PROJECT TITLE

<u>CODE & STANDARD</u>

DESIGN COMPLYING WITH THE LATEST EDITION OF CALIFORNIA BUILDING CODE, CALIFORNIA ELECTRICAL CODE, NEC, AND THE STOCKTON MUNICIPAL CODE

GENERAL NOTES

SOLAR PHOTOVOLTAIC SYSTEM TO BE INSTALLED ON RESIDENTIAL STRUCTURE.

THIS PROJECT HAS BEEN DESIGNED IN COMPLIANCE WITH THE CBC SECTION 1609 TO WITHSTAND A MINIMUM 85 MPH WIND LOAD.

THE HOUSE IS STORY(IES) TALL.

THE RAFTERS ARE x AND INCHES ON CENTER.

THIS SYSTEM WILL NOT BE INTERCONNECTED UNTIL APPROVAL FROM THE LOCAL JURISDICTION AND THE UTILITY IS OBTAINED.

WHEN A STORAGE BATTERY IS PROVIDED, THIS SYSTEM SHALL BE AN UTILITY INTERACTIVE SYSTEM WITH LISTED STORAGE BATTERIES PER CEC ARTICLE 706, AND CRC SECTION R327 REQUIREMENTS. STATIONARY STORAGE BATTERY SYSTEMS SHALL COMPLY CFC, AND HAVING CAPACITIES NOT EXCEEDING THE VALUES SHOWN IN TABLE 608.1 2016 CFC.

THE SOLAR PHOTOVOLTAIC INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL OR BUILDING ROOF VENTS.

IF THE EXISTING MAIN SERVICE PANEL DOES NOT HAVE VERIFIABLE GROUNDING ELECTRODE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.

EACH MODULE WILL BE GROUNDED USING THE SUPPLIED CONNECTIONS POINTS IDENTIFIED ON THE MODULE AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH CAL-OSHA REGULATIONS.

PROPER ACCESS AND WORKING CLEARANCE WILL BE PROVIDED AS PER SECTION 110.26 CEC.

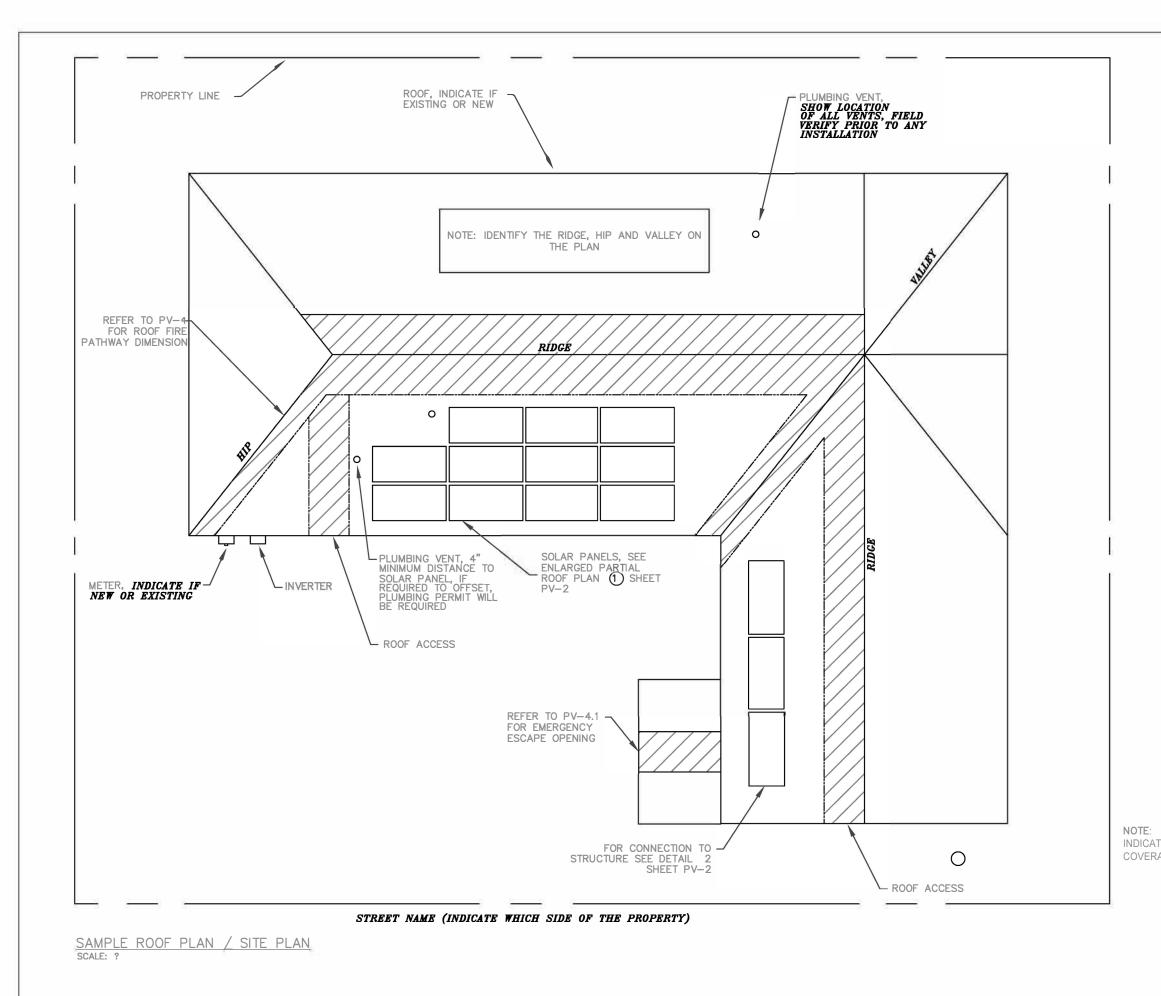
THIS PROJECT HAS BEEN DESIGNED IN COMPLIANCE WITH THE CITY OF SAN DIEGO PROP D & FAA REQUIREMENTS.

SCOPE OF WORK :

SHEET INDEX :

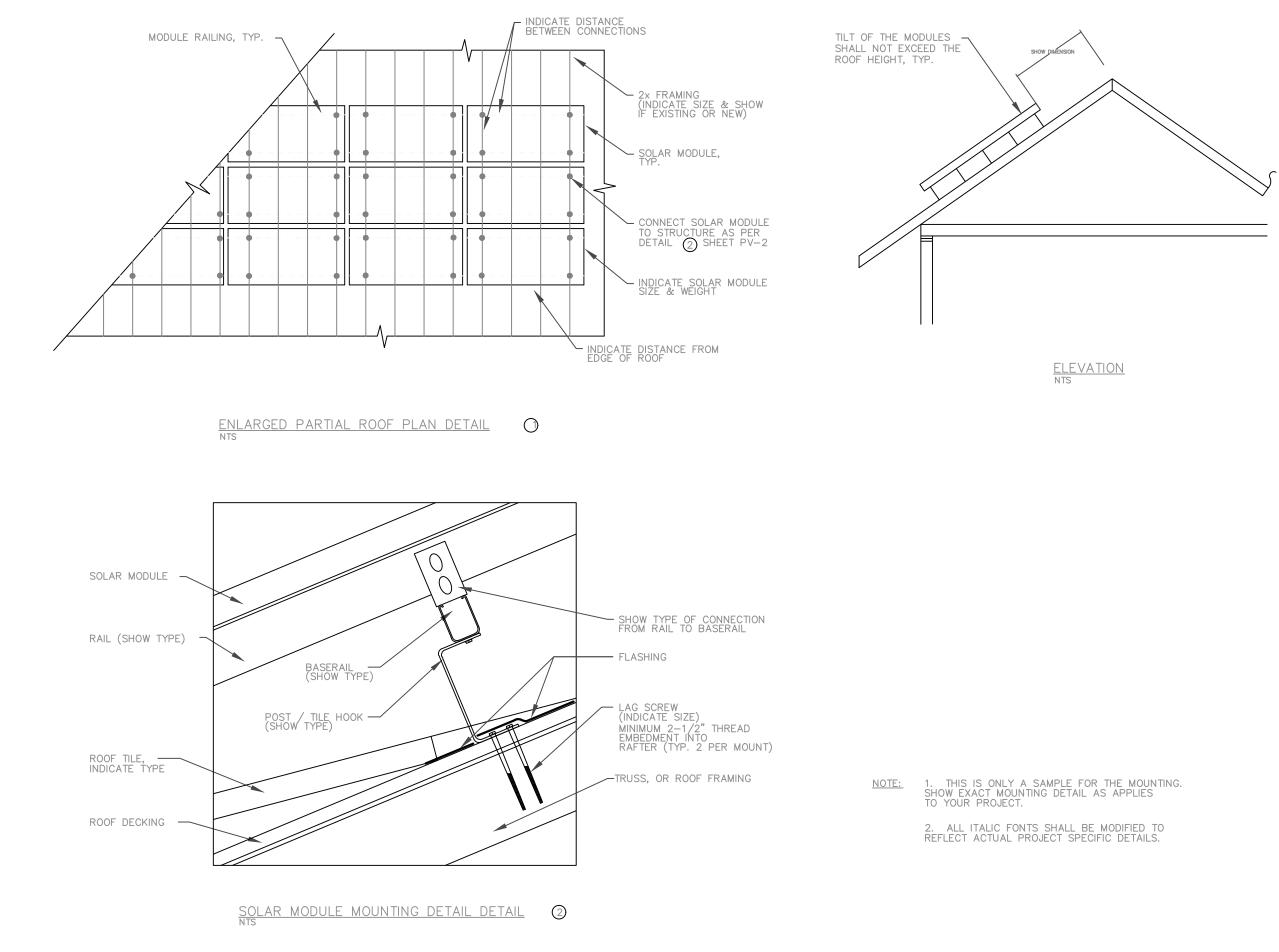
As the home owner of the subject project, I certify that I am requesting to install the solar photovoltaic system shown on these plans. ______ Home Owner Signature ______ Home Owner Signature ______

CITY APPROVAL STAMP	
	COMPANY LOGO
FC	SIGNATURE & LICENSE NUMBER
DR ADMINIS	KW RATING OF THE SYSTEM
FOR ADMINISTRATIVE USE ONLY	PROJECT NAME project adress lecal description / assessor's parcel number
	REVISION DATE DRAWN BY: PROJECT NO. DATE: SHEET PV-O



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KW RATING OF THE SYSTEM
PROJECT NAME project address legal description / assessor's parcel number
REVISION DATE DRAWN BY: PROJECT NO. DATE: SHEET PV-1



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COMPANY LOGO
SIGNATURE & LICENSE NUMBER
KW RATING OF THE SYSTEM
PROJECT NAME project adress lecal description / assessor's parcel number
REVISION DATE DRAWN BY: PROJECT NO. DATE: SHEET PV-2

SOLAR PV MODULE / STRING DC/DC CONVERTERS INSTALLED? YES / NO (IF YES, STEPS 6 & 8 REQUIRED) SOURCE CIRCUIT JUNCTION BOX INSTALLED? YES / NO INVERTER # 2 COMBINER BOX (STEPS 11 & 12 REQUIRED SEPARATE DC DISCONNECT INSTALLED?: YES / NO INTERNAL INVERTER DC DISCONNECT: YES / NO CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED: GROUNDED (INCLUDE GEC) REFER TO STEP 16 FOR RAPID SHUTDOWN DETAILS CENTRAL INVERTER FOR UNGROUNDED SYSTEMS: *SEPARATE AC D ONNECT INSTALLED?: YES / NO - 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. * Consult with your local AHJ and /or Utility MODULE MODULES MODUL MODULE: _ A1 B1 С MODULES MODULES

	COMBIN	ER CONDUCTOR/	CONDUIT SCHED	ULE			NON-C	OMBIN	NED STRINGS	CONDUCTOR/	CONDUIT SCHED
TAG	DESCRIPTION AND	CONDUCTOR	NUMBER OF	CONDUIT/CABLE	CONDUIT SIZE	TAG	DESC	CRIPTIC	ON AND	CONDUCTOR	NUMBER OF
TAG	CONDUCTOR TYPE	SIZE	CONDUCTORS	TYPE	CONDULT SIZE	IAG	CON	DUCTO	OR TYPE	SIZE	CONDUCTORS
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	EGC/GEC:					1	EGC/GEC:				
B1						B2					
	EGC/GEC:						EGC/GEC:				
С											
	EGC/GEC:					1					
D											
	EGC/GEC:					ENTER "N/	A" WHERE	SUITAB	BLE FOR WHEN	NOT USING CO	ONDUIT OR CABLE
						/					

A2

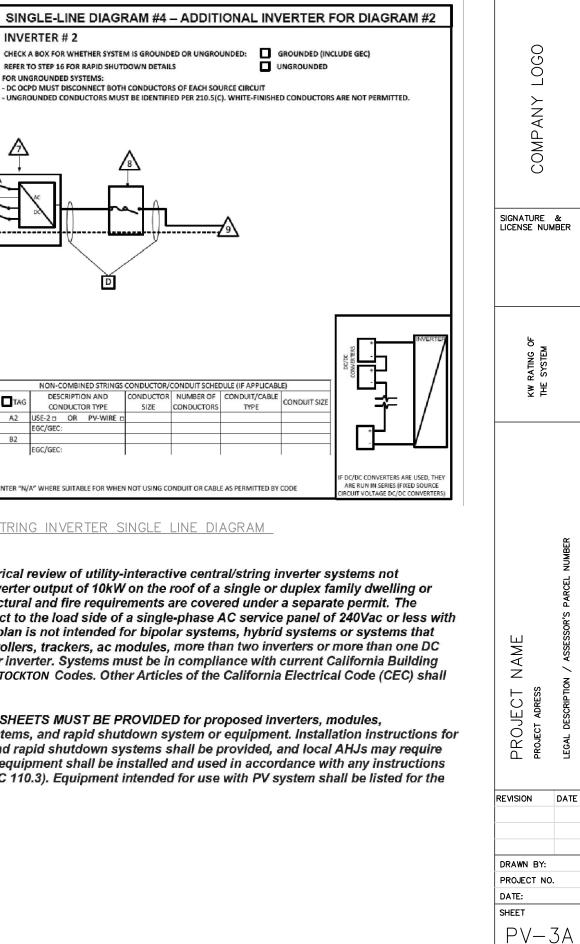
General Notes

L			_	
	1.	ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF CALIFORNIA ELECTRICAL CODE AND THE SAN DIEGO AREA ELECTRICAL NEWSLETTER, WILL BE INSTALLED AS REQUIRED.	11.	ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S APPROVED INSTALLATION INSTRUCTIONS. A COPY OF THESE INSTRUCTIONS ARE INCLUDED AS PART OF THIS PLAN.
	2.	ALTERNATE POWER SOURCE PLACARD SHALL BE METALLIC OR PLASTIC, ENGRAVED OR MACHINE PRINTED LETTERS IN A CONTRASTNG COLOR TO THE PLAQUE. THIS PLAQUE WILL BE ATTACHED BY POP RIVETS OR	12.	ALL EQUIPMENT AND WIRING SHALL BE LISTED BY NATIONAL RECOGNIZED TESTING AGENCY
		SCREWS OR OTHER APPROVED METHOD. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANCE.	13.	USE MINIMUM 8 AWG EQUIPMENT GROUNDING CONDUCTOR (EGC) WHEN IT IS SUBJECT TO PHYSICAL DAMAGE, OR INSTALL THE EGC IN AN APPROVED RACEWAY.
	3.	PHOTOVOLTAIC DC CONDUCTORS ENTERING THE BUILDING SHALL BE		
		INSTALLED IN METAL CONDUIT AND THE CONDUIT SHALL BE LABELED, "CAUTION DC CIRCUIT" OR EQUIVALENT EVERY 10 FT."	14.	ALL WIRING SHALL BE OF COPPER MATERIAL, AND KEPT OUTSIDE OF THE BUILDING.
	4.	EXPOSED NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, EQUIPMENTS, AND CONDUCTOR ENCLOSURES SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136 (A) REGARDLESS OF VOLTAGE.	15.	ALL ELECTRICAL EQUIPMENT INCLUDING THE SERVICE SHALL HAVE A LEGIBLE, VISIBLE, AND DURABLE MARKING INDICATING THE MANUFACTURER NAME, CURRENT, VOLTAGE, FREQUENCY, AND NUMBER
	5.	EACH MODULE SHALL BE GROUNDED USING THE SUPPLIED CONNECTION POINT IDENTIFIED ON THE MODULE AND THE MANUFACTURER'S		OF PHASES.
		INSTRUCTIONS.	16.	EACH INSTALLED EQUIPMENT, WIRING AND OVERCURRENT PROTECTIVE
	6.	IF THE EXISTING GROUNDING ELECTRODE SYSTEM CAN NOT BE VERIFIED		DEVICE (OCPD) SHALL HAVE A SHORT CIRCUIT RATING NOT LESS THAN THE AVAILABLE SHORT CIRCUIT CURRENT AT THEIR INPUT TERMINALS.
		OR IS ONLY METALIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.	17.	THE INVERTER SHALL COMPLY ACCORDANCE WITH CEC 690.11.
	7. 8.	THE INVERTER SHALL BE LISTED AS A UTILITY INTERACTIVE UNIT INSTALLED ON THE SAME BUILDING AS THE MODULES BUT NOT ON THE ROOF.		
		THE ROOF.		
	9.	THE INVERTER OUTPUT CIRCUIT CONDUCTORS SHALL TERMINATE WITHIN THE SERVICE PANEL IN ACCORDANCE WITH CEC 690.64(B)(7).		
	10.	BACKFEED BREAKERS IN THE SERVICE PANEL SHALL BE SUITABLE FOR THAT USE.		

SAMPLE STRING INVERTER SINGLE LINE DIAGRAM

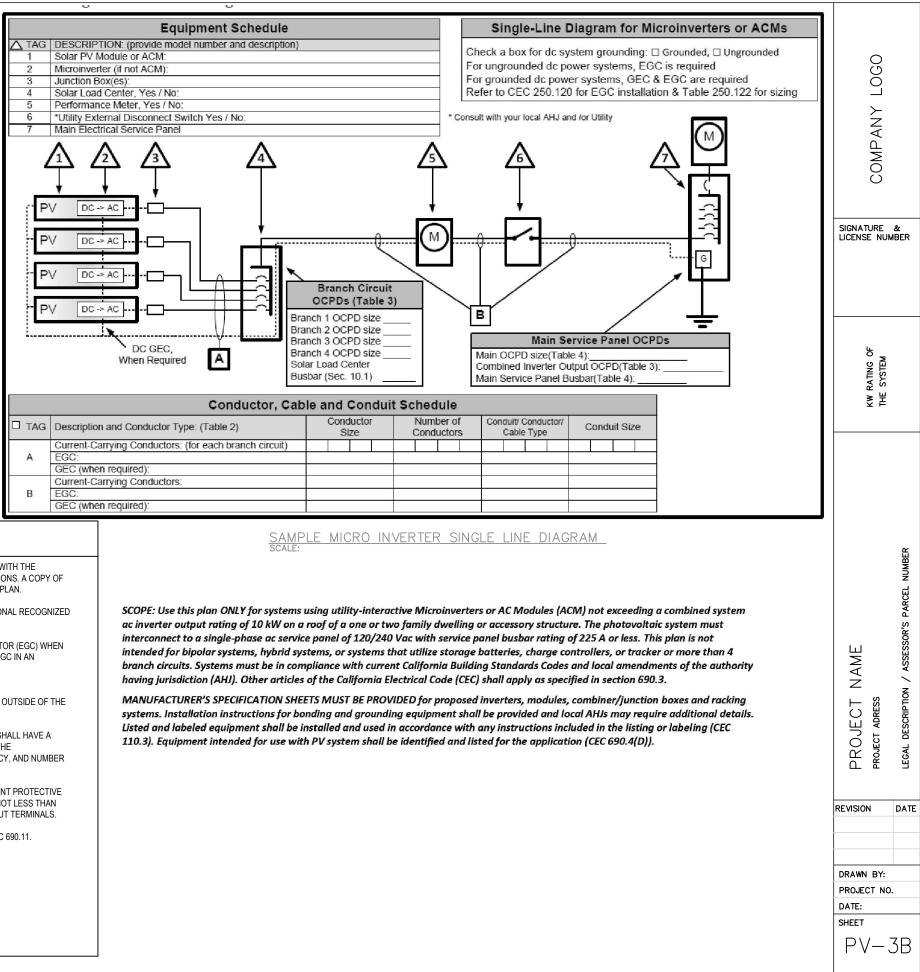
SCOPE: Use this plan ONLY for electrical review of utility-interactive central/string inverter systems not exceeding a combined system AC inverter output of 10kW on the roof of a single or duplex family dwelling or accessory building. The specific structural and fire requirements are covered under a separate permit. The photovoltaic system must interconnect to the load side of a single-phase AC service panel of 240Vac or less with a busbar rating of 225A or less. This plan is not intended for bipolar systems, hybrid systems or systems that utilize storage batteries, charge controllers, trackers, ac modules, more than two inverters or more than one DC combiner (non-inverter-integrated) per inverter. Systems must be in compliance with current California Building Standards Codes and all applicable STOCKTON Codes. Other Articles of the 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, racking systems, and rapid shutdown system or equipment. Installation instructions for bonding and grounding equipment and rapid shutdown systems 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 listed for the PV application (CEC 690.4(B)).



NUMBER

DESCRIPTION / ASSESSOR'S PARCEL



General Notes

1.	ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF CALIFORNIA ELECTRICAL CODE AND THE SAN DIEGO AREA ELECTRICAL NEWSLETTER, WILL BE INSTALLED AS REQUIRED.	11.	ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S APPROVED INSTALLATION INSTRUCTIONS. A COPY OF THESE INSTRUCTIONS ARE INCLUDED AS PART OF THIS PLAN.
2.	ALTERNATE POWER SOURCE PLACARD SHALL BE METALLIC OR PLASTIC, ENGRAVED OR MACHINE PRINTED LETTERS IN A CONTRASTNG COLOR TO THE PLAQUE. THIS PLAQUE WILL BE ATTACHED BY POP RIVETS OR		ALL EQUIPMENT AND WIRING SHALL BE LISTED BY NATIONAL RECOGNIZED TESTING AGENCY
		13.	USE MINIMUM 8 AWG EQUIPMENT GROUNDING CONDUCTOR (EGC) WHEN IT IS SUBJECT TO PHYSICAL DAMAGE, OR INSTALL THE EGC IN AN APPROVED RACEWAY.
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	INSTALLED IN METAL CONDUIT AND THE CONDUIT SHALL BE LABELED, "CAUTION DC CIRCUIT" OR EQUIVALENT EVERY 10 FT."	14.	ALL WIRING SHALL BE OF COPPER MATERIAL, AND KEPT OUTSIDE OF THE BUILDING.
4.	EXPOSED NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, EQUIPMENTS, AND CONDUCTOR ENCLOSURES SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136 (A) REGARDLESS OF VOLTAGE.	15.	ALL ELECTRICAL EQUIPMENT INCLUDING THE SERVICE SHALL HAVE A LEGIBLE, VISIBLE, AND DURABLE MARKING INDICATING THE MANUFACTURER NAME, CURRENT, VOLTAGE, FREQUENCY, AND NUMBER
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	INSTRUCTIONS.	16.	EACH INSTALLED EQUIPMENT, WIRING AND OVERCURRENT PROTECTIVE DEVICE (OCPD) SHALL HAVE A SHORT CIRCUIT RATING NOT LESS THAN
6.	IF THE EXISTING GROUNDING ELECTRODE SYSTEM CAN NOT BE VERIFIED		THE AVAILABLE SHORT CIRCUIT CURRENT AT THEIR INPUT TERMINALS.
	OR IS ONLY METALIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.	17.	THE INVERTER SHALL COMPLY ACCORDANCE WITH CEC 690.11.
7. 8.	THE INVERTER SHALL BE LISTED AS A UTILITY INTERACTIVE UNIT INSTALLED ON THE SAME BUILDING AS THE MODULES BUT NOT ON THE ROOF.		
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10.	BACKFEED BREAKERS IN THE SERVICE PANEL SHALL BE SUITABLE FOR THAT USE.		

SCOPE: Use this plan ONLY for electrical review of utility-interactive central/string inverter sy exceeding a combined system AC inverter output of 10kW on the roof of a single or duplex fai accessory building. The specific structural and fire requirements are covered under a separate photovoltaic system must interconnect to the load side of a single-phase AC service panel of a busbar rating of 225A or less. This plan is not intended for bipolar systems, hybrid systems utilize storage batteries, charge controllers, trackers, ac modules, more than two inverters or r combiner (non-inverter-integrated) per inverter. Systems must be in compliance with current Ca Standards Codes and all applicable STOCKTON Codes. Other Articles of the California Electrica. apply as specified in 690.3.

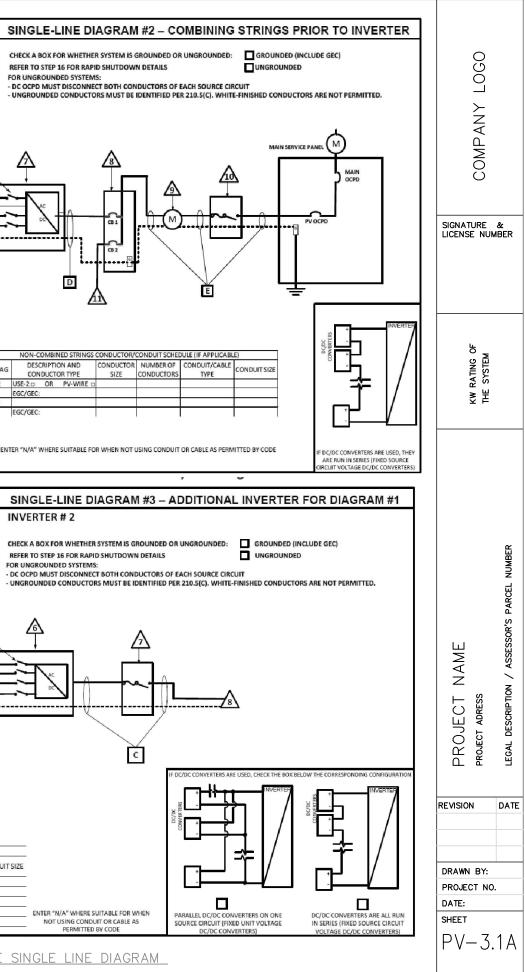
MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed inverters, m combiner/junction boxes, racking systems, and rapid shutdown system or equipment. Installa bonding and grounding equipment and rapid shutdown systems shall be provided, and local additional details. Listed and labeled equipment shall be installed and used in accordance with included in the listing or labeling (CEC 110.3). Equipment intended for use with PV system sha PV application (CEC 690.4(B)).

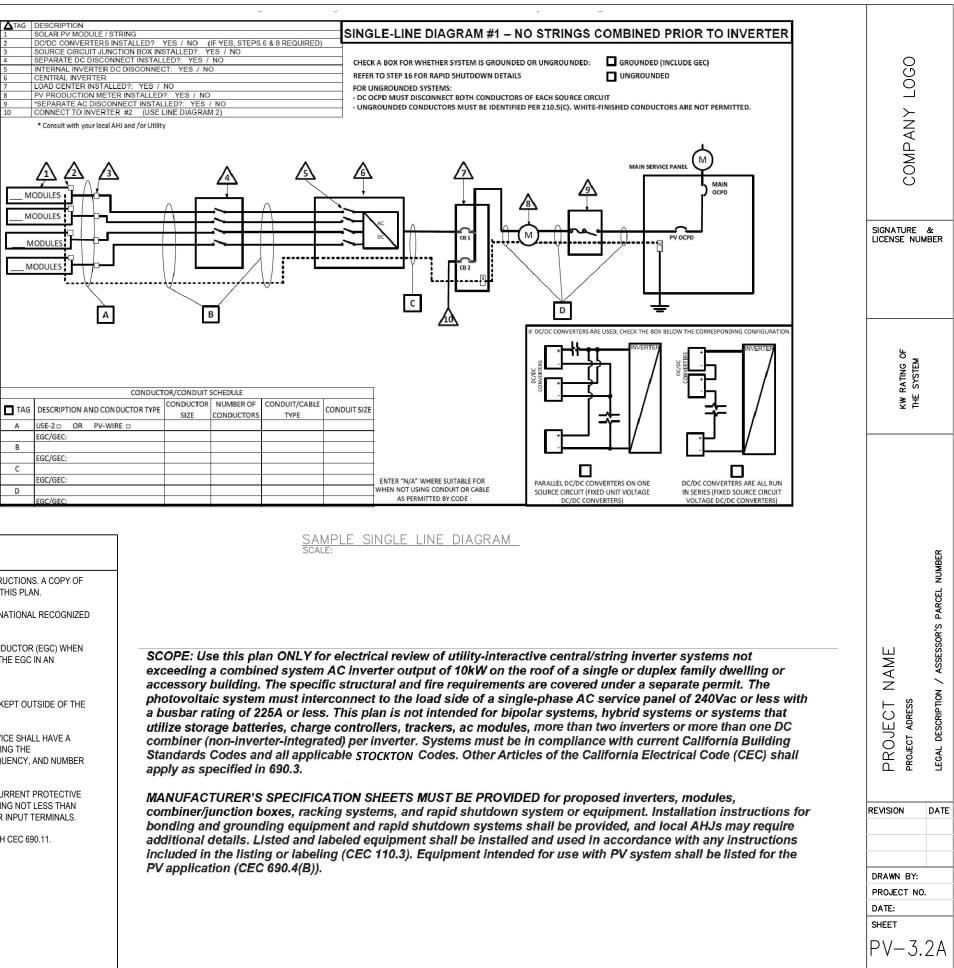
	TAG DESCRIPTION 1 SOLAR PV MODULE / STRING 2 DC/DC CONVERTERS INSTALLED? YES / NO (IF YES, STEPS 6 & 8 REQUIRED)	SINGLE-LINE DIAGRAM #2 – CO
systems not	3 SOURCE CIRCUIT JUNCTION BOX INSTALLED?: YES / NO	
family dwelling or	4 COMBINER BOX (STEPS 11 & 12 REQUIRED) 5 SEPARATE DC DISCONNECT INSTALLED?: YES / NO	CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR I REFER TO STEP 16 FOR RAPID SHUTDOWN DETAILS
ate permit. The of 240Vac or less with	6 INTERNAL INVERTER DC DISCONNECT: YES / NO 7 CENTRAL INVERTER	FOR UNGROUNDED SYSTEMS:
is or systems that	8 LOAD CENTER INSTALLED?: YES / NO 9 PV PRODUCTION METER INSTALLED?: YES / NO	OC OCPD MUST DISCONNECT BOTH CONDUCTORS OF EA UNGROUNDED CONDUCTORS MUST BE IDENTIFIED PER
r more than one DC	10 *SEPARATE AC DISCONNECT INSTALLED?: YES / NO 11 CONNECT TO INVERTER #2 (USE LINE DIAGRAM 4)	-
California Building cal Code (CEC) shall	* Consult with your local AHJ and /or Utility	
car code (cec) shan		
modules,		
llation instructions for I AHJs may require		
with any instructions	MODULES:	
hall be listed for the	MODULES	
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	COMBINER CONDUCTOR/CONDUIT SCHEDULE	NON-COMBINED STRINGS CONDUCTOR/CONDUIT SCHEDL
	DESCRIPTION AND CONDUCTOR NUMBER OF CONDUIT/CABLE CONDUIT SIZE	TAG DESCRIPTION AND CONDUCTOR NUMBER OF
	A1 USE-2 OR PV-WIRE O	CONDUCTOR TYPE SIZE CONDUCTORS A2 USE-2 □ OR PV-WIRE □
	EGC/GEC:	EGC/GEC:
	EGC/GEC:	EGC/GEC:
	C EGC/GEC:	
	D EGC/GEC:	
	E	ENTER "N/A" WHERE SUITABLE FOR WHEN NOT USING CONDUIT O
	EGC/GEC:	. ,
	SOLAR PV MODULE / STRING DC/DC CONVERTERS INSTALLED? YES / NO (IF YES, STEPS 6 & 8 REQUIRED)	SINGLE-LINE DIAGRAM #3 – AD
	3 SOURCE CIRCUIT JUNCTION BOX INSTALLED?: YES / NO 4 SEPARATE DC DISCONNECT INSTALLED?: YES / NO	INVERTER # 2
	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	CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR U REFER TO STEP 16 FOR RAPID SHUTDOWN DETAILS
TALLED IN ACCORDANCE WITH THE	* Consult with your local AHJ and /or Utility	FOR UNGROUNDED SYSTEMS:
CLUDED AS PART OF THIS PLAN.		- DC OCPD MUST DISCONNECT BOTH CONDUCTORS OF EAC - UNGROUNDED CONDUCTORS MUST BE IDENTIFIED PER 2
HALL BE LISTED BY NATIONAL RECOGNIZED		
NT GROUNDING CONDUCTOR (EGC) WHEN		
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ENT, VOLTAGE, FREQUENCY, AND NUMBER		Ċ
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WIRING AND OVERCURRENT PROTECTIVE		IF BC/I
SHORT CIRCUIT RATING NOT LESS THAN		
T CURRENT AT THEIR INPUT TERMINALS.		DSC/RC DSV2FIC
Y ACCORDANCE WITH CEC 690.11.		CON
	TAG DESCRIPTION AND CONDUCTOR TYPE SIZE CONDUCTORS TYPE	NDUITSIZE
	A USE-2 0 OR PV-WIRE 0 EGC/GEC:	
	B EGC/GEC:	
	C	ENTER "N/A" WHERE SUITABLE FOR WHEN PAR NOT USING CONDUIT OR CABLE AS SOL
	EGC/GEC:	PERMITTED BY CODE
		_E SINGLE LINE DIAGRAM
	SAMPI	E SINGLE LINE DIAGRAM

General Notes

- ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF ALL EQUIPMENT SHALL BE INSTA 11 CALIFORNIA ELECTRICAL CODE AND THE SAN DIEGO AREA ELECTRICAL MANUEACTURER'S APPROVED IN NEWSLETTER, WILL BE INSTALLED AS REQUIRED. THESE INSTRUCTIONS ARE INCL ALTERNATE POWER SOURCE PLACARD SHALL BE METALLIC OR PLASTIC, 12. ALL EQUIPMENT AND WIRING SH 2. ENGRAVED OR MACHINE PRINTED LETTERS IN A CONTRASTNG COLOR TO TESTING AGENCY THE PLAQUE. THIS PLAQUE WILL BE ATTACHED BY POP RIVETS OR USE MINIMUM 8 AWG EQUIPMENT SCREWS OR OTHER APPROVED METHOD. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANCE. IT IS SUBJECT TO PHYSICAL DAM APPROVED RACEWAY. PHOTOVOLTAIC DC CONDUCTORS ENTERING THE BUILDING SHALL BE 3 INSTALLED IN METAL CONDUIT AND THE CONDUIT SHALL BE LABELED, "CAUTION DC CIRCUIT" OR EQUIVALENT EVERY 10 FT." 14 ALL WIRING SHALL BE OF COPPE BUILDING. 4 EXPOSED NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, ALL ELECTRICAL EQUIPMENT INC EQUIPMENTS, AND CONDUCTOR ENCLOSURES SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136 (A) REGARDLESS OF VOLTAGE. LEGIBLE, VISIBLE, AND DURABLE MANUFACTURER NAME, CURREN EACH MODULE SHALL BE GROUNDED USING THE SUPPLIED CONNECTION OF PHASES. 5.
- POINT IDENTIFIED ON THE MODULE AND THE MANUFACTURER'S EACH INSTALLED EQUIPMENT, W INSTRUCTIONS DEVICE (OCPD) SHALL HAVE A SI 6. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CAN NOT BE VERIFIED THE AVAILABLE SHORT CIRCUIT
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- UNIT INSTALLED ON THE SAME BUILDING AS THE MODULES BUT NOT ON 8 THE ROOF
- 9 THE INVERTER OUTPUT CIRCUIT CONDUCTORS SHALL TERMINATE WITHIN THE SERVICE PANEL IN ACCORDANCE WITH CEC 690.64(B)(7).
- 10. BACKFEED BREAKERS IN THE SERVICE PANEL SHALL BE SUITABLE FOR THAT USE.

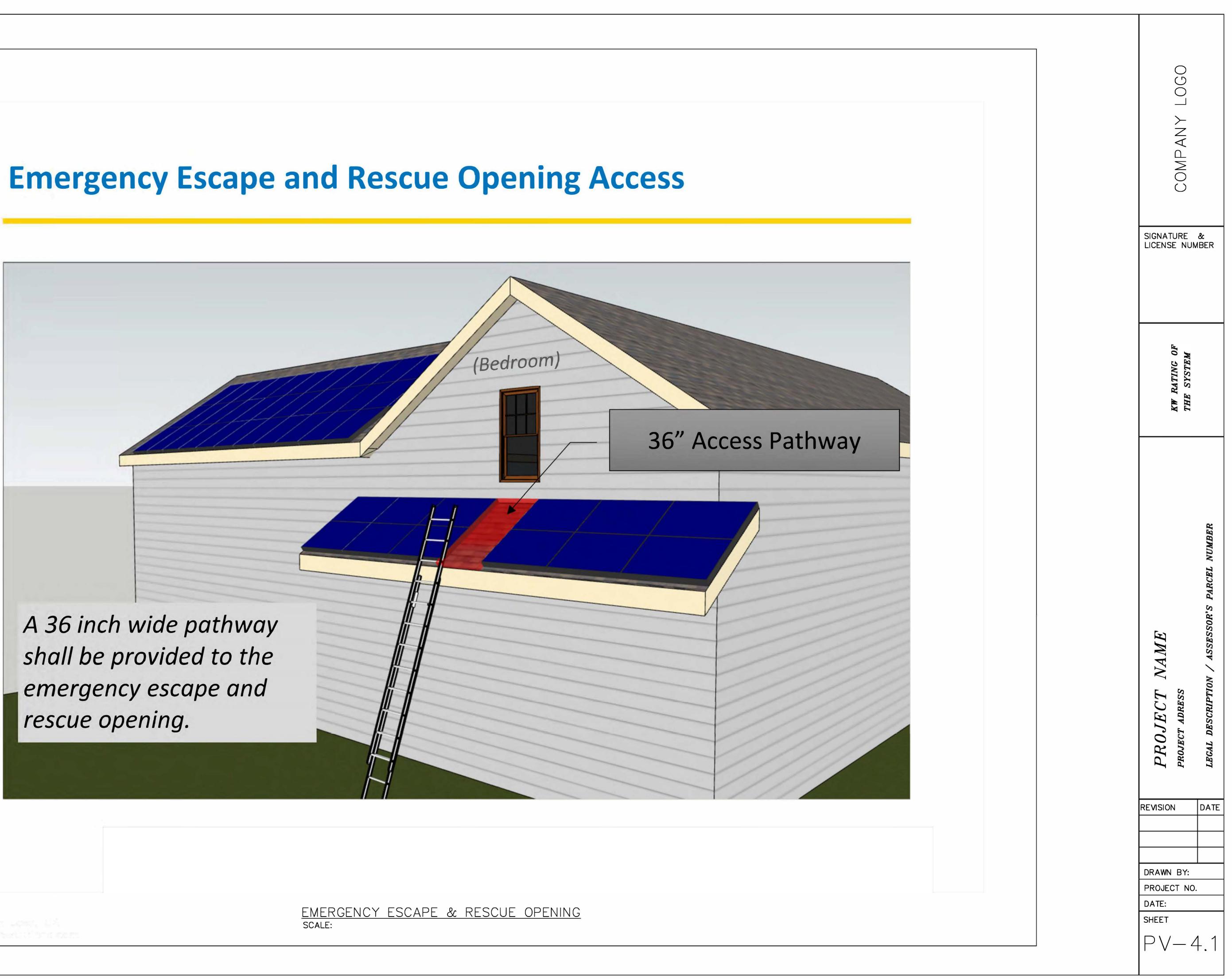
SAMPLE SINGLE LINE DIAGRAM

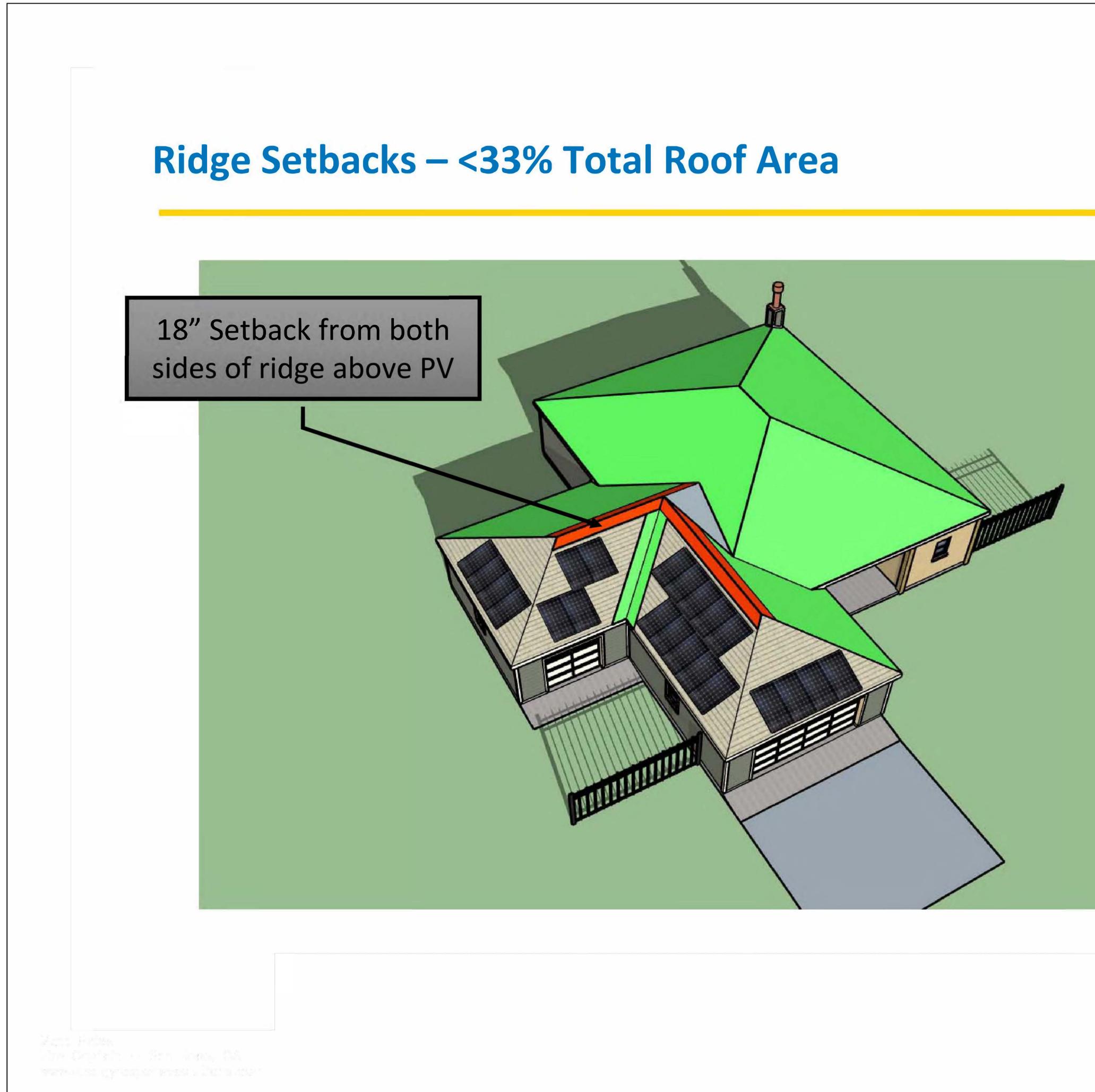




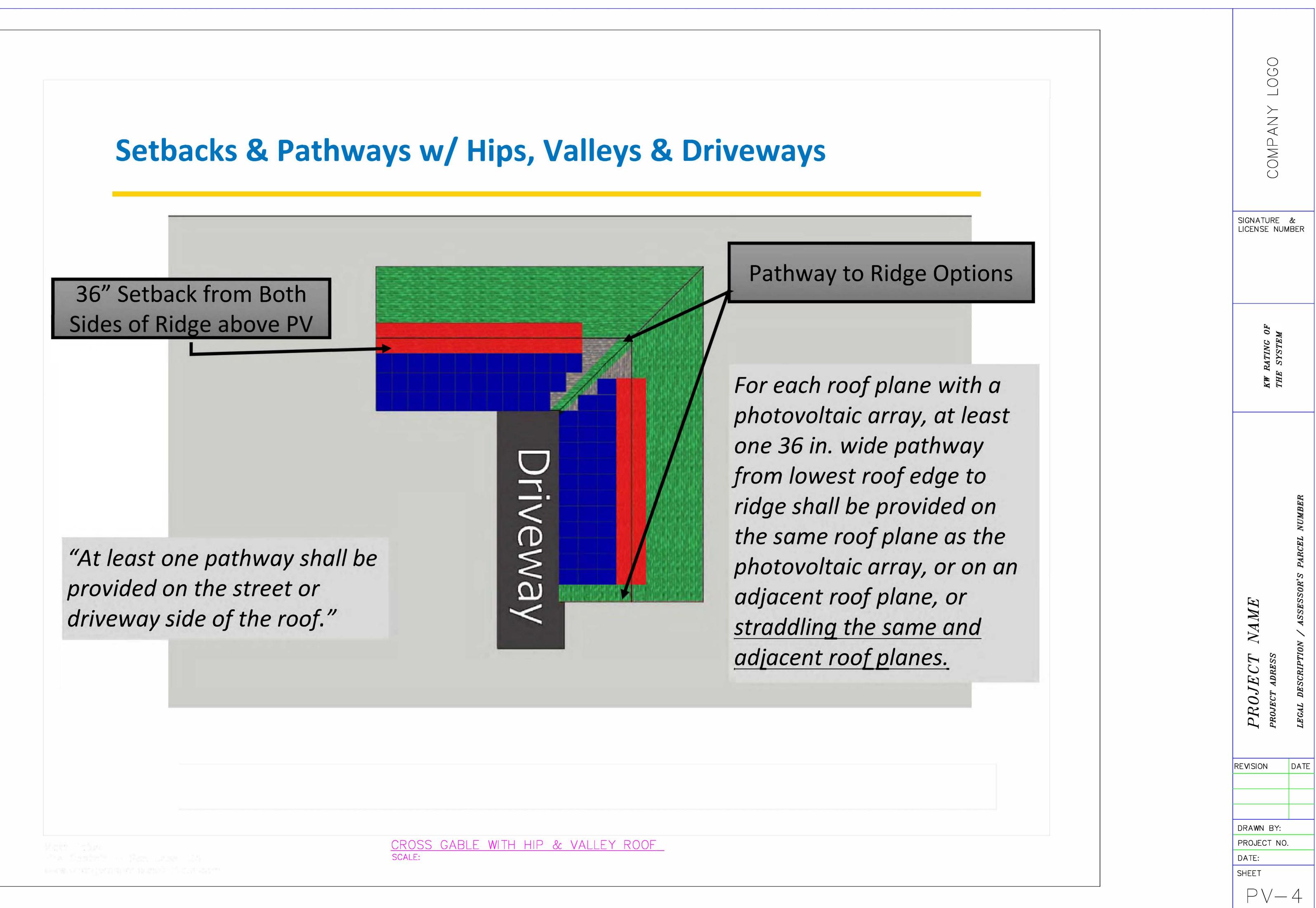
0	ellerur Motes		
1.	ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF CALIFORNIA ELECTRICAL CODE AND THE SAN DIEGO AREA ELECTRICAL NEWSLETTER, WILL BE INSTALLED AS REQUIRED.		MANUFACTURER'S APPROVED INSTALLATION INSTRUCTIONS. A COPY OF THESE INSTRUCTIONS ARE INCLUDED AS PART OF THIS PLAN.
2.	ALTERNATE POWER SOURCE PLACARD SHALL BE METALLIC OR PLASTIC, ENGRAVED OR MACHINE PRINTED LETTERS IN A CONTRASTNG COLOR TO THE PLAQUE. THIS PLAQUE WILL BE ATTACHED BY POP RIVETS OR		ALL EQUIPMENT AND WIRING SHALL BE LISTED BY NATIONAL RECOGNIZED TESTING AGENCY USE MINIMUM 8 AWG EQUIPMENT GROUNDING CONDUCTOR (EGC) WHEN
	SCREWS OR OTHER APPROVED METHOD. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANCE.		IT IS SUBJECT TO PHYSICAL DAMAGE, OR INSTALL THE EGC IN AN APPROVED RACEWAY.
3.	PHOTOVOLTAIC DC CONDUCTORS ENTERING THE BUILDING SHALL BE INSTALLED IN METAL CONDUIT AND THE CONDUIT SHALL BE LABELED, "CAUTION DC CIRCUIT" OR EQUIVALENT EVERY 10 FT."	14.	ALL WIRING SHALL BE OF COPPER MATERIAL, AND KEPT OUTSIDE OF THE BUILDING.
4.	EXPOSED NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, EQUIPMENTS, AND CONDUCTOR ENCLOSURES SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136 (A) REGARDLESS OF VOLTAGE.	15.	ALL ELECTRICAL EQUIPMENT INCLUDING THE SERVICE SHALL HAVE A LEGIBLE, VISIBLE, AND DURABLE MARKING INDICATING THE MANUFACTURER NAME, CURRENT, VOLTAGE, FREQUENCY, AND NUMBER OF PHASES.
5.	EACH MODULE SHALL BE GROUNDED USING THE SUPPLIED CONNECTION POINT IDENTIFIED ON THE MODULE AND THE MANUFACTURER'S INSTRUCTIONS.	16.	EACH INSTALLED EQUIPMENT, WIRING AND OVERCURRENT PROTECTIVE DEVICE (OCPD) SHALL HAVE A SHORT CIRCUIT RATING NOT LESS THAN THE AVAILABLE SHORT CIRCUIT CURRENT AT THEIR INPUT TERMINALS.
6. 7. 8.	IF THE EXISTING GROUNDING ELECTRODE SYSTEM CAN NOT BE VERIFIED OR IS ONLY METALIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE. THE INVERTER SHALL BE LISTED AS A UTILITY INTERACTIVE UNIT INSTALLED ON THE SAME BUILDING AS THE MODULES BUT NOT ON		THE INVERTER SHALL COMPLY ACCORDANCE WITH CEC 690.11.
9.	THE ROOF. THE INVERTER OUTPUT CIRCUIT CONDUCTORS SHALL TERMINATE WITHIN THE SERVICE PANEL IN ACCORDANCE WITH CEC 690.64(B)(7).		
10. 11.	BACKFEED BREAKERS IN THE SERVICE PANEL SHALL BE SUITABLE AS SUCH. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE		

General Notes





		ODD YNY LOGO	& MBER
		KW RATING OF THE SYSTEM	
		DRAWN BY: PROJECT NO DATE: SHEET PV-V	



SOLAR PV STANDARD PLAN - SIMPLIFIED Central/String Inverter Systems for One and Two Family Dwellings	SOLAR PV STANDARD PLAN - SIMPLIFIED	SOLAR PV STANDARD PLAN - SIMPLIFIED	
SCOPE: Use this plan ONLY for electrical review of utility-interactive central/string inverter systems not	Central/String Inverter Systems for One and Two Family Dwellings 5) DC Module Layout	Central/String Inverter Systems for One and Two Family Dwellings 10) Are PV source circuits combined prior to the inverter? Yes No	
exceeding a combined system AC inverter output of 10kW on the roof of a single or duplex family dwelling or accessory building. The specific structural and fire requirements are covered under a separate permit. The	Identify each source	If No, use Single Line Diagram 1 and proceed to Step 12.	
photovoltaic system must interconnect to the load side of a single-phase AC service panel of 240Vac or less with	circuit (string) for Number of modules Identify, by tag, which source circuits on the roof are to be	If Yes, use Single Line Diagram 2 and proceed to Step 11 after this step.	
a busbar rating of 225A or less. This plan is not intended for bipolar systems, hybrid systems or systems that utilize storage batteries, charge controllers, trackers, ac modules, more than two inverters or more than one DC	inverter 1 shown on the per source circuit for paralleled (if none, put N/A)	Is source circuit OCPD required? Yes No Source circuit OCPD size (if needed): 15 Amps	
combiner (non-inverter-integrated) per inverter. Systems must be in compliance with current California Building Standards Codes and all applicable San Diego Codes. Other Articles of the California Electrical Code (CEC) shall	(e.g. A,B,C,)	Are the source circuits combined on the roof? See No	
apply as specified in 690.3.	Combiner 1:	If "Yes," the DC output of the combiner shall have a load break disconnecting means located in the combiner or within 1.8m (6ft) of the combiner (CEC 690.15(C)).	
MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed inverters, modules,		11) Sizing PV Output Circuit Conductors — If strings are combined (answered "Yes" in Step 10), Output Circuit	
combinerljunction boxes, racking systems, and rapid shutdown system or equipment. Installation instructions for bonding and grounding equipment and rapid shutdown systems shall be provided, and local AHJs may require	Combiner 2:	Conductor Size = Min. #6 AWG copper conductor.	
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 listed for the		12) Inverter DC Disconnect Does the inverter have an integrated DC disconnect? Yes No If Yes, proceed to step 13.	
PV application (CEC 690.4(B)).	Total number of source circuits:	If No, the external DC disconnect to be installed is rated for Amps (DC) and Volts (DC)	
	6) Are DC/DC Converters used? If No DC/DC Converter Model #: DC/DC Converter Max DC Input Voltage: Volts Max	13) Inverter Information Manufacturer: Model:	
Job Address: Permit #:	Max DC Output Current: Amps DC Output Current: Volts DC/DC	Manufacturer: Model: Max. Continuous AC Output Current Rating: Amps	
Contractor/ Engineer Name:License # and Class:	Max # of DC/DC Converters in an Input Circuit: Converter Max DC Input Power: Watts	Integrated DC Arc-Fault Circuit Protection? Yes No (If No is selected, this plan is not applicable.) Grounded or Ungrounded System? Grounded Ungrounded	
Signature: Date: Phone Number:	7) Maximum System DC Voltage	Grounded of ongrounded system: L Grounded L ongrounded	
Total # of Inverters installed: (If more than one inverter, complete and attach the "Supplemental	Use for systems without DC/DC converters.	AC Information:	
Calculation Sheets" starting on page 8 & "Load Center Calculations" on page 13 if a new load center is to be used)	A. Module V _{oc} (STEP 2)x # of modules in series (STEP 5)x C _F (STEP 1) =V	14) Sizing Inverter Output Circuit Conductors and OCPD	
Inverter 1 AC Output Power Rating:Watts	Table 1 Maximum Number of PV Modules in Sedes Based on Macule Rated VII, tox 600Vas Rated Equipment (CEC 590.7)	Inverter Output OCPD rating = Amps (Table 3) Inverter Output Circuit Conductor Size = AWG (Table 3)	
Inverter 2 AC Output Power Rating (if applicable):Watts	Max. Rated Module Voc if Cr = 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 Voc xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	Table 3. Minimum Inverter Output OCPD and Circuit Conductor Size	
Combined Inverter Output Power Rating:≤ 10,000 Watts	if $C_{\rm g} = 1.14$ (Volts) 29.24 30.96 32.89 35.09 37.59 40.49 43.86 47.85 32.03 58.48 65.79 75.19 87.72	Inverter Continuous Output Current Rating (Amps) (Step 13) 12 16 20 24 28 32 36 40 48 Minimum OCPD Size (Amps) 15 20 25 30 35 40 45 50 60	
Site Conditions:	Max # of Modules for 600 Vdc 18 17 15 14 13 12 11 10 9 8 7 6	Minimum Conductor Size (AWG, 75° C, Copper) 14 12 10 10 8 8 6 6	
Ambient Temperature Adjustment Factors: select the box for the expected lowest ambient temperature (T_L) with the corresponding Ambient Temperature Correction Factor (C_F):	Use for systems with DC/DC converters. The value calculated below must be less than DC/DC converter max DC input	15) Point of Connection to Utility	
	voltage (STEP 6).	Note: Only load side connections are permitted with this plan.	
 If T_L is greater than or equal to -5°C, C_F = 1.12 If T_L is between -6°C and -10°C, C_F = 1.14 	B. Module V _{oc} (STEP 2) x # of modules per converter (STEP 6) x C _F (STEP 1) = V	Is the PV OCPD positioned at the opposite end from input feeder location or main OCPD location? Yes, use Table 4, row 3 and circle the Max Combined PV System OCPD(s) at 120% based on the bus bar rating and main	
Average ambient high temperature $(T_H) \le 47^\circ$ C	Table 2. Largest Module Voc for Single-Module DC/DC Converter Configurations (With 80V AFCI Cap) (CEC 690.7 and 690.11) Max. Rated Module Voc 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	OCPD values. No, use Table 4, row 4 and circle the Max Combined PV System OCPD(s) at 100% based on the bus bar rating and main	
Note: For a lower T_L or a higher T_H , this plan is not applicable.	$if c_f = 1.12$ (VOIS)	OCPD values.	
DC Information:	$\frac{1}{16} \frac{1}{C_{F}} = 1.14 \text{ (Volts)} \frac{29.8}{32.5} \frac{32.5}{35.1} \frac{37.7}{40.4} \frac{40.4}{43.0} \frac{43.0}{45.6} \frac{48.2}{48.2} \frac{50.9}{53.5} \frac{53.5}{56.1} \frac{58.8}{58.8} \frac{61.4}{64.0} \frac{64.0}{66.7} \frac{69.3}{69.3} \frac{100}{69.3} \frac{100}{69.$	Per 705.12(D)(2)(3): The value circled in Table 4 should be equal to or greater than the OCPD value selected from Table 3 (for a single inverter) or the OCPD value from Step S18 (for two inverters).	
Module Manufacturer: Model:	Input (STEP #6) (Volts) 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79	Table 4. Maximum Combined Supply OCPDs Based on Bus Bar Rating (Amps) per CEC 705.12(D)(2)(3)(b)	
2) Module V _{oc} (from module nameplate):Volts	8) Maximum System DC Voltage from DC/DC Converters to Inverter — Only required if Yes in Step 6	Bus Bar Rating 100 125 125 200 200 225 225 Main OCPD 100 100 125 150 175 200 175 200 225	
3) Module I _{sc} (from module nameplate): Amps	Maximum System DC Voltage = Volts 9) Sizing Source Circuit Conductors	Max Combined PV System OCPD(s) 20 50 25 60* 60* 40 60* 60* 45	
Is Module I _{sc} below 9.6 Amps? Yes No (If No, this plan is not applicable.)	Source Circuit Conductor Size = Min. #10 AWG copper conductor, 90° C wet (USE-2, PVWire, XHHW-2,	at 120% of Bus Bar Rating Image: Combined PV System OCPD(s) 0 25 0 50 25 0 50 25 0	
4) Module DC output power under standard test conditions (STC) = Watts (STC)	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, this plan is not	at 100% Bus Bar Rating *This value has been lowered to 60 A from the calculated value to reflect 10 kW AC size maximum.	
	applicable.	Reduction of the main breaker and/or interconnection to center-fed panel boards are not permitted with this plan.	
Solar PV Central StandardPlan 1 01/23/2016 2014 NEC	2	3	
SOLAR PV STANDARD PLAN - SIMPLIFIED Central/String Inverter Systems for One and Two Family Dwellings Markings	<u>SOLAR PV STANDARD PLAN - SIMPLIFIED</u> <u>Central/String Inverter Systems for One and Two Family Dwellings</u> Supplemental Calculation Sheets for Inverter #2 (Only include if <u>second</u> inverter is used)	<u>SOLAR PV STANDARD PLAN - SIMPLIFIED</u> <u>Central/String Inverter Systems for One and Two Family Dwellings</u> S7) Maximum System DC Voltage	
Central/String Inverter Systems for One and Two Family Dwellings Markings CA Electrical Code (CEC) Articles 690 and 705 and CA Residential Code (CRC) Section R331 require the following labels or	Central/String Inverter Systems for One and Two Family Dwellings Supplemental Calculation Sheets for Inverter #2 (Only	Central/String Inverter Systems for One and Two Family Dwellings	
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<section-header>Carterial Code (CEC) Articles 690 and 705 and CA Residential Code (CRC) Section R331 require the following labels or arkings be installed at these components of the photovoltaic system:</section-header>	Central/String Inverter Systems for One and Two Family Dwellings Supplemental Calculation Sheets for Inverter #2 (Only include if second inverter is used) DC Information: Module Manufacturer: Model: S2) Module Voc (from module nameplate): Volts S3) Module Isc (from module nameplate): Volts S3) Module Isc (from module nameplate): Amps Is Module DC output power under standard test conditions (STC) = Watts (STC) S5) DC Module Layout Identify each source circuit goring for inverter 1 source circuits on the roof are to be paralleled (if none, put N/A) Identify each source circuit (ring) for inverter 1 source circuits for inverter 1 Combiner 1: Combiner 1: Combiner 2: Total number of source circuits for inverter 1: If No, skip to Step S7. If Yes, enter info below. DC/DC Converter Model #: DC/DC Converter Max DC Input Voltage: Max DC Output Current: Amps	Sectoral/String Jovence Cystems for One and Two Family Dwellings S7) Maximum System DC Voltage Use for systems without DC/DC converters. A Module Vog (STEP S2) x# of modules in series (STEP S5) x C (STEP 1) y Image: Note of the Step Step Step Step Step Step Step Ste	
<text><section-header></section-header></text>	Central/String Inverter Systems for One and Two Family Dwellings Supplemental Calculation Sheets for Inverter #2 (Only include if second inverter is used) DC Information: Module Manufacturer: Model: S2) Module Voc (from module nameplate): Volts S3) Module Isc (from module nameplate): Volts S3) Module Isc (from module nameplate): Amps Is Module DC output power under standard test conditions (STC) = Watts (STC) S5) DC Module Layout Identify each source circuit goring for inverter 1 source circuits on the roof are to be paralleled (if none, put N/A) Identify each source circuit (ring) for inverter 1 source circuits for inverter 1 Combiner 1: Combiner 1: Combiner 2: Total number of source circuits for inverter 1: If No, skip to Step S7. If Yes, enter info below. DC/DC Converter Model #: DC/DC Converter Max DC Input Voltage: Max DC Output Current: Amps	Standard String Inverter Systems for One and Two Family Dwellings Standard String Inverter System String String State Standard String Inverter String State A Model V _{oc} (STPF 21) x0 of models in series (STPF 55) x C (STPF 1) r Image: String Inverter String State Image: String String State Image: String String	
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<section-header><section-header><complex-block></complex-block></section-header></section-header>	Central/String Inverter Systems for One and Two Family Dwellings Supplemental Calculation Sheets for Inverter #2 (Only include if second inverter is used) DC Information: Module Manufacturer: Model: S2) Module Voc (from module nameplate): Volts S3) Module Isc (from module nameplate): Volts S3) Module Isc (from module nameplate): Amps Is Module DC output power under standard test conditions (STC) = Watts (STC) S5) DC Module Layout Identify each source circuit goring for inverter 1 source circuits on the roof are to be paralleled (if none, put N/A) Identify each source circuit (ring) for inverter 1 source circuits for inverter 1: Combiner 1: Image: Combiner of source circuits for inverter 1: Combiner 2: Total number of source circuits for inverter 1: If No, skip to Step S7. If Yes, enter info below. DC/DC Converter Model #: DC/DC Converter Max DC Input Voltage: Max DC Output Current: Amps	Status Status Status Status <t< td=""></t<>	
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		ies (ST		tar 600\		STEP 1		C 690.7)	
	38.27	41.21	44.64	48.70	53.57	59.52	66.96	76.53	89.29
,	37.59	40.49	43.86	47.85	52.63	58.48	65.79	75.19	87.72
	14	13	12	11	10	9	8	7	6

SAMPLE STRING INVERTER CALCULATION

Subset of the inverter(s) is within 10 feet of the array, and the location of the inverter is such that uncontrolled PV system conductors are no greater than 5 feet of length within 10 feet of the protect of the inverter output of the array. And the location of reduction of voltage within the time required by CEC 690.12 is performed. Rapid shutdown shall be provided as required by CEC 690.12 with one of the following methods (Select one): The inverter(s) is within 10 feet of the array, and the location of the inverter is such that uncontrolled PV system conductors are no greater than 5 feet of length within the building. A remotely-controlled AC disconnecting means is required by CEC 690.12 shall be verified in the field, or the inverter output within the time required by CEC 690.12 shall be verified in the field, or the inverter output is listed to UL 1741 with rapid shutdown capability. Remotely-controlled DC disconnecting means are located within 10 feet of the array and DC input of the inverter output within the required by CEC 690.12 shall be verified in the field, or the inverter output is listed to UL 1741 with rapid shutdown capability. Remotely-controlled DC disconnecting means are located within 10 feet of the array and DC input of the inverter output within the required by CEC 690.12 shall be verified in the field, or the inverter output is listed to UL 1741 with rapid shutdown capability.	ODOI VARAMOO SIGNATURE & LICENSE NUMBER
 inverter(s) connected to a module level DC-DC converter circuit where the DC-DC converter circuit meets the requirements for controlled conductors when disconnected from the inverter. Reduction of the voltage for the DC-DC converter output and the inverter output within the time required by CEC 690.12 shall be verified in the field, or the DC-DC converter output and the inverter output are listed to UL 1741 with rapid shutdown capability. A UL 1741-listed and identified inverter(s) with input and output rapid shutdown capability supplying module level DC-DC converter circuit where the DC-DC converter circuit meets the requirements for controlled conductors when disconnected from the inverter. A UL 1741-listed rapid shutdown system: Manufacturer: Yating Agency Name: System Model Number: System Components: 17) Grounding and Bonding of Modules and Racking System (select one): Racking system listed to UL 2703 using modules identified in the listing. Other method subject to AHJ approval 	kw rating of The system
<text><form><form></form></form></text>	BRONECT NON BRONECT NO. DATE: SHEET PV-5A

	Microinverter and ACM Systems for O	ne- and Two- Family Dwellings		
ac inve interco intend	: Use this plan ONLY for systems using utility-interactive Microinve erter output rating of 10 kW on a roof of a one or two family dwell onnect to a single-phase ac service panel of 120/240 Vac with servi ed for bipolar systems, hybrid systems, or systems that utilize store a circuits. Systems must be in compliance with current California Bu	ing or accessory structure. The photovoltaic system must ce panel busbar rating of 225 A or less. This plan is not age batteries, charge controllers, or tracker or more than 4	4	PV Moc (If installin) Maximum o open-circui
	y jurisdiction (AHJ). Other articles of the California Electrical Code (calculation Method 2.
systen	IFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for propo ns. Installation instructions for bonding and grounding equipment	hall be provided and local AHJs may require additional details.	4.1	Method 1:
	and labeled equipment shall be installed and used in accordance w . Equipment intended for use with PV system shall be identified an			V _{oc} temper Max numb
App	licant and Site Information			If module n V _{oc} temper
	Job Address:	Permit #:		Max numb
	Contractor/ Engineer Name:		4.2	Method 2: Maximum
	Signature: Date:	Phone Number:		Where K _T =
1	General Requirements and System Inform	ation - AC Module (ACM)		
	Number of PV modules installed: Number of Microinverters installed:	Number of ACM's installed:	5	PV Sho (If installing
	Number of Branch Circuits, 1, 2, 3, or 4:	defined in CEC 690.2 and installed per CEC 690.6	5.1	Calculate the Adjust the I
.1	Total ac system power rating = (Number of Microinverters or ACI Lowest expected ambient temperature for the location: $(T_L) = _$ Average ambient high temperature for the location: $(T_H) =$	As) * (ac inverter power output) = Watts		Rating. (If N 5.1.1 Ma
2	Average ambient high temperature for the location: $(T_H) = _$ Provide the name of the source used to determine T_L and T_H :			5.1.2 Ve
			6	Branch
2	Microinverter or ACM Information and Ra Microinverters with ungrounded dc inputs shall be installed in ac	0	0	Fill in (Tab le
	Microinverter or ACM Manufacturer:			Circuit Pow Circuit Curr
.1	Model: Rated (continuous) ac output power: Watts Nominal ac Voltage Rating: Volts			Table 1 - O
.3	Rated (continuous) ac output current: Amps			
.4	If installing ACMs, skip [STEPS 2.4 and 2.5) Maximum dc Input Voltage Rating: Volts Maximum dc Input Current Pating: Amps			Number o
.5 .6	Maximum dc Input Current Rating: Amps Maximum dc Input Short Circuit Current Rating: Amp	s (if provided by manufacturer)		AC Power Circuit Pov
3	PV Module Information			Nominal a
	(If installing ACMs, skip to [STEP 6]) PV Module Manufacturer:			Circuit Cur
	Model: Module dc output power under standard test conditions (STC) = _		7	Sizing H
.1	Module V _{oc} at STC (from module nameplate): Volts Module I _{sc} at STC (from module nameplate): Amps			Calculate th Output Circ
	PF V 1.1: August 18, 2014 1			
S	PF V 1.1: August 18, 2014 1 OLAR PV MICROINVERTER/ACM STA	NDARD PLAN - COMPREHENSIVE		SOLAR I
<u>S</u>	OLAR PV MICROINVERTER/ACM STA Microinverter and ACM Systems for O	ne- and Two- Family Dwellings	S	
	OLAR PV MICROINVERTER/ACM STA Microinverter and ACM Systems for O Where supplementary grounding electrodes are installed, a bondir Bonding jumpers must be sized to the larger grounding conductor	ne- and Two- Family Dwellings of jumper to the existing grounding electrode must be installed.	S	
	OLAR PV MICROINVERTER/ACM STA Microinverter and ACM Systems for O Where supplementary grounding electrodes are installed, a bondir	me- and Two- Family Dwellings ag jumper to the existing grounding electrode must be installed. that it is bonded to, 250.58 minal must be unbroken or irreversibly spliced and sized	<u></u>	Table 3 - Br
	OLAR PV MICROINVERTER/ACM STA <u>Microinverter and ACM Systems for O</u> Where supplementary grounding electrodes are installed, a bondin Bonding jumpers must be sized to the larger grounding conductor Grounded Systems: The dc grounding electrode conductor (GEC) from the inverter ter minimum #8 AWG copper per article 250.166. The dc GEC from the must tie to the existing grounding electrode or be bonded to the e	ng jumper to the existing grounding electrode must be installed. that it is bonded to, 250.58 minal must be unbroken or irreversibly spliced and sized inverter terminal to the existing grounding electrode system kisting ac GEC using an irreversible means, per 250.64(C)(1).		Table 3 - Br Branch an
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1.2	OLAR PV MICROINVERTER/ACM STA Microinverter and ACM Systems for O Where supplementary grounding electrodes are installed, a bondir Bonding jumpers must be sized to the larger grounding conductor Grounded Systems: The dc grounding electrode conductor (GEC) from the inverter ter minimum #8 AWG copper per article 250.166. The dc GEC from the must tie to the existing grounding electrode or be bonded to the e A combined dc GEC and ac EGC may be run from the inverter dc gr equipment. This combined grounding conductor must be sized to t requirements of EGCs and remaining continuous as a GEC, per 690 Ungrounded Systems:	ng jumper to the existing grounding electrode must be installed. That it is bonded to, 250.58 minal must be unbroken or irreversibly spliced and sized inverter terminal to the existing grounding electrode system kisting ac GEC using an irreversible means, per 250.64(C)(1). ounding terminal to the grounding busbar in the associated ac he larger of the GEC and EGC sizes, with the bonding .47(C)(3).	9 9.1	Table 3 - Br Branch and Solar Lo The sum of percent of t Solar Loa
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1.2	OLAR PV MICROINVERTER/ACM STA Microinverter and ACM Systems for O Where supplementary grounding electrodes are installed, a bondin Bonding jumpers must be sized to the larger grounding conductor Grounded Systems: The dc grounding electrode conductor (GEC) from the inverter ter minimum #8 AWG copper per article 250.166. The dc GEC from the must tie to the existing grounding electrode or be bonded to the e A combined dc GEC and ac EGC may be run from the inverter dc gr equipment. This combined grounding conductor must be sized to t requirements of EGCs and remaining continuous as a GEC, per 690 Ungrounded Systems: A dc GEC shall not be required from the inverter dc grounding terr run from the inverter to the grounding busbar in the associated ac conductors must be identified per 210.5(C). White-finished conductor	me- and Two- Family Dwellings In g jumper to the existing grounding electrode must be installed. It is bonded to, 250.58 minal must be unbroken or irreversibly spliced and sized inverter terminal to the existing grounding electrode system kisting ac GEC using an irreversible means, per 250.64(C)(1). ounding terminal to the grounding busbar in the associated ac he larger of the GEC and EGC sizes, with the bonding .47(C)(3). minal to the building grounding electrode system. The EGC shall equipment, sized per 690.45, using Table 250.122. Ungrounded	9 9.1	Table 3 - Br Branch and Solar Lo The sum of percent of t Solar Loa Using [Ta Point
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11.2 11.3 12 12.1	<section-header>OLAR PV MICROINVERTER/ACM STA Microinverter and ACM Systems for O Mere supplementary grounding electrodes are installed, a bondin Bonding jumpers must be sized to the larger grounding conductor Gounded Systems The de grounding electrode conductor (GEC) from the inverter ter minimum #8 AWG copper per article 250.166. The de GEC from the must tie to the existing grounding electrode or be bonded to the ee A combined de GEC and ac EGC may be run from the inverter de gr equipment. This combined grounding conductor must be sized to to requirements of EGCs and remaining continuous as a GEC, per 690 Migrounded Systems A de GEC shall not be required from the inverter dc grounding terr run from the inverter to the grounding busts in the associated ac conductors must be identified per 210.5(C). White-finished conductor Marchings Pr Section CEC 690.54, a permanent label shall be installed at an indicate the following: Ated ac Output current (total Combined System Current from Ter Mominal Operating ac Voltage [STEP 2.2]</section-header>	me- and Two- Family Dwellings arg jumper to the existing grounding electrode must be installed. that it is bonded to, 250.58 minal must be unbroken or irreversibly spliced and sized enverter terminal to the existing grounding electrode system sixing ac GEC using an irreversible means, per 250.64(C)(1). ounding terminal to the grounding busbar in the associated ac he larger of the GEC and EGC sizes, with the bonding u.47(C)(3). ninal to the building grounding electrode system. The EGC shall equipment, sized per 690.45, using Table 250.122. Ungrounded tors are not permitted. accessible location at the PV ac disconnecting means that shall ble 1)) Amps ng labels or markings be installed at these components of the DLAL POWER SOURCES SECOND SOURCE IS PHOTOVOLTAIC SYSTEM RATED AC OUPPUT CURRENTAMPS AC CORMAL OPERATING VOLTAGEVOLTS VARNINGAMPS AC CORMAL OPERATING VOLTAGEVOLTS CEC 690.54 CEC 690.54 Optional Solar Load Center TE: CEC 705.10 requires a permanent plaque or etry denoting all electric power sources on or in the CEC 690.54 (CC CYSTEM SCONTECT SUBLE SOURCE IS PHOTOVOLTAIC SYSTEM </td <td>9 9.1 9.2 10 10.1 10.2</td> <td>Table 3 - Br Branch and Solar La The sum of percent of th Solar Loa Using [Ta Point One of th Supply Si Overcurre comprom Load Side Is the PV If No to th in calcula Per 705.1 Table 4 - Busbar Size (A Main OCPD (A Maximum Con the supply sid overcurre comprom 2 Load Side Is the PV If No to th in calcula Per 705.1 Table 4 - Busbar Size (A Main OCPD (A Maximum Con the supply sid overcurre comprom 2 Load Side Is the PV If No to th in calcula Per 705.1 Table 4 - Busbar Size (A Main OCPD (A Maximum Con the supply sid overcurre comprom 2 Load Side Is the PV If No to th in calcula Per 705.1 Table 4 - Busbar Size (A Main OCPD (A Maximum Con the supply sid overcurre comprom 2 Load Side Is the PV If No to th in calcula Per 705.1 Table 4 -</td>	9 9.1 9.2 10 10.1 10.2	Table 3 - Br Branch and Solar La The sum of percent of th Solar Loa Using [Ta Point One of th Supply Si Overcurre comprom Load Side Is the PV If No to th in calcula Per 705.1 Table 4 - Busbar Size (A Main OCPD (A Maximum Con the supply sid overcurre comprom 2 Load Side Is the PV If No to th in calcula Per 705.1 Table 4 - Busbar Size (A Main OCPD (A Maximum Con the supply sid overcurre comprom 2 Load Side Is the PV If No to th in calcula Per 705.1 Table 4 - Busbar Size (A Main OCPD (A Maximum Con the supply sid overcurre comprom 2 Load Side Is the PV If No to th in calcula Per 705.1 Table 4 - Busbar Size (A Main OCPD (A Maximum Con the supply sid overcurre comprom 2 Load Side Is the PV If No to th in calcula Per 705.1 Table 4 -
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PV MICROINVERTER/ACM STANDARD PLAN - COMPREHENSIVE

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

dule Maximum DC Voltage

ng ACMs, skip to [STEP 6])

n dc voltage shall not exceed inverter manufacturer's maximum input voltage rating [STEP 2.4] ______ Volts. If the uit voltage (V_{oc} from [STEP 3.1]) temperature coefficients (β or ε) are provided by the module manufacturer, use the n in **Method 1.** If V_{oc} temperature coefficient is not provided by the module manufacturer, use the calculation in 2.

. erature coefficient (β)=_____%/⁰C

ber of modules per inverter ______ × { V_{OC} + [(T_L -25) × (β × V_{OC})/100]} = ______ Volts

manufacturer provides a voltage temperature coefficient (ϵ) in mV/°C, use the formula below. erature coefficient (ϵ)= _____ mV/°C ber of modules per inverter _____ × {V_{oc} + [(T_L-25) × (ϵ /1000)]} = ____ Volts

: number of modules per inverter ______ x V_{oc} _____ x K_T = _____ Volts, = _____ is a correction factor for ambient temperatures below 25 °C. See **Table 690.7**.

Low Temperature V_{oc} is less than the Microinverter maximum input voltage from [STEP 2.4]:
Ves
No

ng ACMs, skip to [STEP 6])

the Maximum Short Circuit Current for the PV module

PV current for peak sunlight (x 1.25) and compare it to the microinverter Maximum dc Input Short Circuit Current Max dc Input Short Circuit Current rating is not provided by manufacturer, use 1.5 x Max dc Input rating (per UL 1741)): Maximum Short Circuit Current = (PV Short Circuit Current, I_{sc}, from [STEP 3.2]) * 1.25 = ______ Amps Verify Maximum Short Circuit Current [STEP 5.1.1] is equal to or less than the Maximum dc Input Short Circuit Current STEP 2.6] = ______ Amps or the Maximum dc Input Current [STEP 2.5] * 1.5 = ______ Amps

h and Combined Inverter Output Circuit Information and Calculations ole 1] to describe the Branch and Combined System circuits.

wer = (Number of Microinverters or ACMs) * (Rated ac output power [STEP 2.1]) = _____ Watts rrent = (Circuit Power) / (Nominal ac voltage [STEP 2.2])) = _____ Amps

OCPD and Ampacity Current Calculations

	Branch 1	Branch 2	Branch 3	Branch 4	Combined Inverter Output Circuit
er of Microinverters or ACMs					
ver for each unit [STEP 2.1], Watts		I	1	1	
Power, Watts					
al ac Voltage [STEP 2.2], Volts					1
Current, Amps		Ĭ		ĺ	

Branch and Combined Inverter Output Circuit Conductors the current using both Method A [STEP 7.1] and Method B [STEP 7.2] for each Branch and the Combined Inverter rcuit from [Table 1]. Enter the results in [Table 2].

2

PV MICROINVERTER/ACM STANDARD PLAN - COMPREHENSIVE

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

anch and Combined Inverter Output Circuit OCPD Sizing

	Branch 1	Branch 2	Branch 3	Branch 4	Combined Inverter Output Circuit
and Inverter Output OCPD, Amps					

Load Center

of the ampere ratings of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 f the rating of the busbar or conductor [CEC 705.12(D)(2)].

ad center busbar rating: ______ Amps

 Table 3], (Sum of all inverter output Branch OCPDs) ______ Amps + (Combined Systems OCPD) _____ Amps = ____ Amps ≤ 120% of [STEP 9.1] Amps.

t of Connection to Utility:

the following methods of interconnection must be utilized.

Side Connection:
Yes
No
Vith your local jurisdiction to determine if this connection is allowed.

ide connections shall only be permitted where the service panel is listed for the purpose. The sum of the ratings of all ent devices connected to power production sources shall not exceed the rating of the service. The connection shall not nise listing or integrity of any equipment.

V OCPD positioned at the opposite end from input feeder location or main OCPD location? \square Yes \square No

the statement above, the sum of OCPD(s) supplying the panel cannot exceed 100% of the bus circle 100% as the multiplier lation. Otherwise, circle 120% and use that as the multiplier.

12(D)(2): [Inverter output OCPD size [Table 3] + Main OCPD Size] ≤ [Bus size x (100% or 120%)]

- Maximum Combined Inverter Output Circuit OCPD, CEC 705.12(D)(2)

e (Amps)	100								
D (Amps)	100	100	125	150	175	200	175	200	225
Combined Inverter OCPD with 120% of busbar rating (Amps)	20	50	25	60†	60†	40	60†	60†	45
Combined Inverter OCPD with 100% of busbar rating (Amps)	0	25	0	50	25	0	50	25	0
a la lista de la ciuna de l		Dates			CO. 4	16.1		law and	

lan limits the maximum system size to less than 10 kW, therefore the OCPD size is limited to 60 A. If the main breaker is d, a load calculation per Article 220 must accompany the Standard Plans to show that the reduction is allowed.

ream panelboard busbar ratings must also comply with CEC 705.12(D)(2).

nding and Bonding

ne of the boxes for whether system is grounded or ungrounded:
□ Grounded, □Ungrounded.
roinverters with a grounded dc input, systems must follow the requirements of GEC (CEC 690.47) and EGC (CEC 690.43).
I systems and Microinverters with ungrounded a dc input follow the EGC requirements of (CEC 690.43).

ems:

s and racking must be bonded by a method listed to the respective UL standard and recognized by the respective ent manufacturers. Bonding method is subject to AHJ approval. DC and ac **equipment grounding conductor (EGC)** shall be sed on source and output circuit conductors per 690.45 using Table 250.122. Where exposed to physical damage, it is d to be #6 AWG copper per 690.46. A dc EGC is required for both grounded and ungrounded systems. If an existing s grounding electrode system is not present, a new grounding electrode system must be established per 250.53.

4

SOLAR PV MICROINVERTER/ACM STANDARD Microinverter and ACM Systems for One- and

7.1 Method A:

- 7.1.1 Each Branch Circuit Current, Method A
- (Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac
 7.1.2 Combined Inverter Output Circuit Current, Method A (Total Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac)
- Amps 7.2 Method B:
 - Number of current-carrying branch and combined output circuit conductors in Each Raceway height above the roof: ______ inches (if not applicable in the second seco
 - The correction factors for each raceway: $C_F = _ C_F$ is the conduit fill coefficient found by referencing **Table 310** $C_T = _ C_T$ is a coefficient dependent on the highest continuous ambient applicable) and is found by referencing **Table 310.15(B)(3)(c)** and **Table 310.15(B)**
 - 7.2.1 Each Branch Circuit Current, Method B
 - (Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac
 7.2.2 Combined Inverter Output Circuit Current, Method B
 - (Total Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nomin Amps

7.3 Determine Conductor Size

Using the greater ampacity as calculated in **Method** A or **Method** B, use **Table 3** size. The conductor ampacity shall not exceed the ampacity of chosen conducto connected termination, conductor, or device (typically 60°C or 75°C).

Table 2 – Branch and Combined Circuit Currents, Correction Factors, and Cond

	Branch 1	Branch 2	
7.1 Method A: Branch and Combined Circuit Current			Î
7.2 Method B: Number of current carrying conductors for Branch and Combined Circuit Current			
7.2 Method B: Raceway height above the roof			I
7.2 Method B: C _F			I
7.2 Method B: C _T			I
7.2 Method B: Branch and Combined Circuit Current			
Minimum Conductor Size, AWG			Ī

8 Branch and Combined Inverter Output Circuit OCP Determine the OCPD size for each Branch Circuit and for the Combined Inverter the OCPD size. Calculate the circuit current for each branch circuit. Enter the res

- 8.1.1 Each Branch Circuit Current for OCPD Sizing (Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac
- 8.1.2 Combined Inverter Output Circuit for OCPD Sizing (Total Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nomir Amps

Size the inverter output OCPD based on the value calculated above. Where the fuse/breaker sizes (see CEC 240.6(A)), the next higher size may be used provide rating may not exceed the conductor ampacity or the inverter manufacturer's n

3

SAMPLE MICRO INVERTER CA

D PLAN - COMPREHENSIVE Two- Family Dwellings c voltage [STEP 2.2]) × 1.25 = Amps inal ac voltage [STEP 2.2]) × 1.25 = n each raceway:	COMPANY LOGO
310.15(B)(16) to identify the ac circuit conductor or rated at the lowest temperature rating of any ductor Sizes	SIGNATURE & LICENSE NUMBER
Branch 3 Branch 4 Combined Inverter Output Circuit Image: Combined Inverter Output Circuit Image: Combined Inverter Output Circuit	
PD Size er Output Circuit. Use CEC 690.8(B)(1) to determine esults in [Table 3]. c voltage [STEP 2.2]) x 1.25 = Amps	kw rating of The system
inal ac voltage (STEP 2.2) x 1.2 s	REVISION / ASSESSOR'S PARCEL NUMBER DRAWN BY: PROJECT NO. DATE: SHEET
ALCULATION	PV-5B

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<form><form><form><form><form><form><form><form><form><form><form><form></form></form></form></form></form></form></form></form></form></form></form></form>	Central/String Inverter Systems for One and Two Family Dwellings				
<form></form>	SCOPE: Use this plan ONLY for electrical review of utility-interactive centralisting inverter systems not exceeding a combined system AC inverter output of 10WV on the roof of a single of august family dwelling or accessory building. The specific structural and fire requirements are covered under a separate permit. The photovolitic system must interconnect to the load side of a single-phase AC service panel of 240Vac or less with a busbar rating of 225A or less. This plan is not intended for bipolar systems, hybrid systems or systems that utilize storage batteries, charge controllers, trackers, are modules, more than the oinverters or more than one DC combiner (non-inverter-integrated) per inverter. Systems must be in compliance with current California Building Standards Codes and al applicable San Diego Codes. Other Articles of the California Electrical Code (CEC) shall apply as specified in 690.3. MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed inverters, modules, core that allalition instructions for bonding and grounding equipment and rapid shutdown system or equipment. Installation instructions for bonding and grounding equipment and rapid shutdown system shall be provided, and local AHJS may require additional delaids. 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 listed for the PV application (CEC 690.4(B)). Job Address:	S) DC Module Lavout Identify each source circuit (string) for 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) (e.g. A,B,C,) Combiner 1:	10) Are PV source circuits combined prior to the inverter? □ Yes □ No If No, use Single Line Diagram 1 and proceed to Step 11. If Yes, use Single Line Diagram 2 and proceed to Step 11 after this step. Is source circuit OCPD required? □ Yes □ No Source circuit OCPD required? □ Yes □ No If Yes, the DC output of the combined on the roof? □ Yes □ No If Yes, the CO cutput of the combiner shall have a load break disconnecting means located in the combiner or within 1.8m (6ft) of the combiner (CEC 690.15(C)). 11) Sizing PV Output Circuit Conductors — If strings are combined (answered "Yes" in Step 10), Output Circuit Conductor Size + Min. #6 AWG copper conductor. 12) Inverter DC Disconnect Does the inverter have an integrated DC disconnect? Yes No If Yes, proceed to step 13. If No, the external DC disconnect to be installed is rated forAmps (DC) andVolts (DC) 13) Inverter information Maniaturer: Model: Model: Max. Continuous AC Output Current Rating: Amps If No is selected, this plan is not applicable.)	16) Rapid Shutdown The rapid Shutdown The rapid shutdown initiation device shall be labeled according to CEC 690.56(C), and its location shall be shown on the site plan drawing. The rapid shutdown initiation device may be the inverter output or input circuits' disconnecting means, the service main disconnect, or a separate device as approved by the AHJ. The disconnecting means. A single rapid shutdown initiation device shall be provided as a disconnecting means. A single rapid shutdown initiation device and loperate all disconnecting means shall be identified for the purpose, suitable for their environment, and list das a disconnecting means. A single rapid shutdown initiation device shall be pertaid all disconnecting means necessary to control conductors in compliance with CEC 690.12. Note: Check with the AHJ regarding approval where field verification of reduction of voltage within the time required by CEC 690.12 is performed. Rapid shutdown shall be provided as required by CEC 690.12 with one of the following methods (Select one); The inverter(s) is within 10 feet of the array, and the location of the inverter is such that uncontrolled PV disconnecting means is required immediately adjacent to or as close as practicable to the inverters, and located within 10 feet of the array, and the location of the inverter is such that uncontrolled PV	AN K
<form></form>	Signature:	7) Maximum System DC Voltage Use for systems without DC/DC converters. A. Module V _{DC} (STEP 2) x # of modules in series (STEP 5) x C _c (STEP 1) = V Interse to know of the Monoco of the	AC Information: 14) Sizing Inverter Output Circuit Conductors and OCPD Inverter Output Circuit Conductors Size =	 system conductors are no greater than 5 feet of length within the building. Reduction of the voltage for the inverter output within the time required by CCE 09012 shall be verified in the field, or the inverter output is listed to UL 1741 with rapid shutdown capability. Remotely-controlled DC disconnecting means are located within 10 feet of the PV array and DC input of the inverter(s), and the locations of the disconnecting means are such that uncontrolled PV system conductors are no greater than 5 feet of length within the building. Reduction of the voltage for the inverter output within the time required by CCE 69012 shall be verified in the field, or the inverter output is listed to UL 1741 with rapid shutdown capability. Remotely-controlled DC disconnecting means is located within 10 feet of the array at the DC input of inverter(s) connected to a module evel DC-DC converter circuit where the DC-DC converter circuit meets the requirements for controlled conductors when disconnected from the inverter. Reduction of the voltage for the DC-DC converter output and the inverter output within the time required by CCE 690.12 shall be verified in the field, or the DC-DC converter output and the inverter output are listed to UL 1741 	SIGNATURE & LICENSE NUMBER
<form><form></form></form>	Average ambient high temperature (T _n) ≤ 47° C Note: For a lower T _i or a higher T _{iv} this plan is not applicable. DC Information: Module Manufacturer: Model: 2) Module V _{oc} (from module nameplate): Voits 3) Module L ₀ (from module nameplate): Nor is Module L ₀ (below 9.6 Amps?	Image: Second	OCPD values. □ No, use Table 4, row 4 and circle the Max Combined PV System OCPD(s) at 100% based on the bus bar rating and main OCPD values. Per 705.12(0)(2)(3): The value circled in Table 4 should be equal to or greater than the OCPD value selected from Table 3 (for a single inverter) or the OCPD value from Step S18 (for two inverters). Table 3 (for a single inverter) or the OCPD value from Step S18 (for two inverters). Table 3 (for a single inverter) or the OCPD value from Step S18 (for two inverters). Table 3 (for a single inverter) or the OCPD value from Step S18 (for two inverters). Table 3 (for a single inverter) or the OCPD value from Step S18 (for two inverters). Table 3 (for a single or the OCPD value from Step S18 (for two inverters). Table 3 (for a single or the OCPD value from Step S18 (for two inverters). Table 3 (for two inverters). Max Combined IV System OCPO(s) 125 150 175 200 225 Max Combined IV System OCPO(s) 0 25 0 50 25 0 Max Combined IV System OCPO(s) 0 25 0 50 25 0 25 0	A UL 1741-listed and identified inverter(s) with input and output rapid shutdown capability supplying module level DC-DC converter circuit where the DC-DC converter circuit meets the requirements for controlled conductors when disconnected from the inverter. A UL 1741-listed rapid shutdown system: Manufacturer: Testing Agency Name: System Model Number; System Components: 17) Grounding and Bonding of Modules and Racking System (select one); Racking system listed to UL 2703 using modules identified in the listing.	KW RATNG OF THE SYSTEM
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SOLAR PV MICROINVERTER/ACM STANDARD PLAN - COMPREHENSIVE Microinverter and ACM systems for One- and Two- Family Dwellings	SOLAR PV MICROINVERTER/ACM STANDARD PLAN - COMPREHENSIVE Microinverter and ACM Systems for One- and Two- Family Dwellings	SOLAR PV MICROINVERTER/ACM STANDARD PLAN - COMPREHEN Microinverter and ACM Systems for One- and Two- Family Dwellings
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 on a roof of a one or two family dwelling or accessory structure. The photovoltaic system must	4 PV Module Maximum DC Voltage (ff installing ACMs, skip to [STEP 6])	7.1 Method A: 7.1.1 Each Branch Circuit Current, Method A
interconnect to a single-phase ac service panel of 120/240 Vac with service panel busbar 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 tracker or more than 4	Maximum dc voltage shall not exceed inverter manufacturer's maximum input voltage rating [STEP 2.4] Volts. If the open-circuit voltage (V_{oc} from [STEP 3.1]) temperature coefficients (β or e) are provided by the module manufacturer, use the	(Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac voltage [STEP 2.2]) × 1.25 = 7.1.2 Combined Inverter Output Circuit Current, Method A
branch circuits. 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.	calculation in Method 1. If V_{0C} temperature coefficient is not provided by the module manufacturer, use the calculation in Method 2.	(Total Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac voltage [STEP 2.2]) x 1.25 = Amps
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 AHIs may require additional details.	4.1 Method 1:	7.2 Method B: Number of current-carrying branch and combined output circuit conductors in each raceway:
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)).	V_{oc} temperature coefficient (β)=%/ ^o C Max number of modules per inverter × { V_{oc} + {($T_{1.}^225$) × (β × V_{oc})/100]} = Volts	Each Raceway height above the roof: inches (if not applicable indicate N/A) The correction factors for each raceway:
Applicant and Site Information	If module manufacturer provides a voltage temperature coefficient (ϵ) in mV/°C, use the formula below.	$C_r = \C_r$ is the conduct fill coefficient found by referencing Table 310.15(B)(3)(a) $C_r = \C_r$ is a coefficient dependent on the highest continuous ambient temperature and raceway height a
	V _{oc} temperature coefficient (ɛ)= mV/ ^o C Max number of modules per inverter × {V _{oc} + [(T _L ·25) × (ɛ/1000)]]} = Volts	c ₇ = c ₇ is a coefficient dependent on the ingress continuous amolent temperature and raceway neight applicable) and is found by referencing Table 310.15(B)(3)(c) and Table 310.15(B)(2)(a).
Job Address: Permit #: Contractor/ Engineer Name: License # and Class:	4.2 Method 2:	7.2.1 Each Branch Circuit Current, Method B (Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac voltage [STEP 2.2]) / (C _r x C _t) =
Signature: Date: Phone Number:	Maximum number of modules per inverterX V _{oc} X K _f =Volts, Where K _f = is a correction factor for ambient temperatures below 25 °C. See Table 690 .7.	7.2.2 Combined Inverter Output Circuit Current, Method B
General Requirements and System Information	Verify the Low Temperature V _{oc} is less than the Microinverter maximum input voltage from [STEP 2.4]: \Box Yes \Box No	(Total Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac voltage [STEP 2.2]) / (C _f x C _T) - Amps
Microinverter AC Module (ACM) Number of PV modules installed: Number of ACM's installed:	5 PV Short Circuit Current	7.3 Determine Conductor Size Using the greater ampacity as calculated in Method A or Method B, use Table 310.15(B)(16) to identify the ac circul
Number of Microinverters installed: Note: Listed Alternating-Current Module (ACM) is defined in CEC 690.2 and installed per CEC 690.6	(If installing ACMs, skip to [STEP 6]) 5.1 Calculate the Maximum Short Circuit Current for the PV module	size. The conductor ampacity shall not exceed the ampacity of chosen conductor rated at the lowest temperature ra connected termination, conductor, or device (typically 60°C or 75°C).
Number of Branch Circuits, 1, 2, 3, or 4: Total ac system power rating = (Number of Microinverters or ACMs) * (ac inverter power output) = Watts	Adjust the PV current for peak sunlight (x 1.25) and compare it to the microinverter Maximum dc Input Short Circuit Current Rating. (If Max dc Input Short Circuit Current rating is not provided by manufacturer, use 1.5 x Max dc Input rating (per UL 1741)):	Table 2 - Branch and Combined Circuit Currents, Correction Factors, and Conductor Sizes
Lowest expected ambient temperature for the location: $(T_i) ={C_i} C$	5.1.1 Maximum Short Circuit Current = (PV Short Circuit Current, I _{sc} , from [STEP 3.2]) * 1.25 = Amps	Branch 1 Branch 2 Branch 3 Branch 4 Combined Output
Average amolent nigh temperature for the location: (1 _H) = C Provide the name of the source used to determine T _L and T _H :	5.1.2 Verify Maximum Short Circuit Current [STEP 5.1.1] is equal to or less than the Maximum dc Input Short Circuit Current [STEP 2.6] = Amps or the Maximum dc Input Current [STEP 2.5] * 1.5 = Amps	7.1 Method A: Branch and Combined Circuit Current
	6 Branch and Combined Inverter Output Circuit Information and Calculations	7.2 Method B: Number of current carrying conductors for Branch and Combined Circuit Current
Microinverter or ACM Information and Ratings Microinverters with ungrounded dc inputs shall be installed in accordance with CEC 690.35.	Fill in [Table 1] to describe the Branch and Combined System circuits.	7.2 Method B: Raceway height above the roof
Microinverter or ACM Manufacturer: Model:	Circuit Power = (Number of Microinverters or ACMs) * (Rated ac output power [STEP 2.1]) Watts Circuit Current = (Circuit Power) / (Nominal ac voltage [STEP 2.2])) = Amps	7.2 Method B: C, 7.2 Method B: C,
Rated (continuous) ac output power: Watts Nominal ac Voltage Rating: Volts	Table 1 - OCPD and Ampacity Current Calculations	7.2 Method B: C _T 7.2 Method B: Branch and Combined Circuit Current
Rated (continuous) ac output current: Amps	Branch 1 Branch 2 Branch 3 Branch 4 Combined Inverter Output Circuit	Minimum Conductor Size, AWG
If installing ACMs, skip [STEPS 2.4 and 2.5) Maximum dc Input Voltage Rating: Volts	Number of Microinverters or ACMs	8 Branch and Combined Inverter Output Circuit OCPD Size
Maximum dc Input Current Rating: Amps Maximum dc Input Short Circuit Current Rating: Amps (if provided by manufacturer)	AC Power for each unit [STEP 2.1], Watts	Determine the OCPD size for each Branch Circuit and for the Combined Inverter Output Circuit. Use CEC 690.8(B)(1): the OCPD size. Calculate the circuit current for each branch circuit. Enter the results in [Table 3].
	Circuit Power, Watts Nominal ac Voltage (STEP 2.2), Volts	8.1.1 Each Branch Circuit Current for OCPD Sizing
PV Module Information (If installing ACMs, skip to (STEP 6))	Circuit Current, Amps	(Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac voltage [STEP 2.2]) x 1.25 = 8.1.2 Combined Inverter Output Circuit for OCPD Sizing
PV Module Manufacturer:		(Total Number Microinverters/ACMs) * (AC power [STEP 2.1]) / (Nominal ac voltage [STEP 2.2]) x 1.25 = Amos
Module dc output power under standard test conditions (STC) =Watts 1 Module V _{oc} at STC (from module nameplate):Volts	7 Sizing Branch and Combined Inverter Output Circuit Conductors Calculate the current using both Method A [STEP 7.1] and Method B [STEP 7.2] for each Branch and the Combined Inverter	Size the inverter output OCPD based on the value calculated above. Where the figure is between two standard value
3.2 Module I _{sc} at STC (from module nameplate): Amps	Output Circuit from [Table 1]. Enter the results in [Table 2].	fuse/breaker sizes (see CEC 240.6(A)), the next higher size may be used provided the conductors are sufficiently sized
PFV 1.1: August 18, 2014 1 SOLAR PV MICROINVERTER/ACM STANDARD PLAN - COMPREHENSIVE Microinverter and ACM Systems for One- and Two- Family Dwellings	2 <u>SOLAR PV MICROINVERTER/ACM STANDARD PLAN - COMPREHENSIVE</u> <u>Microinverter and ACM Systems for One- and Two- Family Dwellings</u>	rating may not exceed the conductor ampacity or the inverter manufacturer's max OCPD rating for the inverter.
SOLAR PV MICROINVERTER/ACM STANDARD PLAN - COMPREHENSIVE Microinverter and ACM systems for One- and Two- Family Dwellings Where supplementary grounding electrodes are installed, a bonding jumper to the existing grounding electrode must be installed. Bonding jumpers must be sized to the larger grounding conductor that it is bonded to, 250.38 1.1 Grounded Systems: The de grounding electrode conductor (GEC) from the inverter terminal to the existing grounding electrode system must tie to the existing grounding electrode or be bonded to the existing are GEC using an irreversibly spliced and sized minimum #8 AWG copper par article 250.166. The dc GEC from the inverter terminal to the existing grounding electrode system must tie to the existing grounding electrode or be bonded to the existing are GEC using an irreversible means, per 250.64(C)(1). A combined dc GEC and a EGC may be run from the inverter dc grounding terminal to the grounding busbar in the associated ac equipment. This combined grounding conductor must be sized to the larger of the GEC and EGC sizes, with the bonding requirements of EGCs and remaining continuous as a GEC, per 690.47(C)(3). 1.1 Ungrounded Systems: A dc GEC Shall not be required from the inverter dc grounding terminal to the building grounding electrode system. The EGC shall run from the inverter to the grounding busbar in the associated ac equipment, sized per 680.45, using Table 250.122. Ungrounded conductors must be identified per 210.5(C). White-finished conductors are not permitted.	Description	rating may not exceed the conductor ampacity or the inverter manufacturer's max OCPD rating for the inverter.
SOLAR PV MICROINVERTER/ACM STANDARD PLAN - COMPREHENSIVE Microinverter and ACM Systems for One- and Two- Family Dwellings Where supplementary grounding electrodes are installed, a bonding jumper to the existing grounding electrode must be installed. Bonding jumpers must be sized to the larger grounding conductor that it is bonded to, 250.58 Grounded Systems The dc grounding electrode conductor (GEC) from the inverter terminal to the existing grounding electrode system must le to the existing grounding electrode or be bonded to the existing a GEC using an irreversible means, per 250.64(C)(1). A combined dc GEC and a CEG may be run from the inverter dc grounding terminal to the grounding busbar in the associated ac equipment. This combined grounding conductor must be sized to the larger of the GEC and EGC sizes, with the bonding requirements of EGCs and remaining continuous as a GEC, per 690.47(C)(3).	Jack Description of the subject	rating may not exceed the conductor ampacity or the inverter manufacturer's max OCPD rating for the inverter.
SOLAR PV MICROINVERTER/ACM STANDARD PLAN - COMPREHENSIVE Microinverter and ACM Systems for One- and Two- Family Dwellings Where supplementary grounding electrodes are installed, a bonding jumper to the existing grounding electrode must be installed. Bonding jumpers must be sized to the larger grounding conductor that it is bonded to, 250.58 Corounded Systems: The dcg grounding electrode conductor (GEC) from the inverter terminal must be unbroken or irreversibly spliced and sized minimum #8 AWG copper per article 250.166. The dc GEC from the inverter terminal to the existing grounding electrode system must ite to the existing grounding conductor must be sized to the larger of the GEC and EGC sizes, with the bonding requirements of EGCs and a c EGC may be run from the inverter dc grounding are for the GEC sizes, with the bonding requirements of EGCs and a c EGC may be run from the inverter dc grounding terminal to the prounding buschar in the associated ac equipment. This combined grounding continuous as a GEC, per 690.47(C)(3). J Ungrounded Systems: Ad GEC shall not be required from the inverter dc grounding terminal to the building grounding electrode system. The EGC shall run from the inverter to the grounding terminal to the building grounding electrode system. The EGC shall run from the inverter of the grounding terminal to the building grounding electrode system. The EGC shall run from the inverter of the grounding terminal to the building grounding electrode system. The EGC shall run from the inverter of the grounding terminal to the building grounding electrode system. The EGC shall Runding and the inverter of the grounding terminal to the building grounding electrode system. The EGC shall run from the inverter of the grounding the shall to conductors must be identified per 210.5(C). White-finished conductors are not permitted.	SUMPLANCE CONCUENCE CLACUACIONE DE LACIÓN CONCUENCE DE LA CIÚNCUENCE DE LACIÓN CONCUENCE 	rating may not exceed the conductor ampacity or the inverter manufacturer's max OCPD rating for the inverter.
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SUBJECT STATUS	<text><section-header><section-header></section-header></section-header></text>	rating may not exceed the conductor ampacity or the inverter manufacturer's max OCPD rating for the inverter.
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Superior Section CEC 690.54, a permanent label shall be installed at an accessible location at the V ac disconnecting means that shall. A GEC Shall not Exe following: Description CEC 690.54, a permanent label shall be installed at an accessible location at the V ac disconnecting means that shall at low outproved in the following: Description CEC 690.54, a permanent label shall be installed at an accessible location at the V ac disconnecting means that shall at low outproved in the following: Description CEC 690.54, a permanent label shall be installed at an accessible location at the V ac disconnecting means that shall at low outproved in the following: Description CEC 690.54, a permanent label shall be installed at an accessible location at the V ac disconnecting means that shall at low outproved in the following: Description CEC 690.54, a permanent label shall be installed at an accessible location at the V ac disconnecting means that shall be installed at an accessible location at the V ac disconnecting means that shall conductor in the following: Description CEC 690.54, a permanent label shall be installed at an accessible location at the V ac disconnecting means that shall be installed at an accessible location at the V ac disconnecting means that shall be installed at an accessible location at the V ac disconnecting means that shall be installed at an accessible location at the V ac disconnecting means that shall be installed at an accessible location at the V ac disconnecting means that shall be installed at an accessible location at the V ac disconnecting means that shall be installed at an accessible location at the V ac disconnecting means that shall be installed at an accessible location at the V ac disconnecting means that shall be installed at an accessible location at the V ac disconnecting means that shall be installed at the secting COM accessible accessible docation at the V ac disconnecting means that shall be installed at the secting COM ac	<text><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></text>	rating may not exceed the conductor ampacity or the inverter manufacturer's max OCPD rating for the inverter.
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