

PROJECT DESCRIPTION

THIS ROOF MOUNTED PHOTOVOLTAIC (PV) SYSTEM IS TO BE INSTALLED AT THE SINGLE-FAMILY DWELLING IN PHOENIX, ARIZONA. THE ENERGY PRODUCED BY THE PV SYSTEM SHALL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ON-SITE ELECTRICAL EQUIPMENT VIA A BACK-FED BREAKER IN THE MAIN SERVICE PANEL. THIS PROJECT DOES NOT INCLUDE STORAGE BATTERIES.

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SCOPE OF WORK

- (20) PV AC MODULES (TOTAL: 351 SQ. FT.)
- (28) ATTACHMENT POINTS @ 72" O.C. MAX.
- (2) AC DISCONNECTS, 240 VAC, NEMA 3R
- (1) AC COMBINER BOX, 240 VAC, NEMA 3R
- (1) PV METER, 240 VAC, NEMA 3R
- (1) PV MONITOR, 240 VAC, NEMA 1

CONSTRUCTION NOTES

- 1.) CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO INITIATING CONSTRUCTION.
- 2.) CONTRACTOR SHALL REVIEW ALL MANUFACTURER INSTALLATION DOCUMENTS PRIOR TO INITIATING CONSTRUCTION.
- 3.) ALL EQUIPMENT SHALL BE LISTED BY U.L. (OR EQUAL) AND LISTED FOR ITS SPECIFIC APPLICATION.
- 4.) ALL EQUIPMENT SHALL BE RATED FOR THE ENVIRONMENT IN WHICH IT IS INSTALLED.
- 5.) ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- 6.) ACCESS TO ELECTRICAL COMPONENTS OVER 150 VOLTS TO GROUND SHALL BE RESTRICTED TO QUALIFIED PERSONNEL.
- 7.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 VOLTS AND 90°C WET ENVIRONMENT, UNLESS OTHERWISE NOTED.
- 8.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, CONTRACTOR SHALL SIZE THEM ACCORDING TO APPLICABLE CODES.
- 9.) PV MODULE FRAMES SHALL BE BONDED TO RACKING RAIL OR BARE COPPER G.E.C. PER THE MODULE MANUFACTURER'S LISTED INSTRUCTION SHEET.
- 10.) PV MODULE RACKING RAIL SHALL BE BONDED TO BARE COPPER G.E.C. VIA WEEB LUG, ILSCO GBL-4DBT LAY-IN LUG, OR EQUIVLENT LISTED LUG.
- 11.) GROUNDING ELECTRODE CONDUCTOR (G.E.C.) SHALL BE CONTINUOUS AND/OR IRREVERSIBLY SPLICED/WELDED.
- 12.) ALL JUNCTION BOXES, COMBINER BOXES, AND DISCONNECTS SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION.
- 13.) ROOF ACCESS POINTS SHALL BE AT A STRONG POINT ON THE BUILDING AND NOT REQUIRE THE PLACEMENT OF LADDERS OVER EXTERIOR WALL OPENINGS.
- 14.) WORKING SPACE AROUND ELECTRIAL EQUIPMENT SHALL COMPLY WITH NEC 110.26

SITE SPECIFICATIONS

OCCUPANCY CATEGORY: II  
 DESIGN WIND SPEED: 110 MPH  
 EXPOSURE CATEGORY: C  
 GROUND SNOW LOAD: 0 PSF

GOVERNING CODES

- 2011 NEC (AS AMENDED BY CITY)
- 2012 INTERNATIONAL BUILDING CODE
- 2012 INTERNATIONAL RESIDENTIAL CODE
- 2012 INTERNATIONAL FIRE CODE
- 2012 INTERNATIONAL GREEN CONSTRUCTION CODE
- UNDERWRITERS LABORATORIES (UL) STANDARDS
- OSHA 29 CFR 1910.269

PARTS LIST

Quantity	Name
12	Sunpower End Clamp
20	PV AC Module
28	Unirac Cone Flashing
28	Unirac Standoff
28	Unirac L-Foot
34	Sunpower Mid Clamp
56	5/16" Lag Screw
140	Feet of Sunpower Invisimount Rail

AC Modules Project:

PHOENIX, AZ 85027

Project Details:

6.90 kW<sub>stc</sub>, 6.40 kW AC  
 AHJ: PHOENIX, CITY OF

Engineering Approval:

REVISIONS

DESCRIPTION	DATE	REV
ORIGINAL	10/25/2017	A

Sheet Title: **COVER**

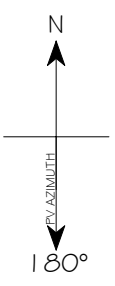
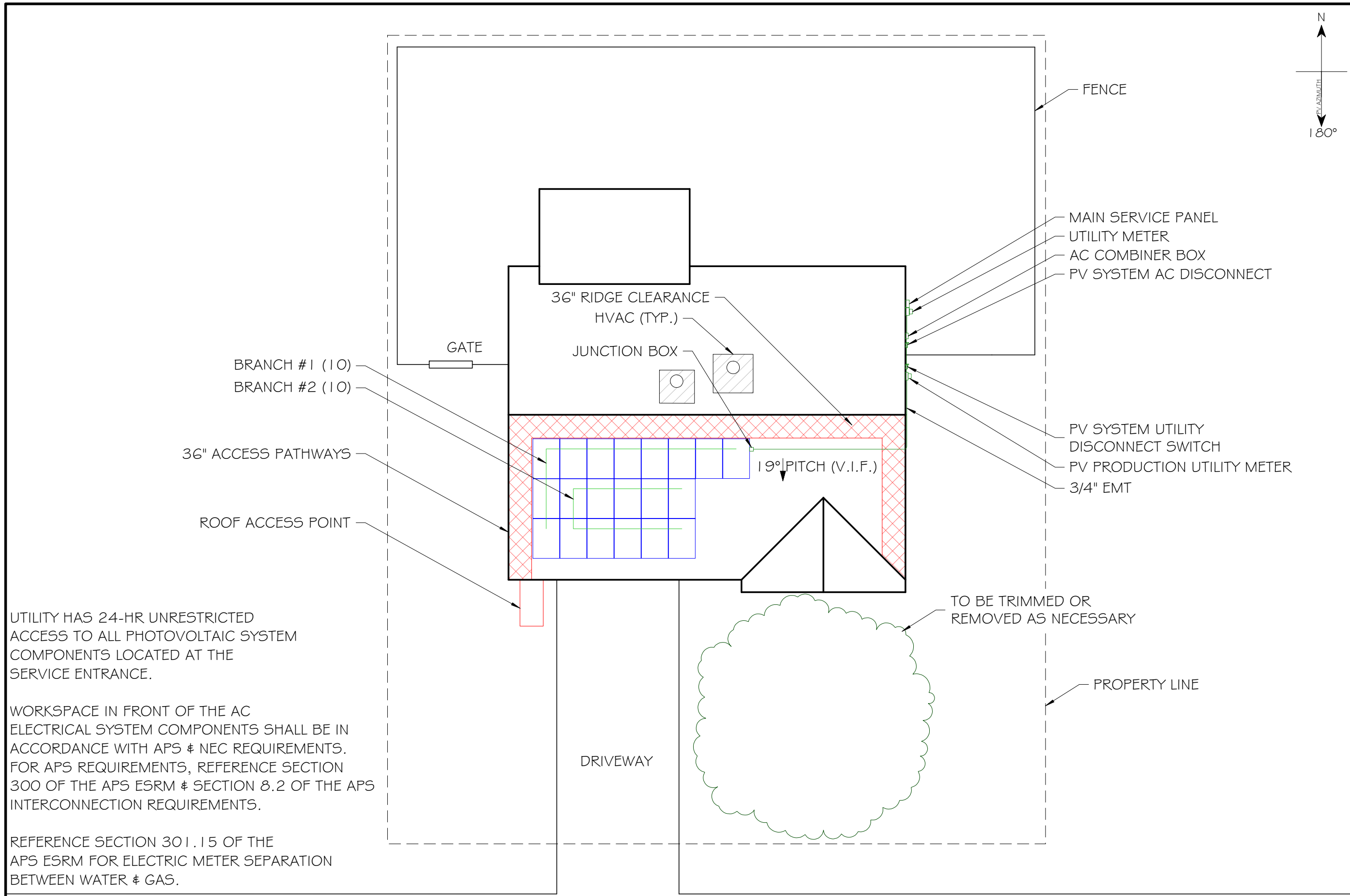
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 ANDREW DOBBINS *ADD*



Reviewed & Approved by:  
 EH



UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.

WORKSPACE IN FRONT OF THE AC ELECTRICAL SYSTEM COMPONENTS SHALL BE IN ACCORDANCE WITH APS & NEC REQUIREMENTS. FOR APS REQUIREMENTS, REFERENCE SECTION 300 OF THE APS ESRM & SECTION 8.2 OF THE APS INTERCONNECTION REQUIREMENTS.

REFERENCE SECTION 301.15 OF THE APS ESRM FOR ELECTRIC METER SEPARATION BETWEEN WATER & GAS.

- FENCE
- MAIN SERVICE PANEL
- UTILITY METER
- AC COMBINER BOX
- PV SYSTEM AC DISCONNECT
- PV SYSTEM UTILITY DISCONNECT SWITCH
- PV PRODUCTION UTILITY METER
- 3/4" EMT

- BRANCH #1 (10)
- BRANCH #2 (10)
- 36" ACCESS PATHWAYS
- ROOF ACCESS POINT

TO BE TRIMMED OR REMOVED AS NECESSARY

PROPERTY LINE

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**SITE PLAN**

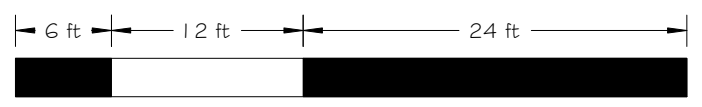
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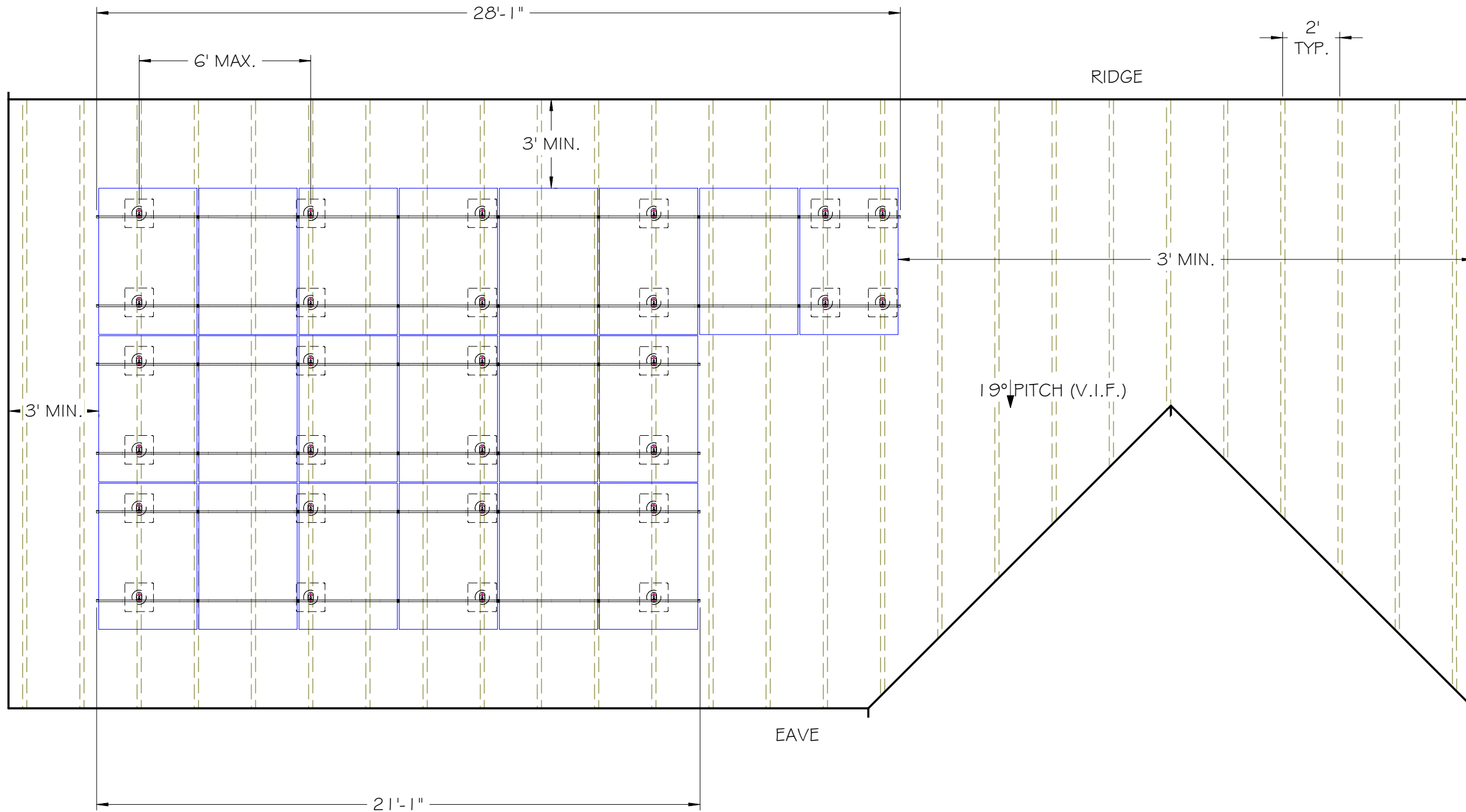
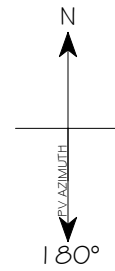
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GOLDENVIEW DRIVE

**LEGEND**

FLASHING    RAFTER/TRUSS    PV MODULE    VENT    CHIMNEY    SKYLIGHT



AC Modules Project:  
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Project Details:  
6.90 kWdc, 6.40 kW AC  
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**ROOF #1  
PV LAYOUT**

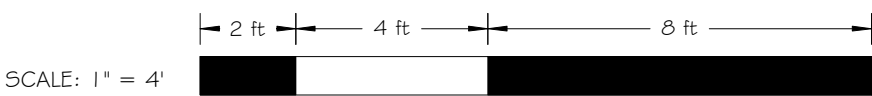
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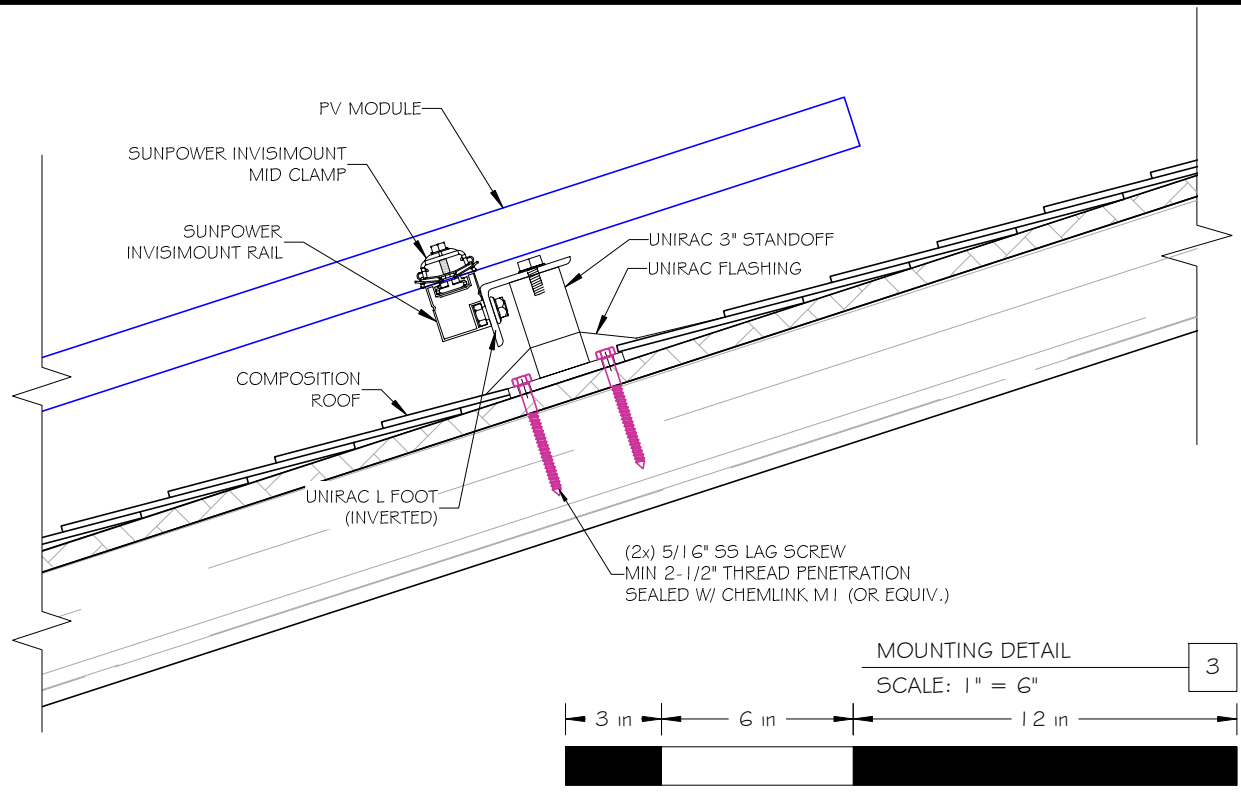
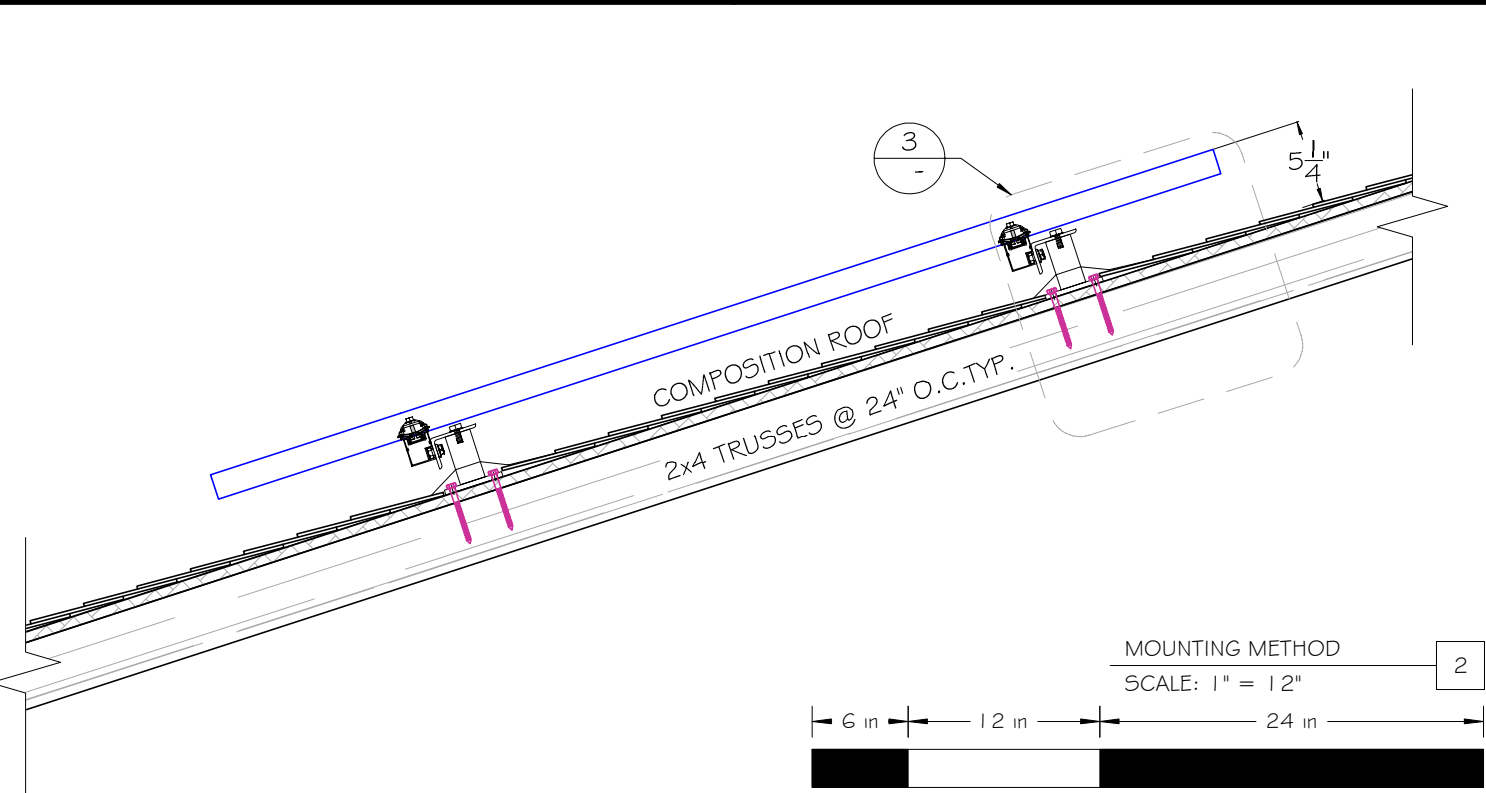
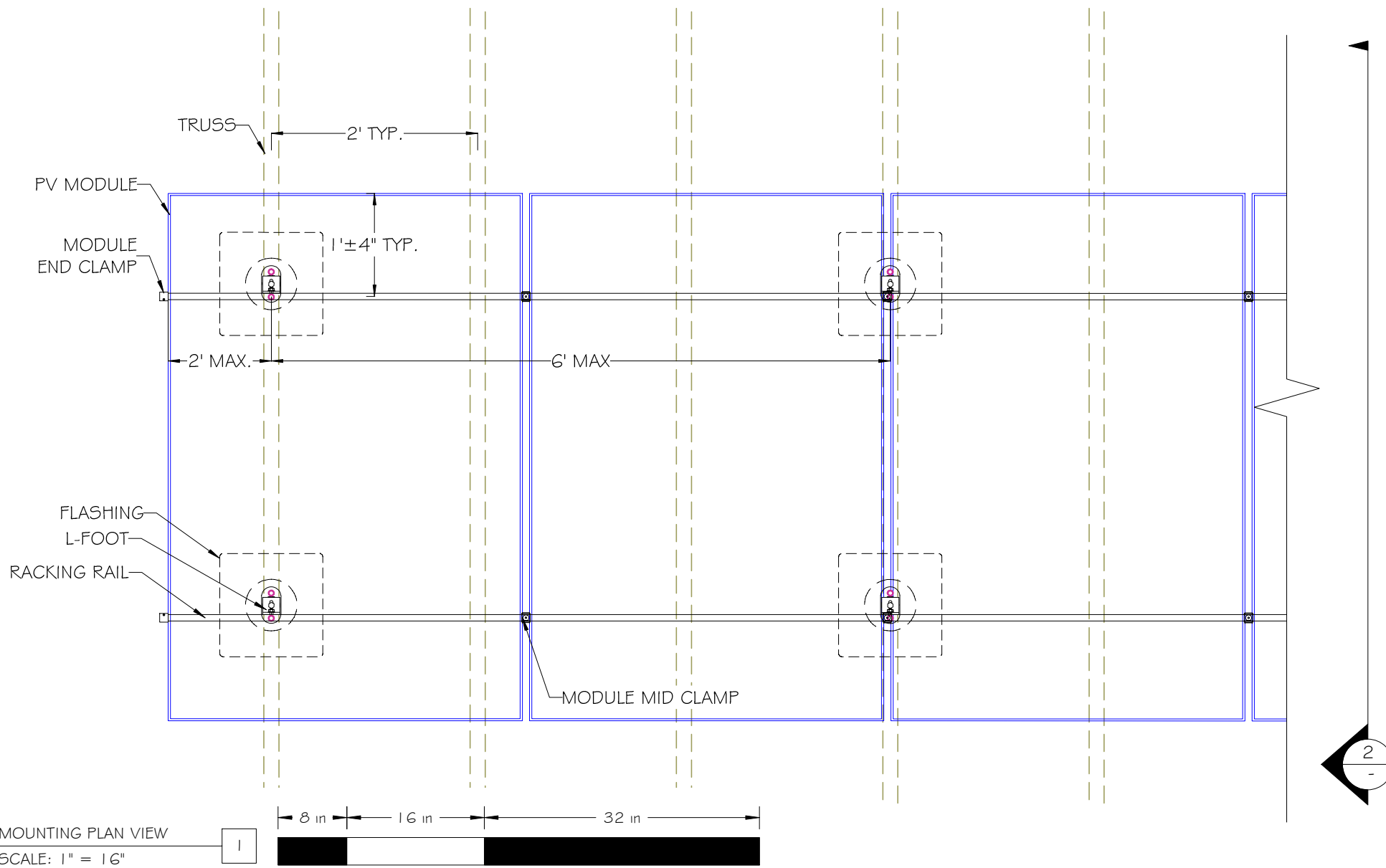


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EH



**STRUCTURAL CALCULATIONS**

	QTY	WEIGHT EA.	TOTAL
PV MODULE	20	41.0 LBS	= 820 LBS
RACKING RAIL	140	1.30 LB/FT	= 182 LBS
ATTACHMENT	28	4.0 LBS	= 112 LBS
<b>TOTAL WEIGHT:</b>			<b>1114 LBS</b>
<b>ARRAY AREA:</b>			<b>351 SQ. FT.</b>
<b>DEAD LOAD:</b>			<b>3.2 PSF</b>
<b>POINT LOAD:</b>			<b>39.8 LBS</b>



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Sheet Title:  
**MOUNTING & RACKING METHOD**

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Array Configuration	
Array Power (kWstc):	<b>6.90</b>
Micro-Inverter Quantity:	<b>20</b>
Branch Circuit Quantity:	<b>2</b>
Length of Branch #1:	<b>10</b>
Length of Branch #2:	<b>10</b>
Total Module Quantity:	<b>20</b>

PV Module Specifications	
Model Number:	<b>SUNPOWER SPR-X21-345-C-AC</b>
Weight:	<b>41.0</b> lbs
Dimensions:	<b>61.4 x 41.2 x 1.8</b> inches
Power @ STC:	<b>345</b> Watts
Voc:	<b>68.2</b> Volts DC
Vmp:	<b>57.3</b> Volts DC
Isc:	<b>6.39</b> Amps
Imp:	<b>6.02</b> Amps
Voc Temp Coeff:	<b>-0.27</b> %/°C

Inverter Specifications	
Model Number:	<b>SUNPOWER SPR-X21-345-C-AC</b>
Power Rating:	<b>320</b> W AC
Nominal Voltage:	<b>240</b> Volts AC
Max Output Current:	<b>1.33</b> Amps
CEC Weighted Efficiency:	<b>96.0%</b>
Maximum # of Modules per Branch:	<b>12</b>
Maximum DC Voltage:	<b>80</b> Volts DC

120% Rule Calculation per NEC 705.12(D)(2)		
Main Busbar Rating:	<b>200</b>	Amps
Main Service Breaker Rating:	<b>100</b>	Amps
PV Backfeeding Current:	<b>33.3</b>	Amps
BUSBAR x 120%	-	MAIN BREAKER
<b>240</b>	-	<b>100</b> = MAX PV BREAKER
		<b>140</b>

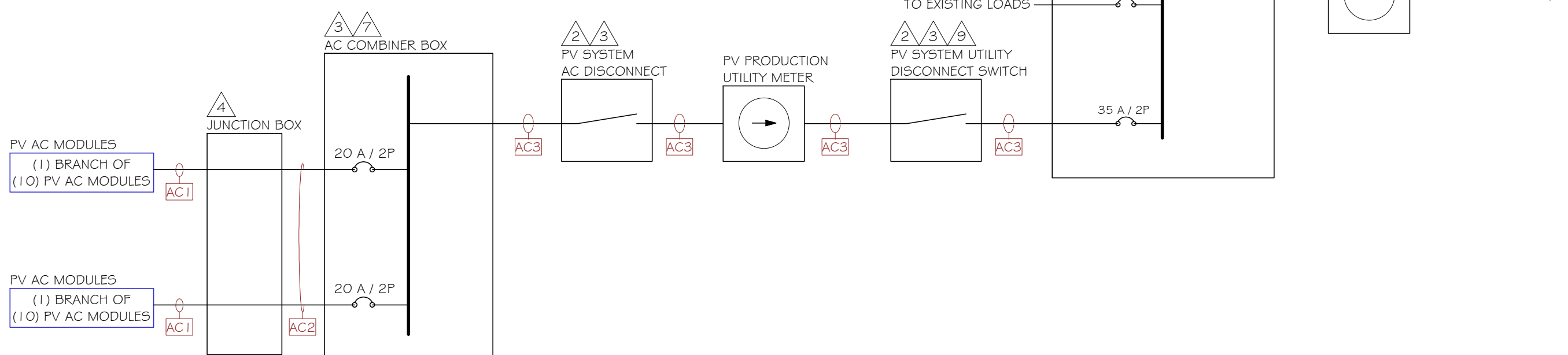
AC System Summary	
System Voltage:	<b>240 VAC</b>
690.8(A) Max Current:	<b>26.6 Amps</b>
690.8(B) Max Current:	<b>33.3 Amps</b>

NOTE: THE CONDUCTORS BETWEEN THE AC DISCONNECT AND THE PV BREAKER MUST BE A MINIMUM OF 4' IN LENGTH.

ALL ROOF MOUNTED CONDUIT MUST BE MOUNTED A MINIMUM OF 1/2" ABOVE THE ROOF.

ALL WIRE TERMINALS SHALL BE RATED MINIMUM 75° C.

AC I CONDUCTORS NOT LOCATED UNDERNEATH MODULES MUST BE PROTECTED BY 3/4" EMT.



NOTE: AC I CONDUCTORS NOT LOCATED UNDERNEATH MODULES MUST BE PROTECTED BY 3/4" EMT.

NOTE: THE CONDUCTORS BETWEEN THE AC DISCONNECT AND THE PV BREAKER MUST BE A MINIMUM OF 4' IN LENGTH.

PV System Maximum Voltage Calculation per NEC 690.7(A)				
Local Record Low Temp:	<b>-3 °C</b>	Data Source:	<b>PHOENIX SKY HARBOR INTL AP</b>	
Voc Temp Coefficient	25°C - Record Low Temp.	Voc Correction Factor	Voc	Max # of Modules in Series
0.27%/°C	28°C	+ 1 =	<b>1.076</b>	1.076 x 68.2 x 1 =
				<b>73.4 Volts DC</b>

WIRE AND CONDUIT SCHEDULE									
TAG	COND QTY	COND SIZE	COND TYPE	GND QTY	GND SIZE	GND TYPE	CONDUIT SIZE	CONDUIT TYPE	EST. DIST.
AC1	2	AWG #12	THWN-2	1	AWG #8	THWN-2	N/A	N/A	20
AC2	4	AWG #10	THWN-2	1	AWG #8	THWN-2	3/4"	EMT	50
AC3	3	AWG #8	THWN-2	1	AWG #8	THWN-2	3/4"	EMT	30

TAG	CIRCUIT ORIGIN	CIRCUIT DESTINATION	CONDUCTOR SPECIFICATIONS			REQUIRED CONDUCTOR AMPACITY			AMPACITY CHECK #1		
			MATERIAL	TEMP. RATING	TRADE SIZE	AMPACITY @ 30°C PER 310.15(B)(16)	CONT. OPERATION 690.8(B)(1)	INVERTER OUTPUT CURRENT (A)	# OF MICRO-INVERTERS IN PARALLEL	REQUIRED AMPACITY	REQUIRED AMPACITY < CONDUCTOR AMPACITY
AC1	MICRO-INVERTER	JUNCTION BOX	COPPER	90°C	AWG #12	30 Amps	1.25	1.33	10	= 16.6 Amps	16.6 Amps < 30.0 Amps
AC2	JUNCTION BOX	AC COMBINER BOX	COPPER	90°C	AWG #10	40 Amps	1.25	1.33	10	= 16.6 Amps	16.6 Amps < 40.0 Amps
AC3	AC COMBINER BOX	PV BREAKER	COPPER	75°C	AWG #8	50 Amps	1.25	1.33	20	= 33.3 Amps	33.3 Amps < 50.0 Amps

CONDUCTOR TEMPERATURE DERATING					
CIRCUIT ENVIRONMENT	LOCAL 2% HIGH TEMP AVG.	HEIGHT ABOVE ROOF (in)	TEMP. ADDER PER 310.15(B)(3)(c)	OPERATING TEMP (°C)	AMPACITY CORRECTION 310.15(B)(2)(a)
ROOFTOP, FREE AIR	43	-	N/A	43	0.87
ROOFTOP, IN CONDUIT	43	1	22	65	0.65
EXT. BLDG. WALL (+15°C)	43	-	N/A	58	0.58

CORRECTED AMPACITY CALCULATION			
CONDUCTOR AMPACITY	TEMP DERATE	CONDUIT DERATE	DERATED CONDUCTOR AMPACITY
30	x 0.87	x 1.00	= 26.1 Amps
40	x 0.65	x 0.80	= 20.8 Amps
50	x 0.58	x 1.00	= 29 Amps

AMPACITY CHECK #2		VOLTAGE DROP	
REQUIRED AMPACITY 690.8(B)(2)	DERATED CONDUCTOR AMPACITY	ESTIMATED ONE-WAY DISTANCE	VOLTAGE DROP
13.3 Amps	< 26.1 Amps	20 ft	0.44%
13.3 Amps	< 20.8 Amps	50 ft	0.67%
26.6 Amps	< 29.0 Amps	30 ft	0.52%

AC Modules Project:  
  
PHOENIX, AZ 85027

Project Details:  
6.90 kWstc, 6.40 kW AC  
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Sheet Title:  
**SINGLE-LINE DIAGRAM**

Sheet Number:

Sheet Size:  
ANSI B - 17" x 11"

DESIGN & DRAFTING BY:  
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— = EQUIP. GROUNDING CONDUCTOR    — = CIRCUIT CONDUCTOR    — = FUSE    — = CIRCUIT BREAKER    (N) = NEW EQUIP.    (E) = EXISTING EQUIP.    L1 = LINE 1 (BLACK)    L2 = LINE 2 (RED)    N = NEUTRAL (WHITE)    G = GROUND (GREEN)    ⊕ = POSITIVE (RED)    ⊖ = NEGATIVE (BLACK)

**120% Rule Calculation per NEC 705.12(D)(2)**

Main Busbar Rating:	200	Amps
Main Service Breaker Rating:	100	Amps
PV Backfeeding Current:	33.3	Amps
<b>BUSBAR x 120%</b>	<b>MAIN BREAKER</b>	<b>= MAX PV BREAKER</b>
240	100	= 140

**WIRE AND CONDUIT SCHEDULE**

TAG	COND QTY	COND SIZE	COND TYPE	GND QTY	GND SIZE	GND TYPE	CONDUIT SIZE	CONDUIT TYPE	EST. DIST.
AC 1	2	AWG #12	THWN-2	1	AWG #8	THWN-2	N/A	N/A	20
AC 2	4	AWG #10	THWN-2	1	AWG #8	THWN-2	3/4"	EMT	50
AC 3	3	AWG #8	THWN-2	1	AWG #8	THWN-2	3/4"	EMT	30

**Array Configuration**

Array Power (kWstc):	<b>6.90</b>
Micro-Inverter Quantity:	<b>20</b>
Branch Circuit Quantity:	<b>2</b>
Length of Branch #1:	<b>10</b>
Length of Branch #2:	<b>10</b>
Total Module Quantity:	<b>20</b>

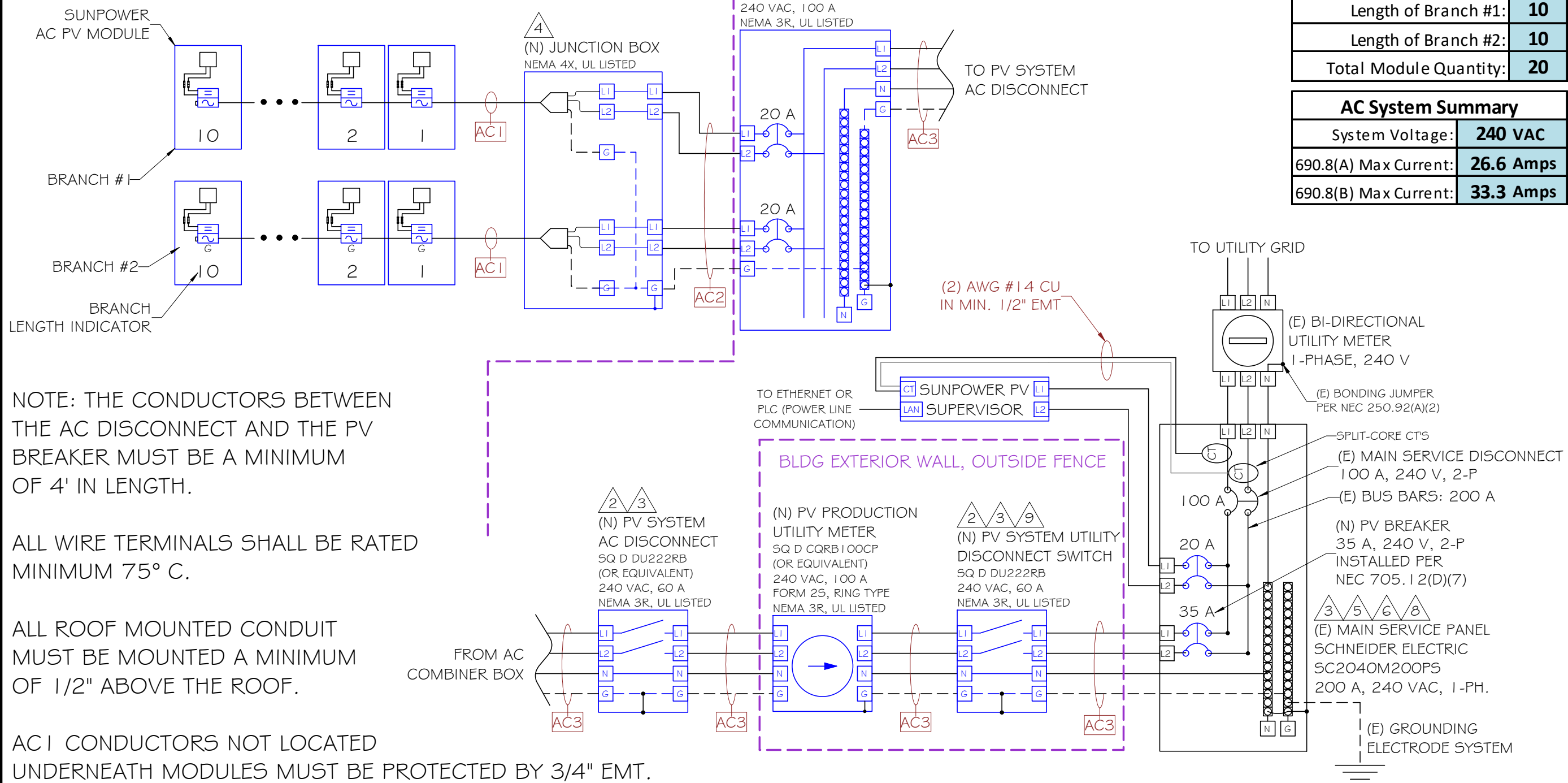
**AC System Summary**

System Voltage:	<b>240 VAC</b>
690.8(A) Max Current:	<b>26.6 Amps</b>
690.8(B) Max Current:	<b>33.3 Amps</b>

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AC 1 CONDUCTORS NOT LOCATED UNDERNEATH MODULES MUST BE PROTECTED BY 3/4" EMT.

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Sheet Title:  
**ELECTRICAL DIAGRAM**

Sheet Number:  
**E1.0**

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DESIGN & DRAFTING BY:  
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PV System Maximum Voltage Calculation per NEC 690.7(A)				
Local Record Low Temp:	<b>-3 °C</b>	Data Source:	<b>PHOENIX SKY HARBOR INTL AP</b>	
Voc Temp Coefficient	25°C - Record Low Temp.	+ 1 =	Voc Correction Factor	
0.27%/°C	28°C	+ 1 =	<b>1.076</b>	
			1.076	x 68.2 x 1 = <b>73.4 Volts DC</b>

PV Module Specifications		
Model Number:	<b>SUNPOWER SPR-X21-345-C-AC</b>	
Weight:	<b>41.0</b>	lbs
Dimensions:	<b>61.4 x 41.2 x 1.8</b> inches	
Power @ STC:	<b>345</b>	Watts
Voc:	<b>68.2</b>	Volts DC
Vmp:	<b>57.3</b>	Volts DC
Isc:	<b>6.39</b>	Amps
Imp:	<b>6.02</b>	Amps
Voc Temp Coeff:	<b>-0.27</b>	%/°C

Inverter Specifications		
Model Number:	<b>SUNPOWER SPR-X21-345-C-AC</b>	
Power Rating:	<b>320</b>	W AC
Nominal Voltage:	<b>240</b>	Volts AC
Max Output Current:	<b>1.33</b>	Amps
CEC Weighted Efficiency:	<b>96.0%</b>	
Maximum # of Modules per Branch:	<b>12</b>	
Maximum DC Voltage:	<b>80</b>	Volts DC

120% Rule Calculation per NEC 705.12(D)(2)		
Main Busbar Rating:	<b>200</b>	Amps
Main Service Breaker Rating:	<b>100</b>	Amps
PV Backfeeding Current:	<b>33.3</b>	Amps
BUSBAR x 120%	-	MAIN BREAKER
240	-	100
	=	MAX PV BREAKER
	=	140

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**ELECTRICAL CALCULATIONS**

Sheet Number:

**E1.1**

Sheet Size:

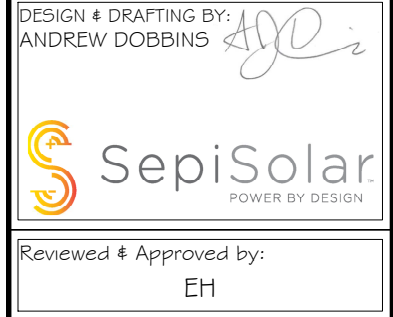
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DESIGN & DRAFTING BY:

ANDREW DOBBINS *ADD*

Reviewed & Approved by:

EH



TAG	CIRCUIT ORIGIN	CIRCUIT DESTINATION	CONDUCTOR SPECIFICATIONS				AMPACITY CHECK #1		AMPACITY CHECK #2		VOLTAGE DROP	
			MATERIAL	TEMP. RATING	TRADE SIZE	AMPACITY @ 30°C PER 310.15(B)(16)	REQUIRED AMPACITY 690.8(B)(1)	CONDUCTOR AMPACITY	REQUIRED AMPACITY 690.8(B)(2)	DERATED CONDUCTOR AMPACITY	ESTIMATED ONE-WAY DISTANCE	VOLTAGE DROP
AC1	MICRO-INVERTER	JUNCTION BOX	COPPER	90°C	<b>AWG #12</b>	<b>30 Amps</b>	16.6 Amps	< 30.0 Amps	13.3 Amps	< 26.1 Amps	20 ft	<b>0.44%</b>
AC2	JUNCTION BOX	AC COMBINER BOX	COPPER	90°C	<b>AWG #10</b>	<b>40 Amps</b>	16.6 Amps	< 40.0 Amps	13.3 Amps	< 20.8 Amps	50 ft	<b>0.67%</b>
AC3	AC COMBINER BOX	PV BREAKER	COPPER	75°C	<b>AWG #8</b>	<b>50 Amps</b>	33.3 Amps	< 50.0 Amps	26.6 Amps	< 29.0 Amps	30 ft	<b>0.52%</b>



SOLAR AC DISCONNECT



WARNING: PHOTOVOLTAIC POWER SOURCE

THIS ELECTRIC SYSTEM IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM

REQ'D BY: NEC 690.5(C)  
APPLY TO:  
INVERTER(S), IF NOT APPLIED BY MFR

REQ'D BY: NEC 690.13(B)  
APPLY TO:  
AC DISCONNECT SWITCHES

REQ'D BY: NEC 690.17(E)  
APPLY TO:  
DISCONNECTS, FUSES, CIRCUIT BREAKERS

REQ'D BY: NEC 690.31(G)(3)  
APPLY TO:  
JUNCTION BOXES, RACEWAYS, CABLE TRAYS,  
CONDUIT BODIES WITH AVAILABLE OPENINGS,  
EVERY 10', WITHIN 1' OF TURNS/PENETRATIONS

REQ'D BY: NEC 705.12(D)(3)  
APPLY TO:  
ANY/ALL ELECTRICAL PANELS  
CONNECTED TO MULTIPLE POWER SOURCES



THIS PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

CAUTION: DO NOT INSTALL ADDITIONAL LOADS IN THIS PANEL

PHOTOVOLTAIC SYSTEM AC DISCONNECT  
OPERATING CURRENT: 33 AMPS  
OPERATING VOLTAGE: 240 VOLTS

REQ'D BY: NEC 705.12(D)(2)(3)(b)  
APPLY TO:  
PV BACKFED CIRCUIT BREAKER(S)

REQ'D BY: AHJ  
APPLY TO:  
PV SYSTEM UTILITY DISCONNECT SWITCH

REQ'D BY: AHJ  
APPLY TO:  
AC COMBINER BOX

REQ'D BY: NEC 690.54  
APPLY TO:  
POINT OF INTERCONNECTION

## Available Fault Current Calculation

Assumptions
120/240V Single Phase
Copper Conductors in Metal Raceway

Utility Company:	APS	
Service Rating:	100	amperes
<b>Utility Symmetrical Fault Current =</b>	<b>8,890</b>	amperes
(Voltage Line-to-Line) E =	240	volts

Conductor Length From PV Breaker to Utility PV Disconnect Terminations shall not be less than this length ---->

Phase Conductor =	8	AWG
Neutral Conductor =	8	AWG

(Conductor Length) L = 4 feet

(# of Conductors per phase) N =	1	
(Phase conductor constant) C =	1,559	
(Voltage line-to-line) $V_{L-L}$ =	240	Volts
f =	0.190	
(Neutral conductor constant) C =	1,559	
(Voltage line-to-neutral) $V_{L-N}$ =	120	Volts
f =	0.380	

$$f' \text{ factor} = \frac{2 \times L \times I}{N \times C \times E \times L-N}$$

$$\text{Multiplier: } M = \frac{1}{1+f}$$

(Multiplier: Line-to-Line) $M_{L-L}$ =	0.840
(Multiplier: Line-to-Neutral) $M_{L-N}$ =	0.725

$I_{sca} \times M$  = fault current at terminals of utility PV disconnect L- L = **7,470** amperes  
 $I_{sca} \times M$  = fault current at terminals of utility PV disconnect L- N = **9,662** amperes

### SIGNAGE REQUIREMENTS

- 1.) RED BACKGROUND
- 2.) WHITE LETTERING
- 3.) MIN. 3/8" LETTER HEIGHT
- 4.) ALL CAPITAL LETTERS
- 5.) ARIAL OR SIMILAR FONT
- 6.) WEATHER RESISTANT MATERIAL, PER UL 969

AC Modules Project:  
  
PHOENIX, AZ 85027

Project Details:  
6.90 kWstc, 6.40 kW AC  
AHJ: PHOENIX, CITY OF

Engineering Approval:

REVISIONS		
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Sheet Title:  
**SAFETY PLACARDS**

Sheet Number:  
**E2.0**

Sheet Size:  
**ANSI B - 17" x 11"**

DESIGN & DRAFTING BY:  
ANDREW DOBBINS *ADD*



Reviewed & Approved by:  
EH

SCALE: 1" = 4"





## SUNPOWER® X21-345-C-AC | Residential AC Module Series

--

AC Modules Project:
PHOENIX, AZ 85027

Project Details:
6.90 kW <sub>stc</sub> , 6.40 kW AC AHJ: PHOENIX, CITY OF

Engineering Approval:

REVISIONS		
DESCRIPTION	DATE	REV
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Sheet Title:
PV AC MODULE DATA SHEET

Sheet Number:
DI.0

Sheet Size:
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DESIGN & DRAFTING BY:
ANDREW DOBBINS <i>ADD</i>



Reviewed & Approved by:
EH

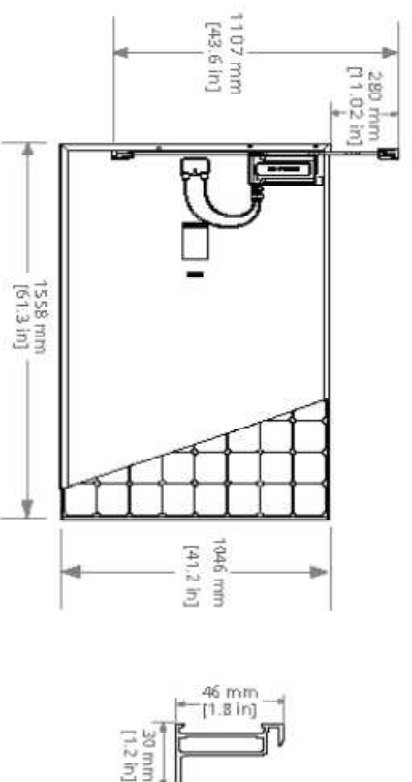
Power Data	
Nominal Power <sup>3</sup> (P <sub>nom</sub> )	345 W
Power Tolerance	+5/-0%
Avg. Panel Efficiency <sup>4</sup>	21.5%
Temp. Coef. (Power)	-0.29%/°C
Shade Tolerance	<ul style="list-style-type: none"> <li>• Integrated module-level maximum power point tracking</li> <li>• Three bypass diodes</li> </ul>

Tested Operating Conditions	
Operating Temp.	-40° F to +185° F (-40° C to +85° C)
Max. Ambient Temp.	122° F (50° C)
Max. Load	Wind: 62 psf, 3000 Pa, 305 kg/m <sup>2</sup> front & back Snow: 125 psf, 6000 Pa, 611 kg/m <sup>2</sup> front
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)

AC Electrical Data	
Output @ 240 V (min./nom./max.)	211/240/264 V
Output @ 208 V (min./nom./max.)	183/208/229 V
Operating Frequency (min./nom./max.)	59.3/60.0/60.5 Hz
Output Power Factor (min.)	0.99
AC Max. Continuous Output Current @ 240 V	1.33 A
AC Max. Continuous Output Current @ 208 V	1.54 A
AC Max. Cont. Output Power	320 W
DC/AC CEC Conversion Efficiency	96.0%
Max. Units Per 20 A Branch Circuit @ 240 V	12 (single phase)
Max. Units Per 20 A Branch Circuit @ 208 V	10 (two pole)
No active phase balancing for 3 phase installations	

Warranties and Certifications	
Warranties	<ul style="list-style-type: none"> <li>• 25-year limited power warranty</li> <li>• 25-year limited product warranty</li> </ul>
Certifications	UL listed to UL 1741, including: <ul style="list-style-type: none"> <li>• IEEE1547/1547a and IEEE1547.1/1547.1a Utility Interactive</li> <li>• PV Rapid Shutdown Equipment</li> <li>• Equipment Grounding</li> <li>• UL 6703, UL 9703 Connectors and cables (load break disconnection)</li> <li>• UL 1703 PV Modules (Type 2 fire rating)</li> </ul> Enables installation in accordance with: <ul style="list-style-type: none"> <li>• NEC 690.6</li> <li>• NEC 690.12 Rapid Shutdown (inside and outside the array)</li> <li>• NEC 690.15 AC Connectors, 690.33(A) - (E)(1)</li> </ul> FCC and ICES-003 Class B
PID Test	When used with InvisiMount racking (UL 2703) <ul style="list-style-type: none"> <li>• Integrated grounding and bonding</li> <li>• Class A fire rated</li> </ul> Potential-induced degradation free

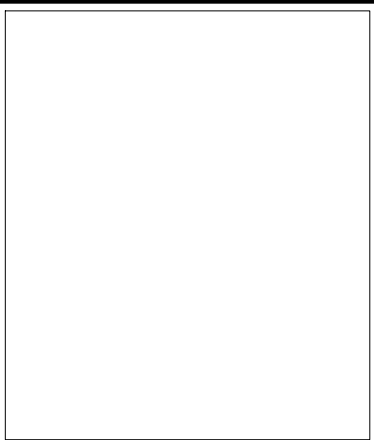
Mechanical Data	
Solar Cells	96 Monocrystalline Maxeon Gen III
Front Glass	High-transmission tempered glass with anti-reflective coating
Environmental Rating	Outdoor rated
Frame	Class 1 black anodized (highest AAMA rating)
Weight	45.5 lbs (20.6 kg)
Max. Recommended Module Spacing	1.3 in. (33 mm)



<sup>1</sup>Highest of over 3,200 silicon solar panels; Photon Module Survey, Feb. 2014  
<sup>2</sup>#1 rank in 'PV Module Durability Initiative Public Report,' Fraunhofer CSE, Feb 2013. Five out of the top eight largest manufacturers were tested; Campeau, Z, et al. 'SunPower Module Degradation Rate,' SunPower white paper, Feb 2013. See www.sunpower.com/facts for details.  
<sup>3</sup>Standard Test Conditions (1000 W/m<sup>2</sup> irradiance, AM 1.5, 25° C, NREL calibration standard; 50 M5 current, LAC CSFF and voltage. All DC voltage is fully contained within the module.  
<sup>4</sup>Based on average of measured power values during production.

See www.sunpower.com/facts for more reference information.  
 For more details, see extended datasheet: www.sunpower.com/datasheets.

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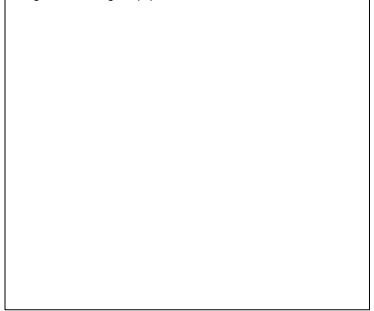
AC Modules Project:

PHOENIX, AZ 85027

Project Details:

6.90 kWdc, 6.40 kW AC  
AHJ: PHOENIX, CITY OF

Engineering Approval:



REVISIONS

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RACKING  
DATA SHEET

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Sheet Size:

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DESIGN & DRAFTING BY:  
ANDREW DOBBINS



Reviewed & Approved by:

EH

# SUNPOWER®

MORE ENERGY. FOR LIFE.™

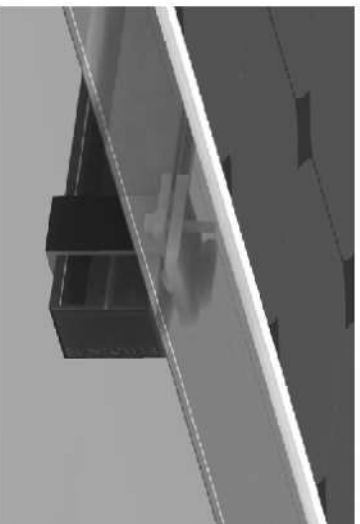
SUNPOWER® INVISIMOUNT™  
Residential Mounting System

### INVISIMOUNT COMPONENT IMAGES

Module\* / Mid Clamp / Rail



Module\* / End Clamp / Rail



Skirt, shown on Array



Mid Clamp



End Clamp



Rail & Rail Splice



Skirt



Skirt Clip



End Cap



### INVISIMOUNT COMPONENT DETAILS

COMPONENT	MATERIAL	WEIGHT
Mid Clamp	Black oxide stainless steel AISI 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)
Skirt	Black anodized aluminum alloy 6063-T6	870 g/m (9.3 oz/ft)
Skirt Clip	Aluminum 6005-T6	23 g (0.8 oz)
End Cap	A31 HP Nylon 66	10.4 g (0.37 oz)

### 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

### ROOF ATTACHMENT HARDWARE SUPPORTED BY INVISIMOUNT SYSTEM DESIGN TOOL

Application	Attachment	Model
Composition Shingle Rafter Attachment	Ez Roof Mount Kit for Shingle Roofs	SunModo K10068-BK6
Composition Shingle Roof Decking Attachment	Ez Roof Mount Kit for Shingle Roofs	SunModo K10068-BK7
Curved Tile	Quick Hook – Curved Tile, 6" Base	QMCTH A 12
Flat Tile	Quick Hook – Flat Tile, 4.5" Base	QMFTH A 12
Universal Interface for Roof Attachments	Black L-Foot Kit	SunModo K10163-BK1

### ROOF ATTACHMENT HARDWARE WARRANTIES

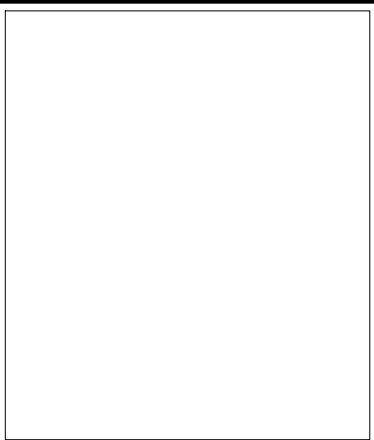
Refer to roof attachment hardware manufacturer's documentation

\*InvisiMount-compatible module frame required for hardware interoperability

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Document #509306 Rev A



AC Modules Project:  
  
PHOENIX, AZ 85027

Project Details:  
6.90 kW<sub>stc</sub>, 6.40 kW AC  
AHJ: PHOENIX, CITY OF

Engineering Approval:

REVISIONS		
DESCRIPTION	DATE	REV
ORIGINAL	10/25/2017	A

Sheet Title:  
**ATTACHMENT  
DATA SHEET**

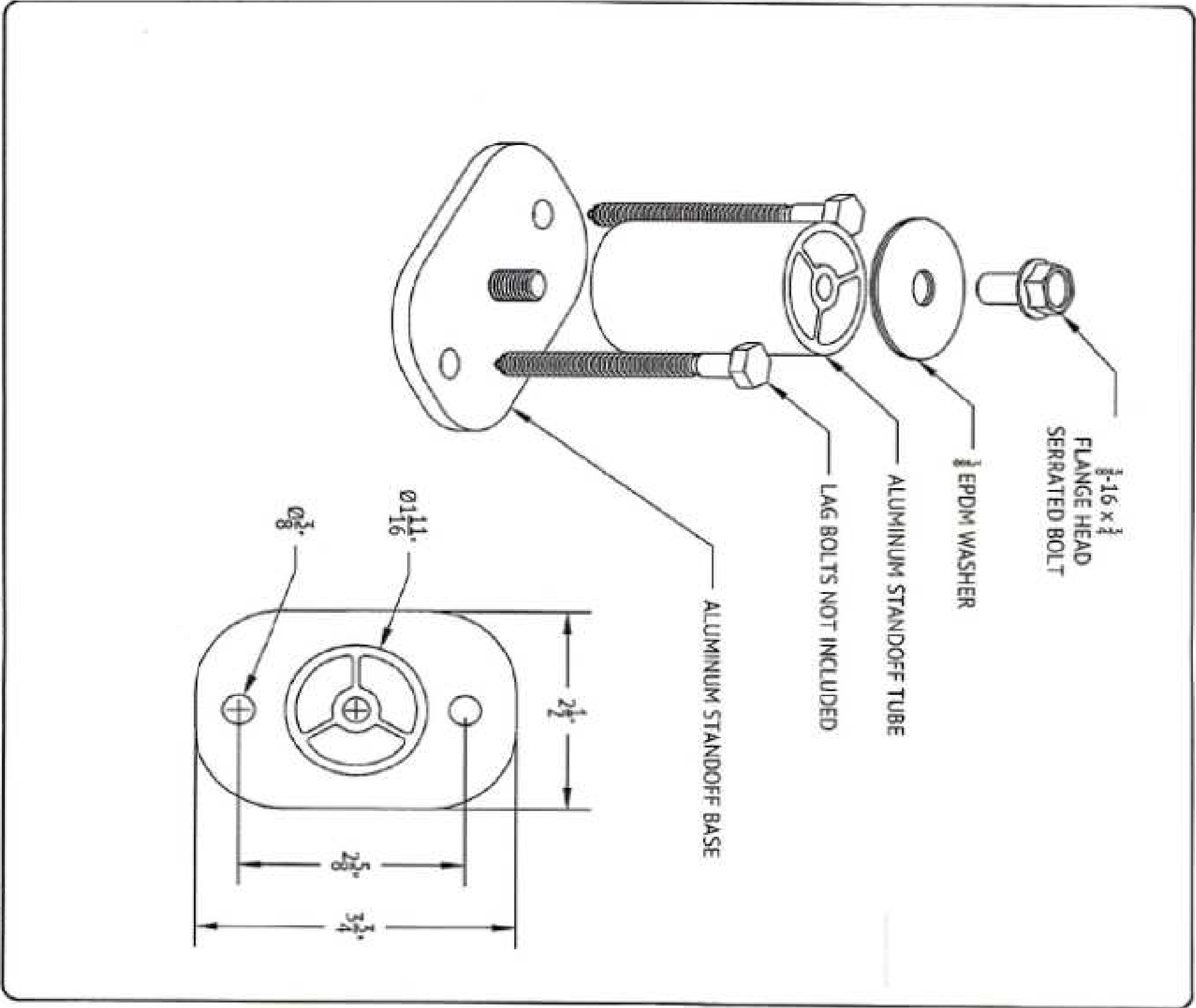
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**D3.0**

Sheet Size:  
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EH



**UNIRAC**  
ANIRAC GROUP COMPANY  
1411 BROADWAY BLVD NE  
ALBUQUERQUE, NM 87102 USA  
WWW.UNIRAC.COM

<b>PRODUCT LINE:</b>	STANDOFFS
<b>DRAWING TYPE:</b>	PART
<b>DESCRIPTION:</b>	2 PC ALUM STANDOFF
<b>REVISION DATE:</b>	JULY 2014

DRAWING NOT TO SCALE  
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE  
OR MORE US PATENTS

LEGAL NOTICE

**ATT-P02**  
SHEET

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AC Modules Project:  
PHOENIX, AZ 85027

Project Details:  
6.90 kWstc, 6.40 kW AC  
AHJ: PHOENIX, CITY OF

Engineering Approval:

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Sheet Title:  
**GROUNDING DATA SHEET**

Sheet Number:  
**D4.0**

Sheet Size:  
**ANSI B - 17" x 11"**

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Fastener	Final Torque
<b>Rail splice screws</b>	4.5 N-m (40 in-lbs)
	(This torque value is achieved by 1/3 turn of the screw after the screw face has contacted the rail face. After tightening in this manner, verify the applied torque with a torque wrench.)
<b>L-foot to roof attachment</b>	Refer to the roof attachment manufacturer's documentation (included in the roof attachment box). If using a roof attachment other than L-feet, refer to that attachment manufacturer's included documentation.

## 4.0 Grounding

Ensure that you fully understand the grounding aspects in this section before proceeding.

**Important!** If installing InvisiMount on a metal roof, you must first ensure that the InvisiMount system is bonded to the roof in compliance with grounding methods as required by the AHJ.

This section is intended to provide a well-rounded understanding of all aspects of grounding for SunPower AC Modules when they are installed on the SunPower® InvisiMount™ Residential Mounting System; it contains excerpts from the SunPower 96-Cell AC Module Design and Installation Guide (#515791); and the SunPower AC Module Safety and Installation Instructions (#51744); as well as references to the applicable NEC Articles and UL Standards.

The InvisiMount system is Listed to UL 2703 for integrated grounding; SunPower AC Modules are a bonding component and are Listed to UL 1741. If you are installing SunPower AC Modules on the InvisiMount system (or any mounting system that is Listed to UL 2703 for bonding—not just for fire classification), **no additional grounding hardware, lugs, or copper wire are required on the roof.**

- The SunPower AC Module is one of the components that bonds all of the metallic non-current carrying components in the system, and is Listed to UL 1741.
- As part of UL 2703, only AC equipment grounding requirements apply—no DC system grounding requirements nor DC equipment grounding requirements apply.
- The equipment grounding conductor (EGC) that's built into the AC Module cable system is sized appropriately and meets all of the AC equipment grounding requirements for the system.
- The AC dedicated branch circuit wiring from the readily accessible disconnect to the array must include an equipment grounding conductor (EGC) in the same raceway or cable as the AC circuit conductors. This EGC must be connected to the green conductor of the transition cable, which is part of the AC module cable system.

AC Modules Project:

PHOENIX, AZ 85027

Project Details:

6.90 kWstc, 6.40 kW AC  
AHJ: PHOENIX, CITY OF

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MAIN PANEL  
DATA SHEET

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# HOMELINE SOLAR-READY COMBINATION SERVICE ENTRANCE DEVICES FOR PLUG-ON NEUTRAL CIRCUIT BREAKERS OFFER

- **Solar-ready**  
Suitable for use with Photovoltaic (PV) system applications as defined in NEC\* Article 690.64
- **PV system data monitoring**  
Provisions for current transformers (CT) on the side of the service disconnect
- **Line side solar tap**  
Accommodates field-installable lug kit ahead of the service disconnect to feed PV system without using a branch breaker space or de-rating the main breaker

## See the difference!



▲ Pigtail Neutral connection

- Less wiring
- Clean gutter
- Fast installation



▲ Plug-on Neutral connection

Existing Catalog Number	New Catalog Number	Main Breaker	Branch Spaces/ Circuits	Accepts Line Side CT's	Accepts Line Side Solar Tap*	Dimensions		
						Length	Width	Depth
SC816F150S	SC816F150PS	150 A	8/16					
SC816F200S	SC816F200PS					29.50	21.50	5.80
SC2040M200S	SC2040M200PS	200 A	20/40	Yes	Yes			
SC3040M200S	SC3042M200PS		30/42			32.30	21.50	5.80
SC40M200S	SC42M200PS		42/42			37.30	21.50	5.80

\*Order Solar-ready sub-feed lug kit SP69064A

Surface Mount Only

With exclusive features including cutting-edge circuit protection and TIME SAVER Diagnostics, Homeline CSEDs are the smart choice for value-minded contractors, remodelers, builders, and homeowners. Whatever your requirements are, Square D has a solution to meet your needs. For more information, call **888-SQUARED (888-778-2733)** or visit your local Square D authorized distributor.

Schneider Electric USA, Inc.

800 Federal Street  
Andover, MA 01844  
Tel: 847-397-2600  
Fax: 847-925-7500  
www.schneider-electric.com/us

Document Number 1173HC1501

March 2015

CAUTION: ELECTRICAL POWER IS ALSO SUPPLIED FROM THIS SOURCE  
WITH DISCONNECTS LOCATED AS SHOWN PER NEC 705.10

KEY:

- ① MAIN ELECTRICAL SERVICE ENTRANCE  
and  
UTILITY REVENUE METER
- ② PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH  
and  
DEDICATED PHOTOVOLTAIC SYSTEM KWH METER
- ③ PHOTOVOLTAIC SYSTEM AC COMBINER BOX  
and  
PHOTOVOLTAIC SYSTEM AC DISCONNECT SWITCH
- ④ SUNPOWER SPR-X21-345-C-AC, 345 WATT AC SOLAR MODULES  
TOTAL QUANTITY: 20 (FLUSH MOUNTED, 19° PITCH)

