



1011 N Causeway Blvd, Suite 19 ♦ Mandeville, Louisiana 70471 ♦ Phone: 985.624.5001 ♦ Fax: 985.624.5303

November 2021

Property Owner: Maria Rodriguez

Property Address: 288 Southwest Battle Court, Fort White, FL 32038

RE: Photovoltaic System Roof Installations

I have reviewed the existing structure referenced above to determine the adequacy of the existing structure support the proposed installation of an array of solar panels on the roof.

Based on my review, the existing structure is adequate to support the proposed solar panel installation. This assessment is based on recent on-site inspection by SunPro Solar inspectors and photographs of the existing structure. The photovoltaic system is designed to withstand uplift and downward forces; our assessment is regarding the structure's support of the array. Stresses induced by the introduction of individual mount loads on the rafters are within acceptable limits as shown on the attached calculations. The structural considerations used in our review and assessment include the following:

Evaluation Criteria:

Applied Codes: ASCE 7-16 FBC 2020 NEC 2017

Risk Category: II

Design Wind Speed (3-second gust): 165 MPH

Wind Exposure Category: C

Ground Snow Load: 0 PSF

Seismic Design Category: D

Existing Structure:

Roof Material: Metal

Roofing Structure: 2x6 rafters @ 24" O.C.

Roof Slope: 3/12

Connection of Array to Structure:

Manufacturer: S-5!

Mount: Protea Bracket

Mounting Connection: S-5! ProteaBracket(SS) L vert. to min. 26 ga steel w/(4) 6mm self-piercing screws at max. 36" o.c. along rails

Zone 1: 3 rails 3'-0" o.c. mounts

Zone 2: 4 rails 3'-0" o.c. mounts

Zone 3: 4 rails 3'-0" o.c. mounts



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Effect of the Solar Array on Structure Loading:

Gravity Loads:

Per IBC Section 1607.12.5.1, the areas of the roof where solar panels are located are considered inaccessible, and therefore not subject to roof live loading. Live load in these areas is replaced by the dead load of the solar array, 3 psf. The total gravity load on the structure is therefore reduced and the structure may remain unaltered. Connections of the mounts to the underlying structure are to be installed in a staggered pattern, except at the array ends, to distribute the loading evenly to the roof structure. The stresses within the rafters due to the introduction of discrete mount loads are within acceptable limits, as shown on the attached calculations.

Wind Load:

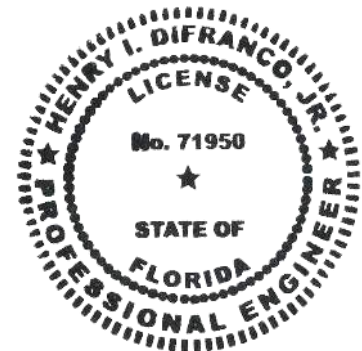
The solar panel array will be flush mounted (no more than 6" above the surrounding roof surface, and parallel to the roof surface. Any additional wind loading on the structure due to the presence of the array is negligible. The array structure is designed by the manufacturer to withstand uplift and downward forces resulting from wind and snow loads. The attached calculations verify the capacity of the connection of the solar array to the roof to resist uplift due to wind loads, the governing load case.

Snow Load:

The reduced friction of the glass surface of the solar panels allows for the lower slope factor (C_s) per Section 7.4 of ASCE 7-16 resulting in a reduced design snow load for the structure. This analysis conservatively considered the snow load to be unchanged.

Seismic Load:

Analysis shows that additional seismic loads due to the array installation will be small. Even conservatively neglecting the wall materials, the solar panel installation represents an increase in the total weight of the roof and corresponding seismic load of less than 10%. This magnitude of additional forces meets the requirements of the exception in Section 11B.4 of ASCE 7-16. The existing lateral force resisting system of the structure is therefore allowed to remain unaltered.



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Conclusion:

To the best of my professional knowledge and belief, the subject construction and photovoltaic system installation will be in compliance with all state and local building codes and guidelines in effect at the time of our review.

Limitations:

Engineer's assessment of the existing structure is based on recent field reports and current photographs of the elements of the structure that were readily accessible at the time of inspection. The design of the solar panel racking (mounts, rails, connectors, etc.), connections between the racking and panels, and electrical engineering related to the installation are the responsibility of others. The photovoltaic system installation must be by competent personnel in accordance with manufacturer recommendations and specifications and should meet or exceed industry standards for quality. The contractor is responsible for ensuring that the solar array is installed according to the approved plans and must notify the engineer of any undocumented damage or deterioration of the structure, or of discrepancies between the conditions depicted in the approved plans and those discovered on site so that the project may be reevaluated and altered as required. Engineer does not assume any responsibility for improper installation of the proposed photovoltaic system.



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Uplift and Wind Downforce Calculation Summary (ASCE 7-16)
Mount, Rack, & Panel Proportioning
Point Load Check and Rafter Stress Analysis

Property Owner:	Maria Rodriguez	Max. Individual Panel Dimensions		
Project Address:	288 Southwest Battle Court	Length (in)	Width (in)	Area (sf)
City, State:	Fort White, FL 32038	77	39	20.85

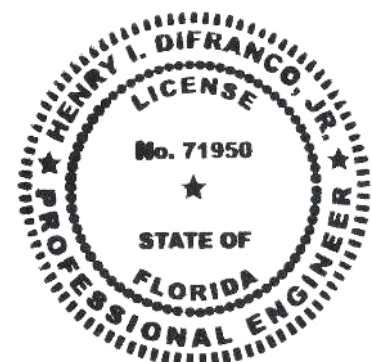
Building Characteristics, Design Input, and Adjustment Factors				
Roof Dimensions:	Length:	78	Greater Dimension	78
	Width:	33	Least Dimension:	33
Roof Height (h):	15	Fig 30.4-1, valid under 60°	✓	
Pitch: 3 on 12 =	14.0°	Must be less than 45°	✓	
Roof Configuration	Gable			
Roof Structure	2x Rafters			
Roof Material	Plywood			
Risk Category:	II			
Basic Wind Speed:	165	From 26.5-1		
Exposure Category:	C	Fig. 26.7		
Topographic Factor (K_{zt})	1.0	Fig. 26.8-1		
Wind Pressure @ $h=30$, p_{net30}	See Table Below	Fig. 30.4-1		
Ht. & Exposure Adjustment (λ)	0.82	Fig. 30.4-1		
Adjusted Wind Pressures, p_{net}	See Table Below	Eq. 30.4-1		
Effective Wind Area (sf):	10.43	(Area per individual mount)		
Roof Zone Strip (a), in ft, Fig. 30.4-1, Note 5				
1 - Least Roof Horizontal Dimension (L or W) x 0.10		3.3		
2 - Roof Height x 0.4		6		
3 - Least Roof Horizontal Dimension (L or W) x 0.04		1.32		
4 - Least of (1) and (2)		3.3		
5 - Greater of (3) and (4)		3.3		
6 - Greater of (5) and 3 feet	a=	3.3		



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Net Design Pressures, p_{net} (Fig 30.4-1), Components & Cladding					
	Uplift (-psf)			Factored Pressure (0.6W, ASCE 7-16)	θ
		P_{30net}	$ K_{zt}P_{30net} $		
gable /hip /flat					
Gable	Zone 1 & 2e	85.4	70.1	42.0	$7^\circ < \theta \leq 20^\circ$
	Zone 2n,2r,3e	124.7	102.2	61.3	
	Zone 3r	148.2	121.5	72.9	
Hip					



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Snow Load		
Ground Snow Load, p_g	0.0	From ASCE 7 or AHJ
Terrain Category:	C	Para 6.5.6.3
Exposure	Fully	
Exposure Factor C_e	0.9	Table 7-2
Thermal Factor, C_t	1.0	Table 7-3
Importance Factor, I_s	1.0	Table 1.5.2
Roof Configuration	Gable	
Roof Slope	14.0°	
Distance from Eave to Ridge	16.5	
p_m , Minimum required Snow Load	0.00 psf	Para. 7.3.4
p_f , Calculated Snow Load	0.00	Eq. 7.3-1
p_f , Design Snow Load	0.00 psf	

Rail & Mount Selection (FS=3.0)		
Manufacturer:	S5!	Allowable Mount Spacing by Uplift Pressure
Model:	Protea Bracket	< 38 psf : 2 rails, mounts @ 3 ft. o.c. 38 to 57 psf : 3 rails, mounts @ 3 ft. o.c. 57 to 0 psf : 4 rails, mounts @ 3 ft. o.c. > 0 psf : > 76 psf : Mount capacity exceeded
Substrate	Corrugated Panel	
Connector:	4- 6mm self-piercing screws	
Allowable Uplift:	366 lb., max.	

Rail & Mount Layout by Zone		
Zone 1:	3 rails, mounts @ 3 ft. o.c.	Zone 2r: 4 rails, mounts @ 3 ft. o.c.
Zone 1':	N/A	Zone 3: N/A
Zone 2:	N/A	Zone 3e: 4 rails, mounts @ 3 ft. o.c.
Zone 2e:	3 rails, mounts @ 3 ft. o.c.	Zone 3r: 4 rails, mounts @ 3 ft. o.c.
Zone 2n:	4 rails, mounts @ 3 ft. o.c.	
(From rail analysis, allowable spacing and number of rails are controlled by individual mount pullout before rail bending)		



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NEW PHOTOVOLTAIC SYSTEM 17.25 KW DC

288 SOUTHWEST BATTLE COURT, FORT WHITE, FL 32038

CONTRACTOR

SUNPRO

22171 MCH RD
MANDEVILLE, LA 70471

PHONE: 9152011490

PROJECT NAME & ADDRESS

MARIA RODRIGUEZ

288 SOUTHWEST
BATTLE COURT,FORT
WHITE,
FL 32038

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 17.250 KW DC-(STC)

AC SIZE: 13.340 KW AC



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SHEET TITLE

COVER PAGE

DRAWN DATE

11/19/2021

DRAWN BY

AP

SHEET NUMBER

G-001

GENERAL NOTES

1.1.1 PROJECT NOTES:

1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.

1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION

1.1.4 GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE MICRO-INVERTER IN ACCORDANCE WITH NEC 690.41(B)

1.1.5 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4: PV MODULES: UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519 COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY

1.1.6 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.

1.1.7 ALL INVERTERS, PHOTOVOLTAIC MODULES,PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4. SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].

1.1.8 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.

1.2.1 SCOPE OF WORK:

1.2.2 PRIME CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM RETROFIT. PRIME CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTING EXISTING ONSITE REQUIREMENTS TO DESIGN, SPECIFY, AND INSTALL THE EXTERIOR ROOF-MOUNTED PORTION OF THE PHOTOVOLTAIC SYSTEMS DETAILED IN THIS DOCUMENT

1.3.1 WORK INCLUDES:

1.3.2 PV RACKING SYSTEM INSTALLATION - UNIRAC SOLAR

1.3.3 PV MODULE AND INVERTER INSTALLATION - LG ELECTRONICS LG375N1C-A6 / ENPHASE IQ7PLUS-72-2-US INVERTER

1.3.4 PV EQUIPMENT ROOF MOUNT

1.3.5 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX

1.3.6 PV LOAD CENTERS (IF INCLUDED)

1.3.7 PV METERING/MONITORING (IF INCLUDED)

1.3.8 PV DISCONNECTS

1.3.9 PV GROUNDING ELECTRODE & BONDING TO (E) GEC

1.3.10 PV FINAL COMMISSIONING

1.3.11 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV

1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

PROJECT INFORMATION

OWNER

NAME: MARIA RODRIGUEZ

PROJECT MANAGER

NAME: SHAHIN HAYNES

PHONE: 8665071461

CONTRACTOR NAME

MARC JONES CONSTRUCTION,
LLC DBA SUNPRO SOLAR

PHONE: 5052180838

SCOPE OF WORK

SYSTEM SIZE: STC:46 X 375W= 17.25 kW DC

PTC: 46 x 347.3W = 15.98 kW DC

(46) LG ELECTRONICS LG375N1C-A6

(46) ENPHASE IQ7PLUS-72-2-US

ATTACHMENT TYPE: ROOF MOUNT

MSP UPGRADE: YES

UTILITY METER UPGRADE: YES

AUTHORITIES HAVING JURISDICTION

BUILDING: COLUMBIA COUNTY

ZONING: COLUMBIA COUNTY

UTILITY: CLAY ELECTRIC CO-OP

DESIGN SPECIFICATION

OCCUPANCY: II

CONSTRUCTION: SINGLE-FAMILY

ZONING: RESIDENTIAL

GROUND SNOW LOAD: REFER STRUCTURAL LETTER

WIND EXPOSURE: REFER STRUCTURAL LETTER

WIND SPEED: 165 MPH

APPLICABLE CODES & STANDARDS

BUILDING: IBC 2018, IRC 2018, FBC 2020 (7TH EDITION)

ELECTRICAL: NEC 2017

FIRE: IFC 2020

VICINITY MAP



SATELLITE VIEW



SHEET INDEX

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R-007	RESOURCE DOCUMENT
R-008	RESOURCE DOCUMENT
R-009	RESOURCE DOCUMENT

2.1.1 SITE NOTES:

2.1.2 A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.

2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.

2.1.4 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.

2.1.5 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.

2.1.6 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.

2.2.1 EQUIPMENT LOCATIONS:

2.2.2 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.

2.2.3 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).

2.2.4 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.

2.2.5 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.

2.2.7 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

2.3.1 STRUCTURAL NOTES:

2.3.2 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAI MANUFACTURER'S INSTRUCTIONS.

2.3.3 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.

2.3.4 ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.

2.3.5 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.

2.4.1 WIRING & CONDUIT NOTES:

2.4.2 ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.

2.4.3 CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.

2.4.4 VOLTAGE DROP LIMITED TO 1.5%.

2.4.5 DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.

2.4.6 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].

2.5.1 GROUNDING NOTES:

2.5.2 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.

2.5.3 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.

2.5.4 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).

2.5.5 EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MICROINVERTER MANUFACTURERS' INSTRUCTIONS.

2.5.6 EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION 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.

2.5.7 THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.

2.5.8 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]

2.5.9 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.

2.5.10 GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS

2.6.1 DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:

2.6.2 DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE RECONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).

2.6.3 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH

2.6.4 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).

2.6.5 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.

2.6.6 MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B).

2.6.7 IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL 1699B.

2.7.1 INTERCONNECTION NOTES:

2.7.2 LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 705.12 (B)]

2.7.3 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(B)(2)(3)(b)].

2.7.4 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)].

2.7.5 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).

2.7.6 FEEDER TAP INTERCONNECTION (LOADSIDE) ACCORDING TO NEC 705.12 (B)(2)(1)

2.7.7 SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42

2.7.8 BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].

CONTRACTOR SUNPRO	
22171 MCH RD MANDEVILLE, LA 70471 PHONE: 9152011490	
PROJECT NAME & ADDRESS MARIA RODRIGUEZ 288 SOUTHWEST BATTLE COURT,FORT WHITE, FL 32038 COUNTY:-COLUMBIA COUNTY	
SYSTEM SIZE DC SIZE: 17.250 KW DC-(STC) AC SIZE: 13.340 KW AC	
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SHEET TITLE NOTES	
DRAWN DATE	11/19/2021
DRAWN BY	AP
SHEET NUMBER G-002	



PHONE: 9152011490

MARIA RODRIGUEZ

COUNTY:-COLUMBIA COUNTY

DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC



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SITE PLAN

DRAWN BY	AP
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A-101

DC SIZE 46 X 375W = 17.25 kW DC-STC
AC SIZE 46X 290W = 13.34 kW AC



LEGEND

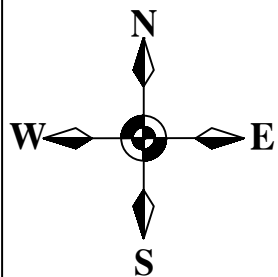


JB



○

- VENT, ATTIC FAN (ROOF OBSTRUCTION)



1 | SITE PLAN

SCALE: 1/64"=1'-0"

- 1 - MODULE STRING
- 2 - MODULE STRING
- 3 - MODULE STRING
- 4 - MODULE STRING

LEGEND

- FIRE SETBACK
- PROPERTY LINE
- JB - JUNCTION BOX
- SKYLIGHT (ROOF OBSTRUCTION)
- CHIMNEY (ROOF OBSTRUCTION)
- VENT, ATTIC FAN (ROOF OBSTRUCTION)

ROOF SECTION(S)

ROOF 1	TILT - 13° AZIMUTH - 267° MODULE - 39 SYSTEM SIZE (KW)- 14.63
ROOF 2	TILT - 13° AZIMUTH - 87° MODULE - 07 SYSTEM SIZE (KW)- 2.63

CONTRACTOR

SUNPRO

22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT NAME & ADDRESS

MARIA RODRIGUEZ

288 SOUTHWEST
BATTLE COURT,FORT
WHITE,
FL 32038

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC



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PRINCIPAL ENGINEERING, INC.
1011 N. CAUSEWAY BLVD. STE 19
MANDEVILLE, LA 70471
985.624.5001
INFO@PI-AEC.COM
FLORIDA FIRM NO. 30649

SHEET TITLE

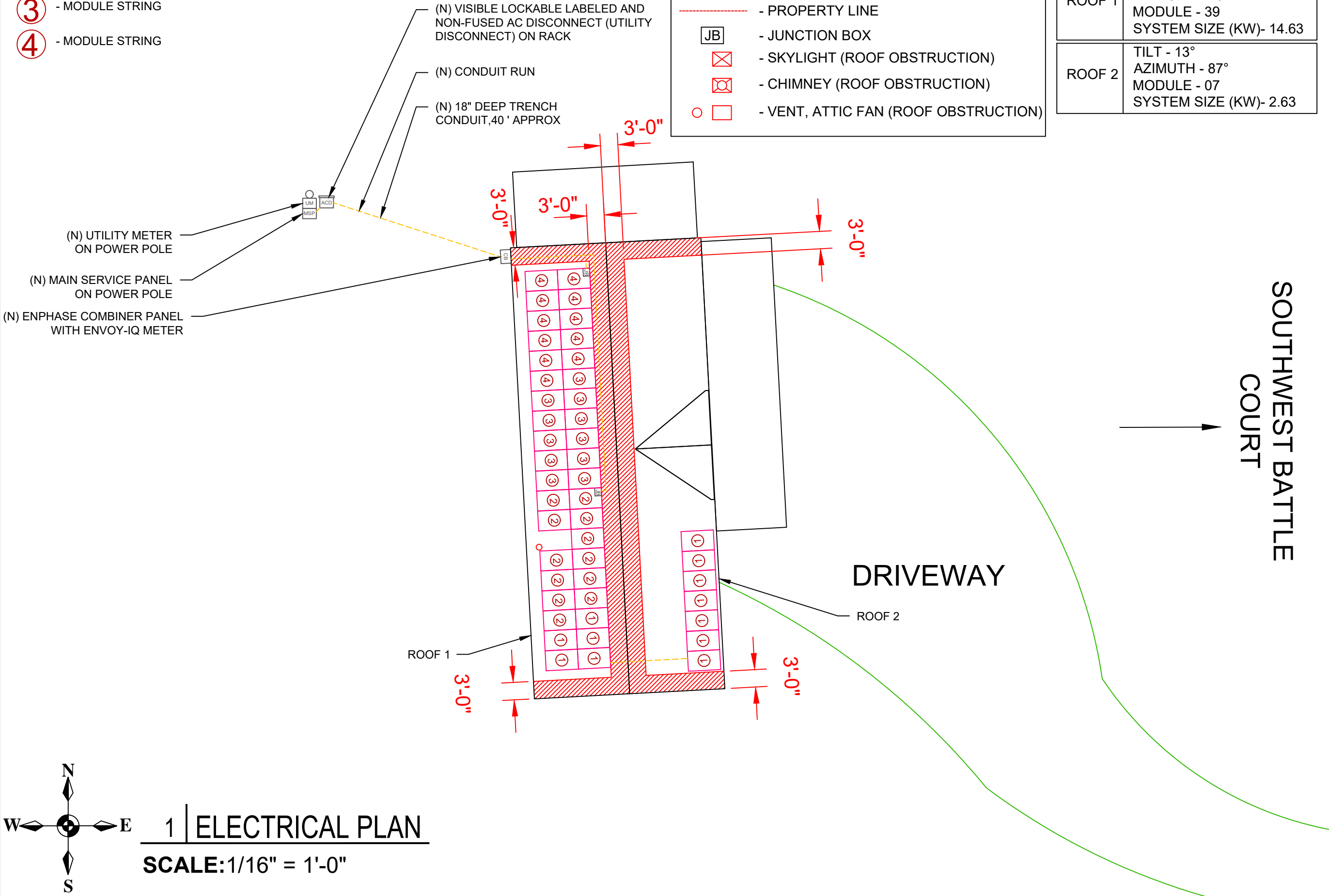
ELECTRICAL PLAN

DRAWN DATE 11/19/2021

DRAWN BY AP

SHEET NUMBER

A-102



Note 1: Windspeed value is design 3-sec gust in accordance with ASCE 7-16

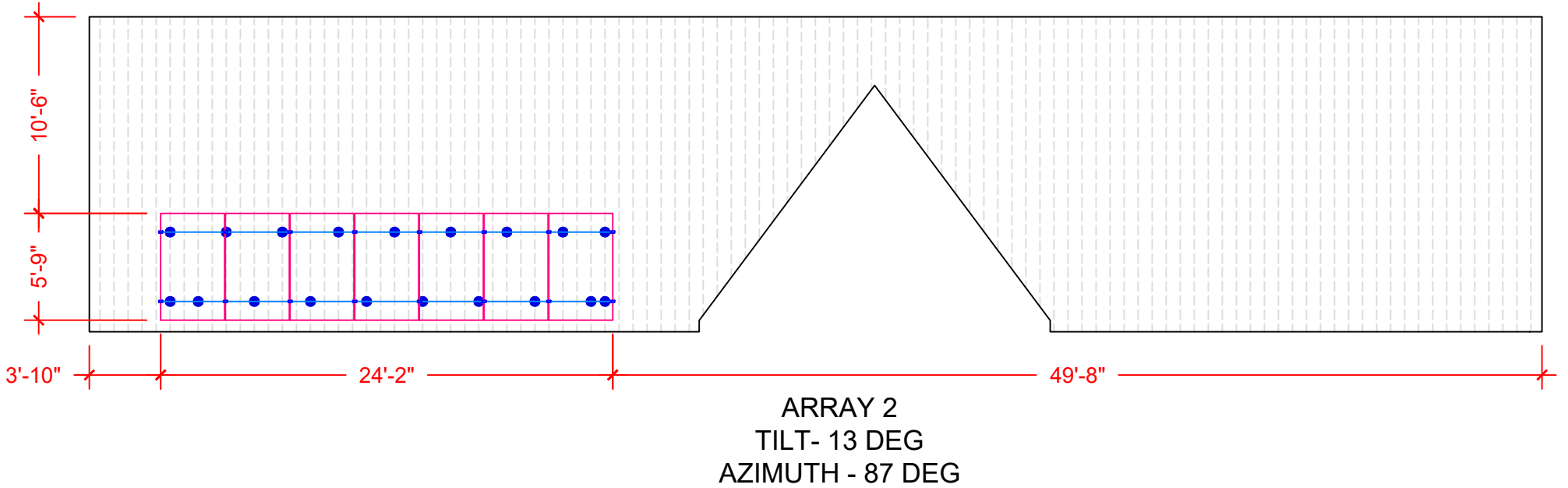
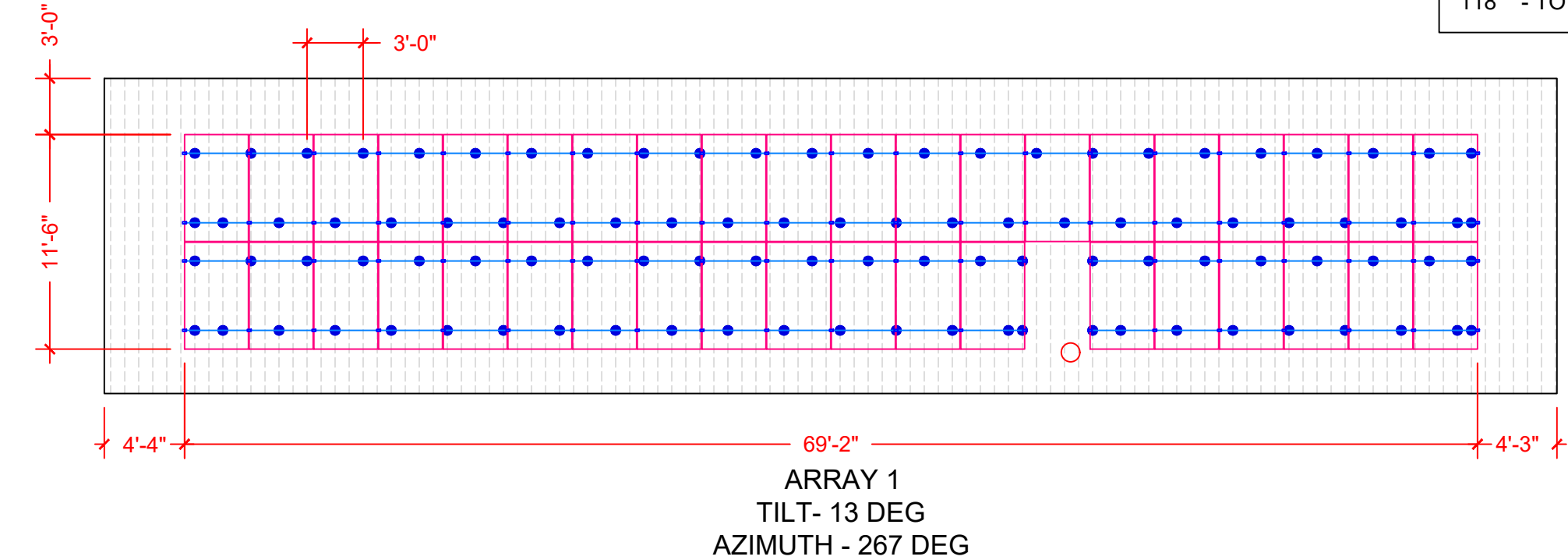
Note 2: a) Metal roof brackets require screws into purlins and deck
b) Do not install SolarFoot brackets into OSB deck without separate written instructions from the Engineer
c) Installers must verify metal panels are 26 gauge or thicker before use of proteabacket

Note 3: These drawings were prepared under my supervision. I have researched the code and to the best of my knowledge And belief, these drawings comply with the 2020 Florida Building Code.

Note 4: Installer shall adjust mount spacing by zone to match prescribed values on engineer's calculation letter

- CLAMP
- PROTEA BRACKET
- RAIL
- METAL TRAPEZOIDAL SEAM @ 09" O.C.

118 - TOTAL MOUNT



CONTRACTOR

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BATTLE COURT,FORT
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FL 32038
COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE
DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC

HENRY I. DIFRANCO, JR.

LICENSE

No. 71950

★

STATE OF

FLORIDA

PROFESSIONAL ENGINEER

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SHEET TITLE
ATTACHMENT PLAN

DRAWN DATE11/19/2021

DRAWN BYAP

SHEET NUMBER
A-103

ROOF SECTION(S)

ROOF 1	ROOF MATERIAL - METAL TRAPEZOIDAL SEAM RAFTER SIZE - 2"X6" O.C. SPACING - 24"
ROOF 2	ROOF MATERIAL - METAL TRAPEZOIDAL SEAM RAFTER SIZE - 2"X6" O.C. SPACING - 24"

CONTRACTOR
SUNPRO

22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT NAME & ADDRESS
MARIA RODRIGUEZ

**288 SOUTHWEST
BATTLE COURT,FORT
WHITE,
FL 32038**

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE
DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC



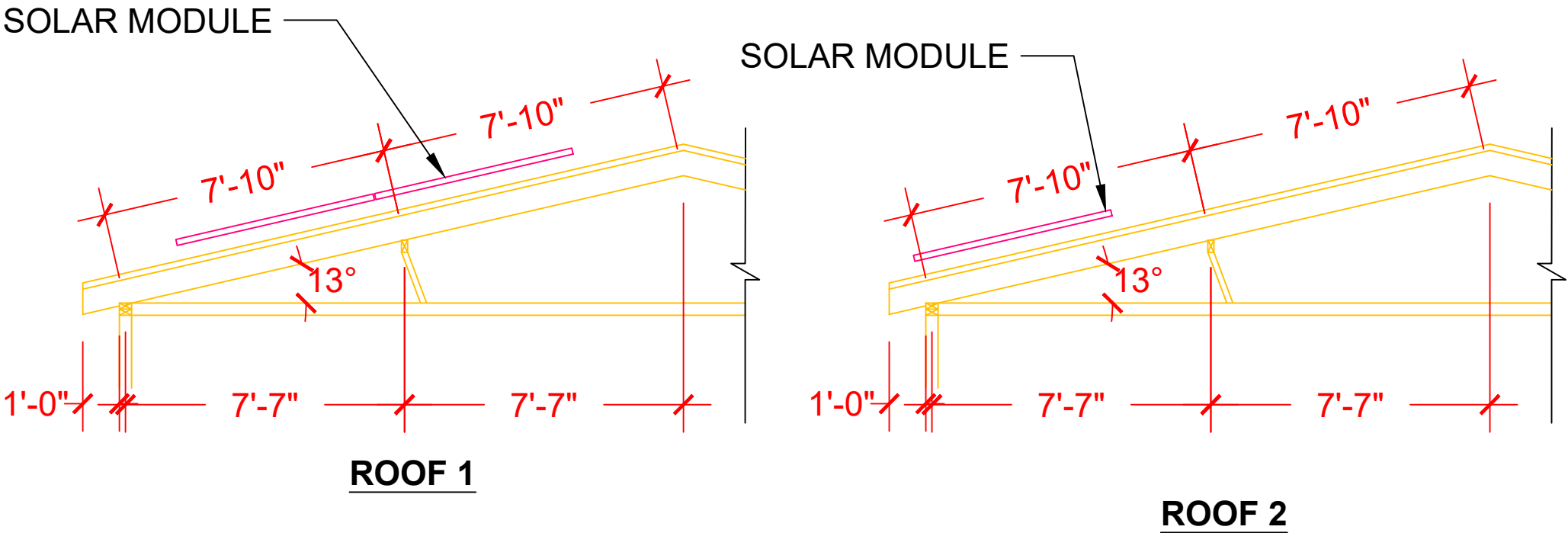
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SHEET TITLE
STRUCTURAL PLAN

DRAWN DATE	11/19/2021
DRAWN BY	AP

SHEET NUMBER
A-104



All dimensions and information provided by Sunpro inspection.

1 | STRUCTURAL PLAN
SCALE:1/4"=1'-0"

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	LG ELECTRONICS LG375N1C-A6
VMP	35.3V
IMP	10.63A
VOC	41.8V
ISC	11.35A
TEMP. COEFF. VOC	-0.26%/°C
MODULE DIMENSION	68.50"L x 41.02"W x 1.57"D (In Inch)

DC SIZE 46 X 375W = 17.250 kW DC-STC
AC SIZE 46X 290W = 13.340 kW AC

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ7PLUS-72-2-US MICROINVERTER
MIN/MAX DC VOLT RATING	22V MIN/ 60V MAX
MAX INPUT POWER	235W-440W
NOMINAL AC VOLTAGE RATING	240V/ 211-264V
MAX AC CURRENT	1.21A
MAX MODULES PER STRING	13 (SINGLE PHASE)
MAX OUTPUT POWER	290 VA

WIRE /CONDUIT SCHEDULE	
TAG	DESCRIPTION
1	#12/2 ROMEX IN ATTIC/#10 THWN-2 ON EXTERIOR & (1)#6 THWN -2 / (GN)
2	#4 THWN-2 & (1)#6 THWN-2 GROUND / (GN) (IN TRENCH 18" DEEP, 40 ' APPROX.)
3	#4 THWN-2 & (1)#6 THWN-2 GROUND / (GN)
4	(1)#6 BARE GROUND

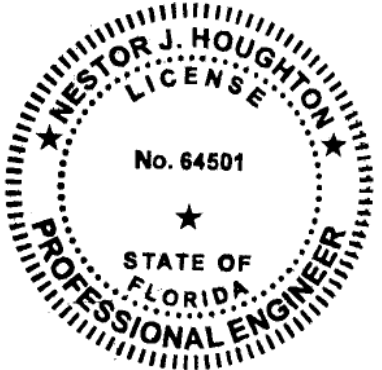
(GN) GENERAL CONDUIT NOTE :
CONDUIT TO BE UL LISTED FOR WET LOCATIONS AND UV PROTECTED (EX. -EMT,SCH 80 PVC OR RMC)*FMC MAYBE USED IN INDOOR APPLICATIONS WHERE PERMITTED BY NEC ART .348

SUNPRO

22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT NAME & ADDRESS
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BATTLE COURT,FORT
WHITE,
FL 32038**
COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE
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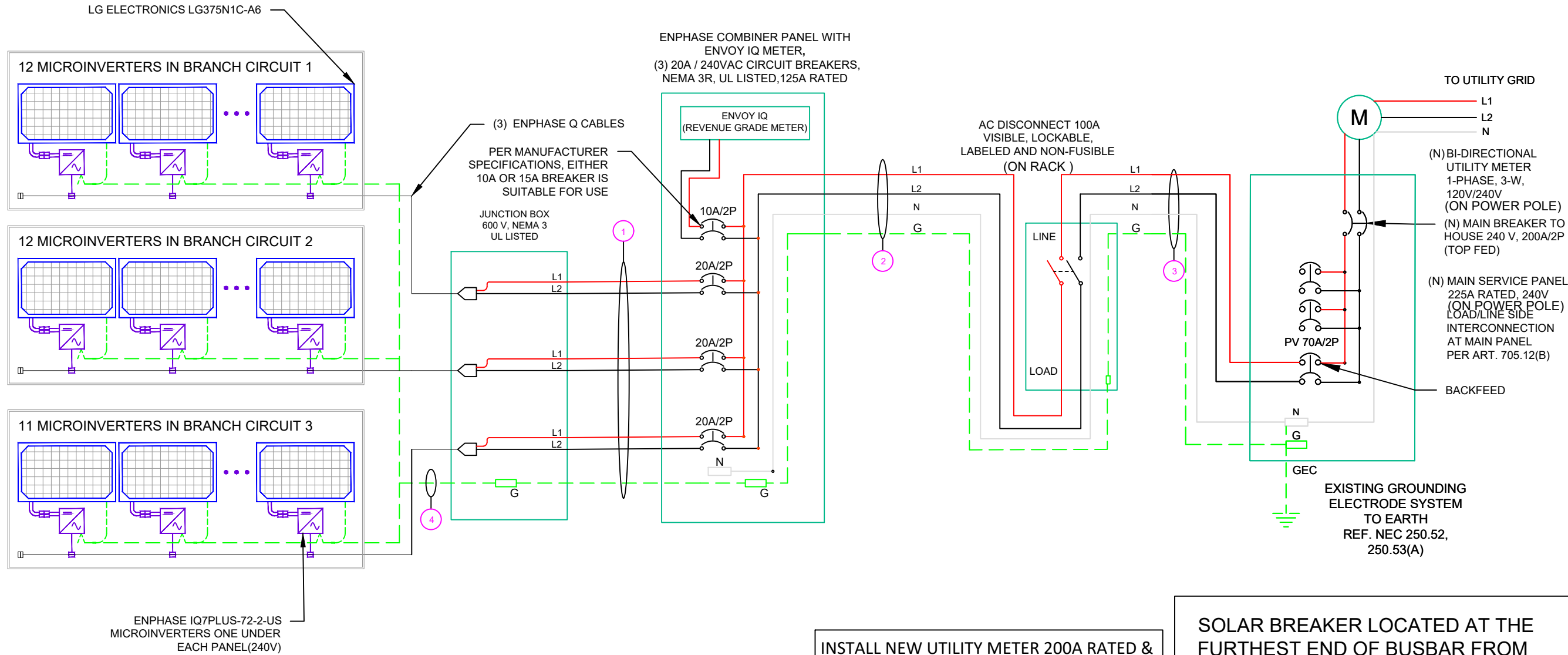
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FLORIDA FIRM NO. 30649

SHEET TITLE
LINE DIAGRAM

DRAWN DATE	11/19/2021
DRAWN BY	AP

SHEET NUMBER
E-601



INSTALL NEW UTILITY METER 200A RATED &
NEW MSP 225A/200A RATED

SOLAR BREAKER LOCATED AT THE
FURTHEST END OF BUSBAR FROM
THE MAIN BREAKER OR FEEDER UNIT

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-5°
AMBIENT TEMP (HIGH TEMP 2%)	34°
CONDUIT HEIGHT	0.5"
CONDUCTOR TEMPERATURE RATE	90°

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS
.80	4-6
.70	7-9
.50	10-20

CONTRACTOR

SUNPRO

22171 MCH RD

MANDEVILLE, LA 70471

PHONE: 9152011490

PROJECT NAME & ADDRESS

MARIA RODRIGUEZ

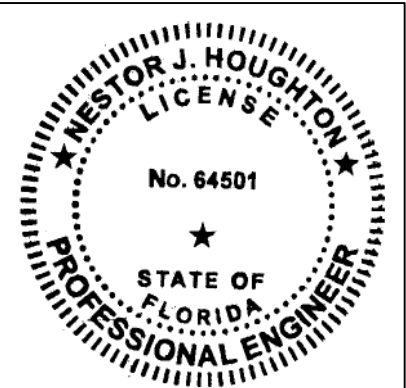
288 SOUTHWEST BATTLE COURT,FORT WHITE, FL 32038

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 17.250 KW DC-(STC)

AC SIZE: 13.340 KW AC



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SHEET TITLE

ELECTRICAL CALCULATIONS

DRAWN DATE	11/19/2021
DRAWN BY	AP

SHEET NUMBER

E-602

CALCULATIONS:

1. CURRENT CARRYING CONDUCTOR

(A) BEFORE IQ COMBINER PANEL
 AMBIENT TEMPERATURE - (34)°C ...NEC 310.15(B)(3)(c)
 TEMPERATURE DERATE FACTOR - 0.96 ...NEC 310.15(B)(2)(a)
 GROUPING FACTOR - 0.8...NEC 310.15(B)(3)(a)

CONDUCTOR AMPACITY
 = (INV O/P CURRENT) x 1.25 / A.T.F / G.F ...NEC 690.8(B)
 = [(12 x 1.21) x 1.25] / [0.96 x 0.8]
 = 23.63A
 SELECTED CONDUCTOR - #12 THWN-2 ...NEC 310.15(B)(16)

(B) AFTER IQ COMBINER PANEL
 TEMPERATURE DERATE FACTOR - 0.96
 GROUPING FACTOR - 1

CONDUCTOR AMPACITY
 = (TOTAL INV O/P CURRENT) x 1.25 / 0.96/ 1 ...NEC 690.8(B)
 = [(46 x 1.21) x 1.25] / [0.96 x 1]
 = 72.47 A
 SELECTED CONDUCTOR - #4 THWN-2 ...NEC 310.15(B)(16)

2. PV OVER CURRENT PROTECTION ...NEC 690.9(B)
 = TOTAL INVERTER O/P CURRENT x 1.25
 = (46 x 1.21) x 1.25 = 69.58 A
 SELECTED OCPD = 70 A ...NEC 240.6

3. 120% RULE FOR BACKFEED BREAKER ...NEC 705.12(B)(2)(3)(b)

MCB + PV BREAKER <= (1.2 x BUS BAR
 RATING RATING RATING)
 (200 + 70) <= 1.2 x 225A
 270.00 <= 270.00 HENCE OK

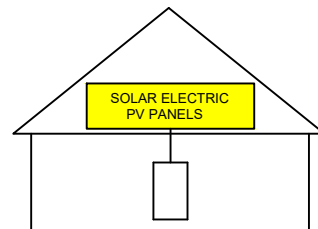
4. VOLTAGE DROP CALCULATION
 VOLTAGE DROP= (0.2 x LENGTH OF CONDUCTOR x
 CURRENT x RESISTANCE IN CONDUCTOR) / 240
 = (0.2 x 40 x 55.66 x 0.31 (FOR #4 AWG WIRE)) / 240
 = 0.58%

VOLTAGE DROP IS WITHIN PERMISSIBLE LIMIT OF
 3%.HENCE OK

**WARNING: PHOTOVOLTAIC
POWER SOURCE**

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



AC DISCONNECT

WARNING
ELECTRIC SHOCK HAZARD

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

**PHOTOVOLTAIC SYSTEM
AC DISCONNECT**

OPERATING VOLTAGE: ____ VOLTS
OPERATING CURRENT: ____ AMPS

**SOLAR
BREAKER**

AC COMBINER BOX

**PHOTOVOLTAIC
MICROINVERTERS
LOCATED UNDER
EACH PV MODULE IN
ROOFTOP ARRAY**

**PHOTOVOLTAIC SYSTEM
EQUIPPED WITH
RAPID SHUTDOWN**

RATED AC OUTPUT CURRENT: ____
NOM. OPERATING VOLTAGE: ____

WARNING
DUAL POWER SOURCES

SOURCES: UTILITY GRID AND PV
SOLAR ELECTRIC SYSTEM

____ KW SOLAR
DISCONNECT LOCATED

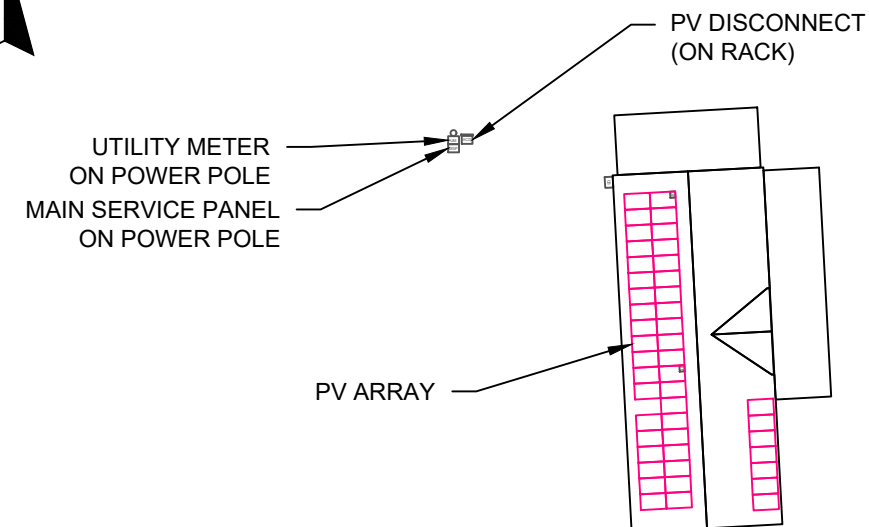
____ FT ←

→ FT ____

WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED
FROM THE FOLLOWING SOURCES WITH
DISCONNECTS LOCATED AS SHOWN:



CONTRACTOR

SUNPRO

22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT NAME & ADDRESS

MARIA RODRIGUEZ

**288 SOUTHWEST
BATTLE COURT, FORT
WHITE,
FL 32038**

COUNTY: -COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC



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FLORIDA FIRM NO. 30649

SHEET TITLE

PLACARD

DRAWN DATE 11/19/2021

DRAWN BY AP

SHEET NUMBER

E-603

22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT NAME & ADDRESS
MARIA RODRIGUEZ
**288 SOUTHWEST
BATTLE COURT,FORT
WHITE,
FL 32038**
COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE
DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC

SHEET TITLE
**LOAD
CALCULATION**

DRAWN DATE 11/19/2021
DRAWN BY AP

SHEET NUMBER
E-604

Residential Standard Calculation

by: John Sokolik

Version 2011 L

9/25/1997

Job Name

STEP 1 Article 220.42 & 220.52

sq. ft

2700

General Lighting load

8,100 VA

4

Small Appliance

6,000 VA

1

Laundry circuit

1,500 VA

Gen.Lgt, Sm App.& Laun. Load

15,600 VA

3,000 VA @ 100%=

3,000 VA

12,600 VA @ 35% =

4,410 VA

VA @ 25% =

VA

10/27/2021 13:49

General Lighting Demand Load

7,410 VA

STEP 2 Article 220.50 & 220.51

A/C Condenser & Fixed Electric Space Heating

QTY

Total

1

5 ton

7,130 VA

AHU 1

9.6kW

10,800 VA

1

A/C #2

VA

AHU 2

Select

VA

Qty

A/C #3

VA

AHU 3

Select

VA

Qty

A/C #4

VA

AHU 4

Select

VA

Qty

A/C #5

VA

AHU 5

Select

VA

Qty

Heating Load

10,800 VA

CU Load

8,330 VA

Greater of Heat @ 100% vs.A/C @ 100%

10,800 VA

STEP 3 Article 220.53

4,500 VA

1

Water Heater

4,500 VA

1,400 VA

1

Refrigerator

1,400 VA

600 VA

Freezer

VA

1,030 VA

1

Dishwasher

1,030 VA

690 VA

Disposal

VA

400 VA

R / Hood

VA

1,630 VA

Microwave

VA

4,000 VA

Microwave

VA

170 VA

Mini Refrig

VA

400 VA

Wine Clr

VA

5,000 VA

Insta Hot

VA

1,500 VA

Ironing Center

VA

select

Jacuzzi Tub

VA

select

Sprinkler Pump

VA

select

Well Pump

VA

select

Fountain Pump

VA

select

Elevator

VA

Pool Equip. Panel

VA 100% Demand

GATES

VA No Demand

Other load

VA No Demand

Appliance Demand Load

6,930 VA

Dryer Demand Load

5,000 VA

Range Demand Load

8,000 VA

Service Demand

38,140 VA

Demand Load

159 A

Neutral Demand

79 A

Min.Service Req.

175 A

Min. Feeder size

1/0

Min. Neutral size

4

Eq. Grding Cond.

6

Copper

Total Appliance Load

6,930 VA

4 or more demand @ 75% plus 100% demand loads

VA

STEP 4 Article 220.54

Electric Clothes Dryers

5,000 VA

STEP 5 Article 220.55

Electric Ranges

10,000 W

Col C demand

8000

or Number of appliances

Check Box for Gas Range

Cooktop

Col B demand

Cooktop

Col B demand

Oven(s)

Col B demand

Oven(s)

Col B demand

Number of appliances

0

Dem. Factor

0%

Cooktop & Oven Demand Load

W

jmp1jds@comcast.net

Pool Panel Feeder Calculation

(See Note)

Continuous Motors

0

.....

Non-continuous

0

.....

Spa heater 11 kVA

.....

Pool heater 3.5 ton

.....

Pool heater 5 ton

.....

Pool Light

select

0

.....

Blower

select

0

240v

other load

0

240v

other load

0

240v

Min.Copper Pool Feeder

AWG

Minimum Panel Rating

A

A

B

N

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

A

A

A

Phase Amperes

Neut. load

Continuous Motors

select

240v

select

240v

select

240v

select

240v

select

240v

Non-continuous Motors

select

240v

select

240v

select

240v

select

240v

0.0

Motor Neutral Load

Max.Unbalanced Neutral Load

LG NeON[®]2

LG370N1C-A6 | LG375N1C-A6 | LG380N1C-A6 Preliminary

370W 375W 380W

The LG NeON[®] 2 is LG's best selling solar module and one of the most powerful and versatile modules on the market today. The cells are designed to appear all-black at a distance, and the performance warranty guarantees 90.6% of labeled power output at 25 years.



Features



Enhanced Performance Warranty

LG NeON[®] 2 has an enhanced performance warranty. After 25 years, LG NeON[®] 2 is guaranteed at least 90.6% of initial performance.



25-Year Limited Product Warranty

The NeON[®] 2 is covered by a 25-year limited product warranty. In addition, up to \$450 of labor costs will be covered in the rare case that a module needs to be repaired or replaced.



Solid Performance on Hot Days

LG NeON[®] 2 performs well on hot days due to its low temperature coefficient.



Roof Aesthetics

LG NeON[®] 2 has been designed with aesthetics in mind using thinner wires that appear all black at a distance.

When you go solar, ask for the brand you can trust: LG Solar

About LG Electronics USA, Inc.

LG Electronics is a global leader in electronic products in the clean energy markets by offering solar PV panels and energy storage systems. The company first embarked on a solar energy source research program in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry and materials industries. In 2010, LG Solar successfully released its first Mono[®] series to the market, which is now available in 32 countries. The NeON[®] (previous Mono[®] NeON), NeON[®]2, NeON[®]2 BiFacial won the "Intersolar AWARD" in 2013, 2015 and 2016, which demonstrates LG's leadership and innovation in the solar industry.



LG NeON[®]2

LG370N1C-A6 | LG375N1C-A6 | LG380N1C-A6



Preliminary

General Data

Cell Properties (Material/Type)	Monocrystalline/N-type
Cell Maker	LG
Cell Configuration	60 Cells (6 x 10)
Module Dimensions (L x W x H)	1,740mm x 1,042mm x 40mm
Weight	18.6 kg
Glass (Material)	Tempered Glass with AR Coating
Backsheet (Color)	White
Frame (Material)	Anodized Aluminium
Junction Box (Protection Degree)	IP 68 with 3 Bypass Diodes
Cables (Length)	1,100mm x 2EA
Connector (Type/Maker)	MC 4/MC

Certifications and Warranty

Certifications**	IEC 61215-1/-1-1/-2 : 2016, IEC 61730-1/2 : 2016, UL 61730-1 : 2017, UL 61730-2 : 2017, ISO 9001, ISO 14001, ISO 50001, OHSAS 18001
Salt Mist Corrosion Test	IEC 61701:2012 Severity 6
Ammonia Corrosion Test	IEC 62716 : 2013
Module Fire Performance	Type 1 (UL 61730)
Fire Rating	Class C (UL 790, UL/C/ORD C 1703)
Solar Module Product Warranty	25 Year Limited
Solar Module Output Warranty	Linear Warranty*

*Improved: 1st year 98.5%, from 2-24th year: 0.33%/year down, 90.6% at year 25

**In Progress

Temperature Characteristics

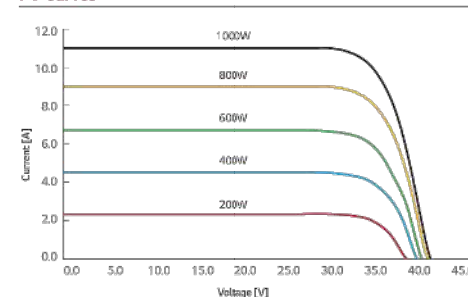
NMOT*	[°C]	42 ± 3
Pmax	[%/°C]	-0.34
Voc	[%/°C]	-0.26
Isc	[%/°C]	0.03

*NMOT (Nominal Module Operating Temperature): Irradiance 800 W/m², Ambient temperature 20°C, Wind speed 1 m/s, Spectrum AM 1.5

Electrical Properties (NMOT)

Model		LG370N1C-A6	LG375N1C-A6	LG380N1C-A6
Maximum Power (Pmax)	[W]	277	281	285
MPP Voltage (Vmpp)	[V]	32.8	33.2	33.5
MPP Current (Impp)	[A]	8.46	8.48	8.49
Open Circuit Voltage (Voc)	[V]	39.3	39.4	39.4
Short Circuit Current (Isc)	[A]	9.09	9.13	9.16

I-V Curves



Electrical Properties (STC*)

Model		LG370N1C-A6	LG375N1C-A6	LG380N1C-A6
Maximum Power (Pmax)	[W]	370	375	380
MPP Voltage (Vmpp)	[V]	34.9	35.3	35.7
MPP Current (Impp)	[A]	10.61	10.63	10.65
Open Circuit Voltage (Voc, ± 5%)	[V]	41.7	41.8	41.9
Short Circuit Current (Isc, ± 5%)	[A]	11.31	11.35	11.39
Module Efficiency	[%]	20.4	20.7	21.0
Bifaciality Coefficient of Power	[%]	10		
Power Tolerance	[%]	0 ~ +3		

*STC (Standard Test Condition): Irradiance 1000 W/m², cell temperature 25°C, AM 1.5

Operating Conditions

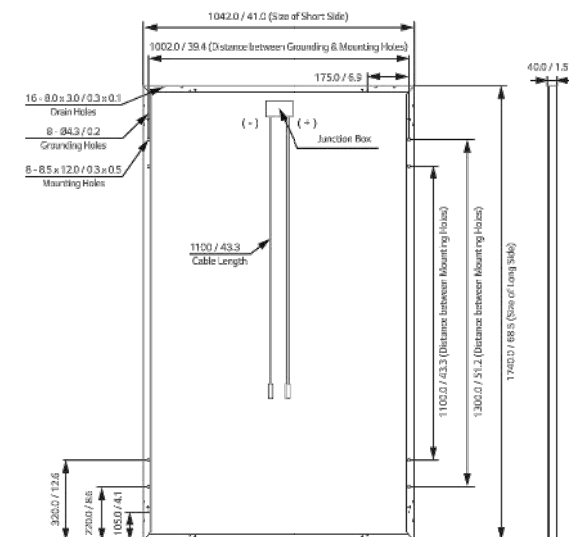
Operating Temperature	[°C]	-40 ~+85
Maximum System Voltage	[V]	1,000
Maximum Series Fuse Rating	[A]	20
Mechanical Test Load* (Front)	[Pa/psf]	5,400
Mechanical Test Load* (Rear)	[Pa/psf]	4,000

*Based on IEC 61215-2 : 2016 (Test Load = Design Load x Safety Factor (1.5))
Mechanical Test Loads 6,000Pa / 5,400Pa based on IEC 61215 : 2005

Packaging Configuration

Number of Modules per Pallet	[EA]	25
Number of Modules per 40' Container	[EA]	650
Number of Modules per 53' Container	[EA]	850
Packaging Box Dimensions (L x W x H)	[mm]	1,790 x 1,120 x 1,213
Packaging Box Dimensions (L x W x H)	[in]	70.5 x 44.1 x 47.8
Packaging Box Gross Weight	[kg]	500
Packaging Box Gross Weight	[lb]	1,102

Dimensions (mm/inch)



LG Electronics USA, Inc.
Solar Business Division
2090 Millbrook Drive
Lincolnshire, IL 60069
www.lg-solar.com

Product specifications are subject to change without notice.
LG370-380N1C-A6_AUS.pdf
121520

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CONTRACTOR
SUNPRO

22171 MCH RD
MANDEVILLE, LA 70471

PHONE: 9152011490

PROJECT NAME & ADDRESS

MARIA RODRIGUEZ

**288 SOUTHWEST
BATTLE COURT, FORT
WHITE,
FL 32038**

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC

SHEET TITLE
**RESOURCE
DOCUMENT**

DRAWN DATE 11/19/2021

DRAWN BY AP

SHEET NUMBER

R-001

Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.



Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell modules.



To learn more about Enphase offerings, visit enphase.com



Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US		IQ7PLUS-72-2-US	
Commonly used module pairings ¹	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	0 A		0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
OUTPUT DATA (AC)	IQ 7 Microinverter		IQ 7+ Microinverter	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range ²	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit ³	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	0 A		0 A	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
EFFICIENCY	@240 V	@208 V	@240 V	@208 V
Peak efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %

MECHANICAL DATA

Ambient temperature range	-40°C to +65°C
Relative humidity range	4% to 100% (condensing)
Connector type (IQ7-60-2-US & IQ7PLUS-72-2-US)	MC4 (or Amphenol H4-UTX with additional Q-DCC-5 adapter)
Dimensions (WxHxD)	212 mm x 175 mm x 30.2 mm (without bracket)
Weight	1.08 kg (2.38 lbs)
Cooling	Natural convection - No fans
Approved for wet locations	Yes
Pollution degree	PD3
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure
Environmental category / UV exposure rating	NEMA Type 6 / outdoor

FEATURES

Communication	Power Line Communication (PLC)
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.
Disconnecting means:	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.

1. No enforced DC/AC ratio. See the compatibility calculator at <https://enphase.com/en-us/support/module-compatibility>.
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit enphase.com

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2019-3-26



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MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT NAME & ADDRESS
MARIA RODRIGUEZ
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FL 32038**
COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE
DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC

SHEET TITLE RESOURCE DOCUMENT

DRAWN DATE	11/19/2021
DRAWN BY	AP

SHEET NUMBER
R-002

Enphase IQ Combiner 3 (X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3™** with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.



Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring
- Supports Ensemble Communications Kit for communication with Enphase Encharge™ storage and Enphase Enpower™ smart switch

Simple

- Reduced size from previous combiner
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- UL listed



To learn more about Enphase offerings, visit enphase.com



Enphase IQ Combiner 3

MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%).
ACCESSORIES and REPLACEMENT PARTS (not included, order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G/12-year data plan) CELLMODEM-01 (3G/5-year data plan) CELLMODEM-M1 (4G based LTE-M/5-year data plan)	Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.)
Consumption Monitoring* CT CT-200-SPLIT	Split core current transformers enable whole home consumption metering (+/- 2.5%).
* Consumption monitoring is required for Enphase Storage Systems	
Ensemble Communications Kit COMMS-KIT-01	Installed at the IQ Envoy. For communications with Enphase Encharge™ storage and Enphase Enpower™ smart switch. Includes USB cable for connection to IQ Envoy or Enphase IQ Combiner™ and allows wireless communication with Encharge and Enpower.
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replace the default solar shield with this Ensemble Combiner Solar Shield to match the look and feel of the Enphase Enpower™ smart switch and the Enphase Encharge™ storage system
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80 A of distributed generation / 95 A with IQ Envoy breaker included
Envoy breaker	10A or 15A rating GE Q-line/Siemens Type QP /Eaton BR series included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy
MECHANICAL DATA	
Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5" x 14.75" x 6.63"). Height is 21.06" (53.5 cm with mounting brackets).
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	CELLMODEM-M1 4G based LTE-M cellular modem (not included). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
COMPLIANCE	
Compliance, Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit enphase.com

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CONTRACTOR
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22171 MCH RD
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PHONE: 9152011490

PROJECT NAME & ADDRESS
MARIA RODRIGUEZ
**288 SOUTHWEST
BATTLE COURT,FORT
WHITE,
FL 32038**
COUNTY:-COLUMBIA COUNTY

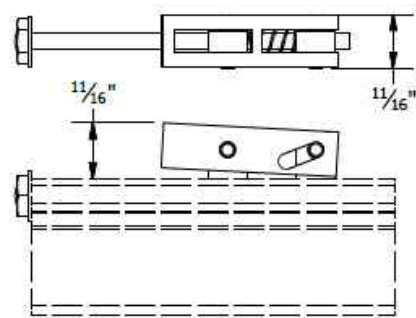
SYSTEM SIZE
DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC

SHEET TITLE
**RESOURCE
DOCUMENT**

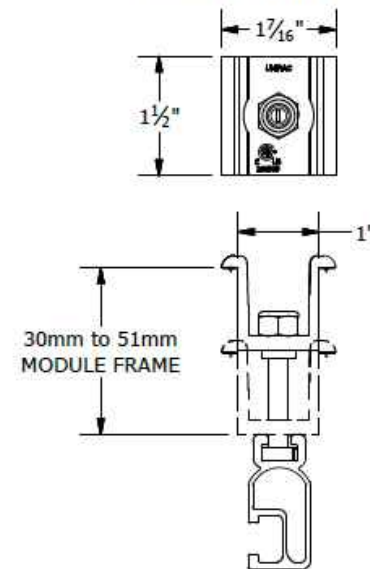
DRAWN DATE	11/19/2021
DRAWN BY	AP

SHEET NUMBER
R-003

PRO SERIES END CLAMP

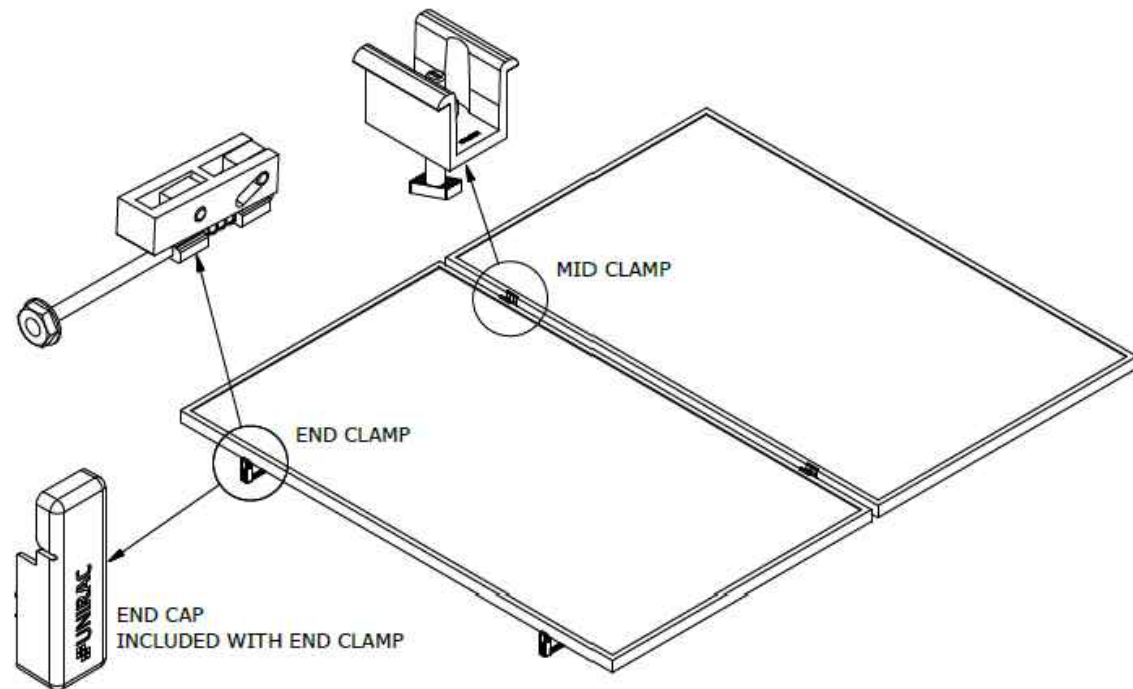


PRO SERIES MID CLAMP



PART # TABLE

P/N	DESCRIPTION
302035M	ENDCLAMP PRO
302030M	MIDCLAMP PRO - MILL
302030D	MIDCLAMP PRO - DRK



1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	PRO SERIES BONDING CLAMPS
REVISION DATE:	10/26/2017

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE
NOMINAL

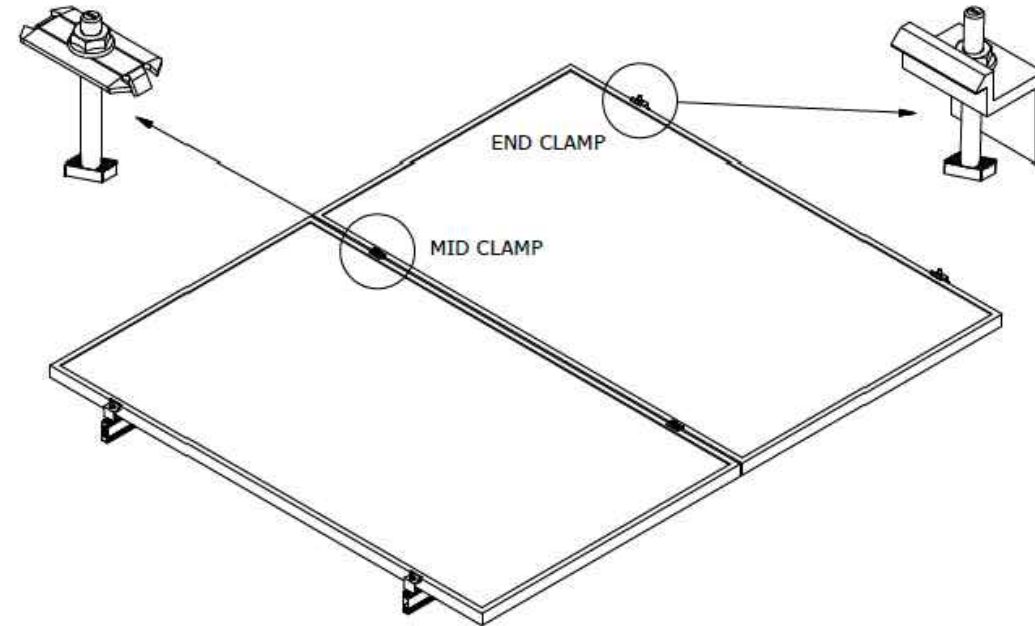
PRODUCT PROTECTED BY
ONE OR MORE US PATENTS
LEGAL NOTICE

SM-A01

SHEET

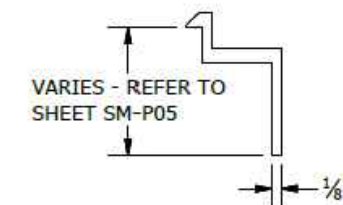
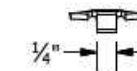
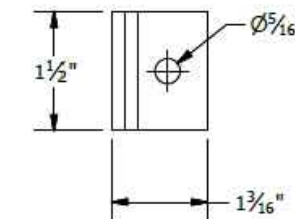
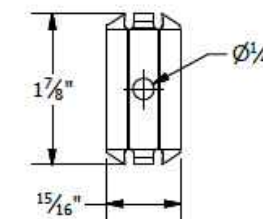
END CLAMP

MID CLAMP



PART # TABLE

P/N	DESCRIPTION
302027C	SM BND MIDCLAMP BC SS
302027D	SM BND MIDCLAMP BC DRK SS
302028C	SM BND MIDCLAMP EF SS
302028D	SM BND MIDCLAMP EF DRK SS
302029C	SM BND MIDCLAMP DK SS
302029D	SM BND MIDCLAMP DK DRK SS
	FOR BONDING END CLAMP REFER TO SHEET SM-P05



BONDING SM MID CLAMP

BONDING SM END CLAMP



1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	BONDING TOP CLAMPS
REVISION DATE:	10/26/2017

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE
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SM-A01A

SHEET

CONTRACTOR

SUNPRO

22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT NAME & ADDRESS

MARIA RODRIGUEZ

**288 SOUTHWEST
BATTLE COURT, FORT
WHITE,
FL 32038**

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC

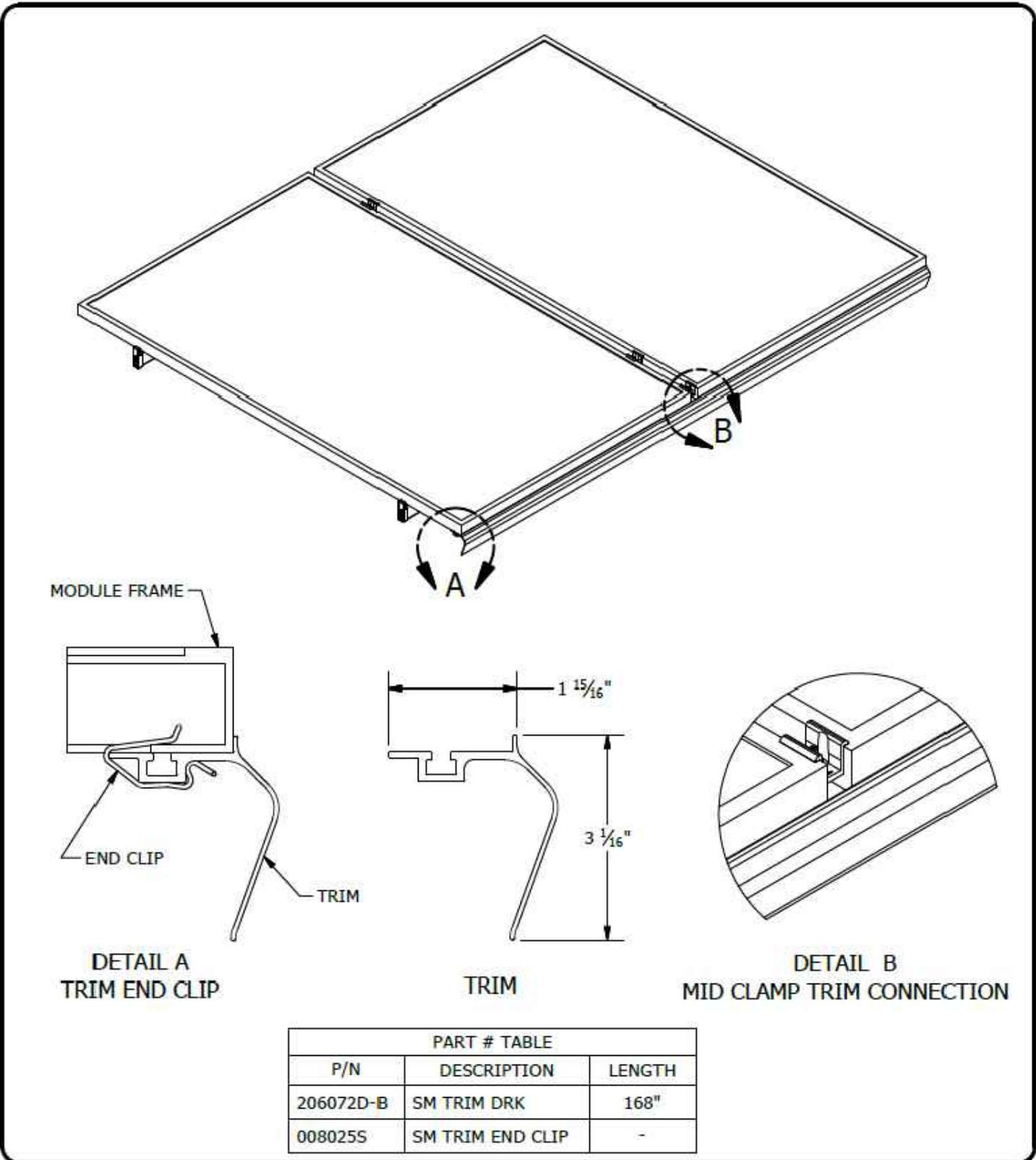
SHEET TITLE
**RESOURCE
DOCUMENT**

DRAWN DATE 11/19/2021

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SHEET NUMBER

R-004



PART # TABLE		
P/N	DESCRIPTION	LENGTH
206072D-B	SM TRIM DRK	168"
008025S	SM TRIM END CLIP	-



1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	SM TRIM END CLIP
REVISION DATE:	9/27/2017

DRAWING NOT TO SCALE
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SM-A02

SHEET

CONTRACTOR



22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT NAME & ADDRESS

MARIA RODRIGUEZ

288 SOUTHWEST
BATTLE COURT,FORT
WHITE,
FL 32038

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 17.250 KW DC-(STC)

AC SIZE: 13.340 KW AC

SHEET TITLE

RESOURCE
DOCUMENT

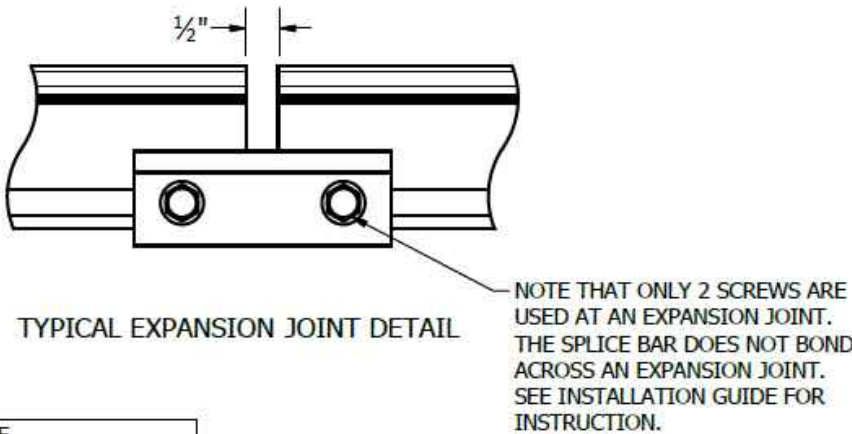
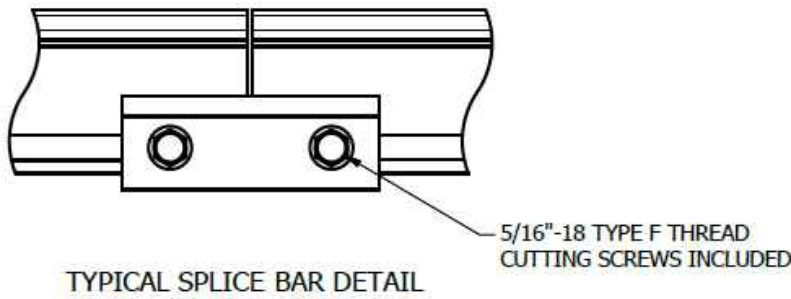
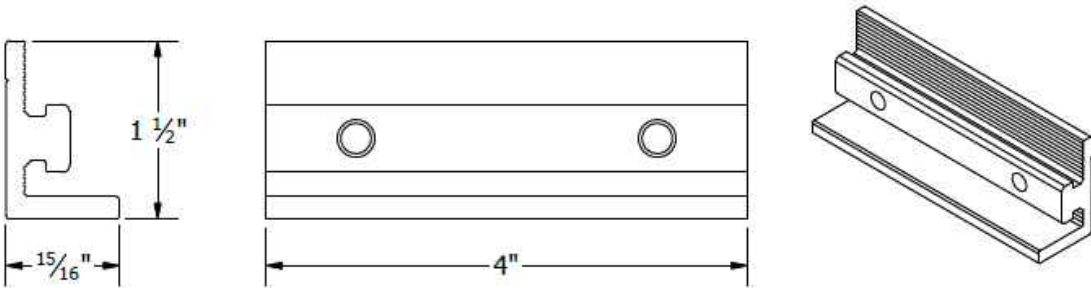
DRAWN DATE11/19/2021

DRAWN BYAP

SHEET NUMBER

R-005

BONDING SPLICE BAR



PART # TABLE	
P/N	DESCRIPTION
303019M	BND SPLICE BAR PRO SERIES MILL
303019D	BND SPLICE BAR PRO SERIES DRK

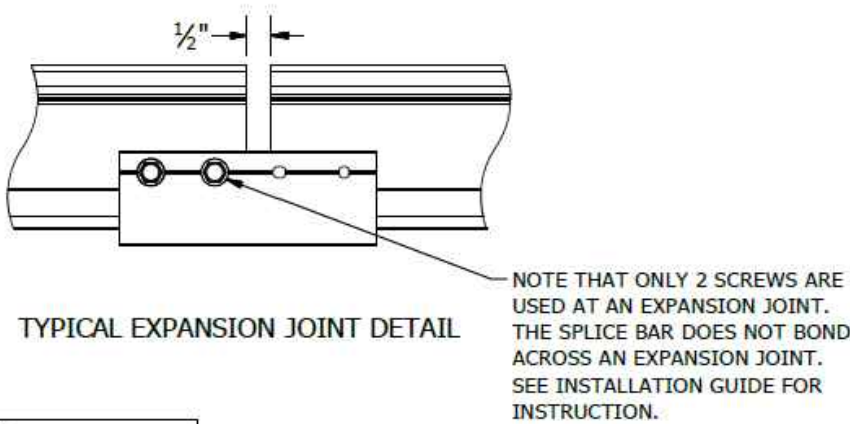
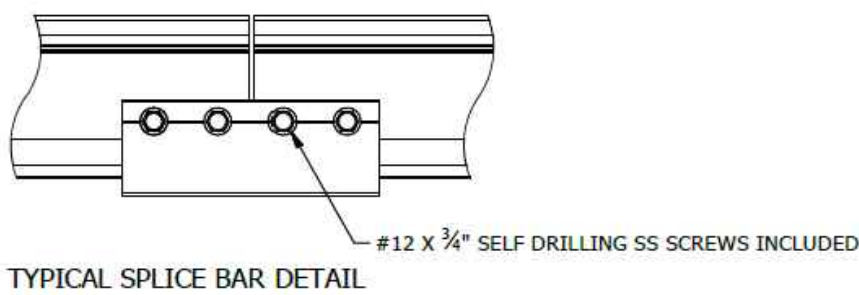
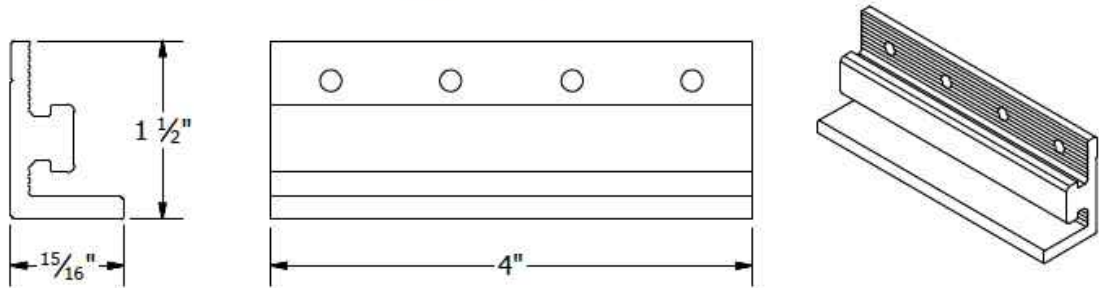
UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE: SOLARMOUNT
DRAWING TYPE: PART & ASSEMBLY
DESCRIPTION: BONDING SPLICE BAR PRO SERIES
REVISION DATE: 8/23/2018

DRAWING NOT TO SCALE
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SM-A05
SHEET

BONDING SPLICE BAR



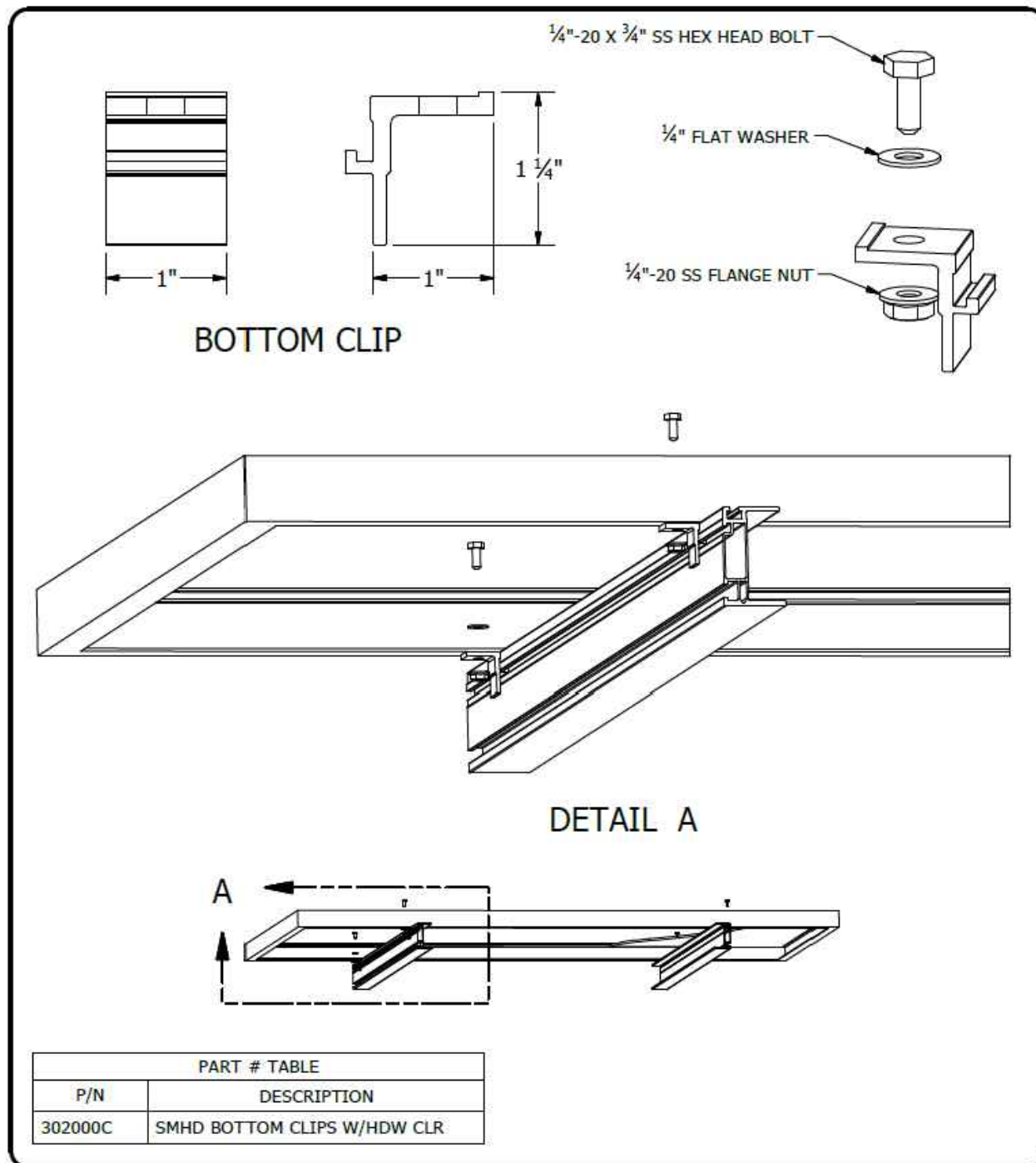
PART # TABLE	
P/N	DESCRIPTION
303018C	BND SPLICE BAR SERRATED CLR
303018D	BND SPLICE BAR SERRATED DRK

UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE: SOLARMOUNT
DRAWING TYPE: PART & ASSEMBLY
DESCRIPTION: BONDING SPLICE BAR
REVISION DATE: 9/27/2017

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SHEET



1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT HD
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	BOTTOM CLIP
REVISION DATE:	9/27/2017

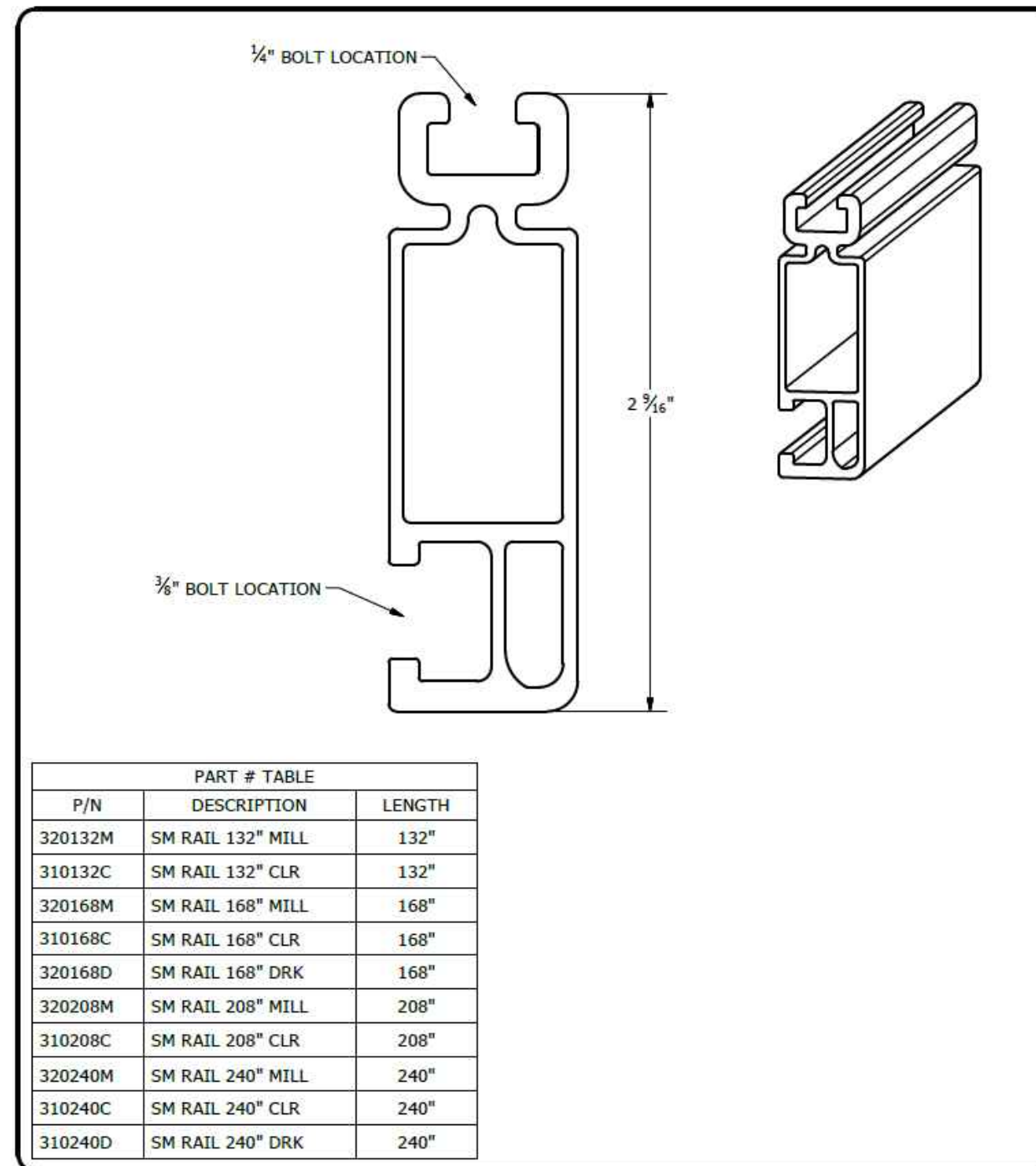
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1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DETAIL
DESCRIPTION:	STANDARD RAIL
REVISION DATE:	9/11/2017

DRAWING NOT TO SCALE
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LEGAL NOTICE

SM-P01

SHEET

CONTRACTOR

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PHONE: 9152011490

PROJECT NAME & ADDRESS

MARIA RODRIGUEZ

**288 SOUTHWEST
BATTLE COURT,FORT
WHITE,
FL 32038**

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC

SHEET TITLE

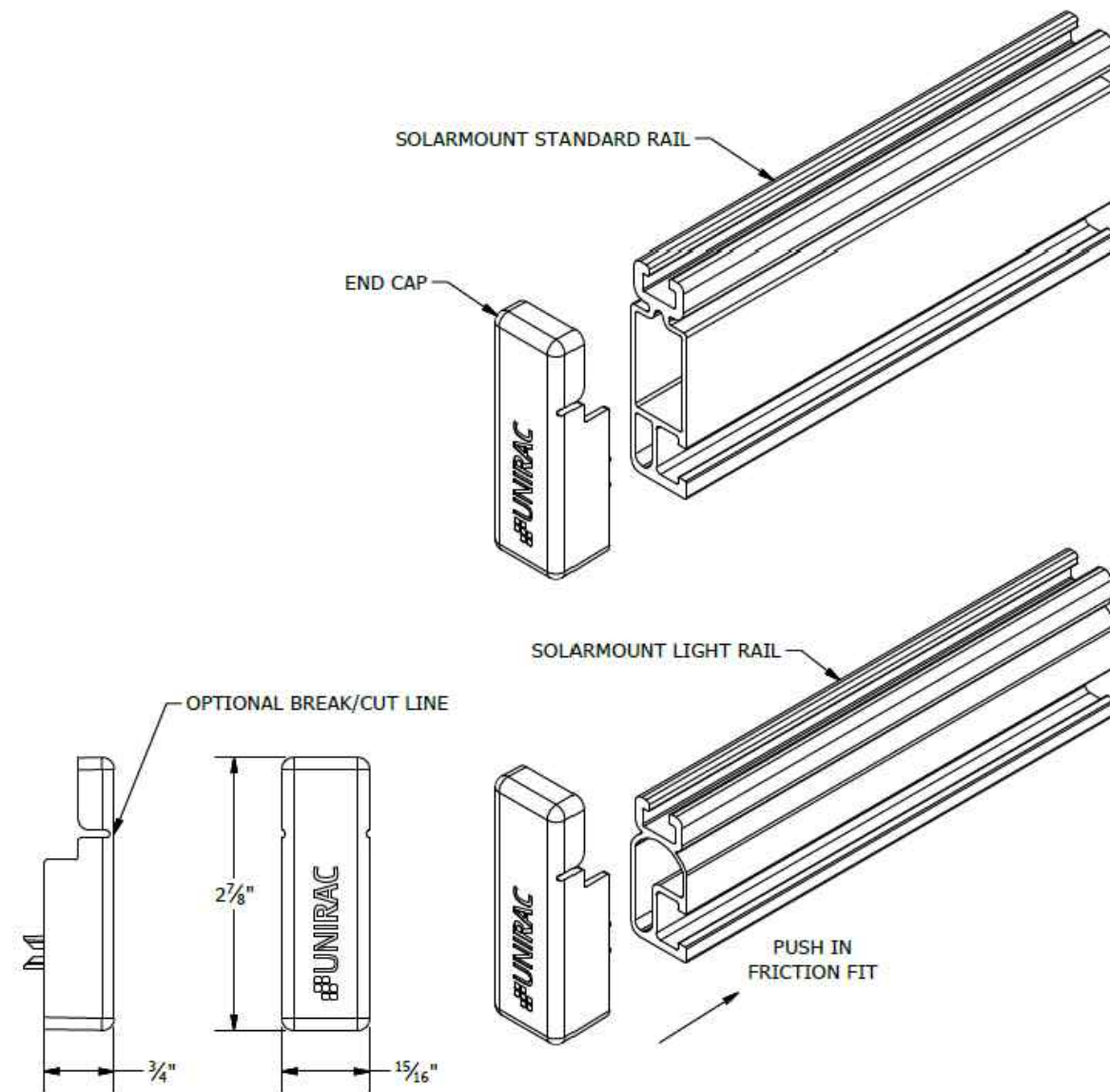
**RESOURCE
DOCUMENT**

DRAWN DATE	11/19/2021
DRAWN BY	AP

SHEET NUMBER

R-007

- NOTES:
1. END CAP INCLUDED WITH EVERY END CLAMP.
 2. END CAP FITS SOLARMOUNT LIGHT AND STANDARD RAIL PROFILES.

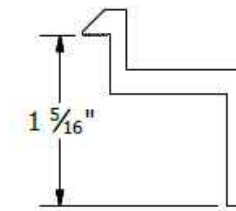


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1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

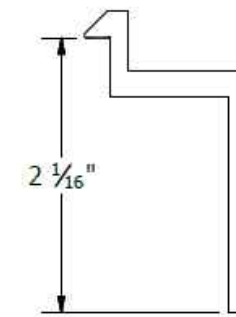
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DRAWING TYPE: PART DETAIL
DESCRIPTION: END CAPS
REVISION DATE: 9/27/2017

DRAWING NOT TO SCALE
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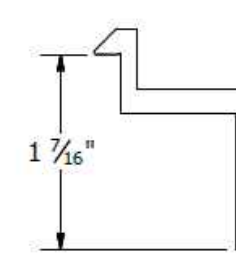
SM-P04
SHEET



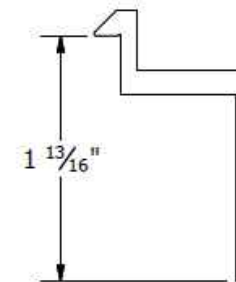
B CLAMP
30mm to 32mm Module Thickness
(1.18" to 1.26")



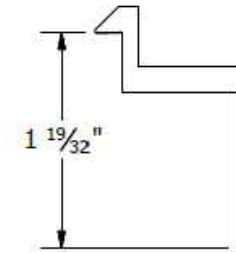
E CLAMP
50mm to 51mm Module Thickness
(1.97" to 2.00")



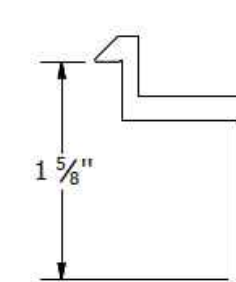
C CLAMP
33mm to 36mm Module Thickness
(1.30" to 1.42")



F CLAMP
45mm to 47mm Module Thickness
(1.77" to 1.85")

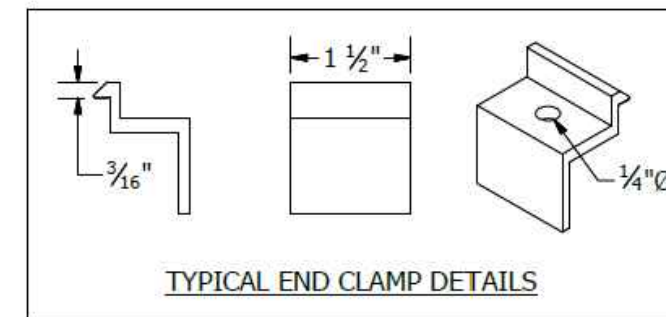


D CLAMP
38mm to 40mm Module Thickness
(1.50" to 1.57")



K CLAMP
39mm to 41mm Module Thickness
(1.54" to 1.61")

PART # TABLE	
P/N	DESCRIPTION
302021C	SM ENDCLAMP B CLR AL
302021D	SM ENDCLAMP B DRK AL
302022C	SM ENDCLAMP C CLR AL
302022D	SM ENDCLAMP C DRK AL
302023C	SM ENDCLAMP D CLR AL
302023D	SM ENDCLAMP D DRK AL
303024C	SM ENDCLAMP E CLR AL
302024D	SM ENDCLAMP E DRK AL
302025C	SM ENDCLAMP F CLR AL
302025D	SM ENDCLAMP F DRK AL
302026C	SM ENDCLAMP K CLR AL
302026D	SM ENDCLAMP K DRK AL



UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE: SOLARMOUNT
DRAWING TYPE: PART DETAIL
DESCRIPTION: END CLAMPS -
TOP MOUNTING
REVISION DATE: 9/27/2017

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE
NOMINAL
PRODUCT PROTECTED BY
ONE OR MORE US PATENTS
LEGAL NOTICE

SM-P05
SHEET

CONTRACTOR
SUNPRO

22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT NAME & ADDRESS
MARIA RODRIGUEZ
**288 SOUTHWEST
BATTLE COURT,FORT
WHITE,
FL 32038**
COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE
DC SIZE: 17.250 KW DC-(STC)
AC SIZE: 13.340 KW AC

SHEET TITLE
**RESOURCE
DOCUMENT**

DRAWN DATE 11/19/2021
DRAWN BY AP

SHEET NUMBER
R-008

S-5!®

The Right Way!™

NEW

NOW AVAILABLE
IN ALUMINUM

ProteaBracket™

ProteaBracket™

A versatile bracket for
mounting solar PV to
trapezoidal roof profiles

ProteaBracket™ is now made in aluminum. Still the most versatile trapezoidal metal roof attachment solution on the market, the S-5! ProteaBracket just got better!

The bracket features an adjustable attachment base and module attachment options to accommodate different roof profile dimensions and mounting options.

Our pre-applied EPDM gasket with peel and stick adhesive makes installation a snap, ensuring accurate and secure placement the first time.

With no messy sealants, faster installation, and a weather-proof fit, ProteaBracket offers you the most versatile solar attachment solution available.

ProteaBracket* can be used for
rail mounting or "direct-attach"
with S-5! PVKIT™

Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot™
- Load-tested for engineered application
- Corrosion-resistant materials
- Adjustable - Fits rib profiles up to 3"
- Peel-and-Stick prevents accidental shifting during installation
- Fully pre-assembled
- 25-year warranty*

*When ProteaBracket is used in conjunction with the S-5! PVKIT, an additional nut is required during installation.

*See www.S-5.com for details.



888-825-3432 | www.S-5.com

S-5!®

The Right Way!™

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal rib, exposed-fastened metal roof profiles!

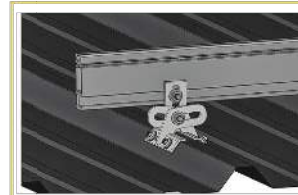
ProteaBracket™ is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

Note: All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

For design assistance, ask your distributor, or visit www.S-5.com for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

S-5!® holding strength is unmatched in the industry.

Multiple Attachment Options:



Side
Mount Rail



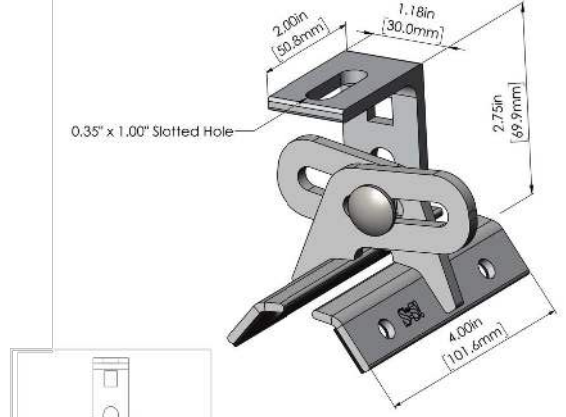
Bottom
Mount Rail



w/ S-5!
PVKIT™
(rail-less)

ProteaBracket™

ProteaBracket™ is still available in stainless steel.



ProteaBracket fits profiles
up to 3 inches

INSTALLATION:

No surface preparation needed. (1) Wipe away excess oil and debris. (2) Peel off adhesive release paper. (3) Align and mount bracket directly onto crown of panel. (4) Secure ProteaBracket through pre-punched holes, using piercing-point S-5! screws.



ProteaBracket™ and the S-5! PVKIT™ 2.0
mounted on a trapezoidal roof profile

S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents, and trademarks, visit the S-5! website at www.S-5.com.

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