



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

Friday, April 21, 2023

Property Owner: GAYLE BOUDREAU

Property Address: 2038 SW MAYO RD, LAKE CITY, FL 32024

**RE: Photovoltaic System Roof Installations**

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

Based on my review, the existing structure meets or exceeds applicable codes listed below to support the proposed solar panel installation. This assessment is based on recent on-site inspection by solar inspectors and photographs of the existing structure. The photovoltaic system is designed to withstand uplift and downward forces. The structural considerations used in our review and assessment include the following:

**Evaluation Criteria:**

Applied Codes: ASCE 7-16 FBC 2020 NEC 2017

Risk Category: II

Design Wind Speed (3-second gust): 117 mph

Wind Exposure Category: C

Ground Snow Load: 0 PSF

Seismic Design Category: D

**Existing Structure:**

Roof Material: Metal

Roof Structure: 2x6 Rafters

Roof Slope: 2/12



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FLORIDA FIRM NO. 30649

**PRINCIPAL Infrastructure®**

Architecture ♦ Engineering ♦ Construction

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**Effect of the Solar Array on Structure Loading:****Gravity Load:**

Per IBC Section 1607, the areas of the roof where solar panels are located are considered inaccessible, and therefore not subject to roof live loading. Live load in these areas is replaced by the dead load of the solar array, 3 psf. The total gravity load on the structure is therefore reduced and the structure may remain unaltered. Connections of the mounts to the underlying structure are to be installed in a staggered pattern, except at the array ends, to distribute the loading evenly to the roof structure. The stresses within the rafters or truss top chord due to the introduction of discrete mount loads are within acceptable limits, as shown on the attached calculations.

**Wind Load:**

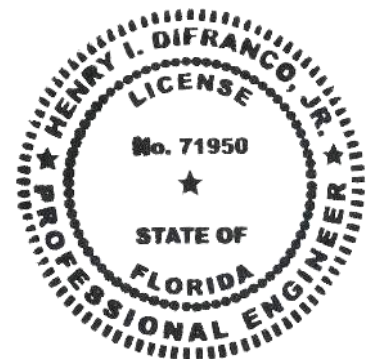
The solar panel array will be flush mounted (no more than 6" above the surrounding roof surface, and parallel to the roof surface. Any additional wind loading on the structure due to the presence of the array is negligible. The array structure is designed by the manufacturer to withstand uplift and downward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

**Snow Load:**

The reduced friction of the glass surface of the solar panels allows for the lower slope factor (Cs) per Section 7.4 of ASCE 7.16 resulting in a reduced design snow load for the structure. This analysis conservatively considered the snow load to be unchanged.

**Seismic Load:**

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



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Conclusion:

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

Limitations:

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

I HENRY I. DIFRANCO, JR PE # 71950 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL 2020 7<sup>TH</sup> ED., CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES, AND EQUIPEMENT DEAD LOADS.

I NESTOR HOUGHTON PE # 64501 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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**Uplift and Wind Downforce Calculation Summary (ASCE 7-16)**  
**Mount, Rack, & Panel Proportioning**  
**Point Load Check and Rafter Stress Analysis**

Property Owner:	GAYLE BOUDREAU	Max. Individual Panel Dimensions		
Project Address:	2038 SW MAYO RD	Length (in)	Width (in)	Area (sf)
City, State:	LAKE CITY, FL 32024	57.6	41.1	16.44

Building Characteristics, Design Input, and Adjustment Factors				
Roof Dimensions:	Length:	65	Greater Dimension	65
	Width:	43	Least Dimension:	43
Roof Height (h):		25	Fig 30.4-1, valid under 60'	✓
Pitch:	<div>2 on 12 =</div>	9.5°	Must be less than 45°	✓
Roof Configuration	Gable			
Roof Structure	2x6 Rafters			
Roof Material	Corrugated Panel			
Risk Category:	II			
Basic Wind Speed:	117		From 26.5-1	
Exposure Category:	C		Fig. 26.7	
Topographic Factor ( $K_{zt}$ )	1.35		Fig. 26.8-1	
Wind Pressure @ $h=30$ , $p_{net30}$	See Table Below		Fig. 30.4-1	
Ht. & Exposure Adjustment ( $\lambda$ )	1.35		Fig. 30.4-1	
Adjusted Wind Pressures, $p_{net}$	See Table Below		Eq. 30.4-1	
Effective Wind Area (sf):	8.22		(Area per individual mount)	
Roof Zone Strip (a), in ft, Fig. 30.4-1, Note 5				
1 - Least Roof Horizontal Dimension (L or W) x 0.10			4.3	
2 - Roof Height x 0.4			10	
3 - Least Roof Horizontal Dimension (L or W) x 0.04			1.72	
4 - Least of (1) and (2)			4.3	
5 - Greater of (3) and (4)			4.3	
6 - Greater of (5) and 3 feet			4.3	
			a=	

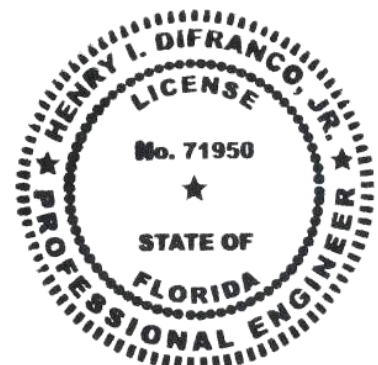


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# ROOF: 1 & 3

Net Design Pressures, $p_{net}$ (Fig 30.4-1), Components & Cladding					
	Uplift (-psf)			Factored Pressure (0.6W, ASCE 7-16)	$\theta$
		$P_{30net}$	$ K_{zt} P_{30net}$		
gable /hip /flat					
Gable	Zone 1 & 2e	44.0	80.3	48.2	$7^\circ < \theta \leq 20^\circ$
	Zone 2n,2r,3e	64.3	117.2	70.3	
	Zone 3r	76.4	139.2	83.5	
Hip					



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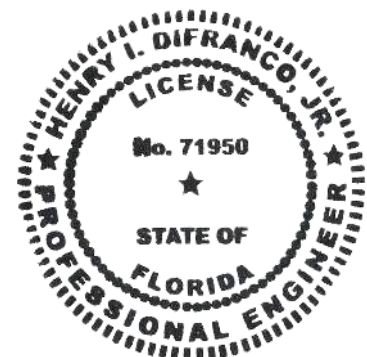
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## ROOF: 1 & 3

Snow Load		
Ground Snow Load, $p_g$	0.0	From ASCE 7 or AHJ
Terrain Category:	C	Para 6.5.6.3
Exposure	Fully	
Exposure Factor $C_e$	0.9	Table 7-2
Thermal Factor, $C_t$	1.2	Table 7-3
Importance Factor, $I_s$	1.0	Table 1.5.2
Roof Configuration	Gable	
Roof Slope	09.5°	
Distance from Eave to Ridge	21.5	
$p_m$ , Minimum required Snow Load	0.00 psf	Para. 7.3.4
$p_f$ , Calculated Snow Load	0.00	Eq. 7.3-1
$p_f$ , Design Snow Load	0.00 psf	

Rail & Mount Selection		
Manufacturer:	S5!	Allowable Mount Spacing by Uplift Pressure
Model:	Protea Bracket	$< 88$ psf : 2 rails, mounts @ 3 ft. o.c. $88$ to $132$ psf : 3 rails, mounts @ 3 ft. o.c. $132$ to $0$ psf : 4 rails, mounts @ 3 ft. o.c. $> 0$ psf : $> 176$ psf : Mount capacity exceeded
Substrate	Corrugated Panel	
Connector:	4- 6mm self-piercing screws	
Allowable Uplift:	633 lb., max.	

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



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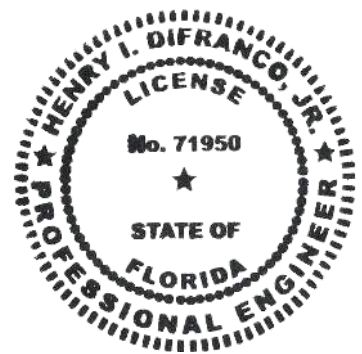
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## ROOF: 2 & 4

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

Property Owner:	GAYLE BOUDREAU	Max. Individual Panel Dimensions		
Project Address:	2038 SW MAYO RD	Length (in)	Width (in)	Area (sf)
City, State:	LAKE CITY, FL 32024	57.6	41.1	16.44

Building Characteristics, Design Input, and Adjustment Factors				
Roof Dimensions:	Length:	31	Greater Dimension	31
	Width:	18	Least Dimension:	18
Roof Height (h):		15	Fig 30.4-1, valid under 60'	✓
Pitch: <input type="text" value="7"/> on 12 =		30.3°	Must be less than 45°	✓
Roof Configuration		Gable		
Roof Structure		2x6 Rafters		
Roof Material		Corrugated Panel		
Risk Category:		II		
Basic Wind Speed:		117	From 26.5-1	
Exposure Category:		C	Fig. 26.7	
Topographic Factor ( $K_{zt}$ )		1.21	Fig. 26.8-1	
Wind Pressure @ $h=30$ , $p_{net30}$		See Table Below	Fig. 30.4-1	
Ht. & Exposure Adjustment ( $\lambda$ )		1.21	Fig. 30.4-1	
Adjusted Wind Pressures, $p_{net}$		See Table Below	Eq. 30.4-1	
Effective Wind Area (sf):		8.22	(Area per individual mount)	
Roof Zone Strip (a), in ft, Fig. 30.4-1, Note 5				
1 - Least Roof Horizontal Dimension (L or W) x 0.10		1.8		
2 - Roof Height x 0.4		6		
3 - Least Roof Horizontal Dimension (L or W) x 0.04		0.72		
4 - Least of (1) and (2)		1.8		
5 - Greater of (3) and (4)		1.8		
6 - Greater of (5) and 3 feet	a=	3		



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## ROOF: 2 & 4

Net Design Pressures, $p_{net}$ (Fig 30.4-1), Components & Cladding					
	Uplift (-psf)			Factored Pressure (0.6W, ASCE 7-16)	$\theta$
		$P_{30net}$	$ K_{zt} P_{30net}$		
gable /hip /flat					
Gable					
					$27^\circ < \theta \leq 45^\circ$
	Zone 1,2e,2r	43.5	63.7	38.2	
	Zone 2n & 3r	47.9	70.2	42.1	
Hip	Zone 3e	58.8	86.0	51.6	



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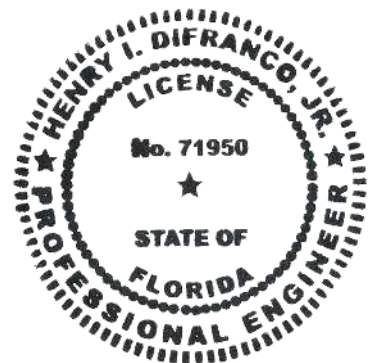
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## ROOF: 2 & 4

Snow Load		
Ground Snow Load, $p_g$	0.0	From ASCE 7 or AHJ
Terrain Category:	C	Para 6.5.6.3
Exposure	Fully	
Exposure Factor $C_e$	0.9	Table 7-2
Thermal Factor, $C_t$	1.2	Table 7-3
Importance Factor, $I_s$	1.0	Table 1.5.2
Roof Configuration	Gable	
Roof Slope	30.3°	
Distance from Eave to Ridge	9.0	
$p_m$ , Minimum required Snow Load	N/A	Para. 7.3.4
$p_f$ , Calculated Snow Load	0.00	Eq. 7.3-1
$p_f$ , Design Snow Load	0.00 psf	

Rail & Mount Selection		
Manufacturer:	S5!	Allowable Mount Spacing by Uplift Pressure
Model:	Protea Bracket	$< 88$ psf : 2 rails, mounts @ 3 ft. o.c. $88$ to $132$ psf : 3 rails, mounts @ 3 ft. o.c. $132$ to $0$ psf : 4 rails, mounts @ 3 ft. o.c. $> 0$ psf : $> 176$ psf : Mount capacity exceeded
Substrate	Corrugated Panel	
Connector:	4- 6mm self-piercing screws	
Allowable Uplift:	633 lb., max.	

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



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# PHOTOVOLTAIC ROOF MOUNT SYSTEM

32 MODULES-ROOF MOUNTED - 12.640 KW DC STC, 11.811 KW DC PTC, 9.280 KW AC

2038 SW MAYO RD, LAKE CITY, FL 32024



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

## PROJECT DATA

PROJECT ADDRESS: 2038 SW MAYO RD,  
LAKE CITY, FL 32024

OWNER: GAYLE BOUDREAU

CONTRACTOR: ADT SOLAR LLC  
PHONE: (985) 238-0864

DESIGNER: ESR

SCOPE: 12.640 KW DC ROOF MOUNT  
SOLAR PV SYSTEM WITH  
32 CANADIAN SOLAR CS3N-395MS 395W  
PV MODULES WITH  
32 ENPHASE IQ8PLUS-72-2-US  
MICROINVERTERS WITH  
2 TESLA POWERWALL 2 = 10KW / 27KWH

AUTHORITIES HAVING JURISDICTION:  
BUILDING: COLUMBIA, COUNTY OF (FL)  
ZONING: COLUMBIA, COUNTY OF (FL)  
UTILITY: FLORIDA POWER & LIGHT CO. - FPL (FL)

## SHEET INDEX

PV-1	COVER SHEET
PV-2	SITE PLAN
PV-3	ROOF PLAN & MODULES
PV-4	ELECTRICAL PLAN
PV-5	STRUCTURAL DETAIL
PV-6	ELECTRICAL LINE DIAGRAM
PV-7	WIRING CALCULATIONS
PV-8	LABELS
PV-9	PLACARD
PV-10	JHA FORM
PV-11	MICRO INVERTER CHART
PV-12+	EQUIPMENT SPECIFICATIONS

## GENERAL NOTES

- ALL COMPONENTS ARE UL LISTED AND CEC CERTIFIED, WHERE WARRANTED.
- THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2017.
- THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
- ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
- WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
- HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
- A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
- PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
- PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
- ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
- INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
- THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
- ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
- ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
- SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
- PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
- DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
- ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
- WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
- ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
- ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.
- THE TESLA BATTERY AS PART OF THE ENSEMBLE SYSTEM DOES NOT EXPORT POWER TO THE GRID IN ANY STORAGE MODE.

## VICINITY MAP



## HOUSE PHOTO



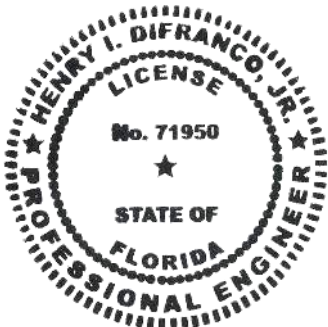
## CODE REFERENCES

PROJECT TO COMPLY WITH THE FOLLOWING:

FLORIDA RESIDENTIAL CODE, 7TH EDITION 2020 (FRC)  
FLORIDA PLUMBING CODE, 7TH EDITION 2020 (FPC)  
FLORIDA BUILDING CODE, 7TH EDITION 2020 EDITION (FBC)  
FLORIDA MECHANICAL CODE, 7TH EDITION 2020 (FMC)  
FLORIDA FIRE PREVENTION CODE, 7TH EDITION 2020 (FFPC)  
2017 NATIONAL ELECTRICAL CODE

### REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	



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

### PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE

2038 SW MAYO RD,  
LAKE CITY, FL 32024

### SHEET NAME

COVER SHEET

### SHEET SIZE

ANSI B  
11" X 17"

### SHEET NUMBER

PV-1



PROJECT DESCRIPTION:

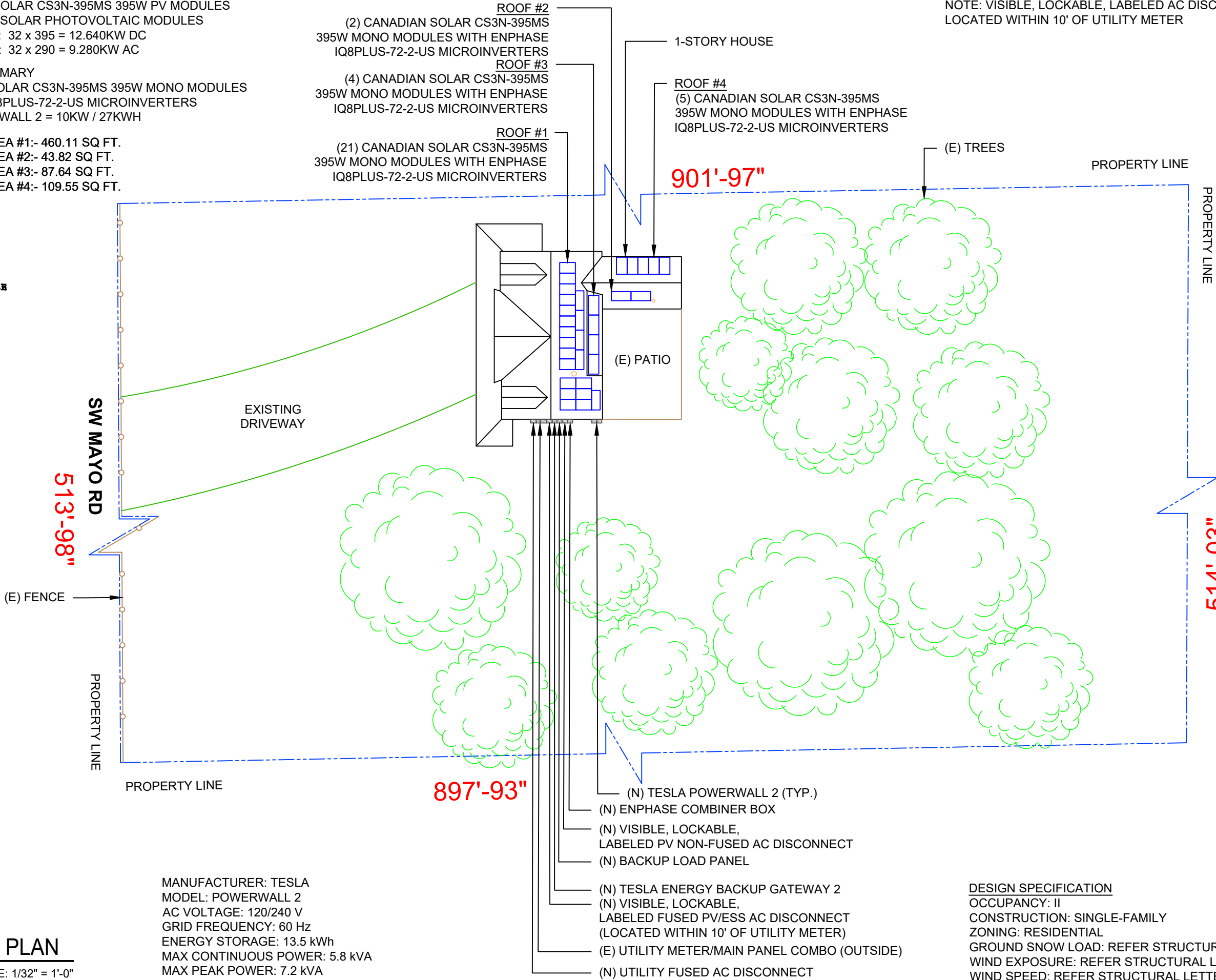
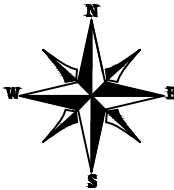
32 X CANADIAN SOLAR CS3N-395MS 395W PV MODULES  
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES  
DC SYSTEM SIZE: 32 x 395 = 12.640KW DC  
AC SYSTEM SIZE: 32 x 290 = 9.280KW AC

EQUIPMENT SUMMARY  
32 CANADIAN SOLAR CS3N-395MS 395W MONO MODULES  
32 ENPHASE IQ8PLUS-72-2-US MICROINVERTERS  
2 TESLA POWERWALL 2 = 10KW / 27KWH

ROOF ARRAY AREA #1:- 460.11 SQ FT.  
ROOF ARRAY AREA #2:- 43.82 SQ FT.  
ROOF ARRAY AREA #3:- 87.64 SQ FT.  
ROOF ARRAY AREA #4:- 109.55 SQ FT.

ROOF #2  
(2) CANADIAN SOLAR CS3N-395MS  
395W MONO MODULES WITH ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS  
ROOF #3  
(4) CANADIAN SOLAR CS3N-395MS  
395W MONO MODULES WITH ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS  
ROOF #1  
(21) CANADIAN SOLAR CS3N-395MS  
395W MONO MODULES WITH ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS  
ROOF #4  
(5) CANADIAN SOLAR CS3N-395MS  
395W MONO MODULES WITH ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT  
LOCATED WITHIN 10' OF UTILITY METER



MANUFACTURER: TESLA  
MODEL: POWERWALL 2  
AC VOLTAGE: 120/240 V  
GRID FREQUENCY: 60 Hz  
ENERGY STORAGE: 13.5 kWh  
MAX CONTINUOUS POWER: 5.8 kVA  
MAX PEAK POWER: 7.2 kVA

DESIGN SPECIFICATION  
OCCUPANCY: II  
CONSTRUCTION: SINGLE-FAMILY  
ZONING: RESIDENTIAL  
GROUND SNOW LOAD: REFER STRUCTURAL LETTER  
WIND EXPOSURE: REFER STRUCTURAL LETTER  
WIND SPEED: REFER STRUCTURAL LETTER



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS		
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MANDEVILLE, LA 70471  
985.624.5001  
INFO@PI-AEC.COM  
FLORIDA FIRM NO. 30649

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME

SITE PLAN

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

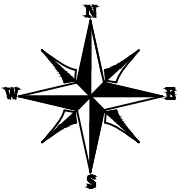
PV-2

1 SITE PLAN

PV-2 SCALE: 1/32" = 1'-0"

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 32 MODULES  
MODULE TYPE = CANADIAN SOLAR CS3N-395MS 395W MONO MODULES  
MODULE WEIGHT = 51.6 LBS / 23.4KG.  
MODULE DIMENSIONS = 76.4" x 41.3" = 21.91 SF



ROOF #1  
(21) CANADIAN SOLAR CS3N-395MS  
395W MONO MODULES WITH ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS

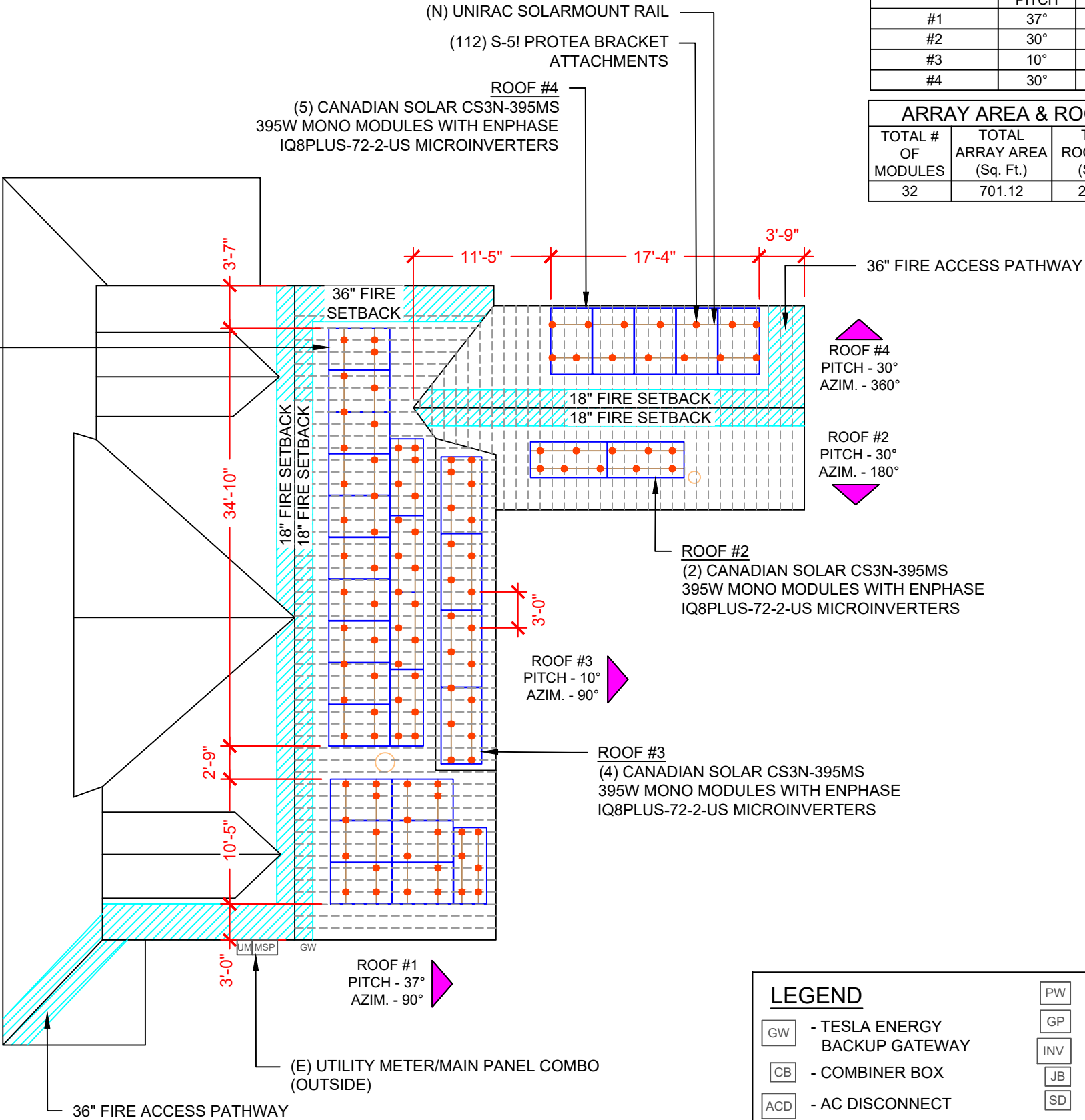
ROOF #4  
(5) CANADIAN SOLAR CS3N-395MS  
395W MONO MODULES WITH ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS

ROOF #2  
(2) CANADIAN SOLAR CS3N-395MS  
395W MONO MODULES WITH ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS

ROOF #3  
(4) CANADIAN SOLAR CS3N-395MS  
395W MONO MODULES WITH ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS

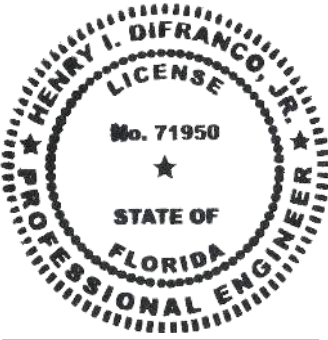
ROOF DESCRIPTION			
ROOF TYPE			METAL ROOF
ROOF	ROOF PITCH	AZIMUTH	SEAM SPACING
#1	37°	90°	12"
#2	30°	180°	12"
#3	10°	90°	12"
#4	30°	360°	12"

ARRAY AREA & ROOF AREA CALC'S			
TOTAL # OF MODULES	TOTAL ARRAY AREA (Sq. Ft.)	TOTAL ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
32	701.12	2974.04	24



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MANDEVILLE, LA 70471  
985.624.5001  
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FLORIDA FIRM NO. 30649

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
ROOF PLAN &  
MODULES

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-3

1 ROOF PLAN & MODULES

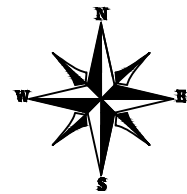
PV-3

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



DC SYSTEM SIZE: 32 x 395 = 12.640KW DC  
AC SYSTEM SIZE: 32 x 290 = 9.280KW AC  
(32) CANADIAN SOLAR CS3N-395MS 395W MONO MODULES  
WITH (32) ENPHASE IQ8PLUS-72-2-US MICROINVERTERS  
LOCATED UNDER EACH PANEL (240V)

CIRCUIT LEGENDS	
<span style="color: red;">---</span>	CIRCUIT #1
<span style="color: green;">---</span>	CIRCUIT #2
<span style="color: orange;">---</span>	CIRCUIT #3



SW MAYO RD

CIRCUIT #1  
(11 MODULES)

CIRCUIT #3  
(10 MODULES)

CIRCUIT #2  
(11 MODULES)

(32) ENPHASE IQ8PLUS-72-2-US  
MICROINVERTERS LOCATED  
UNDER EACH PANEL (240V)

(N) CONDUIT

(N) TESLA POWERWALL 2 (TYP.)

(N) ENPHASE COMBINER BOX  
(N) VISIBLE, LOCKABLE,  
LABELED PV NON-FUSED AC DISCONNECT

(N) BACKUP LOAD PANEL

(N) TESLA ENERGY BACKUP GATEWAY 2

(N) VISIBLE, LOCKABLE,  
LABELED FUSED PV/ESS AC DISCONNECT  
(LOCATED WITHIN 10' OF UTILITY METER)

(E) UTILITY METER/MAIN PANEL COMBO (OUTSIDE)

(N) UTILITY FUSED AC DISCONNECT

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	32	CANADIAN SOLAR CS3N-395MS 395W MODULES
MICRO INVERTERS	32	ENPHASE IQ8PLUS-72-2-US MICROINVERTERS
JUNCTION BOXES	4	6"X6"X4" UL LISTED, STEEL WATER TIGHT NEMA TYPE 3R, UL LISTED
RAIL	21	UNIRAC SM STANDARD RAIL, 168" SILVER
SPLICE	10	SPLICE KIT
MID MODULE CLAMPS	48	MID MODULE CLAMPS
END CLAMPS	32	END CLAMPS / STOPPER SLEEVE
ATTACHMENTS	112	S-5! PROTEA BRACKET ATTACHMENT
INVERTER MOUNT CLIP	32	INVERTER MOUNT CLIP
INVERTER T-BOLTS	32	INVERTER T-BOLTS
TRUNK CABLES	39	TRUNK CABLES
GROUND LUGS	3	GROUND LUGS
TP LINKS	1	TP LINKS
TERMINAL BLOCKS	20	TERMINAL BLOCKS
ZIPTIES	100	ZIPTIES
TRUNK BRANCH TERMINAL	6	TRUNK BRANCH TERMINAL
TRUNK WATER TIGHT COVER	6	TRUNK WATER TIGHT COVER
BATTERY	2	2 TESLA POWERWALL 2 = 10KW / 27KWH

### LEGEND

<div>GW</div>	- TESLA ENERGY BACKUP GATEWAY	<div>PW</div>	- TESLA POWERWALL
<div>CB</div>	- COMBINER BOX	<div>GP</div>	- GENERATION PANEL
<div>ACD</div>	- AC DISCONNECT	<div>INV</div>	- INVERTER
<div>LC</div>	- LOAD CENTER	<div>JB</div>	- JUNCTION BOX
<div>UM</div>	- UTILITY METER	<div>SD</div>	- SOLADECK
<div>MSP</div>	- MAIN SERVICE PANEL	<div>○</div>	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
		<div>●</div>	- ROOF ATTACHMENT
		<div>---</div>	- SEAM
		<div>---</div>	- CONDUIT



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

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

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME

ELECTRICAL PLAN

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

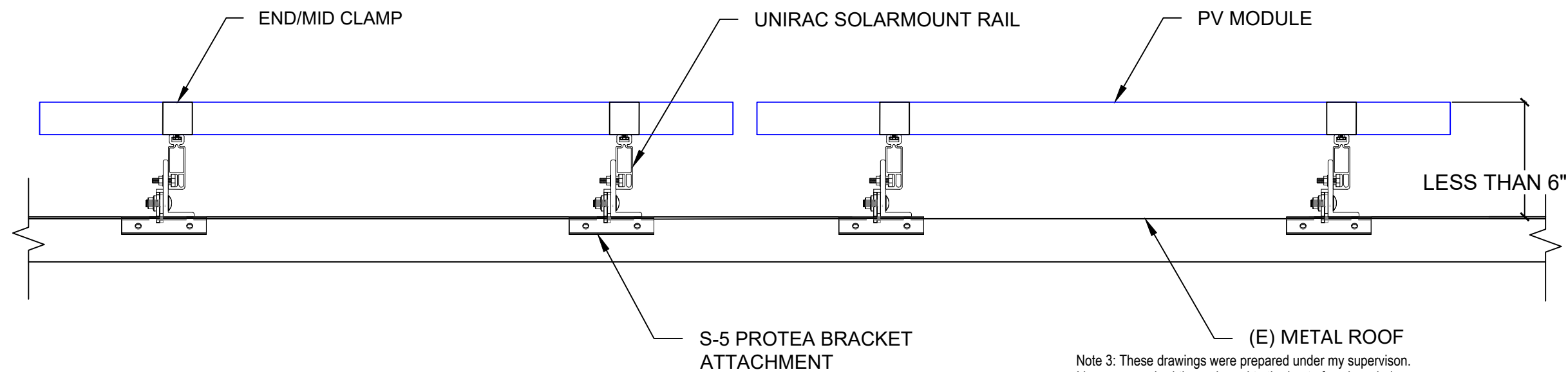
PV-4

1

ELECTRICAL PLAN

PV-4

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



1 | STRUCTURAL ATTACHMENT (SIDE VIEW)  
PV-5 | SCALE: N.T.S.

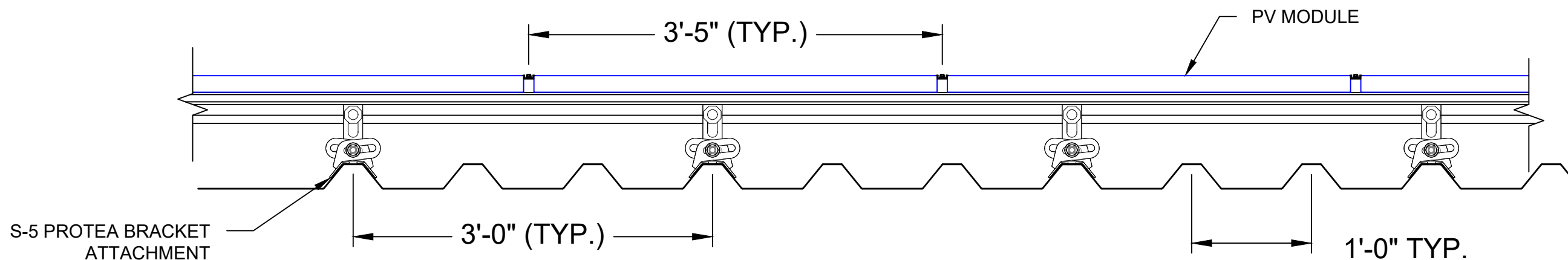
Note 1: Windspeed value is design 3-sec gust in accordance with ASCE 7-16

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

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

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

Note 5: Maximum rail cantilever distance beyond outermost mount is One-third the zone-specific mount spacing.



2 | ATTACHMENT DETAIL (FRONT VIEW)  
PV-5 | SCALE: N.T.S.



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MANDEVILLE, LA 70471  
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FLORIDA FIRM NO. 30649

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
STRUCTURAL DETAIL

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-5

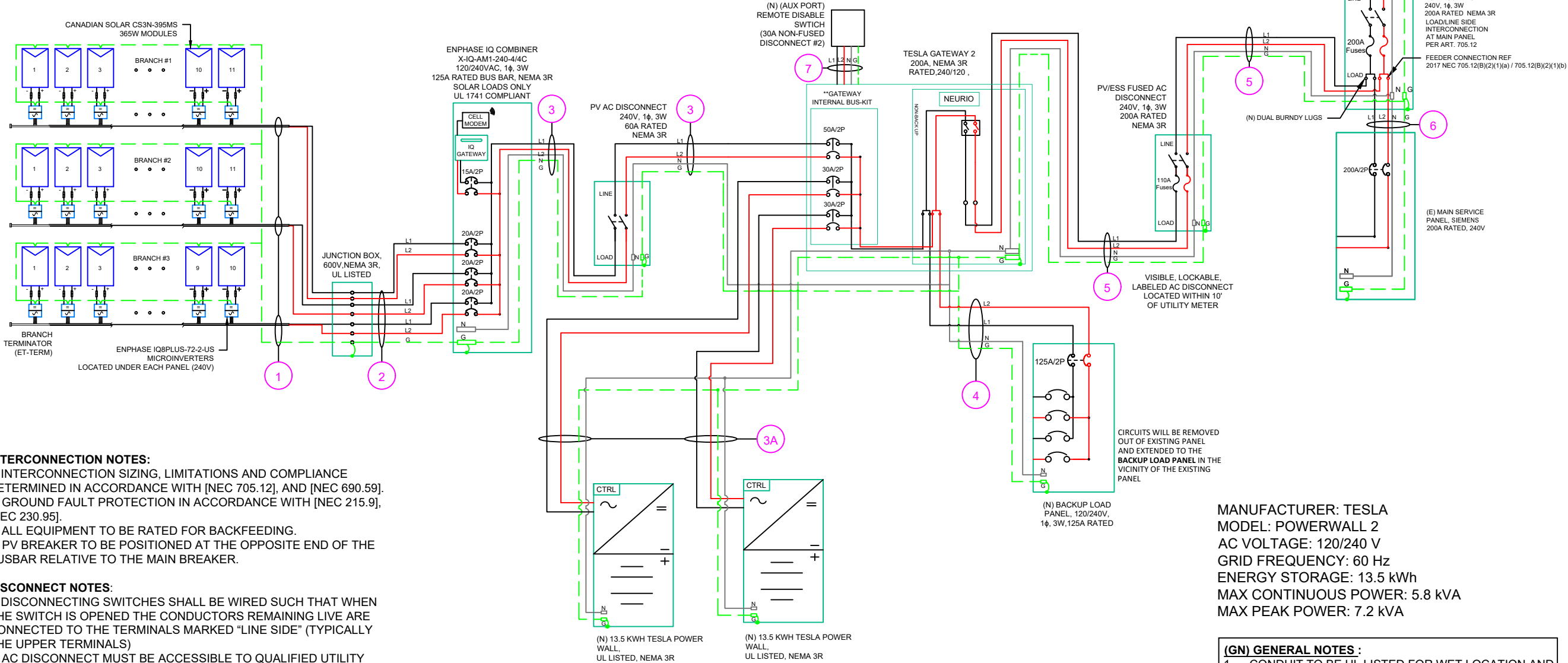
QTY	CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
1	(6)	#12AWG - Q CABLE (L1 & L2 NO NEUTRAL)	N/A	N/A
	(1)	#6AWG - BARE COPPER IN FREE AIR		
2	(6)	#12AWG - THWN-2 (L1,L2) (EXTERIOR) / #12/2 ROMEX IN ATTIC	EMT, LFMC OR PVC	1"
	(1)	#12AWG - THWN-2 GND		
3	(2)	#8AWG - THWN-2 (L1,L2)	EMT, LFMC OR PVC	1"
	(1)	#8AWG - THWN-2 N		
3A	(1)	#10AWG - THWN-2 GND	EMT, LFMC OR PVC	1"
	(3)	#10AWG - THWN-2 (L1,L2,N)		
4	(1)	#10AWG - THWN-2 GND	EMT, LFMC OR PVC	1"
	(2)	#1AWG - THWN-2 (L1,L2)		
5	(1)	#1AWG - THWN-2 N	EMT, LFMC OR PVC	1-1/4"
	(1)	#6AWG - THWN-2 GND		
6	(3)	#2AWG - THWN-2 (L1,L2,N)	EMT, LFMC OR PVC	1-1/4"
	(1)	#6AWG - THWN-2 GND		
7	(3)	#2/0AWG - THWN-2 (L1,L2,N)	EMT, LFMC OR PVC	2"
	(1)	#6AWG - THWN-2 GND		
	(3)	#18AWG - THWN-2 (L1,L2,N)	EMT, LFMC OR PVC	1"
	(1)	#14AWG - THWN-2 GND		

**GROUNDING & GENERAL NOTES:**

1. PV GROUNDING ELECTRODE SYSTEM NEEDS TO BE INSTALLED IN ACCORDANCE WITH [NEC 690.43]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. SOLADECK QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOXES DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.
8. VERIFY UFER/EXISTING ROD OR ADD TWO GROUNDING RODS(5/8" X 8' EMBEDMENT) SPACED 6 FEET MINIMUM APART.(RECOMMENDED MINIMUM SPACING SHALL BE THE LENGTH OF THE GROUND ROD USED.)
9. BOND COLD WATER AND GAS LINES(IF PRESENT) TO GROUNDING ELECTRODE CONDUCTOR

DC SYSTEM SIZE: 32 x 395 = 12.640KW DC  
AC SYSTEM SIZE: 32 x 290 = 9.280KW AC

(32) CANADIAN SOLAR CS3N-395MS 395W MONO MODULES  
WITH (32) ENPHASE IQ8PLUS-72-2-US MICROINVERTERS  
LOCATED UNDER EACH PANEL (240V)  
(2) BRANCH CIRCUITS OF 11 MODULES AND  
(1) BRANCH CIRCUIT OF 10 MODULES CONNECTED IN PARALLEL  
2 TESLA POWERWALL 2 = 10KW / 27KWH



**INTERCONNECTION NOTES:**

1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95].
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

**DISCONNECT NOTES:**

1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3. DISCONNECT MEANS AND THEIR LOCATION SHALL BE IN ACCORDANCE WITH [NEC 225.31] AND [NEC 225.32].

MANUFACTURER: TESLA  
MODEL: POWERWALL 2  
AC VOLTAGE: 120/240 V  
GRID FREQUENCY: 60 Hz  
ENERGY STORAGE: 13.5 kWh  
MAX CONTINUOUS POWER: 5.8 kVA  
MAX PEAK POWER: 7.2 kVA

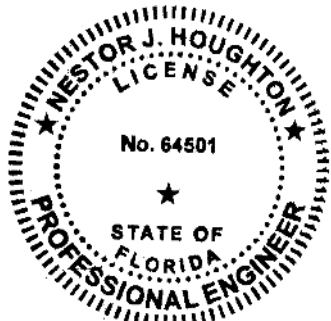
**(GN) GENERAL NOTES :**

1. CONDUIT TO BE UL LISTED FOR WET LOCATION AND UV PROTECTED (EX. -EMT, SCH 80 PVC OR RMC).
2. FMC MAYBE USED IN INDOOR APPLICATIONS WHERE PERMITTED BY NEC ART. 348
3. THE TESLA POWERWALL AS PART OF THE GATEWAY SYSTEM DOES NOT EXPORT POWER TO THE GRID IN ANY STORAGE MODE.



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FLORIDA FIRM NO. 30649

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
ELECTRICAL LINE DIAGRAM

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-6

1 ELECTRICAL LINE DIAGRAM

PV-6

SCALE: N.T.S.

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ8PLUS-72-2-US MICROINVERTERS
MIN/MAX DC VOLT RATING	30V MIN/ 58V MAX
MAX INPUT POWER	235W-440W
NOMINAL AC VOLTAGE RATING	240V/ 211-264V
MAX AC CURRENT	1.21A
MAX MODULES PER CIRCUIT	13 (SINGLE PHASE)
MAX OUTPUT POWER	290 VA

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	CANADIAN SOLAR CS3N-395MS 395W MODULE
VMP	37V
IMP	10.68A
VOC	44.3V
ISC	11.44A
TEMP. COEFF. VOC	-0.26%/°C
MODULE DIMENSION	76.4"L x 41.3"W x 1.38"D (In Inch)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-9°C
AMBIENT TEMP (HIGH TEMP 2%)	34°C
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.26%/°C

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

AC CALCULATIONS																						
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OC PD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
CIRCUIT 1	JUNCTION BOX	240	14.41	16.6375	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	34	2	30	0.96	1	28.8	PASS		0.35	N/A	N/A	
CIRCUIT 2	JUNCTION BOX	240	13.31	16.6375	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	34	2	30	0.96	1	28.8	PASS		0.40	N/A	N/A	
CIRCUIT 3	JUNCTION BOX	240	12.1	15.125	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	34	2	30	0.96	1	28.8	PASS		0.32	N/A	N/A	
JUNCTION BOX	COMBINER PANEL	240	13.31	16.6375	20	N/A	CU #12 AWG	CU #12 AWG	25	PASS	34	6	30	0.96	0.8	23.04	PASS	20	1.38	0.439	1" PVC	11.1899
COMBINER PANEL	PV AC DISCONNECT	240	38.72	48.4	50	CU #8 AWG	CU #10 AWG	CU #8 AWG	50	PASS	34	2	55	0.96	1	52.8	PASS	5	0.778	0.126	1" PVC	15.73317
PV AC DISCONNECT	TESLA GATEWAY 2	240	38.72	48.4	50	CU #8 AWG	CU #10 AWG	CU #8 AWG	50	PASS	34	2	55	0.96	1	52.8	PASS	5	0.778	0.176	1" PVC	15.73317
TESLA GATEWAY 2	TESLA POWERWALL 2	240	24	30	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	34	2	40	0.96	1	38.4	PASS	5	1.24	0.124	1" PVC	10.14423
TESLA GATEWAY 2	BACKUP LOAD PANEL	240	100	125	125	CU #1 AWG	CU #6 AWG	CU #1 AWG	130	PASS	34	2	175	0.96	1	139.2	PASS	5	0.154	0.064	1 1/4" PVC	35.73985
TESLA GATEWAY 2	PV /ESS AC DISCONNECT	240	86.72	108.4	110	CU #2 AWG	CU #6 AWG	CU #2 AWG	115	PASS	34	2	130	0.96	1	124.8	PASS	5	0.194	0.070	1 1/4" PVC	27.39849
PV/ESS AC DISCONNECT	POI	240	86.72	108.4	110	CU #2 AWG	CU #6 AWG	CU #2 AWG	115	PASS	34	2	130	0.96	1	124.8	PASS	5	0.194	0.070	1 1/4" PVC	27.39849

Circuit 1 Voltage Drop	1.380
Circuit 2 Voltage Drop	1.230
Circuit 3 Voltage Drop	1.150

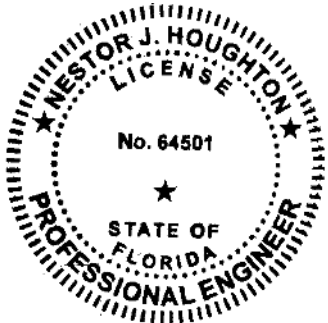
ELECTRICAL NOTES

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.
3. 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.
4. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
5. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6. WHERE SIZES OF SOLADECK, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSKO GBL-4DBT LAY-IN LUG.
10. TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	



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

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
WIRING CALCULATIONS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-7



CAUTION:  
AUTHORIZED SOLAR  
PERSONNEL ONLY!

LABEL- 1:  
LABEL LOCATION:  
AC DISCONNECT

⚠ WARNING

**ELECTRICAL SHOCK HAZARD**

TERMINALS ON THE LINE AND LOAD SIDES MAY  
BE ENERGIZED IN THE OPEN POSITION

LABEL- 2:  
LABEL LOCATION:  
AC DISCONNECT  
COMBINER  
MAIN SERVICE PANEL  
SUBPANEL  
MAIN SERVICE DISCONNECT  
CODE REF: NEC 690.13(B)

⚠ WARNING DUAL POWER SOURCE  
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL- 3:  
LABEL LOCATION:  
PRODUCTION METER  
UTILITY METER  
MAIN SERVICE PANEL  
SUBPANEL  
CODE REF: NEC 705.12(C) & NEC 690.59

⚠ WARNING

TURN OFF PHOTOVOLTAIC AC  
DISCONNECT PRIOR TO  
WORKING INSIDE PANEL

LABEL- 4:  
LABEL LOCATION:  
MAIN SERVICE PANEL  
SUBPANEL  
MAIN SERVICE DISCONNECT  
COMBINER  
CODE REF: NEC 110.27(C) & OSHA 1910.145 (f) (7)

⚠ CAUTION

PHOTOVOLTAIC SYSTEM CIRCUIT IS  
BACKFEED

LABEL- 5:  
LABEL LOCATION:  
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
CODE REF: NEC 705.12(D) & NEC 690.59

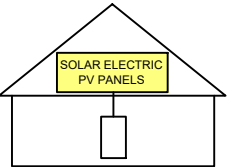
⚠ WARNING

POWER SOURCE OUTPUT  
CONNECTION. DO NOT  
RELOCATE THIS  
OVERCURRENT DEVICE

LABEL- 6:  
LABEL LOCATION:  
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
CODE REF: NEC 705.12(B)(3)(2)

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- 7:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: IFC 605.11.3.1(1) & NEC 690.56(C)

RAPID SHUTDOWN SWITCH  
FOR SOLAR PV SYSTEM

LABEL- 8:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: NEC 690.56(C)(2)

P H O T O V O L T A I C

A C D I S C O N N E C T

LABEL- 9:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: NEC 690.13(B)

PHOTOVOLTAIC  
AC DISCONNECT

NOMINAL OPERATING AC VOLATGE 240 V  
RATED AC OUTPUT CURRENT 38.72 A

LABEL- 10:  
LABEL LOCATION:  
MAIN SERVICE PANEL  
SUBPANEL  
AC DISCONNECT  
CODE REF: NEC 690.54

MAIN PHOTOVOLTAIC  
SYSTEM DISCONNECT

LABEL- 11:  
LABEL LOCATION:  
MAIN SERVICE DISCONNECT (ONLY IF MAIN SERVICE DISCONNECT IS PRESENT)  
CODE REF: NEC 690.13(B)

PHOTOVOLTAIC / ESS  
AC DISCONNECT

NOMINAL OPERATING AC VOLATGE 240 V  
RATED AC OUTPUT CURRENT 86.72 A

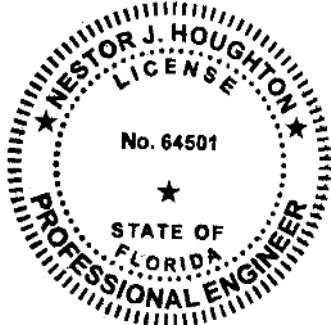
LABEL- 12:  
LABEL LOCATION:  
MAIN SERVICE PANEL  
SUBPANEL  
AC DISCONNECT #3  
CODE REF: NEC 690.54



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS

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

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME

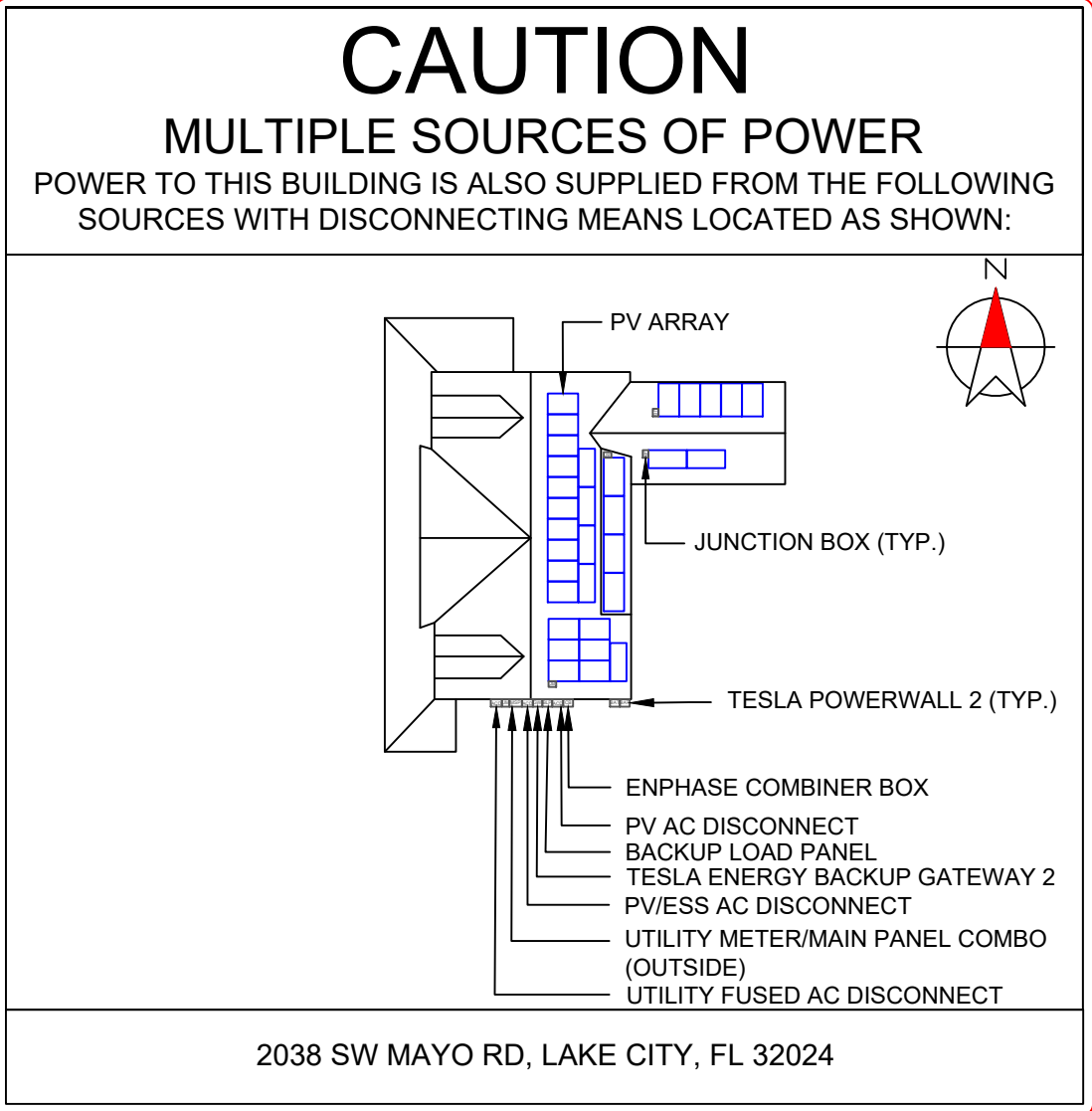
LABELS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-8



**DIRECTORY**  
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

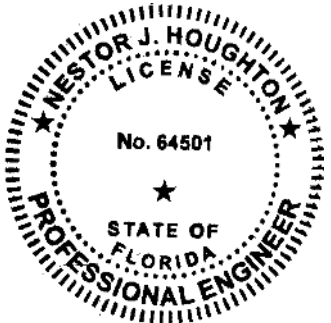
(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN: NEC 690.56(B)&(C), [NEC 705.10])

- LABELING NOTES:**
1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
  2. LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
  3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
  4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
  5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]



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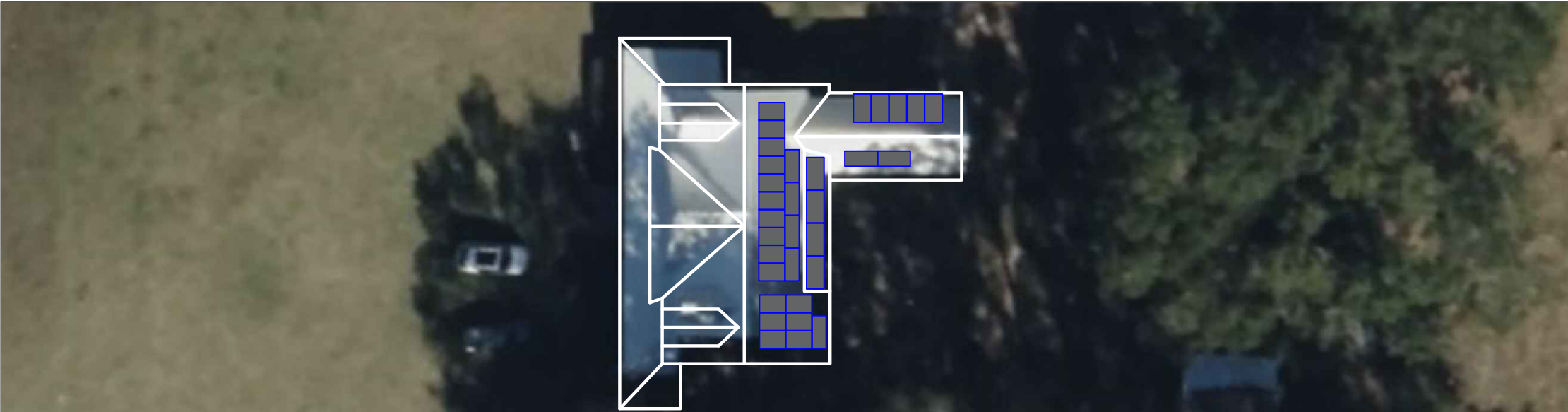
PRINCIPAL ENGINEERING, INC.  
1011 N. CAUSEWAY BLVD. STE 19  
MANDEVILLE, LA 70471  
985.624.5001  
INFO@PI-AEC.COM  
FLORIDA FIRM NO. 30649

PROJECT NAME & ADDRESS	
GAYLE BOUDREAU RESIDENCE	2038 SW MAYO RD, LAKE CITY, FL 32024

SHEET NAME
PLACARD

SHEET SIZE
ANSI B 11" X 17"

SHEET NUMBER
PV-9



- (H) - INSPECT ENTIRE JOBSITE FOR HAZARDS

(SV) - DRAW SUNPRO VEHICLE LOCATION ON PLANS

(HHZ) - DRAW HARD HAT ZONE AROUND HOUSE

(X) - DRAW FALL PROTECTION ANCHOR LOCATIONS
- (L) - DRAW LADDER & ROOF ACCESS POINTS

(EH) - DRAW ELECTRICAL HAZARD AREAS

(W/TH) - DRAW WATER & TRIP HAZARD LOCATIONS

SKY LIGHT: YES | NO IF SO, HOW MANY:\_\_\_\_\_

SERVICE LINE ENTRANCE: OVERHEAD | UNDERGROUND  
\*IF OVERHEAD, DRAW POWERLINE ON PLAN SET AND PROVIDE  
APPROPRIATE WORK BOUNDARY

ROOF SURFACE: SHINGLE | METAL | TILE | TPO

CIRCLE WEATHER CONDITIONS:

SUNNY OVERCAST LIGHT RAIN  
HEAVY RAIN FOGGY WINDY

TEMPERATURE:\_\_\_\_\_ IF WINDY, STATE WIND SPEED:\_\_\_\_\_

CHECK IF THE FOLLOWING EQUIPMENT IS READILY AVAILABLE ON  
ALL SUNPRO SOLAR INSTALLATION VEHICLES ON EACH JOB SITE:

\_\_\_\_ EYE WASH BOTTLE/SOLUTION

\_\_\_\_ DRINKING WATER

\_\_\_\_ FIRE EXTINGUISHER

\_\_\_\_ FIRST AID KIT

\_\_\_\_ NECESSARY JOB SPECIFICS

ADDRESS OF NEAREST MEDICAL CARE FACILITY:

LEAD INSTALLER IS TO CONDUCT A DAILY SAFETY  
BRIEFING AND THE INCLUDED CHECKLIST MUST BE  
COMPLETED WITH ALL NECESSARY LABELS PRIOR TO  
BEGINNING ANY ONSITE WORK.

\_\_\_\_\_  
LEAD INSTALLER SIGNATURE DATE

CREW SIGNATURES:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROJECT ADDRESS:



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE

2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME

JHA FORM

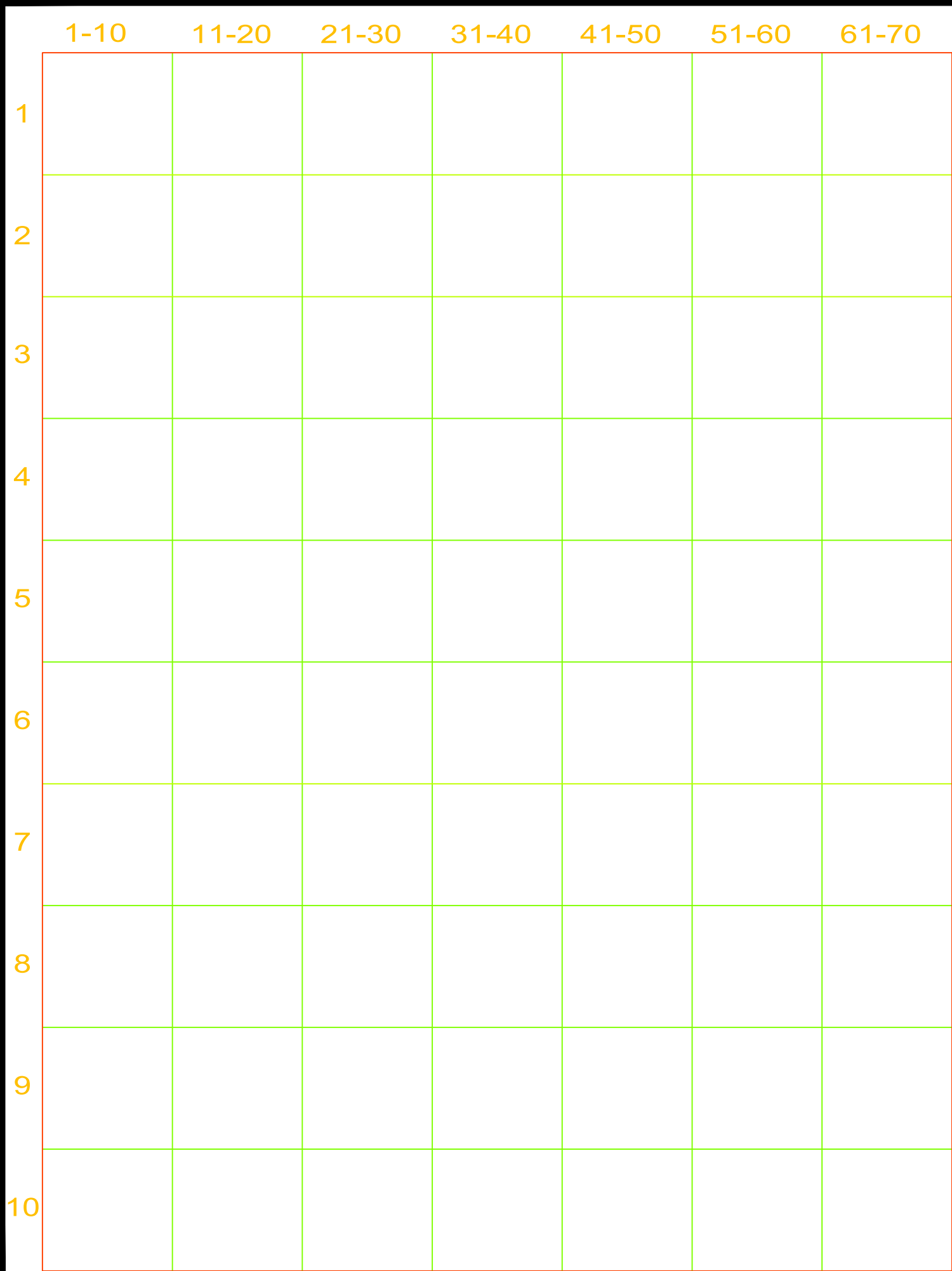
SHEET SIZE

ANSI B  
11" X 17"

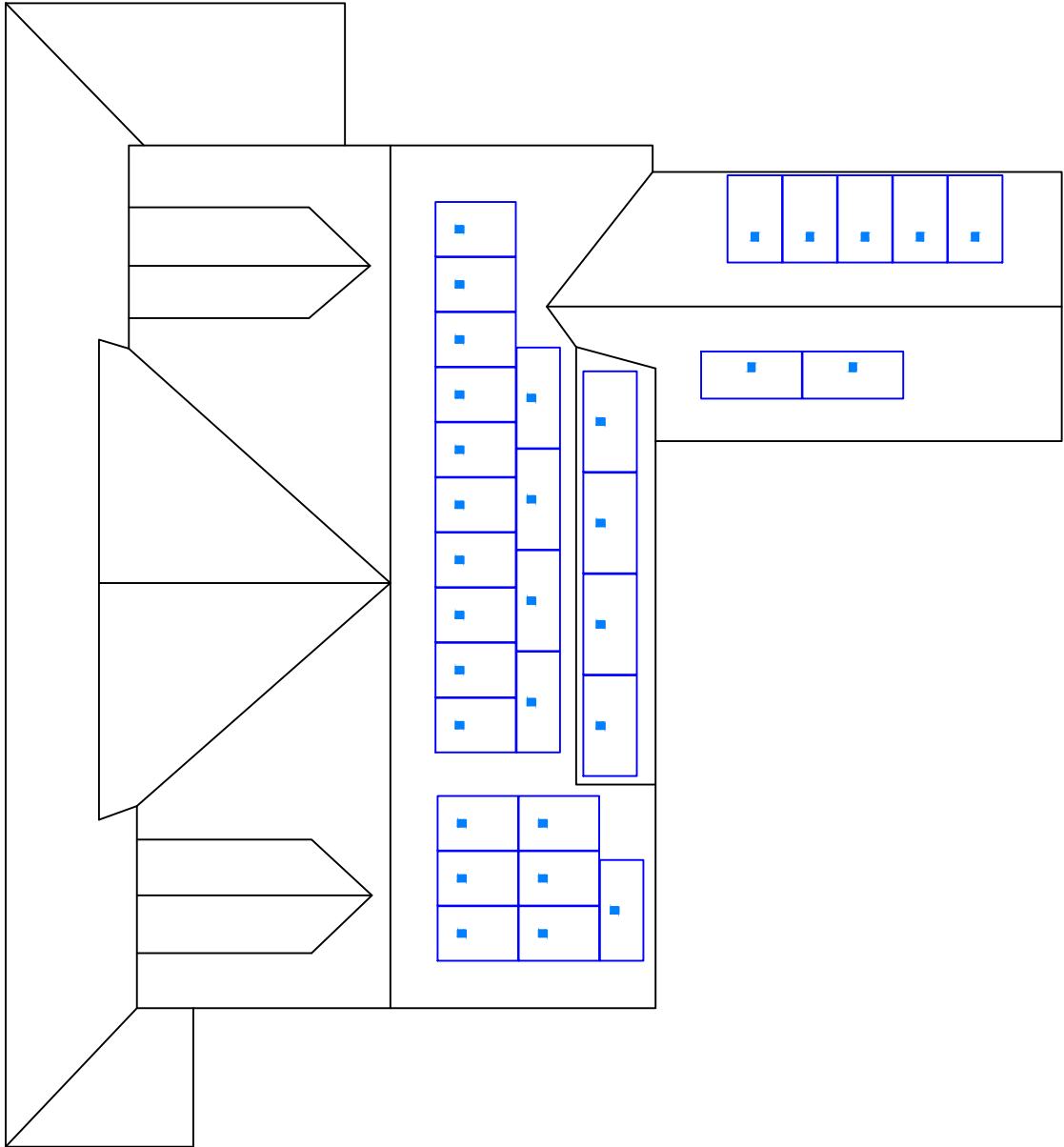
SHEET NUMBER

PV-10





# MICRO INVERTER CHART



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
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DATE: 04/20/2023

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE

2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME

MICRO INVERTER CHART

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-11



## HiKuBlack Mono PERC

### BLACK FRAME ON BLACK BACKSHEET

### F23 Frame

### 380 W ~ 410 W

### CS3N-380 | 385 | 390 | 395 | 400 | 405 | 410MS

#### MORE POWER

**410 W** Module power up to 410 W  
Module efficiency up to 20.2 %

**\$** Lower LCOE & BOS cost

**📈** Comprehensive LID / LeTID mitigation technology, up to 50% lower degradation

**🏠** Better shading tolerance

#### MORE RELIABLE

**🛡️** Minimizes micro-crack impacts

**\*\*\*** Heavy snow load up to 8100 Pa,  
enhanced wind load up to 6000 Pa\*

\* For detailed information, please refer to Installation Manual.

**CSI SOLAR (USA) CO., LTD.**  
1350 Treat Blvd. Suite 500, Walnut Creek, CA 94598, USA | [www.csisolar.com/na](http://www.csisolar.com/na) | [service.ca@csisolar.com](mailto:service.ca@csisolar.com)

**25 Years** Industry Leading Product Warranty on Materials and Workmanship\*

**25 Years** Linear Power Performance Warranty\*

**1<sup>st</sup> year power degradation no more than 2%**  
**Subsequent annual power degradation no more than 0.55%**

\*Subject to the terms and conditions contained in the applicable Canadian Solar Limited Warranty Statement. Also this 25-year limited product warranty is available only for products installed and operating on residential rooftops in certain regions.

#### MANAGEMENT SYSTEM CERTIFICATES\*

ISO 9001: 2015 / Quality management system  
ISO 14001: 2015 / Standards for environmental management system  
ISO 45001: 2018 / International standards for occupational health & safety

#### PRODUCT CERTIFICATES\*

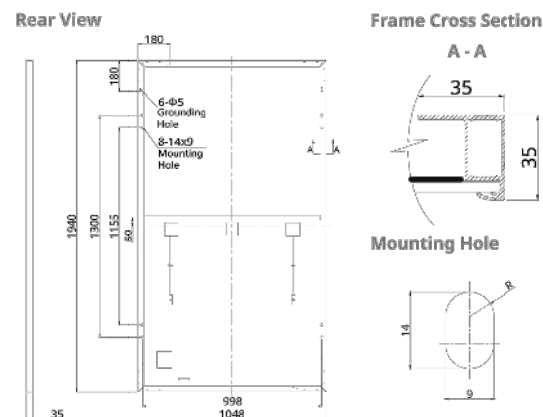
IEC 61215 / IEC 61730 / CE  
FSEC (US Florida) / UL 61730 / IEC 61701 / IEC 62716



\* The specific certificates applicable to different module types and markets will vary, and therefore not all of the certifications listed herein will simultaneously apply to the products you order or use. Please contact your local Canadian Solar sales representative to confirm the specific certificates available for your Product and applicable in the regions in which the products will be used.

**CSI SOLAR (USA) CO., LTD.** is committed to providing high quality solar photovoltaic modules, solar energy and battery storage solutions to customers. The company was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey. Over the past 20 years, it has successfully delivered over 63 GW of premium-quality solar modules across the world.

#### ENGINEERING DRAWING (mm)



#### ELECTRICAL DATA | STC\*

CS3N	380MS	385MS	390MS	395MS	400MS	405MS	410MS
Nominal Max. Power (Pmax)	380 W	385 W	390 W	395 W	400 W	405 W	410 W
Opt. Operating Voltage (Vmp)	36.4 V	36.6 V	36.8 V	37.0 V	37.2 V	37.4 V	37.6 V
Opt. Operating Current (Imp)	10.44 A	10.52 A	10.60 A	10.68 A	10.76 A	10.83 A	10.92 A
Open Circuit Voltage (Voc)	43.7 V	43.9 V	44.1 V	44.3 V	44.5 V	44.7 V	44.9 V
Short Circuit Current (Isc)	11.26 A	11.32 A	11.38 A	11.44 A	11.50 A	11.56 A	11.62 A
Module Efficiency	18.7%	18.9%	19.2%	19.4%	19.7%	19.9%	20.2%
Operating Temperature	-40°C ~ +85°C						
Max. System Voltage	1000V (UL)						
Module Fire Performance	TYPE 2 (UL 61730 1000V)						
Max. Series Fuse Rating	20 A						
Application Classification	Class A						
Power Tolerance	0 ~ + 10 W						

\* Under Standard Test Conditions (STC) of irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5 and cell temperature of 25°C.

#### ELECTRICAL DATA | NMOT\*

CS3N	380MS	385MS	390MS	395MS	400MS	405MS	410MS
Nominal Max. Power (Pmax)	284 W	288 W	291 W	295 W	299 W	303 W	306 W
Opt. Operating Voltage (Vmp)	34.0 V	34.2 V	34.4 V	34.6 V	34.7 V	34.9 V	35.1 V
Opt. Operating Current (Imp)	8.35 A	8.42 A	8.48 A	8.54 A	8.60 A	8.66 A	8.73 A
Open Circuit Voltage (Voc)	41.2 V	41.4 V	41.6 V	41.8 V	41.9 V	42.1 V	42.3 V
Short Circuit Current (Isc)	9.08 A	9.13 A	9.18 A	9.23 A	9.28 A	9.33 A	9.37 A

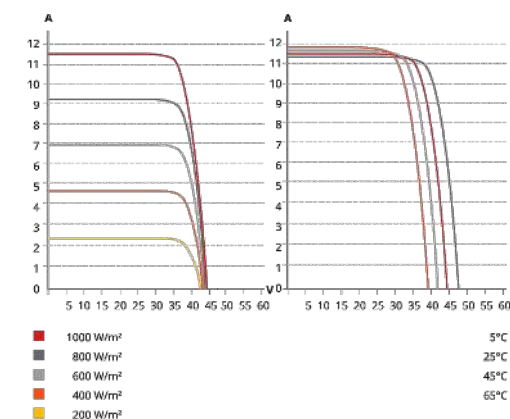
\* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m<sup>2</sup>, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

\* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. CSI Solar Co., Ltd. reserves the right to make necessary adjustment to the information described herein at any time without further notice. Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

**CSI SOLAR (USA) CO., LTD.**

Jan. 2022 | All rights reserved | PV Module Product Datasheet v2.9C25\_F23\_J2\_NA

#### CS3N-400MS / I-V CURVES



#### MECHANICAL DATA

Specification	Data
Cell Type	Mono-crystalline
Cell Arrangement	132 [2 X (11 X 6)]
Dimensions	1940 X 1048 X 35 mm (76.4 X 41.3 X 1.38 in)
Weight	23.4 kg (51.6 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	12 AWG (UL)
Cable Length (Including Connector)	Portrait: 400 mm (15.7 in) (+) / 280 mm (11.0 in) (-) (supply additional cable jumper: 2 lines/pallet); landscape: 1250 mm (49.2 in)*
Connector	T4 or MC4 series
Per Pallet	30 pieces
Per Container (40' HQ)	720 pieces

\* For detailed information, please contact your local Canadian Solar sales and technical representatives.

#### TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.34 % / °C
Temperature Coefficient (Voc)	-0.26 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

#### PARTNER SECTION



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

#### REVISIONS

DESCRIPTION	DATE	REV
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DATE: 04/20/2023

#### PROJECT NAME & ADDRESS

**GAYLE BOUDREAU  
RESIDENCE**  
  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
**EQUIPMENT  
SPECIFICATION**

#### SHEET SIZE

**ANSI B  
11" X 17"**

#### SHEET NUMBER

**PV-12**





DATA SHEET



## IQ8 and IQ8+ Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.



IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.



Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.



IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

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IQ8SP-DS-0002-01-EN-US-2022-03-17

### Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

### High productivity and reliability

- Produce power even when the grid is down\*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

### Microgrid-forming

- Complies with the latest advanced grid support\*\*
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) requirements

\* Only when installed with IQ System Controller 2, meets UL 1741.

\*\* IQ8 and IQ8Plus supports split phase, 240V installations only.

## IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings <sup>1</sup>	W	235 – 350	235 – 440
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell
MPPT voltage range	V	27 – 37	29 – 45
Operating range	V	25 – 48	25 – 58
Min/max start voltage	V	30 / 48	30 / 58
Max input DC voltage	V	50	60
Max DC current <sup>2</sup> (module Isc)	A		15
Overvoltage class DC port			II
DC port backfeed current	mA		0
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Peak output power	VA	245	300
Max continuous output power	VA	240	290
Nominal (L-L) voltage/range <sup>3</sup>	V		240 / 211 – 264
Max continuous output current	A	1.0	1.21
Nominal frequency	Hz		60
Extended frequency range	Hz		50 – 68
AC short circuit fault current over 3 cycles	A <sub>rms</sub>		2
Max units per 20 A (L-L) branch circuit <sup>4</sup>		16	13
Total harmonic distortion			<5%
Overvoltage class AC port			III
AC port backfeed current	mA		30
Power factor setting			1.0
Grid-tied power factor (adjustable)			0.85 leading – 0.85 lagging
Peak efficiency	%	97.5	97.6
CEC weighted efficiency	%	97	97
Night-time power consumption	mW		60
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
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	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		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. 1071-01  This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.	

(1) No enforced DC/AC ratio. See the compatibility calculator at <https://link.enphase.com/module-compatibility>

(2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8SP-DS-0002-01-EN-US-2022-03-17



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

### REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

### PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE

2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-13



# Enphase IQ Combiner 4/4C

X-IQ-AM1-240-4  
X-IQ-AM1-240-4C



The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters 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 Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

## Simple

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

## Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed

## Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	
IQ Combiner 4C (X-IQ-AM1-240-4C)	
IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.	
IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem 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.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.	
ACCESSORIES AND REPLACEMENT PARTS	
(not included, order separately)	
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	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 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 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. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
Envoy breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" 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
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ 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) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

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

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ENPHASE



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

## REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

## PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
EQUIPMENT  
SPECIFICATION

## SHEET SIZE

ANSI B  
11" X 17"

## SHEET NUMBER

PV-14

POWERWALL

Tesla Powerwall is a fully-integrated AC battery system for residential or light commercial use. Its rechargeable lithium-ion battery pack provides energy storage for solar self-consumption, load shifting, and backup.

Powerwall's electrical interface provides a simple connection to any home or building. Its revolutionary compact design achieves market-leading energy density and is easy to install, enabling owners to quickly realize the benefits of reliable, clean power.



PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240 V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Total Energy <sup>1</sup>	14 kWh
Usable Energy <sup>1</sup>	13.5 kWh
Real Power, max continuous	5 kW (charge and discharge)
Real Power, peak (10 s, off-grid/backup)	7 kW (charge and discharge)
Apparent Power, max continuous	5.8 kVA (charge and discharge)
Apparent Power, peak (10 s, off-grid/backup)	7.2 kVA (charge and discharge)
Maximum Supply Fault Current	10 kA
Maximum Output Fault Current	32 A
Overcurrent Protection Device	30 A
Imbalance for Split-Phase Loads	100%
Power Factor Output Range	+/- 1.0 adjustable
Power Factor Range (full-rated power)	+/- 0.85
Internal Battery DC Voltage	50 V
Round Trip Efficiency <sup>1,2</sup>	90%
Warranty	10 years

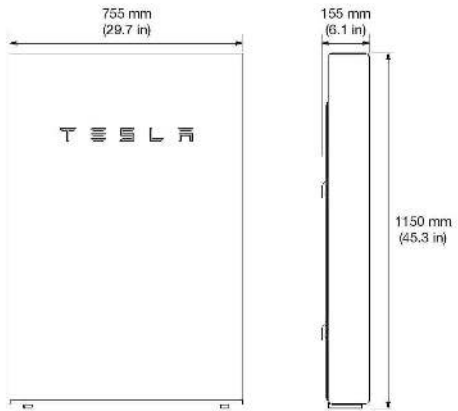
<sup>1</sup>Values provided for 25°C (77°F), 3.3 kW charge/discharge power.  
<sup>2</sup>AC to battery to AC, at beginning of life.

COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 1973, UL 9540, IEEE 1547, UN 38.3
Grid Connection	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)

MECHANICAL SPECIFICATIONS

Dimensions	1150 mm x 755 mm x 155 mm (45.3 in x 29.7 in x 6.1 in)
Weight	125 kg (276 lbs)
Mounting options	Floor or wall mount



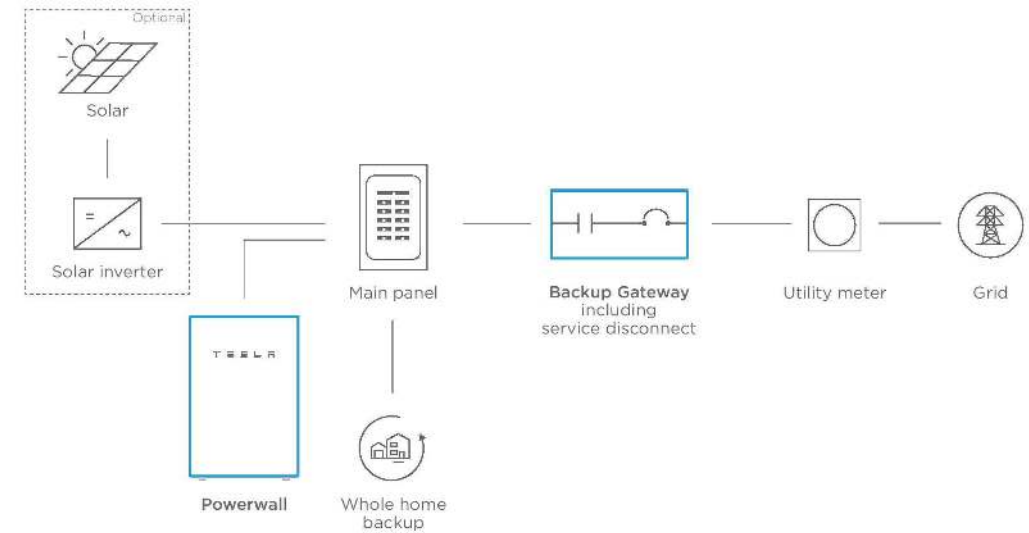
ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	-20°C to 30°C (-4°F to 86°F) Up to 95% RH, non-condensing State of Energy (SoE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring Compartment)
Wet Location Rating	Yes
Noise Level @ 1m	< 40 dBA at 30°C (86°F)

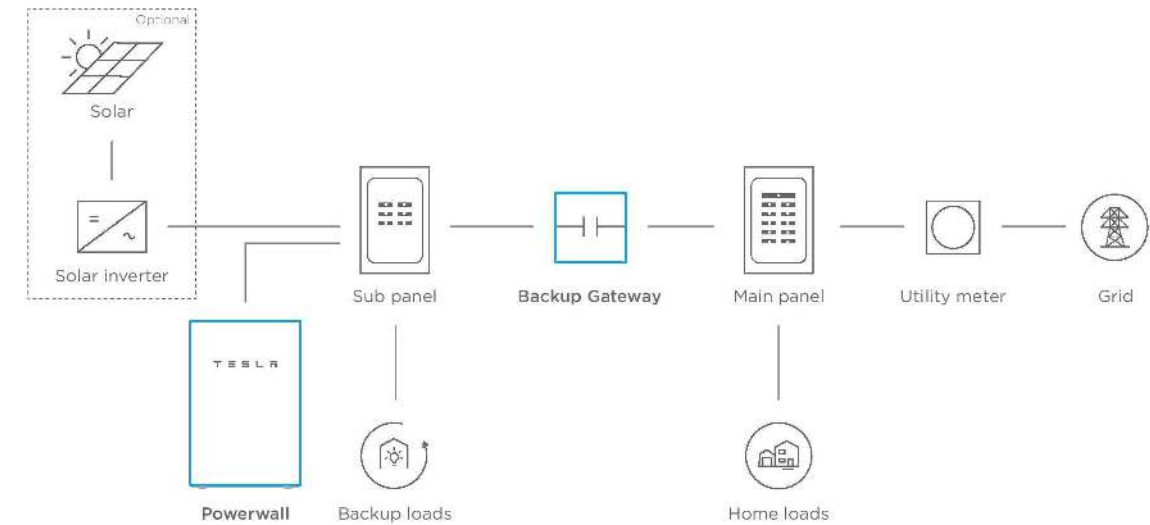
TESLA.COM/ENERGY

TYPICAL SYSTEM LAYOUTS

WHOLE HOME BACKUP



PARTIAL HOME BACKUP



TESLA

NA - BACKUP - 2018-01-19

TESLA.COM/ENERGY



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MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-15



## POWERWALL

### Backup Gateway 2

The Backup Gateway 2 for Tesla Powerwall provides energy management and monitoring for solar self-consumption, time-based control, and backup.

The Backup Gateway 2 controls connection to the grid, automatically detecting outages and providing a seamless transition to backup power. When equipped with a main circuit breaker, the Backup Gateway 2 can be installed at the service entrance. When the optional internal panelboard is installed, the Backup Gateway 2 can also function as a load center.

The Backup Gateway 2 communicates directly with Powerwall, allowing you to monitor energy use and manage backup energy reserves from any mobile device with the Tesla app.



## PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Current Rating	200 A
Maximum Input Short Circuit Current	10 kA <sup>1</sup>
Overcurrent Protection Device	100-200A; Service Entrance Rated <sup>1</sup>
Overvoltage Category	Category IV
AC Meter	Revenue accurate (+/- 0.2 %)
Primary Connectivity	Ethernet, Wi-Fi
Secondary Connectivity	Cellular (3G, LTE/4G) <sup>2</sup>
User Interface	Tesla App
Operating Modes	Support for solar self-consumption, time-based control, backup, and off-grid
Backup Transition	Automatic disconnect for seamless backup
Modularity	Supports up to 10 AC-coupled Powerwalls
Optional Internal Panelboard	200A 6-space / 12 circuit Eaton BR Circuit Breakers
Warranty	10 years

<sup>1</sup> When protected by Class J fuses, Backup Gateway 2 is suitable for use in circuits capable of delivering not more than 22kA symmetrical amperes.

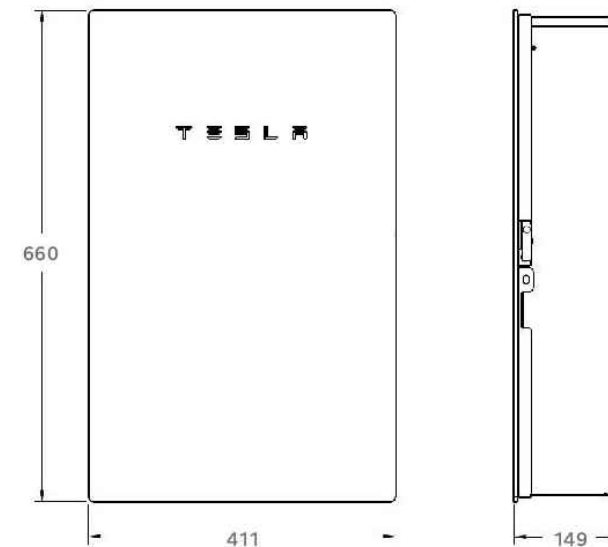
<sup>2</sup> The customer is expected to provide internet connectivity for Backup Gateway 2; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

## COMPLIANCE INFORMATION

<b>Certifications</b>	UL 67, UL 869A, UL 916, UL 1741 PCS CSA 22.2 0.19, CSA 22.2 205
<b>Emissions</b>	FCC Part 15, ICES 003

## MECHANICAL SPECIFICATIONS

<b>Dimensions</b>	660 mm x 411 mm x 149 mm (26 in x 16 in x 6 in)
<b>Weight</b>	20.4 kg (45 lb)
<b>Mounting options</b>	Wall mount, Semi-flush mount



## ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R



TESLA.COM/ENERGY



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

## REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

## PROJECT NAME &amp; ADDRESS

GAYLE BOUDREAU  
RESIDENCE

2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
EQUIPMENT  
SPECIFICATION

---

SHEET SIZE

ANSI B  
11" X 17"

## SHEET NUMBER

PV-16

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE

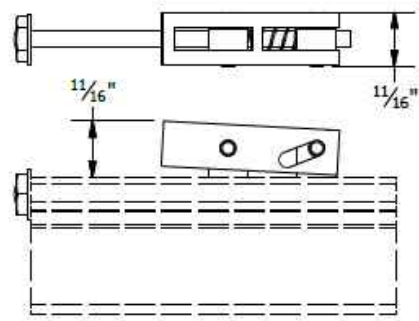
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
EQUIPMENT  
SPECIFICATION

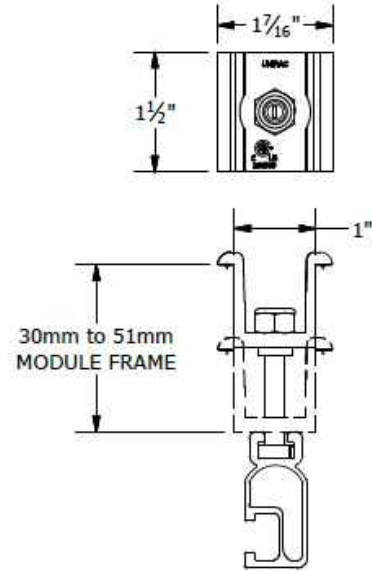
SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-17

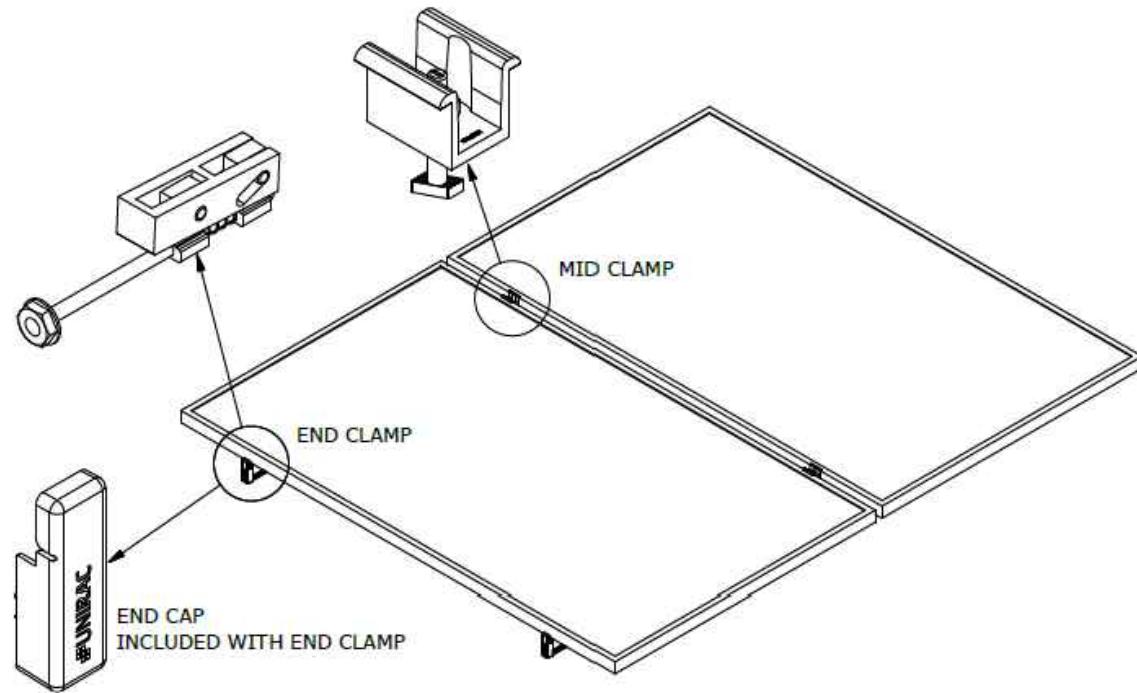
PRO SERIES END CLAMP



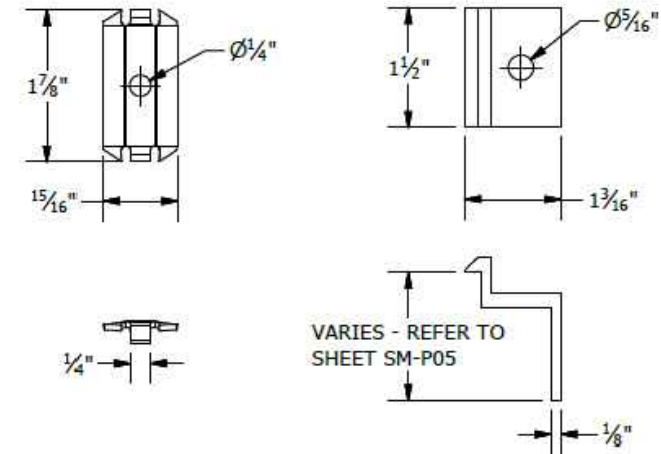
PRO SERIES MID CLAMP



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



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



BONDING SM MID CLAMP      BONDING SM END CLAMP

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

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

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

SM-A01A  
SHEET

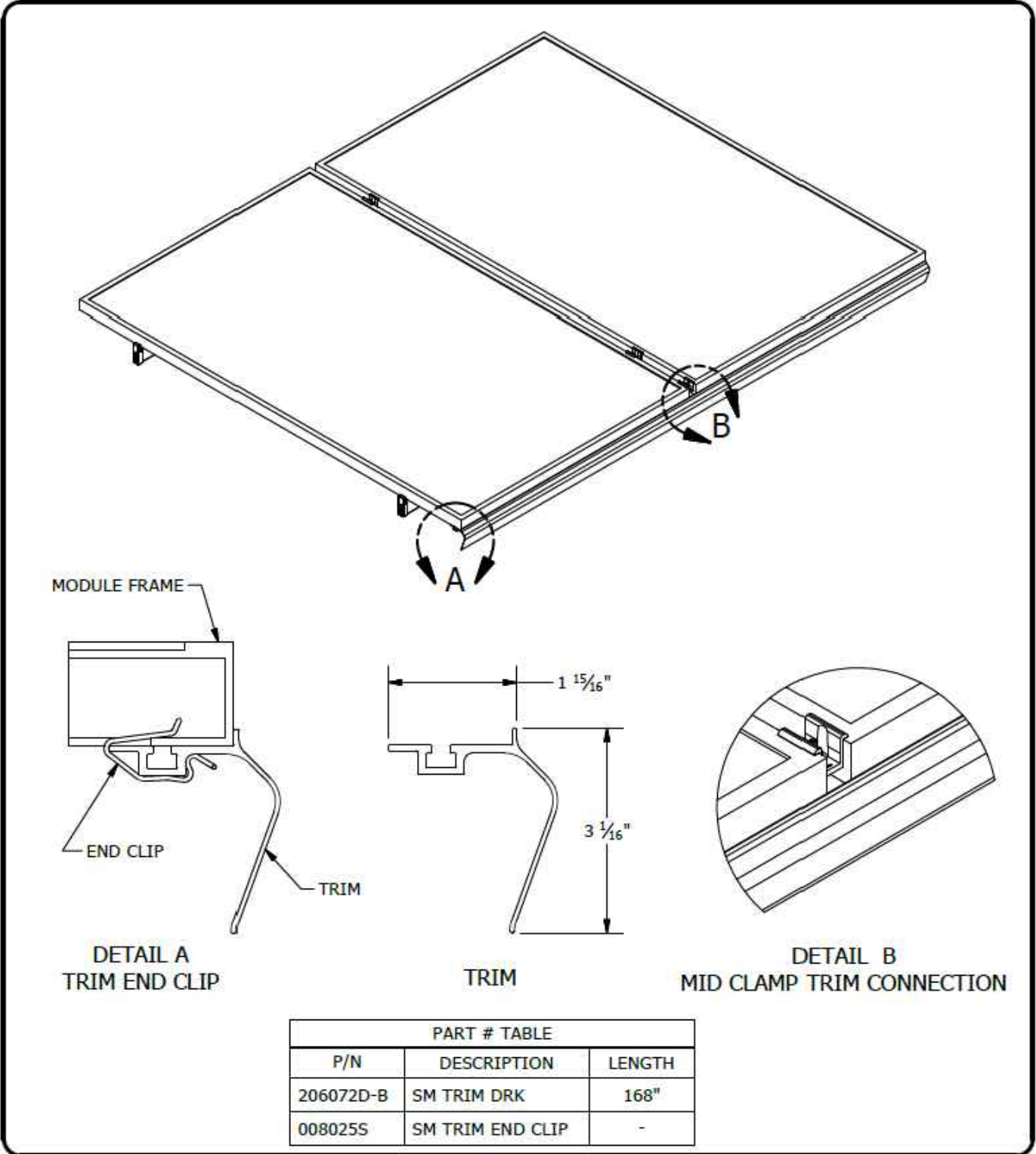
1411 BROADWAY BLVD. NE  
ALBUQUERQUE, NM 87102 USA  
PHONE: 505.242.6411  
WWW.UNIRAC.COM

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

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

SM-A01  
SHEET





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



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

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

DRAWING NOT TO SCALE  
ALL DIMENSIONS ARE  
NOMINAL

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LEGAL NOTICE

SM-A02

SHEET



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE

2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME

EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-18



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

PROJECT NAME & ADDRESS

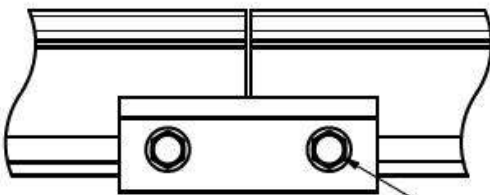
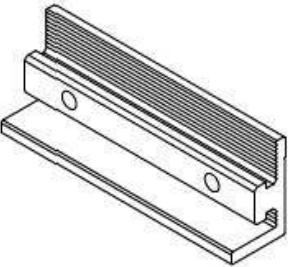
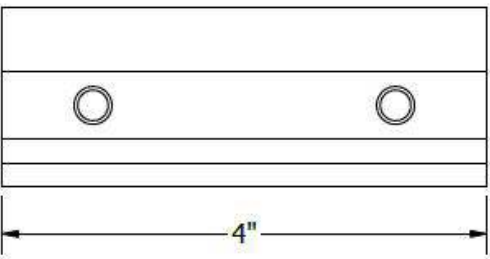
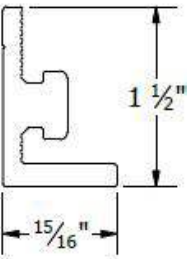
GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

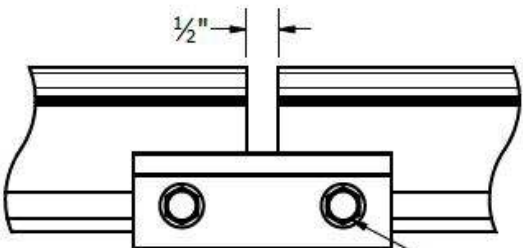
SHEET NUMBER  
PV-19

BONDING SPLICE BAR



TYPICAL SPLICE BAR DETAIL

5/16"-18 TYPE F THREAD  
CUTTING SCREWS INCLUDED



TYPICAL EXPANSION JOINT DETAIL

NOTE THAT ONLY 2 SCREWS ARE  
USED AT AN EXPANSION JOINT.  
THE SPLICE BAR DOES NOT BOND  
ACROSS AN EXPANSION JOINT.  
SEE INSTALLATION GUIDE FOR  
INSTRUCTION.

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



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

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

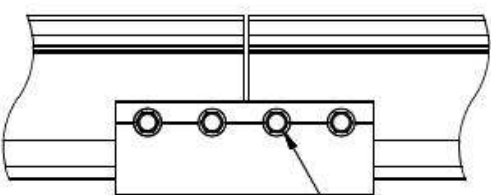
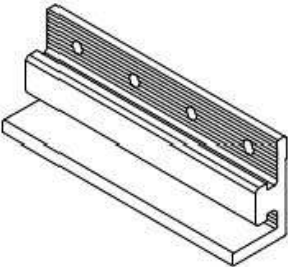
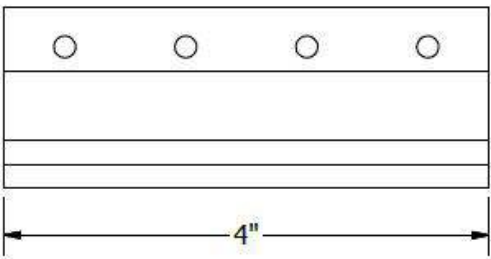
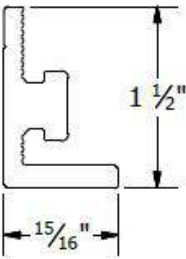
DRAWING NOT TO SCALE  
ALL DIMENSIONS ARE  
NOMINAL

PRODUCT PROTECTED BY  
ONE OR MORE US PATENTS  
LEGAL NOTICE

SM-A05

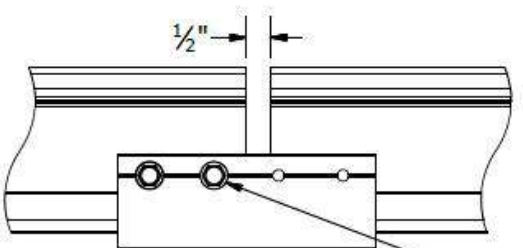
SHEET

BONDING SPLICE BAR



TYPICAL SPLICE BAR DETAIL

#12 X 3/4" SELF DRILLING SS SCREWS INCLUDED



TYPICAL EXPANSION JOINT DETAIL

NOTE THAT ONLY 2 SCREWS ARE  
USED AT AN EXPANSION JOINT.  
THE SPLICE BAR DOES NOT BOND  
ACROSS AN EXPANSION JOINT.  
SEE INSTALLATION GUIDE FOR  
INSTRUCTION.

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



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

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

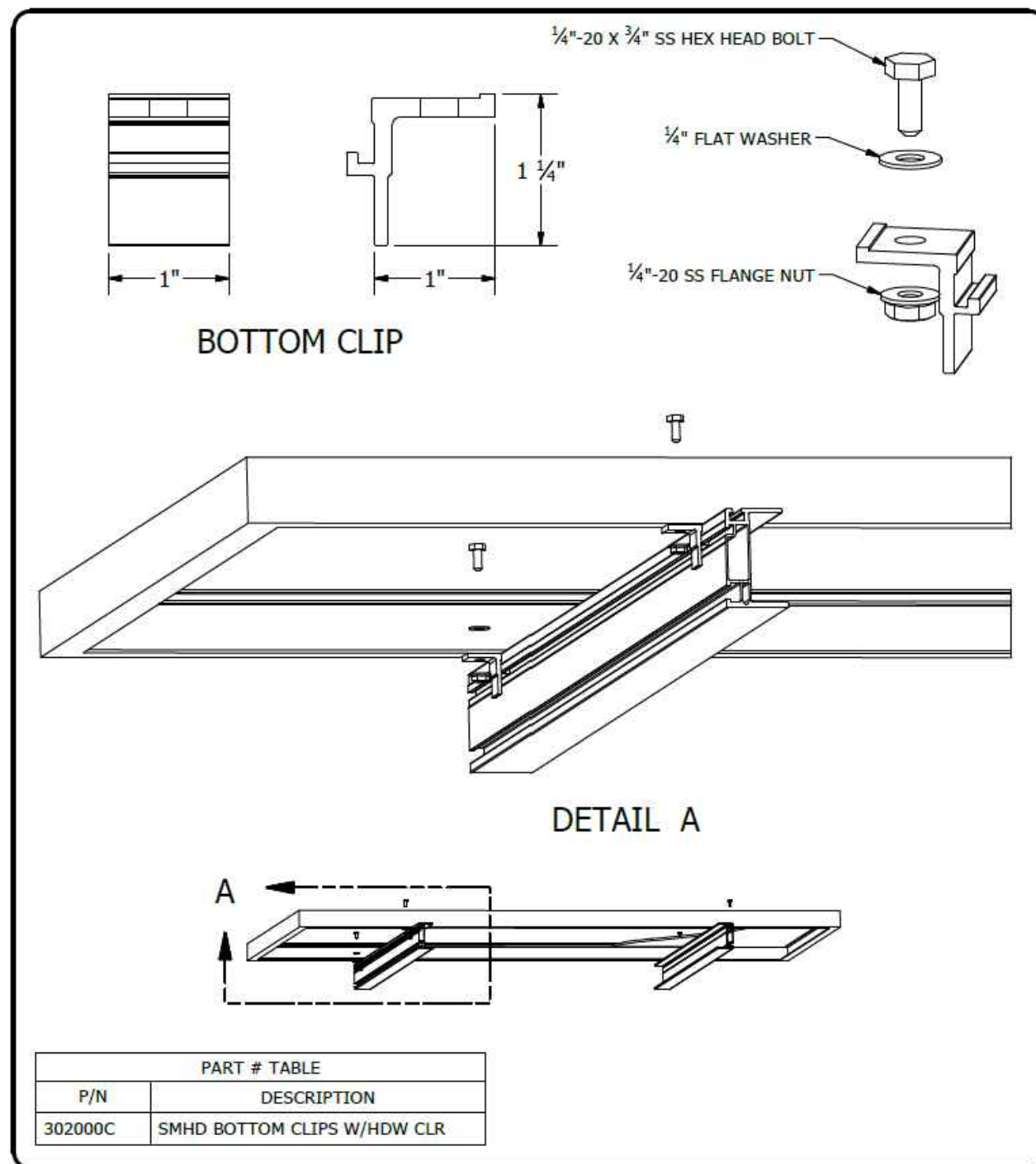
DRAWING NOT TO SCALE  
ALL DIMENSIONS ARE  
NOMINAL


PRODUCT PROTECTED BY  
ONE OR MORE US PATENTS  
LEGAL NOTICE

SM-A05

SHEET







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

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

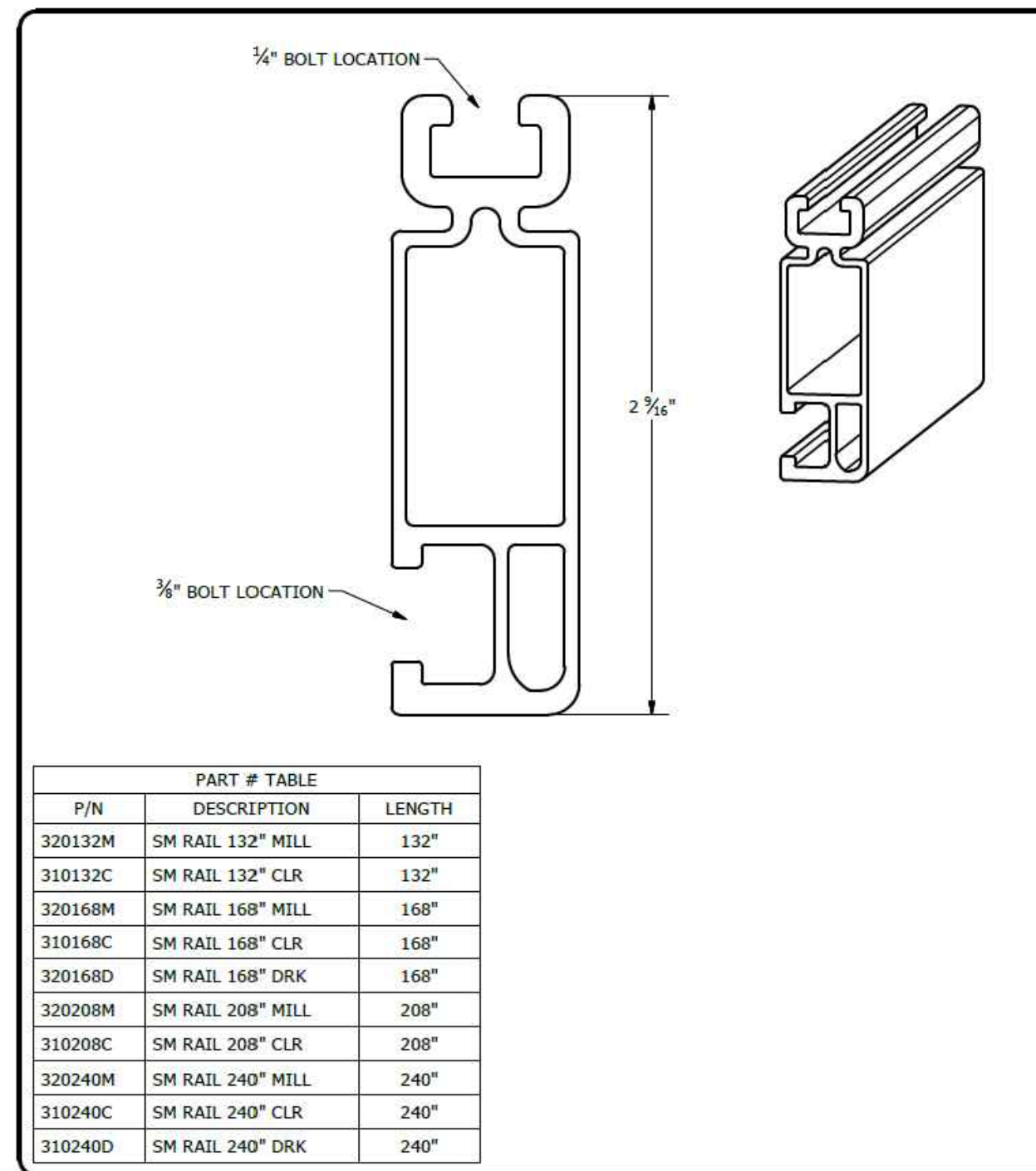
DRAWING NOT TO SCALE  
ALL DIMENSIONS ARE  
NOMINAL


PRODUCT PROTECTED BY  
ONE OR MORE US PATENTS

LEGAL NOTICE

SM-A10

SHEET





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

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

DRAWING NOT TO SCALE  
ALL DIMENSIONS ARE  
NOMINAL

PRODUCT PROTECTED BY  
ONE OR MORE US PATENTS

LEGAL NOTICE

SM-P01

SHEET



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE

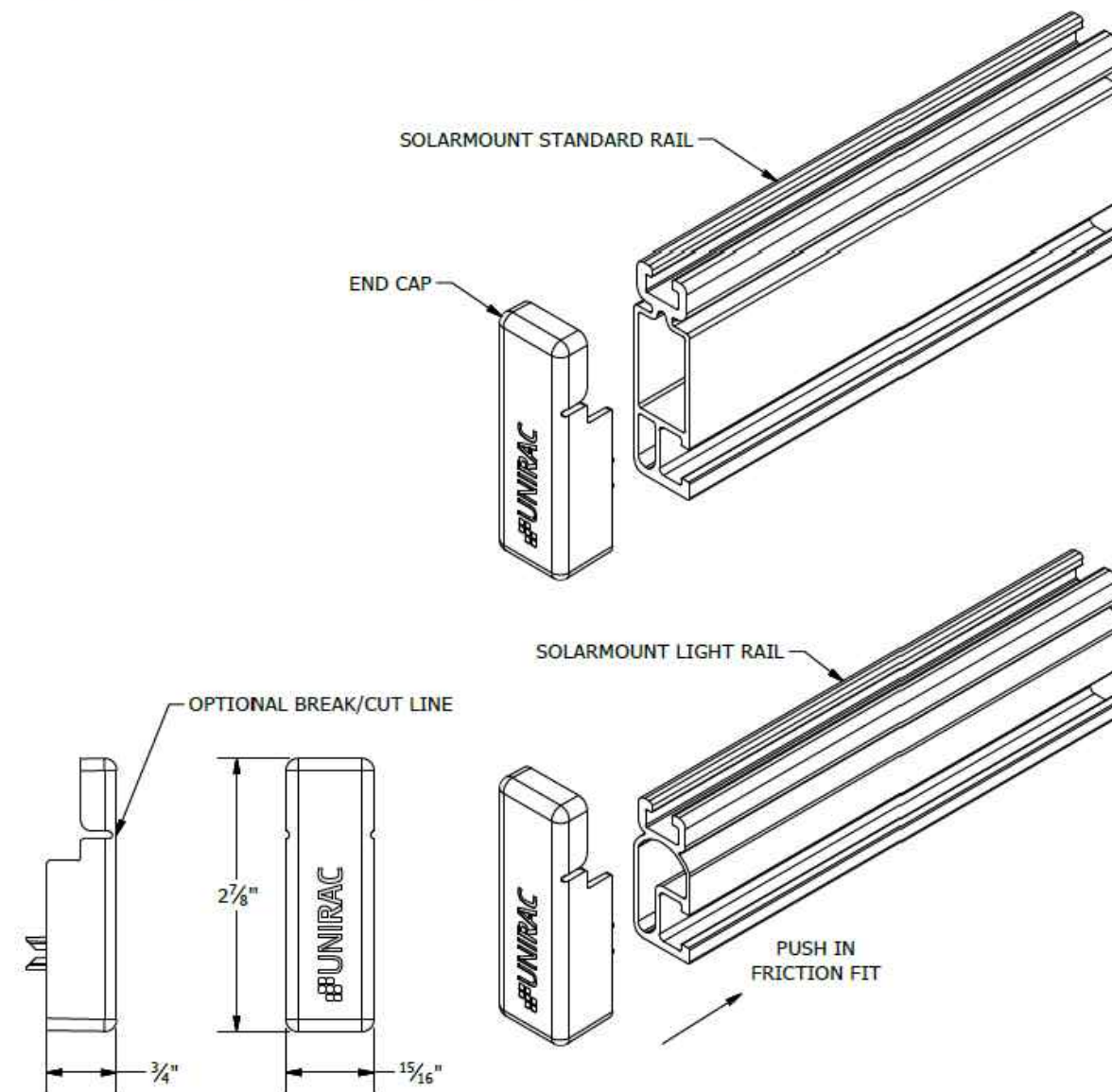
2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-20

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



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

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

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

**SM-P04**  
SHEET

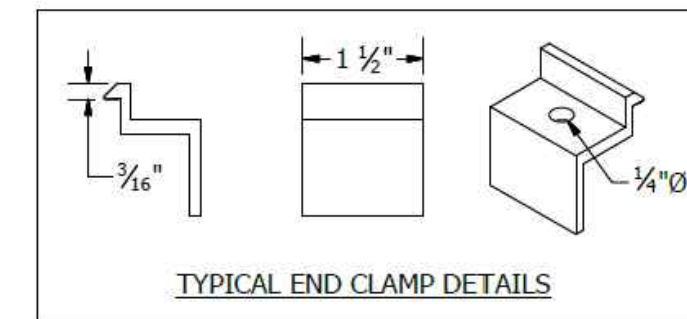
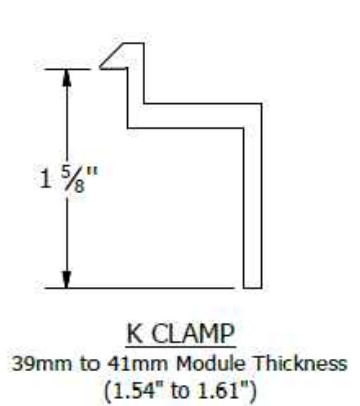
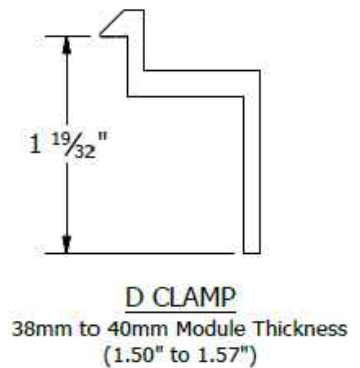
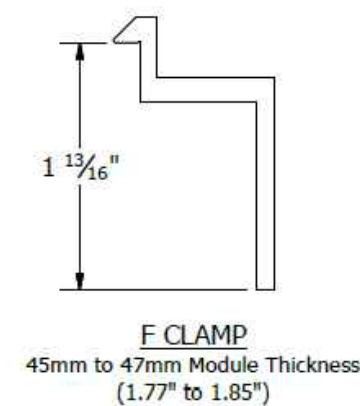
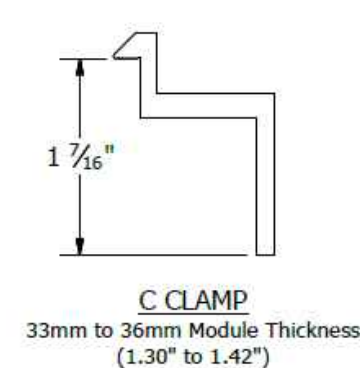
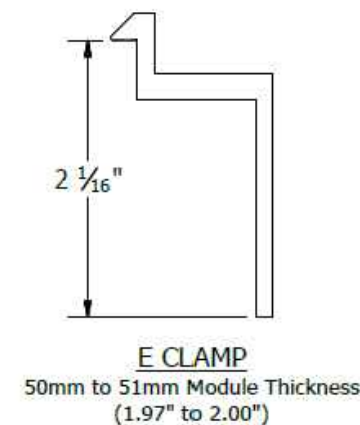
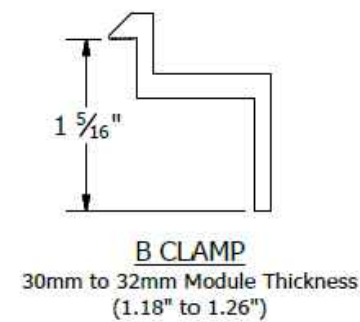
**UNIRAC**  
1411 BROADWAY BLVD. NE  
ALBUQUERQUE, NM 87102 USA  
PHONE: 505.242.6411  
WWW.UNIRAC.COM

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

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

**SM-P05**  
SHEET

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



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE

2038 SW MAYO RD,  
LAKE CITY, FL 32024

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-21





22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	04/20/2023	

DATE: 04/20/2023

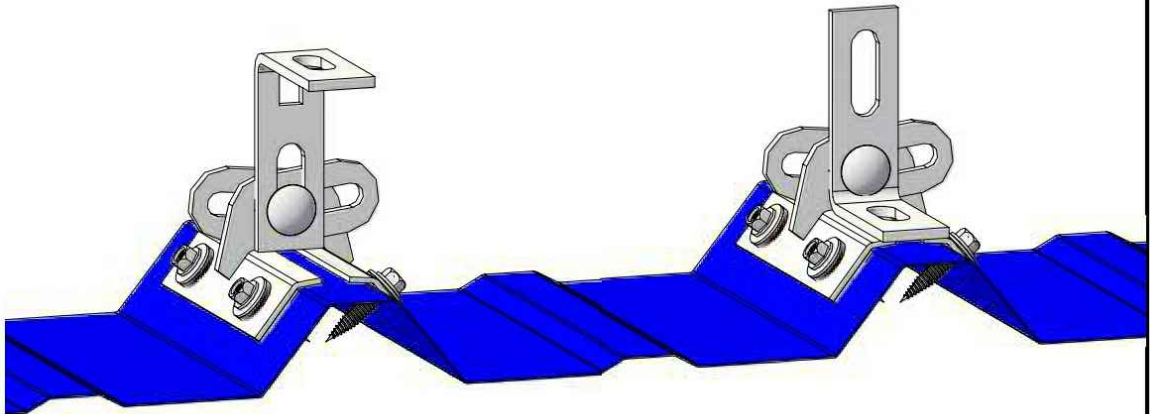
PROJECT NAME & ADDRESS

GAYLE BOUDREAU  
RESIDENCE  
2038 SW MAYO RD,  
LAKE CITY, FL 32024

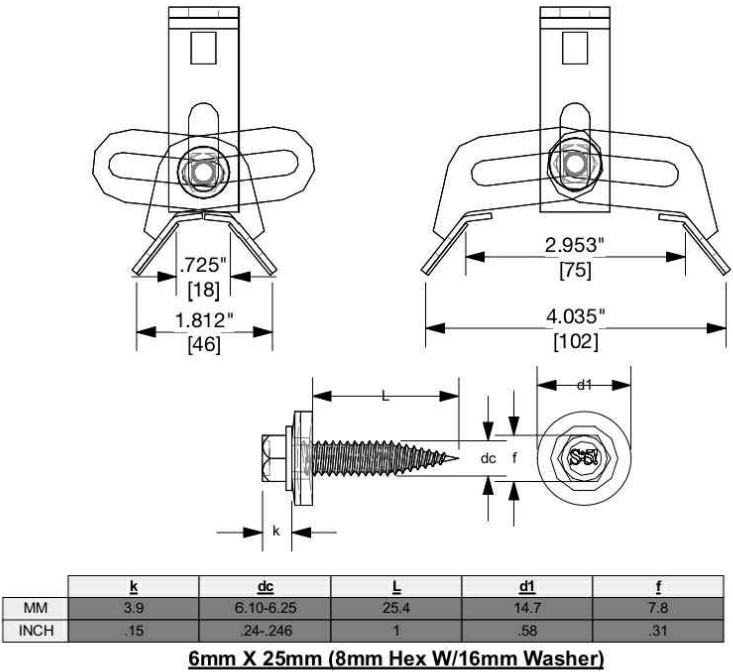
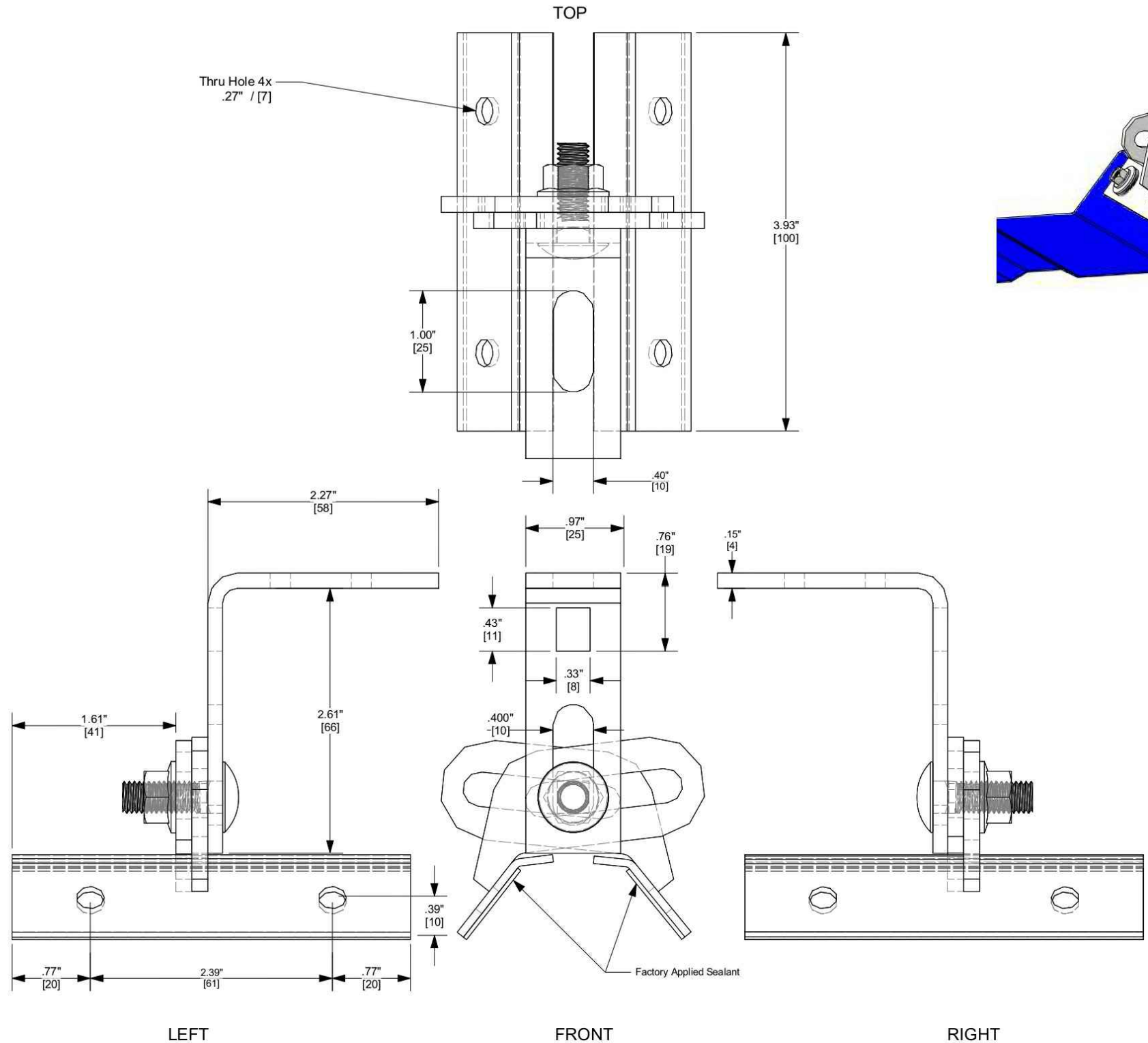
SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"


SHEET NUMBER  
PV-22



# ProteaBracket



FOR STANDING SEAM SPECIFIC MECHANICAL LOAD TEST  
INFORMATION AND CLAMP INSTALLATION INFORMATION  
PLEASE VISIT: [WWW.S-5.COM](http://WWW.S-5.COM)

MATERIAL: <b>A2 Stainless</b>	 <b>The Right Way!</b>			METAL ROOF INNOVATIONS, LTD. 8655 STABLE BUTTE RD COLORADO SPRINGS, CO 80908 719-495-0518 719-495-0045 (FAX)		
EST ASSEMBLY WEIGHT : <b>.526 lbs</b>						
SUPPLIED HARDWARE: (4) 6mm X 25mm (8mm Hex W/Washer) Bi-Metal Sheet Screw	TITLE <b>S-5! ProteaBracket</b>					
SCALE: <b>1:1</b>	DRAWING NO. <b>ProteaBracket_CCD_2015</b>		DRAWN BY <b>DMMH</b>		DATE <b>10/5/2015</b>	
OTHER:	S-5!® PRODUCTS ARE PROTECTED BY MULTIPLE U.S. PATENTS INCLUDING 5,228,248, 5,983,588 AND 6,164,033 (OTHERS ISSUED AND PENDING). EUROPEAN PATENTS ARE ALSO APPLIED FOR AND PENDING UNDER THE PATENT COOPERATION TREATY WITH DIVISIONAL FILING RIGHTS RETAINED. METAL ROOF INNOVATIONS, LTD. (LICENSOR OF S-5!® TECHNOLOGY) AGGRESSIVELY PROSECUTES PATENT INFRINGEMENT.					