

PHOTOVOLTAIC ROOF MOUNT SYSTEM

39 MODULES-ROOF MOUNTED - 15.600 kW DC, 13.611 kW AC, 18 MEADOWBROOK ROAD, IRVINGTON, NY 10533

PHOTOVOLTAIC SYSTEM SPECIFICATIONS:

SYSTEM SIZE:	15.600 kW DC 13.611 kW AC
MODULE TYPE & AMOUNT:	(39) SPR-A400-BLK-G-AC
MODULE DIMENSIONS:	(L/W/H) 72.2"/40.0"/1.57"
INVERTER:	(39) SUNPOWER TYPE G / SPWR-A4 (IQ 7AS)
INTERCONNECTION METHOD:	LINE SIDE TAP
UTILITY METER #:	009675372
ACCOUNT #:	51-1702-5250-0003-3

GOVERNING CODES

ADOPTED CONSTRUCTION CODES

- 2020 RESIDENTIAL CODE OF NEW YORK STATE
- 2020 INTERNATIONAL PLUMBING CODE
- 2020 INTERNATIONAL MECHANICAL CODE
- 2020 INTERNATIONAL ENERGY CONSERVATION CODE
- 2020 INTERNATIONAL FIRE CODE
- 2017 NATIONAL ELECTRICAL CODE

GENERAL NOTES:

- INSTALLATION OF SOLAR PHOTOVOLTAIC SYSTEM SHALL BE IN ACCORDANCE WITH NEC ARTICLE 690, AND ALL OTHER APPLICABLE NEC CODES WHERE NOTED OR EXISTING.
- PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL COMPLY WITH NEC ARTICLE 110.
- ALL CONDUCTORS, INCLUDING THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE IN ACCORDANCE WITH NEC ARTICLE 250.
- THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE; THIS SYSTEM IS UTILITY INTERACTIVE PER UL 1741 AND DOES NOT INCLUDE STORAGE BATTERIES OR OTHER ALTERNATIVE STORAGE SOURCES.
- ALL DC WIRES SHALL BE SIZED ACCORDING TO [NEC 690.8]
- DC CONDUCTORS SHALL BE WITHIN PROTECTED RACEWAYS IN ACCORDANCE WITH [NEC 690.31]
- ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL JURISDICTIONAL BUILDING CODE.
- PV MODULES TO BE RATED UL 1703 CLASS C FIRE RATING OR BETTER.
- ALL EQUIPMENT TO BE CERTIFIED BY A NATIONALLY RECOGNIZED TESTING LABORATORY.

SHEET INDEX:

PV 0.0:	COVER SHEET
PV 1.0:	SITE PLAN
PV 2.0:	ROOF PLAN
S 1.1:	MOUNT DETAILS
E 1.1:	3-LINE DIAGRAM
E 1.2:	NOTES
E 1.3:	WARNING LABELS
DS+	EQUIPMENT SPEC SHEET

ROOF ACCESS POINT

ROOF ACCESS POINT SHALL NOT BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.

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WC-29935-H17

REVISIONS		
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Project Name & Address

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IRVINGTON, NY 10533

Sheet Name

COVER SHEET

Sheet Size

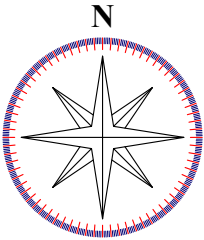
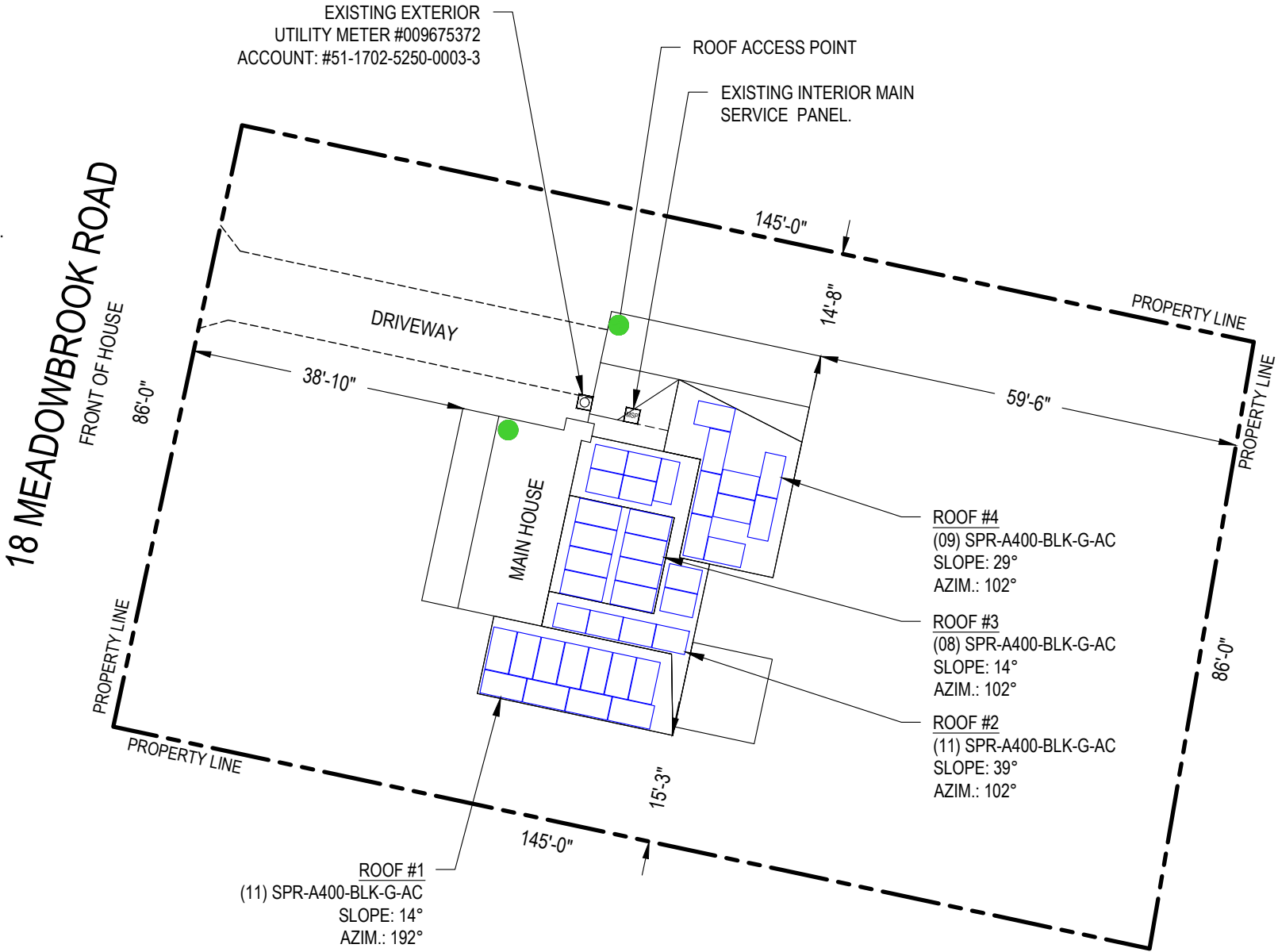
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PV 0.0

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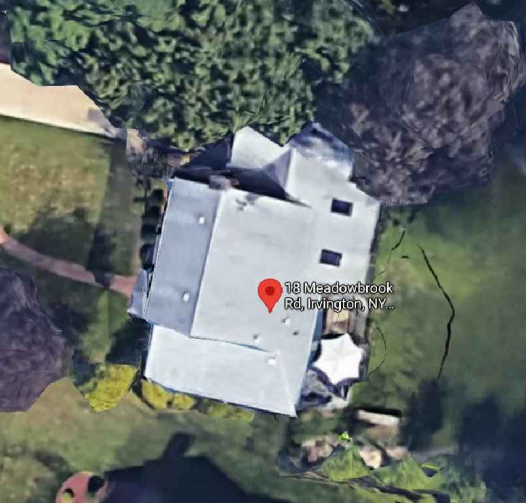
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1 PLOT PLAN

PV 0.0

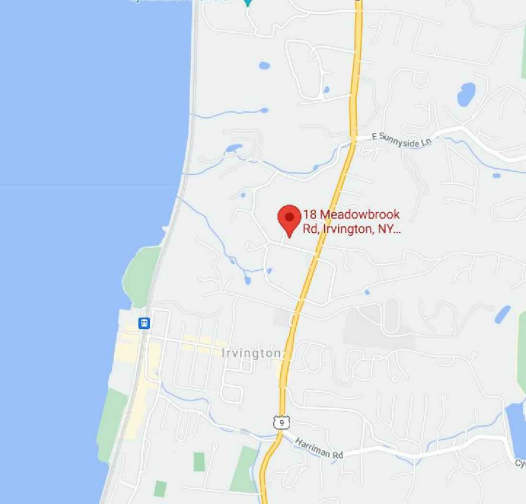
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2 SATELLITE VIEW

PV 0.0

SCALE: NTS



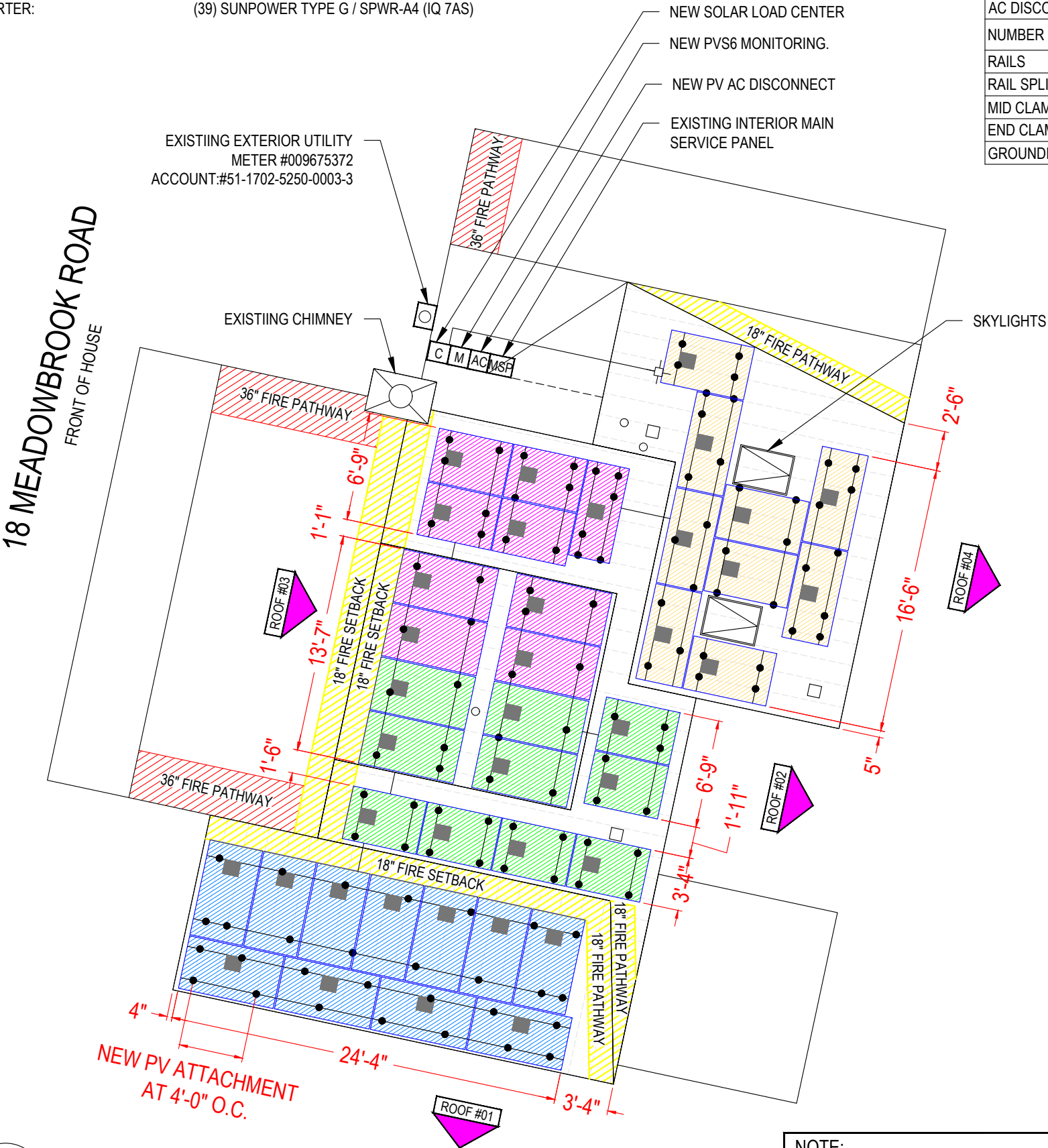
3 VICINITY MAP

PV 0.0

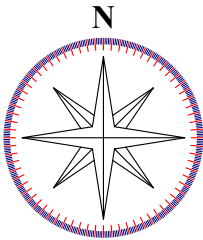
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PHOTOVOLTAIC SYSTEM SPECIFICATIONS:

SYSTEM SIZE: 15.600 kW DC  
13.611 kW AC  
MODULE TYPE & AMOUNT: (39) SPR-A400-BLK-G-AC  
MODULE DIMENSIONS: (L/W/H) 72.2"/40.0"/1.57"  
INVERTER: (39) SUNPOWER TYPE G / SPWR-A4 (IQ 7AS)



BILL OF MATERIALS		
NUMBER OF MODULES	39	SPR-A400-BLK-G-AC
NUMBER OF INVERTER	39	SUNPOWER TYPE G / SPWR-A4 (IQ 7AS)
SOLAR COMBINER	1	125A SOLAR COMBINER PANEL, 240V
AC DISCONNECT	1	100A FUSIBLE AC DISCONNECT, 80A FUSES, 240V
NUMBER OF ATTACHMENTS	121	SUNPOWER FLASHINGS
RAILS	24	INVISIMOUNT RACKING
RAIL SPLICE	6	SPLICE KIT
MID CLAMPS	44	MID CLAMPS / UFO
END CLAMPS	68	END CLAMPS / STOPPER SLEEVE
GROUNDING LUG	17	GROUNDING LUG



MODULE, ARRAY WEIGHT (LOAD CALC'S)		
Number of Modules	39	
Module Weight	46.5	LBS
Total Module (Array) Weight	1813.50	LBS
Number of Attachment point	121	
Mounting System Weight (Per Module)	1.5	LBS
Mounting System Weight	181.50	LBS
Total System Weight (Module Weight + Mounting System Weight)	1995.00	LBS
Weight at Each Attachment Point (Array Weight / Number of Attachment Point)	14.99	LBS
Module Area (72.2"x40.0")	20.06	SqFt
Total Array Area	782.17	SqFt
Distributed Load (Total System Weight / Total Array Area)	2.39	Per SqFt
Total Roof Area	2009	SqFt
Total Percentage of Roof Covered (Total Array Area / Total Roof Area)*100	38.93%	

SYSTEM LEGEND

MSP

EXISTING INTERIOR MAIN SERVICE PANEL & POINT OF INTERCONNECTION. TIED TO EXTERIOR UTILITY METER #009675372.

AC

NEW PHOTOVOLTAIC AC DISCONNECT.

39 NEW SPR-A400-BLK-G-AC MODULES WITH INTEGRATED 39 - SUNPOWER TYPE G / SPWR-A4 (IQ 7AS) INVERTERS, MOUNTED ON THE BACK OF EACH MODULES.

C

NEW SOLAR LOAD CENTER

M

NEW PVS6 MONITORING

= FIRE PATHWAY

= ROOF OBSTRUCTIONS

= ATTACHMENT POINTS

= RAFTER

= RACKING SYSTEM

= CONDUIT EXTERIOR RUN

= ROOF TOP JUNCTION BOX

ROOF SECTIONS

ROOF #01

MODULE - 11  
SLOPE - 14°  
AZIMUTH - 192°  
MATERIAL - COMP. SHINGLE  
RAFTER SIZE & SPACING - 2"x6" @ 16" O.C.

ROOF #02

MODULE - 11  
SLOPE - 39°  
AZIMUTH - 102°  
MATERIAL - COMP. SHINGLE  
RAFTER SIZE & SPACING - 2"x6" @ 16" O.C.

ROOF #03

MODULE - 08  
SLOPE - 14°  
AZIMUTH - 102°  
MATERIAL - COMP. SHINGLE  
RAFTER SIZE & SPACING - 2"x6" @ 16" O.C.

ROOF #04

MODULE - 09  
SLOPE - 29°  
AZIMUTH - 102°  
MATERIAL - COMP. SHINGLE  
RAFTER SIZE & SPACING - 2"x6" @ 16" O.C.

STRING(S)

STRING #1 - 11 MODULES

STRING #2 - 10 MODULES

STRING #3 - 09 MODULES

STRING #4 - 09 MODULES

NOTE:  
DISTANCE (HEIGHT) BETWEEN ROOF SURFACE AND TOP OF MODULE SHOULD BE LESS THAN 6".

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Sheet Name

SITE PLAN

Sheet Size

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11" X 17"

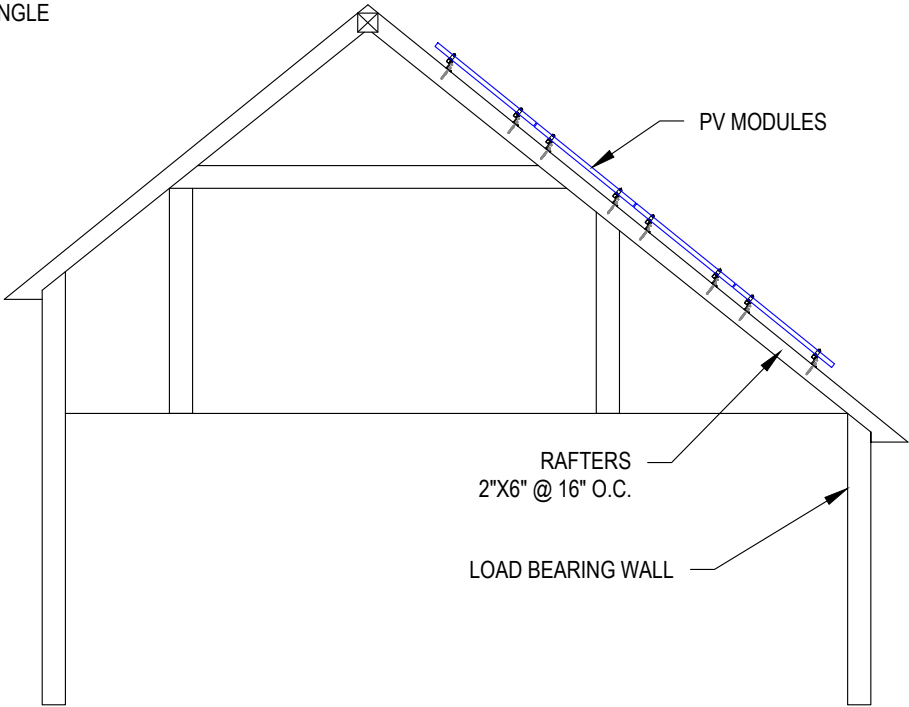
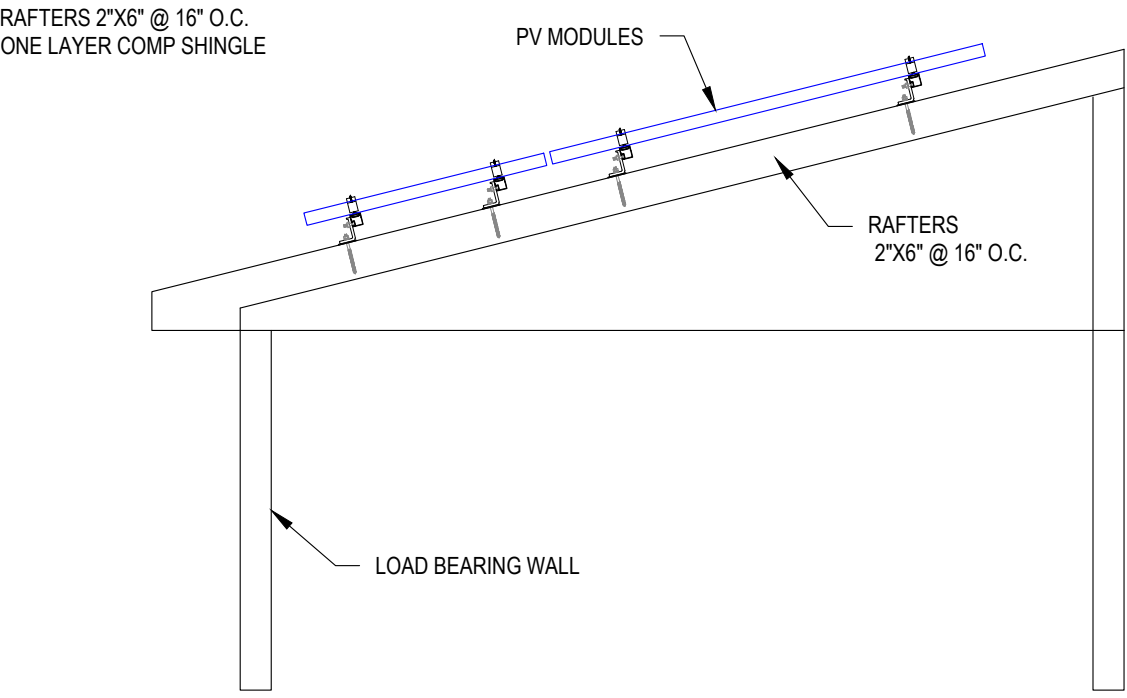
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PV 1.0

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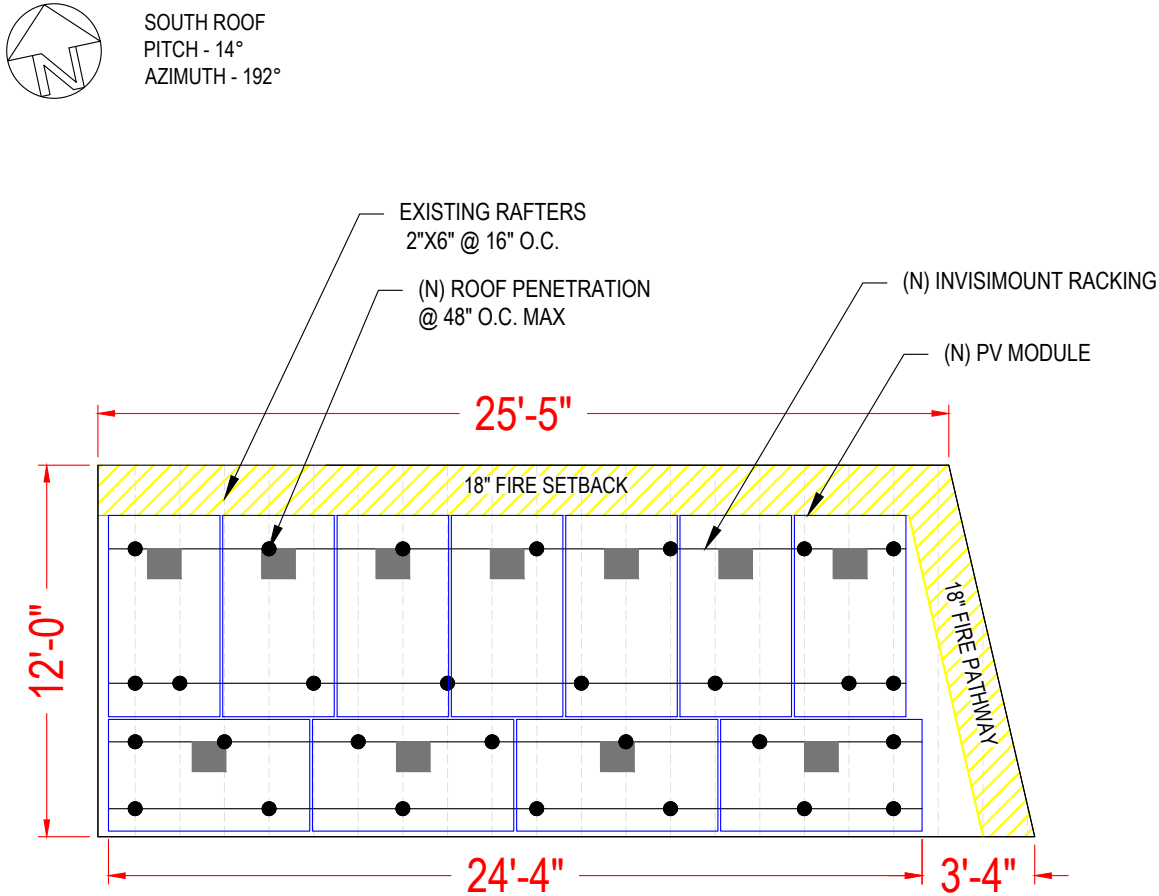
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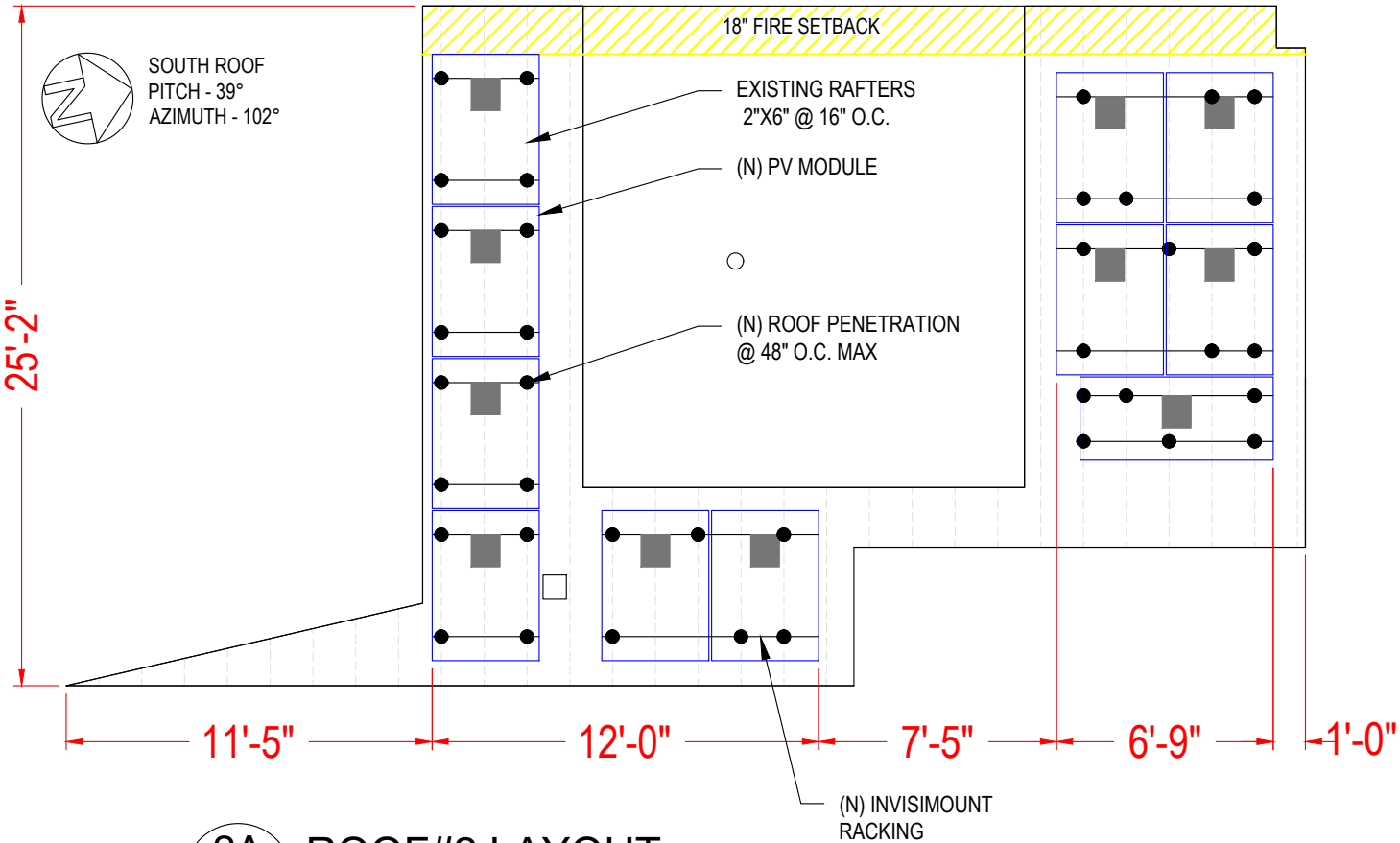


1 ROOF#1 STRUCTURAL MEMBRANE DETAIL  
PV 2.0 SCALE: NTS

2 ROOF#2 STRUCTURAL MEMBRANE DETAIL  
PV 2.0 SCALE: NTS



1A ROOF#1 LAYOUT  
PV 2.0 SCALE: NTS



2A ROOF#2 LAYOUT  
PV 2.0 SCALE: NTS

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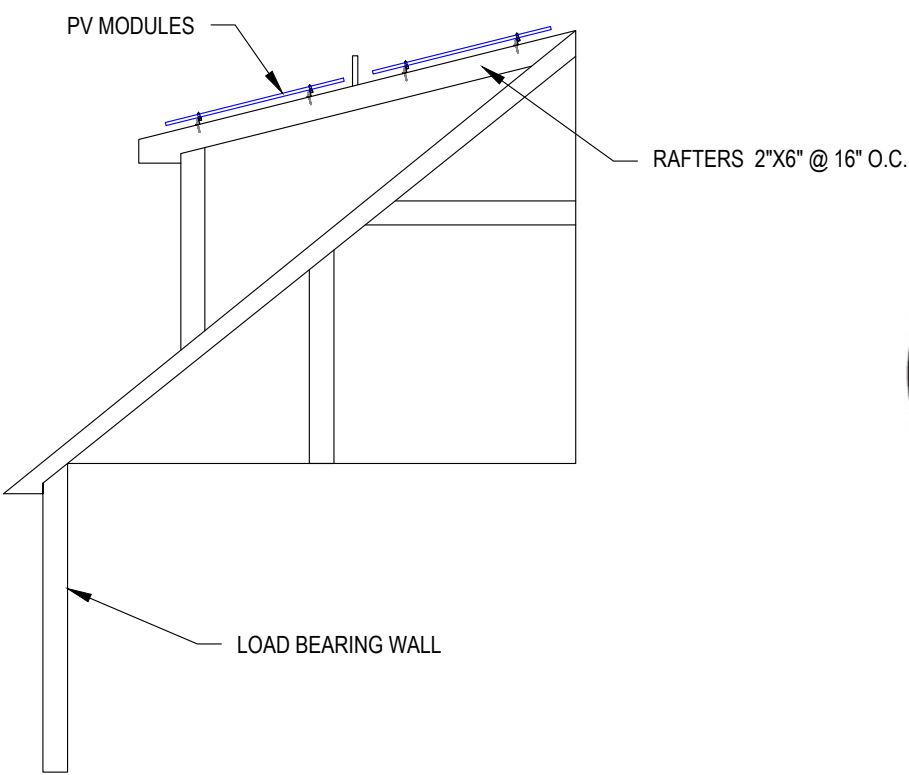
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ROOF PLAN

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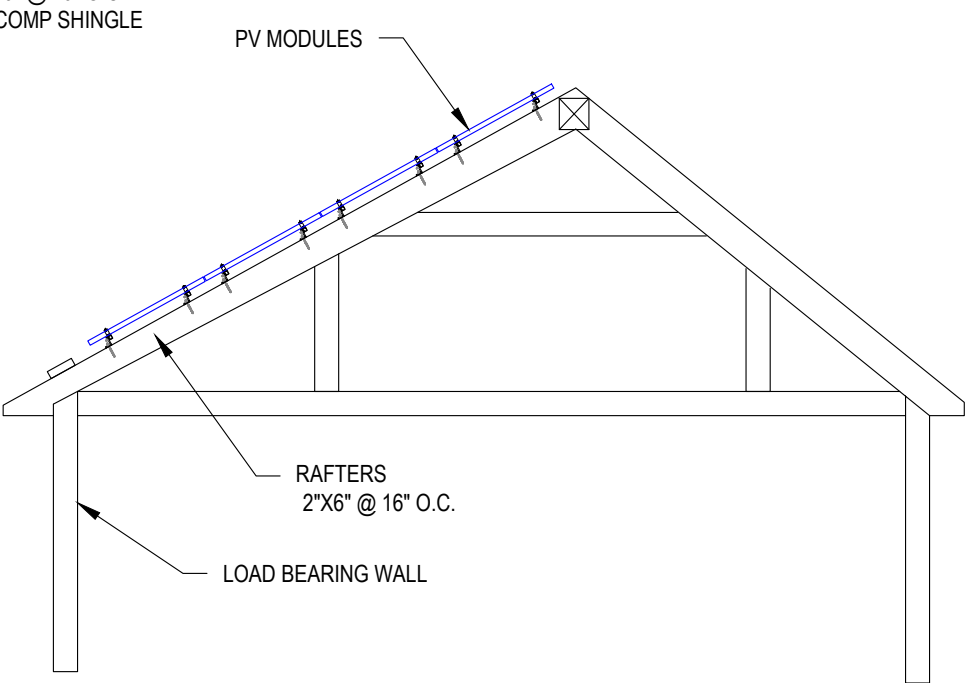
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RAFTERS 2"x6" @ 16" O.C.  
ONE LAYER COMP SHINGLE



RAFTERS 2"x6" @ 16" O.C.  
ONE LAYER COMP SHINGLE

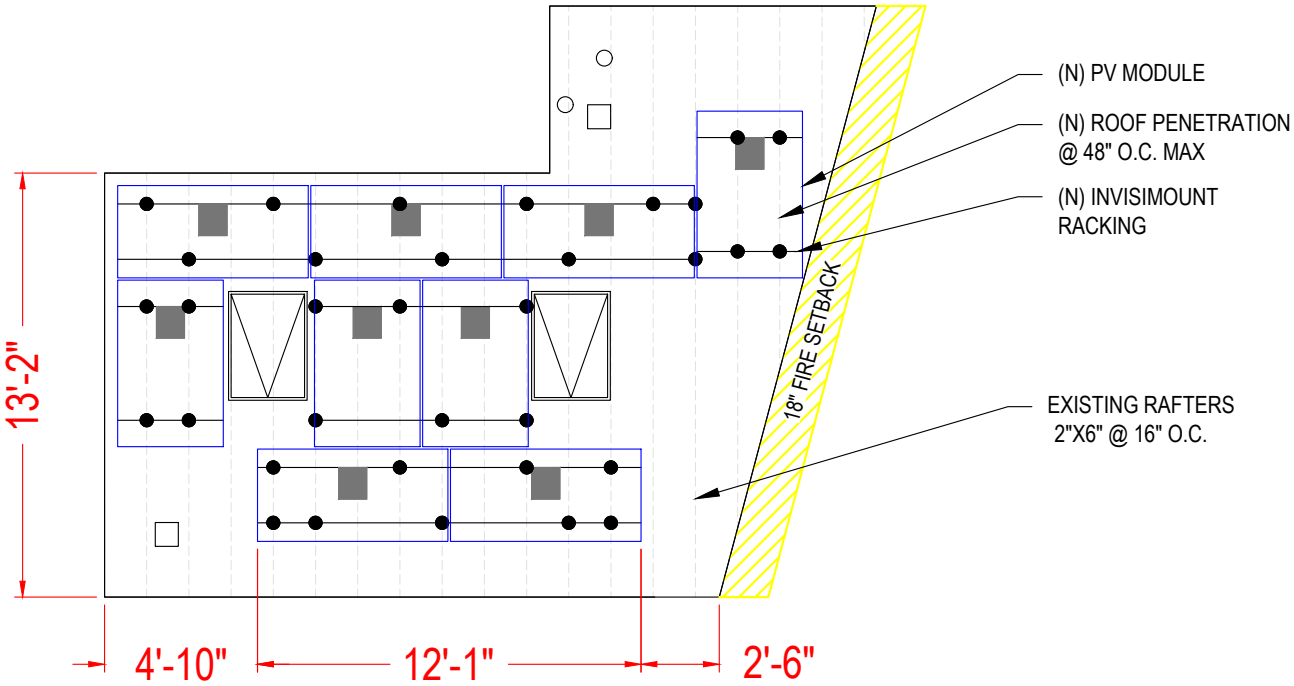
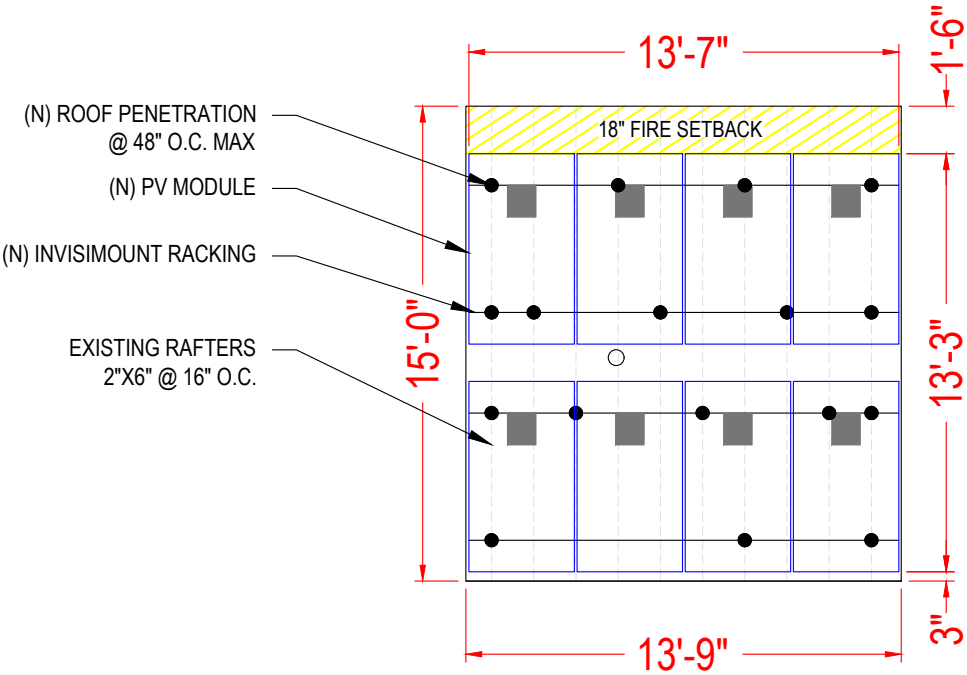


3 ROOF#3 STRUCTURAL MEMBRANE DETAIL  
PV 2.1 SCALE: NTS

4 ROOF#4 STRUCTURAL MEMBRANE DETAIL  
PV 2.1 SCALE: NTS

SOUTH ROOF  
PITCH - 14°  
AZIMUTH - 102°

SOUTH ROOF  
PITCH - 29°  
AZIMUTH - 102°



3A ROOF 3 LAYOUT  
PV 2.1 SCALE: NTS

4A ROOF#4 LAYOUT  
PV 2.1 SCALE: NTS

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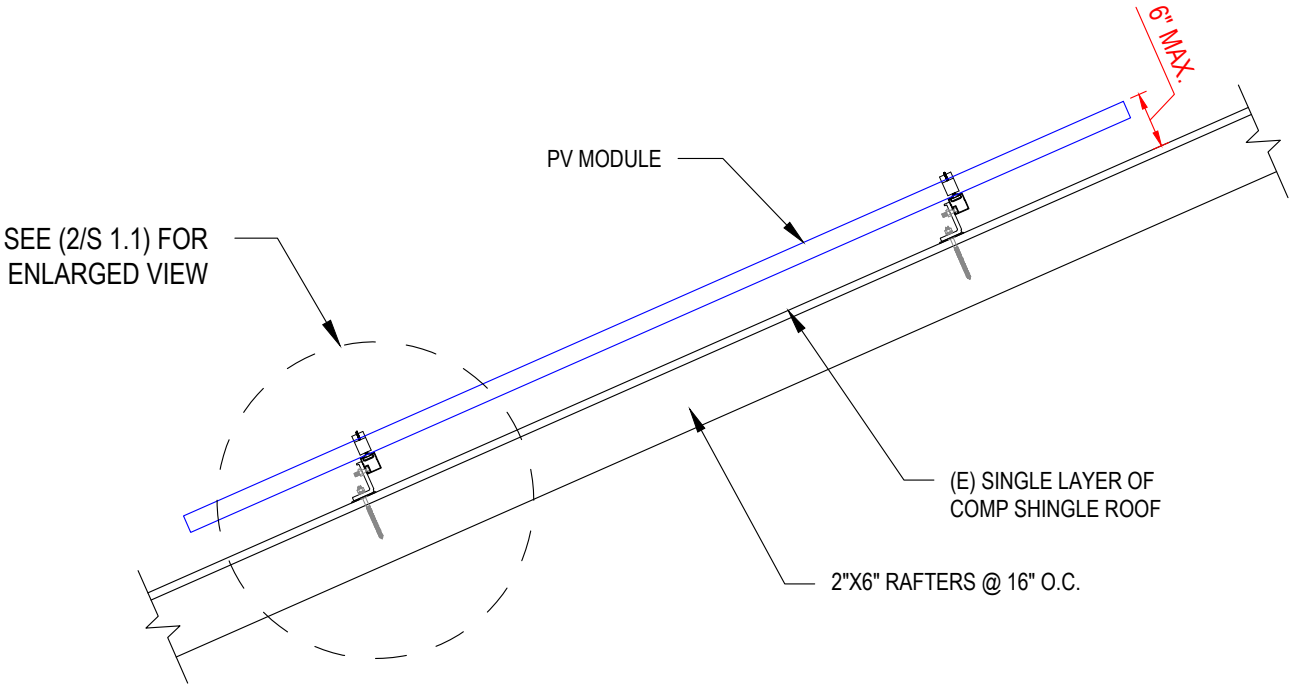
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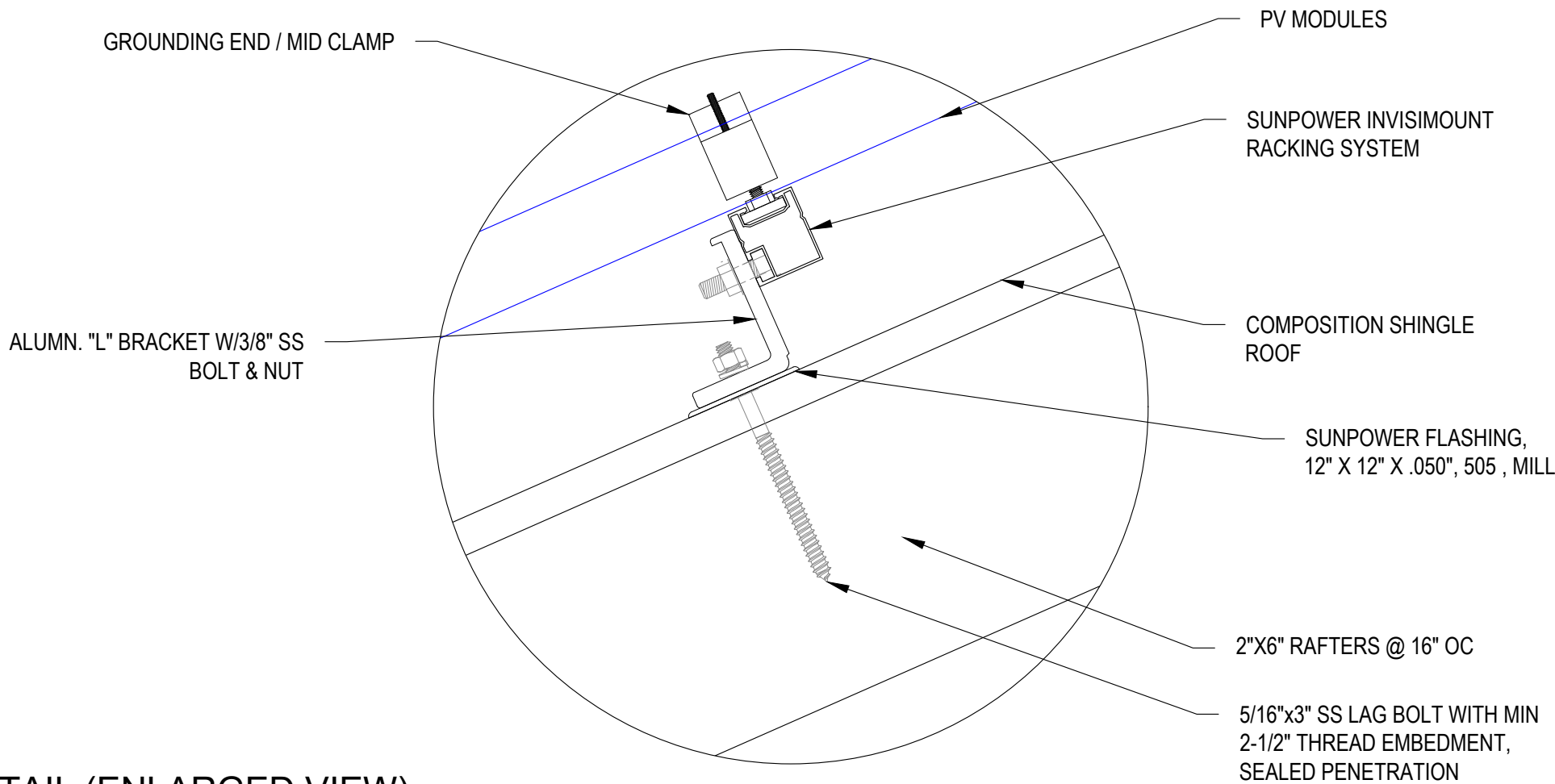
GENERAL STRUCTURAL NOTES:

- 1. THE SOLAR PANELS ARE TO BE MOUNTED TO THE ROOF FRAMING USING THE SUNPOWER INVISIMOUNT RACKING COMPOSITION. THE MOUNTING FEET ARE TO BE SPACED AS SHOWN IN THE DETAILS, AND MUST BE STAGGERED TO ADJACENT FRAMING MEMBERS TO SPREAD OUT THE ADDITIONAL LOAD.
- 2. UNLESS NOTED OTHERWISE, MOUNTING ANCHORS SHALL BE 5/16" LAG SCREWS WITH A MINIMUM OF 2-1/2" PENETRATION INTO ROOF FRAMING.
- 3. THE PROPOSED PV SYSTEM ADDS 2.6 PSF TO THE ROOF FRAMING SYSTEM.
- 4. ROOF LIVE LOAD = 20 PSF TYPICAL, 0 PSF UNDER NEW PV SYSTEM.
- 5. GROUND SNOW LOAD = 30 PSF
- 6. WIND SPEED = 124 MPH
- 7. EXPOSURE CATEGORY = B
- 8. RISK CATEGORY = II

NOTE:  
DISTANCE (HEIGHT) BETWEEN ROOF SURFACE  
AND TOP OF MODULE SHOULD BE LESS THAN 6".



1 ATTACHMENT DETAIL (SIDE VIEW)  
S 1.1 SCALE: NTS



2 ATTACHMENT DETAIL (ENLARGED VIEW)  
S 1.1 SCALE: NTS



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Sheet Name  
**MOUNT DETAIL**

Sheet Size  
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Sheet Number  
**S 1.1**

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SUNPOWER A400-BLK-G-AC : AC ELECTRICAL DATA		
INVERTER MODEL	SUNPOWER TYPE G / SPWR-A4 (IQ 7AS)	
PEAK OUTPUT POWER	366 VA	
MAX. CONT. OUTPUT POWER	349 VA	
NOMINAL AC VOLTAGE	240 VOLTS	
MAX. AC CURRENT	1.45 AMPS	
MAX. OCPD RATING	20 AMPS	
MAX. PANELS/CIRCUIT	11	

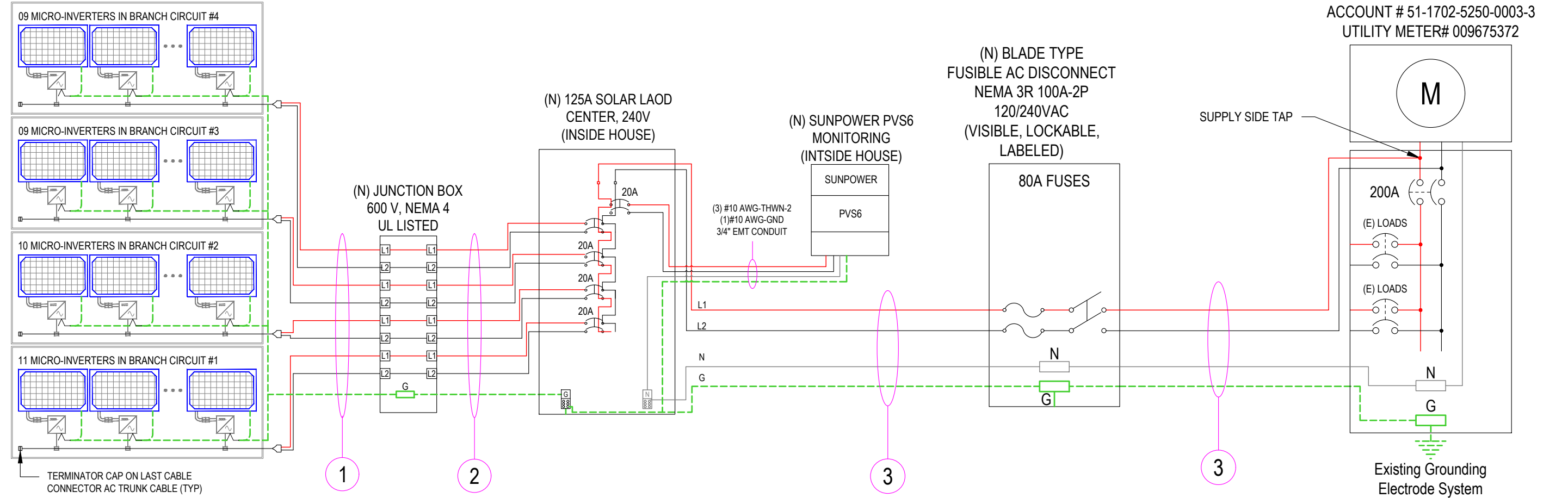
MODULE: (39) SPR-A400-BLK-G-AC  
INVERTER: (39) SUNPOWER TYPE G / SPWR-A4 (IQ 7AS)

THIS PANEL IS FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)		
AC OUTPUT CURRENT	56.55A	
NOMINAL AC VOLTAGE	240V	

120% RULE
BUS BAR RATING X 120% - MAIN BREAKER RATING = MAX. PV OCPD
(200A x 120%) - 200A = 40A

Rooftop conductor ampacities designed in compliance with art. 690.8, Tables 310.15(B)(2)(a), 310.15(B)(3)(a), 310.15(B)(3)(c), 310.15(B)(16), Chapter 9 Table 4, 5, & 9. Location specific temperature obtained from ASHRAE 2017 data tables	
RECORD LOW TEMP	-17°C
AMBIENT TEMP (HIGH TEMP 2%)	32°C
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	54°C
CONDUCTOR TEMPERATURE RATE	90°C

(39) SUNPOWER TYPE G / SPWR-A4 (IQ 7AS)  
240VAC, 1.45A MAX  
CEC WEIGHTED EFFICIENCY 97.0%  
NEMA 4R, UL LISTED, INTERNAL GFDI



POINT OF INTERCONNECT, LINE SIDE TAP  
EXISTING 240V/200A BUS BAR RATING,  
MAIN SERVICE PANEL, SINGLE PHASE,  
WITH A 200A MAIN BREAKER  
UTILITY COMPANY - CON EDISON CO.  
ACCOUNT # 51-1702-5250-0003-3  
UTILITY METER# 009675372

WIRE TAG #	MAX PARALLEL DEVICES		C.C RATING		PV CURR. MULT		TOTAL CURR	CONT. CURR X 125%	WIRE SIZE\TYPE\AMP.	WIRE OCP	#C.C.C.	CONDUIT	TEMP DE-RATE:	CONDUIT FILL:	WIRE AMP:	DERATED AMPACITY	MAX. CONT. CURRENT	GND	
①	11	x	1.45	x	N/A	=	15.95A	19.94A	#12\ THWN \ 25A @90°C	20A	8	TRUNK CABLE IN AIR	0.96	x	N/A	x 25A	24.00A	15.95A	#6 AWG
②	11	x	1.45	x	N/A	=	15.95A	19.94A	#10\ THWN \ 35A @75°C	20A	8	3/4" EMT	0.94	x	0.70	x 35A	23.03A	15.95A	#8 AWG
③	39	x	1.45	x	N/A	=	56.55A	70.69A	#4 \ THWN \ 85A @75°C	80A	3	1" EMT	0.94	x	1.00	x 85A	79.90A	56.55A	#8 AWG

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Sheet Name

**3-LINE  
DIAGRAM**

Sheet Size

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11" X 17"**

Sheet Number

**E 1.1**

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SITE NOTES:

- 1. A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
- 2. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
- 3. THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- 4. PROPERACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PERSECTION NEC 110.26.
- 5. ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.

EQUIPMENT LOCATIONS:

- 1. ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.
- 2. WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).
- 3. JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.
- 4. ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT. 2.2.6 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.
- 5. ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

STRUCTURAL NOTES:

- 1. RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUSTALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAI MANUFACTURER'S INSTRUCTIONS.
- 2. JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.
- 3. ROOFTOP PENETRATIONS FOR PV RACEWAY WILLBE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.
- 4. ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER. 2.3.6 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

WIRING & CONDUIT NOTES:

- 1. ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS AREBASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.
- 2. CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.
- 3. VOLTAGE DROP LIMITED TO 1.5%.
- 4. DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.
- 5. AC CONDUCTORS COLORED OR MARKED AS FOLLOWS: PHASE A OR L1- BLACK PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE PHASE C OR L3- BLUE, YELLOW, ORANGE\*\*, OR OTHER CONVENTION NEUTRAL- WHITE OR GREY IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

GROUNDING NOTES:

- 1. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.
- 2. PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.
- 3. METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).
- 4. EQUIPMENT GROUNDING CONDUCTORS SHALLBE SIZED ACCORDING TO NEC 690.45 AND MICROINVERTER MANUFACTORERS' INSTRUCTIONS.
- 5. EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURERDOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.
- 6. THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OFA MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.
- 7. GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]
- 8. THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.
- 9. GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS

DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:

- 1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARECONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).
- 2. DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
- 3. PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690.12(A) THROUGH (D).
- 4. ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.
- 5. MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B).
- 6. IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.

INTERCONNECTION NOTES:

- 1. LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 705.12 (B)]
- 2. THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(D)(2)(3)].
- 3. THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR, PV DEDICATED BACKFEED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(B)(2)(3)].
- 4. AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (B)(2)(3)(C).
- 5. FEEDER TAP INTERCONECTION (LOADSIDE) ACCORDING TO NEC 705.12 (B)(2)(1)
- 6. SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42 2.7.8BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].

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WC-29935-H17

REVISIONS		
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Revision	9/15/2021	01

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Project Name & Address

JACOB STYBURSKI RESIDENCE

18 MEADOWBROOK ROAD,  
IRVINGTON, NY 10533

Sheet Name

NOTES

Sheet Size

ANSI B  
11" X 17"

Sheet Number

E 1.2

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PremiumCAD

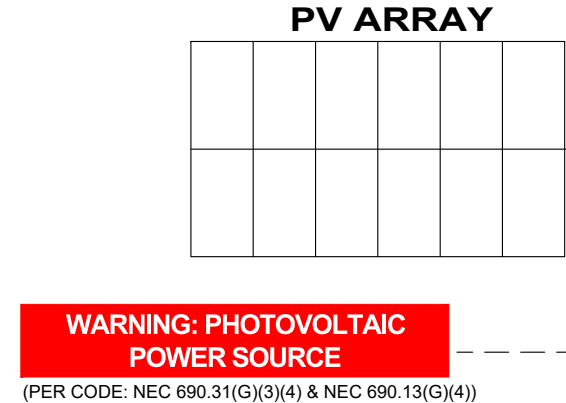


**⚠ WARNING ⚠**  
ELECTRICAL SHOCK HAZARD  
DO NOT TOUCH TERMINALS.  
TERMINALS ON LINE AND LOAD  
SIDES MAY BE ENERGIZED IN  
THE OPEN POSITION  
PER CODE(S): NEC 2017: 690.13(B)

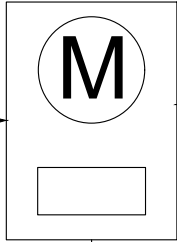
**⚠ WARNING**  
ELECTRICAL SHOCK HAZARD  
DO NOT TOUCH TERMINALS.  
TERMINALS ON LINE AND LOAD  
SIDES MAY BE ENERGIZED IN  
THE OPEN POSITION  
LABEL LOCATION:  
INVERTER(S), AC DISCONNECT(S), AC  
COMBINER PANEL (IF APPLICABLE).  
PER CODE(S): NEC 2017: 690.17(4)

**⚠ WARNING** DUAL POWER SOURCE  
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM  
POINT OF INTERCONNECTION  
NEC 705.12(D)(3) & NEC 690.64

**PHOTOVOLTAIC SYSTEM  
EQUIPPED WITH  
RAPID SHUTDOWN**  
LABEL LOCATION:  
UTILITY SERVICE ENTRANCE/METER, INVERTER/DC DISCONNECT  
IF REQUIRED BY LOCAL AHJ, OR OTHER LOCATIONS AS  
REQUIRED BY LOCAL AHJ.  
PER CODE(S): NEC 2017: ARTICLE 690.56(C)



**WARNING: PHOTOVOLTAIC  
POWER SOURCE**  
(PER CODE: NEC 690.31(G)(3)(4) & NEC 690.13(G)(4))



**⚠ WARNING ⚠**  
**INVERTER OUTPUT CONNECTION**  
DO NOT RELOCATE THIS  
OVERCURRENT DEVICE  
PER CODE(S): NEC 2017: 705.12(B)(2)(3)(b):

**PHOTOVOLTAIC  
AC DISCONNECT**  
(PER CODE: NEC 690.14 (C) (1))

**SOLAR PHOTOVOLTAIC  
SYSTEMS**  
(PER CODE: NEC 690)

**SOLAR PV SYSTEM  
EQUIPPED WITH RAPID  
SHUTDOWN**

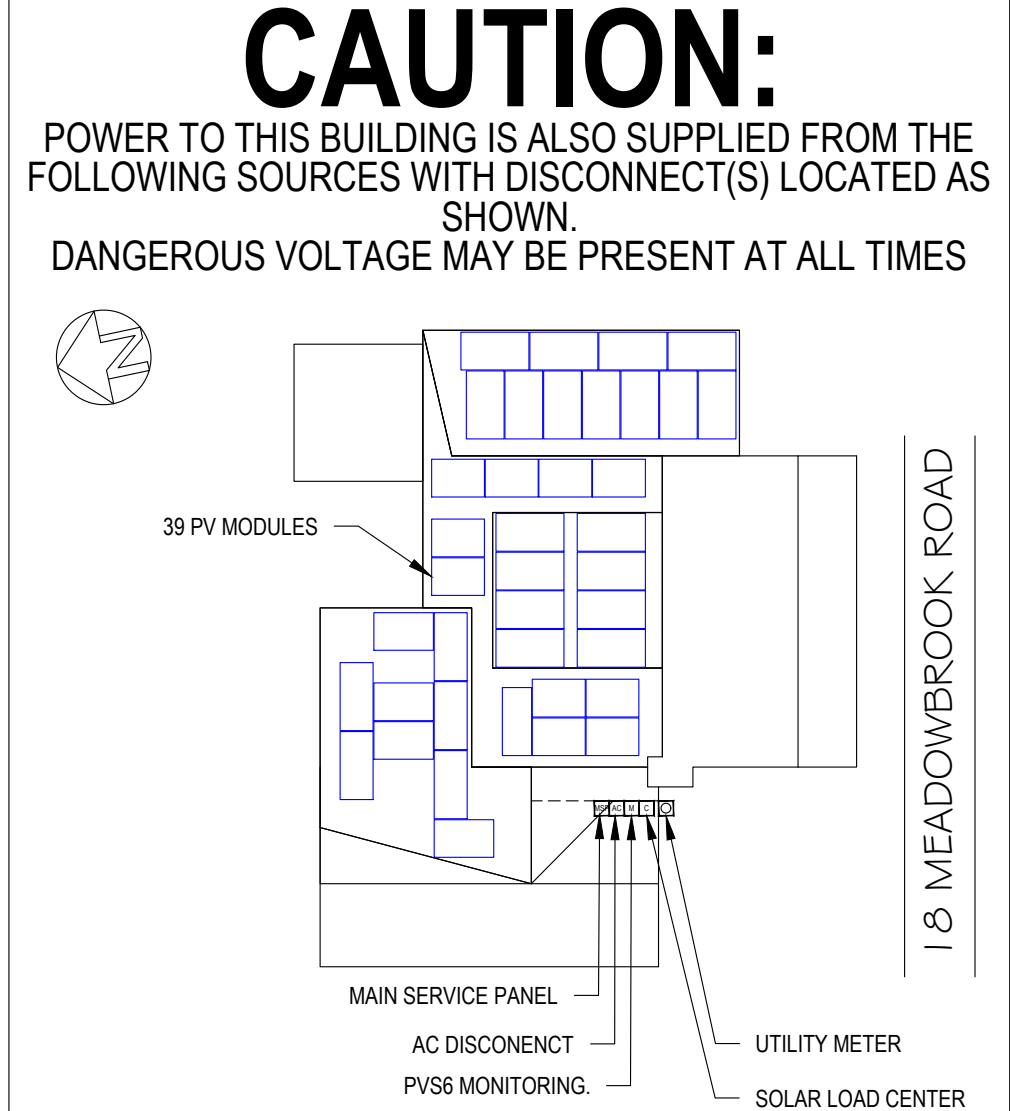
TURN RAPID  
SHUTDOWN  
SWITCH TO THE  
"OFF" POSITION TO  
SHUTDOWN PV  
SYSTEM AND  
REDUCE  
SHOCK HAZARD  
IN THE ARRAY

AT INVERTER [IFC 605.11.3.1(1) & 690.56(C)(1)(a)]  
PER CODE: NEC 2017

**SOLAR PHOTOVOLTAIC  
SYSTEMS**  
(PER CODE: NEC 690)

**SOLAR PHOTOVOLTAIC  
SYSTEMS**  
(PER CODE: NEC 690)

**PHOTOVOLTAIC SYSTEM AC DISCONNECT**  
RATED AC OPERATING CURRENT 56.55 AMPS  
AC NOMINAL OPERATING VOLTAGE 240 VOLTS  
LABEL LOCATION:  
AC DISCONNECT, POINT OF INTERCONNECTION  
(PER CODE: NEC 690.54)



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NY 10543  
WC-29935-H17

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Description	Date	Rev
Revision	9/15/2021	01

Signature with Seal

Project Name &  
Address  
**JACOB STYBURSKI RESIDENCE**  
**18 MEADOWBROOK ROAD,**  
**IRVINGTON, NY 10533**

Sheet Name  
**WARNING  
LABELS**

Sheet Size  
**ANSI B  
11" X 17"**

Sheet Number  
**E 1.3**

Drawn By  
**PremiumCAD**





SUNPOWER®

## A-Series A400-BLK | A390-BLK SunPower® Residential AC Module

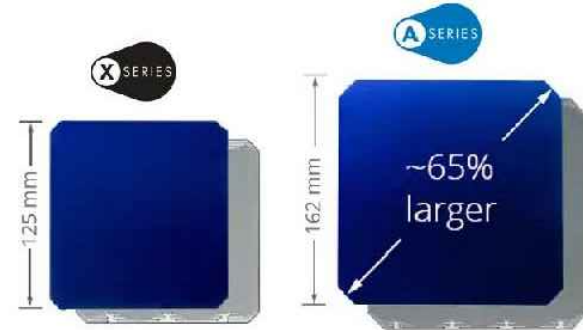
SunPower® Maxeon® Technology

Built specifically for use with the SunPower Equinox™ system, the only fully integrated solution designed, engineered, and warranted by one manufacturer.



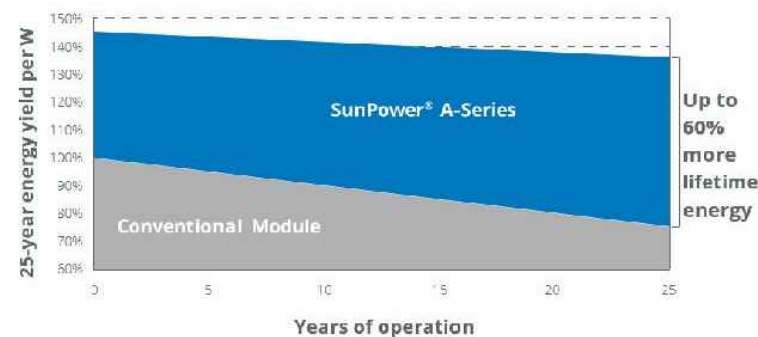
### Highest Power Density Available.

SunPower's new Maxeon® Gen 5 cell is 65% larger than prior generations, delivering the most powerful cell and highest-efficiency module in residential solar. The result is more power per square meter than any commercially available solar.



### Highest Lifetime Energy and Savings.

Designed to deliver 60% more energy over 25 years in real-world conditions like partial shade and high temperatures.<sup>1</sup>



### Best Reliability. Best Warranty.

With more than 25 million modules deployed around the world, SunPower technology is proven to last. That's why we stand behind our module and microinverter with the industry's best 25-year Combined Power and Product Warranty, including the highest Power Warranty in solar.



### Fundamentally Different. And Better.



SunPower® Maxeon® Technology

- Most powerful cell in home solar<sup>2</sup>
- Delivers unmatched reliability<sup>3</sup>
- Patented solid metal foundation prevents breakage and corrosion



Factory-integrated Microinverter (MI)

- Highest-power integrated AC module in solar
- 60% lighter than prior SunPower MIs
- Engineered and calibrated by SunPower for SunPower AC modules

## A-Series: A400-BLK | A390-BLK SunPower® Residential AC Module

AC Electrical Data	
Inverter Model: Type G / SPWR-A4 (IQ 7AS)	@240 VAC
Peak Output Power	366 VA
Max. Continuous Output Power	349 VA
Nom. (L-L) Voltage/Range <sup>2</sup> (V)	240 / 211-264
Max. Continuous Output Current (A)	1.45
Max. Units per 20 A (L-L) Branch Circuit <sup>3</sup>	11
CEC Weighted Efficiency	97.0%
Nom. Frequency	60 Hz
Extended Frequency Range	47-68 Hz
AC Short Circuit Fault Current Over 3 Cycles	5.8 A rms
Overvoltage Class AC Port	III
AC Port Backfeed Current	18 mA
Power Factor Setting	1.0
Power Factor (adjustable)	0.7 lead. / 0.7 lag.

DC Power Data		
	A400-BLK-G-AC	A390-BLK-G-AC
Nom. Power <sup>5</sup> (Phom) W	400	390
Power Tol.	+5/-0%	
Module Efficiency	21.5	20.9
Temp. Coef. (Power)	-0.29%/°C	
Shade Tol.	Integrated module-level max. power point tracking	

Tested Operating Conditions	
Operating Temp.	-40°F to +185°F (-40°C to +85°C)
Max. Ambient Temp.	122°F (50°C)
Max. Test Load <sup>7</sup>	Wind: 125 psf, 6000 Pa, 611 kg/m² back Snow: 187 psf, 9000 Pa, 917 kg/m² front.
Design Load	Wind: 75 psf, 3600 Pa, 367 kg/m² back Snow: 125 psf, 6000 Pa, 611 kg/m² front.
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)

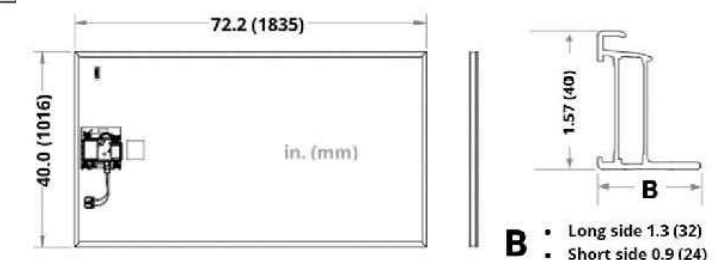
Mechanical Data	
Solar Cells	66 Monocrystalline Maxeon Gen 5
Front Glass	High-transmission tempered glass with anti-reflective coating
Environmental Rating	Outdoor rated
Frame	Class 1 black anodized (highest AAMA rating)
Weight	46.5 lbs (21.1 kg)
Recommended Max. Module Spacing	1.3 in. (33 mm)

Warranties, Certifications, and Compliance	
Warranties	• 25-year limited power warranty • 25-year limited product warranty
Certifications and Compliance	• UL 1703 • UL 1741 / IEEE-1547 • UL 1741 AC Module (Type 2 fire rated) • UL 62109-1 / IEC 62109-2 • FCC Part 15 Class B • IECES-0003 Class B • CAN/CSA-C22.2 NO. 107.1-01 • CA Rule 21 (UL 1741 SA) <sup>6</sup> (Includes Volt/Var and Reactive Power Priority) • UL Listed PV Rapid Shutdown Equipment <sup>6</sup>  Enables installation in accordance with: • NEC 690.6 (AC module) • NEC 690.12 Rapid Shutdown (inside and outside the array) • NEC 690.15 AC Connectors, 690.33(A)-(E)(1)  When used with InvisiMount racking and InvisiMount accessories (UL 2703): • Module grounding and bonding through InvisiMount • Class A fire rated When used with AC module Q Cables and accessories (UL 6703 and UL 2238) <sup>6</sup> : • Rated for load break disconnect
PID Test	Potential-induced degradation free

- 1 SunPower 415 W, 22.3% efficient, compared to a Conventional Panel on same-sized arrays (260 W, 16% efficient, approx. 1.6 m²), 7.9% more energy per watt (based on PV Syst pan files for avg. US climate), 0.5%/yr slower degradation rate (Jordan, et. al. "Robust PV Degradation Methodology and Application," PVSC 2018).
- 2 Based on search of datasheet values from websites of top 10 manufacturers per IHS, as of January 2019.
- 3 #1 rank in "Fraunhofer PV Durability Initiative for Solar Modules: Part 3," PV Tech Power Magazine, 2015. Campeau, Z. et al. "SunPower Module Degradation Rate," SunPower white paper, 2013.
- 4 Factory set to 1547a-2014 default settings, CA Rule 21 default settings profile set during commissioning.
- 5 Standard Test Conditions (1000 W/m² irradiance, AM 1.5, 25°C), NREL calibration standard: SOMS current, LACCS FF and voltage. All DC voltage is fully contained within the module.
- 6 This product is UL Listed as PV RSE and conforms with NEC 2014 and NEC 2017 690.12; and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors; when installed according to manufacturer's instructions.
- 7 Please read the safety and installation instructions for more information regarding load ratings and mounting configurations.

See [www.sunpower.com/facts](http://www.sunpower.com/facts) for more reference information.

For more details, see extended datasheet: [www.sunpower.com/datasheets](http://www.sunpower.com/datasheets) Specifications included in this datasheet are subject to change without notice.  
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Module Fire Performance: Type 2  
Please read the Safety and Installation Instructions 531725 for additional details.

537616 RevA



# Introducing SunPower Equinox™



## Anatomy of a SunPower Equinox™ System



### Technology designed to work together.

The SunPower Equinox™ system is the only complete home solar system that is designed and built by one company. From highest efficiency panels<sup>1</sup> to Smart Energy software, every component is engineered to work together perfectly—from sun to switch.

[sunpower.com/equinox](http://sunpower.com/equinox)

### More lifetime energy without compromise.

We believe that with an integrated design process, less is more. Which is why we created SunPower Equinox to produce 70% more lifetime energy<sup>2</sup> with 70% fewer visible parts,<sup>3</sup> for the most power without compromising curb appeal.

### Best in class warranty, all from one company.

Only SunPower can offer a complete home solar system that comes with the peace of mind of one comprehensive warranty. With SunPower Equinox, we stand behind every part of your home solar experience.

## Technical Specifications

### What's Included

- High Efficiency AC Panels with factory-integrated Microinverters
- InvisiMount Mounting Hardware
- EnergyLink Monitoring Hardware
- EnergyLink Monitoring Software

### Power Options

- 20% Efficiency, 327 W
- 21% Efficiency, 335 W
- 21% Efficiency, 345 W
- 22% Efficiency, 360 W

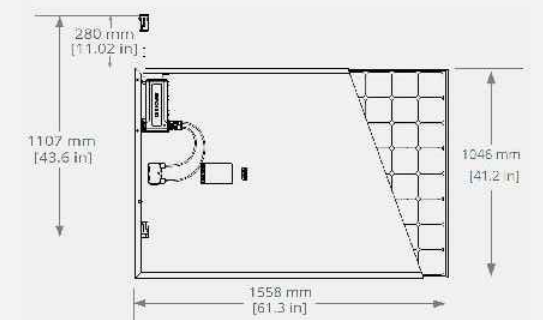
### Warranty

- SunPower Panels: 25 years
- SunPower Microinverters: 25 years
- SunPower InvisiMount Hardware: 25 years
- SunPower Monitoring Hardware: 10 years

### EnergyLink Connectivity

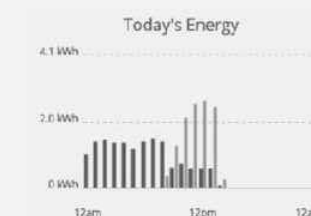
- Hardware Ethernet
- Power Line Communication
- Wi-Fi
- Cellular Backup

### Panel Dimensions



### Software Features

- Real-time access to solar production and home energy usage<sup>1</sup> any day, month, or year
- Insights including energy mix, bill savings, and environmental impact



<sup>1</sup> Extra installation required. Please contact your SunPower dealer for details.

<sup>1</sup> Highest of over 3,200 silicon solar panels, Photon Module Survey, Feb 2014.  
<sup>2</sup> SunPower 345W compared to a Conventional Panel (250W, 15.3% efficient, approx. 1.6 m<sup>2</sup>), 9% more energy per watt, 0.75%/yr slower degradation. BEW/DNV Engineering "SunPower Yield Report," 2013 with CPV Solar Test Lab Report #12063, temp. coef. calculation. Campeau, Z. et al. "SunPower Module Degradation Rate," SunPower white paper, 2013. See [www.sunpowercorp.com/facts](http://www.sunpowercorp.com/facts) for details.  
<sup>3</sup> Analysis of SunPower Equinox™ versus residential solar systems containing conventional panels, string inverters and racking hardware.  
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**SUNPOWER**  
EQUINOX™



## PVS6 Installation Instructions

Follow these instructions to install and commission the PV Supervisor 6 (PVS6) to receive monitoring data. **See the *Equinox Installation Guide (#518101)* for the complete Equinox system installation instructions.**

### Kit includes:

- PV Supervisor 6 (PVS6)
- Mounting bracket
- (2) Screws
- (2) Hole plugs
- (2) 100 A Current Transformers (shipped separately)

### You will need:

- Phillips and small flathead screwdriver
- Hardware that supports 6.8 kg (15 lbs) to install the bracket
- RJ45 crimp tool
- Wire cutter and stripper
- Step drill (Optional)
- Laptop with latest Chrome or Firefox version installed
- Ethernet cable
- Your SunPower monitoring website credentials
- (Optional) Customer's Wi-Fi network and password

### Input

208 VAC (L-L) CAT III 50/60 Hz, 0.2 A, 35 W; **OR**

240 VAC (L-L) from a split-phase three-wire system CAT III, 50/60 Hz, 0.2 A, 35 W.

**Intended Use:** The PVS6 is a datalogger-gateway device used for solar system and home monitoring, metering, and control.

## SUNPOWER®

77 Rio Robles San Jose CA 95134  
www.sunpower.com 1.408.240.5500

### Routing wire and cable:

- **Fill all openings in the enclosure with components rated NEMA Type 4 or better to maintain the integrity of the enclosure's environmental system.**
- Drill extra openings with step drill (**do not** use screwdriver or hammer).
- Use only the provided conduit openings or drillout locations and never cut holes in the top or sides of the enclosure.
- Never run inverter or Ethernet communication cable in the same conduit as AC wiring.
- CT and AC wiring may be run in the same conduit.
- The max. allowable conduit size for PVS6 is 3/4".

### Environmental Ratings

Pollution Degree 2; -30°C to +60°C operating ambient temp.; 15–95% non-condensing humidity; max. altitude 2000 m; outdoor use; Type 3R enclosure.

### 1. Mount the PVS6

1. Select an installation location that is not in direct sunlight.
2. Mount the PVS6 bracket to the wall using appropriate hardware for the mounting surface and that can support at least 6.8 kg (15 lbs).
3. Fit the PVS6 onto the bracket until the mounting holes at the bottom are aligned.
4. Use a screwdriver to secure the PVS6 to the bracket using the provided screws. Do not overtighten.

### 2. Wire the PVS6 power

**Danger! Hazardous voltages! Do not power up the system until after you complete Sections 1 through 3.** Accessing the system involves possible contact with potentially lethal voltages and currents. No attempt to access, install, adjust, repair, or test the system should be made by anyone who is not qualified to work on such equipment. Use copper conductors only, with min. 75°C temp. rating.

1. Use a screwdriver—do not use power tools—to prepare the PVS6 for AC wiring:
  - Using a flat-blade screwdriver, carefully bend the PVS6 cover retention tab back to release and then remove the outer cover
  - Remove the lower AC wiring cover
  - Remove the upper AC wiring cover
2. Run power conduit from the service panel to the PVS6. If you use the rear conduit entrances, seal the holes on the bottom of the enclosure with the included hole plugs. Use step drill if you are using rear or center bottom entrances.
3. Connect the PVS6 to either a 15 A (with 14 AWG) or a 20 A (with 12 AWG) UL Listed dedicated dual-pole breaker.  
**Note:** For AC modules, this breaker should be in the same service panel containing the AC module output circuits.
4. Strip wires to 12 mm and land according to the color-coded labels (black wire to **L1**, red wire to **L2**, the white wire to **N**, and green wire to **GND**) in the J2 terminals on the bottom left of the PVS6 board, and then close each locking lever completely.

### 3. Install and wire the consumption CTs

**Danger! Hazardous voltages! Do not power up the system until after you complete Sections 1 through 3.** Accessing the system involves possible contact with potentially lethal voltages and currents. No attempt to access, install, adjust, repair, or test the system should be made by anyone who is not qualified to work on such equipment.

Max. 120/240 VAC split phase, three wire system, Measurement Category III, 0.333 VAC from a current sensor rated to measure max. 50 A.

The SunPower-provided CTs are suitable for use on 200 A conductors. CTs may be labeled "100 A" but this is a calibration reference rating only. You may install CTs in parallel or bundled configurations. **Refer to the *Consumption Meter CT Installation Instructions*.**

1. Turn off all power to the main service panel in which you are installing CTs.
2. Place the CTs in the main service panel, around incoming service conductors, with the side labeled **THIS SIDE TOWARD SOURCE** toward the utility meter and away from the loads. Never install CTs in the utility-designated section of the service panel.
  - Place **L1 CT** (black and white wires) around incoming Line 1 service conductor
  - Place **L2 CT** (red and white wires) around incoming Line 2 service conductor
3. Align the steel core pieces and snap the CTs closed.
4. Route CT wires through conduit to PVS6.
  - **Running CT wires:** You may run CT and AC wiring in the same conduit. Do not run CT wiring and internet communication cables in the same conduit.
  - **Extending CT leads:** Use Class 1 (600 V rated minimum, 16 AWG maximum) twisted-pair instrument cable and appropriate connectors; SunPower recommends the use of silicone-filled insulation displacement connectors (IDC) or telecom crimps; do not use power cables (for example, THWN or Romex) to extend the CT leads.  
**Note:** See *Continental Control Systems: Current Transformer (CT) Wire Extension* guide at: <https://ctsys.com/current-transformer-wire-extension> for suggested wire types.

**If the equipment is used in a manner not specified by SunPower, the protection provided by the equipment may be impaired.**

### Safety & Certifications

#### Safety Instructions

Installation and field service is to be performed only by qualified, trained personnel with the necessary skills and knowledge to work on this type of electrical device. Field service is limited to the components contained in the lower compartment of the PVS6.

- Perform all electrical installations in accordance with any national and local codes, such as the National Electrical Code (NEC) ANSI/NFPA 70.
- The enclosure is suitable for use indoors or outdoors (NEMA Type 3R). Operating ambient from -30°C to 60°C.
- Before connecting power, the PVS6 must be securely mounted to an inside or outside wall following the instructions in this document.
- For electrical wiring code compliance, connect the PVS6 to a dedicated UL Listed 15 A rated breaker using 14 AWG wiring or a UL Listed 20 A rated breaker using 12 AWG wiring. The input operating current is less than 0.1 amp with AC nominal voltages of 240 VAC (L1-L2).
- The PVS6 contains internal transient surge protection for connection to the load side of the service entrance AC service panel (overvoltage category III). For installations in areas at risk of surges generated by high-voltage utilities, industry, or by lightning, it is recommended that a UL Listed external surge protective device also be installed.
- Do not attempt to repair the PVS6. Tampering with or opening the upper compartment voids the product warranty.
- Use only UL Listed, double-insulated, XOBA CTs with the PVS6.

#### Safety Certification

- UL Listed to UL 61010 and UL 50 for outdoor use.
- The PVS6 is not a utility meter, disconnect device, or power distribution device.

### FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and  
(2) This device must accept any interference received, including interference that may cause undesired operation.  
**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

#### IMPORTANT NOTES:

##### Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 25 cm (9.84 in) between the device and your body.

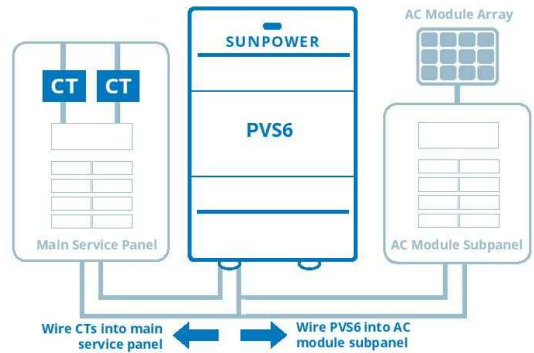
#### CAUTION:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

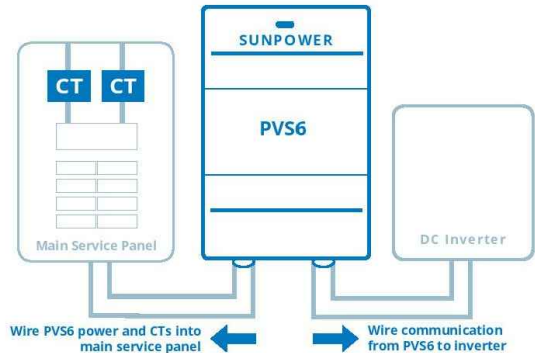
## PVS6 Quick Start Guide

Follow these instructions to install, configure, and commission the PV Supervisor 6 (PVS6) to begin receiving monitoring data. **Refer to the *PVS6 Installation Instructions* on the other side for the complete instructions.**

### PVS6 Connection Diagram: AC Module Site



### PVS6 Connection Diagram: DC Inverter Site

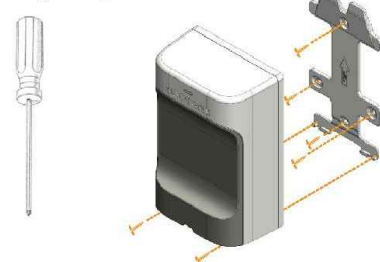


### Routing wire and cable:

- **Fill all conduit openings in the enclosure with components rated NEMA Type 4 or better to maintain the integrity of the enclosure's environmental system.**
- Drill extra 0.875" (22 mm) or 1.11" (28 mm) conduit openings, if required, with step drill (**do not** use screwdriver or hammer).
- Use only the provided conduit openings or drillout locations and never cut holes in the top or sides of the enclosure.
- Never run inverter or Ethernet communication cable in the same conduit as AC wiring.
- CT and AC wiring may be run in the same conduit.

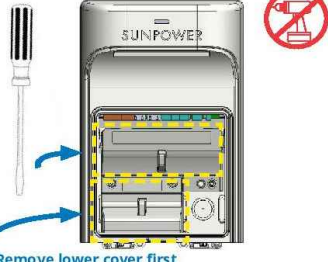
### 1. Mount the PVS6

Mount the PVS6 bracket to the wall using hardware that supports 6.8 kg (15 lb); use Phillips screwdriver to secure the PVS6 to the bracket using the two provided screws.



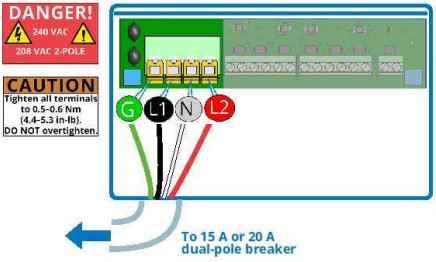
### 2. Remove all PVS6 covers

Use flathead screwdriver to carefully remove the enclosure cover. Use Phillips to remove the AC wiring covers.



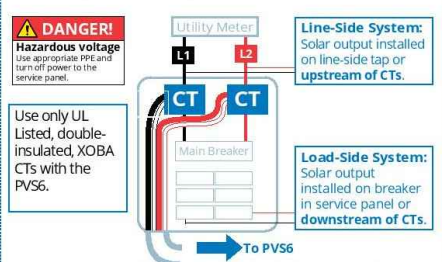
### 3. Wire PVS6 power

Use copper conductors only, with min. 75°C temp. rating. Install a dedicated 240 or 208 VAC circuit. Land wires in J2 terminals: green to GND; black to L1; white to N; and red to L2.



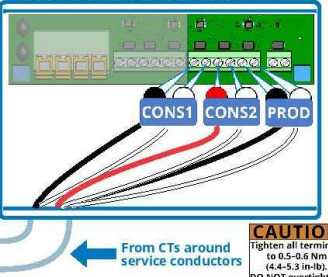
### 4. Install consumption CTs

Refer to Section 3 on the other side for complete CT installation instructions. Place CTs around incoming service conductors: L1 CT (black and white wires) around Line 1 and L2 CT (red and white wires) around Line 2.



### 5. Wire consumption CTs

Land wires in J3 terminals: L1 CT and L2 CT wires to corresponding CONS L1 and CONS L2.



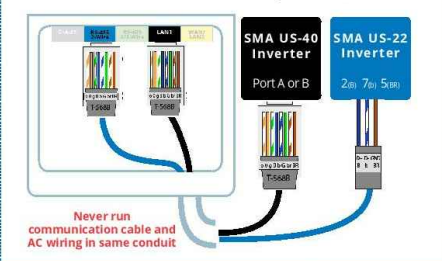
### 6. Replace PVS6 wiring covers

Use screwdriver to replace AC wiring covers over AC power wires.



### 7. Connect DC inverter communication

If DC inverter is installed, connect communication from DC inverter to the PVS6. No additional connection is required for AC modules.



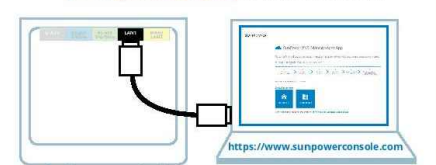
### 8. Connect PVS6 to the Internet

Connect to customer's internet with either:

- **Ethernet Cable**  
From PVS6 LAN2 to customer's router (recommended method).
- **Customer's Wi-Fi**  
Connect during commissioning with network and password.

### 9. Commission with PVS Management App

Turn off laptop Wi-Fi, connect Ethernet cable from PVS6 LAN1 to laptop, open latest Chrome or Firefox, type [www.sunpowerconsole.com](https://www.sunpowerconsole.com), and follow instructions.



### 10. Replace PVS6 cover

Snap the enclosure cover onto the PVS6.



- Always open or disconnect circuit from power-distribution system (or service) of building before installing or servicing current transformers (CTs).
- The CTs may not be installed in equipment where they exceed 75% of the wiring space of any cross-sectional area within the equipment.
- Restrict installation of CT in an area where it would block ventilation openings.
- Restrict installation of CT in an area of breaker arc venting.
- Not suitable for Class 2 wiring methods.
- Not intended for connection to Class 2 equipment
- Secure CT, and route conductors so that they do not directly contact live terminals or bus.
- **WARNING!** To reduce the risk of electric shock, always open or disconnect circuit from power-distribution system (or service) of building before installing or servicing CTs.
- For use with UL Listed Energy Monitoring Current Sensors rated for Double Insulation.





SunPower® InvisiMount™ | Residential Mounting System

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Simple and Fast Installation

- Integrated module-to-rail grounding
- Pre-assembled mid and end clamps
- Levitating mid clamp for easy placement
- Mid clamp width facilitates even module spacing
- Simple, pre-drilled rail splice
- UL 2703 Listed integrated grounding

Flexible Design

- Addresses nearly all sloped residential roofs
- Design in landscape and portrait
- Rails enable easy obstacle management

Customer-Preferred Aesthetics

- #1 module and #1 mounting aesthetics
- Best-in-class system aesthetics
- Premium, low-profile design
- Black anodized components
- Hidden mid clamps and end clamps hardware, and capped, flush rails

Part of Superior System

- Built for use with SunPower DC and AC modules
- Best-in-class system reliability and aesthetics
- Combine with SunPower modules and monitoring app



Elegant Simplicity

SunPower® InvisiMount™ is a SunPower-designed rail-based mounting system. The InvisiMount system addresses residential sloped roofs and combines faster installation time, design flexibility, and superior aesthetics. The InvisiMount product was specifically envisioned and engineered to pair with SunPower modules. The resulting system-level approach will amplify the aesthetic and installation benefits for both homeowners and installers.



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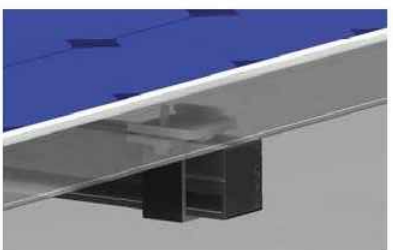


InvisiMount Component Images

Module\* / Mid Clamp and Rail



Module\* / End Clamp and Rail



Mid Clamp



End Clamp



Rail & Rail Splice



Ground Lug Assembly



End Cap



InvisiMount Component Details		
Component	Material	Weight
Mid Clamp	Black oxide stainless steel A/SI 304	63 g (2.2 oz)
End Clamp	Black anodized aluminum alloy 6063-T6	110 g (3.88 oz)
Rail	Black anodized aluminum alloy 6005-T6	830 g/m (9 oz/ft)
Rail Splice	Aluminum alloy 6005-T5	830 g/m (9 oz/ft)
Ground Lug Assembly	304 stainless (A2-70 bolt; tin-plated copper lug)	106.5 g/m (3.75 oz)
End Cap	Black acetal (POM) copolymer	10.4 g (0.37 oz)

Roof Attachment Hardware Supported by InvisiMount System Design Tool	
Application	<ul style="list-style-type: none"><li>• Composition Shingle Rafter Attachment</li><li>• Composition Shingle Roof Decking Attachment</li><li>• Curved and Flat Tile Roof Attachment</li><li>• Universal Interface for Other Roof Attachments</li></ul>

InvisiMount Operating Conditions	
Temperature	-40° C to 90° C (-40° F to 194° F)
Max. Load	2400 Pa uplift 5400 Pa downforce

InvisiMount Warranties And Certifications	
Warranties	25-year product warranty 5-year finish warranty
Certifications	UL 2703 Listed Class A fire rating when distance between roof surface and bottom of SunPower module frame is ≤ 3.5"

Roof Attachment Hardware Warranties	
Refer to roof attachment hardware manufacturer's documentation	

\*Module frame that is compatible with the InvisiMount system required for hardware interoperability.

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## Invisimount Span Tables Engineering Summary Letter

The following tables list the allowable spacing of attachment points for the SunPower Invisimount mounting system. Loads on the system were calculated in accordance with ASCE 7-10, using the following parameters:

- Risk Category II
- System weight (including PV modules, rails, attachments, and wiring) = 2.84 psf
- No live load acts on top of the PV modules
- Wind speed & exposure as indicated in the tables
- Roof height and slope as indicated in the tables
- For wind load, topographic factor  $K_{zt} = 1.0$ , and directionality factor  $K_d = 0.85$  per ASCE 7-10 Table 26.6-1
- Wind load coefficients per either wind tunnel testing or ASCE 7-10 Chapter 30 (see notes below tables)
- Ground snow load as indicated in the tables
- For snow loads, thermal factor  $C_t = 1.2$  ("unheated and open air structures"), per ASCE 7-10 Table 7-3
- For snow loads, exposure factor  $C_e = 0.9$  ("fully exposed"), per ASCE 7-10 Table 7-2
- For snow loads, slope factor  $C_s$  is determined per ASCE 7-10 Figure 7-2 assuming the array is an "unobstructed slippery surface" where snow is free to slide off the array
- Seismic short-term spectral acceleration ( $S_s$ ) = 3.0g, maximum, and seismic site class = D, per ASCE 7-10 Section 11.4.2
- Seismic component importance factor  $I_p = 1.0$  per ASCE 7-10 Section 13.1.3; seismic component response factor  $R_p = 1.5$ , and component amplification factor  $a_p = 1.0$ , per ASCE 7-10 Table 13.5-1 and 13.6-1; seismic loads are calculated per ASCE 7-10 Chapters 11 and 13
- Load combinations per ASCE 7-10 Chapter 2

The maximum allowable spans shown in the tables are based on the calculated loads and the capacity of the rail and the attachment, determined by analysis and testing in accordance with IBC 2012/2015 and referenced standards.

- Bending strength of aluminum rails is calculated according to the Aluminum Design Manual 2010 Section 8.3.2.1 (LRFD)
- The strength of attachments to the L foot roof attachment hardware is based on product information from the attachment manufacturer
- The strength of the lag screw in withdrawal and shear is calculated according to the National Design Specification (NDS) for Wood Construction, 2010
- The maximum allowable attachment spacing is calculated by checking the demand/capacity ratios for bending in the rail and tension, compression and shear on attachments for all required load combinations. The reported maximum allowable spacing is the greatest spacing, rounded down to the nearest 2-foot increment, for which the demand/capacity ratios are less than or equal to 1.0.
- These tables do not consider the strength of the supporting roof structure. In areas of low snow load, the weight of the array is often considered to offset the design live load of the roof, since

personnel and equipment cannot be placed on top of the array. It is recommended to stagger attachment points, as shown in Figure 1, to evenly distribute loads to the rafters.

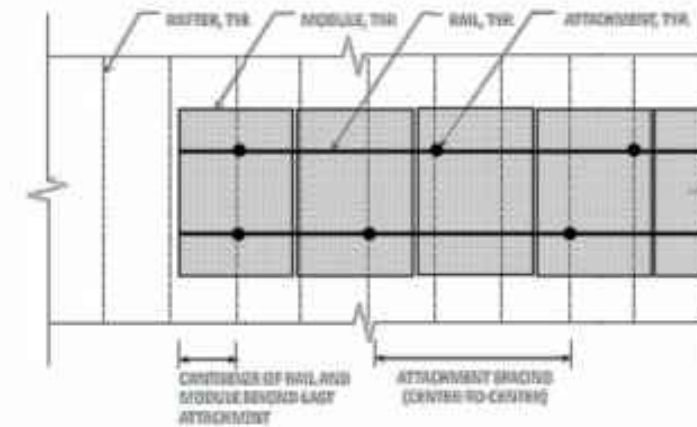


Figure 1

- These tables assume that each module is installed centered over a pair of rails, as shown in Figure 2(a). In cases where one rail is closer to the midpoint of the module, as shown in Figure 2(b), adjustments to the spacing may be required.

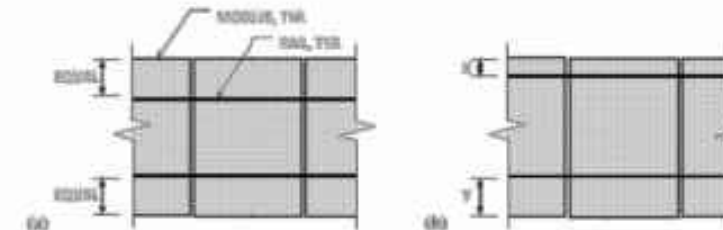


Figure 2

Please contact SunPower for any further technical information which may be required.



4/4/17