty.gov/bsd/content>.
- b) Demonstrate compliance with the eligibility checklist for expedited permitting. See Attachment B – Eligibility Checklist for Expedited Solar Photovoltaic Permitting.
- c) A completed Standard Electrical Plan. The standard plan may be used for proposed solar installations 10 kW in size or smaller and can be downloaded at <http://dpw.lacounty.gov/bsd/content>.
- d) A roof plan showing roof layout, PV panels and the following fire safety items: approximate location of roof access point, location of code-compliant access pathways, PV system fire classification and the locations of all required labels and markings. Examples of clear path access pathways are available in the State Fire Marshal Solar PV Installation Guide. <http://osfm.fire.ca.gov/pdf/reports/solarphotovoltaicguideline.pdf>.
- e) Completed expedited Structural Criteria along with required documentation. Structural Criteria can be downloaded at <http://dpw.lacounty.gov/bsd/content>.
- f) Completed Form A, Form B, or Form C Affidavit. Forms A, B, and C can be downloaded at <http://dpw.lacounty.gov/bsd/content>.

3. Plan Review

Permit applications can be submitted electronically through the following website: <https://dpw.lacounty.gov/bsd/bsop> or to the local office having jurisdiction for the project, see <http://dpw.lacounty.gov/general/ServiceLocator/>.

4. Fees

Pursuant to Section 6805 of the Building Code, permit fees for the installation of small residential rooftop solar energy systems shall be charged according to the applicable fees prescribed in Section 107 of this Code and Section 82-8 of the Electrical Code, as applicable. The combined permit fee for small residential rooftop photovoltaic systems shall not exceed \$500 unless modified by or in accordance with Government Code Section 66015 or other applicable law.

5. Inspections

Once all permits to construct the solar installation have been issued and the system has been installed, it must be inspected before final approval is granted for the solar system. On-site inspections can be scheduled by contacting the local office by telephone. For contact information see our website at: <http://dpw.lacounty.gov/bsd/index.cfm?p=offices>.

Inspection requests received within business hours are typically scheduled for the next business day. If next business day is not available, inspection should happen within a five-day window.

Permit holders must be prepared to show conformance with all technical requirements in the field at the time of inspection. The inspector will verify that the installation is in conformance with applicable code requirements and with the approved plans.

The inspection checklist provides an overview of common points of inspection that the applicant should be prepared to show compliance. Common checks will include the following:

- Number of PV modules, layout, orientation and model number match plans and specification sheets.
- Array conductors and components are installed in a neat and workman-like manner.
- PV array is properly grounded and bonded matching approved plan details, specification sheets and installation instructions.
- Electrical boxes are accessible and connections are suitable for environment.
- Array is fastened and sealed according to attachment detail.
- Conductor type, rating and sizes match plans.
- Appropriate signs are properly constructed, installed and displayed, including the following.
 - Sign identifying PV power source system attributes at DC disconnect
 - Sign identifying AC point of connection
 - Sign identifying switch for alternative power system

- Sign identifying PV power source circuits at junction boxes and combiner box.
 - Sign identifying PV circuits on raceways.
 - Permanent plaque or directory, denoting all electric power sources on or in the premises.
- Equipment ratings are consistent with application and installed signs on the installation, including the following:
 - Inverter has a rating as high as max voltage on PV power source sign.
 - DC-side overcurrent circuit protection devices (OCPDs) are DC rated at least as high as max voltage on sign.
 - Switches and OCPDs are installed according to the manufacturer's specifications (i.e., many 600VDC switches require passing through the switch poles twice in a specific way).
 - Inverter is rated for the site AC voltage supplied and shown on the AC point of connection sign.
 - OCPD connected to the AC output of the inverter is rated at least 125% of maximum current on sign and is no larger than the maximum OCPD on the inverter listing label.
 - Sum of the main OCPD and the inverter OCPD is rated for not more than 120% of the bus bar rating.
 - Photographs or video image of attachment of the PV panels to the roof. Photos shall display 10% but no fewer than two of the total attachment points. See Attachment F - Inspection Guide for PV Systems.

6. Departmental Contact Information

For additional information regarding this permit process, please consult our departmental website at <http://dpw.lacounty.gov/bsd/content> or contact the local office having jurisdiction for the project.



Eligibility Checklist for Expedited Solar Photovoltaic Permitting for One- and Two-Family Dwellings

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GENERAL REQUIREMENTS

- A. System size is 10kW AC CEC rating or less Y N
- B. The solar array is roof-mounted on one- or two-family dwelling or accessory structure Y N
- C. The solar panel/module arrays will not exceed the maximum legal building height Y N
- D. Solar system is utility interactive and without battery storage Y N
- E. Permit application is completed and attached Y N

ELECTRICAL REQUIREMENTS

- A. No more than four photovoltaic module strings are connected to each Maximum Power Tracking (MPPT) input where source circuit fusing is included in the inverter
 - 1) No more than two strings per MPPT input where source circuit fusing is not included Y N
 - 2) Fuses (if needed) are rated to the series fuse rating of the PV module Y N
 - 3) No more than one noninverter-integrated DC combiner is utilized per inverter Y N
- B. For central inverter systems: No more than two inverters are utilized
- C. The PV system is interconnected to a single-phase AC service panel of nominal 120/220 Vac with a bus bar rating of 225 A or less Y N
- D. The PV system is connected to the load side of the utility distribution equipment Y N
- E. A Solar PV Standard Plan and supporting documentation is completed and attached Y N

STRUCTURAL REQUIREMENTS

- A. A completed Structural Criteria and supporting documentation is attached Y N

FIRE SAFETY REQUIREMENTS

- A. Clear access pathways provided Y N
- B. Fire classification solar system is provided Y N
- C. All required marking and labels are provided Y N
- D. A diagram of the roof layout of all panels, modules, clear access pathways and approximate locations of electrical disconnecting means and roof access points is completed and attached Y N

Notes:

1. *These criteria are intended for expedited solar permitting process.*
2. *If any items are checked NO, revise design to fit within Eligibility Checklist, otherwise permit application may go through standard process.*



Solar PV Standard Plan – Simplified
Central/String Inverter Systems for
One- and Two-Family Dwellings

SCOPE: Use this plan ONLY for utility-interactive central/string inverter systems not exceeding a system AC inverter output rating of 10kW on the roof of a one- or two-family dwelling or accessory structure. The photovoltaic system must interconnect to the load side of a single-phase AC service panel of nominal 120/240Vac with a bus bar rating of 225A or less. This plan is not intended for bipolar systems, hybrid systems or systems that utilize storage batteries, charge controllers, trackers, more than two inverters or more than one DC combiner (noninverter-integrated) per inverter. Systems must be in compliance with current California Building Standards Codes and local amendments of the authority having jurisdiction (AHJ). Other Articles of the California Electrical Code (CEC) shall apply as specified in 690.3.

MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed inverter, modules, combiner/junction boxes and racking systems. Installation instructions for bonding and grounding equipment shall be provided, and local AHJs may require additional details. Listed and labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling (CEC 110.3). Equipment intended for use with PV system shall be identified and listed for the application (CEC 690.4[D]).

Job Address: _____ Permit #: _____

Contractor/Engineer Name: _____ License # and Class: _____

Signature: _____ Date: _____ Phone Number: _____

Total # of Inverters installed: _____ (If more than one inverter, complete and attach the "Supplemental Calculation Sheets" and the "Load Center Calculations" if a new load center is to be used.)

Inverter 1 AC Output Power Rating: _____ Watts

Inverter 2 AC Output Power Rating (if applicable): _____ Watts

Combined Inverter Output Power Rating: _____ ≤ 10,000 Watts

Location Ambient Temperatures (Check box next to which lowest expected temperature is used):

- 1) [] Lowest expected ambient temperature for the location (TL) = Between -1° to -5° C
[] Lowest expected ambient temperature for the location (TL) = Between -6° to -10° C
Average ambient high temperature (TH) = 47° C
Note: For a lower TL or a higher TH, use the Comprehensive Standard Plan

DC Information:

Module Manufacturer: _____ Model: _____																
2) Module V_{oc} (from module nameplate): ____ Volts																
3) Module V_{oc} (from module nameplate): ____ Volts																
4) Module DC output power under standard test conditions (STC) = _____ Watts (STC)																
5) DC Module Layout																
Identify each source circuit (string) for inverter 1 shown on the roof plan with a Tag (e.g. A,B,C,...)	Number of modules per source circuit for inverter 1	Identify, by tag, which source circuits on the roof are to be paralleled (if none, put N/A)														
		Combiner 1:														
		Combiner 2:														
Total number of source circuits for inverter 1: _____																
6) Are DC/DC Converters used? <input type="checkbox"/> Yes <input type="checkbox"/> No If No, skip to Step 7. If Yes enter info below.																
DC/DC Converter Model #: _____	DC/DC Converter Max DC Input Voltage: ____ Volts Max															
Max DC Output Current: _____ Amps	DC Output Current: _____ Volts															
Max # of DC/DC Converters in an Input Circuit: _____	DC/DC Converter Max DC Input Power: _____ Watts															
7) Maximum System DC Voltage – Use A1 or A2 for systems without DC/DC converters, and B1 or B2 with DC/DC Converters.																
<input type="checkbox"/> A1. Module V_{oc} (STEP 2) = _____ x # in series (STEP 5) _____ x 1.12 (If $-1 \leq T_c \leq -5^\circ\text{C}$, STEP 1) = _____ V <input type="checkbox"/> A2. Module V_{oc} (STEP 2) = _____ x # in series (STEP 5) _____ x 1.14 (If $-6 \leq T_c \leq -10^\circ\text{C}$, STEP 1) = _____ V																
Table 2. Largest Module V_{oc} for Single-Module DC/DC Converter Configurations (with 80 V AFCI Cap) (CEC 690.7 and 690.11)																
Max. Rated Module V_{oc} (*1.12) (Volts)	30.4	33.0	35.7	38.4	41.1	43.8	46.4	49.1	51.8	54.5	57.1	59.8	62.5	65.2	67.9	70.5
Max. Rated Module V_{oc} (*1.14) (Volts)	29.8	32.5	35.1	37.7	40.4	43.0	45.6	48.2	50.9	53.5	56.1	58.8	61.4	64.0	66.7	69.3
DC/DC Converter Max DC Input (Step #6) (Volts)	34	37	40	43	46	49	52	55	58	61	64	67	70	73	76	79

Use for DC/DC converters. The value calculated below must be less than DC/DC converter max DC input voltage (STEP 6).

- B1. Module V_{oc} (STEP 2) = _____ x # of modules per converter (STEP 6) _____ x 1.12 (If $-1 \leq T_l \leq -5^\circ\text{C}$, STEP 1) = _____ V
- B2. Module V_{oc} (STEP 2) = _____ x # of modules per converter (STEP 6) _____ x 1.14 (If $-6 \leq T_l \leq -10^\circ\text{C}$, STEP 1) = _____ V

Table 1. Maximum Number of PV Modules in Series Based on Module Rated V_{oc} for 600 Vdc Rated Equipment (CEC 690.7)													
Max. Rated Module V_{oc} (*1.12) (Volts)	29.76	31.51	33.48	35.71	38.27	41.21	44.64	48.70	53.57	59.52	66.96	76.53	89.29
Max. Rated Module V_{oc} (*1.14) (Volts)	29.24	30.96	32.89	35.09	37.59	40.49	43.86	47.85	52.63	58.48	65.79	75.19	87.72
Max # of Modules for 600 Vdc	18	17	16	15	14	13	12	11	10	9	8	7	6

8) Maximum System DC Voltage from DC/DC Converters to Inverter — Only required if Yes in Step 6
Maximum System DC Voltage = _____ Volts

9) Maximum Source Circuit Current
Is Module I_{SC} below 9.6 Amps (Step 3)? Yes No (If No, use Comprehensive Standard Plan)

10) Sizing Source Circuit Conductors
Source Circuit Conductor Size = Min. #10 AWG copper conductor, 90° C wet (USE-2, PV Wire, XHHW-2, THWN-2, RHW-2)
For up to 8 conductors in roof-mounted conduit exposed to sunlight at least ½" from the roof covering (CEC 310)

Note: For over 8 conductors in the conduit or mounting height of lower than ½" from the roof, use Comprehensive Plan.

11) Are PV source circuits combined prior to the inverter? Yes No
If No, use Single Line Diagram 1 and proceed to Step 13.
If Yes, use Single Line Diagram 2 with Single Line Diagram 4 and proceed to Step 12.
Is source circuit OCPD required? Yes No
Source circuit OCPD size (if needed): 15 Amps

12) Sizing PV Output Circuit Conductors - If a combiner box will NOT be used (Step 11), Output Circuit Conductor Size = Min. #6 AWG copper conductor

13) Inverter DC Disconnect
Does the inverter have an integrated DC disconnect? Yes No If Yes, proceed to step 14.
If No, the external DC disconnect to be installed is rated for _____ Amps (DC) and _____ Volts (DC)

14) Inverter Information
Manufacturer: _____ Model: _____
Max. Continuous AC Output Current Rating: _____ Amps
Integrated DC Arc-Fault Circuit Protection? Yes No
(If No is selected, Comprehensive Standard Plan)
Grounded or Ungrounded System? Grounded Ungrounded

AC Information:

15) Sizing Inverter Output Circuit Conductors and OCPD

Inverter Output OCPD rating = _____ Amps (Table 3)

Inverter Output Circuit Conductor Size = _____ AMG (Table 3)

Table 3. Minimum Inverter Output OCPD and Circuit Conductor Size									
Inverter Continuous Output Current Rating (Amps) (Step 14)	12	16	20	24	28	32	36	40	48
Minimum OCPD Size (Amps)	15	20	25	30	35	40	45	50	60
Minimum Conductor Size (AWG, 75° C, Copper)	14	12	10	10	8	8	6	6	6

16) Point of Connection to Utility

Only load side connections are permitted with this plan. Otherwise, use Comprehensive Standard Plan.

Is the PV OCPD positioned at the opposite end from input feeder location or main OCPD location? Yes No

If Yes, circle the Max Combined PV System OCPD(s) at 120% value as determined from Step 15 (or Step S20), bus bar Rating, and Main OCPD as shown in Table 4. If No, circle the Max Combined PV System OCPD(s) at 100% value as determined from Step 15 (or Step S20), bus bar Rating, and Main OCPD as shown in Table 4.

Per 705.12(D)(2): [Inverter output OCPD size [Step #15 or S20] + Main OCPD Size] ≤ [bus size x (100% or 120%)]

Table 4. Maximum Combined Supply OCPDs Based on Bus Bar Rating (Amps) per CEC 705.12(D)(2)										
Bus Bar Rating	100	125	125	200	200	200	225	225	225	
Main OCPD	100	100	125	150	175	200	175	200	225	
Max Combined PV System OCPD(s) at 120% of Bus Bar Rating	20	50	25	60*	60*	40	60*	60*	45	
Max Combined PV System OCPD(s) at 100% Bus Bar Rating	0	25	0	50	25	0	50	25	0	

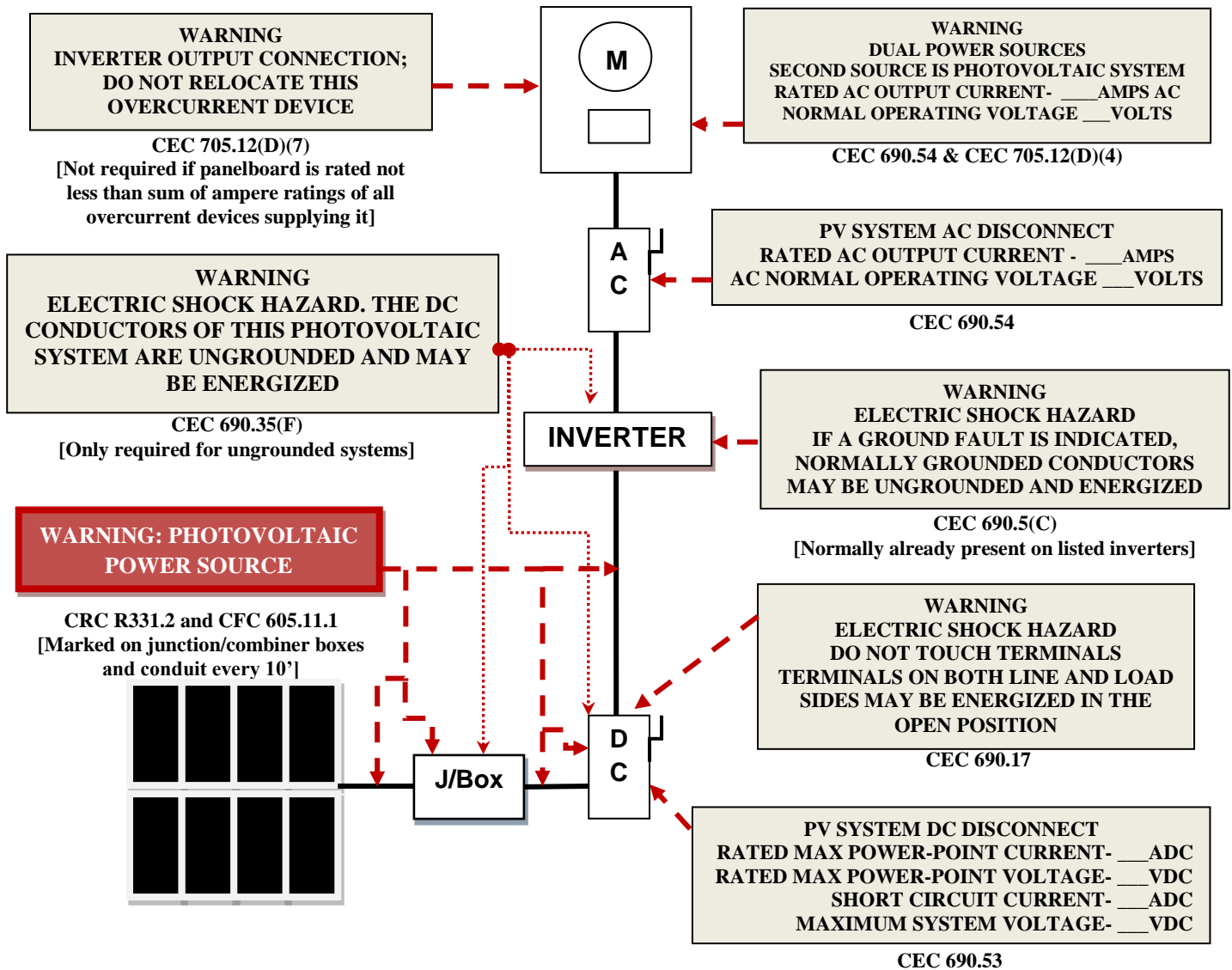
17 & 18 & 19) Labels and Grounding and Bonding

This content is covered by the labels on the next page and the Single Line Diagram(s). For background information, refer to the Comprehensive Standard Plan.

Solar PV Standard Plan – Simplified Central/String Inverter Systems for One- and Two-Family Dwellings

Markings

CEC Articles 690 and 705 and CRC Section R331 require the following labels or markings be installed at these components of the photovoltaic system:



Code Abbreviations:

- California Electrical Code (CEC)
- California Residential Code (CRC)
- California Fire Code (CFC)

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.

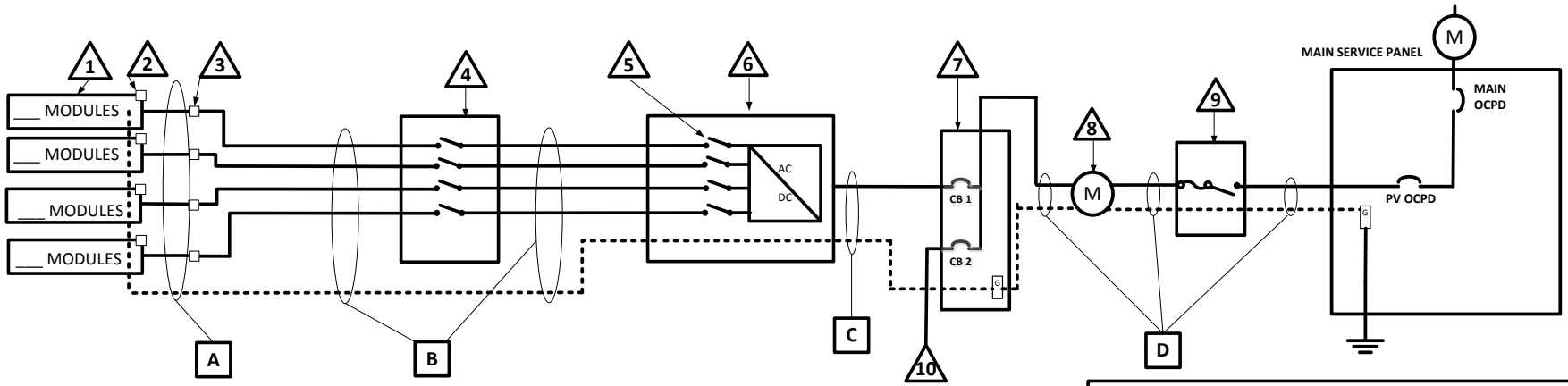
Solar PV Standard Plan – Simplified Central/String Inverter System for One- and Two-Family Dwellings

△TAG	DESCRIPTION
1	SOLAR PV MODULE / STRING
2	DC/DC CONVERTERS INSTALLED? YES / NO (IF YES, STEPS 6 & 8 REQUIRED)
3	SOURCE CIRCUIT JUNCTION BOX INSTALLED?: YES / NO
4	SEPARATE DC DISCONNECT INSTALLED?: YES / NO
5	INTERNAL INVERTER DC DISCONNECT: YES / NO
6	CENTRAL INVERTER
7	LOAD CENTER INSTALLED?: YES / NO
8	PV PRODUCTION METER INSTALLED?: YES / NO
9	SEPARATE AC DISCONNECT INSTALLED?: YES / NO
10	CONNECT TO INVERTER #2 (USE LINE DIAGRAM 2)

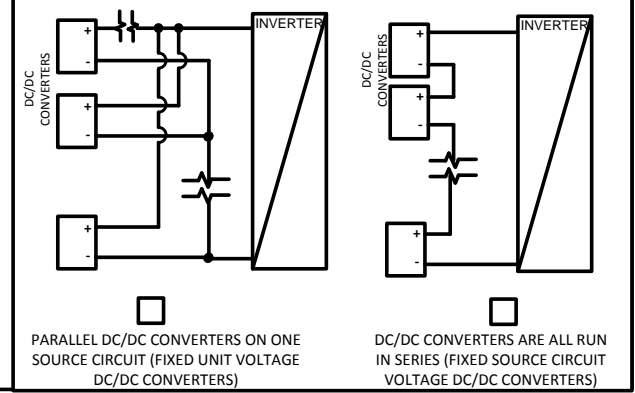
SINGLE-LINE DIAGRAM #1 – NO STRINGS COMBINED PRIOR TO INVERTER

CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED: GROUNDED (INCLUDE GEC) UNGROUNDED

FOR UNGROUNDED SYSTEMS:
 - DC OCPD MUST DISCONNECT BOTH CONDUCTORS OF EACH SOURCE CIRCUIT
 - UNGROUNDED CONDUCTORS MUST BE IDENTIFIED PER 210.5(C). WHITE-FINISHED CONDUCTORS ARE NOT PERMITTED.



IF DC/DC CONVERTERS ARE USED, CHECK THE BOX BELOW THE CORRESPONDING CONFIGURATION



CONDUCTOR/CONDUIT SCHEDULE					
□ TAG	DESCRIPTION AND CONDUCTOR TYPE	CONDUCTOR SIZE	NUMBER OF CONDUCTORS	CONDUIT/CABLE TYPE	CONDUIT SIZE
A	USE-2 <input type="checkbox"/> OR PV-WIRE <input type="checkbox"/>				
	EGC/GEC:				
B					
	EGC/GEC:				
C					
	EGC/GEC:				
D					
	EGC/GEC:				

ENTER "N/A" WHERE SUITABLE FOR WHEN NOT USING CONDUIT OR CABLE AS PERMITTED BY CODE

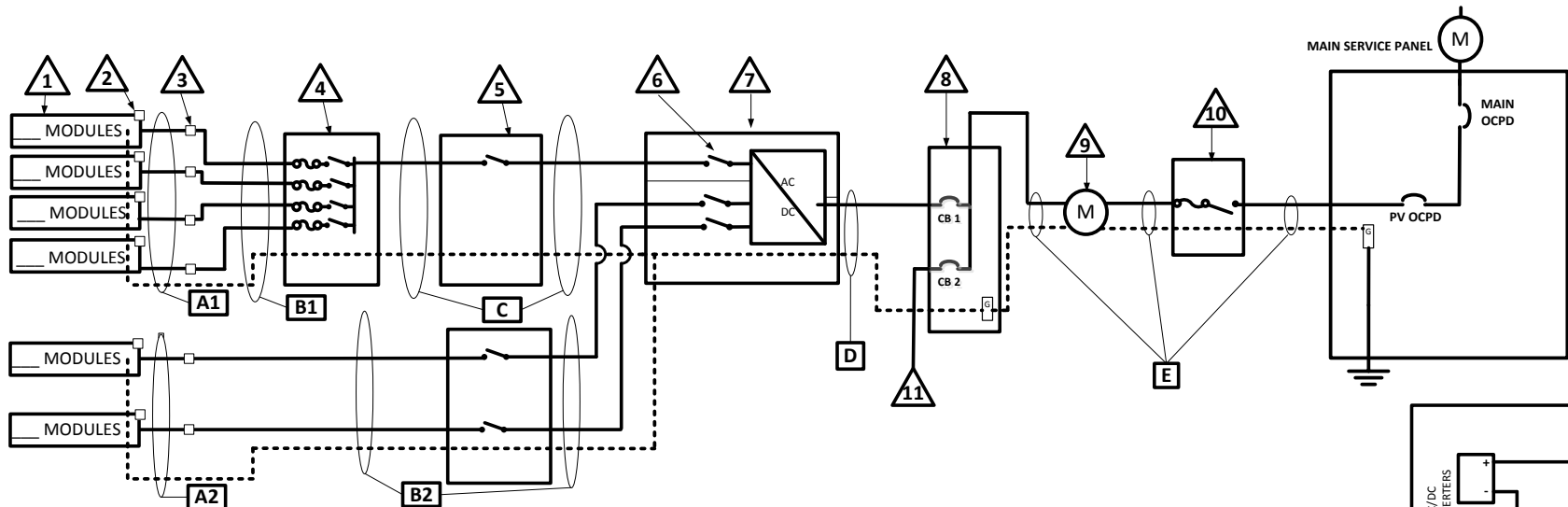
Solar PV Standard Plan – Simplified Central/String Inverter System for One- and Two-Family Dwellings

△ TAG	DESCRIPTION
1	SOLAR PV MODULE / STRING
2	DC/DC CONVERTERS INSTALLED? YES / NO (IF YES, STEPS 6 & 8 REQUIRED)
3	SOURCE CIRCUIT JUNCTION BOX INSTALLED?: YES / NO
4	COMBINER BOX (STEPS 11 & 12 REQUIRED)
5	SEPARATE DC DISCONNECT INSTALLED?: YES / NO
6	INTERNAL INVERTER DC DISCONNECT: YES / NO
7	CENTRAL INVERTER
8	LOAD CENTER INSTALLED?: YES / NO
9	PV PRODUCTION METER INSTALLED?: YES / NO
10	SEPARATE AC DISCONNECT INSTALLED?: YES / NO
11	CONNECT TO INVERTER #2 (USE LINE DIAGRAM 4)

SINGLE-LINE DIAGRAM #2 – COMBINING STRINGS PRIOR TO INVERTER

CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED: GROUNDED (INCLUDE GEC) UNGROUNDED

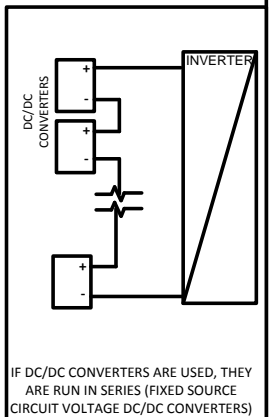
FOR UNGROUNDED SYSTEMS:
 - DC OCPD MUST DISCONNECT BOTH CONDUCTORS OF EACH SOURCE CIRCUIT
 - UNGROUNDED CONDUCTORS MUST BE IDENTIFIED PER 210.5(C). WHITE-FINISHED CONDUCTORS ARE NOT PERMITTED.



COMBINER CONDUCTOR/CONDUIT SCHEDULE					
□ TAG	DESCRIPTION AND CONDUCTOR TYPE	CONDUCTOR SIZE	NUMBER OF CONDUCTORS	CONDUIT/CABLE TYPE	CONDUIT SIZE
A1	USE-2 <input type="checkbox"/> OR PV-WIRE <input type="checkbox"/>				
	EGC/GEC:				
B1					
	EGC/GEC:				
C					
	EGC/GEC:				
D					
	EGC/GEC:				
E					
	EGC/GEC:				

NON-COMBINED STRINGS CONDUCTOR/CONDUIT SCHEDULE (IF APPLICABLE)					
□ TAG	DESCRIPTION AND CONDUCTOR TYPE	CONDUCTOR SIZE	NUMBER OF CONDUCTORS	CONDUIT/CABLE TYPE	CONDUIT SIZE
A2	USE-2 <input type="checkbox"/> OR PV-WIRE <input type="checkbox"/>				
	EGC/GEC:				
B2					
	EGC/GEC:				

ENTER "N/A" WHERE SUITABLE FOR WHEN NOT USING CONDUIT OR CABLE AS PERMITTED BY CODE



Supplemental Calculation Sheets for Inverter #2 (Only include if second inverter is used)

DC Information:

Module Manufacturer: _____ Model: _____

S2) Module V_{oc} (from module nameplate): _____ Volts

S3) Module I_{sc} (from module nameplate): _____ Amps

S4) Module DC output power under standard test conditions (STC) = _____ Watts

S5) DC Module Layout

Identify each source circuit (string) for inverter 1 shown on the roof plan with a Tag (e.g. A,B,C,...)	Number of modules per source circuit for inverter 1	Identify, by tag, which source circuits on the roof are to be Paralleled (if none, put N/A)
		Combiner 1
		Combiner 2
Total number of source circuits for inverter 1		

S6) Are DC/DC Converters used? Yes No If No, skip to Step S7. If Yes, enter info below.

DC/DC Converter Model #: _____ Max DC Output Current: _____ Amps Max # of DC/DC Converters in an Input Circuit: ____	DC/DC Converter Max DC Input Voltage: _____ Volts Max DC Output Current: _____ Volts DC/DC Converter Max DC Input Power: _____ Watts
--	--

S7) Maximum System DC Voltage - Use A1 or A2 for systems without DC/DC converters, and B1 or B2 with DC/DC Converters.

- A1. Module V_{oc} (STEP S2) = _____ x # in series (STEP S5) _____ x 1.12 (If $-1 \leq T_l \leq -5^\circ\text{C}$, STEP S1) = _____ V
- A2. Module V_{oc} (STEP S2) = _____ x # in series (STEP S5) _____ x 1.14 (If $-6 \leq T_l \leq -10^\circ\text{C}$, STEP S1) = _____ V

Table 1. Maximum Number of PV Modules in Series Based on Module Rated V_{oc} for 600 Vdc Rated Equipment (CEC 690.7)													
Max. Rated Module V_{oc} (*1.12) (Volts)	29.76	31.51	33.48	35.71	38.27	41.21	44.64	48.70	53.57	59.52	66.96	76.53	89.29
Max. Rated Module V_{oc} (*1.14) (Volts)	29.24	30.96	32.89	35.09	37.59	40.49	43.86	47.85	52.63	58.48	65.79	75.19	87.72
Max # of Modules for 600 Vdc	18	17	16	15	14	13	12	11	10	9	8	7	6

Use for DC/DC converters. The value calculated below must be less than DC/DC converter max DC input voltage (STEP S6).

- B1. Module V_{oc} (STEP S2) = _____ x # of modules per converter (STEP S6) _____ x 1.12 (If $-1 \leq T_1 \leq -5^\circ\text{C}$, STEP S1) = _____
- B2. Module V_{oc} (STEP S2) = _____ # of modules per converter (STEP S6) _____ x 1.14 (If $-6 \leq T_1 \leq -10^\circ\text{C}$, STEP S1) = _____

Table 2. Largest Module V_{oc} for Single-Module DC/DC Converter Configurations (with 80 V AFCI Cap) (CEC 690.7 and 690.11)

Max. Rated Module V_{oc} (*1.12) (Volts)	30.4	33.0	35.7	38.4	41.1	43.8	46.4	49.1	51.8	54.5	57.1	59.8	62.5	65.2	67.9	70.5
Max. Rated Module V_{oc} (*1.14) (Volts)	29.8	32.5	35.1	37.7	40.4	43.0	45.6	48.2	50.9	53.5	56.1	58.8	61.4	64.0	66.7	69.3
DC/DC Converter Max DC Input (Step 6) (Volts)	34	37	40	43	46	49	52	55	58	61	64	67	70	73	76	79

S8) Maximum System DC Voltage from DC/DC Converters to Inverter – Only required if Yes in S6
Maximum System DC Voltage = _____ Volts

S9) Maximum Source Circuit Current
Is Module I_{sc} below 9.6 Amps (Step S3)? Yes No (If No, use Comprehensive Standard Plan)

S10) Sizing Source Circuit Conductors
Source Circuit Conductor Size = Min. #10 AWG copper conductor, 90° C wet (USE-2, PV Wire, XHHW-2, THWN-2, RHW-2)
For up to 8 conductors in roof-mounted conduit exposed to sunlight at least 1/2" from the roof covering (CEC 310)
Note: For over 8 conductors in the conduit or mounting height of lower than 1/2" from the roof, use Comprehensive Plan.

S11) Are PV source circuits combined prior to the inverter? Yes No
If No, use Single Line Diagram 1 and proceed to Step S13.
If Yes, use Single Line Diagram 2 with Single Line Diagram 4 and proceed to Step S12.
Is source circuit OCPD required? Yes No
Source circuit OCPD size (if needed): 15 Amps

S12) Sizing PV Output Circuit Conductors — If a combiner box will NOT be used (Step S11),
Output Circuit Conductor Size = Min. #6 AWG copper conductor

S13) Inverter DC Disconnect
Does the inverter have an integrated DC disconnect? Yes No If Yes, proceed to Step S14.
If No, the external DC disconnect to be installed is rated for _____ Amps (DC) and _____ Volts (DC)

S14) Inverter Information
Manufacturer: _____ Model: _____
Max. Continuous AC Output Current Rating: _____ Amps
Integrated DC Arc-Fault Circuit Protection? Yes No (If no is selected, Comprehensive Standard Plan Grounded or Ungrounded System? Grounded Ungrounded)

AC Information:

S15) Sizing Inverter Output Circuit Conductors and OCPD
Inverter Output OCPD rating = _____ Amps (Table 3)
Inverter Output Circuit Conductor Size = _____ AWG (Table 3)

Table 3. Minimum Inverter Output OCPD and Circuit Conductor Size

Inverter Continuous Output Current Rating (Amps) (Step 14)	12	16	20	24	28	32	36	40	48
Minimum OCPD Size (Amps)	15	20	25	30	35	40	45	50	60
Minimum Conductor Size (AWG, 75° C, Copper)	14	12	10	10	8	8	6	6	6

**Load Center Calculations
(Omit if a load center will not be installed for PV OCPDs)**

S20) Load Center Output:
Calculate the sum of the maximum AC outputs from each inverter.
Inverter #1 Max Continuous AC Output Current Rating [STEP S14] _____ × 1.25 = _____ Amps
Inverter #2 Max Continuous AC Output Current Rating [STEP S14] _____ × 1.25 = _____ Amps
Total inverter currents connected to load center (sum of above) = _____ Amps
Conductor Size: _____ AWG
Overcurrent Protection Device: _____ Amps
Load center bus bar rating: _____ Amps
The sum of the ampere ratings of overcurrent devices in circuits supplying power to a bus bar or conductor shall not exceed 120 percent of the rating of the bus bar or conductor.

Solar PV Standard Plan – Simplified Central/String Inverter System for One- and Two-Family Dwellings

△ TAG	DESCRIPTION
1	SOLAR PV MODULE / STRING
2	DC/DC CONVERTERS INSTALLED? YES / NO (IF YES, STEPS 6 & 8 REQUIRED)
3	SOURCE CIRCUIT JUNCTION BOX INSTALLED?: YES / NO
4	SEPARATE DC DISCONNECT INSTALLED?: YES / NO
5	INTERNAL INVERTER DC DISCONNECT: YES / NO
6	CENTRAL INVERTER
7	SEPARATE AC DISCONNECT INSTALLED?: YES / NO
8	TO LOAD CENTER ON LINE DIAGRAM 1

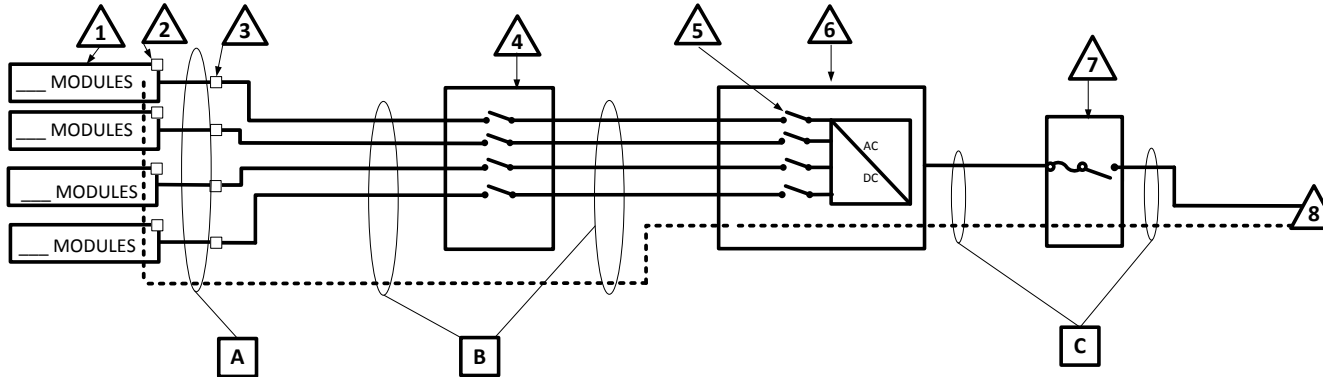
SINGLE-LINE DIAGRAM #3 – ADDITIONAL INVERTER FOR DIAGRAM #1

INVERTER # 2

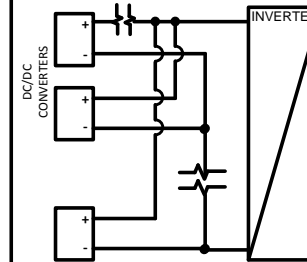
CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED: GROUNDED (INCLUDE GEC) UNGROUNDED

FOR UNGROUNDED SYSTEMS:

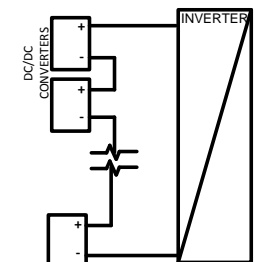
- DC OCPD MUST DISCONNECT BOTH CONDUCTORS OF EACH SOURCE CIRCUIT
- UNGROUNDED CONDUCTORS MUST BE IDENTIFIED PER 210.5(C). WHITE-FINISHED CONDUCTORS ARE NOT PERMITTED.



IF DC/DC CONVERTERS ARE USED, CHECK THE BOX BELOW THE CORRESPONDING CONFIGURATION



PARALLEL DC/DC CONVERTERS ON ONE SOURCE CIRCUIT (FIXED UNIT VOLTAGE DC/DC CONVERTERS)



DC/DC CONVERTERS ARE ALL RUN IN SERIES (FIXED SOURCE CIRCUIT VOLTAGE DC/DC CONVERTERS)

CONDUCTOR/CONDUIT SCHEDULE

□ TAG	DESCRIPTION AND CONDUCTOR TYPE	CONDUCTOR SIZE	NUMBER OF CONDUCTORS	CONDUIT/CABLE TYPE	CONDUIT SIZE
A	USE-2 <input type="checkbox"/> OR PV-WIRE <input type="checkbox"/>				
	EGC/GEC:				
B					
	EGC/GEC:				
C					
	EGC/GEC:				

ENTER "N/A" WHERE SUITABLE FOR WHEN NOT USING CONDUIT OR CABLE AS PERMITTED BY CODE

Solar PV Standard Plan – Simplified Central/String Inverter System for One- and Two-Family Dwellings

△ TAG	DESCRIPTION
1	SOLAR PV MODULE / STRING
2	DC/DC CONVERTERS INSTALLED? YES / NO (IF YES, STEPS 6 & 8 REQUIRED)
3	SOURCE CIRCUIT JUNCTION BOX INSTALLED?: YES / NO
4	COMBINER BOX (STEPS 11 & 12 REQUIRED)
5	SEPARATE DC DISCONNECT INSTALLED?: YES / NO
6	INTERNAL INVERTER DC DISCONNECT: YES / NO
7	CENTRAL INVERTER
8	SEPARATE AC DISCONNECT INSTALLED?: YES / NO
9	TO LOAD CENTER ON LINE DIAGRAM 3

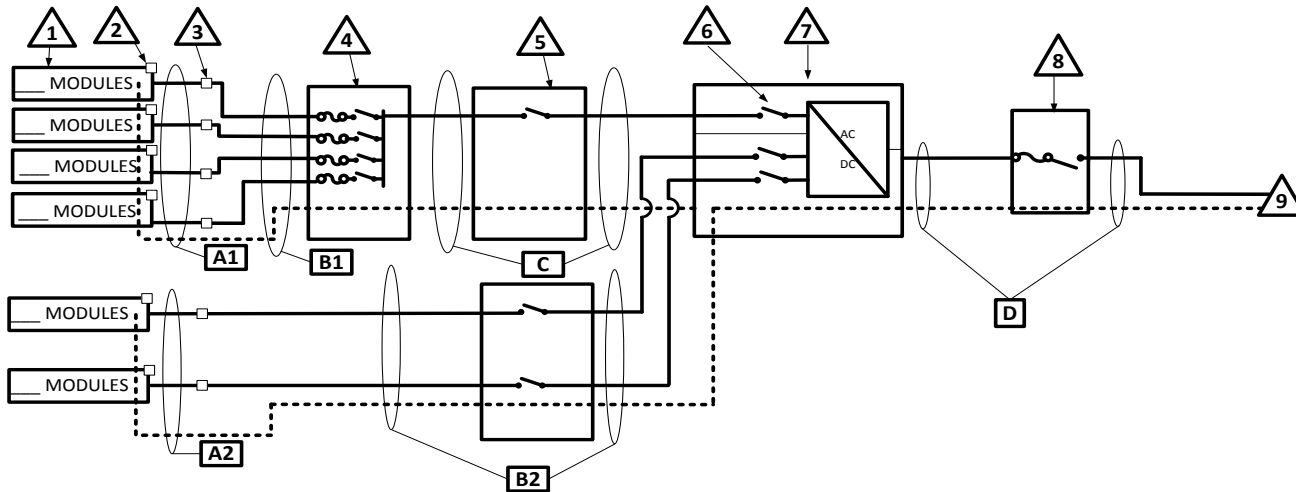
SINGLE-LINE DIAGRAM #4 – ADDITIONAL INVERTER FOR DIAGRAM #2

INVERTER # 2

CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED: GROUNDED (INCLUDE GEC) UNGROUNDED

FOR UNGROUNDED SYSTEMS:

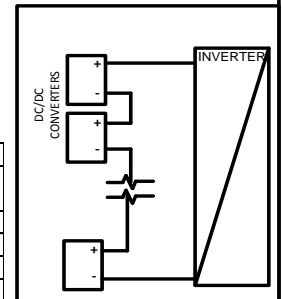
- DC OCPD MUST DISCONNECT BOTH CONDUCTORS OF EACH SOURCE CIRCUIT
- UNGROUNDED CONDUCTORS MUST BE IDENTIFIED PER 210.5(C). WHITE-FINISHED CONDUCTORS ARE NOT PERMITTED.



COMBINER CONDUCTOR/CONDUIT SCHEDULE					
□ TAG	DESCRIPTION AND CONDUCTOR TYPE	CONDUCTOR SIZE	NUMBER OF CONDUCTORS	CONDUIT/CABLE TYPE	CONDUIT SIZE
A1	USE-2 <input type="checkbox"/> OR PV-WIRE <input type="checkbox"/>				
	EGC/GEC:				
B1					
	EGC/GEC:				
C					
	EGC/GEC:				
D					
	EGC/GEC:				

NON-COMBINED STRINGS CONDUCTOR/CONDUIT SCHEDULE (IF APPLICABLE)					
□ TAG	DESCRIPTION AND CONDUCTOR TYPE	CONDUCTOR SIZE	NUMBER OF CONDUCTORS	CONDUIT/CABLE TYPE	CONDUIT SIZE
A2	USE-2 <input type="checkbox"/> OR PV-WIRE <input type="checkbox"/>				
	EGC/GEC:				
B2					
	EGC/GEC:				

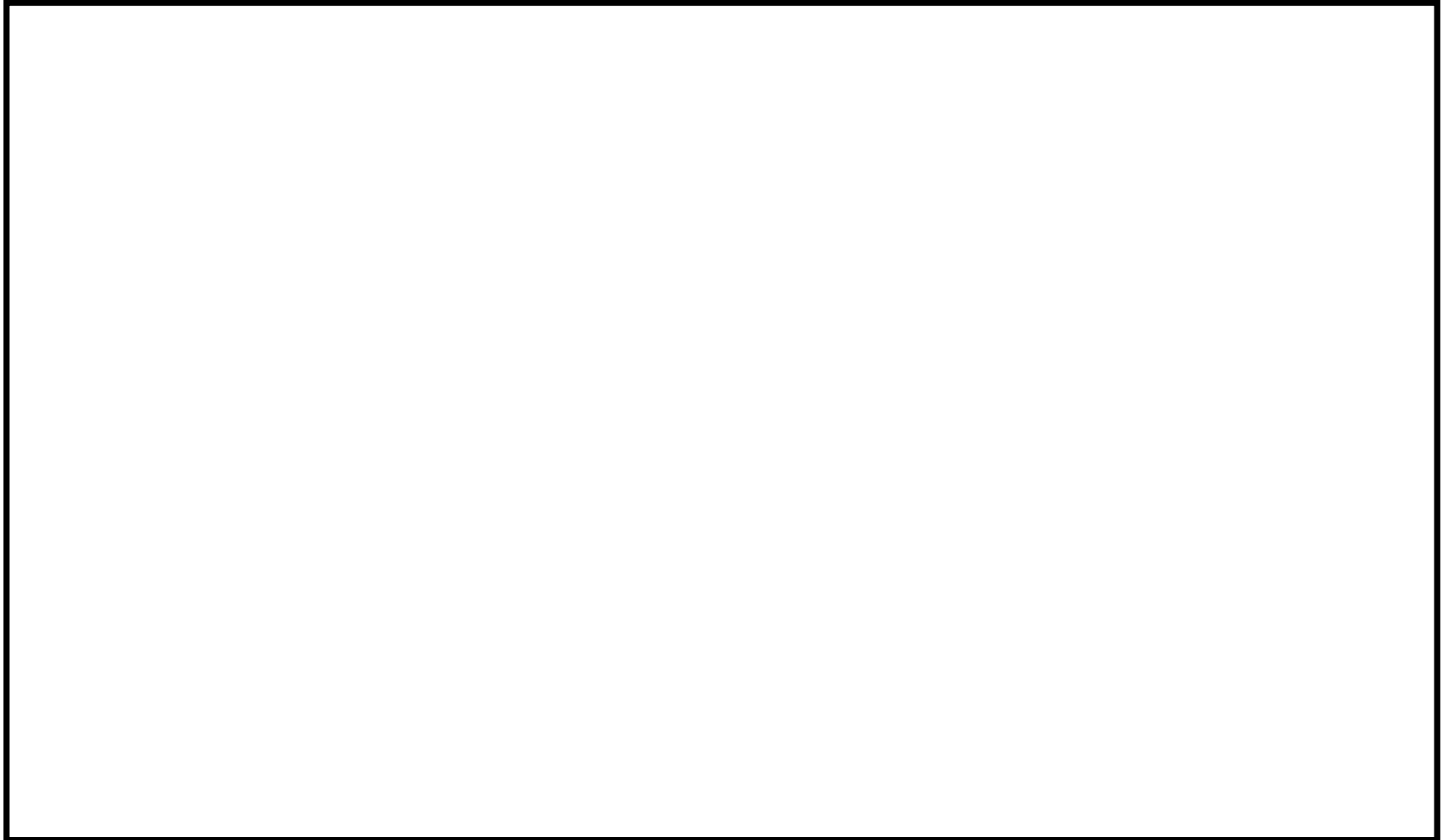
ENTER "N/A" WHERE SUITABLE FOR WHEN NOT USING CONDUIT OR CABLE AS PERMITTED BY CODE



IF DC/DC CONVERTERS ARE USED, THEY ARE RUN IN SERIES (FIXED SOURCE CIRCUIT VOLTAGE DC/DC CONVERTERS)

SOLAR PV STANDARD PLAN

Roof Layout Diagram for One- and Two-Family Dwellings



Items required: roof layout of all panels, modules, clear access pathways and approximate locations of electrical disconnecting means and roof access points.



Solar PV Standard Plan - Simplified Microinverter and ACM Systems for One- and Two-Family Dwellings

ATTACHMENT D
BCM 6807
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SCOPE: Use this plan **ONLY** for systems using utility-interactive Microinverters or AC Modules (ACM) not exceeding a combined system AC inverter output rating of 10 kW, with a maximum of 3 branch circuits, one PV module per inverter and with PV module ISC maximum of 10-A DC, installed on a roof of a one- or two-family dwelling or accessory structure. The photovoltaic system must interconnect to a single-phase AC service panel of 120/240 Vac with service panel bus bar rating of 225 A or less. This plan is not intended for bipolar systems, hybrid systems or systems that utilize storage batteries, charge controllers or trackers. Systems must be in compliance with current California Building Standards Codes and local amendments of the authority having jurisdiction (AHJ). Other articles of the California Electrical Code (CEC) shall apply as specified in section 690.3.

MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed inverters, modules, combiner/junction boxes and racking systems. Installation instructions for bonding and grounding equipment shall be provided and local AHJs may require additional details. Listed and labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling (CEC 110.3). Equipment intended for use with PV system shall be identified and listed for the application CEC 690.4(D).

Applicant and Site Information

Job Address: _____ Permit #: _____

Contractor/Engineer Name: _____ License # and Class: _____

Signature: _____ Date: _____ Phone Number: _____

1. General Requirements and System Information

Microinverter

Number of PV modules installed: _____

Number of Microinverters installed: _____

AC Module (ACM)

Number of ACMs Installed _____

Note: Listed Alternating-Current Module (ACM) is defined in CEC 690.2 and installed per EC 690.6

1.1 Number of Branch Circuits, 1, 2 or 3: _____

1.2 Actual number of Microinverters or ACMs per branch circuit: 1. ____ 2. ____ 3. ____

1.3 Total AC system power rating = (Total Number of Microinverters or ACMs) * (AC inverter power output) = _____ Watts

1.4 Lowest expected ambient temperature for this plan in Table 1: For -1° to -5° C use 1.12 or for -6° to -10° C use 1.14 correction factors.

- 1.5 Average ambient high temperature for this plan: = +47° C
Note: For lower expected ambient or higher average ambient high temperatures, use Comprehensive Standard Plan.

2. Microinverter or ACM Information and Ratings

Microinverters with ungrounded DC inputs shall be installed in accordance with CEC 690.35.

Microinverter or ACM Manufacturer: _____

Model: _____

2.1 Rated (continuous) AC output power: _____ Watts

2.2 Nominal AC voltage rating: _____ Volts

2.3 Rated (continuous) AC output current: _____ Amps

If installing ACMs, skip [STEPS 2.4]

2.4 Maximum DC input voltage rating: _____ Volts (limited to 79 V, otherwise use the Comprehensive Standard Plan)

2.5 Maximum AC output overcurrent protection device (OCPD) _____ Amps

2.6 Maximum number of microinverters or ACMs per branch circuit: _____

3. PV Module Information

(If installing ACMs, skip to [STEP 4])

PV Module Manufacturer: _____

Model: _____

Module DC output power under standard test conditions (STC) = _____ Watts

3.1 Module V_{OC} at STC (from module nameplate): _____ Volts

3.2 Module I_{SC} at STC (from module nameplate): _____ Amps

3.3 Adjusted PV Module DC voltage at minimum temperature = [Table 1] _____
[cannot exceed Step 2.4]

Table 1. Module V_{OC} at STC Based on Inverter Maximum DC Input Voltage Derived from CEC 690.7																
Microinverter Max. DC Input [STEP 2.4] (Volts)	34	37	40	43	46	49	52	55	58	61	64	67	70	73	76	79
Max. Module VOC @ STC, 1.12 (-1° to -5° C) Correction Factor (Volts)	30.4	33.0	35.7	38.4	41.1	43.8	46.4	49.1	51.8	54.5	57.1	59.8	62.5	65.2	67.9	70.5
Max. Module VOC @ STC, 1.14 (-6° to -10° C) Correction Factor (Volts)	29.8	32.5	35.1	37.7	40.4	43.0	45.6	48.2	50.9	53.5	56.1	58.8	61.4	64.0	66.7	69.3

4. Branch Circuit Output Information

Fill in [Table 3] to describe the branch circuit inverter output conductor and OCPD size. Use [Table 2] for determining the OCPD and Minimum Conductor size.

Table 2. Branch Circuit OCPD and Minimum Conductor Size*				
Circuit Current (Amps)	Circuit Power (Watts)	OCPD (Amps)	Minimum Conductor Size (AWG)	Minimum Metal Conduit Size for 6 Current Carrying Conductors
12	2880	15	12	¾"
16	3840	20	10	¾"
20	4800	25	8	1"
24	5760	30	8	1"

*CEC 690.8 and 210.19 (A)(1) factored in Table 2, conductors are copper, insulation must be 90° C wet-rated. Table 2 values are based on maximum ambient temperature of 69° C, which includes 22° C adder, exposed to direct sunlight, mounted > 0.5 inches above rooftop, ≤ 6 current carrying conductors (3 circuits) in a circular raceway. Otherwise use Comprehensive Standard Plan.

Table 3. PV Array Configuration Summary			
	Branch 1	Branch 2	Branch 3
Number of Microinverters or ACMs [Step 1]			
Selected Conductor Size [Table 2] (AWG)			
Selected Branch and Inverter Output OCPD [Table 2]			

5. Solar Load Center (if used)

5.1 Solar Load Center is to have a bus bar rating not less than 100 Amps. Otherwise use Comprehensive Standard Plan.

5.2 Circuit Power see [STEP 1] = _____ Watts

5.3 Circuit Current = (Circuit Power) / (AC voltage) = _____ Amps

Table 4. Solar Load Center and Total Inverter Output OCPD and Conductor Size**				
Circuit Current (Amps)	Circuit Power (Watts)	OCPD (Amps)	Minimum Conductor Size (AWG)	Minimum Metal Conduit Size
24	5760	30	10	½"
28	6720	35	8	¾"
32	7680	40	8	¾"
36	8640	45	8	¾"
40	9600	50	8	¾"
41.6	≤ 10000	60	6	¾"

**CEC 690.8 and 210.19 (A)(1) factored in Table 4, conductors are copper, insulation must be 90° C wet-rated. Table 4 values are based on maximum ambient temperature of 47° C (no rooftop temperature adder in this calculation), ≤ 3 current carrying conductors in a circular raceway. Otherwise use Comprehensive Standard Plan.

6. Point of Connection to Utility:

6.1 Load Side Connection only! Otherwise use the Comprehensive Standard Plan

6.2 Is the PV OCPD positioned at the opposite end from input feeder location or main OCPD location?

Yes No (If No, then use 100% row in Table 5)

6.3 Per 705.12(D)(2): (Combined inverter output OCPD size + Main OCPD size) ≤ [bus bar size × (100% or 120%)]

Table 5. Maximum Combined Inverter Output Circuit OCPD										
Bus Bar Size (Amps)	100	125	125	200	200	200	225	225	225	
Main OCPD (Amps)	100	100	125	150	175	200	175	200	225	
Maximum Combined Inverter OCPD with 120% of bus bar rating (Amps)	20	50	25	60 [†]	60 [†]	40	60 [†]	60 [†]	45	
Maximum Combined Inverter OCPD with 100% of bus bar rating (Amps)	0	25	0	50	25	0	50	25	0	

[†]This plan limits the maximum system size to less than 10 kW, therefore the OCPD size is limited to 60 A. Reduction of Main Breaker is not permitted with this plan.

7. Grounding and Bonding

Check one of the boxes for whether system is grounded or ungrounded:

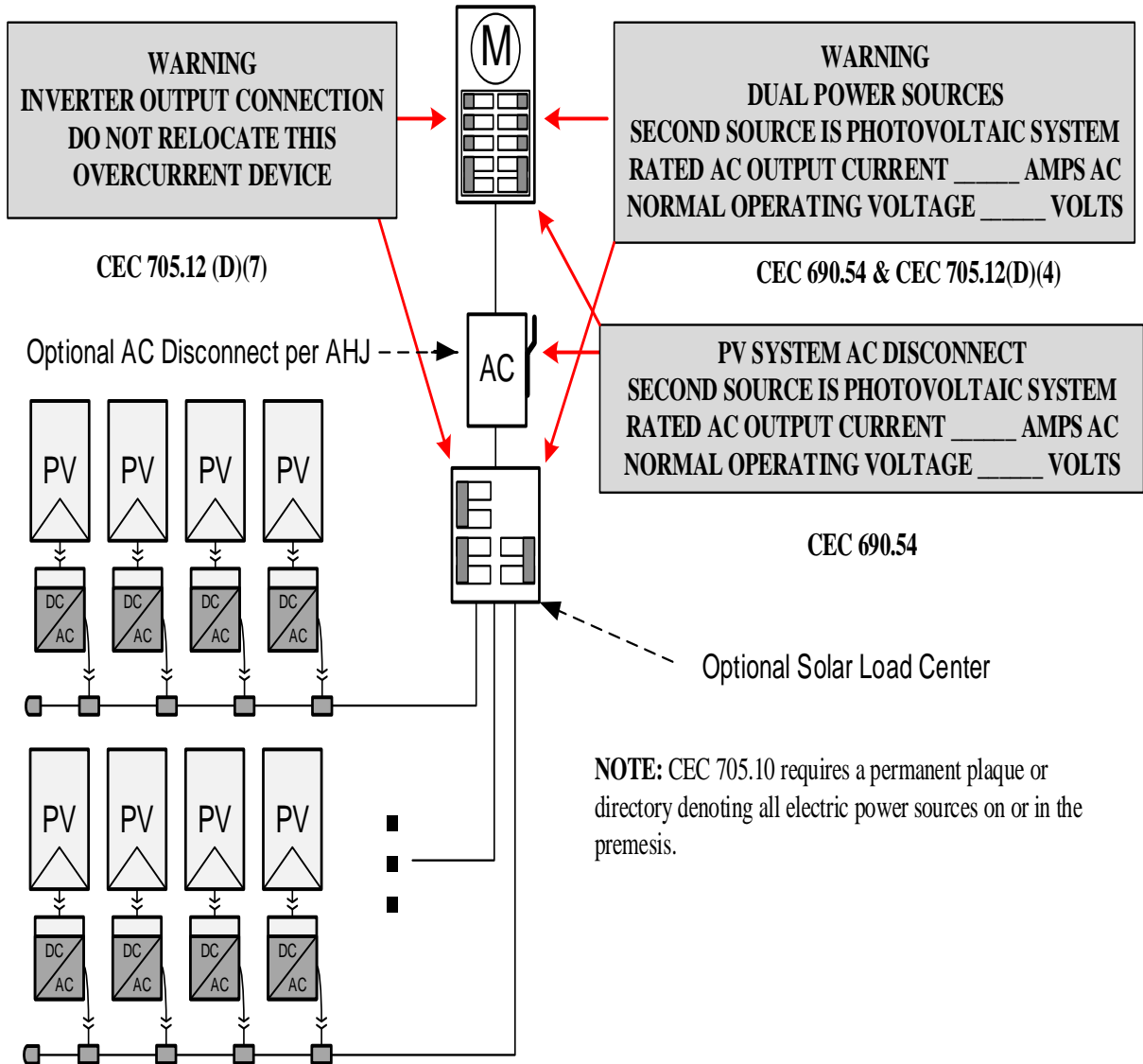
Grounded Ungrounded

For Microinverters with a grounded DC input, systems must follow the requirements of GEC CEC 690.47) and EGC (CEC 690.43).

For ACM systems and Microinverters with ungrounded a DC input follow the EGC requirements of (CEC 690.43).

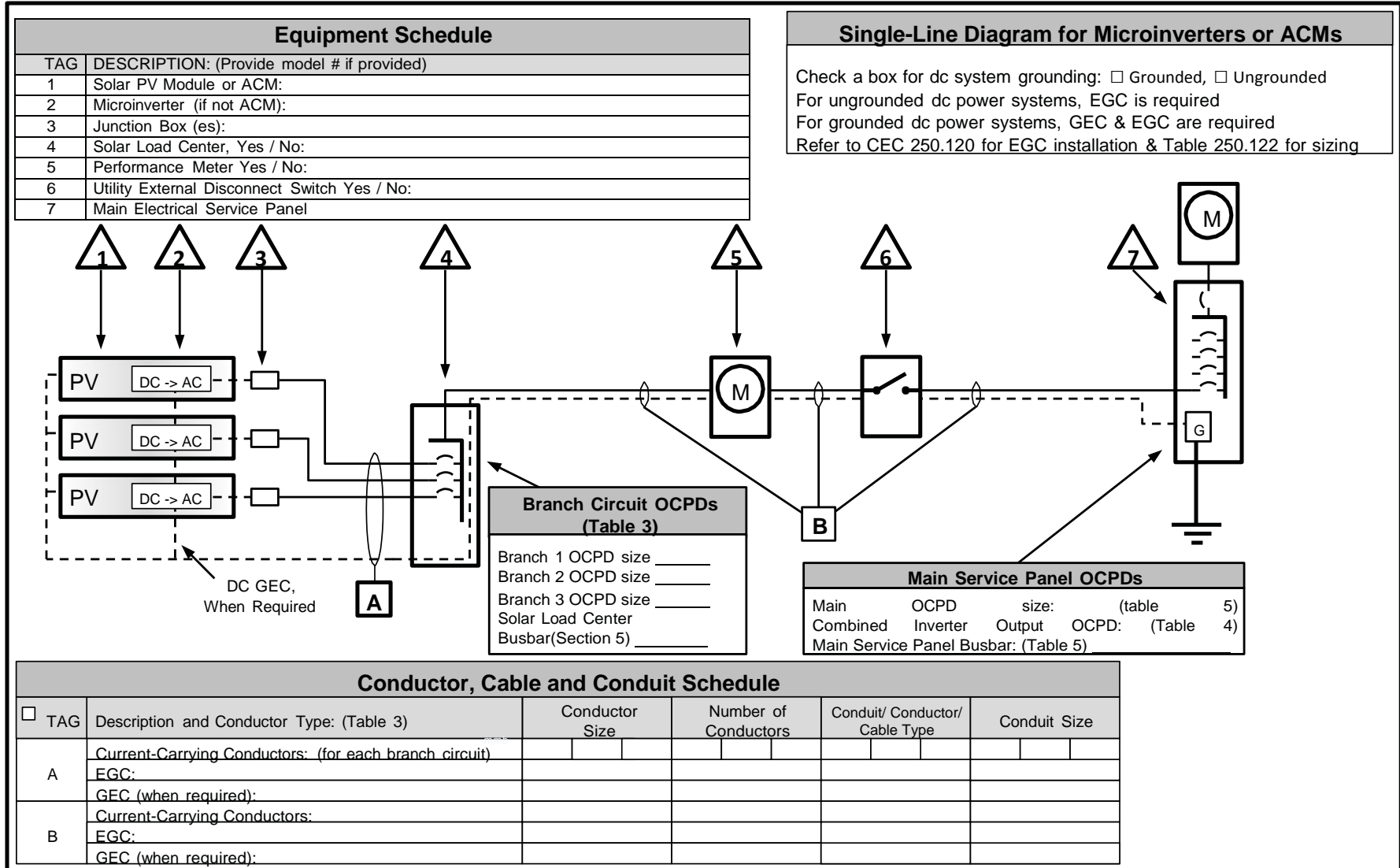
8. Markings

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.



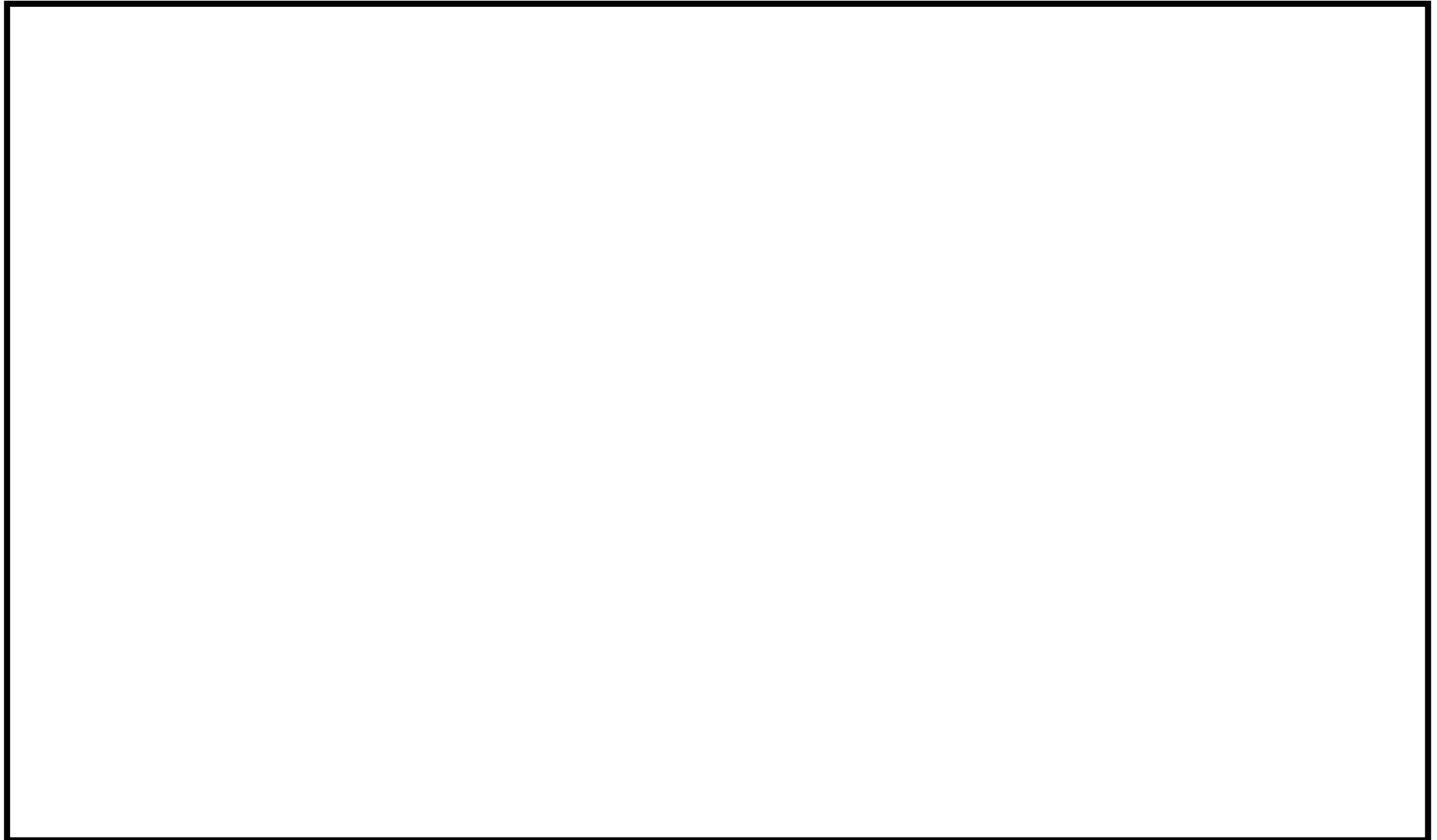
9. Single-Inverter Line Diagram

Solar PV Standard Plan — Simplified Central/String Inverter Systems for One- and Two-Family Dwellings



SOLAR PV STANDARD PLAN - SIMPLIFIED

**Microinverter and ACM Systems for One- and Two-Family Dwellings
ROOF LAYOUT PLAN**



Items required: roof layout of all panels, modules, clear access pathways and approximate locations of electrical disconnecting means and roof access points.



Structural Criteria for PV Systems for One- and Two- Family Dwellings

**ATTACHMENT E
BCM 6807
Article 1
09-01-15
Page 1 of 11**

Use of this document

This document includes a one-page list of structural criteria for over-the-counter or online approval, as well as attached tables and figures that supplement the criteria and explain their use.

This document applies to flush-mounted solar arrays installed on the roofs of wood-framed one- and two family dwellings. “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 2013 California Building Code (CBC) and 2013 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
 - 3) Is the elevation of the site under 2,000 feet? Y N
 - 4) Is the dwelling farther than 200 yards from the ocean or a large coastal bay? 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
 - 4) Measured rafter size (e.g. 13/4 x 33/4, not 2x4): _____ x _____ inch
 - 5) Measured rafter horizontal span (see Figure 4): _____' - _____" ft-in
 - 6) Horizontal rafter span per Table 2: _____' - _____" ft-in
 - 7) Is measured horizontal rafter span less than Table 2 span? Y N Truss

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, hops, 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. Downward Load Check (Anchor Layout Check):
- 1) Proposed anchor horizontal spacing (see Figure 2): _____ x _____ inch
 - 2) Horizontal anchor spacing per Table 1: _____' - _____" ft-in
 - 3) Is proposed anchor horizontal spacing less than Table 1 spacing? Y N
- G. 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 is the anchor LA County approved for such application? 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 #: _____

Table 1. Maximum Horizontal Anchor Spacing				
Roof Slope		Rafter Spacing		
		16" o.c.	24" o.c.	32" o.c.
Photovoltaic Arrays (4 psf max)				
Flat to 6:12	0° to 26°	5'-4"	6'-0"	5'-4"
7:12 to 12:12	27° to 45°	1'-4"	2'-0"	2'-8"
13:12 to 24:12	46° to 63°	1'-4"	2'-0"	2'-8"
Solar Thermal Arrays (5 psf max)				
Flat to 6:12	0° to 26°	4'-0"	4'-0"	5'-4"
7:12 to 12:12	27° to 45°	1'-4"	2'-0"	2'-8"
13:12 to 24:12	46° to 63°	Calc. Req'd	Calc. Req'd	Calc. Req'd

Solar support component manufacturer's guidelines may be relied upon to ensure the array above the roof is properly designed, but manufacturer's guidelines typically do NOT check to ensure that the roof itself can support the concentrated loads from the solar array. Table 1 assumes that the roof complied with the building code in effect at the time of construction, and places limits on anchor horizontal spacing to ensure that a roof structure is not overloaded under either downward loads or wind uplift loads. Note 4 below lists the basic assumptions upon which this table is based.

Table 1 Notes:

1. Anchors are also known as “stand-offs”, “feet”, “mounts” or “points of attachment”. Horizontal anchor spacing is also known as “cross-slope” or “east-west” anchor spacing (see Figure 2).
2. If anchors are staggered from row-to-row going up the roof, the anchor spacing may be twice that shown above, but no greater than 6'-0”.
3. For manufactured plated wood trusses at slopes of flat to 6:12, the horizontal anchor spacing shall not exceed 4'-0” and anchors in adjacent rows shall be staggered.
4. This table is based on the following assumptions:
 - The roof structure conformed to building code requirements at the time it was built.
 - The attached list of criteria are met.
 - Mean roof height is not greater than 40 feet.
 - Roof sheathing is at least 7/16” thick oriented strand board or plywood. 1x skip sheathing is acceptable.
 - If the dwelling is in Wind Exposure B (typical urban, suburban or wooded areas farther than 500 yards from large open fields), no more than one of the following conditions apply:
 - The dwelling is located in a special wind region with design wind speed between 115 and 130 mph per ASCE 7-10, or
 - The dwelling is located on the top half of a tall hill, provided average slope steeper is less than 15%.
 - If the dwelling is In Wind Exposure C (within 500 yards of large open fields or grasslands), all of the following conditions apply:
 - Design wind speed is 110 mph or less (not in a Special Wind Region), and
 - The dwelling is not located on the top half of a tall hill.
 - The solar array displaces roof live loads (temporary construction loads) that the roof was originally designed to carry.
 - The Structural Technical Appendix provides additional information about analysis assumptions.

Table 2. Roof Rafter Maximum Horizontal Span (feet - inches) ¹								
Assumed Vintage	Nominal Size	Actual Size	Non-Tile Roof ²			Tile Roof ³		
			Rafter Spacing					
			16" o.c.	24" o.c.	32" o.c.	16" o.c.	24" o.c.	32" o.c.
Post-1960	2x4	1½"x3½"	9'-10"	8'-0"	6'-6"	8'-6"	6'-11"	5'-6"
	2x6	1½"x5½"	14'-4"	11'-9"	9'-6"	12'-5"	10'-2"	8'-0"
	2x8	1½"x7¼"	18'-2"	14'-10"	12'-0"	15'-9"	12'-10"	10'-3"
Pre-1960	2x4	1¾"x3¾"	11'-3"	9'-9"	7'-9"	10'-3"	8'-6"	6'-9"
	2x6	1¾"x5¾"	17'-0"	14'-0"	11'-3"	14'-9"	12'-0"	9'-9"
	2x8	1¾"x7¾"	22'-3"	18'-0"	14'-6"	19'-0"	15'-6"	12'-6"

Beyond a visual review by the Contractor checking for unusual sagging or deterioration, some CBOs may want additional assurance that the roof structure complies with structural building code requirements. Table 2 is an optional table some CBOs may elect to use to provide additional assurance by requiring a check of existing roof rafter spans, and supports optional criteria 1.B.5 and 1.B.6. For post-1960 construction, these span tables match the rafter span tables found in the 2013 California Building and Residential codes. For pre-1960 construction, the rafter span tables are based on structural calculations with lumber sizes and wood species & grade appropriate for older construction. Note 5 below lists the basic assumptions upon which this table is based.

Table 2 Notes:

1. See Figure 4 for definition of roof rafter maximum horizontal span.
2. "Non-tile Roof" = asphalt shingle, wood shingle & wood shake, with an assumed roof assembly weight of 10 psf.
3. "Tile Roof" = clay tile or cement tile, with an assumed roof assembly weight of 20psf
4. Unaltered manufactured plated-wood trusses may be assumed to be code compliant and meet intent of Table 2.
 - This table is based on the following assumptions:
 - pan/deflection ratio is equal to or greater than 180.
 - For post-1960 construction, wood species and grade is Douglas Fir-Larch No. 2.
 - For pre-1960 construction, wood species and grade is Douglas Fir-Larch No. 1.
 - Other wood species and/or grade are also acceptable if allowable bending stress is equal or greater to that listed above.

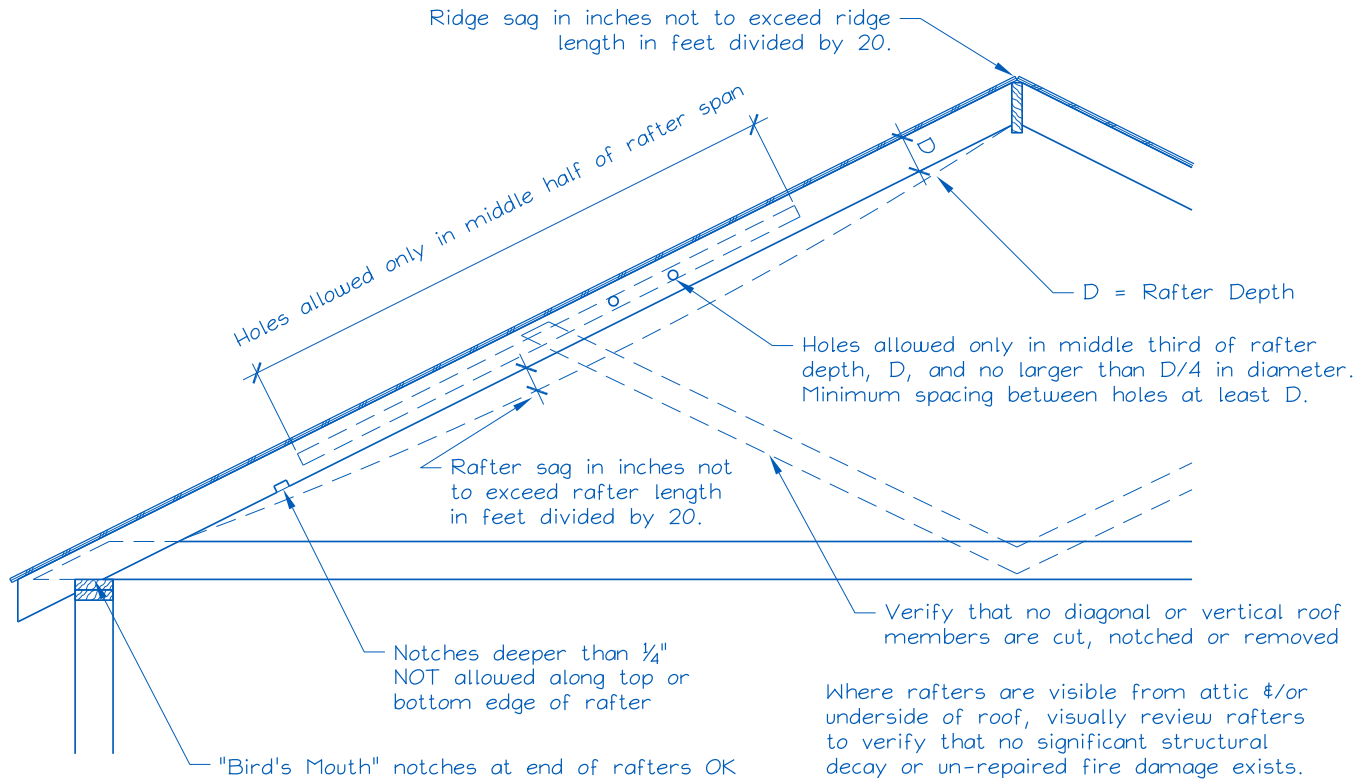


Figure 1. Roof Visual Structural Review (Contractor’s Site Audit) of Existing Conditions.

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.

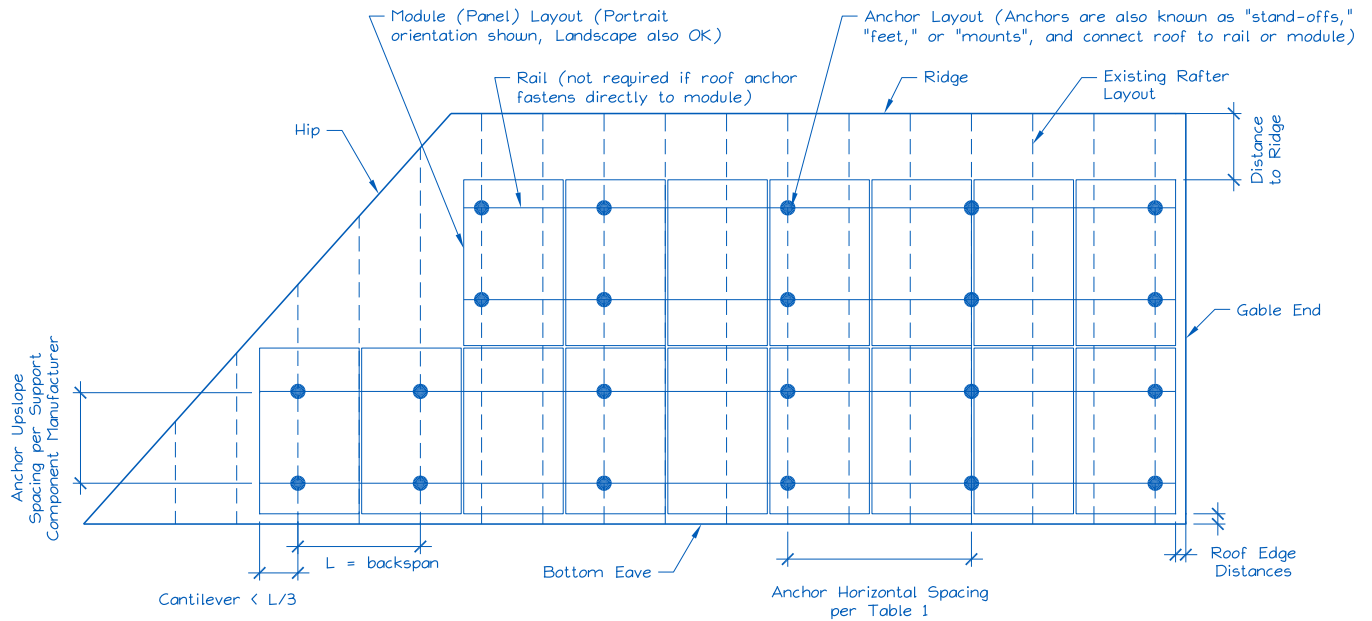


Figure 2. Sample Solar Panel Array and Anchor Layout Diagram (Roof Plan).

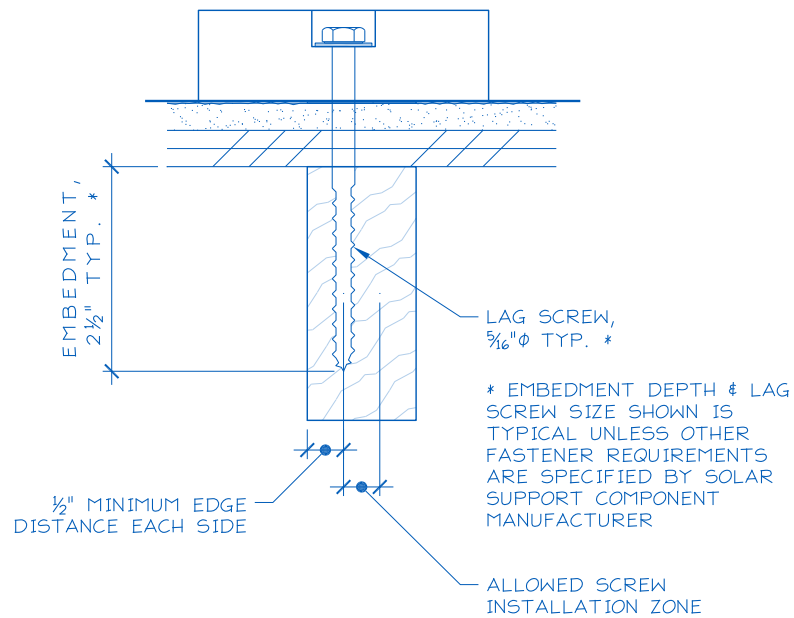
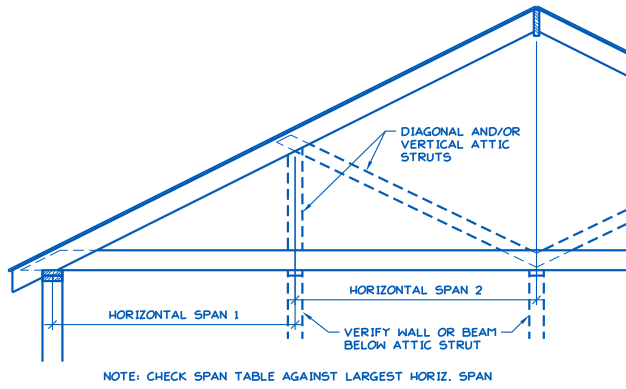
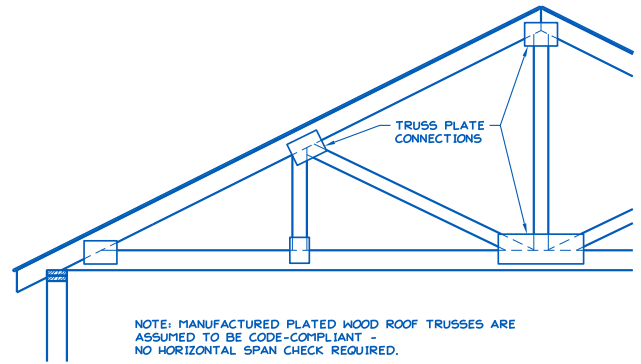


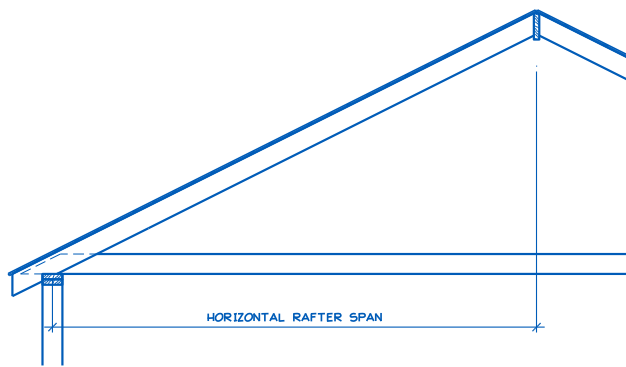
Figure 3. Typical Anchor with Lag Screw Attachment.



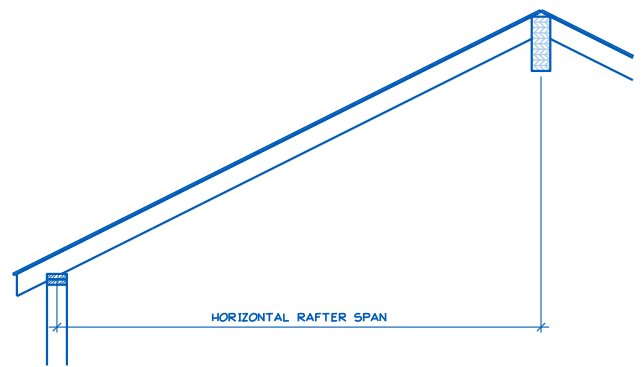
C STRUTS TO WALLS BELOW



D MANUFACTURED PLATED WOOD ROOF TRUSS



A SIMPLE ATTIC



B CATHEDRAL CEILING

Figure 4. Definition of Rafter Horizontal Span.

THE FOLLOWING IS PROVIDED FOR REFERENCE ONLY.

Regional and Site Assumptions

This document is based on the following regional and site assumptions:

- The dwelling is located in a ZERO snow load area (see Map 1 and BCM 1608, Article 1).
- The dwelling is not in Wind Exposure D (within 200 yards of the ocean or a large coastal bay).
- If in Wind Exposure B (urban, suburban or wooded areas), the dwelling may be located: in a Special Wind Region (see Map 2 BCM 1609.1.1, Article 1) with design wind speeds between 110 and 130 mph, or on a tall hill, provided average slope is no steeper than 15%.
- If in Wind Exposure C (within 500 yards of large open fields or grasslands), the dwelling is:
 - in a standard 110 mph design wind speed region, and
 - not on a hill with a grade steeper than 5%.

Additional Requirements

- Regional and Site Checks
 - In a mixed snow load area, with zero snow load only at lower elevations, consider asking “is the dwelling lower than elevation _____ feet?”
 - In a coastal region, consider asking “is the dwelling farther than 200 yards from the ocean or a large coastal bay?” to verify the dwelling is not in Wind Exposure D.
 - In a Special Wind Region with design wind speeds between 115 and 130 mph, consider verifying that the dwelling is in Wind Exposure B by asking “is the dwelling in an urban, suburban or wooded area, and not within 500 yards of open fields and grasslands?”
 - In a Special Wind Region with design wind speeds between 115 and 130 mph, consider verifying that there are no significant topographic wind speed-up effects by asking “is the dwelling in a relatively flat area (grade less than 5%) and not within 500 yards of the crest of a tall hill?”
- Roof Check
 - With evidence of structurally deficient one- and two-family housing stock or poor structural code compliance history, the rafter span check option is added in the criteria.

The Structural Toolkit and CRC Wind Speeds

The 2013 CRC contains an inconsistency related to wind speeds. Despite referencing ASCE 7-10 as its standard, the 2013 CRC's text and tables use outdated ASCE 7-05 wind speeds. Under the old ASCE 7-05 / CBC 2010, the basic design wind speed in most regions of the state was 85 mph (max. 3 second gust in 50 years). Under ASCE 7-10 / CBC 2013, the design wind speed has increased to 110 mph (max. 3 second gust in 700 years). Despite the different definitions of wind speed, design wind pressures remain essentially unchanged.

Because the Toolkit's structural document is intended to be forward looking, all wind speeds in the Toolkit document are based on the ASCE 7-10. This is clearly stated in the caption to the state wind speed map, and in the Table 1 footnotes. This anticipates an obvious and expected correction to the CRC; otherwise the Toolkit would become immediately outdated when the CRC is amended to change the base design wind speed from 85 mph to 110 mph 2013 CRC text (ASCE 7-05) wind speeds equivalent to the 2013 CRC and CBC Reference Standard (ASCE 7-10) are shown below. See ASCE 7-10 Table C26.5-6 for additional information.

<u>2013 CRC text</u> <u>ASCE 7-05</u>	<u>2013 CRC and CBC Referenced Standard</u> <u>ASCE 7-10</u>
85 mph	110 mph
90 mph	115 mph
95 mph	120 mph
100 mph	126 mph
105 mph	133 mph

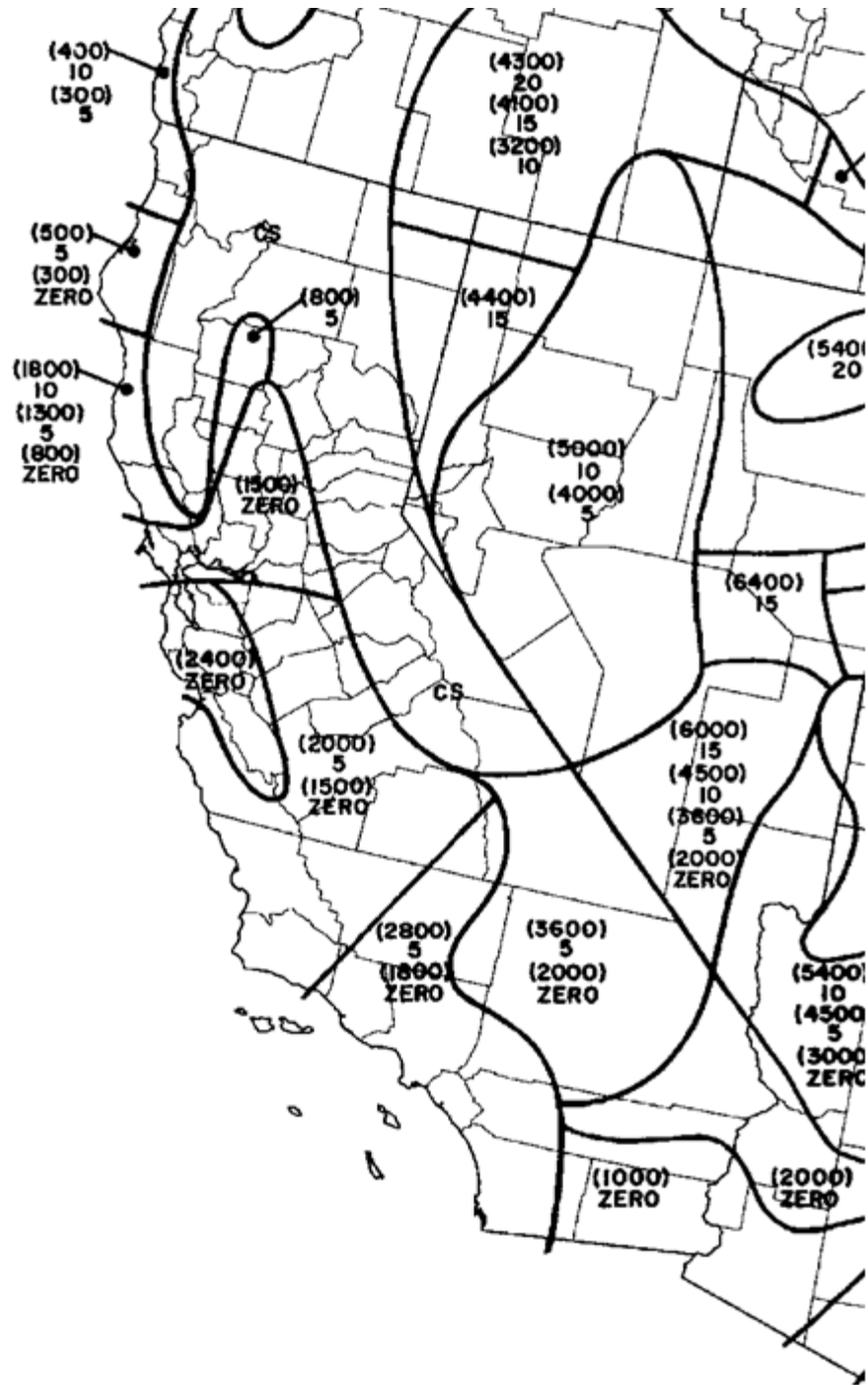
Structural Technical Appendix

This toolkit document is supported by a Structural Technical Appendix that describes the technical analysis behind these criteria, which are based on structural engineering principles and the California Building and Residential Codes. The Technical Appendix also provides some additional guidance to address nonconforming items, such as when an anchor layout is not based on a solar support component manufacturer's guidelines, or when a coastal site is located within 200 yards of the ocean (Exposure D).

http://www.opr.ca.gov/docs/Solar_Structural_Technical_Appendix.pdf

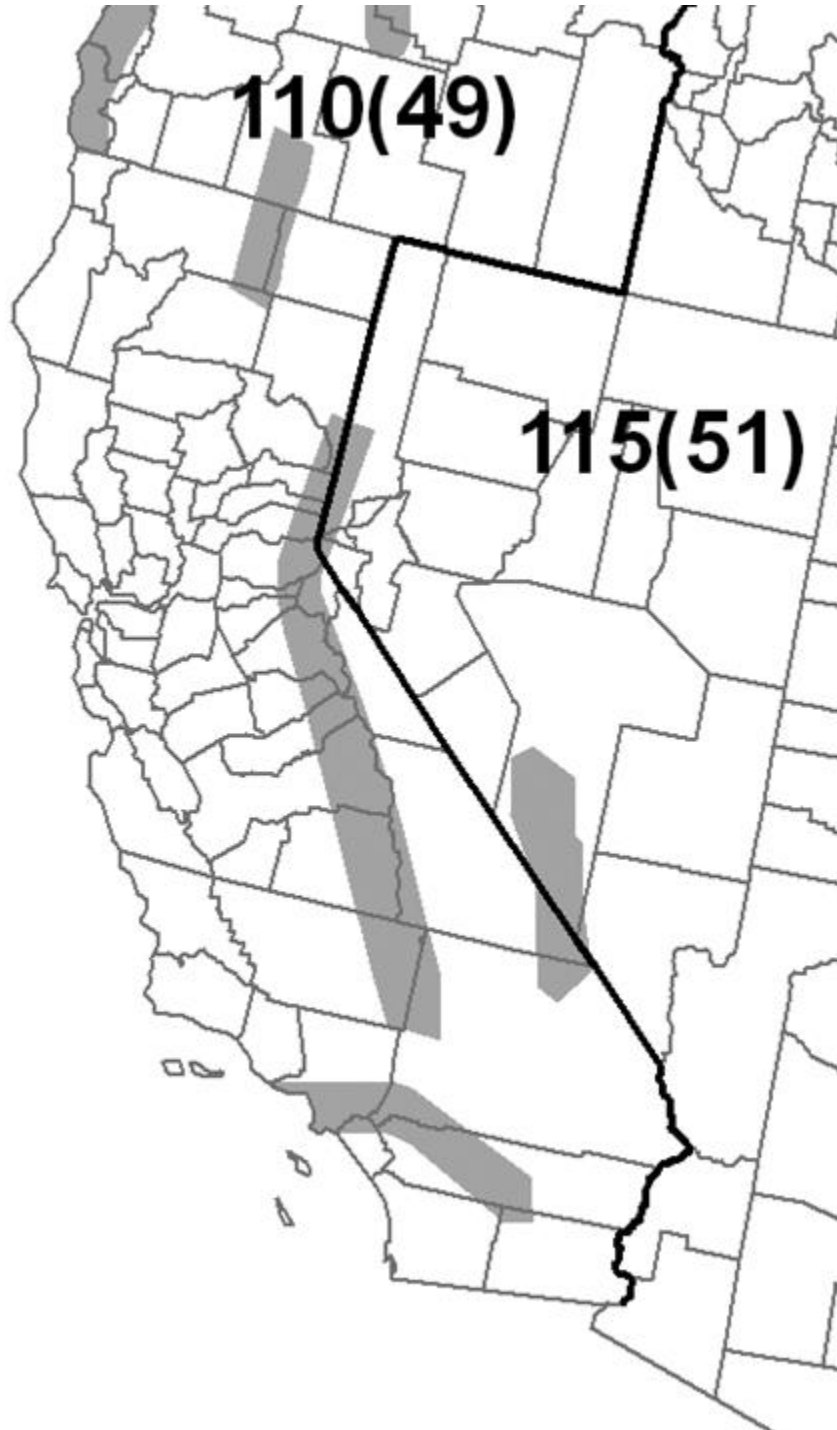
Probability of Code Compliance

The Structural Technical Appendix includes a section that examines the probabilities associated with the assumptions behind Table 1 that allows six feet cross-slope anchor spacing in some circumstances. That statistical analysis estimates that the probability of code noncompliance for six feet anchor spacing is only 2 in a thousand installations (0.2%). Note that probability of structural failure is orders of magnitude lower than the probability of code *noncompliance*.



Map 1. California Ground Snow Load Map (Ref: ASCE 7-10).

The numbers in parentheses represent the upper elevation limits in feet for the ground snow load in psf listed below the elevation. Example: (2400) ZERO in the South San Francisco bay area indicates that zero ground snow loads occur from sea level up to an elevation of 2400 feet. CS indicates “Case Studies” where extreme local variations in ground snow loads occur. Non-zero snow load areas and Case Study (CS) areas are excluded from the use of this structural toolkit document. See the Technical Appendix for additional information.



Map 2. California Design Wind Speed Map (Ref: ASCE 7-10).

The number outside the parentheses represents the design wind speed in mph. Typical design wind speed is 110 mph. The grey shaded areas on the map indicate “special wind regions” where higher wind speeds may apply. When the project is in a grey shaded area, contact the local building department for the design wind speed.



Inspection Guide for PV Systems For One- and Two-Family Dwellings

(For Rooftop Solar Photovoltaic Systems Qualified For Expedited Permitting Process)

All California Building Code (CBC), California Electrical Code (CEC), California Fire Code (CFC), and California Residential Code (CRC) references are to the current Codes with County of Los Angeles local amendments, unless otherwise noted.

Field Inspection Guide for Rooftop Solar Photovoltaic (PV) Systems

During the field inspection, photographic or video evidence of the items listed below may be required. In addition, photographic or video evidence of 10% (or a minimum of two) of the attachment points of the PV panels to the roof shall be submitted. Images shall be readily identifiable to the installation project. See example photograph Appendix A.

All installations shall be in accordance with the approved plans. At the time of inspection installer shall provide:

- a. the means to safely access and inspect construction on the roof
- b. knowledgeable personnel on site familiar with the installed system
- c. access to the inside of the house to inspect for required carbon monoxide and smoke alarms

Make sure all PV system AC/DC disconnects and circuit breakers are in the open position and verify or request the following.

1. Array mounting system and structural connections according to the approved plan.

See example photograph Appendix B.

2. Roof-mounted PV systems have the required fire classification (CBC 1505.9 or CRC R902.4).

See example photograph Appendix C.

3. Grounding/bonding of rack and modules according to the manufacturer's installation instructions that are approved and listed.

See example photograph Appendix D.

4. If applicable, the conduit installation in the attic with 18" minimum clearance from the roof assembly (provide attic access for inspection).

See example photograph Appendix E.

5. All work done in a neat and workmanlike manner (CEC 110.12).
6. PV module model number, quantity and location according to the approved plan.
7. Firefighter access according to approved plan.
8. Roof penetrations flashed/sealed according to the approved plan. Also check for plumbing vents under modules. Provide proper slope in rerouted pipes, if applicable.

See example photograph Appendix B.

9. Exposed array conductors properly secured, supported and routed to prevent physical damage.
10. Conduit installation according to CRC R331.3 and CEC 690.4(F).
11. Conductors, cables and conduit types, sizes, markings, and temperature ratings according to the approved plan.
12. Equipment installed, listed and labeled according to the approved plan (e.g., PV modules, DC/DC converters (power optimizer), combiners, inverters, disconnects, load centers and electrical service equipment).
13. For ungrounded inverters, installation complies with CEC 690.35 requirements.
14. For grid-connected systems, inverter is labeled as "utility interactive."
15. Disconnects according to the approved plan and properly located as required by the CEC.
16. Overcurrent devices are the type and size according to the approved plan.
17. Inverter output circuit breaker is located at opposite end of bus from utility supply at load center and/or service panelboard (not required if the sum of the inverter and utility supply circuit breakers is less than or equal to the panelboard bus rating).
18. PV system markings, labels and signs according to the approved plan.
19. Connection of the PV system to the grounding electrode system according to the approved plan.
20. Access and working space for operation and maintenance of PV equipment such as inverters, disconnecting means and panelboards (not required for PV modules) (CEC 110.26)."



**Submittal Requirements for Solar
Domestic Water Heating
Installations for One- and Two-
Family Dwellings**

**ATTACHMENT G
BCM 6807
Article 1
04-04-16
Page 1 of 2**

This information bulletin is published to guide applicants through a streamlined permitting process for solar domestic water heating (SDWH) projects 30 kWth (462 square foot) in size or smaller. This bulletin provides information about submittal requirements for plan review, required fees, and inspections.

1. Approval Requirements

Building, plumbing and depending on the configuration of the proposed system, electrical permits shall be required to install a SDWH system with a maximum thermal output of 30 kWth or less.

2. Submittal Requirements

- a) Completed permit application form. This permit application can be downloaded at <http://dpw.lacounty.gov/bsd/content>.
- b) Demonstrate compliance with the eligibility checklist for expedited permitting. See Attachment J – Eligibility Checklist for Expedited Solar Domestic Water Heating Permitting.
- c) A completed Solar Domestic Water Heating Standard Plan. The standard plan may be used for proposed solar installations 30 kWth in size or smaller and can be downloaded at <http://dpw.lacounty.gov/bsd/content>.
- d) A roof plan showing roof layout and solar collector with attachment details.
- e) System schematic, including major components.
- f) Equipment cut sheets including collectors, controller, storage tank/heat exchanger (if applicable).
- g) Completed expedited Structural Criteria along with required documentation. Structural Criteria can be downloaded at <http://dpw.lacounty.gov/bsd/content>.
- h) Complete Form A, Form B, or Form C Affidavit. Forms A, B, and C can be downloaded at <http://dpw.lacounty.gov/bsd/content>.

3. Plan Review

Permit applications can be submitted electronically through the following website: <https://dpw.lacounty.gov/bsd/bsop> or to the local office having jurisdiction for the project, see <http://dpw.lacounty.gov/general/ServiceLocator/>.

4. Fees

Plan check and permit fees are a set amount and can be found in our fee schedule at: <http://dpw.lacounty.gov/bsd/index.cfm?p=fees>.

5. Inspections

Once all permits to construct the solar installation have been issued and the system has been installed, it must be inspected before final approval is granted. On-site inspections can be scheduled by contacting the local office by telephone. For contact information see our website at: <http://dpw.lacounty.gov/bsd/index.cfm?p=offices>.

Inspection requests received within business hours are typically scheduled for the next business day. If next business day is not available, inspection should happen within a five-day window.

Permit holders must be prepared to show conformance with all technical requirements in the field at the time of inspection. The inspector will verify that the installation is in conformance with applicable code requirements and with the approved plans.

The inspection checklist provides an overview of common points of inspection and the applicant should be prepared to show compliance with these points.

6. Departmental Contact Information

For additional information regarding this permit process, please consult our departmental website at <http://dpw.lacounty.gov/bsd/content> or contact the local office having jurisdiction for the project.



Submittal Requirements for Solar Pool Heating Installations for One- and Two-Family Dwellings

ATTACHMENT H
BCM 6807
Article 1
04-04-16
Page 1 of 2

This information bulletin is published to guide applicants through a streamlined permitting process for solar pool heating (SPH) projects 30 kWth (462 square foot) in size or smaller. This bulletin provides information about submittal requirements for plan review, required fees, and inspections.

1. Approval Requirements

Building, plumbing and depending on the configuration of the proposed system, electrical and/or mechanical permits shall be required to install a SPH system with a maximum thermal output of 30 kWth or less.

1. Submittal Requirements

- a) Completed permit application form. This permit application can be downloaded at <http://dpw.lacounty.gov/bsd/content>.
- b) Demonstrate compliance with the eligibility checklist for expedited permitting. See Attachment K – Eligibility Checklist for Expedited Solar Pool Heating Permitting.
- c) A completed Solar Pool Heating Standard Plan. The standard plan may be used for proposed solar installations 30 kWth in size or smaller and can be downloaded at <http://dpw.lacounty.gov/bsd/content>.
- d) A roof plan showing roof layout and solar collectors with attachment details.
- e) Standard one-line plumbing diagram of system showing and labeling major components.
- f) Equipment cut sheets including collectors, controller, motorized valve (if applicable).
- g) Completed expedited Structural Criteria along with required documentation. Structural Criteria can be downloaded at <http://dpw.lacounty.gov/bsd/content>.
- h) Completed Form A, Form B, or Form C Affidavit. Forms A, B, and C can be downloaded at <http://dpw.lacounty.gov/bsd/content>.

3. Plan Review

Permit applications can be submitted electronically through the following website: <https://dpw.lacounty.gov/bsd/bsop> or to the local office having jurisdiction for the project, see <http://dpw.lacounty.gov/general/ServiceLocator/>.

4. Fees

Plan check and permit fees are a set amount and can be found in our fee schedule at: <http://dpw.lacounty.gov/bsd/index.cfm?p=fees>.

5. Inspections

Once all permits to construct the solar installation have been issued and the system has been installed, it must be inspected before final approval is granted. On-site inspections can be scheduled by contacting the local office by telephone. For contact information see our website at: <http://dpw.lacounty.gov/bsd/index.cfm?p=offices>.

Inspection requests received within business hours are typically scheduled for the next business day. If next business day is not available, inspection should happen within a five-day window.

Permit holders must be prepared to show conformance with all technical requirements in the field at the time of inspection. The inspector will verify that the installation is in conformance with applicable code requirements and with the approved plans.

The inspection checklist provides an overview of common points of inspection and the applicant should be prepared to show compliance with these points.

6. Departmental Contact Information

For additional information regarding this permit process, please consult our departmental website at <http://dpw.lacounty.gov/bsd/content> or contact the local office having jurisdiction for the project.



**Eligibility Checklist for Expedited
Solar Domestic Water Heating Permitting for
One- and Two-Family Dwellings**

**ATTACHMENT J
BCM 6807
Article 1
09-01-15
Page 1 of 1**

GENERAL REQUIREMENTS

- | | | | |
|----|---|----------------------------|----------------------------|
| A. | System size is 30 kWth (462 square feet of collector) or less | <input type="checkbox"/> Y | <input type="checkbox"/> N |
| B. | The solar array is roof-mounted on one- or two-family dwelling or accessory structure | <input type="checkbox"/> Y | <input type="checkbox"/> N |
| C. | The solar collector arrays will not exceed the maximum legal building height | <input type="checkbox"/> Y | <input type="checkbox"/> N |
| D. | Solar collectors are certified by an accredited listing agency | <input type="checkbox"/> Y | <input type="checkbox"/> N |
| E. | Solar domestic water heating system is certified by an accredited listing agency | <input type="checkbox"/> Y | <input type="checkbox"/> N |
| F. | Permit application is completed and attached | <input type="checkbox"/> Y | <input type="checkbox"/> N |
| G. | Stem schematic is included | <input type="checkbox"/> Y | <input type="checkbox"/> N |
| H. | List of major components to match system schematic | <input type="checkbox"/> Y | <input type="checkbox"/> N |
| I. | Heat transfer fluid is either water or a nontoxic fluid | <input type="checkbox"/> Y | <input type="checkbox"/> N |

PLUMBING REQUIREMENTS

- | | | | |
|----|---|----------------------------|----------------------------|
| A. | Adequate extreme temperature protection is provided | <input type="checkbox"/> Y | <input type="checkbox"/> N |
|----|---|----------------------------|----------------------------|

STRUCTURAL REQUIRMENTS

- | | | | |
|----|--|----------------------------|----------------------------|
| A. | A completed Structural Criteria and supporting documentation is attached | <input type="checkbox"/> Y | <input type="checkbox"/> N |
|----|--|----------------------------|----------------------------|

Notes:

- 1. These criteria are intended for streamlined solar permitting process.*
- 2. If any items are checked NO, revise design to fit within Eligibility Checklist, otherwise permit application may go through standard process.*



Eligibility Checklist for Expedited Solar Pool Heating Permitting for One- and Two-Family Dwellings

ATTACHMENT K
BCM 6807
Article 1
09-01-15
Page 1 of 1

GENERAL REQUIREMENTS

- | | | | | | |
|----|---|--------------------------|---|--------------------------|---|
| A. | System size is 30 kWth (462 square feet of collector) or less | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |
| B. | The solar array is roof-mounted on one- or two-family dwelling or accessory structure | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |
| C. | The solar collector arrays will not exceed the maximum legal building height | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |
| D. | Solar collectors are certified by an accredited listing agency | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |
| E. | Solar domestic water heating system is certified by an accredited listing agency | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |
| F. | Permit application is completed and attached | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |
| G. | Heat transfer fluid is either water or a nontoxic fluid | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |

PLUMBING REQUIREMENTS

- | | | | | | |
|----|---|--------------------------|---|--------------------------|---|
| A. | Adequate extreme temperature protection is provided (if applicable) | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |
| B. | Standard one-line plumbing diagram is provided with components showing solar interface with existing plumbing | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |

STRUCTURAL REQUIRMENTS

- | | | | | | |
|----|--|--------------------------|---|--------------------------|---|
| A. | A completed Structural Criteria and supporting documentation is attached | <input type="checkbox"/> | Y | <input type="checkbox"/> | N |
|----|--|--------------------------|---|--------------------------|---|

Notes:

- 1. These criteria are intended for streamlined solar permitting process.*
- 2. If any items are checked NO, revise design to fit within Eligibility Checklist, otherwise permit application may go through standard process.*



**Solar Domestic Water Heating
Standard Plan for
One- and Two-Family Dwellings**

**ATTACHMENT L
BCM 6807
Article 1
09-01-15
Page 1 of 1**

SCOPE: Use this plan ONLY for solar domestic water heating (SDWH) systems not exceeding a thermal output rating of 30 kWth on the roof of a one- or two-family dwelling or accessory structure and used for domestic water heating. Systems must be in compliance with current California Building Standards Code, Title 24 and local amendments of the authority having jurisdiction (AHJ). Other articles of the California Plumbing Code (CPC) or California Mechanical Code (CMC) or other California health and safety codes shall apply.

MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed collector, controller, pump, storage tank/heat exchanger/ heat transfer fluid (if applicable) and mounting systems. Equipment intended for use with SDWH system shall be identified and listed for the application.

Job Address: _____ Permit #: _____

Contractor/Engineer Name: _____ License # and Class: _____

Signature: _____ Date: _____ Phone Number: _____

Email: _____

Total # of Collectors Installed _____ Total Area of Collectors _____

Collector Certification Number (include certifying agency) _____

System Certification Number (include certifying agency) _____

Max Height Above Roof _____ Height Above Ground _____

Major Components (for SDWH systems)

Solar Tank Make/Model _____ Gallons _____ Insulation R-_____ Pressurized? _____

Heat Exchanger Make/Model _____ Number of Walls _____ Heat Exchange Fluid _____

Solar Control Make/Model _____

Solar Pump/Circulator Make/Model _____

Expansion Tank Make/Model _____ Appropriately Sized for Use? _____

Mounting Hardware Make/Model or Type _____

Do all the above data match substantially the data used for certification? _____



**Solar Pool Heating Standard Plan for
One- and Two-Family Dwellings**

**ATTACHMENT M
BCM 6807
Article 1
09-01-15
Page 1 of 1**

SCOPE: Use this plan ONLY for solar pool heating (SPH) systems not exceeding a thermal output rating of 30 kWth on the roof of a one- or two- family dwelling or accessory structure and used for residential solar pool heating. Systems must be in compliance with current California Building Standards Code, Title 24 and local amendments of the authority having jurisdiction (AHJ). Other articles of the California Plumbing Code (CPC) or California Mechanical Code (CMC) or other health and safety codes shall apply.

MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed collector, controller, solar pump (if applicable), heat exchanger/heat transfer fluid (if applicable), diverting valve (if applicable) and mounting systems. Equipment intended for use with a SPH system shall be identified and listed for the application.

Job Address: _____ Permit #: _____

Contractor/Engineer Name: _____ License # and Class: _____

Signature: _____ Date: _____ Phone Number: _____

Email: _____

Total # of Collectors Installed _____ Total Area of Collectors _____

Collector Certification Number (include certifying agency) _____

System Certification Number (include certifying agency) _____

Max Height Above Roof _____ Height Above Ground _____

Major Components (for SDWH systems)

Solar Control Make/Model _____

Solar Pump/Circulator Make/Model _____

Diverting Valve Make/Model _____

Mounting Hardware Make/Model or Type _____



**Structural Criteria for Residential
Rooftop Solar Energy
Installations for One- and Two-
Family Dwellings**

**ATTACHMENT N
BCM 6807
Article 1
09-01-15
Page 1 of 11**

Use of this document

This document includes a one-page list of structural criteria for over-the-counter or online approval, as well as attached tables and figures that supplement the criteria and explain their use.

This document applies to flush-mounted solar arrays installed on the roofs of wood-framed one- and two family dwellings. “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 2013 California Building Code (CBC) and 2013 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
 - 3) Is the elevation of the site under 2,000 feet? Y N
 - 4) Is the dwelling farther than 200 yards from the ocean or a large coastal bay? 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
 - 4) Measured rafter size (e.g. 13/4 x 33/4, not 2x4): _____ x _____ inch
 - 5) Measured rafter horizontal span (see Figure 4): _____' - _____" ft-in
 - 6) Horizontal rafter span per Table 2: _____' - _____" ft-in
 - 7) Is measured horizontal rafter span less than Table 2 span? Y N Truss

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, hops, 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. Downward Load Check (Anchor Layout Check):
- 1) Proposed anchor horizontal spacing (see Figure 2): _____ x _____ inch
 - 2) Horizontal anchor spacing per Table 1: _____' - _____" ft-in
 - 3) Is proposed anchor horizontal spacing less than Table 1 spacing? Y N
- G. 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 is the anchor LA County approved for such application? 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 #: _____

Table 1. Maximum Horizontal Anchor Spacing				
Roof Slope		Rafter Spacing		
		16" o.c.	24" o.c.	32" o.c.
Photovoltaic Arrays (4 psf max)				
Flat to 6:12	0° to 26°	5'-4"	6'-0"	5'-4"
7:12 to 12:12	27° to 45°	1'-4"	2'-0"	2'-8"
13:12 to 24:12	46° to 63°	1'-4"	2'-0"	2'-8"
Solar Thermal Arrays (5 psf max)				
Flat to 6:12	0° to 26°	4'-0"	4'-0"	5'-4"
7:12 to 12:12	27° to 45°	1'-4"	2'-0"	2'-8"
13:12 to 24:12	46° to 63°	Calc. Req'd	Calc. Req'd	Calc. Req'd

Solar support component manufacturer's guidelines may be relied upon to ensure the array above the roof is properly designed, but manufacturer's guidelines typically do NOT check to ensure that the roof itself can support the concentrated loads from the solar array. Table 1 assumes that the roof complied with the building code in effect at the time of construction, and places limits on anchor horizontal spacing to ensure that a roof structure is not overloaded under either downward loads or wind uplift loads. Note 4 below lists the basic assumptions upon which this table is based.

Table 1 Notes:

1. Anchors are also known as “stand-offs”, “feet”, “mounts” or “points of attachment”. Horizontal anchor spacing is also known as “cross-slope” or “east-west” anchor spacing (see Figure 2).
2. If anchors are staggered from row-to-row going up the roof, the anchor spacing may be twice that shown above, but no greater than 6'-0”.
3. For manufactured plated wood trusses at slopes of flat to 6:12, the horizontal anchor spacing shall not exceed 4'-0” and anchors in adjacent rows shall be staggered.
4. This table is based on the following assumptions:
 - The roof structure conformed to building code requirements at the time it was built.
 - The attached list of criteria are met.
 - Mean roof height is not greater than 40 feet.
 - Roof sheathing is at least 7/16” thick oriented strand board or plywood. 1x skip sheathing is acceptable.
 - If the dwelling is in Wind Exposure B (typical urban, suburban or wooded areas farther than 500 yards from large open fields), no more than one of the following conditions apply:
 - The dwelling is located in a special wind region with design wind speed between 115 and 130 mph per ASCE 7-10, or
 - The dwelling is located on the top half of a tall hill, provided average slope steeper is less than 15%.
 - If the dwelling is In Wind Exposure C (within 500 yards of large open fields or grasslands), all of the following conditions apply:
 - Design wind speed is 110 mph or less (not in a Special Wind Region), and
 - The dwelling is not located on the top half of a tall hill.
 - The solar array displaces roof live loads (temporary construction loads) that the roof was originally designed to carry.
 - The Structural Technical Appendix provides additional information about analysis assumptions.

Table 2. Roof Rafter Maximum Horizontal Span (feet - inches) ¹								
Assumed Vintage	Nominal Size	Actual Size	Non-Tile Roof ²			Tile Roof ³		
			Rafter Spacing					
			16" o.c.	24" o.c.	32" o.c.	16" o.c.	24" o.c.	32" o.c.
Post-1960	2x4	1½"x3½"	9'-10"	8'-0"	6'-6"	8'-6"	6'-11"	5'-6"
	2x6	1½"x5½"	14'-4"	11'-9"	9'-6"	12'-5"	10'-2"	8'-0"
	2x8	1½"x7¼"	18'-2"	14'-10"	12'-0"	15'-9"	12'-10"	10'-3"
Pre-1960	2x4	1¾"x3¾"	11'-3"	9'-9"	7'-9"	10'-3"	8'-6"	6'-9"
	2x6	1¾"x5¾"	17'-0"	14'-0"	11'-3"	14'-9"	12'-0"	9'-9"
	2x8	1¾"x7¾"	22'-3"	18'-0"	14'-6"	19'-0"	15'-6"	12'-6"

Beyond a visual review by the Contractor checking for unusual sagging or deterioration, some CBOs may want additional assurance that the roof structure complies with structural building code requirements. Table 2 is an optional table some CBOs may elect to use to provide additional assurance by requiring a check of existing roof rafter spans, and supports optional criteria 1.B.5 and 1.B.6. For post-1960 construction, these span tables match the rafter span tables found in the 2013 California Building and Residential codes. For pre-1960 construction, the rafter span tables are based on structural calculations with lumber sizes and wood species & grade appropriate for older construction. Note 5 below lists the basic assumptions upon which this table is based.

Table 2 Notes:

1. See Figure 4 for definition of roof rafter maximum horizontal span.
2. "Non-tile Roof " = asphalt shingle, wood shingle & wood shake, with an assumed roof assembly weight of 10 psf.
3. "Tile Roof " = clay tile or cement tile, with an assumed roof assembly weight of 20psf
4. Unaltered manufactured plated-wood trusses may be assumed to be code compliant and meet intent of Table 2.
 - This table is based on the following assumptions:
 - pan/deflection ratio is equal to or greater than 180.
 - For post-1960 construction, wood species and grade is Douglas Fir-Larch No. 2.
 - For pre-1960 construction, wood species and grade is Douglas Fir-Larch No. 1.
 - Other wood species and/or grade are also acceptable if allowable bending stress is equal or greater to that listed above.

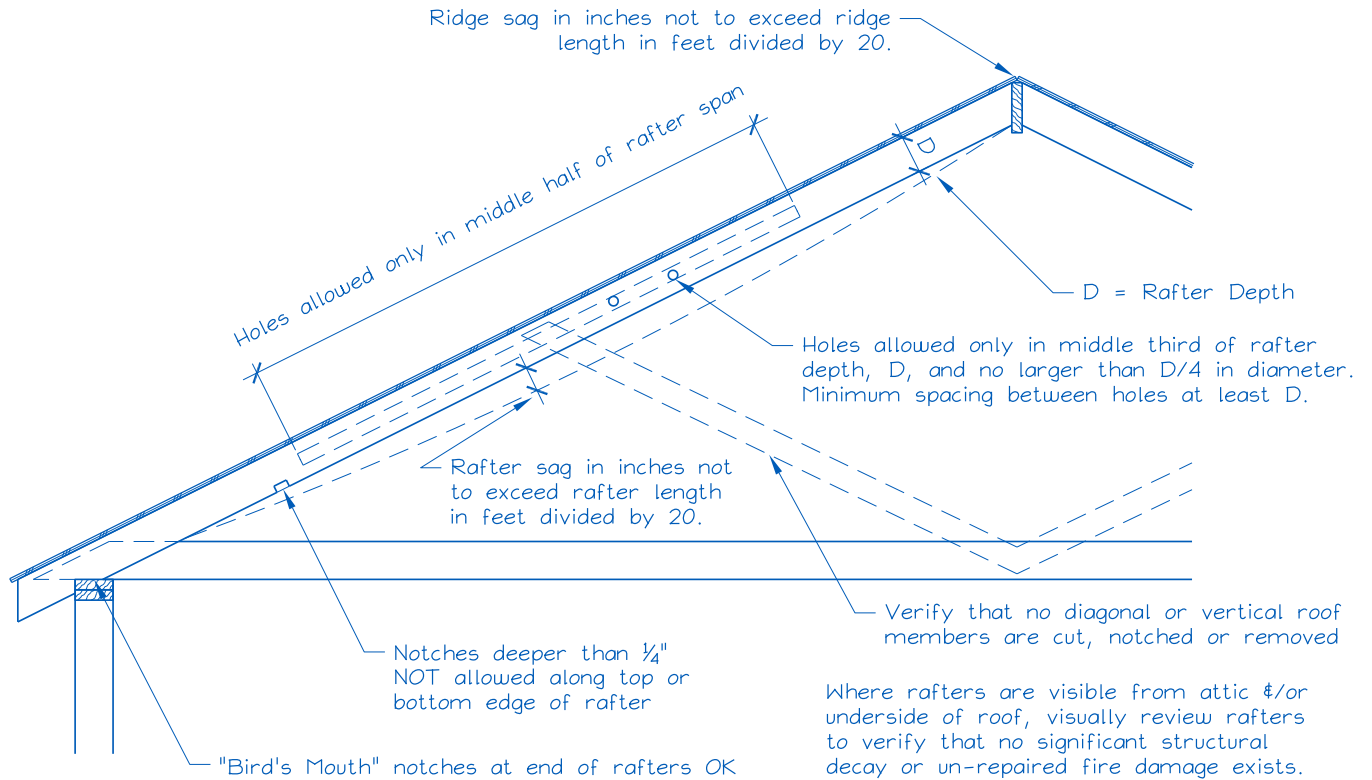


Figure 1. Roof Visual Structural Review (Contractor’s Site Audit) of Existing Conditions.
The site auditor should verify the following:

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.

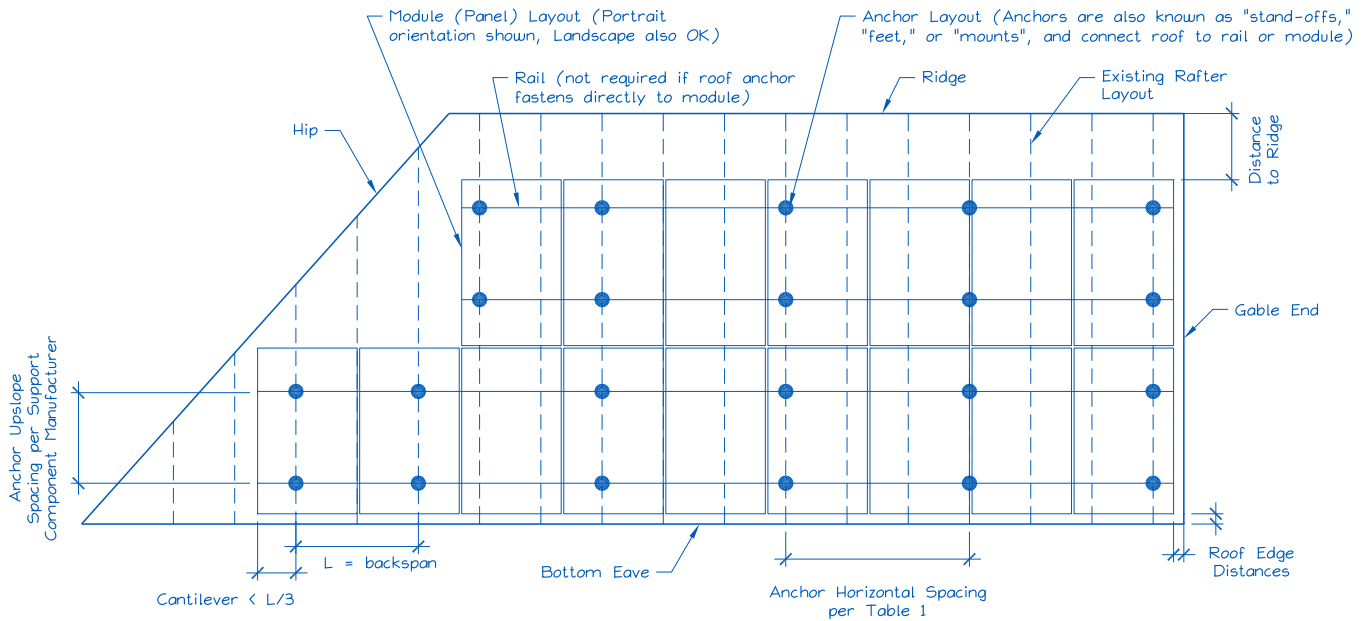


Figure 2. Sample Solar Panel Array and Anchor Layout Diagram (Roof Plan).

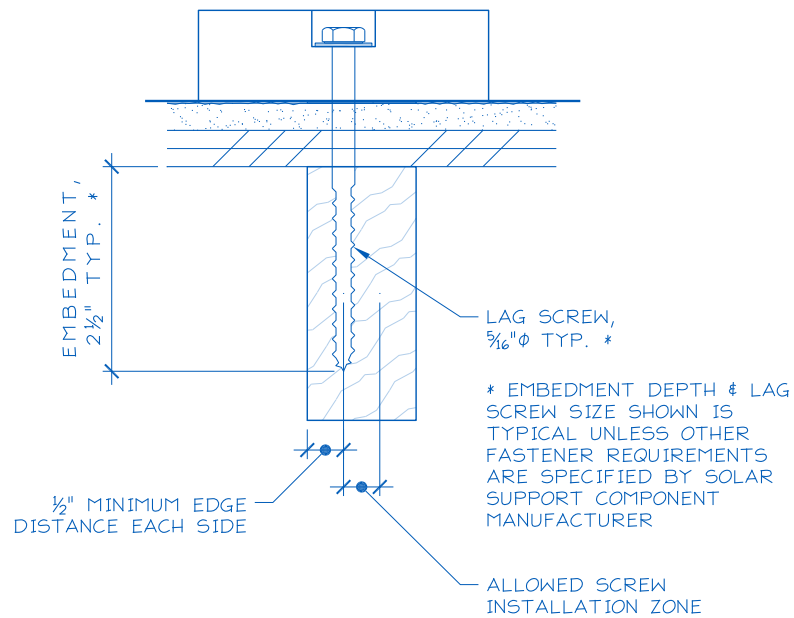
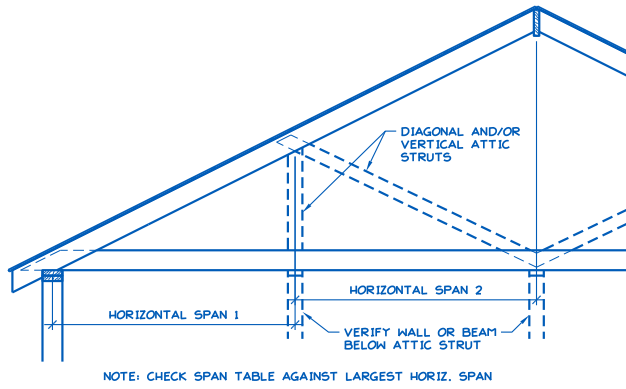
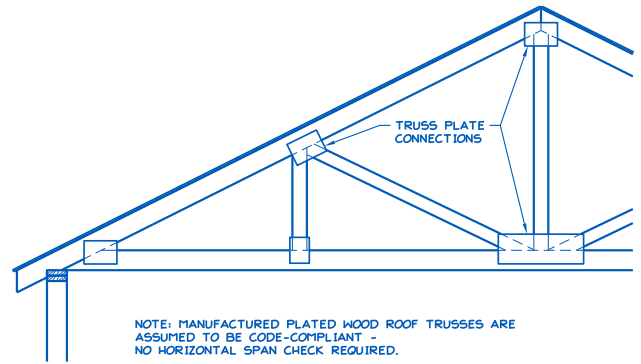


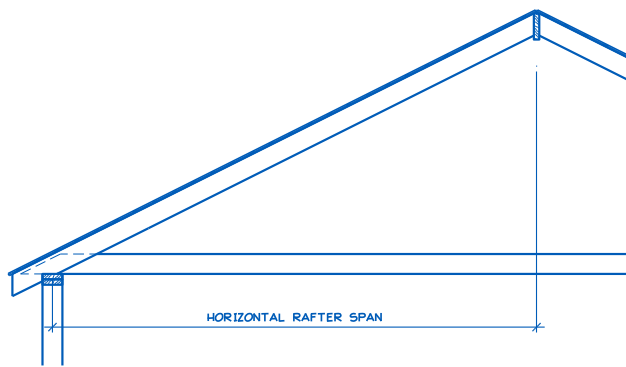
Figure 3. Typical Anchor with Lag Screw Attachment.



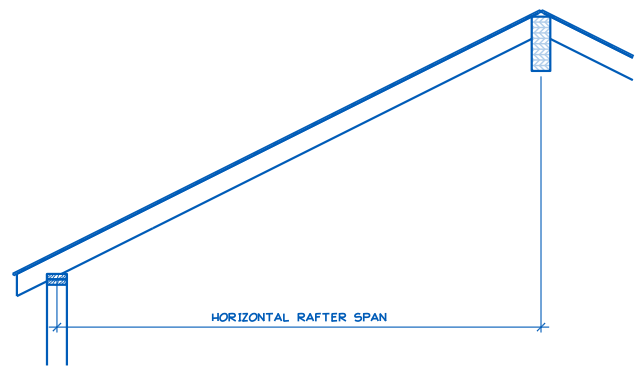
C STRUTS TO WALLS BELOW



D MANUFACTURED PLATED WOOD ROOF TRUSS



A SIMPLE ATTIC



B CATHEDRAL CEILING

Figure 4. Definition of Rafter Horizontal Span.

THE FOLLOWING IS PROVIDED FOR REFERENCE ONLY.

Regional and Site Assumptions

This document is based on the following regional and site assumptions:

- The dwelling is located in a ZERO snow load area (see Map 1 and BCM 1608, Article 1).
- The dwelling is not in Wind Exposure D (within 200 yards of the ocean or a large coastal bay).
- If in Wind Exposure B (urban, suburban or wooded areas), the dwelling may be located: in a Special Wind Region (see Map 2 BCM 1609.1.1, Article 1) with design wind speeds between 110 and 130 mph, or on a tall hill, provided average slope is no steeper than 15%.
- If in Wind Exposure C (within 500 yards of large open fields or grasslands), the dwelling is:
 - in a standard 110 mph design wind speed region, and
 - not on a hill with a grade steeper than 5%.

Additional Requirements

- Regional and Site Checks
 - In a mixed snow load area, with zero snow load only at lower elevations, consider asking “is the dwelling lower than elevation _____ feet?”
 - In a coastal region, consider asking “is the dwelling farther than 200 yards from the ocean or a large coastal bay?” to verify the dwelling is not in Wind Exposure D.
 - In a Special Wind Region with design wind speeds between 115 and 130 mph, consider verifying that the dwelling is in Wind Exposure B by asking “is the dwelling in an urban, suburban or wooded area, and not within 500 yards of open fields and grasslands?”
 - In a Special Wind Region with design wind speeds between 115 and 130 mph, consider verifying that there are no significant topographic wind speed-up effects by asking “is the dwelling in a relatively flat area (grade less than 5%) and not within 500 yards of the crest of a tall hill?”
- Roof Check
 - With evidence of structurally deficient one- and two-family housing stock or poor structural code compliance history, the rafter span check option is added in the criteria.

The Structural Toolkit and CRC Wind Speeds

The 2013 CRC contains an inconsistency related to wind speeds. Despite referencing ASCE 7-10 as its standard, the 2013 CRC's text and tables use outdated ASCE 7-05 wind speeds. Under the old ASCE 7-05 / CBC 2010, the basic design wind speed in most regions of the state was 85 mph (max. 3 second gust in 50 years). Under ASCE 7-10 / CBC 2013, the design wind speed has increased to 110 mph (max. 3 second gust in 700 years). Despite the different definitions of wind speed, design wind pressures remain essentially unchanged.

Because the Toolkit's structural document is intended to be forward looking, all wind speeds in the Toolkit document are based on the ASCE 7-10. This is clearly stated in the caption to the state wind speed map, and in the Table 1 footnotes. This anticipates an obvious and expected correction to the CRC; otherwise the Toolkit would become immediately outdated when the CRC is amended to change the base design wind speed from 85 mph to 110 mph 2013 CRC text (ASCE 7-05) wind speeds equivalent to the 2013 CRC and CBC Reference Standard (ASCE 7-10) are shown below. See ASCE 7-10 Table C26.5-6 for additional information.

2013 CRC text <u>ASCE 7-05</u>	2013 CRC and CBC Referenced Standard <u>ASCE 7-10</u>
85 mph	110 mph
90 mph	115 mph
95 mph	120 mph
100 mph	126 mph
105 mph	133 mph

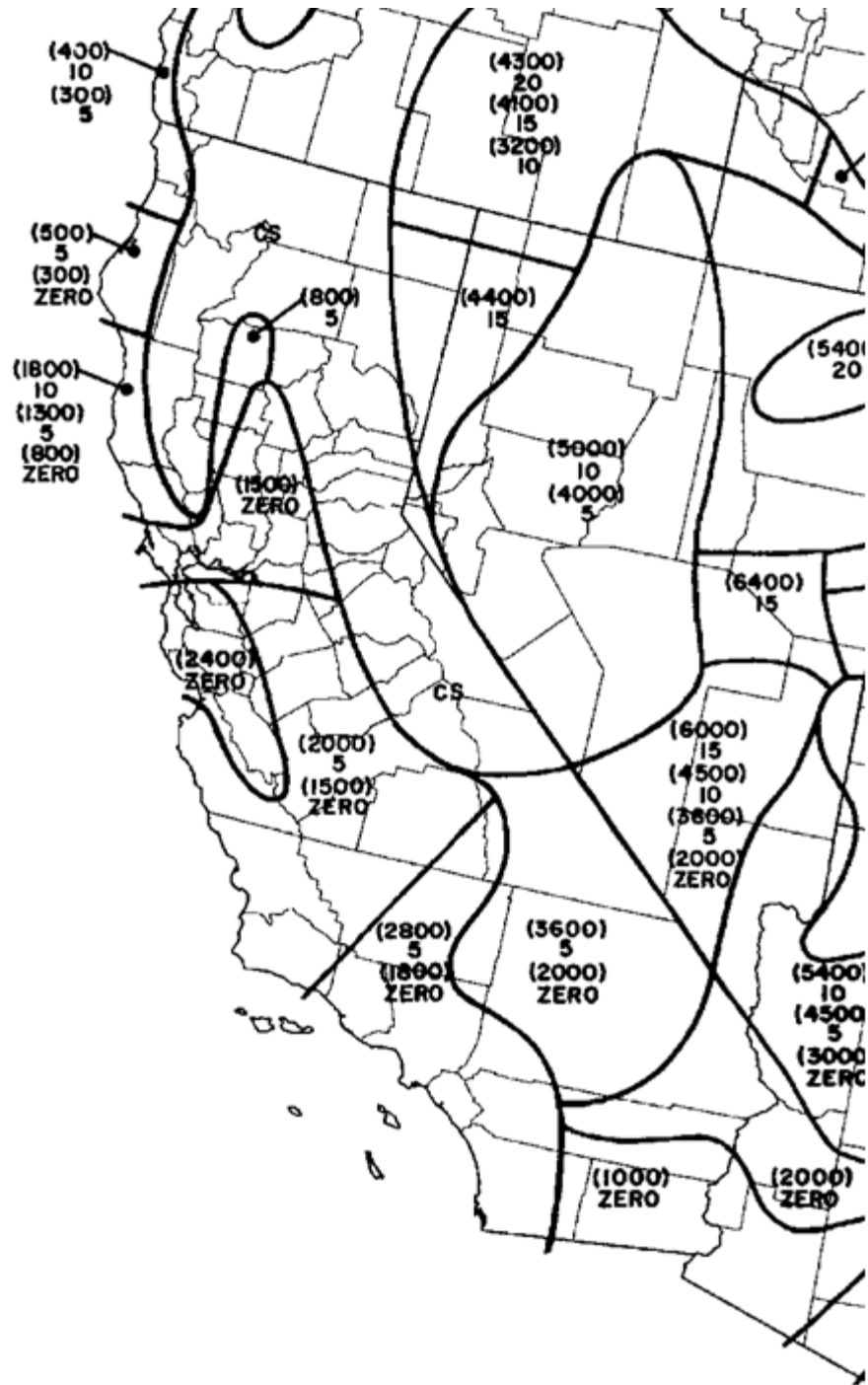
Structural Technical Appendix

This toolkit document is supported by a Structural Technical Appendix that describes the technical analysis behind these criteria, which are based on structural engineering principles and the California Building and Residential Codes. The Technical Appendix also provides some additional guidance to address nonconforming items, such as when an anchor layout is not based on a solar support component manufacturer's guidelines, or when a coastal site is located within 200 yards of the ocean (Exposure D).

http://www.opr.ca.gov/docs/Solar_Structural_Technical_Appendix.pdf

Probability of Code Compliance

The Structural Technical Appendix includes a section that examines the probabilities associated with the assumptions behind Table 1 that allows six feet cross-slope anchor spacing in some circumstances. That statistical analysis estimates that the probability of code noncompliance for six feet anchor spacing is only 2 in a thousand installations (0.2%). Note that probability of structural failure is orders of magnitude lower than the probability of code *noncompliance*.



Map 1. California Ground Snow Load Map (Ref: ASCE 7-10).

The numbers in parentheses represent the upper elevation limits in feet for the ground snow load in psf listed below the elevation. Example: (2400) ZERO in the South San Francisco bay area indicates that zero ground snow loads occur from sea level up to an elevation of 2400 feet. CS indicates “Case Studies” where extreme local variations in ground snow loads occur. Non-zero snow load areas and Case Study (CS) areas are excluded from the use of this structural toolkit document. See the Technical Appendix for additional information.



Map 2. California Design Wind Speed Map (Ref: ASCE 7-10).

The number outside the parentheses represents the design wind speed in mph. Typical design wind speed is 110 mph. The grey shaded areas on the map indicate “special wind regions” where higher wind speeds may apply. When the project is in a grey shaded area, contact the local building department for the design wind speed.



Inspection Guide for Solar Domestic Water Heating Systems In One- and Two-Family Dwellings Dwellings

This document is a field inspection guide for solar domestic water heating (SDWH) systems. These inspection references detail most of the issues that relate to SDWH systems during the inspection process.

All California Electrical Code (CEC), California Residential Code (CRC), California Building Code (CBC), California Mechanical Code (CMC) and California Plumbing Code (CPC) references are to the 2013 versions unless otherwise noted.

SOLAR DOMESTIC WATER HEATING SYSTEM ELIGIBILITY			
SYSTEM	Criteria		Yes
		1. Major components installed match those of certified system?	
SOLAR DOMESTIC WATER HEATING INSPECTION GUIDE			
	Guideline	Source of Guideline	Yes
ROOF	I. Roof penetrations/attachments are properly flashed	CBC Chap. 15, CRC Chap. 9	
	SOLAR LOOP PIPING	I. Piping must be properly supported, hung and anchored per code	CPC 313.0
II. Solar piping properly insulated		Energy Sec. 150.0(j)	
III. Dissimilar materials isolated, as required		CPC 310.6	
IV. Penetrations through structural members as per code		CPC 312.2	
V. Penetrations through fire-resistant assemblies installed per code		CPC 1505.2	
VI. Where the collector fluid is water, two freeze protection mechanisms installed		CPC 312.6 CPC S 13.4.3(4)	
VII. System overheat protection		CPC 505.2	
VIII. Expansion tank sized correctly (indirect system) according to need for operation or overheat protection?		CMC 1005.3, 1005.4 CMC S 8.2.1	
IX. Air release vents installed per design		S 12.8	
X. Piping labels show type of fluid and direction of flow		CPC 601.2, S 13.4.6	
XI. Drain and fill valves labeled		CPC 601.2, S 13.4.6	
XII. Certificate of compliance posted		S 16.0	

SOLAR POOL HEATING INSPECTION GUIDE			
	Guideline	Source of Guideline	Yes
STORAGE TANK	I. Tank labeled with pressure rating for pressurized storage	CPC 505.4, S 8.1.4	
	II. T & P Relief drain installed properly for pressurized storage	CPC 608.5, CMC 1006.1, S 8.1.4	
	III. Pressurized water storage tank installed with T&P relief valve	CPC 608.3, S8.1.4	
	IV. Tank installed in garage meets code requirements	CPC 507.13	
	V. Pan installed under tank (as required)	CPC 507.4, S 8.1.10	
	VI. Tank installed on level surface	CPC 508.4.3	
	VII. Tank supported for seismic loads	CPC 507.2	
	VIII. All valves, fittings and solders are rated for portable systems and meeting CA lead law requirements	CPC 604.1	
	IX. Unions installed within 12" of tank connections for all piping to and from tank and heat exchangers	CPC 609.5	
	X. Single-wall heat exchanger installed with a label	S 11.2	



Inspection Guide for Solar Pool Heating Systems in One- and Two-Family Dwellings

This document is a field inspection guide for solar domestic pool heating (SPH) systems. These inspection references detail most of the issues that relate to SPH systems during the inspection process.

All California Electrical Code (CEC), California Residential Code (CRC), California Building Code (CBC), California Mechanical Code (CMC) and California Plumbing Code (CPC) references are to the 2013 versions unless otherwise noted.

SOLAR POOL HEATING SYSTEM ELIGIBILITY			
SYSTEM	Criteria		Yes
		1. Major components installed match those of certified system?	
SOLAR POOL HEATING INSPECTION GUIDE			
	Guideline	Source of Guideline	Yes
ROOF	I. Roof penetrations/attachments are properly flashed	CBC Chap. 15, CRC Chap. 9	
SOLAR LOOP PIPING	I. Piping properly supported	CPC 313.0	
	II. Vacuum relief valve installed (if required by manufacturer)	See local ordinance.	
	III. Drain valves installed if the system is not self-draining	CPC 312.6	
	IV. Penetrations through structural members as per code	CPC 312.2	
	V. Penetrations through fire-resistant assemblies installed per code	CPC 1505.2	
	VI. System has adequate freeze protection	CPC 312.6	
CONTROL	I. Control and pump properly installed and bolted to pad	CEC 430 (IX), 690.17	
	II. Conductors between control and power source properly installed	CEC 430 (II)	
	III. Conductors between control and pump properly installed	CEC 430 (II), 690 (IV)	
	IV. Solar collector sensors protected from sun and weather	CEC 310.8 B, D(1), D(2)	
	V. Control relay rated higher than load for each output	CEC 430.83	



**PV Installation Projects
(Example Photographs)**

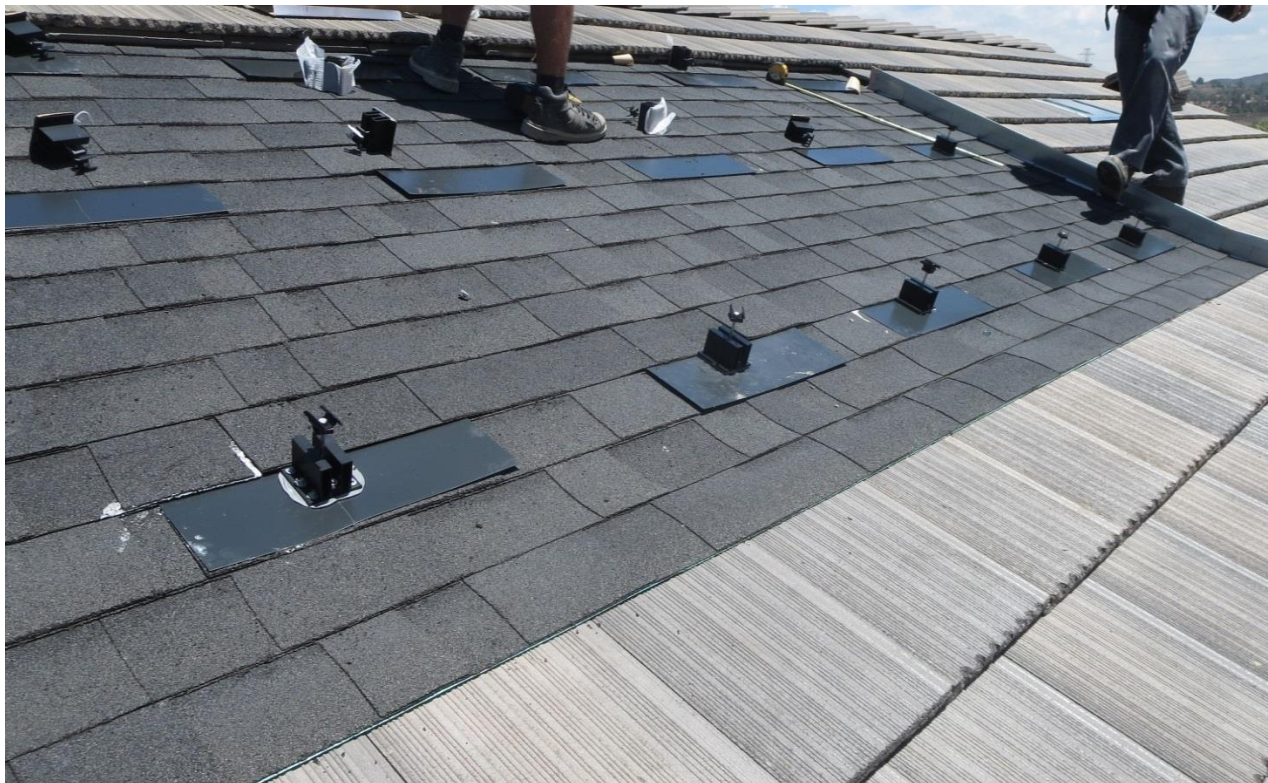




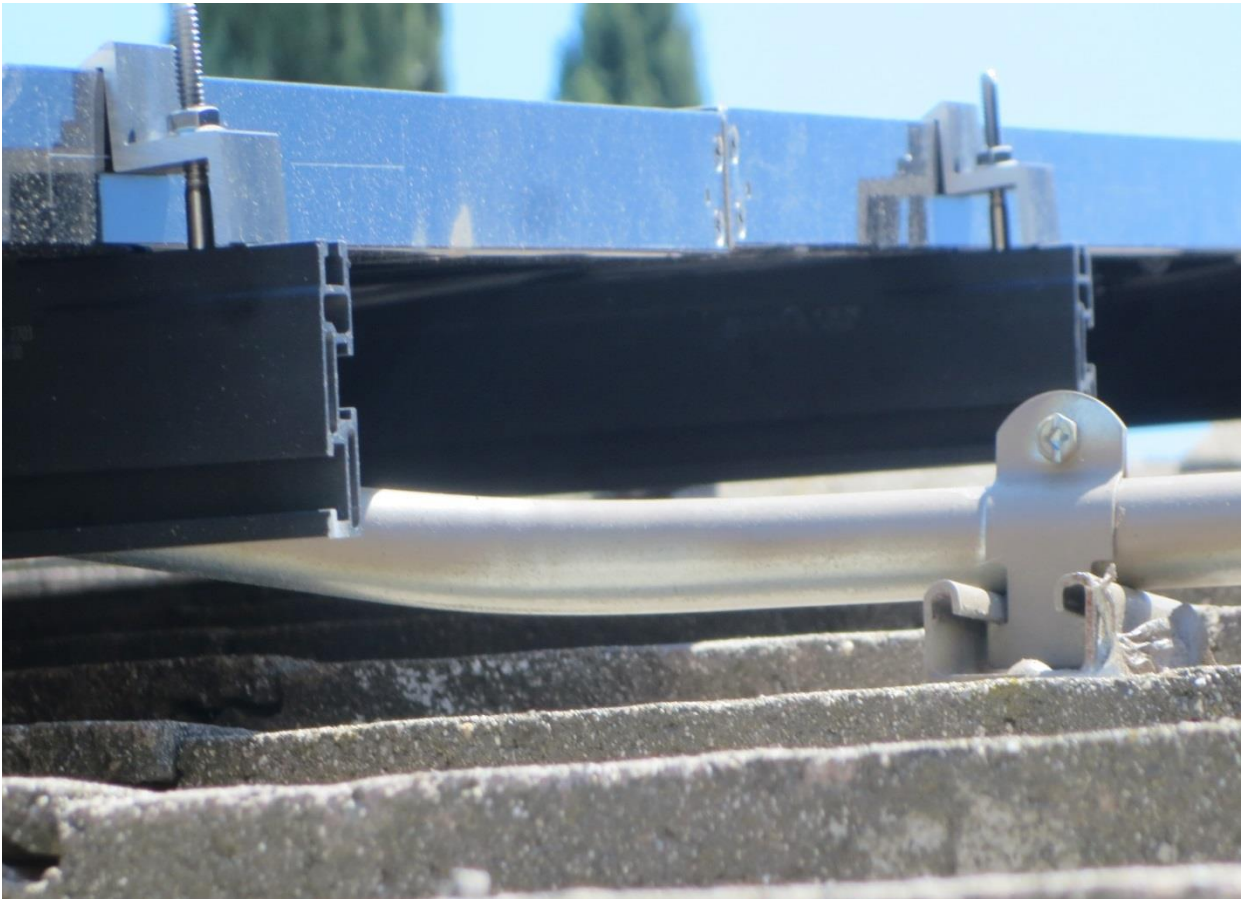


PV Roof Mounting System (Example Photographs)

APPENDIX B
BCM 6807
Article 1
09-01-15
Page 1 of 3









PV Panel Label
(Example Photograph)





**Grounding/Bonding of
PV Roof-Mounted Panels
(Example Photograph)**

**APPENDIX D
BCM 6807
Article 1
09-01-15
Page 1 of 1**





Conduit Clearance in Attic (Example Photograph)





**COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY DIVISION**

Form A

AFFIDAVIT FOR EXPEDITED PERMITTING OF SMALL RESIDENTIAL ROOFTOP SOLAR ENERGY SYSTEM INSTALLATION

Date: _____

Project Address: _____

APN: _____ - _____

Property Owner's Declaration

I, _____ (print full name), legal owner of the above mentioned property, certify and declare under penalty of perjury, that I am aware that the proposed solar energy system at this site shall be installed only on a structure built with the appropriate permits and approvals. I am aware that if the County of Los Angeles determines that the solar energy system has been installed on an unpermitted structure as required by the Building Code, the Building Official shall order that the solar energy system and the structure be removed within 45 days or permits be obtained to bring the structure into compliance with current codes, within 45 days. I am aware that failure to comply with any order issued by the Building Official shall result in code enforcement action and a Notice of Violation may be recorded against the property title.

The County shall not, in any way, be liable or responsible for any costs and I shall indemnify the County from and against any and all claims and expenses, including reasonable attorney's fees, in connection with any requested action and/or liability related to the required removal a solar energy installation system.

Property Owner's Information

Name: _____

Address: _____

Telephone Number: _____

Signature: _____

Solar Company Representative's Declaration

I, _____(print full name), the legal representative of the solar energy system installation company _____(print company name), certify and declare under penalty of perjury that I am aware that the proposed solar energy system at this site shall be installed only on a structure built with the appropriate permits and approvals. We have reviewed the site and all available public records relating to building permits and approvals to verify that the installation will be placed on a permitted structure. In the event that the solar energy system is determined to have been installed on an unpermitted structure, _____(print company name) will be responsible for the relocation or removal of the system.

The County shall not, in any way, be liable or responsible for any costs and I shall indemnify the County from and against any and all claims and expenses, including reasonable attorney's fees, in connection with any requested action and/or liability related to the required removal a solar energy installation system.

Solar Company Information

Name: _____

Address: _____

Company Representative: _____

Telephone Number: _____

Signature: _____



**COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY DIVISION**

Form B

AFFIDAVIT FOR EXPEDITED PERMITTING OF SMALL RESIDENTIAL ROOFTOP SOLAR ENERGY SYSTEM INSTALLATION

Date: _____

Project Address: _____

APN: _____ - _____

Owner Builder Declaration

I, _____ (print full name), legal owner of the above mentioned property, certify and declare under penalty of perjury that I am aware that the proposed solar energy system at this site shall be installed only on a structure built with the appropriate permits and approvals. I have reviewed all available public records relating to building permits and approvals to verify that the installation will be placed on a permitted structure. I am aware that if the County of Los Angeles determines that the solar energy system has been installed on an unpermitted structure, the Building Official shall order that the solar energy system and the structure be removed within 45 days or permits be obtained to bring the structure into compliance with current codes, within 45 days. I am aware that failure to comply with any order issued by the Building Official shall result in code enforcement action and a Notice of Violation may be recorded against the property title.

The County shall not, in any way, be liable or responsible for any costs and I shall indemnify the County from and against any and all claims and expenses, including reasonable attorney's fees, in connection with any requested action and/or liability related to the required removal a solar energy installation.

Name: _____

Address: _____

Telephone Number: _____

Signature: _____



**COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY DIVISION**

Form C

AFFIDAVIT FOR EXPEDITED PERMITTING OF SMALL RESIDENTIAL ROOFTOP SOLAR ENERGY SYSTEM INSTALLATION

Date: _____

Project Address: _____

APN: _____ - _____

Solar Company Representative's Declaration

I, _____ (print full name), the representative of the solar energy system installation company _____ (print company name), certify and declare that the proposed solar energy system at this site shall be installed only on a structure built with the appropriate permits and approvals, and I am not aware of any deficiency in required permits or approvals for the structure on which the solar energy system is being installed. We have reviewed the site and the building permits to verify that the installation will be placed on a permitted structure.

In the event that the solar energy system is determined to have been installed on an unpermitted structure which lacks required permits or inspection approvals, _____ (print company name) will be responsible for the relocation or removal of the solar energy system upon County issuance of a correction or violation notice.

The County shall not, in any way, be liable or responsible for any costs and/or claims and expenses, including attorney's fees, in connection with any requested action and/or liability related to the required removal a solar energy installation system.

Solar Company Information

Name of solar company: _____

Address: _____

Name of Authorized Company

Representative: _____

Telephone No.: _____

Signature of Authorized Company

Representative: _____