

# NELSON RESIDENCE

## 8.000 kW PV SYSTEM

### 456 SW DURANT ST, FORT WHITE, FL 32038



**Castillo Engineering**  
SOLAR DONE RIGHT®

**CASTILLO ENGINEERING SERVICES, LLC**  
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ERMOCRATES E. CASTILLO - FL PE 52590

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REVISIONS		
DESCRIPTION	DATE	REV

PROJECT INSTALLER



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PROJECT NAME

**NELSON RESIDENCE**

456 SW DURANT ST,  
FORT WHITE, FL 32038

SHEET NAME

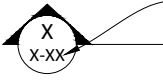
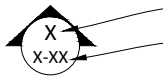
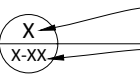
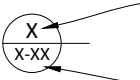












COVER SHEET

SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**G-01**

PROJECT DESCRIPTION:	CODES AND STANDARDS	OWNER	HOUSE PHOTO																								
<p>20x400 REC SOLAR: REC400-AA PURE (400W) MODULES ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES</p> <p>SYSTEM SIZE: 8.000 kW DC STC ARRAY AREA #1: 398.40 SQ FT.</p> <p><b>EQUIPMENT SUMMARY</b> 20 REC SOLAR: REC400-AA PURE (400W) MODULES 20 ENPHASE IQ7PLUS-72-2-US MICROINVERTERS</p> <p>RACKING: SNAPRACK ULTRA RAIL UR-60 ATTACHMENT: S-5! PROTEA BRACKET</p> <p><b>DESIGN CRITERIA:</b> WIND SPEED (ULT): 130 MPH WIND SPEED (ASD): 101 MPH RISK CATEGORY: II EXPOSURE: B</p>	<p><b>GOVERNING CODES :</b> FLORIDA RESIDENTIAL CODE, 7TH EDITION 2020 (FRC) FLORIDA PLUMBING CODE, 7TH EDITION 2020 (FPC) FLORIDA BUILDING CODE, 7TH EDITION 2020 (FBC) FLORIDA MECHANICAL CODE, 7TH EDITION 2020 (FMC) NATIONAL ELECTRICAL CODE 2017 (NEC) ASCE 7-16</p>	<p>NELSON, KEITH</p> <p><b>INSTALLER</b> Power Production Management 625 NW 8th Ave Gainesville, FL 32601 United States PH: (352) 263-0766</p> <p><b>ENGINEER</b> Castillo Engineering Services LLC 620 N. Wymore Road, Suite 250, Maitland FL 32751 TEL: (407) 289-2575 Ermocrates E. Castillo License#: FL PE 52590</p>																									
<b>STRUCTURAL CERTIFICATION:</b>	<b>ELECTRICAL CERTIFICATION:</b>	<b>SHEET INDEX</b>																									
I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL 2020 7th ED., CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES, AND EQUIPMENT DEAD LOADS.	I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE PV ELECTRICAL SYSTEM AND ELECTRICAL COMPONENTS ARE DESIGNED AND APPROVED USING THE STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE. FBC 107, THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION	<table border="1"> <thead> <tr> <th>SHEET #</th> <th>SHEET DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>G-01</td> <td>COVER SHEET</td> </tr> <tr> <td>A-00</td> <td>NOTES AND DESCRIPTION</td> </tr> <tr> <td>A-01</td> <td>ROOF PLAN</td> </tr> <tr> <td>S-01</td> <td>MODULE LAYOUT</td> </tr> <tr> <td>S-01.1</td> <td>PARTIAL PRESSURE AND MODULES EXPOSURE</td> </tr> <tr> <td>S-02</td> <td>ATTACHMENT DETAIL</td> </tr> <tr> <td>S-02.1</td> <td>STRUCTURE CALCULATION</td> </tr> <tr> <td>E-01</td> <td>ELECTRICAL LINE DIAGRAM</td> </tr> <tr> <td>E-02</td> <td>WIRING CALCULATIONS</td> </tr> <tr> <td>E-03</td> <td>SYSTEM LABELING</td> </tr> <tr> <td>DS-01-07</td> <td>DATA SHEETS</td> </tr> </tbody> </table>	SHEET #	SHEET DESCRIPTION	G-01	COVER SHEET	A-00	NOTES AND DESCRIPTION	A-01	ROOF PLAN	S-01	MODULE LAYOUT	S-01.1	PARTIAL PRESSURE AND MODULES EXPOSURE	S-02	ATTACHMENT DETAIL	S-02.1	STRUCTURE CALCULATION	E-01	ELECTRICAL LINE DIAGRAM	E-02	WIRING CALCULATIONS	E-03	SYSTEM LABELING	DS-01-07	DATA SHEETS	
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**Symbols:**

- Section.....  Sheet where section is located
- Elevation .....  Detail ID Letter  
Sheet where section is located
- Detail .....  Detail ID Letter  
Sheet where section is located
- Detail .....  Detail ID Letter  
(Enlarged Plan) ← Area to be enlarged  
Sheet where section is located
- Keyed Notes ..... 1 Keyed note designation on applicable sheet
- Ground Terminal ..... 
- Grounding Point/rod.... 
- Solar Panel .....  or 00 ← Module with Source Circuit number
- Combiner Box ..... CB
- ACD Disconnect ..... ACD
- Main Distribution Panel ..... MDP
- Fuse ..... 
- Overcurrent Breaker .. 
- Inverter ..... 
- Transformer ..... 
- Automatic ..... ATS  
Transfer Switch
- Vent, Attic fan (Roof obstruction) 
- PV Roof Attachment 
- Trusses 
- Conduit 
- Fire Access 

**Abbreviations:**

- AC Alternating Current
- ACD AC Disconnect
- APPROX Approximate
- AWG American Wire Gauge
- BAT Tesla Powerwall
- CB Combiner Box
- DC Direct Current
- DISC Disconnect
- (E) Existing
- EL Elevation
- EQ Equal
- GP Generation Panel
- JB Junction Box
- MCB Main Combiner Box
- MFR Manufacturer
- MID Microgrid Interconnect Device
- MIN Minimum
- MISC Miscellaneous
- MDP Main Distribution Panel
- (N) New
- NAVD North American Vertical datum
- OCPD Over Current Protection Device
- POCC Point Of Common Coupling
- PV Photovoltaic
- SF Squarefoot/feet
- STC Standard Test Conditions
- SD Soladeck
- TBD To Be Determined
- TYP Typical
- UNO Unless Noted Otherwise
- UM Utility meter
- VIF Verify In Field
- WP Weather Proof

**System Description**

This system is a grid-tied, PV system, with PV generation consisting of 20 REC SOLAR: REC400-AA PURE (400W) MODULES with a combined STC rated dc output power of 8,000W. The modules are connected into 20 ENPHASE IQ7PLUS-72-2-US MICROINVERTERS. The inverter has electronic maximum power point tracking to maximize energy captured by the PV modules. The inverter also has an internal ground fault detection and interruption device that is set to disconnect the array in the event that a ground fault that exceeds one ampere should occur. The inverter has DC and AC disconnect integrated system and labels are provided as required by the National Electrical Code.

When the sun is shining, power from the PV array is fed into the inverter, where it is converted from DC to AC. The inverter output is then used to contribute to the power requirements of the occupancy. If PV power meets the requirements of the loads of the occupancy, any remaining PV power is sold back to the utility. When utility power is available, but PV power is not available, building loads are supplied by the utility.

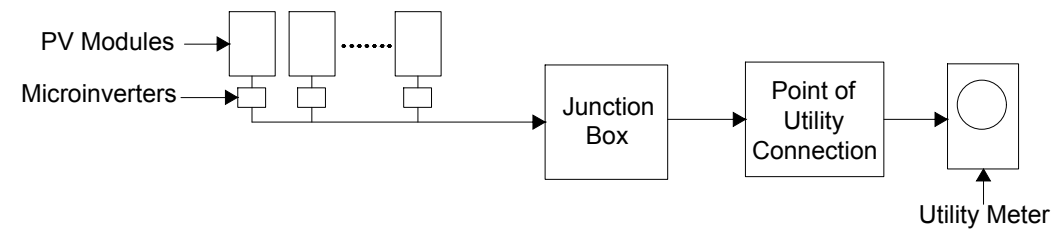


Figure 1: PV System Block Diagram  
The inverter meets the requirements of IEEE 1547 and UL 1741.

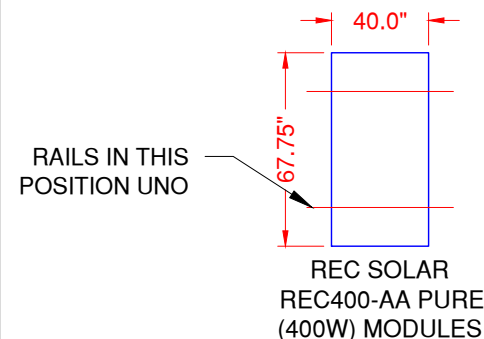
**FALL PROTECTION:**

ANCHORAGES USED FOR ATTACHMENT OF PERSONAL FALL ARREST EQUIPMENT MUST BE INDEPENDENT OF ANY ANCHORAGE BEING USED TO SUPPORT OR SUSPEND PLATFORMS, AND CAPABLE OF SUPPORTING AT LEAST 5,000 POUNDS PER EMPLOYEE ATTACHED, OR MUST BE DESIGNED AND USED AS FOLLOWS:

- AS PART OF A COMPLETE PERSONAL FALL ARREST SYSTEM WHICH MAINTAINS A SAFETY FACTOR OF AT LEAST TWO.
- UNDER THE SUPERVISION OF A QUALIFIED PERSON

**ADDITIONAL INFORMATION**

- 29 CFR 1926 SUBPART M, FALL PROTECTION. OSHA STANDARD.
- 1926.502, FALL PROTECTION SYSTEMS CRITERIA AND PRACTICES
- 1926.502(D)(15)



ALLOWABLE DESIGN PRESSURE	PSF
DOWN PRESSURE	75
UPLIFT PRESSURE, 2 RAILS	75

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**POWER**  
PRODUCTION MANAGEMENT, INC.

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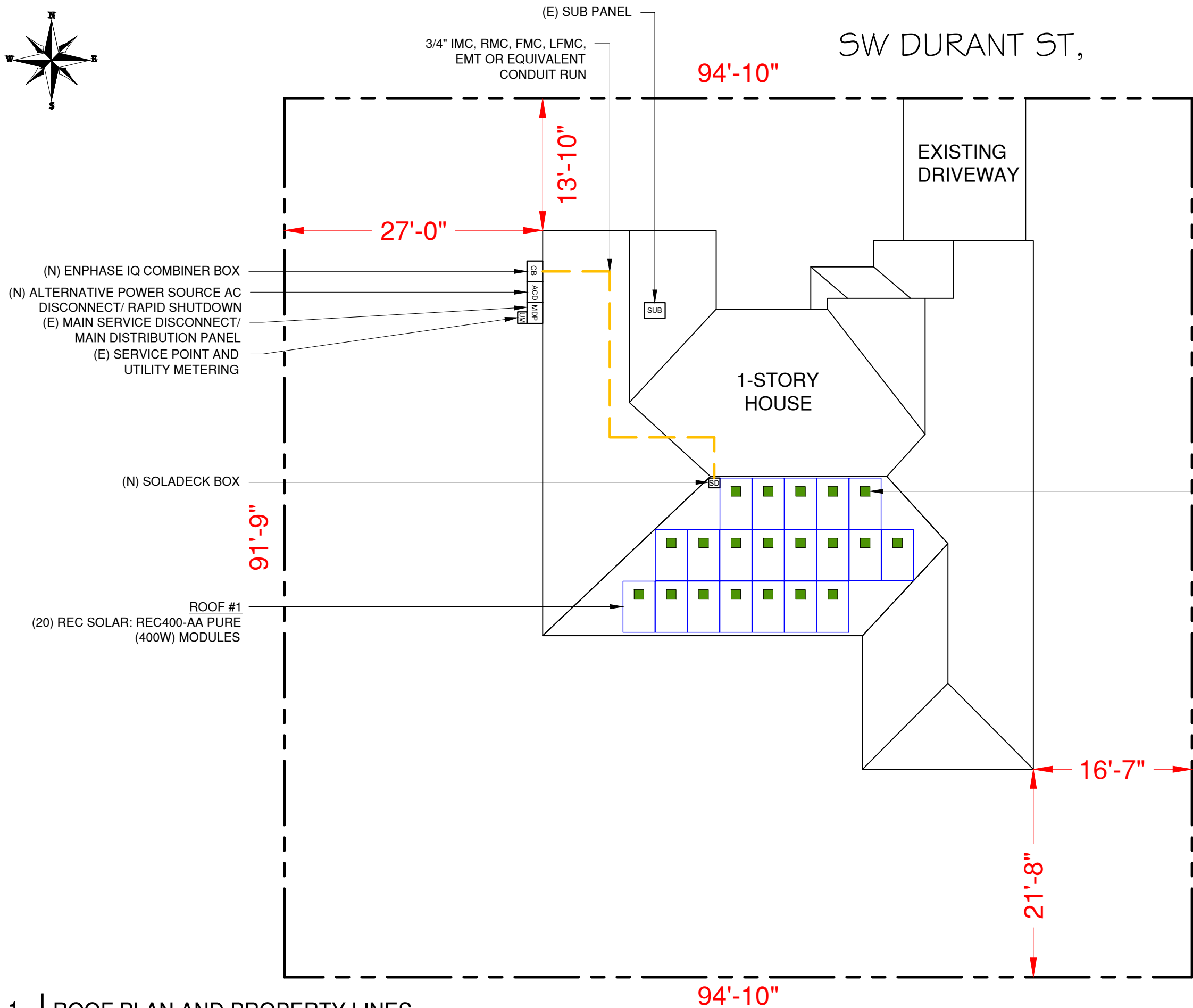
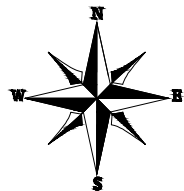
PROJECT NAME

**NELSON RESIDENCE**  
456 SW DURANT ST,  
FORT WHITE, FL 32038

SHEET NAME  
NOTES AND DESCRIPTION

SHEET SIZE  
**ANSI B**  
11" X 17"

SHEET NUMBER  
**A-00**



SW DURANT ST,

(E) SUB PANEL  
3/4" IMC, RMC, FMC, LFMC,  
EMT OR EQUIVALENT  
CONDUIT RUN

EXISTING  
DRIVEWAY

1-STORY  
HOUSE

(N) SOLADECK BOX

(N) (20) ENPHASE IQ7PLUS-72-2-US  
MICROINVERTERS

ROOF #1  
(20) REC SOLAR: REC400-AA PURE  
(400W) MODULES

1 ROOF PLAN AND PROPERTY LINES

SCALE: 3/32" = 1'-0"

A-01

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SHEET NAME

ROOF PLAN

SHEET SIZE

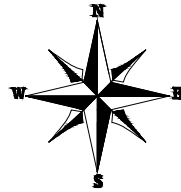
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**MODULE TYPE, DIMENSIONS & WEIGHT**

NUMBER OF MODULES = 20 MODULES  
 MODULE TYPE = REC SOLAR: REC400-AA PURE (400W) MODULES  
 MODULE WEIGHT = 43.0 LBS / 19.5 KG.  
 MODULE DIMENSIONS = 67.75" x 40" = 18.82 SF  
 UNIT WEIGHT OF ARRAY = 2.28 PSF



ARRAY AREA & ROOF AREA CALC'S								
ROOF	ROOF TYPE	ARRAY AREA (sq.Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)	TILT	AZIMUTH	TRUSS SIZE	SEAM SPACING
#1	METAL	398.40	493.17	80.78	26.6°	180°	2"x4"	12" O.C.

**GENERAL INSTALLATION PLAN NOTES:**

1) ROOF ATTACHMENTS TO SEAM SHALL BE INSTALLED AS SHOWN IN SHEET S-02 AND AS FOLLOWS FOR EACH WIND ZONE:

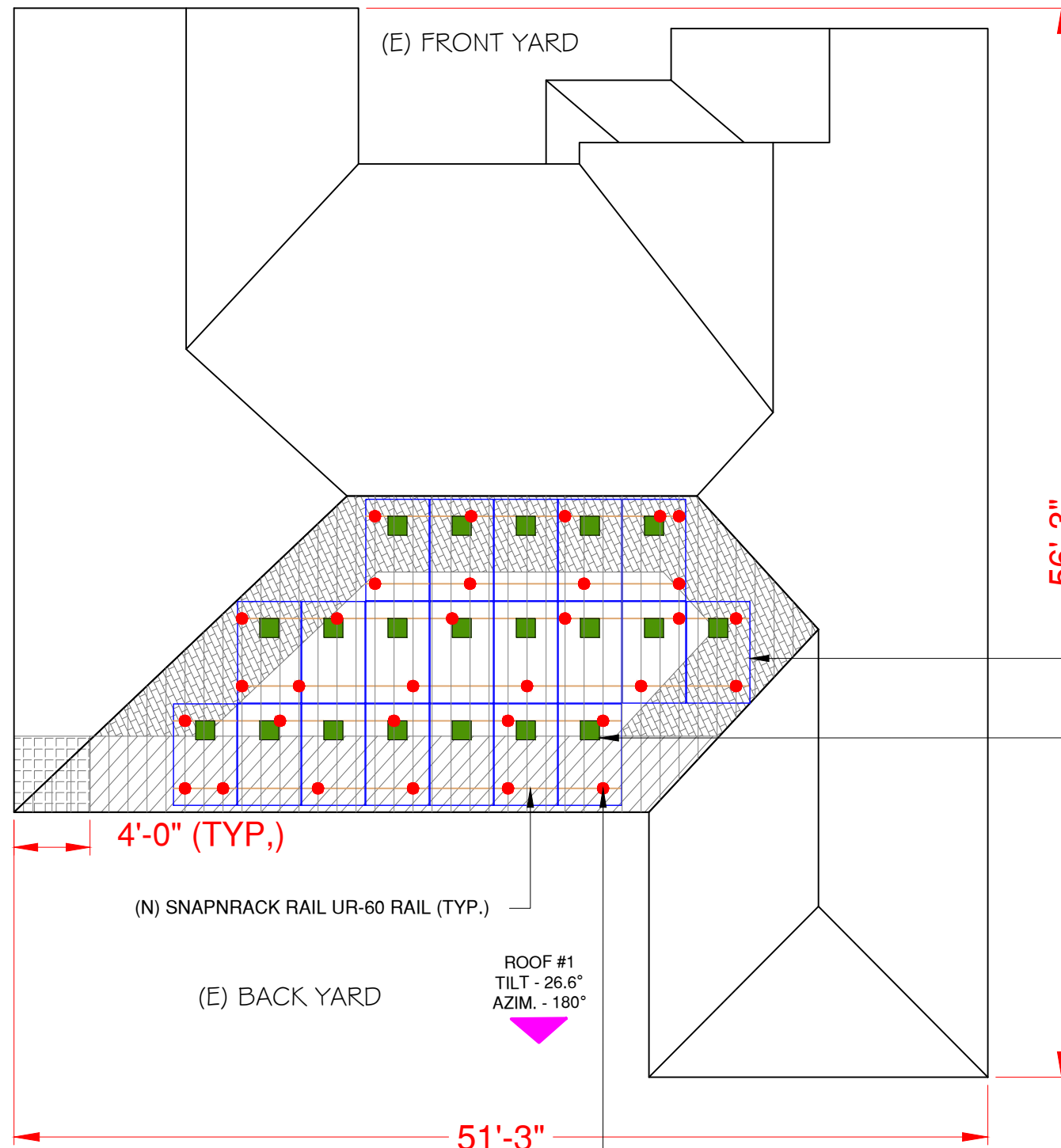
WIND ZONES	NON - EXPOSED MODULES		EDGE / EXPOSED MODULES	
	SPAN	CANTILEVER	SPAN	CANTILEVER
ZONE 1	6' - 0"	1' - 4"	6' - 0"	1' - 4"
ZONE 1'	X	X	X	X
ZONE 2e	6' - 0"	1' - 4"	5' - 0"	1' - 4"
ZONE 2n	X	X	X	X
ZONE 2r	6' - 0"	1' - 4"	5' - 0"	1' - 4"
ZONE 3e	6' - 0"	1' - 4"	5' - 0"	1' - 4"
ZONE 3r	X	X	X	X

SEE SHEET S-02.1 FOR SUPPORTING CALCULATIONS

2) EXISTING RESIDENTIAL BUILDING HAVE 2"x4" SYP TRUSSES SPACED @ 24" O.C. AND METAL ROOF DECKS WITH MEAN ROOF HEIGHTS OF 15 FT WITH SEAMS SPACED 12" O.C. EXISTING ROOF SLOPE FOR THE SOLAR RETROFIT IS 26.6° DEGREES. CONTRACTOR TO FIELD VERIFY AND SHALL REPORT TO THE ENGINEER IF ANY DISCREPANCIES EXIST BETWEEN PLANS AND IN FIELD CONDITIONS.

3) THE EXISTING ROOF AND STRUCTURE WILL NOT BE ADVERSLY AFFECTED BY THE ADDITIONAL LOADS IMPOSED BY THE SOLAR SYSTEM.

\* I CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL 2020 7TH ED. CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES AND EQUIPMENT DEAD LOADS. \*



ROOF #1  
 (20) REC SOLAR: REC400-AA PURE (400W) MODULES  
 (N) (20) ENPHASE IQ7PLUS-72-2-US MICROINVERTERS

(32) PV ROOF ATTACHMENT @ 60" & 72" O.C. MAX. (SEE SHEET S-02 FOR ATTACHMENT DETAIL)

(SEE SHEET S-01.1 FOR PARTIAL PRESSURE OF THE MODULE)

**LEGEND**

- WIND ZONE 1 (TYP)
- WIND ZONE 2e (TYP)
- WIND ZONE 2n (TYP)
- WIND ZONE 2r (TYP)
- WIND ZONE 3r (TYP)
- WIND ZONE 3e (TYP)

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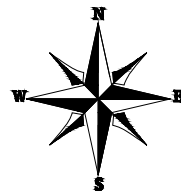
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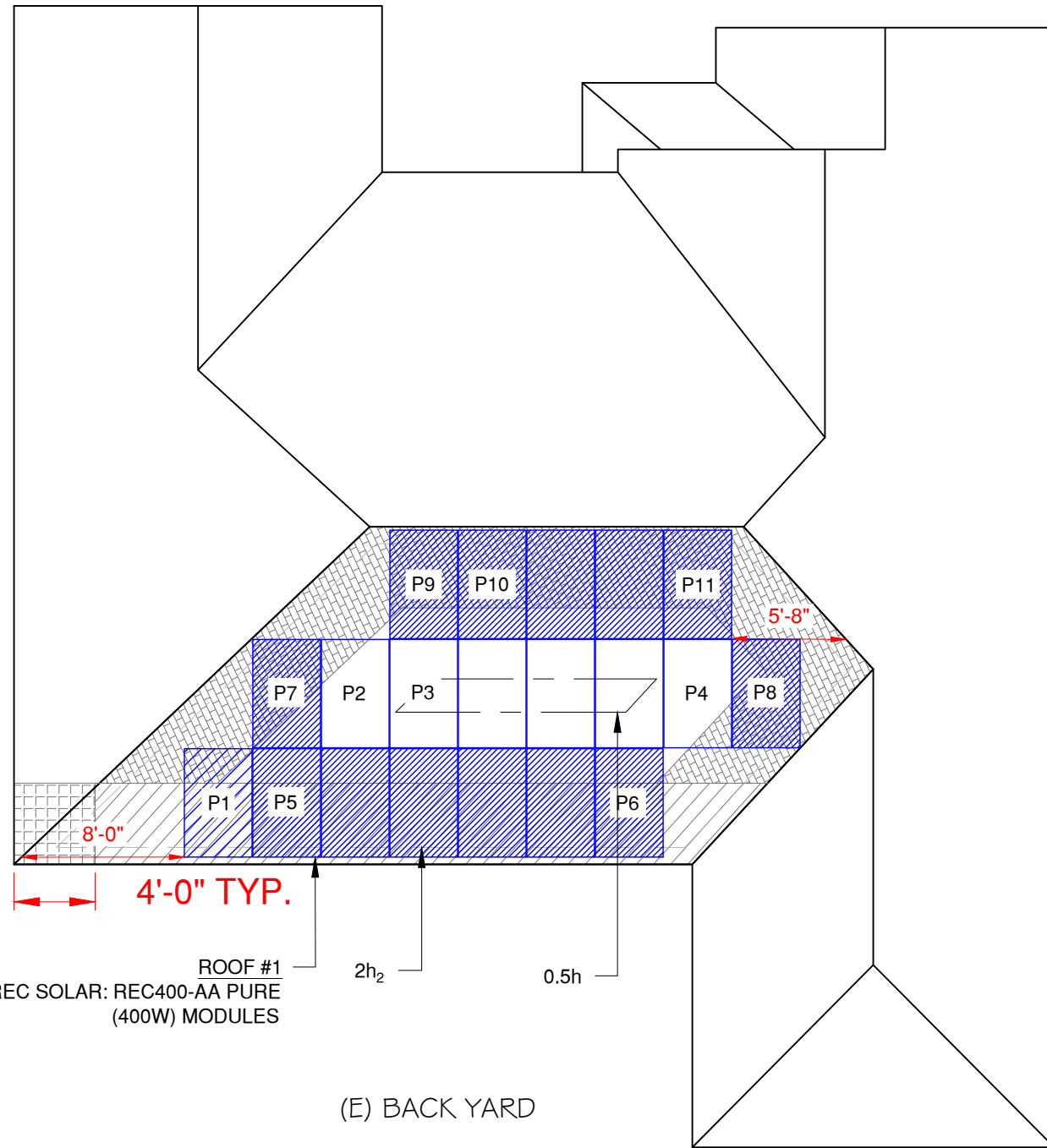
SHEET NAME  
 MODULE LAYOUT

SHEET SIZE  
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(E) FRONT YARD



ROOF #1  
(20) REC SOLAR: REC400-AA PURE  
(400W) MODULES

(E) BACK YARD

2h<sub>2</sub> DISTANCE : 0' - 10"  
0.5h DISTANCE : 7' - 6"

NOTE : PARTIAL PRESSURES OF THE WIND ZONES ON ALL MODULES HAVE BEEN VERIFIED AND ARE WITHIN THE ALLOWABLE PER THE MANUFACTURER SPECIFICATION, INSTALLER SHOULD FOLLOW THE LAYOUT TO AVOID HIGHER ZONAL PARTIAL PRESSURES. ANY CHANGES IN LAYOUT SHOULD BE REPORTED BACK TO THE ENGINEER OF RECORD.

FOR EXPOSED MODULES

1	1'	2e	2n	2r	3e	3r
18.1	0	25.2	0	25.2	25.2	0

Module Size | 19.92 | Sq. ft.

Exposed modules							Partial Pressure
1	1'	2e	2n	2r	3e	3r	
P1	1.53	0	13.59	0	4.80	0	24.65

FOR NON EXPOSED MODULES

1	1'	2e	2n	2r	3e	3r
16	0	16.8	0	16.8	16.8	0

Module Size | 19.92 | Sq. ft.

Non-Exposed modules							Partial Pressure
1	1'	2e	2n	2r	3e	3r	
P2	17.00	0	0	0	2.92	0	16.12
P3	19.92	0	0	0	0	0	16.00
P4	17.35	0	0	0	2.57	0	16.10

FOR EDGE MODULES

1	1'	2e	2n	2r	3e	3r
18.1	0	25.2	0	25.2	25.2	0

Module Size | 19.92 | Sq. ft.

Edge Modules							Partial Pressure
1	1'	2e	2n	2r	3e	3r	
P5	6.33	0	13.59	0	0	0	22.94
P6	6.28	0	13.59	0	0.06	0	22.96
P7	5.57	0	0	0	14.35	0	23.21
P8	2.74	0	0	0	17.18	0	24.22
P9	5.44	0	0	0	14.48	0	23.26
P10	5.63	0	0	0	14.29	0	23.19
P11	4.78	0	0	0	15.14	0	23.50

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS : 75 PSF

LEGEND

- EXPOSED MODULE
- EDGE MODULE
- NON- EXPOSED MODULE
- MISSING MODULE
- MIN. MODULE EDGE DISTANCE LINE
- MODULE EXPOSURE LINE
- WIND ZONE 1 (TYP)
- WIND ZONE 2e (TYP)
- WIND ZONE 2n (TYP)
- WIND ZONE 2r (TYP)
- WIND ZONE 3r (TYP)
- WIND ZONE 3e (TYP)



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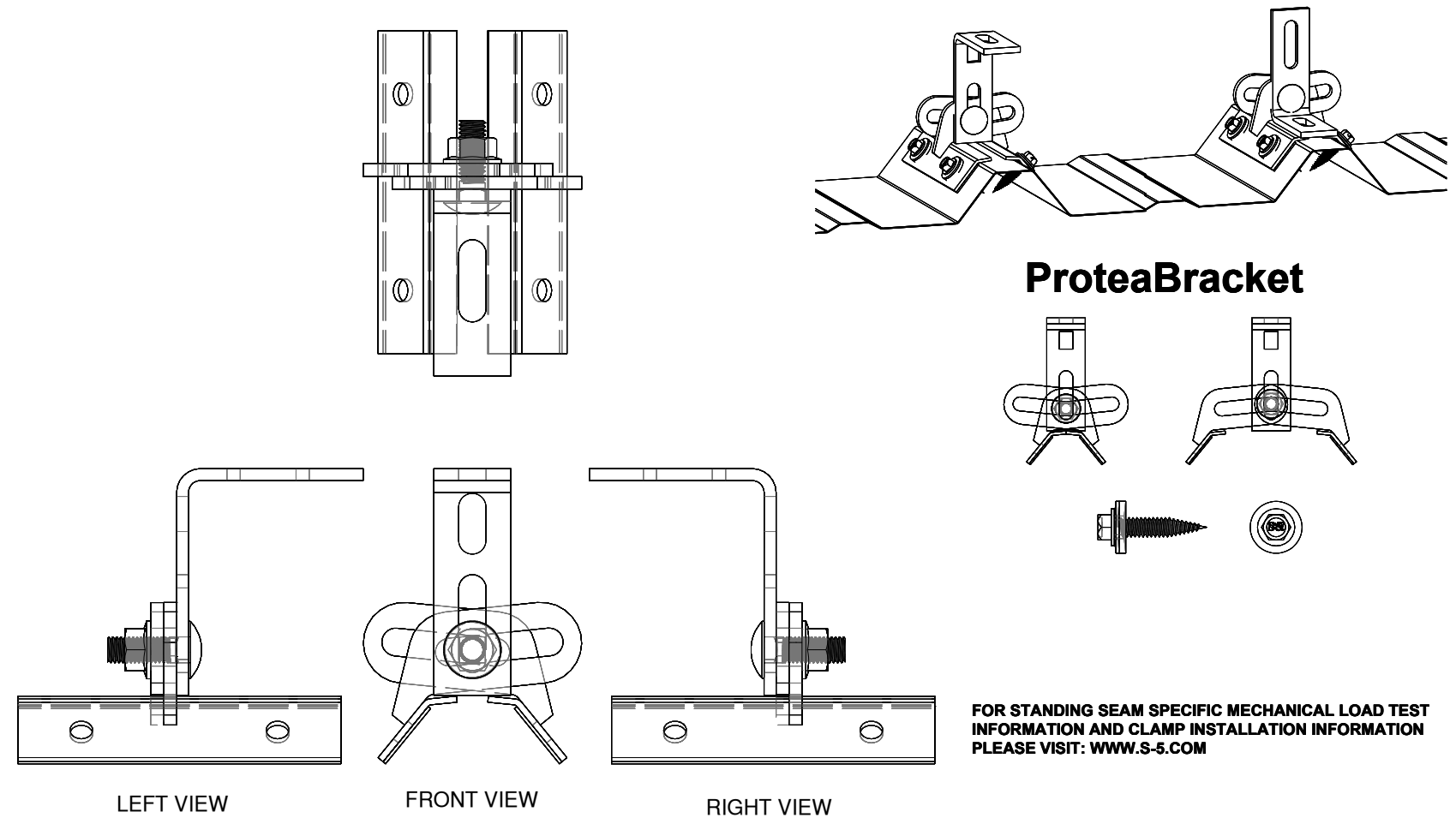
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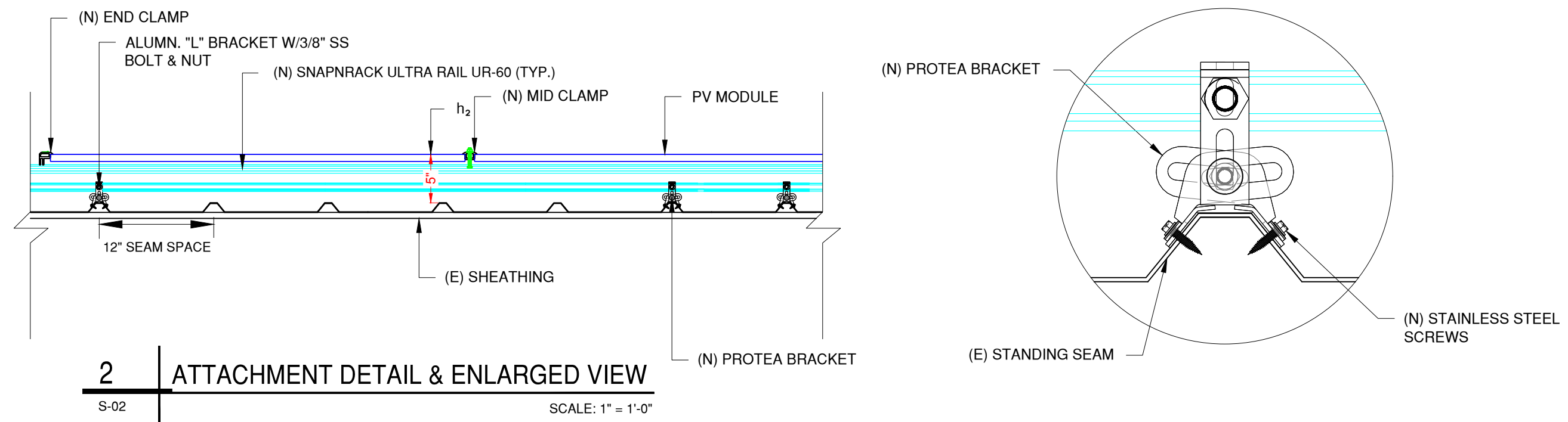
SHEET NAME  
ATTACHMENT DETAIL

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
S-02



**1 ATTACHMENT DETAIL**  
S-02      SCALE: NTS



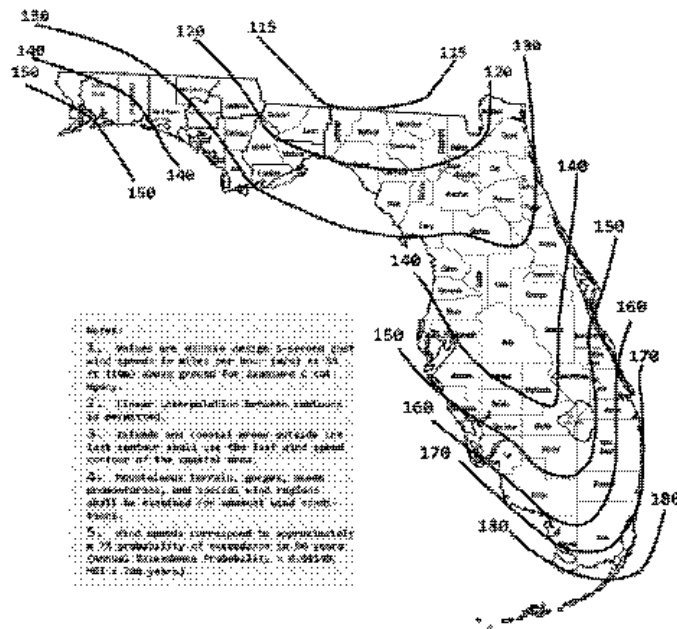


FIGURE 1608-G(1)  
ULTIMATE DESIGN WIND SPEEDS, V<sub>ULT</sub>, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

WIND LOAD CALCULATIONS FOR MODULES INSTALLED ON ROOFS WITH A HEIGHT LESS THAN 60'

SITE INFORMATION			
IBC VERSION	2018	RISK CATEGORY	II
MEAN ROOF HEIGHT (ft)	15.0	EXPOSURE CATEGORY	B
ROOF LENGTH (ft)	56.3	ROOF SLOPE	6 / 12
ROOF WIDTH (ft)	51.3	ROOF SLOPE (°)	26.6
PARAPET HEIGHT (ft)	0.0	ROOF TYPE	HIP
MODULE LENGTH (in)	71.7	ULTIMATE WIND SPEED	130 mph
MODULE WIDTH (in)	40.00	NOMINAL WIND SPEED	101 mph
MODULE ORIENTATION	PORTRAIT	EXPOSURE FACTOR (C <sub>e</sub> )	1.000
MODULE AREA (sq. ft.)	19.92	TEMPERATURE FACTOR (C <sub>t</sub> )	1.000
GROUND SNOW LOAD (psf)	0.0	IMPORTANCE FACTOR (I <sub>e</sub> )	1.000
DEAD LOAD (psf)	3.0	SLOPE FACTOR (C <sub>s</sub> )	0.910
SLOPED ROOF SNOW LOAD (psf)	0.0	K <sub>D</sub>	0.850
EFFECTIVE WIND AREA (ft <sup>2</sup> )	19.9	K <sub>ZT</sub>	1.000
GROUND ELEVATION (ft)	76.0	K <sub>e</sub>	0.997
HVHZ	NO	K <sub>z</sub>	0.575

DESIGN CALCULATIONS			
VELOCITY PRESSURE (q) = .00256 * K <sub>F</sub> * K <sub>Z</sub> * K <sub>ZT</sub> * K <sub>D</sub> * V <sup>2</sup>			
VELOCITY PRESSURE(ASD) 12.6 psf			
WIDTH OF PRESSURE COEFFICIENT	51.3' * 10% = 5.13'	ZONE WIDTH A	4 FT
	15' * 40% = 6'	ZONE 2 WIDTH	N/A (FOR (°) < 7°)
		ZONE 3 WIDTH	N/A (FOR (°) < 7°)
EXTERNAL PRESSURE COEFFICIENT	ZONE 1	0.580	-1.220
	ZONE 1'	0.580	X
	ZONE 2e	0.580	-1.770
	ZONE 2n	0.580	X
	ZONE 2r	0.580	-1.770
	ZONE 3e	0.580	-1.770
	ZONE 3r	0.580	X
INTERNAL PRESSURE COEFFICIENT (+/-)	0.18		

DESIGN PRESSURES				
ROOF ZONE	DOWN	UP		
1	15.0	-17.7	psf	
1'	13.0	X	psf	
2c	15.0	-24.7	psf	Module a lowable uplift pressure 75 psf
2n	15.0	X	psf	Module a lowable down pressure 75 psf
2r	15.0	-24.7	psf	
3e	15.0	24.7	psf	
3i	15.0	X	psf	

ARRAY FACTORS			
ARRAY EDGE FACTOR (EXPDSED)	1.5	SOLAR PANEL PRESSURE	0.68031
ARRAY EDGE FACTOR (NON-EXPOSED)	-	EQUALIZATION FACTOR	

ADJUSTED DESIGN PRESSURES				
ROOF ZONE	DOWN	UP (Exposed)	U <sup>2</sup> (N Exposed)	
1	15.0	-18.1	-13.0	psf
1'	13.0	X	X	psf
2e	15.0	-25.2	-13.8	psf
2n	15.0	X	X	psf
2r	15.0	-25.2	-13.8	psf
3e	15.0	-25.2	-13.8	psf
3r	15.0	X	X	psf

ATTACHMENTS USED		
ATTACHMENT MODEL	S-5 protea	
ATTACHMENT STRENGTH	422	lbs

MAX DESIGN LOADS ALLOWABLE						
LIMIT MAX SPAN TO		N/A		in		
RAFTER/SEAM SPACING		12	in	NO. OF RAILS	Exposed: 2	Non. Exp: 2
ROOF ZONE	DOWN	UP (Exposed)	U <sup>2</sup> (N Exposed)		SPANS (E)	SPANS (N.E)
1	286.8	324.0	266.8	lbs	72 in	72 in
1'	0.0	X	X	lbs	X in	X in
2e	286.8	375.9	300.7	lbs	60 in	72 in
2n	0.0	X	X	lbs	X in	X in
2r	286.8	375.9	300.7	lbs	60 in	72 in
3e	286.8	375.9	300.7	lbs	60 in	72 in
3r	0.0	X	X	lbs	X in	X in

**Castillo Engineering**  
SOLAR DONE RIGHT®  
CASTILLO ENGINEERING SERVICES, LLC  
COA # 28345  
620 N. WYMORE ROAD, SUITE 250,  
MAITLAND, FL 32751  
TEL: (407) 289-2575  
ERMOCRATES E. CASTILLO - FL PE 52590

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DESCRIPTION	DATE	REV

PROJECT INSTALLER

**POWER**  
PRODUCTION MANAGEMENT, INC.

Digitally signed by: Ermocrates E Castillo  
Date: 2022.03.11 09:22:28

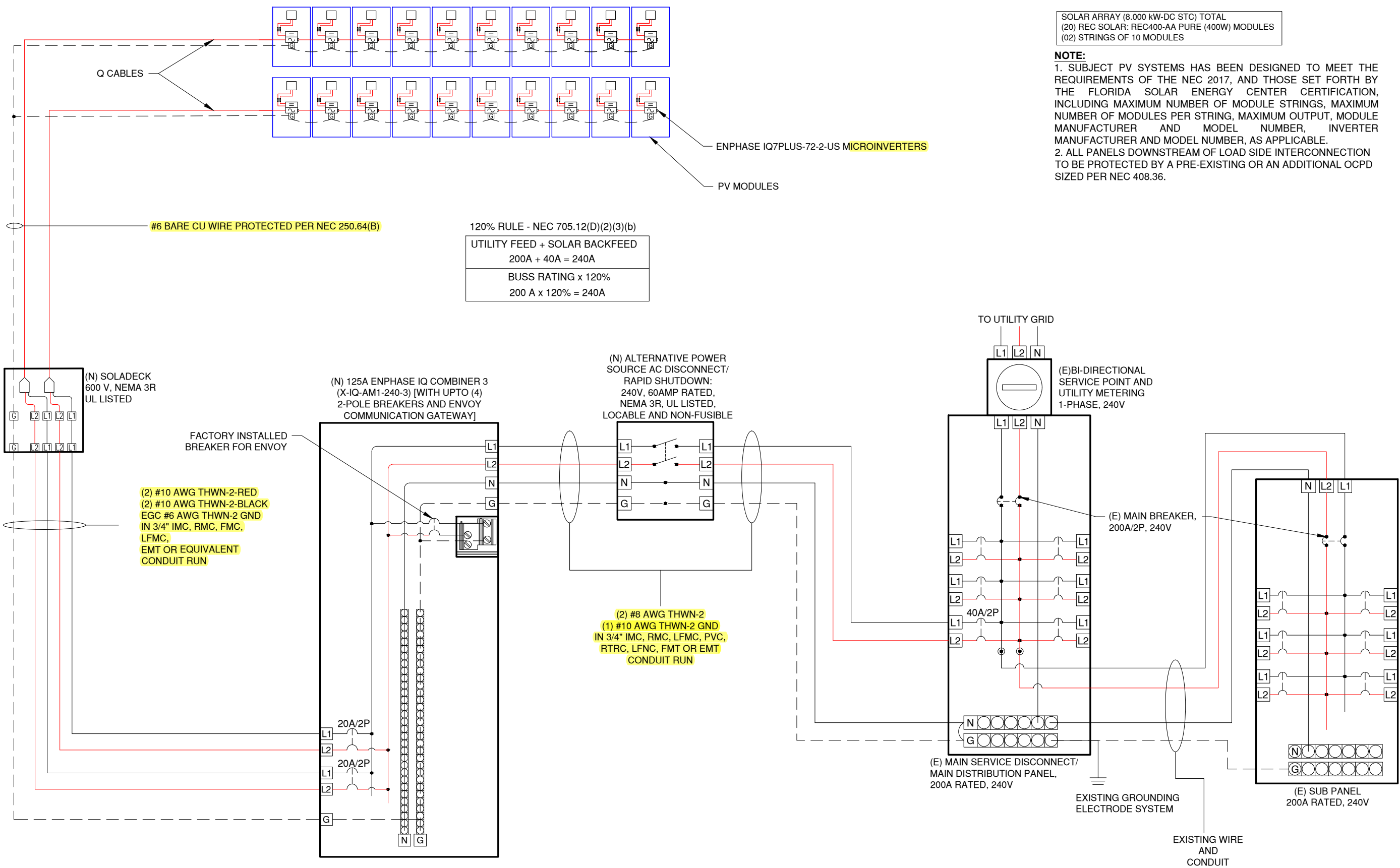
PROJECT NAME

**NELSON RESIDENCE**  
456 SW DURANT ST,  
FORT WHITE, FL 32038

SHEET NAME  
STRUCTURE CALCULATION

SHEET SIZE  
**ANSI B**  
11" X 17"

SHEET NUMBER  
**S-02.1**



SOLAR ARRAY (8.000 kW-DC STC) TOTAL  
(20) REC SOLAR: REC400-AA PURE (400W) MODULES  
(02) STRINGS OF 10 MODULES

**NOTE:**  
1. SUBJECT PV SYSTEMS HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION, INCLUDING MAXIMUM NUMBER OF MODULE STRINGS, MAXIMUM NUMBER OF MODULES PER STRING, MAXIMUM OUTPUT, MODULE MANUFACTURER AND MODEL NUMBER, INVERTER MANUFACTURER AND MODEL NUMBER, AS APPLICABLE.  
2. ALL PANELS DOWNSTREAM OF LOAD SIDE INTERCONNECTION TO BE PROTECTED BY A PRE-EXISTING OR AN ADDITIONAL OCPD SIZED PER NEC 408.36.



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DESCRIPTION	DATE	REV

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PROJECT NAME

**NELSON RESIDENCE**  
456 SW DURANT ST,  
FORT WHITE, FL 32038

SHEET NAME  
ELECTRICAL LINE DIAGRAM

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
E-01

1 | ELECTRICAL LINE DIAGRAM

E-01

SCALE: NTS

# ELECTRICAL CALCULATION

MODULE MANUFACTURER	REC SOLAR
MODULE MODEL	REC400-AA PURE
INVERTER MANUFACTURER	ENPHASE
INVERTER MODEL	ENPHASE IQ 7 PLUS
MODULES/BRANCH CIRCUIT 1	10
MODULES/BRANCH CIRCUIT 2	10
TOTAL ARRAY POWER (KW)	8.00
SYSTEM AC VOLTAGE	240V 1-PHASE

MODULE PROPERTIES			
V <sub>OC</sub>	48.8	I <sub>SC</sub>	10.1
V <sub>MPP</sub>	42.1	I <sub>MP</sub>	9.51
TC V <sub>OC</sub>	-0.24%/°C	TC V <sub>MPP</sub>	-0.26%/°C
PMP	400.0	NOCT	45 °C

INVERTER PROPERTIES	
OUTPUT VOLTAGE	240 L-L 1-PH
MAX INPUT DC VOLTAGE	60 VDC
OPERATING RANGE	16 - 60 VDC
MPPT VOLTAGE RANGE	27 - 45 VDC
START VOLTAGE	22 VDC
MAX INPUT POWER	440 WDC
CONTINUOUS AC POWER	290 VA

DESIGN TEMPERATURE	
MIN. AMBIENT TEMP. °F	32
MAX. AMBIENT TEMP. °F	117
CALCULATED MAX. V <sub>OC</sub>	53
CALCULATED MIN V <sub>MPP</sub>	33
CONDUIT FILL	
NUMBER OF CONDUITS	1

AMPACITY CALCULATIONS										
CIRCUIT	MAX AMPS	1.25 x MAX AMPS	AWG	90 °C AMPACITY	AMBIENT TEMP °F	TEMP DERATE	CONDUIT FILL	FILL DERATE	DERATED AMPACITY	MAXIMUM CIRCUIT BREAKER
CIRCUIT 1	12.1	15.1	#10	40	130	0.76	8	0.7	21.28	20 A
CIRCUIT 2	12.1	15.1	#10	40	130	0.76	8	0.7	21.28	20 A
AC COMBINER PANEL OUTPUT	24.2	30.2	#8	55	95	0.96	3	1	52.8	40 A

MAXIMUM CIRCUIT VOLTAGE DROP	2%
------------------------------	----

VOLTAGE DROP CALCULATIONS					
CIRCUIT	AWG	CIRCULAR MILLS	I	V	MAX LENGTH
CIRCUIT 1	#10	10380	12.1	240	160 FEET
CIRCUIT 2	#10	10380	12.1	240	160 FEET
AC COMBINER PANEL OUTPUT	#8	16510	24.2	240	127 FEET

NOTES	
TEMP DERATE BASED ON NEC TABLE 310.15(B)(2)(A)	
CONDUIT FILL DERATE BASED ON NEC TABLE 310.15(B)(3)(A)	
MAXIMUM V <sub>OC</sub> CALCULATED USING MODULE MANUFACTURE TEMPERATURE COEFFICIENTS PER NEC 690.7(A)	
UNLESS OTHERWISE SPECIFIED, ALL WIRING MUST BE THHN OR THWN-2 COPPER	
ALL WIRE SIZES LISTED ARE THE MINIMUM ALLOWABLE	
<span style="background-color: #90EE90;"> </span> IN ANY CELL INDICATES THAT THE SYSTEM IS SAFE AND COMPLIES WITH NEC REQUIREMENTS	
<span style="background-color: #FF0000;"> </span> IN ANY CELL INDICATES A POTENTIALLY UNSAFE CONDITION	
<span style="background-color: #FFFF00;"> </span> INFORMATION INPUT BY SYSTEM DESIGNER	
<span style="background-color: #ADD8E6;"> </span> INFORMATION OBTAINED FROM MANUFACTURER DATASHEETS	

# ELECTRICAL NOTES

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT. THE TERMINALS ARE RATED FOR 75 DEGREE C.
- THE WIRES ARE SIZED ACCORDING TO NEC 110.14.
- WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE .
- UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
- MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
- RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
- CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
- CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).
- THIS SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN OF PV CONDUCTORS IN COMPLIANCE WITH NEC 690.12.
- LABELING IN COMPLIANCE WITH NEC 690.12 AND 690.56(C) IS SHOWN ON SHEET E-03.
- ALL CONDUITS TO BE INSTALLED A MIN OF 7/8" ABOVE THE ROOF SURFACE.

I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE PV ELECTRICAL SYSTEM AND ELECTRICAL COMPONENTS ARE DESIGNED AND APPROVED USING THE STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE. FBC 107, THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION.



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 COA # 28345  
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 MAITLAND, FL 32751  
 TEL: (407) 289-2575  
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REVISIONS		
DESCRIPTION	DATE	REV

PROJECT INSTALLER



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 Date: 2022.03.11 09:22:28

PROJECT NAME

**NELSON RESIDENCE**  
 456 SW DURANT ST,  
 FORT WHITE, FL 32038

SHEET NAME  
 WIRING CALCULATIONS

SHEET SIZE  
 ANSI B  
 11" X 17"

SHEET NUMBER  
 E-02

# WARNING

**ELECTRIC SHOCK HAZARD**  
TERMINALS ON BOTH LINE AND  
LOAD SIDES MAY BE ENERGIZED  
IN THE OPEN POSITION

LABEL LOCATION:  
AC DISCONNECT, POINT OF INTERCONNECTION  
(PER CODE: NEC 690.13(B))

# WARNING DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:  
POINT OF INTERCONNECTION  
(PER CODE: NEC 705.12(B)(2)(3)(b))

# RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:  
AC DISCONNECT  
(PER CODE: NEC 690.56(C)(3))

- ADHESIVE FASTENED SIGNS:**
- THE LABEL SHALL BE VISIBLE, REFLECTIVE AND SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED [NFPA 1, 11.12.2.1]
  - WHERE REQUIRED ELSEWHERE IN THIS CODE, ALL FIELD APPLIED LABELS, WARNINGS, AND MARKINGS SHOULD COMPLY WITH ANSI Z535.4 [NEC 110.21(B) FIELD MARKING].
  - ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT [IFC 605.11.1.3]

# PHOTOVOLTAIC SYSTEM AC DISCONNECT RATED AC OPERATING CURRENT 24.2 AMPS AC NOMINAL OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:  
AC DISCONNECT, POINT OF INTERCONNECTION  
(PER CODE: NEC 690.54)

# WARNING: POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:  
POINT OF INTERCONNECTION  
(PER CODE: NEC 705.12(B)(2)(3)(b))

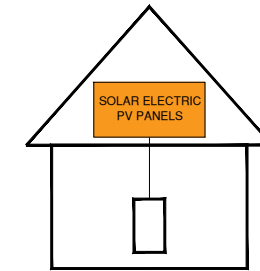
DATA PER PANEL

NOMINAL OPERATING AC VOLTAGE -	240	V
NOMINAL OPERATING AC FREQUENCY -	60	Hz
MAXIMUM AC POWER -	290	VA
MAXIMUM AC CURRENT -	1.21	A
MAXIMUM OVERCURRENT DEVICE RATING FOR AC MODULE PROTECTION PER CIRCUIT -	20	A

LABEL LOCATION:  
COMBINER BOX  
(PER CODE: NEC 690.52)

# 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

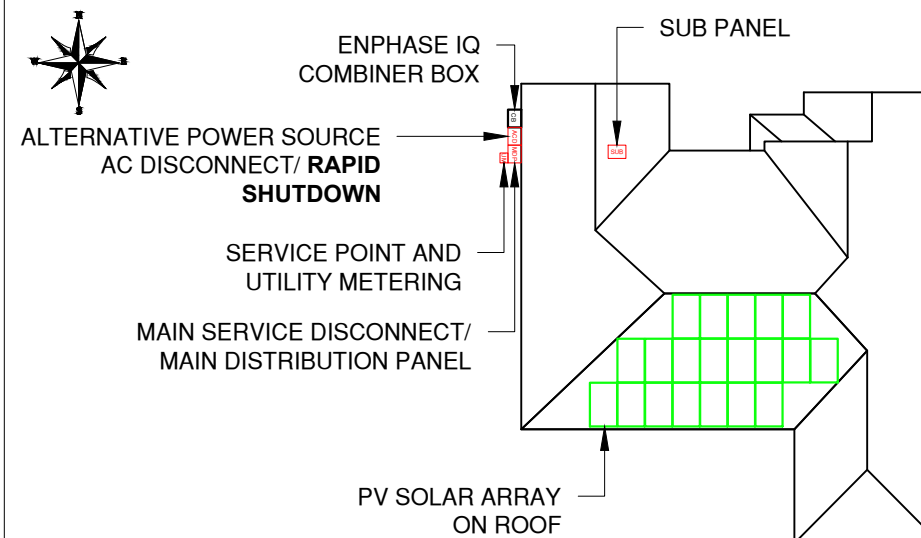


LABEL LOCATION:  
AC DISCONNECT, POINT OF INTERCONNECTION  
(PER CODE: NEC 690.56(C)(1)(a), IFC 1204.5.1)

# CAUTION! POWER TO THIS BUILDING SUPPLIED FROM MULTIPLE SOURCES

EMERGENCY RESPONDER:  
THIS SOLAR PV SYSTEM IS EQUIPPED  
WITH RAPID SHUTDOWN.

TURN RAPID SHUTDOWN SWITCH TO THE "OFF"  
POSITION TO SHUTDOWN ENTIRE PV SYSTEM



456 SW DURANT ST, FORT WHITE, FL 32038

LABEL LOCATION:  
MAIN SERVICE DISCONNECT / MAIN DISTRIBUTION PANEL, PV DISCONNECT  
LOCATED NO MORE THAN 3FT (1M) FROM THE SERVICE DISCONNECT  
(TEXT HEIGHT SHOULD BE A MINIMUM OF 3/8")  
(PER CODE: NEC 690.56(B), NEC 705.10, NFPA 1, 11.12.2.1)

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

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Ermocrates E Castillo  
Date: 2022.03.11 09:22:29

PROJECT NAME

**NELSON RESIDENCE**  
456 SW DURANT ST,  
FORT WHITE, FL 32038

SHEET NAME

SYSTEM LABELING

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

E-03

SOLAR'S MOST TRUSTED 

# REC ALPHA<sup>®</sup> PURE BLACK SERIES

## PRODUCT SPECIFICATIONS



**400 WP**  
**20.3 W/FT<sup>2</sup>**

**REC 25 YEAR PROTRUST WARRANTY**  
ELIGIBLE

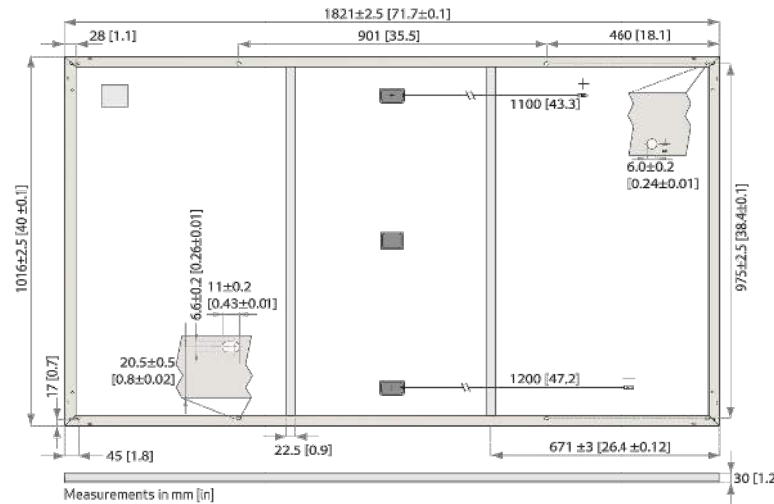
**LEAD-FREE**  
ROHS COMPLIANT

**EXPERIENCE**  
**α**  
PERFORMANCE



REC ALPHA PURE BLACK SERIES > PRODUCT SPECIFICATIONS

### PRODUCT SPECIFICATIONS



#### GENERAL DATA

Cell type:	132 half-cut REC heterojunction cells with lead-free, gapless technology 5 strings of 22 cells in series	Connectors:	Stäubli MC4 PV-KB14/KS14, I2AWG (4mm <sup>2</sup> ) in accordance with IEC 62852 IP68 only when connected
Glass:	0.13 in (3.2 mm) solar glass with anti-reflection surface treatment	Cable:	I2AWG (4mm <sup>2</sup> ) PV wire, 43+47 in (11+12 m) in accordance with EN50618
Backsheet:	Highly resistant polymer (black)	Dimensions:	71.7 x 40 x 1.2 in (1821 x 1016 x 30 mm)
Frame:	Anodized aluminum (black)	Weight:	45 lbs (20.5 kg)
Junction box:	3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790	Origin:	Made in Singapore

#### ELECTRICAL DATA

Product Code\*: RECxxxAA Pure Black

	385	390	395	400	405
Power Output - P <sub>MAX</sub> (Wp)	385	390	395	400	405
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V <sub>MPP</sub> (V)	41.2	41.5	41.8	42.1	42.4
Nominal Power Current - I <sub>MPP</sub> (A)	9.35	9.40	9.45	9.51	9.56
Open Circuit Voltage - V <sub>OC</sub> (V)	48.5	48.6	48.7	48.8	48.9
Short Circuit Current - I <sub>SC</sub> (A)	9.99	10.03	10.07	10.10	10.14
Power Density (W/sq ft)	19.3	19.6	19.8	20.1	20.3
Panel Efficiency (%)	20.8	21.1	21.3	21.6	21.9

	293	297	301	305	309
Power Output - P <sub>MAX</sub> (Wp)	293	297	301	305	309
Nominal Power Voltage - V <sub>MPP</sub> (V)	38.8	39.1	39.4	39.7	40.0
Nominal Power Current - I <sub>MPP</sub> (A)	7.55	7.59	7.63	7.68	7.72
Open Circuit Voltage - V <sub>OC</sub> (V)	45.7	45.8	45.9	46.0	46.1
Short Circuit Current - I <sub>SC</sub> (A)	8.07	8.10	8.13	8.16	8.19

Values at standard test conditions (STC: air mass AM1.5, irradiance 1075 W/sq ft (1000 W/m<sup>2</sup>), temperature 77°F (25°C), based on a production spread with a tolerance of P<sub>MAX</sub>, V<sub>OC</sub> & I<sub>SC</sub> ±3% within one watt class. Nominal module operating temperature (NMOT): air mass AM1.5, irradiance 800 W/m<sup>2</sup>, temperature 68°F (20°C), wind speed 3.3 ft/s (1 m/s). \*Where xxx indicates the nominal power class (P<sub>MAX</sub>) at STC above.

#### CERTIFICATIONS

IEC 61215:2016, IEC 61730:2016, UL 61730 (Pending)  
ISO 14001:2004, ISO 9001:2015, OHSAS 18001:2007, IEC 62941



#### WARRANTY

	Standard	REC ProTrust	
Installed by an REC Certified Solar Professional	No	Yes	Yes
System Size	All	<25 kW	25-500 kW
Product Warranty (yrs)	20	25	25
Power Warranty (yrs)	25	25	25
Labor Warranty (yrs)	0	25	10
Power in Year 1	98%	98%	98%
Annual Degradation	0.25%	0.25%	0.25%
Power in Year 25	92%	92%	92%

See warranty documents for details. Conditions apply.

#### MAXIMUM RATINGS

Operational temperature:	-40 ... +185°F (-40 ... +85°C)
Maximum system voltage:	1000 V
Maximum test load (front):	+7000 Pa (146 lbs/sq ft)
Maximum test load (rear):	-4000 Pa (83.5 lbs/sq ft)
Max series fuse rating:	25 A
Max reverse current:	25 A

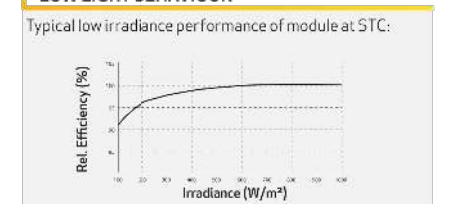
\*See installation manual for mounting instructions. Design load = Test load / 1.5 (safety factor)

#### TEMPERATURE RATINGS\*

Nominal Module Operating Temperature:	44°C (±2°C)
Temperature coefficient of P <sub>MAX</sub> :	-0.26 %/°C
Temperature coefficient of V <sub>OC</sub> :	-0.24 %/°C
Temperature coefficient of I <sub>SC</sub> :	0.04 %/°C

\*The temperature coefficients stated are linear values

#### LOW LIGHT BEHAVIOUR



Specifications subject to change without notice.

Ref: PM-DS-12-01-Rev. A-03.21

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SOLAR DONE RIGHT<sup>®</sup>

CASTILLO ENGINEERING SERVICES, LLC  
COA # 28345  
620 N. WYMORE ROAD, SUITE 250,  
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TEL: (407) 289-2575  
ERMOCRATES E. CASTILLO - FL PE 52590

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REVISIONS		
DESCRIPTION	DATE	REV

#### PROJECT INSTALLER



Digitally signed by: Ermocrates E Castillo  
Date: 2022.03.11 09:22:29

#### PROJECT NAME

**NELSON RESIDENCE**  
456 SW DURANT ST,  
FORT WHITE, FL 32038

SHEET NAME  
DATA SHEET

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
DS-01

Founded in 1996, REC Group is an international pioneering solar energy company dedicated to empowering consumers with clean, affordable solar power. As Solar's Most Trusted, REC is committed to high quality, innovation, and a low carbon footprint in the solar materials and solar panels it manufactures. Headquartered in Norway with operational headquarters in Singapore, REC also has regional hubs in North America, Europe, and Asia-Pacific.





Castillo Engineering Services, LLC  
 2925 W. State Road 434, Suite 111,  
 Longwood, FL 32779

RE: REC Modules Max Wind Load

**REC Americas LLC**  
 1420 Gateway Dr, Suite 170  
 San Mateo, CA 94404  
 Dir 805 704 3226  
 Fax 805 457 6104  
[www.recgroup.com](http://www.recgroup.com)

San Luis Obispo, 18 February 2021

To Whom it May Concern;

REC Americas LLC confirms that the REC Twin Peak 3M series (RECXXTP3M) and REC Alpha Series (RECXXA) modules have passed UL2703 Mechanical Load testing at a test load of +/-113 PSF utilizing four-point attachments on the long side of the module.

Please be in touch with the REC Technical Department if you have any questions.

Sincerely,

George McClellan  
 REC Americas LLC  
 Senior Technical Sales Manager



**CASTILLO ENGINEERING SERVICES, LLC**  
 COA # 28345  
 620 N. WYMORE ROAD,  
 SUITE 250,  
 MAITLAND, FL 32751  
 TEL: (407) 289-2575  
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PROJECT NAME

**NELSON RESIDENCE**  
 456 SW DURANT ST,  
 FORT WHITE, FL 32038

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B  
 11" X 17"

SHEET NUMBER

DS-02

## 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 seamlessly with the Enphase IQ Envoy™, Enphase Q Aggregator™, 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](http://enphase.com)



## Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US		IQ7PLUS-72-2-US	
Commonly used module pairings <sup>1</sup>	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	
Oversoltage 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 <sup>2</sup>	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	1.15 A	1.21 A	1.39 A
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 <sup>3</sup>	16 (240 VAC) 13 (208 VAC)		13 (240 VAC) 11 (208 VAC)	
Oversoltage class AC port	III		III	
AC port backfeed current	0 A		0 A	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	@240 V	@208 V	@240 V	@208 V
Peak CEC efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA	IQ 7 Microinverter			
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type	MC4 (or Amphenol F-4 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/IEE1547, 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](http://enphase.com)

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### REVISIONS

DESCRIPTION	DATE	REV

### PROJECT INSTALLER



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 Date: 2022.03.11 09:22:29

### PROJECT NAME

**NELSON RESIDENCE**  
 456 SW DURANT ST,  
 FORT WHITE, FL 32038

### SHEET NAME

DATA SHEET

### SHEET SIZE

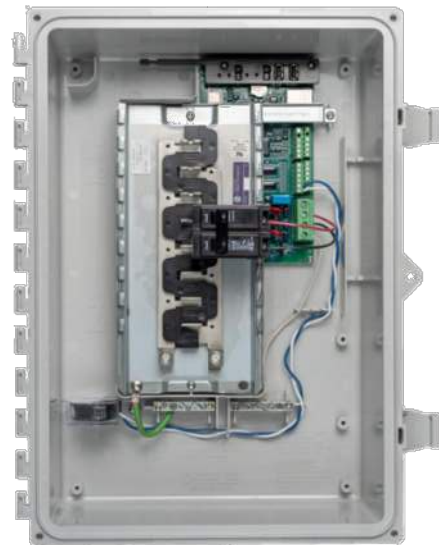
ANSI B  
 11" X 17"

### SHEET NUMBER

DS-03

# 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

## 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 C-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	<ul style="list-style-type: none"> <li>• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors</li> <li>• 60 A breaker branch input: 4 to 1/0 AWG copper conductors</li> <li>• Main lug combined output: 10 to 2/0 AWG copper conductors</li> <li>• Neutral and ground: 14 to 1/0 copper conductors</li> </ul> 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](http://enphase.com)

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To learn more about Enphase offerings, visit [enphase.com](http://enphase.com)



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REVISIONS		
DESCRIPTION	DATE	REV

PROJECT INSTALLER



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PROJECT NAME

NELSON RESIDENCE  
456 SW DURANT ST,  
FORT WHITE, FL 32038

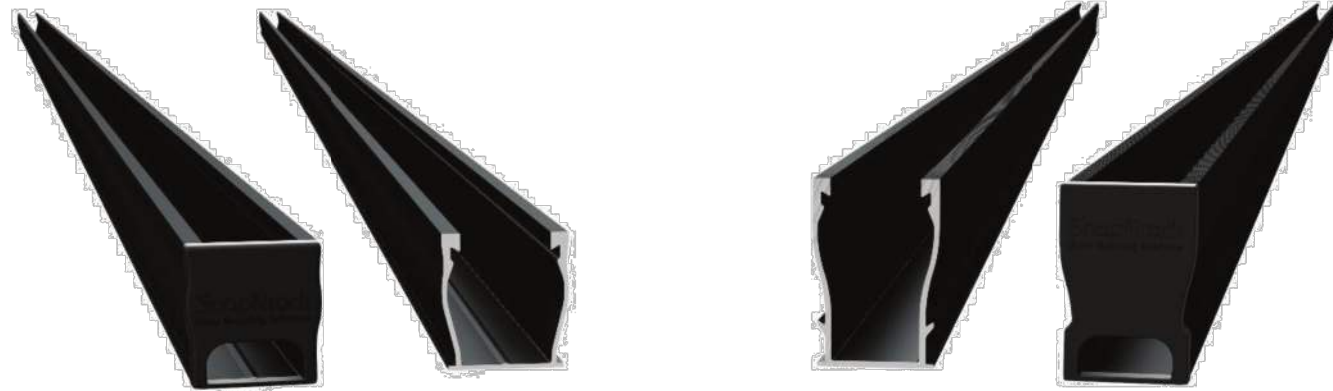
SHEET NAME  
DATA SHEET

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
DS-04

# Ultra Rail

UR-40  
UR-60



## SnapNrack Ultra Rail System

A sleek, straightforward rail solution for mounting solar modules on all roof types. Ultra Rail features two rail profiles; UR-40 is a lightweight rail profile that is suitable for most geographic regions and maintains all the great features of SnapNrack rail, while UR-60 is a heavier duty rail profile that provides a larger rail channel and increased span capabilities. Both are compatible with all existing mounts, module clamps, and accessories for ease of install.

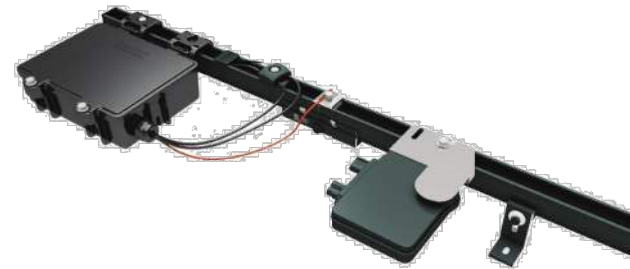
### The Entire System is a Snap to Install

- New Ultra Rail Mounts include snap-in brackets for attaching rail
- Compatible with all the SnapNrack Mid Clamps and End Clamps customers love
- Universal End Clamps and snap-in End Caps provide a clean look to the array edge



### Unparalleled Wire Management

- Open rail channel provides room for running wires resulting in a long-lasting quality install
- Industry best wire management offering includes Junction Boxes, Universal Wire Clamps, MLPE Attachment Kits, and Conduit Clamps
- System is fully bonded and listed to UL 2703 Standard



## The Ultimate Value in Rooftop Solar

 Industry leading Wire Management Solutions

 Mounts available for all roof types

 Single Tool Installation

 All SnapNrack Module Clamps & Accessories are compatible with both rail profiles

**Start Installing Ultra Rail Today**

**RESOURCES** [snapnrack.com/resources](http://snapnrack.com/resources)  
**DESIGN** [snapnrack.com/configurator](http://snapnrack.com/configurator)  
**WHERE TO BUY** [snapnrack.com/where-to-buy](http://snapnrack.com/where-to-buy)

### Heavy Duty UR-60 Rail

- UR-60 rail profile provides increased span capabilities for high wind speeds and snow loads
- Taller, stronger rail profile includes profile-specific rail splice and end cap
- All existing mounts, module clamps, and accessories are retained for the same great install experience



# Quality. Innovative. Superior.

SnapNrack Solar Mounting Solutions are engineered to optimize material use and labor resources and improve overall installation quality and safety.

877-732-2860 [www.snapnrack.com](http://www.snapnrack.com) [contact@snapnrack.com](mailto:contact@snapnrack.com)

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DESCRIPTION	DATE	REV

#### PROJECT INSTALLER

**POWER™**  
PRODUCTION MANAGEMENT, INC.

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#### PROJECT NAME

**NELSON RESIDENCE**  
456 SW DURANT ST,  
FORT WHITE, FL 32038

#### SHEET NAME

DATA SHEET

#### SHEET SIZE

ANSI B  
11" X 17"

#### SHEET NUMBER

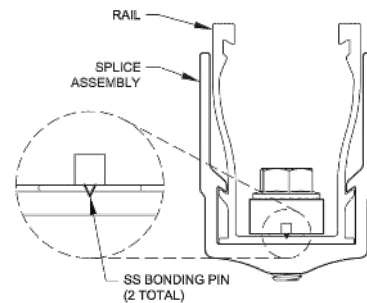
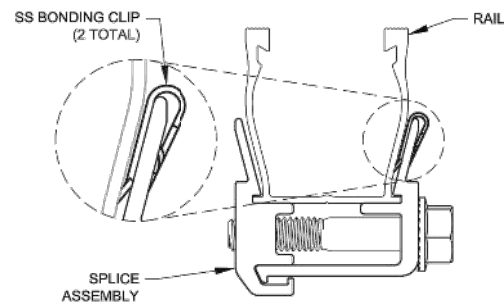
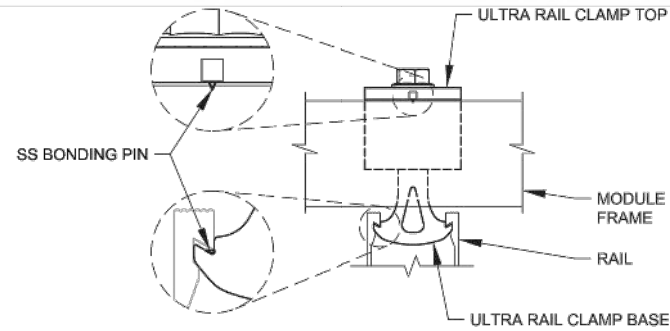
DS-05

# Grounding Specifications

snaprack.com

## System Bonding Methods

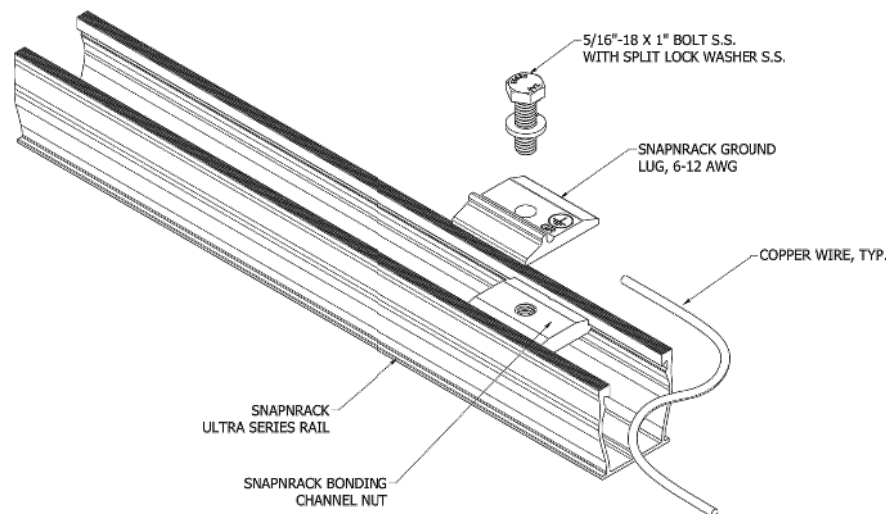
- 1 SnapNrack Ultra Rail Mid Clamp
- 2 SnapNrack Ultra Rail End Clamp
- 3 SnapNrack Mid Clamp
- 4 SnapNrack Adjustable End Clamp
- 5 SnapNrack UR-40 Rail Splice
- 6 SnapNrack UR-60 Rail Splice



**Note:**  
SnapNrack module clamps contain a SnapNrack Channel Nut with integral bonding clips or pins in assembly to properly bond the system (except Universal End Clamps).

**Note:**  
SnapNrack Ultra Rail Splices contain integral bonding clips in assembly to properly bond the system.

## SnapNrack Ground Lug Assembly

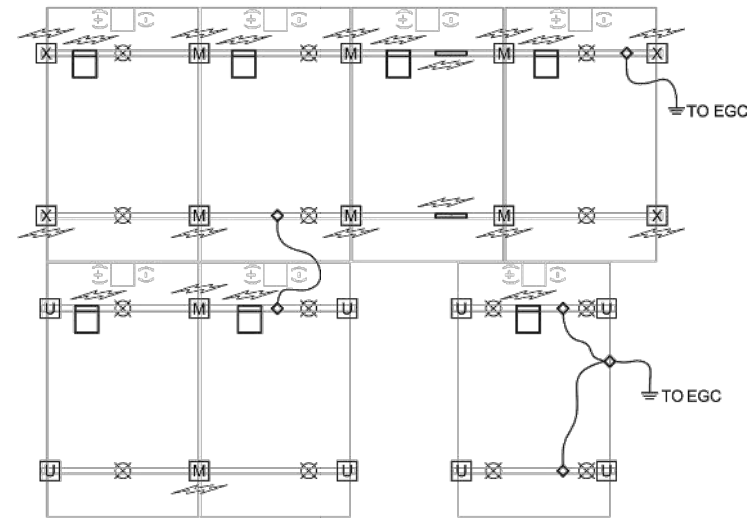


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# Grounding Specifications

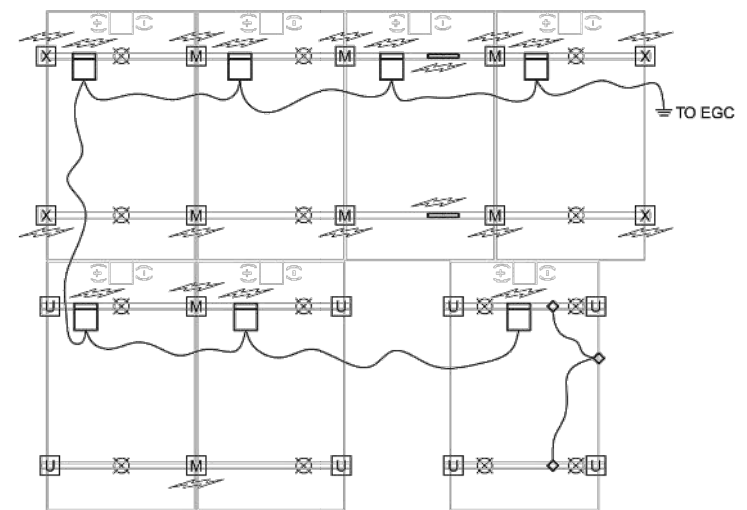
snaprack.com

## Ground Path Details - SolarEdge



- RAIL
- RAIL SPLICE
- MOUNT
- GROUND LUG
- MODULE CLAMP
- M = MIDCLAMP
- X = X-END CLAMP
- U = UNIVERSAL END CLAMP
- GROUND PATH
- EQUIPMENT GROUNDING CONDUCTOR
- SOLAREGE OPTIMIZER

## Ground Path Details - Enphase



- RAIL
- RAIL SPLICE
- MOUNT
- GROUND LUG
- MODULE CLAMP
- M = MIDCLAMP
- X = X-END CLAMP
- U = UNIVERSAL END CLAMP
- GROUND PATH
- EQUIPMENT GROUNDING CONDUCTOR
- ENPHASE MICRO-INVERTER

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REVISIONS		
DESCRIPTION	DATE	REV

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PROJECT NAME

**NELSON RESIDENCE**  
456 SW DURANT ST,  
FORT WHITE, FL 32038

SHEET NAME

DATA SHEET

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
DS-06

# S-5!<sup>®</sup>

## The Right Way!<sup>™</sup>

**NEW**

**NOW AVAILABLE  
IN ALUMINUM**

ProteaBracket<sup>™</sup>



### ProteaBracket<sup>™</sup>

A versatile bracket for mounting solar PV to trapezoidal roof profiles

ProteaBracket<sup>™</sup> 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<sup>™</sup>

### Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot<sup>™</sup>
- 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\*



888-825-3432 | [www.S-5.com](http://www.S-5.com)

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

\*See [www.S-5.com](http://www.S-5.com) for details.

The right way to attach solar PV to trapezoidal roof profiles!

## S-5!<sup>®</sup>

### The Right Way!<sup>™</sup>

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

ProteaBracket<sup>™</sup> 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](http://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!<sup>®</sup> holding strength is unmatched in the industry.

### Multiple Attachment Options:



Side  
Mount Rail



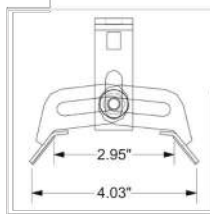
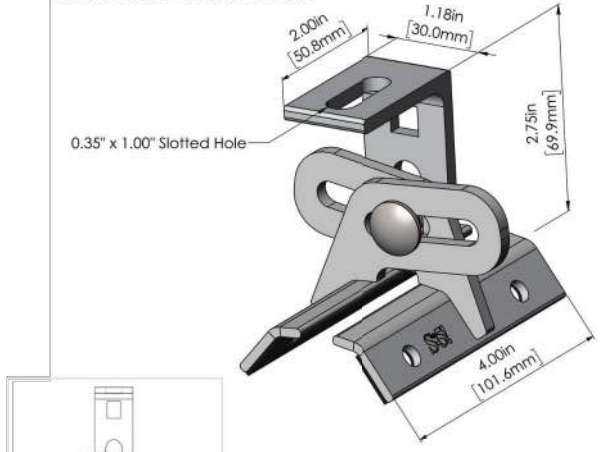
Bottom  
Mount Rail



w/ S-5!  
PVKIT<sup>™</sup>  
(rail-less)

### ProteaBracket<sup>™</sup>

ProteaBracket<sup>™</sup> is still available in stainless steel.



ProteaBracket fits profiles up to 3 inches

### INSTALLATION:

- (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<sup>™</sup> and the S-5! PVKIT<sup>™</sup> 2.0 mounted on a trapezoidal roof profile

### S-5!<sup>®</sup> 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](http://www.S-5.com).

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FORT WHITE, FL 32038

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

DS-07