MIRANDA RESIDENCE

18.25 kW PV SYSTEM

217 SW DRAGONFLY CT, LAKE CITY, FL 32024

PROJECT DESCRIPTION:

50x365 REC SOLAR: REC365AA (365W) MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES

SYSTEM SIZE: 18.25 kW DC STC
ARRAY AREA #1: 771.62 SQ FT.
ARRAY AREA #2: 169.38 SQ FT.

EQUIPMENT SUMMARY
50 REC SOLAR: REC365AA (365W) MODULES
50 ENPHASE IQ7PLUS-72-2-US MICROINVERTERS

RACKING: SNAPNRACK ULTRA RAIL UR-60
ATTACHMENT: SNAPNRACK SPEEDSEAL FOOT

DESIGN CRITERIA:
WIND SPEED (ULT): 130 MPH
WIND SPEED (ASD): 101 MPH
RISK CATEGORY: II
EXPOSURE: B

CODES AND STANDARDS

GOVERNING CODES :
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

OWNER

MIRANDA, ARTURO

INSTALLER

Power Production Management
625 NW 8th Ave
Gainesville, FL 32601
United States
PH: (352) 263-0766

ENGINEER

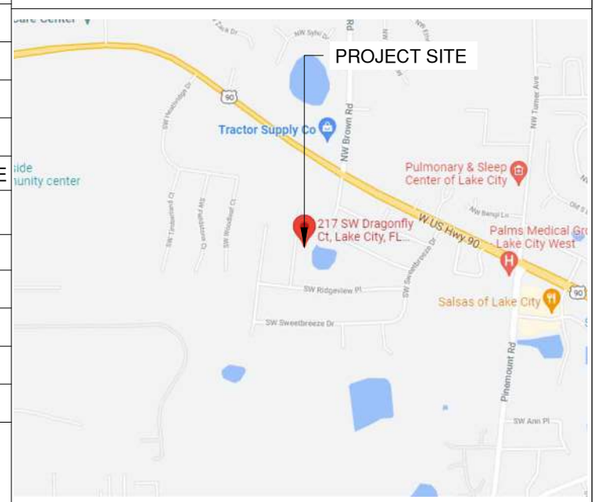
Castillo Engineering Services LLC
620 N. Wymore Road, Suite 250, Maitland FL 32751
TEL: (407) 289-2575
Ermocrates E. Castillo
License#: FL PE 52590

SHEET INDEX

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

HOUSE PHOTO

VICINITY MAP



STRUCTURAL CERTIFICATION:

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.

ELECTRICAL CERTIFICATION:

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

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER™ PRODUCTION MANAGEMENT, INC.

Signature with Digital ID
Digitally signed by: Ermocrates E Castillo
Date: 2022.01.07 10:40:32

PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT, LAKE CITY, FL 32024

SHEET NAME
COVER SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
G-01

Symbols:

Section..... X / X-XX — Sheet where section is located

Elevation ..... X / X-XX — Detail ID Letter; Sheet where section is located

Detail ..... X / X-XX — Detail ID Letter; Sheet where section is located

Detail ..... (Enlarged Plan) X / X-XX — Detail ID Letter; 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 ..... Transfer Switch ATS

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 50 REC SOLAR: REC365AA (365W) MODULES with a combined STC rated dc output power of 18,250W. The modules are connected into 50 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.

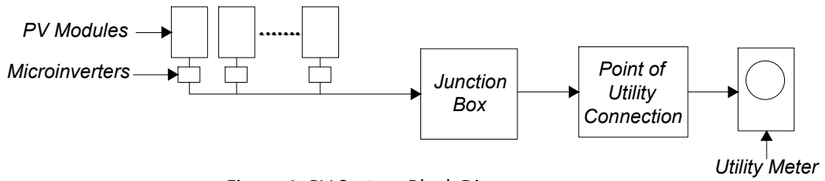


Figure 1: PV System Block Diagram

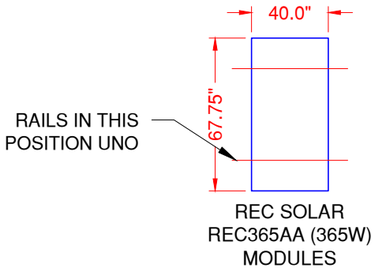
The inverter meets the requirements of IEEE 1547 and UL 1741.

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)



REC SOLAR
REC365AA (365W)
MODULES

ALLOWABLE DESIGN PRESSURE	PSF
DOWN PRESSURE	75.3
UPLIFT PRESSURE, 2 RAILS	75.3

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2022.01.07 10:40:33

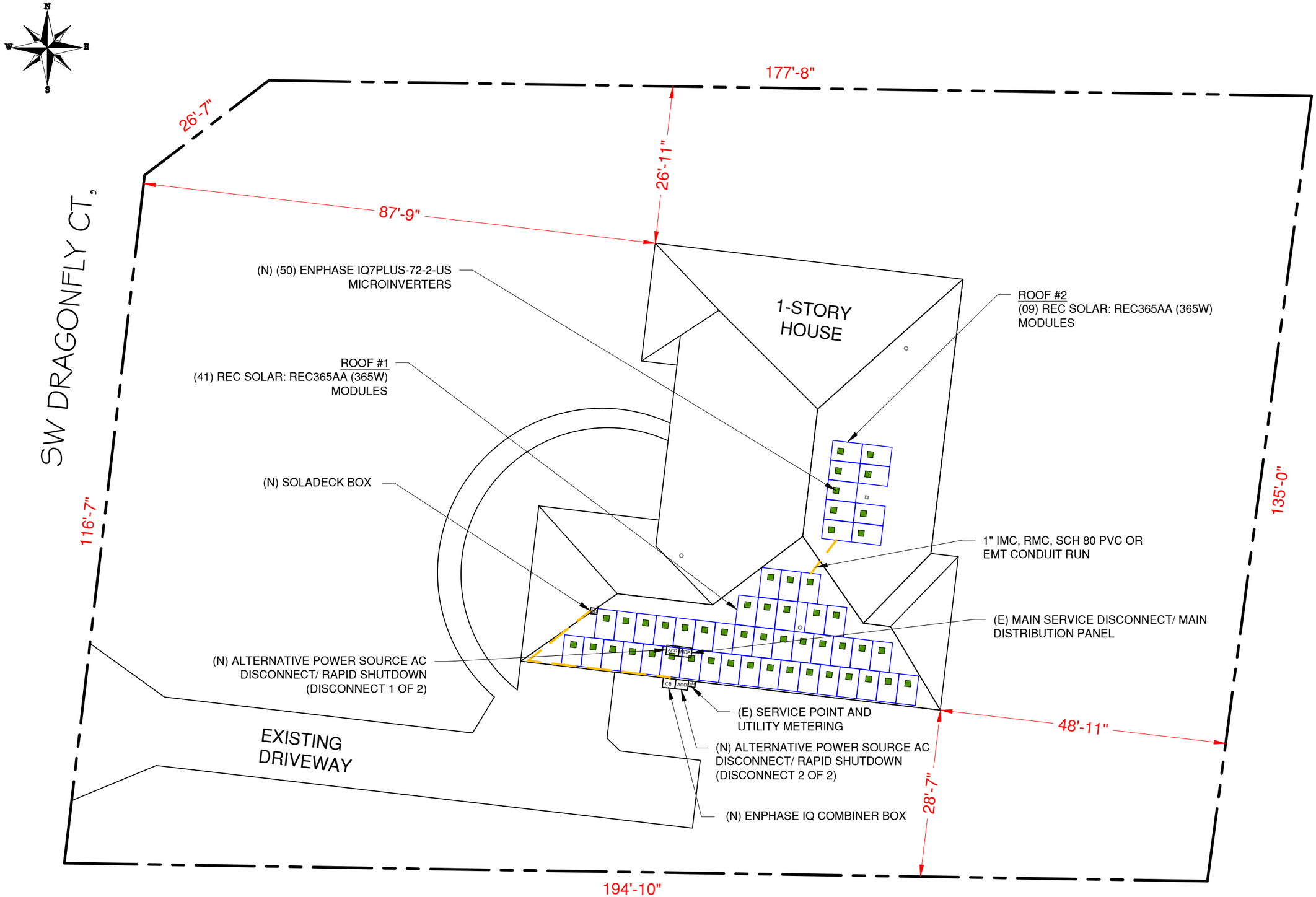
PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
NOTES AND DESCRIPTION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
A-00



1 ROOF PLAN AND PROPERTY LINES

A-01

SCALE: 1/16" = 1'-0"

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SHEET NAME

ROOF PLAN

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

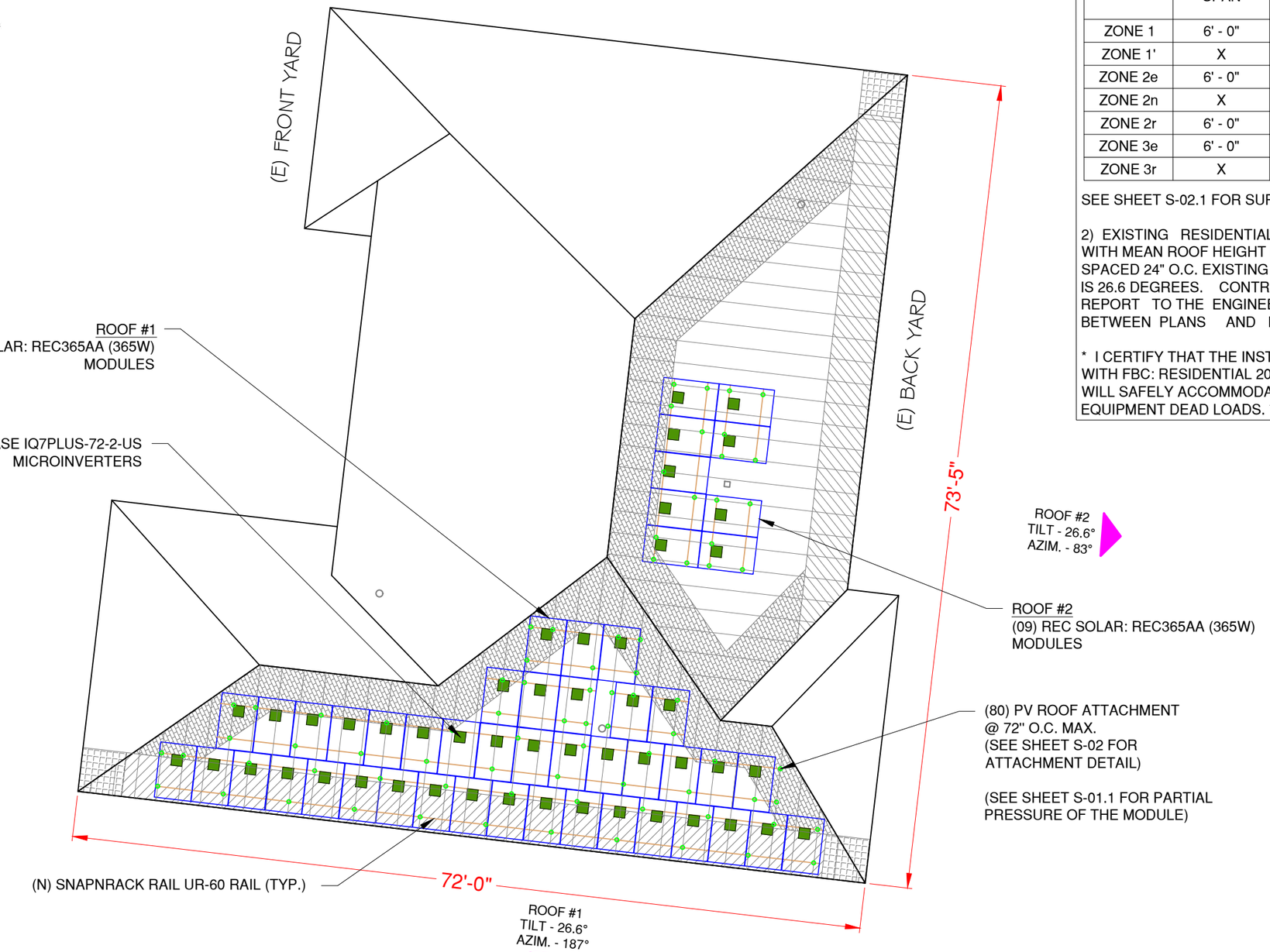
A-01

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 50 MODULES
MODULE TYPE = REC SOLAR: REC365AA (365W) 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	TRUSS SPACING
#1	ASPHALT SHINGLE	771.62	962.17	80.20	26.6°	187°	2"x4"	24" O.C.
#2	ASPHALT SHINGLE	169.38	905.88	18.70	26.6°	83°	2"x4"	24" O.C.



ROOF #1
(41) REC SOLAR: REC365AA (365W) MODULES

(N) (50) ENPHASE IQ7PLUS-72-2-US MICROINVERTERS

ROOF #2
(09) REC SOLAR: REC365AA (365W) MODULES

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

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

(N) SNAPNRACK RAIL UR-60 RAIL (TYP.)

1 MODULE LAYOUT
S-01 SCALE: 3/32" = 1'-0"

GENERAL INSTALLATION PLAN NOTES:

1) ROOF ATTACHMENTS TO SYP TRUSSES 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"	6' - 0"	1' - 4"
ZONE 2n	X	X	X	X
ZONE 2r	6' - 0"	1' - 4"	6' - 0"	1' - 4"
ZONE 3e	6' - 0"	1' - 4"	6' - 0"	1' - 4"
ZONE 3r	X	X	X	X

SEE SHEET S-02.1 FOR SUPPORTING CALCULATIONS.

2) EXISTING RESIDENTIAL BUILDING IS AN ASPHALT SHINGLE ROOF WITH MEAN ROOF HEIGHT IS 15 FT AND SYP 2'X4' ROOF TRUSSES SPACED 24" O.C. EXISTING ROOF SLOPE FOR SOLAR SYSTEM 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.

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

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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217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
MODULE LAYOUT

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01

FOR EDGE MODULES

1	1'	2e	2n	2r	3e	3r
18.5	0	25.7	0	25.7	25.7	0

Module Size	18.82	Sq. ft.

	Edge Modules							Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P18	0	0	13.84	0	4.98	0	0	25.70
P19	3.65	0	13.84	0	1.33	0	0	24.30
P20	4.98	0	13.84	0	0	0	0	23.80
P21	3.50	0	13.84	0	1.48	0	0	24.36
P22	5.10	0	0	0	13.72	0	0	23.75
P23	4.39	0	0	0	14.43	0	0	24.02

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS : 75.3 PSF

FOR NON EXPOSED MODULES

1	1'	2e	2n	2r	3e	3r
16	0	17.1	0	17.1	17.1	0

Module Size	18.82	Sq. ft.

	Non-Exposed modules							Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P1	9.09	0	0	0	9.73	0	0	16.57
P2	14.11	0	0	0	4.71	0	0	16.28
P3	17.49	0	0	0	1.33	0	0	16.08
P4	18.82	0	0	0	0	0	0	16.00
P5	17.18	0	0	0	1.64	0	0	16.10
P6	14.67	0	0	0	4.15	0	0	16.24
P7	13.96	0	0	0	4.86	0	0	16.28
P8	18.24	0	0	0	0.58	0	0	16.03
P9	18.72	0	0	0	0.10	0	0	16.01
P10	15.77	0	0	0	3.05	0	0	16.18
P11	15.92	0	0	0	2.90	0	0	16.17

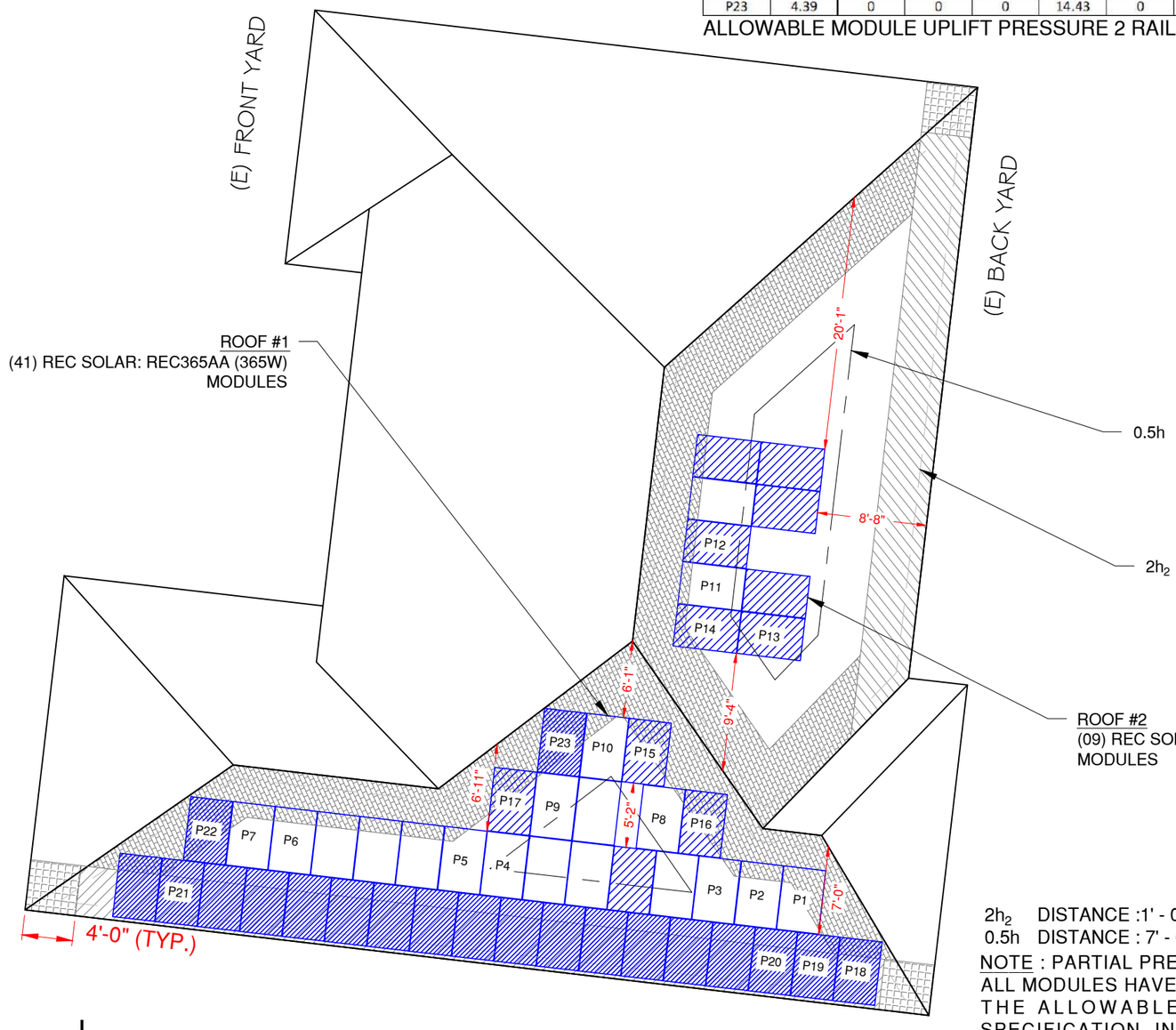
FOR EXPOSED MODULES

1	1'	2e	2n	2r	3e	3r
18.5	0	25.7	0	25.7	25.7	0

Module Size	18.82	Sq. ft.

	Exposed modules							Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P12	15.92	0	0	0	2.90	0	0	19.61
P13	18.82	0	0	0	0.00	0	0	18.50
P14	14.79	0	0	0	4.03	0	0	20.04
P15	10.05	0	0	0	8.77	0	0	21.86
P16	7.56	0	0	0	11.26	0	0	22.81
P17	11.11	0	0	0	7.71	0	0	21.45

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS : 75.3 PSF



$2h_2$ DISTANCE :1' - 0"
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.

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)

1 PARTIAL PRESSURE AND MODULES EXPOSURE

S-01.1 SCALE: 3/32" = 1'-0"

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2022.01.07 10:40:34

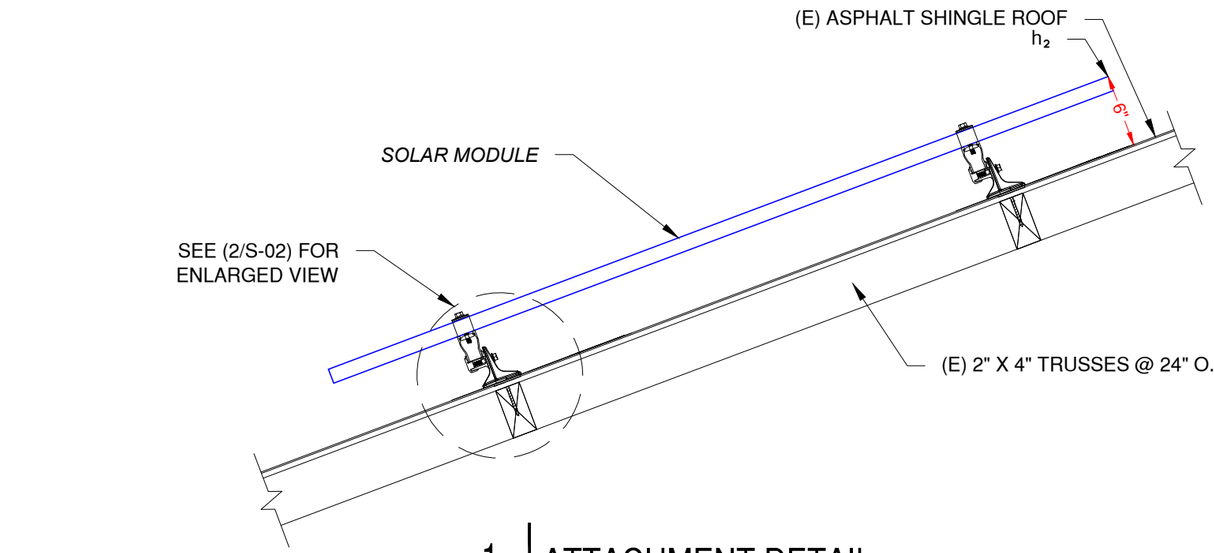
PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
PARTIAL PRESSURE AND MODULES EXPOSURE

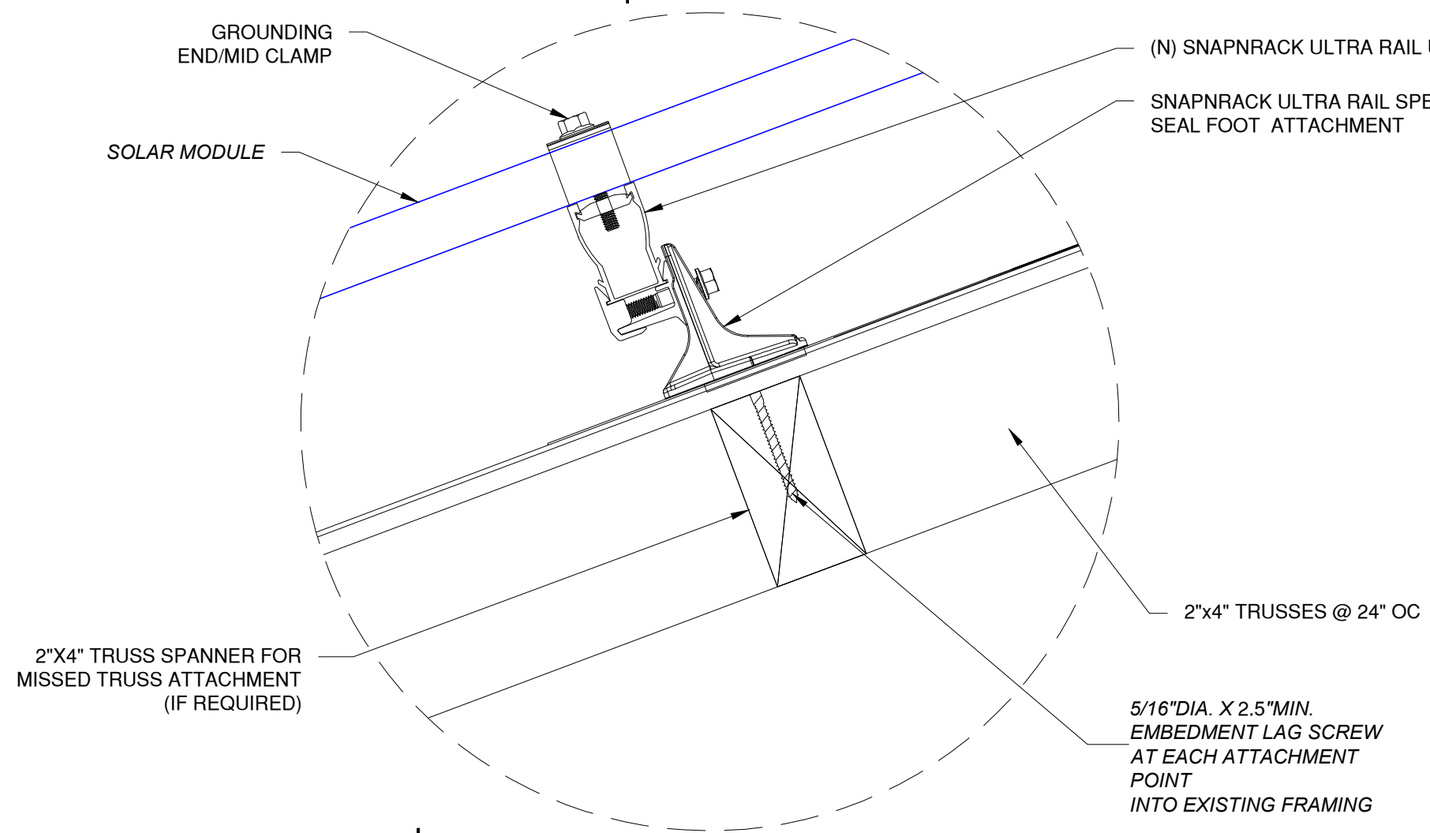
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01.1



1 ATTACHMENT DETAIL

S-02 SCALE: 1" = 1'-0"



2 ATTACHMENT DETAIL (ENLARGED SECTION VIEW)

S-02 SCALE: 1" = 2'

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217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME

ATTACHMENT DETAIL

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

S-02

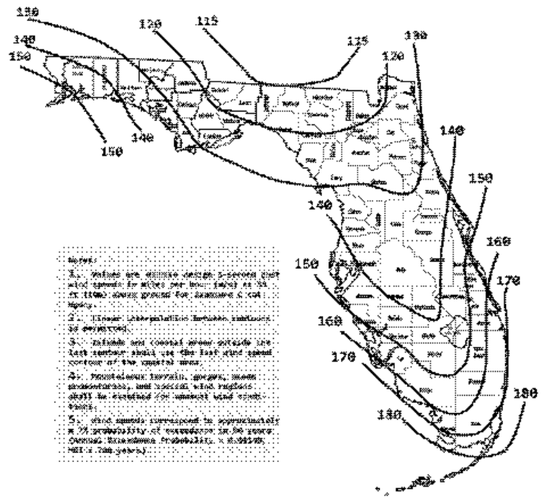

FIGURE 1609.3(1)
ULTIMATE DESIGN WIND SPEEDS, V_{ULT}, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

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

SITE INFORMATION

FBC VERSION	2020	RISK CATEGORY	II
MEAN ROOF HEIGHT (ft)	15.0	EXPOSURE CATEGORY	B
ROOF LENGTH (ft)	72.0	ROOF SLOPE	6 /12
ROOF WIDTH (ft)	73.5	ROOF SLOPE (°)	26.6
PARAPET HEIGHT (ft)	0.0	ROOF TYPE	HIP
MODULE LENGTH (in)	67.75	ULTIMATE WIND SPEED	130 mph
MODULE WIDTH (in)	40.00	NOMINAL WIND SPEED	101 mph
MODULE ORIENTATION	PORTRAIT	EXPOSURE FACTOR (C_e)	1.000
MODULE AREA (sq. ft.)	18.82	TEMPERATURE FACTOR (C_t)	1.000
GROUND SNOW LOAD (psf)	0.0	IMPORTANCE FACTOR (I_s)	1.000
DEAD LOAD (psf)	3.0	SLOPE FACTOR (C_s)	0.910
SLOPED ROOF SNOW LOAD (psf)	0.0	K_D	0.850
EFFECTIVE WIND AREA (ft^2)	18.8	K_{ZT}	1.000
GROUND ELEVATION (ft)	160.0	K_H	0.994
HVHZ	NO	K_z	0.575

DESIGN CALCULATIONS

VELOCITY PRESSURE (q) = $.00256*K_E K_z K_{ZT} K_D V^2$

VELOCITY PRESSURE(ASD) 12.6 psf

WIDTH OF PRESSURE COEFFICIENT	72' * 10%	=	7.2'	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	0.590	-1.235
	ZONE 1'	0.590	X
	ZONE 2e	0.590	-1.789
	ZONE 2n	0.590	X
	ZONE 2r	0.590	-1.789
	ZONE 3e	0.590	-1.789
	ZONE 3r	0.590	X

INTERNAL PRESSURE COEFFICIENT (+/-) 0.18

DESIGN PRESSURES

ROOF ZONE	DOWN	UP				
1	16.0	-17.8	psf			
1'	16.0	X	psf			
2e	16.0	-24.8	psf	Module allowable uplift pressure	75.3	psf
2n	16.0	X	psf	Module allowable down pressure	75.3	psf
2r	16.0	-24.8	psf			
3e	16.0	-24.8	psf			
3r	16.0	X	psf			

ARRAY FACTORS

ARRAY EDGE FACTOR (EXPOSED)	1.5	SOLAR PANEL PRESSURE EQUALIZATION FACTOR	0.6902
ARRAY EDGE FACTOR (NON-EXPOSED)	1		

ADJUSTED DESIGN PRESSURES

ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)	
1	16.0	-18.5	-16.0	psf
1'	16.0	X	X	psf
2e	16.0	-25.7	-17.1	psf
2n	16.0	X	X	psf
2r	16.0	-25.7	-17.1	psf
3e	16.0	-25.7	-17.1	psf
3r	16.0	X	X	psf

ATTACHMENTS USED

ATTACHMENT MODEL	Snap-N-Rack	
ATTACHMENT STRENGTH	476	lbs

MAX DESIGN LOADS ALLOWABLE

LIMIT MAX SPAN TO **N/A** in

RAFTER/SEAM SPACING **24** in **NO. OF RAILS** **Exposed: 2** **Non. Exp: 2**

ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)		SPANS (E)	SPANS (N.E)
1	271.0	312.9	271.0	lbs	72 in	72 in
1'	0.0	X	X	lbs	X in	X in
2e	271.0	435.3	290.2	lbs	72 in	72 in
2n	0.0	X	X	lbs	X in	X in
2r	271.0	435.3	290.2	lbs	72 in	72 in
3e	271.0	435.3	290.2	lbs	72 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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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER™ PRODUCTION MANAGEMENT, INC.

Signature with Seal

Digitally signed by: Ermocrates E Castillo
Date: 2022.01.07 10:40:35

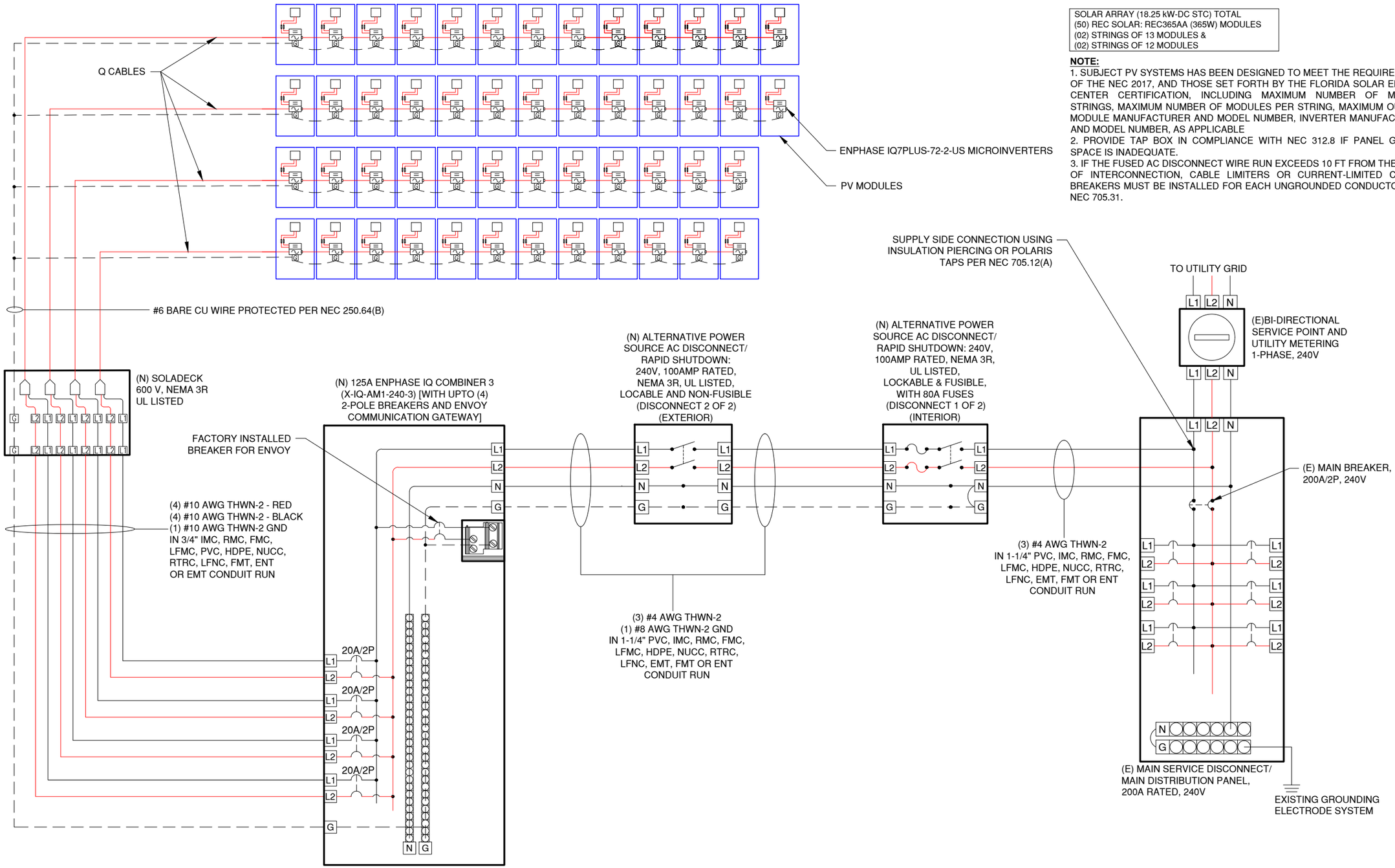
PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
STRUCTURE CALCULATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-02.1



SOLAR ARRAY (18.25 kW-DC STC) TOTAL
(50) REC SOLAR: REC365AA (365W) MODULES
(02) STRINGS OF 13 MODULES &
(02) STRINGS OF 12 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. PROVIDE TAP BOX IN COMPLIANCE WITH NEC 312.8 IF PANEL GUTTER SPACE IS INADEQUATE.
3. IF THE FUSED AC DISCONNECT WIRE RUN EXCEEDS 10 FT FROM THE POINT OF INTERCONNECTION, CABLE LIMITERS OR CURRENT-LIMITED CIRCUIT BREAKERS MUST BE INSTALLED FOR EACH UNGROUNDED CONDUCTOR PER NEC 705.31.

1 | ELECTRICAL LINE DIAGRAM

E-01

SCALE: NTS

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PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME

ELECTRICAL
LINE DIAGRAM

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

E-01

ELECTRICAL CALCULATION

Module Manufacturer	REC Solar
Module Model	REC 365AA
Inverter Manufacturer	Enphase
Inverter Model	Enphase IQ 7 Plus
Modules/Branch Circuit 1	13
Modules/Branch Circuit 2	13
Modules/Branch Circuit 3	12
Modules/Branch Circuit 4	12
Total Array Power (kW)	18.25
System AC Voltage	240V 1-Phase

Module Properties			
Voc	44	Isc	10.52
Vmpp	37.1	Imp	9.85
TC Voc	-0.24%/ °C	TC Vmp	-0.26%/°C
Pmp	365.0	NOCT	45 °C

Design Temperature	
Min. Ambient Temp. °F	32
Max. Ambient Temp. °F	117
Calculated Max. Voc	48
Calculated Min Vmp	29
Conduit Fill	
Number of conduits	1

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

Ampacity Calcultions

Circuit	Max Amps	1.25 x Max Amps	AWG	90 °C Ampacity	AmbientT emp °F	Temp Derate	Conduit Fill	Fill Derate	Derated Ampacity	Maximum Circuit Breaker
Circuit 1	15.7	19.6	#10	40	130	0.76	8	0.7	21.28	20 A
Circuit 2	15.7	19.6	#10	40	130	0.76	8	0.7	21.28	20 A
Circuit 3	14.5	18.1	#10	40	130	0.76	8	0.7	21.28	20 A
Circuit 4	14.5	18.1	#10	40	130	0.76	8	0.7	21.28	20 A
AC Combiner Panel Output	60.4	75.5	#4	95	95	0.96	3	1	91.2	80 A

Maximum Circuit Voltage Drop	2%

Voltage Drop Calculations

Circuit	AWG	Circular Mills	I	V	Max Length
Circuit 1	#10	10380	15.7	240	123 Feet
Circuit 2	#10	10380	15.7	240	123 Feet
Circuit 3	#10	10380	14.5	240	133 Feet
Circuit 4	#10	10380	14.5	240	133 Feet
Combiner Panel Output	#4	41740	60.4	240	139 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 Voc 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
	In any cell indicates that the system is safe and complies with NEC requirements
	In any cell indicates a potentially unsafe condition
	Information input by system designer
	Informaton obtained from manufacturer datasheets

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT. THE TERMINALS ARE RATED FOR 75 DEGREE C.
3. THE WIRES ARE SIZED ACCORDING TO NEC 110.14.
4. 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.
5. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
6. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
7. WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
8. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
9. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
10. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
11. THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE .
12. UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
13. MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
14. RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
15. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
16. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).
17. THIS SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN OF PV CONDUCTORS IN COMPLIANCE WITH NEC 690.12.
18. LABELING IN COMPLIANCE WITH NEC 690.12 AND 690.56(C) IS SHOWN ON SHEET E-03.
19. 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.

Castillo Engineering
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TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2022.01.07 10:40:37

PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

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 60.4 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))

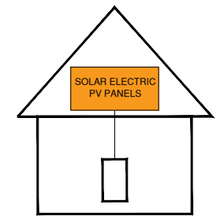
DATA PER PANEL

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

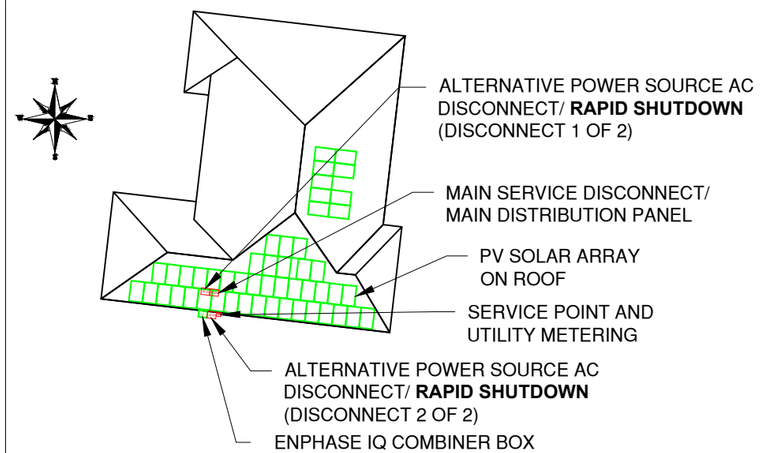


LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.56(C)(1)(a), IFC 1204.5.1

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



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)

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Digitally signed by: Ermocrates E Castillo
Date: 2022.01.07 10:40:37

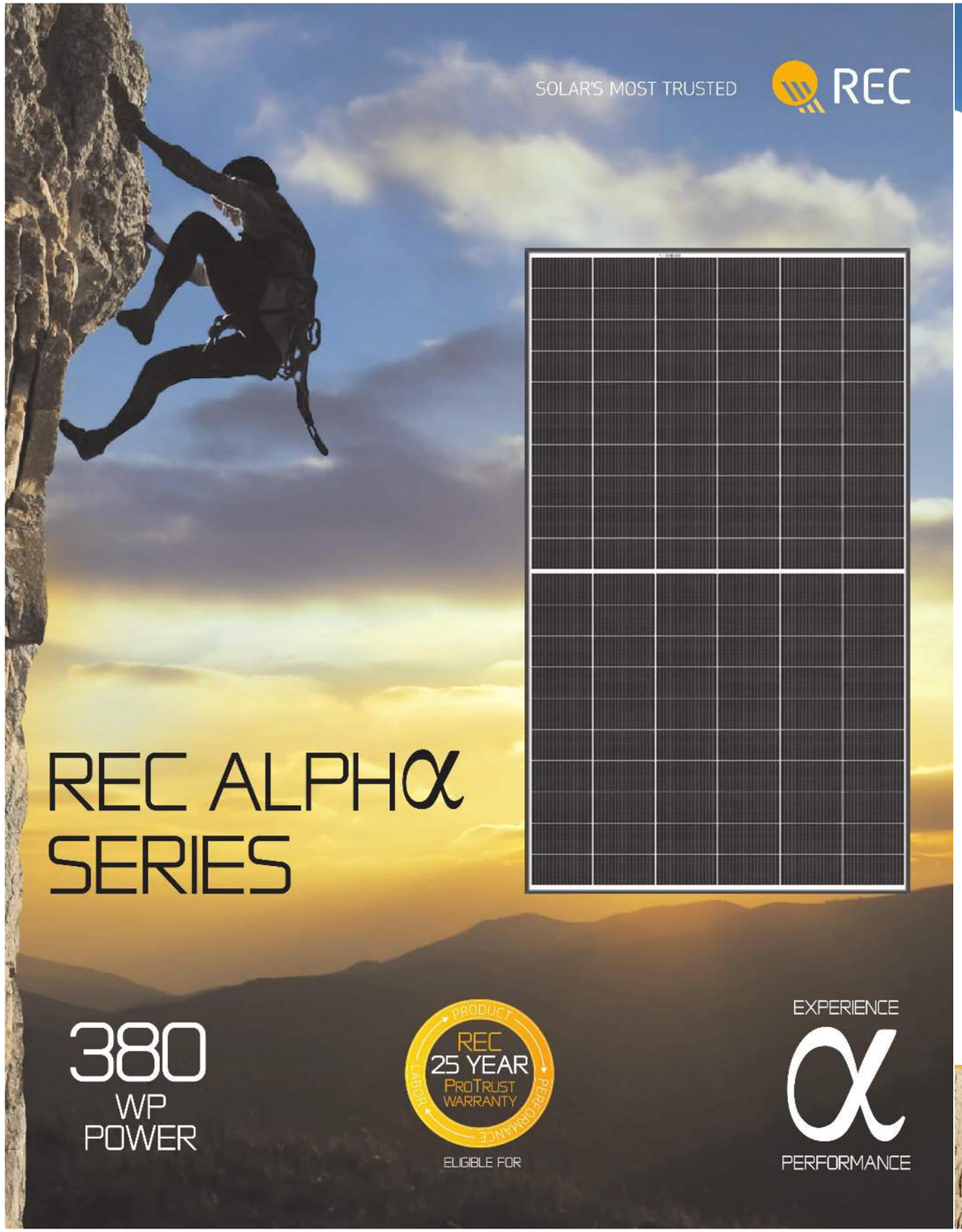
PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
SYSTEM LABELING

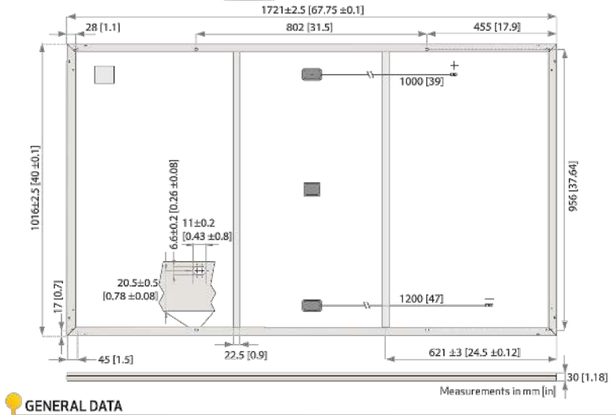
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-03



REC ALPHA SERIES

PRODUCT DATASHEET



GENERAL DATA

Cell type:	120 half-cut cells with REC heterojunction cell technology 6 strings of 20 cells in series	Connectors:	Stäubli MC4 PV-KBT4/KST4, 12 AWG (4 mm²) in accordance with IEC 62852 IP68 only when connected
Glass:	0.13 in (3.2 mm) solar glass with anti-reflection surface treatment	Cable:	12 AWG (4 mm²) PV wire, 39 + 47 in (1 + 1.2 m) accordance with EN 50618
Backsheet:	Highly resistant polymeric construction	Dimensions:	67.8 x 40 x 1.2 in (1721 x 1016 x 30 mm) 18.8 sq ft (1.75 m²)
Frame:	Anodized aluminum (black)	Weight:	43 lbs (19.5 kg)
Junction box:	3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790	Origin:	Made in Singapore

ELECTRICAL DATA — Product Code*: RECxxxAA

STC	Power Output - P_{MAX} (Wp)	360	365	370	375	380
	Watt Class Sorting - (W)	-0/+5	-0/+5	-0/+5	-0/+5	-0/+5
	Nominal Power Voltage - V_{MPP} (V)	36.7	37.1	37.4	37.8	38.1
	Nominal Power Current - I_{MPP} (A)	9.82	9.85	9.9	9.94	9.98
	Open Circuit Voltage - V_{OC} (V)	43.9	44	44.1	44.2	44.3
	Short Circuit Current - I_{SC} (A)	10.49	10.52	10.55	10.58	10.61
	Power Density (W/sq ft)	19.15	19.41	19.68	19.94	20.21
	Panel Efficiency (%)	20.6	20.9	21.2	21.4	21.7
NMOT	Power Output - P_{MAX} (Wp)	274	278	282	286	289
	Nominal Power Voltage - V_{MPP} (V)	34.6	35.0	35.2	35.6	35.9
	Nominal Power Current - I_{MPP} (A)	7.93	7.96	8.00	8.03	8.06
	Open Circuit Voltage - V_{OC} (V)	41.4	41.5	41.6	41.6	41.7
	Short Circuit Current - I_{SC} (A)	8.47	8.50	8.52	8.55	8.57

Values at standard test conditions (STC: air mass AM1.5, irradiance 10.75 W/sq ft (1000 W/m²), temperature 77°F (25°C), based on a production spread with a tolerance of P_{MAX}, V_{OC} & I_{SC} ±3% within one watt class. Nominal module operating temperature (NMOT: air mass AM1.5, irradiance 800 W/m², temperature 68°F (20°C), windspeed 3.3 ft/s (1 m/s). *Where xxx indicates the nominal power class (P_{MPP}) at STC above.

CERTIFICATIONS

IEC 61215:2016, IEC 61730:2016, UL 1703, UL 61730	
IEC 62804	PID
IEC 61701	Salt Mist
IEC 62716	Ammonia Resistance
UL 1703	Fire Type Class 2
IEC 62782	Dynamic Mechanical Load
IEC 61215-2:2016	Hailstone (35mm)
AS4040.2 NCC 2016	Cyclic Wind Load

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 ... +85°C
Maximum system voltage:	1000 V
Design load (+): snow Maximum test load (+):	4666 Pa (97.5 lbs/sq ft)* 7000 Pa (146 lbs/sq ft)*
Design load (-): wind Maximum test load (-):	2666 Pa (55.6 lbs/sq ft)* 4000 Pa (83.5 lbs/sq ft)*
Max series fuse rating:	25 A
Max reverse current:	25 A

*Calculated using a safety factor of 1.5
**See installation manual for mounting instructions

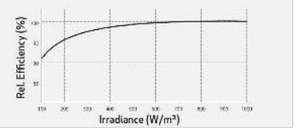
TEMPERATURE RATINGS**

Nominal Module Operating Temperature:	44°C (±2°C)
Temperature coefficient of P_{MAX}:	-0.26 %/°C
Temperature coefficient of V_{OC}:	-0.24 %/°C
Temperature coefficient of I_{SC}:	0.04 %/°C

**The temperature coefficients stated are linear values

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



Specifications subject to change without notice.

Ref: PM-DS-12-01-Rev- D 03.20

Founded in Norway in 1996, REC is a leading vertically integrated solar energy company. Through integrated manufacturing from silicon to wafers, cells, high-quality panels and extending to solar solutions, REC provides the world with a reliable source of clean energy. REC's renowned product quality is supported by the lowest warranty claims rate in the industry. REC is a Bluestar Elkem company with headquarters in Norway and operational headquarters in Singapore. REC employs around 2,000 people worldwide, producing 1.5 GW of solar panels annually.

REC
www.recgroup.com

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POWER PRODUCTION MANAGEMENT, INC.

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Date: 2022.01.07 10:40:38

PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-01

REC Americas LLC
1420 Gateway Dr, Suite 170
San Mateo, CA 94404
Dir 805 704 3226
Fax 805 457 6104
www.recgroup.com

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

RE: REC Modules Max Wind Load

San Luis Obispo, 18 February 2021

To Whom it May Concern;

REC Americas LLC confirms that the REC Twin Peak 3M series (RECXXXTP3M) and REC Alpha Series (RECXXXAA) 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
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CASTILLO ENGINEERING SERVICES, LLC
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217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-02

Data Sheet
Enphase Microinverters
Region: US

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.

UL CERTIFIED SAFETY US-CA E341165

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

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	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[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)	0.7 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 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**

ENPHASE

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2018-02-08

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2022.01.07 10:40:39

PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

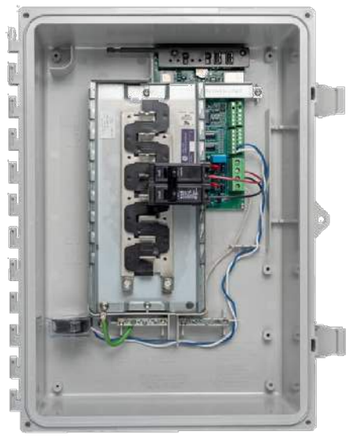
SHEET NUMBER
DS-03

Data Sheet
Enphase Networking

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

UL LISTED

To learn more about Enphase offerings, visit **enphase.com**

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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 * Consumption monitoring is required for Enphase Storage Systems	Split core current transformers enable whole home **consumption** metering (+/- 2.5%).
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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Date: 2022.01.07 10:40:40

PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-04

SnapNrack
Solar Mounting Solutions

UR-40
UR-60

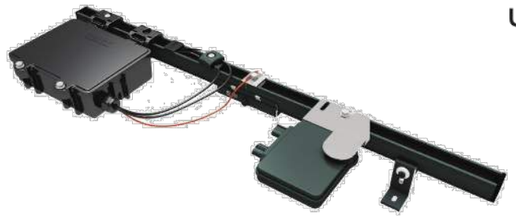
Ultra Rail

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

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

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
DESIGN	snapnrack.com/configurator
WHERE TO BUY	snapnrack.com/where-to-buy

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** **contact@snapnrack.com**

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217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

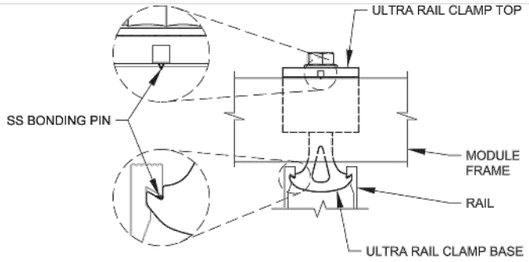
SHEET NUMBER
DS-05

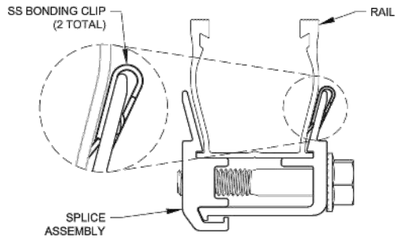
Grounding Specifications

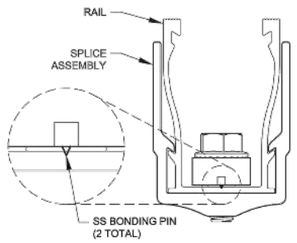
snapnrack.com

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



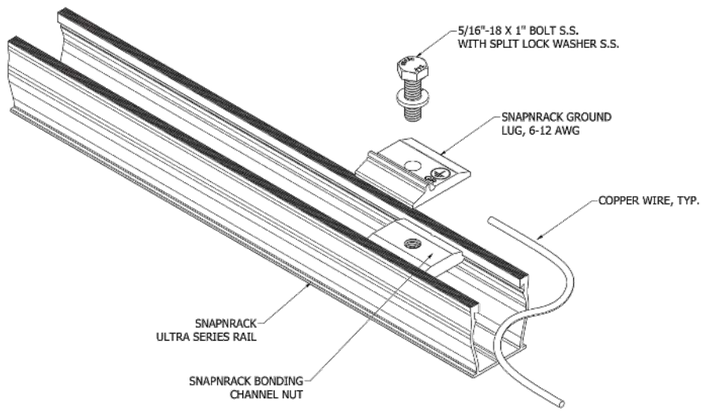




Note:
SnapNrack module clamps contain a SnapNrack Channel Nut with integral bonding clips or pins in assembly to properly bond the system (except Universal End Clamps).

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

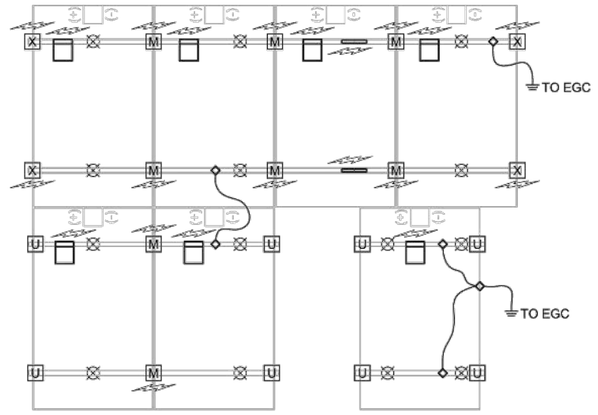
SnapNrack Ground Lug Assembly



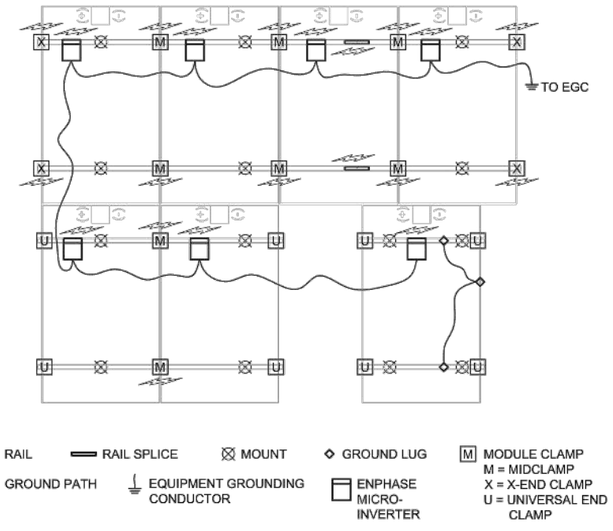
Grounding Specifications

snapnrack.com

Ground Path Details - SolarEdge



Ground Path Details - Enphase



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Date: 2022.01.07 10:40:41

PROJECT NAME

MIRANDA RESIDENCE
217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-05.1

SnapNrack
Solar Mounting Solutions

snapnrack.com

SnapNrack SpeedSeal™ Foot

Patent Pending Lag Driven Sealant Solution for Ultra Rail

A New Generation of Roof Attachments

- Innovative design incorporates flashing reliability into a single roof attachment
- 100% waterproof solution
- Sealing cavity with compressible barrier secures sealant in place & fills voids

Maintain the Integrity of the Roof by Eliminating Disruption

- Zero prying of shingles
- Zero removal of nails leaving holes in the roof
- Roof remains installed the way manufacturer meant it to be

Lag Driven Sealant Waterproofing

- Time Tested Roof Sealant provides lasting seal
- Sealant is compressed into cavity and lag hole as attachment is secured to rafter
- Active sealant solidifies bond if ever touched by liquid
- Technology passes UL 2582 Wind Driven Rain Test and ASTM E2140 Water Column Testing standards. Patent Pending.

Single Tool Installation

- SnapNrack was the first in the industry to develop a complete system that only requires a single tool. That tradition is continued as a ½" socket is still the only tool necessary to secure the mount as well as all other parts of the system.

Note: Sealant shown in white for illustration purposes only.

snapnrack.com

SnapNrack SpeedSeal™ Foot

Fastest Roof Attachment in Solar

- Lag straight to a structural member, no in-between components such as flashings or bases.
- Simply locate rafter, fill sealant cavity & secure to roof. *It's that simple!*

Integrated Flashings. No Questions.

- Sealant fills around lag screw keeping roof and structure sealed and intact
- No added holes from ripping up nails, staples and screws holding shingles on roof

Less Time. Less Parts. Less Tools.

- No more need for a pry bar to rip up shingles
- No more proprietary lag screws
- Single Tool installation with ½" socket

Total System Solution

One Tool. One Warranty.

- SnapNrack Ultra Rail is a straightforward intuitive install experience on the roof without compromising quality, aesthetics & safety, all supported by a 25 year warranty.
- Built-in Wire Management & Aesthetically pleasing features designed for Ultra Rail result in a long-lasting quality install that installers and homeowners love.

Certifications

SnapNrack Ultra Rail System has been evaluated by Underwriters Laboratories (UL) and Listed to UL/ANSI Standard 2703 for Mechanical Loading and Fire. Additionally it is listed to UL 2582 for wind-driven rain and ASTM 2140.

SnapNrack
Solar Mounting Solutions

877-732-2860 www.snapnrack.com contact@snapnrack.com

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217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-06

DESCRIPTION:

SNAPNRACK, ULTRA RAIL SPEEDSEAL™ FOOT

PART NUMBER(S):

242-02163, 242-02167

DRAWN BY:

mwatkins

REVISION:

A

SnapNrack™ Solar Mounting Solutions

595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA
PHONE (415) 580-6900 • FAX (415) 580-6902

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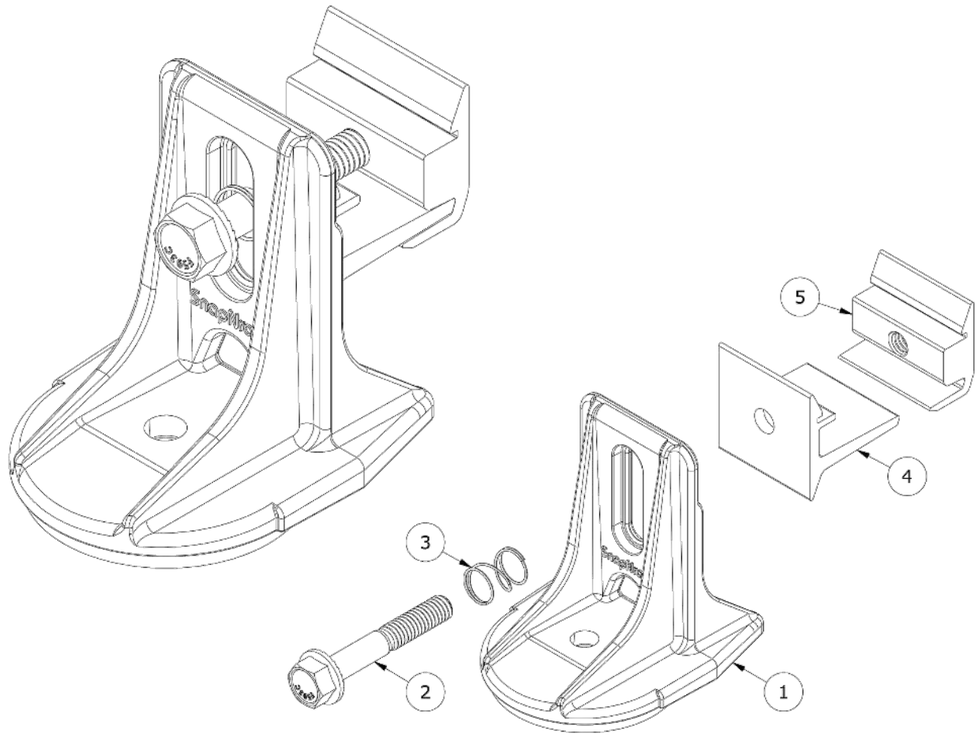

PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	SNAPNRACK, SPEEDSEAL FOOT, BASE, SEALING, SILVER / BLACK
2	1	BOLT, FLANGE, SERRATED, 5/16IN-18 X 2IN, SS
3	1	SNAPNRACK, RL UNIVERSAL, MOUNT SPRING, SS
4	1	SNAPNRACK, ULTRA RAIL MOUNT THRU PRC, CLEAR / BLACK
5	1	SNAPNRACK, ULTRA RAIL MOUNT TAPPED PRC, CLEAR / BLACK

MATERIALS:	DIE CAST A380 ALUMINUM, 6000 SERIES ALUMINUM, STAINLESS STEEL	
DESIGN LOAD (LBS):	802 UP, 1333 DOWN, 357 SIDE	OPTIONS:
ULTIMATE LOAD (LBS):	2118 UP, 4006 DOWN, 1331 SIDE	CLEAR / BLACK
TORQUE SPECIFICATION:	12 LB-FT	
CERTIFICATION:	UL 2703, FILE E359313; WIND-DRIVEN RAIN TEST FROM SUBJECT UL 2582	
WEIGHT (LBS):	0.45	

DESCRIPTION:

SNAPNRACK, ULTRA RAIL SPEEDSEAL™ FOOT

PART NUMBER(S):

242-02163, 242-02167

DRAWN BY:

mwatkins

REVISION:

A

SnapNrack™ Solar Mounting Solutions

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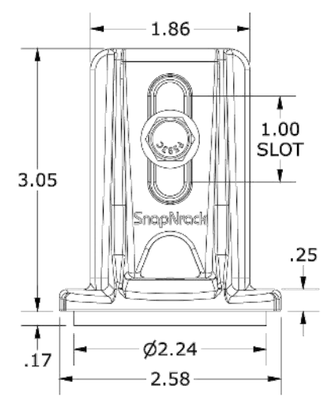

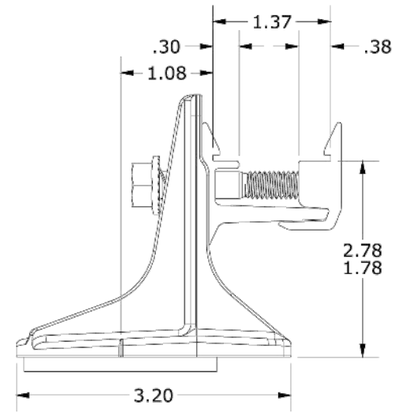

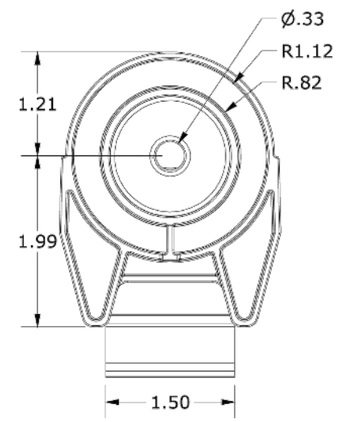

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PROJECT INSTALLER

POWER™ PRODUCTION MANAGEMENT, INC.

Signature with Digital

Digitally signed by: Ermocrates E Castillo
Date: 2022.01.07 10:40:42

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MIRANDA RESIDENCE

217 SW DRAGONFLY CT,
LAKE CITY, FL 32024

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
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SHEET NUMBER

DS-07