



Expedited Permit Process For Solar Photovoltaic (PV) Systems

For regions within Mono County exclusive of the Town of Mammoth Lakes

PURPOSE

In an effort to promote a consistent methodology for processing permits for all regions within Mono County, this standardized permit submittal has been developed for both ground mounted and roof mounted solar PV systems.

Effective Dates: This document is effective April 1, 2014 through December 31, 2016. Revisions may be necessary based upon amendments and errata issued by the State of California as it pertains to the 2013 California Code of Regulations, Title 24, and/or local amendments.

DESIGN AND REVIEW

1. All PV applications shall be reviewed at the front counter for completeness.
2. Systems using new technology (i.e., micro inverters, thin-film panels, etc.) may be required to submit detailed plans and specifications for plan review.
3. All PV system plans shall specify:
 - a. Conductor wiring methods and wire type, system and solar panel grounding methods as per inverter and solar panel manufacturer's listings, and PV system DC and AC disconnects.
 - b. Signage [on panel(s), disconnects and transmission line conductors]
 - c. Placement of equipment and modules with associated access and pathways for roof mounted systems.
 - d. Equipment type, listing, testing agency approvals, etc.
 - e. Module attachment details and data from manufacturer.
 - f. Inverter location(s), if applicable.
4. Qualifying projects may utilize Mono County prescriptive designs for both roof mounted and ground mounted solar PV projects.

SUBMITTAL REQUIREMENTS

1. **General information:** Name of applicant, address of project, name of licensed contractor, and other similar pertinent information must be filled out completely on a building permit application form.
2. Completed roof mounted solar PV prescriptive design, if applicable, for qualifying projects.
3. Documents and information as detailed in the below plan submittal checklist.

PHOTOVOLTAIC DISCONNECT REQUIREMENTS

1. PV disconnect shall be installed in a readily accessible location and located together when possible. All electrical panel disconnecting means shall be designed to shut off all power (solar and domestic).
2. All roof surface-mounted conduits, pipes, braces, etc. crossing the pathways are to be clearly identified by a red/white reflective tape, or other approved identifying material. Check with the local fire protection district in which the project is located for the disconnect requirements of those systems as well as other applicable fire-safety related criteria.

PROTECTION OF EMERGENCY RESPONDERS

The following conditions shall be verified and apply to all roof and ground-mount solar PV systems:

1. All sharp edges and fastener tips shall be covered or crimped over to eliminate sharp edges. This will minimize risk of injury to emergency responders (or any other individual accessing the rooftop).
2. All roof surface-mounted conduits, pipes, braces, etc. crossing the pathways on roof mounted systems are to be clearly identified by a red/white reflective tape, or other approved identifying material. Check with the local fire protection district in which the project is located for the disconnect requirements of these systems as well as other applicable fire-safety related criteria.

ROOF ACCESS REQUIREMENTS & ARRAY CONFIGURATIONS

All arrays shall be mounted per the listing installation instructions of the system. Pathways shall be established in the design of the solar installation and clearly indicated on the plans. All roof access pathways shall be located at a structurally supported location on the building, such as over a bearing wall, or beam lines. Arrays shall be located in a manner that provides access pathways for the following conditions. Additional information is available on the Mono County prescriptive roof top solar PV design.

1. Residential buildings with hip-roof layouts: Modules shall be located in a manner that provides one 3-ft. wide clear pathway from the eave to the ridge on each roof slope where panels are located.
2. Residential buildings with a single ridge: Modules shall be located in a manner that provides a three-foot (3') wide access pathway between the panels to the ridge on each roof slope where arrays are located.
3. Hips and valleys: Panels/modules shall be located no closer than 18 inches (457 mm) to a hip or a valley if panels/modules are to be placed on both sides of a hip or valley. If the panels are to be located on only one side of a hip or valley that is of equal length, then the panels shall be permitted to be placed directly adjacent to the hip or valley.

Modules shall be located no higher than 3 ft. below the ridge for fire ventilation purposes, unless specifically authorized by the local fire chief of the district where the project is located.

Project shall comply with local fire codes of the respective jurisdictions. The State Fire Marshal amendments to the 2013 California Fire Code are enforced by local jurisdictions for all solar PV systems. It is recommended that you contact the local fire and building departments prior to submitting your application.

Plan Submittal Checklist

All PV system plans shall show and/or specify in the following order:

- a. Basic site plan provided showing location of structure and equipment (form provided)
- b. Array configuration and placement of equipment and modules on roof with dimensional access and pathways (use Mono County prescriptive roof top solar PV design as a guide).
- c. Electrical single-line drawing (forms provided) including:
 - showing size and location of the main electrical panel and sub panels;
 - equipment grounding
 - combiner/junction box location
 - the AC / DC disconnect box
 - conduit size from the array to the power source
 - inverter string sizing or micro inverter branch circuit details
 - conductor wiring methods and insulation rating, system and solar panel grounding methods as per inverter and solar panel manufacturer's listings, and PV system DC and AC disconnects
 - listing information, including mounting wire type, method of grounding, of PV modules and mounting racks
- d. Provide manufacturer technical specifications for all PV equipment and mounting systems including, but not limited to:
 - PV modules
 - All components for rack mounting system
 - Inverters or micro inverters
 - Panel and rack attachment details (if not using Mono County prescriptive roof mounted solar PV design).
- e. Equipment type, listing, testing agency approvals, etc.
- f. Permanent labels and signage with a red background and white lettering resistant to fading pursuant to UL 969 and the 2013 California Electrical Code Article 690 and permanently affixed. See attached guide.

NOTE: Points 1a and 1b may be listed on the same diagram

STANDARD STRING SYSTEM SITE PLAN

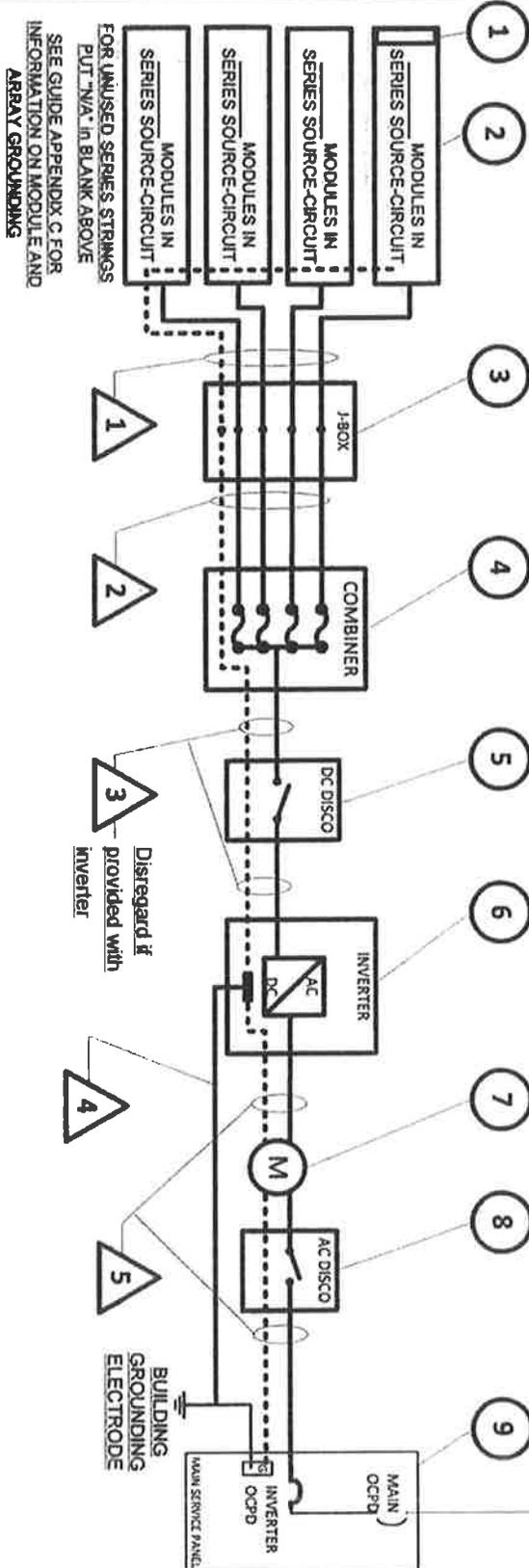
Contractor Name, Address and Phone:		Site Plan for Small-Scale, Single-Phase PV Systems			
		Site Name:	Site Address:	System AC Size:	DWG NO
Drawn By:	SITE FSCH NO	DATE	NTS	DATE	PART
Checked By:	SCALE	NTS	DATE	PART	REV

STANDARD STRING SYSTEM SITE PLAN

Contractor Name, Address and Phone		Site Plan for Small-Scale, Single-Phase PV Systems			
Site Name: Site Address: System AC Size:		SQE FSCM NO	DWG NO	REV	DATE
Drawn By:	Checked By:	SCALE	NTS	DATE:	SHEET

STANDARD STRING SYSTEM ELECTRICAL DIAGRAM

EQUIPMENT SCHEDULE			
TAG	DESCRIPTION	PART NUMBER	NOTES
1	SOLAR PV MODULE		
2	PV ARRAY		
3	J-BOX (IF USED)		
4	COMBINER (IF USED)		
5	DC DISCONNECT		
6	DC/AC INVERTER		
7	GEN METER (IF USED)		
8	AC DISCONNECT (IF USED)		
9	SERVICE PANEL		



CONDUIT AND CONDUCTOR SCHEDULE				
TAG	DESCRIPTION OR CONDUCTOR TYPE	COND. GAUGE	NUMBER OF CONDUCTORS	CONDUIT TYPE AND SIZE
1	USE-2 <input type="checkbox"/> or PV WIRE <input type="checkbox"/>			N/A
2	BARE COPPER EQ. GRD. COND. (EGC)			N/A
3	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>			N/A
4	DC GROUNDING ELECTRODE COND.			
5	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>			

Contractor Name, Address and Phone: _____

Site Name: _____

Site Address: _____

System AC Size: _____

Drawn By: _____

Checked By: _____

Scale: _____

NTS: _____

Date: _____

Sheet: _____

One-Line Standard Electrical Diagram for Small-Scale, Single-Phase PV Systems

NOTES FOR STANDARD STRING SYSTEM ELECTRICAL DIAGRAM

PV MODULE RATINGS @ STC (Guide Section 5)

MODULE MAKE	
MODULE MODEL	
MAX POWER-POINT CURRENT (I _{mp})	A
MAX POWER-POINT VOLTAGE (V _{mp})	V
OPEN-CIRCUIT VOLTAGE (V _{oc})	V
SHORT-CIRCUIT CURRENT (I _{sc})	A
MAX SERIES FUSE (OCPPD)	A
MAXIMUM POWER (P _{max})	W
MAX VOLTAGE (TYP 600V _{DC})	V
VOC TEMP COEFF (mV/°C <input type="checkbox"/> or %/°C <input type="checkbox"/>)	
IF COEFF SUPPLIED, CIRCLE UNITS	

NOTES FOR ALL DRAWINGS:

OCPPD = OVERCURRENT PROTECTION DEVICE
 NATIONAL ELECTRICAL CODE® REFERENCES
 SHOWN AS (NEC XXX.XX)

INVERTER RATINGS (Guide Section 4)

INVERTER MAKE	
INVERTER MODEL	
MAX DC VOLT RATING	V
MAX POWER @ 40°C	W
NOMINAL AC VOLTAGE	V
MAX AC CURRENT	A
MAX OCPPD RATING	A

SIGNS—SEE GUIDE SECTION 7

SIGN FOR DC DISCONNECT	
PHOTOVOLTAC POWER SOURCE	
RATED MPP CURRENT	A
RATED MPP VOLTAGE	V
MAX SYSTEM VOLTAGE	V
MAX CIRCUIT CURRENT	A
WARNING: ELECTRICAL SHOCK HAZARD—LINE AND LOAD MAY BE ENERGIZED IN OPEN POSITION	
SIGN FOR INVERTER OCPPD AND AC DISCONNECT (IF USED)	
SOLAR PV SYSTEM AC POINT OF CONNECTION	
AC OUTPUT CURRENT	A
NOMINAL AC VOLTAGE	V
THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)	

NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix D):

- 1) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP _____ °C
- 2) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE _____ °C
- 3) 2005 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.1°C); FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5" ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES).
- 4) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 7.68 AMPS OR LESS WHEN PROTECTED BY A 12-AMP OR SMALLER FUSE
- 5) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 9.6 AMPS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER FUSE.

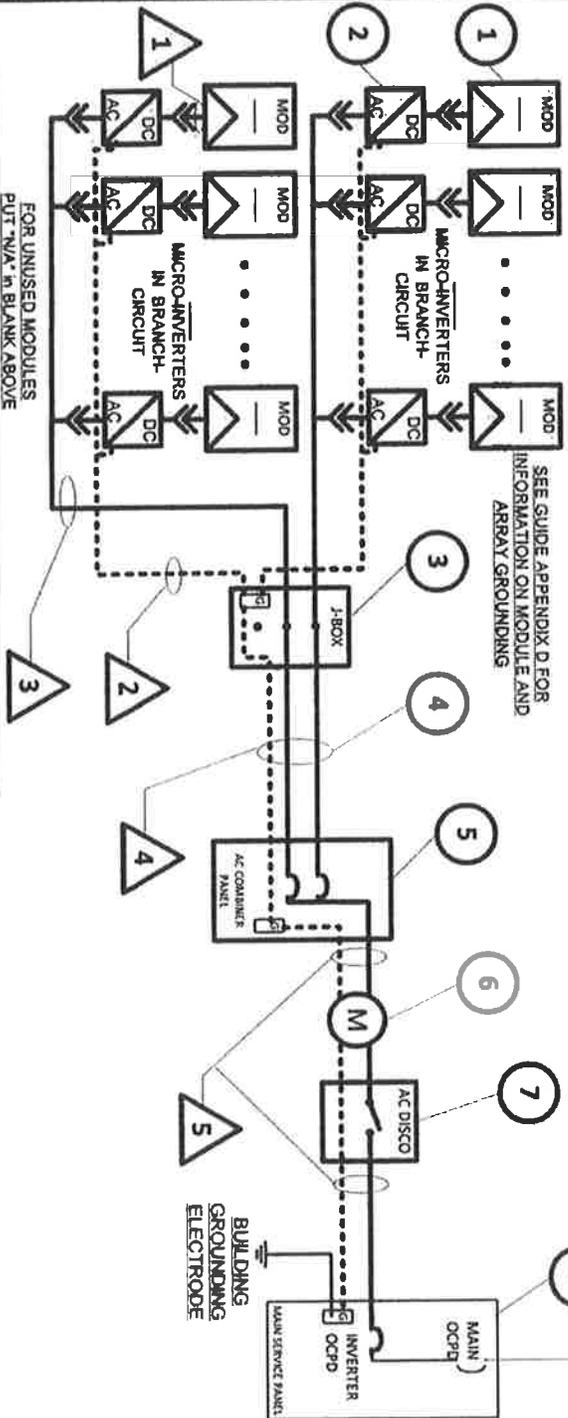
NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):

- 1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES NO N/A
- 2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES NO N/A
- 3) SIZE PHOTOVOLTAC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPPD RATING AT DISCONNECT
- 4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPPD AMPERE RATING. (See Guide Section 9)
- 5) TOTAL OF _____ INVERTER OCPPDs, ONE FOR EACH INVERTER, DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(b)(2)(a)? YES NO

Contractor Name: Address and Phone: _____ _____		Notes for One-Line Standard Electrical Diagram for Single-Phase PV Systems Site Name: _____ Site Address: _____ System AC Size: _____	
Drawn By: _____	SIZE FSC/AND		
Checked By: _____	SCALE	NTS	Date: _____ SHEET _____

MICRO-INVERTER ELECTRICAL DIAGRAM

EQUIPMENT SCHEDULE			
○ TAG	DESCRIPTION	PART NUMBER	NOTES
1	PV DC or AC MODULE		
2	DC/AC INVERTER (MICRO)		
3	J-BOX (IF USED)		
4	PV ARRAY		
5	AC COMB. PANEL (IF USED)		
6	GEN METER (IF USED)		
7	AC DISCONNECT (IF USED)		
8	SERVICE PANEL		



△ TAG	DESCRIPTION OR CONDUCTOR TYPE	COND.	NUMBER OF CONDUCTORS	CONDUIT TYPE	CONDUIT SIZE
1	USE-2 <input type="checkbox"/> or PV WIRE <input type="checkbox"/>	MFG	MFG Cable	N/A	N/A
2	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY	MFG	MFG Cable	N/A	N/A
3	EXTERIOR CABLE LISTED w/ INV.	MFG	MFG Cable	N/A	N/A
4	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>			SAME	SAME
5	NO DC GEC IF 690.35 SYSTEM			SAME	SAME
	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>			SAME	SAME
	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY			SAME	SAME

Contractor Name:
Address and Phone:

One-Line Standard Electrical Diagram
for Micro-Inverter PV Systems

Site Name:
Site Address:
System AC Size:

Drawn By: []
Checked By: []

Scale: [] NTS Date: []

Sheet [] of []

NOTES FOR MICRO-INVERTER ELECTRICAL DIAGRAM

PV MODULE RATINGS @ STC (Guide Section 5)

MODULE MAKE	
MODULE MODEL	
MAX POWER-POINT CURRENT (I _{mp})	
MAX POWER-POINT VOLTAGE (V _{mp})	
OPEN-CIRCUIT VOLTAGE (V _{oc})	
SHORT-CIRCUIT CURRENT (I _{sc})	
MAX SERIES FUSE (OCPP)	
MAXIMUM POWER (P _{max})	
MAX VOLTAGE (TYP 600V _{dc})	
VOC TEMP COEFF (mV/°C or %/°C)	
IF COEFF SUPPLIED, CIRCLE UNITS	

NOTES FOR ALL DRAWINGS:
 OCPD = OVERCURRENT PROTECTION DEVICE
 NATIONAL ELECTRICAL CODE® REFERENCES
 SHOWN AS (NEC XXX.XX)

INVERTER RATINGS (Guide Section 4)

INVERTER MAKE	
INVERTER MODEL	
MAX DC VOLT RATING	
MAX POWER @ 40°C	
NOMINAL AC VOLTAGE	
MAX AC CURRENT	
MAX OCPD RATING	

SIGNS-SEE GUIDE SECTION 7
 SIGN FOR DC DISCONNECT
 No sign necessary since 690.51
 marking on PV module covers
 needed information

SIGN FOR INVERTER OCPD AND AC
 DISCONNECT (IF USED)
 SOLAR PV SYSTEM
 AC POINT OF CONNECTION
 AC OUTPUT CURRENT
 NOMINAL AC VOLTAGE
 THIS PANEL FED BY MULTIPLE
 SOURCES (UTILITY AND SOLAR)

NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix E):

- 1) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP _____ °C
- 2) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE _____ °C
- 3) 2009 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA US 4.1°) FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5' ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES).
 - a) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 7.58 AMPS OR LESS WHEN PROTECTED BY A 12-AMP OR SMALLER FUSE.
 - b) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH I_{sc} OF 9.6 AMPS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER FUSE.

NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):

- 1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES NO N/A
- 2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES NO N/A
- 3) SIZE PHOTOVOLTAIC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPD RATING AT DISCONNECT
- 4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPD AMPERE RATING. (See Guide Section 9)
- 5) TOTAL OF _____ INVERTER OUTPUT CIRCUIT (OCPD)s, ONE FOR EACH MICRO-INVERTER CIRCUIT. DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(B)(2)(a)? YES NO

Contractor Name: _____
 Address and Phone: _____

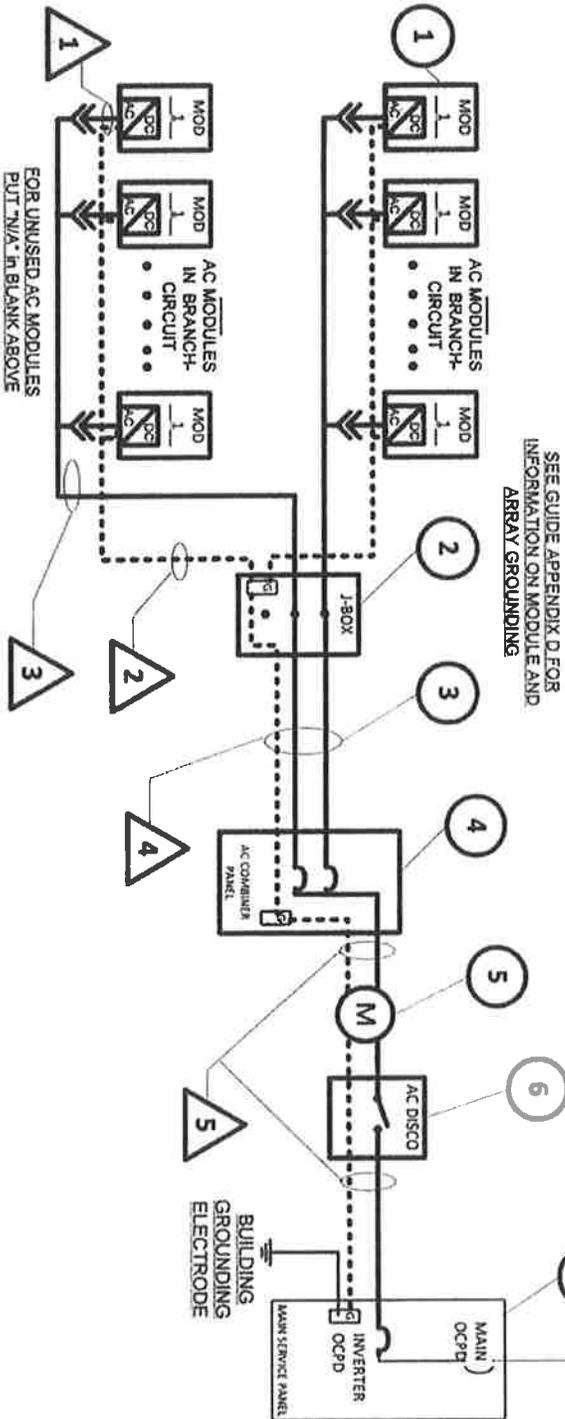
Notes for One-Line Standard Electrical
 Diagram for Single-Phase PV Systems

Site Name: _____
 Site Address: _____
 System AC Size: _____

Drawn By:	SIZE	ESCH NO	DWG NO	REV
Checked By:	DATE	NTS	DATE	SHEET

AC MODULE ELECTRICAL DIAGRAM

EQUIPMENT SCHEDULE			
○ TAG	DESCRIPTION	PART NUMBER	NOTES
1			
2			
3			
4			
5			
6			
7			



CONDUIT AND CONDUCTOR SCHEDULE					
△ TAG	DESCRIPTION OR CONDUCTOR TYPE	COND. GAUGE	NUMBER OF CONDUCTORS	CONDUIT TYPE	CONDUIT SIZE
1	USE-2 <input type="checkbox"/> or PV WIRE <input type="checkbox"/>	MFG	MFG Cable	N/A	N/A
2	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY	MFG	MFG Cable	N/A	N/A
3	EXTERIOR CABLE LISTED W/ INV.	MFG	MFG Cable	N/A	N/A
4	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>				
5	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY				
	NO DC GEC IF 690.35 SYSTEM				
	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>				
	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY				

Contractor Name:
Address and Phone:

Site Name:
Site Address:
System AC Size:

Drawn By: _____ DATE: _____

Checked By: _____ DATE: _____

One-Line Standard Electrical Diagram
for AC Module PV Systems

SIZE: _____ FSCM NO: _____ DWG NO: _____

SCALE: _____ NTS: _____ DATE: _____

REV: _____

NOTES FOR AC MODULE ELECTRICAL DIAGRAM

NOTES FOR ALL DRAWINGS:
 OCPD = OVERCURRENT PROTECTION DEVICE
 NATIONAL ELECTRICAL CODE® REFERENCES
 SHOWN AS (NEC XXX.XX)

AC MODULE RATINGS (Guide Appendix C)

AC MODULE MAKE	
AC MODULE MODEL	
NOMINAL OPERATING AC VOLTAGE	
NOMINAL OPERATING AC FREQUENCY	
MAXIMUM AC POWER	
MAXIMUM AC CURRENT	
MAXIMUM OCPD RATING	

SIGNS—SEE GUIDE SECTION 2

SIGN FOR DC DISCONNECT

N/A since no dc wiring

SIGN FOR INVERTER OCPD AND AC DISCONNECT (IF USED)

SOLAR PV SYSTEM
 AC POINT OF CONNECTION

AC OUTPUT CURRENT

NOMINAL AC VOLTAGE

THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)

NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix E):

- 1.) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP ____ °C
- 2.) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE ____ °C
- 3.) 2009 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.1°C). FOR 6 OR LESS CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5" ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES).
- a) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR AC MODULES INVERTER OUTPUT CIRCUITS WITH 12 AMPERS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER OCPD.
- b) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR AC MODULES INVERTER OUTPUT CIRCUITS WITH 16 AMPERS OR LESS WHEN PROTECTED BY A 20-AMP OR SMALLER OCPD.

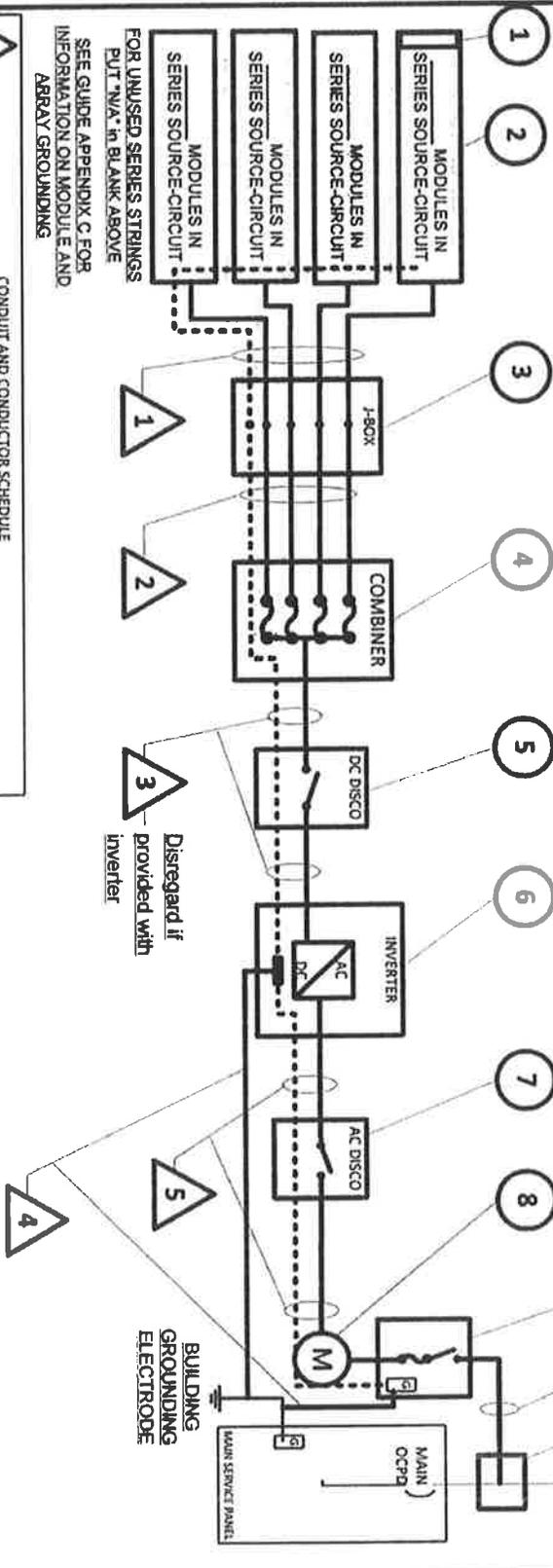
NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):

- 1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES NO N/A
- 2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES NO N/A
- 3) SIZE PHOTOVOLTAIC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPD RATING AT DISCONNECT (N/A)
- 4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPD AMPERE RATING. (See Guide Section 9)
- 5) TOTAL OF _____ INVERTER OUTPUT CIRCUIT (OCPDs), ONE FOR EACH AC MODULE CIRCUIT DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(B)(2)(e)? YES NO

Contractor Name: Address and Phone:		Notes for One-Line Standard Electrical Diagram for Single-Phase PV Systems	
Site Name:			
Site Address:		System AC Size:	
Drawn By:	SIZ2	ESCM INO	DWG NO
Checked By:	Scale	NTS	Date:
			SHEET

SUPPLY-SIDE CONNECTION ELECTRICAL DIAGRAM

EQUIPMENT SCHEDULE			
TAG	DESCRIPTION	PART NUMBER	NOTES
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			



FOR UNUSED SERIES STRINGS PUT 'N/A' in BLANK ABOVE

SEE GUIDE APPENDIX C FOR INFORMATION ON MODULE AND ARRAY GROUNDING

CONDUIT AND CONDUCTOR SCHEDULE				
TAG	DESCRIPTION OR CONDUCTOR TYPE	COND. GAUGE	NUMBER OF CONDUCTORS	CONDUIT TYPE AND SIZE
1	USE 2-Ø or PV WIRE			
2	BARE COPPER EQ. GRD. COND. (EGC)			
3	THWN-2 or XHHW-2 or RHW-2			
4	THWN-2 or XHHW-2 or RHW-2			
5	THWN-2 or XHHW-2 or RHW-2			
6	THWN-2 or XHHW-2 or RHW-2			

Contractor Name, Address and Phone:

One-Line Electrical Diagram for Supply-Side Connected Single-Phase PV Systems

Site Name:

Site Address:

System AC Size:

Drawn By:

Checked By:

Scale: NTS

Date:

DWG NO:

REV:

NOTES FOR SUPPLY-SIDE CONNECTION ELECTRICAL DIAGRAM

PV MODULE RATINGS @ STC (Guide Section 5)

MODULE MAKE	
MODULE MODEL	
MAX POWER-POINT CURRENT (I_{mp})	A
MAX POWER-POINT VOLTAGE (V_{mp})	V
OPEN-CIRCUIT VOLTAGE (V_{oc})	V
SHORT-CIRCUIT CURRENT (I_{sc})	A
MAX SERIES FUSE (OCPD)	A
MAXIMUM POWER (P_{max})	W
MAX VOLTAGE (TYP 600V _{DC})	V
VOC TEMP COEFF (mV/°C or %/°C)	
IF COEFF SUPPLIED, CIRCLE UNITS	

NOTES FOR ALL DRAWINGS:

OCPD = OVERCURRENT PROTECTION DEVICE
 NATIONAL ELECTRICAL CODE® REFERENCES
 SHOWN AS (NEC XXXXX)

INVERTER RATINGS (Guide Section 4)

INVERTER MAKE	
INVERTER MODEL	
MAX DC VOLT RATING	V
MAX POWER @ 40°C	W
NOMINAL AC VOLTAGE	V
MAX AC CURRENT	A
MAX OCPD RATING	A

SKINS- SEE GUIDE SECTION 7

SIGN FOR DC DISCONNECT

PHOTOVOLT/AC POWER SOURCE	
RATED MPP CURRENT	A
RATED MPP VOLTAGE	V
MAX SYSTEM VOLTAGE	V
MAX CIRCUIT CURRENT	A
WARNING: ELECTRICAL SHOCK HAZARD-LINE AND LOAD MAY BE ENERGIZED IN OPEN POSITION	

SIGN FOR INVERTER OCPD AND AC DISCONNECT (IF USED)

SOLAR PV SYSTEM	
AC POINT OF CONNECTION	A
AC OUTPUT CURRENT	A
NOMINAL AC VOLTAGE	V
THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)	

NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix D):

- 1.) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP _____ °C
- 2.) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE _____ °C
- 2.) 2005 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.1°C). FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5' ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES).
 - a) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH Iac OF 7.68 AMPS OR LESS WHEN PROTECTED BY A 12-AMP OR SMALLER FUSE.
 - b) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR MODULES WITH Iac OF 9.6 AMPS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER FUSE.

NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):

- 1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES NO N/A
- 2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES NO N/A
- 3) SIZE PHOTOVOLT/AC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPD RATING AT DISCONNECT
- 4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPD AMPERE RATING. (See Guide Section 9)
- 5) TOTAL OF INVERTER OCPD(S), ONE FOR EACH INVERTER. DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(B)(2)(a)? YES NO

Notes for One-Line Standard Electrical Diagram for Single-Phase PV Systems

Contractor Name: _____
 Address and Phone: _____

Site Name: _____
 Site Address: _____
 System AC Size: _____

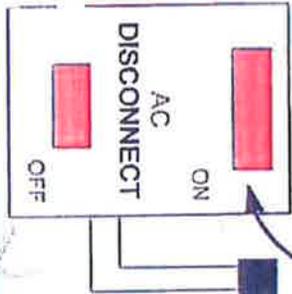
Drawn By: _____ SIZE: _____ FSCM NO: _____ DWG NO: _____ REV: _____
 Checked By: _____ SCALE: _____ NTS: _____ Date: _____ SHEET: _____

Caution Solar Circuit

Stickers for EMT/Conduit every 60" & 24" from each turn



SOLAR PHOTOVOLTAIC DISCONNECT FOR UTILITY OPERATION



Ac DISCONNECT

OPERATING CURRENT _____ AMP
SHORT CIRCUIT CURRENT _____ AMP
OPERATING VOLTAGE _____ VDC
MAXIMUM SYSTEM VOLTAGE _____ VDC



WARNING
ELECTRICAL SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION



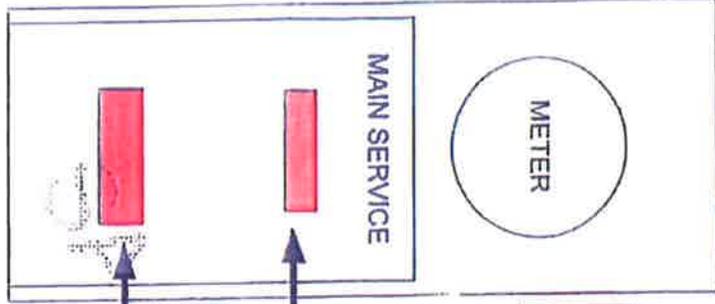
WARNING
ELECTRIC SHOCK HAZARD IF GROUNDED FAULT IS INDICATED NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED



WARNING
INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

WARNING
THIS SERVICE METER IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM

WARNING
ELECTRICAL SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION



MAIN SERVICE