CITY OF FONTANA
BUILDING & SAFETY
8353 SIERRA AVE, FONTANA, CA 92335
(909) 350-7640
+ FAX: (909) 350-7676

Submittal Requirements for Expedited One- and Two-Family Residential Rooftop Solar Energy Installations (10KW or Less)

FORM PV 1

SUBMITTAL REQUIREMENTS

1. Completed **permit application form**. This permit application form and all other required PV forms can be downloaded at http://www.fontana.org/index.aspx?nid=144.
2. Two (2) complete sets of the following documents:
    1) A completed Eligibility Checklist form **(Form PV2).**
    2) A completed Solar PV Standard Plan **(Form PV3 & PV3S or PV4).**
    3) 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.
    4) A **Site Plan** showing all structures on property, property lines, PV panels, service meter, subpanels, inverters, disconnects, etc.
    5) Listed/approved manufacturer **Specification Sheets** for all proposed equipment including modules, inverters, panels, racking system, support mounts, etc.
    6) A completed Structural Criteria form **(Form PV5).**

    For non-qualifying systems, **provide structural drawings and calculations** stamped and signed by a California licensed architect or registered professional civil or structural engineer, along with the following information:
    - The type of roof covering and the number of roof coverings installed.
    - Type of roof framing, size of members and spacing.
    - Weight of panels, support locations and method of attachment.
    - Framing plan and details for any work necessary to strengthen the existing roof structure.
    - Site-specific structural calculations.
    - Wind Design: 129 MPH Ultimate Design Wind Speed (Vult), Exposure C.
    - Where an approved racking system is used, provide documentation showing manufacture of the rack system, maximum allowable weight the system can support, attachment method to the roof or ground and product evaluation information or structural design for the rack system.

PLAN REVIEW

Permit applications can be submitted in person to the Building and Safety Division public counter. Only permit applications utilizing all standard plans (PV2, PV3 or PV4, and PV5) qualify for an expedited plan review timeframe within one to three working days.

FEES

Plan Check	Permit	Total
$176	$169.21*	$345.21*

*Permit fee may vary:

- Strong Motion Instrumentation Program (SMIP) and Building Standards fees are based on overall project valuation cost.
- Additional fees apply for main panel upgrades.

INSPECTIONS

Once permit to construct the solar installation has 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 calling the Building and safety electronic voice response system at **(909) 350-7693**. Inspection requests received within business hours are typically scheduled for the next business day.

Contractor/owner-builder 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 include the following:

1) Number of PV modules and model number match plans and specification sheets.
2) Array conductors and components are installed in a neat and workman-like manner.
3) Conductors ratings and sizes match plans.
4) Appropriate signs are properly constructed, installed and displayed, including the following:
    a. Sign identifying PV system attributes at DC disconnect
    b. Sign identifying AC disconnect
    c. Warning sign indicating Dual Power Sources
5) Equipment ratings are consistent with application and installed signs on the installation, including the following:
    a. Inverter has a rating as high as max voltage on PV power source sign.
    b. DC-side overcurrent circuit protection devices (OCPDs) are DC rated at least as high as max voltage on sign.
    c. 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).
    d. Inverter is rated for the site AC voltage supplied and shown on the AC point of connection sign.
    e. 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.
    f. Sum of the main OCPD and the inverter OCPD is rated for not more than 120% of the bus bar rating for end fed main panels.
    g. Sum of the main OCPD and the inverter OCPD is rated for not more than 100% of the bus bar rating for center fed main panels.
6) All exterior equipment including but not limited to raceways, junction boxes, combiner boxes, load centers, disconnects etc. are painted to match exterior of building.

DEPARTMENTAL CONTACT INFORMATION

For additional information regarding this permit process, please consult our departmental website at **http://www.fontana.org/index.aspx?nid=136** or contact Building and Safety at **(909) 350-7640**.

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Eligibility Checklist for Expedited One- and Two-Family Residential Rooftop Solar Energy Installations (10KW or Less)

FORM PV 2

GENERAL REQUIREMENTS

1. System size is 10 KW AC CEC rating or less.	☐ Y	☐ N
2. The solar array is roof-mounted on one- or two-family dwelling or accessory structure.	☐ Y	☐ N
3. The solar panel/module arrays will not exceed the maximum legal building height.	☐ Y	☐ N
4. Solar system is utility interactive and without battery storage.	☐ Y	☐ N
5. Permit application is completed and attached.	☐ Y	☐ N

ELECTRICAL REQUIREMENTS

1. No more than four photovoltaic module strings are connected to each Maximum PowerPoint Tracking (MPPT) input where source circuit fusing is included in the inverter.	☐ Y	☐ N
a. No more than two strings per MPPT input where source circuit fusing is not included.	☐ Y	☐ N
b. Fuses (if needed) are rated to the series fuse rating of the PV module.	☐ Y	☐ N
c. No more than one noninverter-integrated DC combiner is utilized per inverter.	☐ Y	☐ N
2. For central inverter systems: No more than two inverters are utilized.	☐ Y	☐ N
3. 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
4. The PV system is connected to the load side of the utility distribution equipment.	☐ Y	☐ N
5. A completed Solar PV Standard Plan is attached **(Form PV3 or PV4)**.	☐ Y	☐ N

STRUCTURAL REQUIREMENTS

1. A completed Structural Criteria form is attached **(Form PV5)**.	☐ Y	☐ N

FIRE SAFETY REQUIREMENTS

1. Clear access pathways provided.	☐ Y	☐ N
2. Fire classification solar system is provided.	☐ Y	☐ N
3. All required markings and labels are provided.	☐ Y	☐ N
4. 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

Note: If any items are checked NO, revise design to fit within Eligibility Checklist, otherwise permit application may go through standard process.

Address:_____ **Signature:**_____

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Solar PV Standard Plan – Simplified Microinverter and ACM Systems for One- and Two-Family Dwellings (10 KW or Less)

FORM PV 4

Use this plan ONLY for systems using utility-interactive Microinverters or AC Modules (ACM), with a maximum of 3 branch circuits, one PV module per inverter and with PV module ISC maximum of 10-A DC. 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 (non-inverter-integrated) per inverter. Systems must be in compliance with current 2013 California Building Standards Code and City of Fontana amendments. Other Articles of the 2013 California Electrical Code (CEC) shall apply as specified in 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, Building and Safety 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: _____

Contractor/Owner Builder: _____

Signature: _____ Date: _____ Phone: _____

GENERAL REQUIREMENTS AND SYSTEM INFORMATION

☐ Microinverter
Number of PV modules installed: _____
Number of Microinverters installed: _____

☐ A C Module (ACM)
Number of ACMs installed: _____
Note: Listed Alternating-Current Module (ACM) is defined in CEC 690.2 and installed per CEC 690.6

1. Number of Branch Circuits, 1, 2 or 3: _____
2. Actual number of Microinverters or ACMs per branch circuit: 1 _____ 2._____ 3._____
3. Total AC system power rating = (Total Microinverters or ACMs) * (AC inverter power output) = _____Watts

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: _____

1. Rated (continuous) AC output power: _____ Watts
2. Nominal AC voltage rating: _____ Volts
3. Rated (continuous) AC output current: _____ Amps

If installing ACMs, skip [STEP 4]

4. Maximum DC input voltage rating: _____ Volts (limited to 79 V, otherwise use the Comprehensive Standard Plan)
5. Maximum AC output overcurrent protection device (OCPD) _____ Amps
6. Maximum number of Microinverters or ACMs per branch circuit: _____

PV MODULE INFORMATION

(If installing ACMs, skip to Branch Circuit Output Information)

PV Module Manufacturer: _____

Model: _____

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

1. Module VOC at STC (from module nameplate): _____ Volts
2. Module ISC at STC (from module nameplate): _____ Amps
3. Adjusted PV Module DC voltage at minimum temperature = [Table 1] _____ [cannot exceed max rating]

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(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

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]			

SOLAR LOAD CENTER (IF USED)

1. Solar Load Center is to have a bus bar rating not less than 100 Amps. Otherwise use Comprehensive Standard Plan.
2. Circuit Power see [STEP 1] =_____ Watts
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"

POINT OF CONNECTION TO UTILITY

1. Load Side Connection only! Otherwise use the Comprehensive Standard Plan.

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 for center fed panels)

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.

GROUNDING AND BONDING

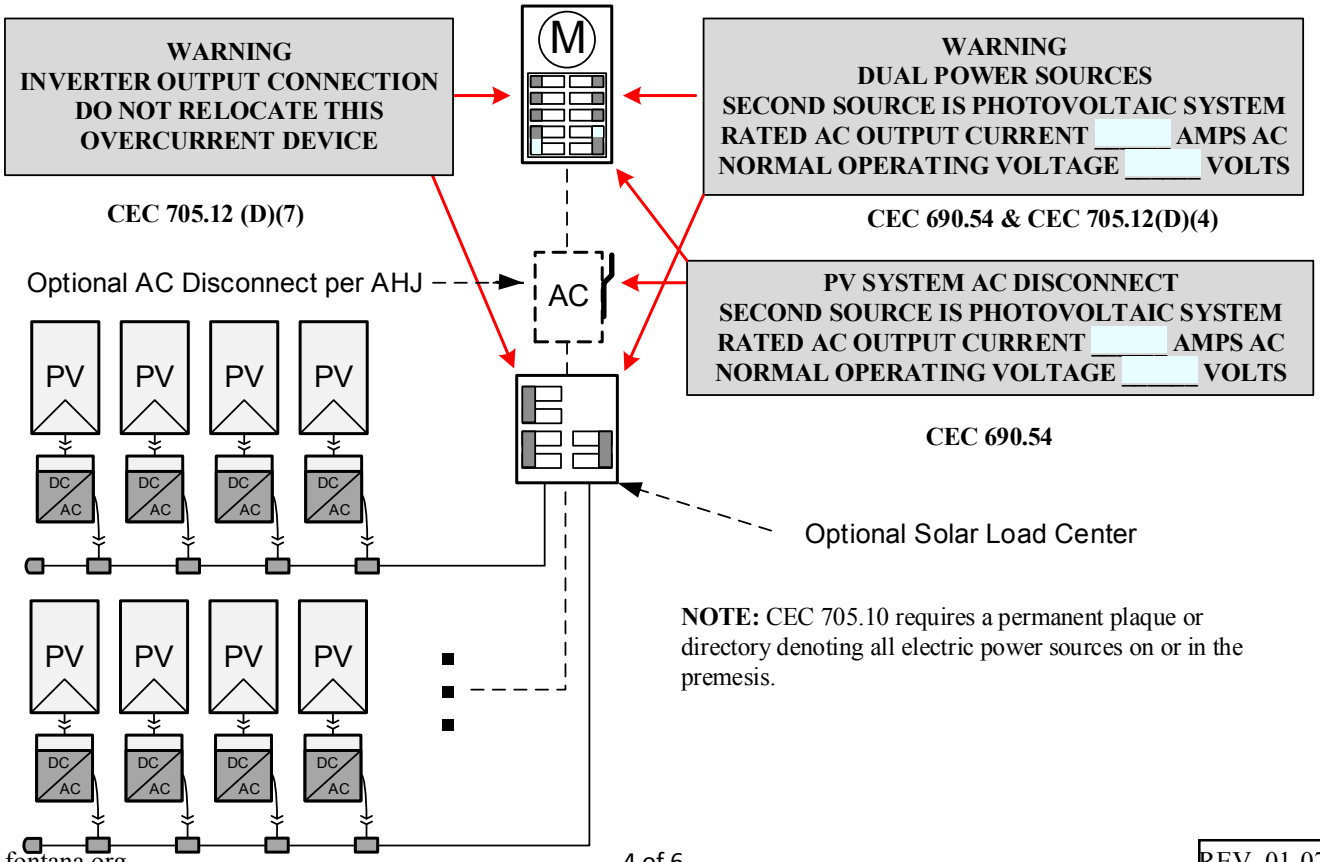
Check one of the boxes for whether system is grounded or ungrounded: ☐ Grounded ☐ Ungrounded

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).

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 ofthe code for permanency. No type size is specified, but 20 point (3/8") should be considered the minimum.



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

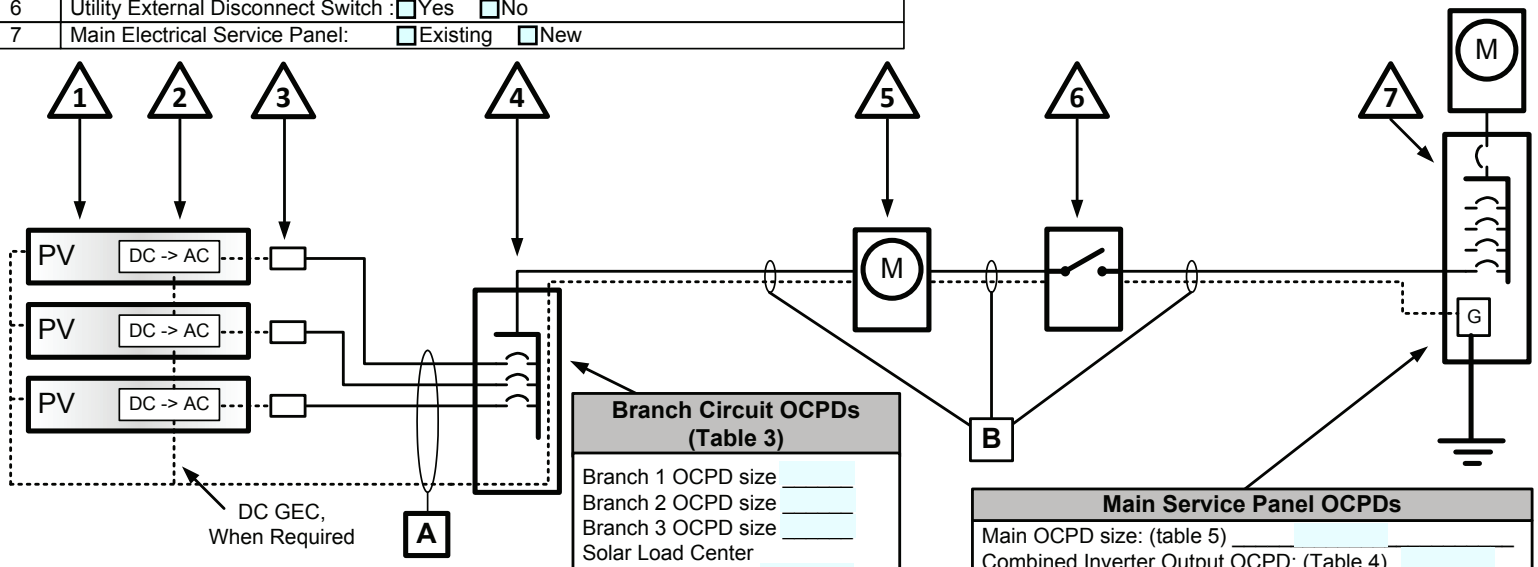
9. Single-Inverter Line Diagram

Equipment Schedule

△ TAG	DESCRIPTION: (Provide model # if provided)
1	Solar PV Module or ACM:
2	Microinverter (if not ACM):
3	Junction Box (es):
4	Solar Load Center: ☐ Yes ☐ No
5	Performance Meter: ☐ Yes ☐ No
6	Utility External Disconnect Switch : ☐ Yes ☐ No
7	Main Electrical Service Panel: ☐ Existing ☐ New

Single-Line Diagram for Microinverters or ACMs

Check a box for dc system grounding: ☐ Grounded, ☐ Ungrounded
For ungrounded dc power systems, EGC is required
For grounded dc power systems, GEC & EGC are required
Refer to CEC 250.120 for EGC installation & Table 250.122 for sizing



Branch Circuit OCPDs (Table 3)

Branch 1 OCPD size _____
Branch 2 OCPD size _____
Branch 3 OCPD size _____
Solar Load Center
Busbar(Section 5) _____

Main Service Panel OCPDs

Main OCPD size: (table 5) _____
Combined Inverter Output OCPD: (Table 4) _____
Main Service Panel Busbar: (Table 5) _____

Conductor, Cable and Conduit Schedule

☐ TAG	Description and Conductor Type: (Table 3)	Conductor Size	Number of Conductors	Conduit/ Conductor/ Cable Type	Conduit Size
A	Current-Carrying Conductors: (for each branch circuit)				
	EGC:				
	GEC (when required):				
B	Current-Carrying Conductors:				
	EGC:				
	GEC (when required):				

REV. 01-07-16

SOLAR PV STANDARD PLAN — SIMPLIFIED

Microinverter and ACM Systems for One- and Two-Family Dwellings

ROOF LAYOUT PLAN

REV. 01-07-16

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

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Structural Criteria for Expedited One and Two Family Residential Rooftop Solar Energy Installations (10KW or Less)

FORM PV 5

SITE CHECK FOR EXPOSURE B WIND CRITERIA

1. Wind Exposure Checks for Special Wind Regions:
   a. Is the dwelling farther than 500 yards from large open fields or grasslands? ☐ Y ☐ N
   b. Is the dwelling in a relatively flat area (grade less than 5%) and not within 500 yards of the crest of a tall hill? ☐ Y ☐ N
2. Steep Hill Wind Exposure Check:
   a. Is the dwelling NOT on the top half of a very steep hill (average grade more than 15%), and NOT within 500 yards of the crest of such a hill? ☐ Y ☐ N
3. Map provided illustrates a 500 yard radius to justify conformance with items A and B above? ☐ Y ☐ N

ROOF CHECK

1. Visual Review/Contractor's Site Audit of Existing Conditions:
   a. Is the roof a single roof without a reroof overlay? ☐ Y ☐ N
   b. Does the roof structure appear structurally sound, without signs of alterations or significant structural deterioration or sagging? ☐ Y ☐ N
2. Roof Structure Data:
   a. Measured roof slope is 6:12 or less? ☐ Y ☐ N
   b. Measured rafter spacing (center-to-center) is 24" o.c. or less? ☐ Y ☐ N
   c. Roof framing (rafter or manufactured truss) are at least 2 x 4 DF #2? ☐ Y ☐ N

SOLAR ARRAY CHECKS

1. Flush-mounted Solar Array:
   a. Is the plane of the modules (panels) parallel to the plane of the roof? ☐ Y ☐ N
   b. Is there a 2" to 10" gap between underside of module and the roof surface? ☐ Y ☐ N
   c. Modules do not overhang any roof edges (ridges, hips, gable ends, eaves)? ☐ Y ☐ N
2. Do the modules plus support components weigh no more than: 4 psf ? ☐ Y ☐ N
3. Does the array cover no more than half of the total roof area (all roof planes)? ☐ Y ☐ N
4. Are solar support component manufacturer's project-specific completed worksheets, tables with relevant cells circled, or web-based calculator results attached? ☐ Y ☐ N

5. Is a roof plan of the module and anchor layout attached? ☐ Y ☐ N

6. Downward Load Check (Anchor Layout Check):

    a. Horizontal anchor spacing (stand offs) in each direction does not exceed 4 ft. ☐ Y ☐ N

7. Wind Uplift Check (Anchor Fastener Check):

    a. Anchor fastener data:

        i. Diameter of lag screw, hanger bolt or self-drilling screw: _____ inch

        ii. Embedment depth of rafter: _____ inch

        iii. Number of screws per anchor (typically one): _____

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

SUMMARY

1. All items above are checked YES. No additional calculations are required.

2. One or more items are checked NO. Attach project-specific drawings and calculations stamped and signed by a California Registered Civil / Structural Engineer or California Licensed Architect.

Job Address: _____

Contractor/Installer: _____

Signature: _____ **Date:** _____ **Phone #:** _____