



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

Monday, January 9, 2023

Property Owner: Laura Niles

Property Address: 209 Northwest Cimarron Way, Lake City, FL 32055

**RE: Photovoltaic System Roof Installations**

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

Based on my review, the existing structure 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; our assessment is regarding the structure's support of the array. Stresses induced by the introduction of individual mount loads on the rafters or truss top chord are within acceptable limits as shown on the attached calculations. The structural considerations used in our review and assessment include the following:

**Evaluation Criteria:**

Applied Codes: ASCE 7-16 FBC 2020 NEC 2020

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: 2x2 Truss Top Chord

Roof Slope: 3/12



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1011 N. CAUSEWAY BLVD. STE 19  
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FLORIDA FIRM NO. 30649

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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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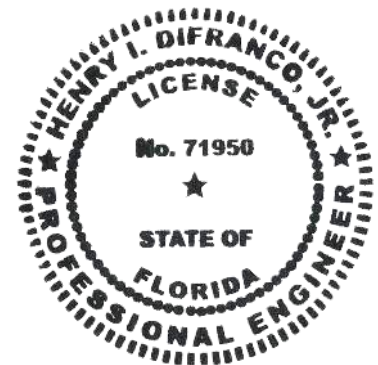
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Conclusion:

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.



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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:	Laura Niles	Max. Individual Panel Dimensions		
Project Address:	209 Northwest Cimarron Way	Length (in)	Width (in)	Area (sf)
City, State:	Lake City, FL 32055	57.6	41.1	16.44

Building Characteristics, Design Input, and Adjustment Factors				
Roof Dimensions:	Length:	72	Greater Dimension	72
	Width:	32	Least Dimension:	32
Roof Height (h):		15	Fig 30.4-1, valid under 60'	✓
Pitch: <input type="text" value="3"/> on 12 =		14.0°	Must be less than 45°	✓
Roof Configuration	Gable			
Roof Structure	2x2 Truss Top Chord			
Roof Material	Plywood			
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		3.2		
2 - Roof Height x 0.4		6		
3 - Least Roof Horizontal Dimension (L or W) x 0.04		1.28		
4 - Least of (1) and (2)		3.2		
5 - Greater of (3) and (4)		3.2		
6 - Greater of (5) and 3 feet	<b>a=</b>	3.2		



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House

Net Design Pressures, $p_{net}$ (Fig 30.4-1), Components & Cladding					
	Uplift (-psf)			Factored Pressure (0.6W, ASCE 7-16)	$\theta$
		$P_{30net}$	$IK_{zt}P_{30net}$		
gable /hip /flat					
Gable	Zone 1 & 2e	44.0	64.5	38.7	$7^\circ < \theta \leq 20^\circ$
	Zone 2n,2r,3e	64.3	94.1	56.5	
	Zone 3r	76.4	111.8	67.1	
Hip					



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Snow Load		
Ground Snow Load, $p_g$	0.0	From ASCE 7 or AHJ
Terrain Category:	C	Para 6.5.6.3
Exposure	Fully	
Exposure Factor $C_e$	0.9	Table 7-2
Thermal Factor, $C_t$	1.2	Table 7-3
Importance Factor, $I_s$	1.0	Table 1.5.2
Roof Configuration	Gable	
Roof Slope	14.0°	
Distance from Eave to Ridge	16.0	
$p_m$ , 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 < 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
Model:	Protea Bracket	
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.		
<i>(From rail analysis, allowable spacing and number of rails are controlled by individual mount pullout before rail bending)</i>		



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Ground Snow Load: 0 PSF

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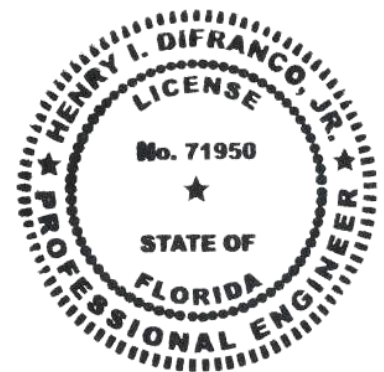


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2 - Roof Height x 0.4		6		
3 - Least Roof Horizontal Dimension (L or W) x 0.04		1.24		
4 - Least of (1) and (2)		3.1		
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Garage

Net Design Pressures, $p_{net}$ (Fig 30.4-1), Components & Cladding					
	Uplift (-psf)			Factored Pressure (0.6W, ASCE 7-16)	$\theta$
		$P_{30net}$	$IK_{zt}P_{30net}$		
gable /hip /flat					
Gable	Zone 1 & 2e	44.0	64.5	38.7	$7^\circ < \theta \leq 20^\circ$
	Zone 2n,2r,3e	64.3	94.1	56.5	
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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	14.0°	
Distance from Eave to Ridge	15.5	
$p_m$ , 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 < 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
Model:	Protea Bracket	
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.		
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# NEW PHOTOVOLTAIC SYSTEM 14.62 KW DC

## 209 NORTHWEST CIMARRON WAY, LAKE CITY, FL 32055



**CONTRACTOR**



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

PROJECT NAME & ADDRESS

**LAURA NILES**  
**209 NORTHWEST CIMARRON WAY, LAKE CITY, FL 32055**

COUNTY: COLUMBIA COUNTY

**SYSTEM SIZE**

DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC



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SHEET TITLE

**COVER PAGE**

DRAWN DATE 1/9/2023

DRAWN BY VG

SHEET NUMBER

**G-001**

### GENERAL NOTES

**1.1.1 PROJECT NOTES:**

- 1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
- 1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
- 1.1.4 GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE MICRO-INVERTER IN ACCORDANCE WITH NEC 690.41(B)
- 1.1.5 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4: PV MODULES: UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519 COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY
- 1.1.6 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
- 1.1.7 ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4. SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
- 1.1.8 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ. THE ENCHARGE BATTERY AS PART OF THE ENSEMBLE SYSTEM DOES NOT EXPORT POWER TO THE GRID IN ANY STORAGE MODE.

**1.2.1 SCOPE OF WORK:**

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

**1.3.1 WORK INCLUDES:**

- 1.3.2 PV RACKING SYSTEM INSTALLATION - UNIRAC SOLAR
- 1.3.3 PV MODULE/ INVERTER/ BATTERY INSTALLATION - CANADIAN SOLAR INC. CS3N-395MS / ENPHASE IQ8PLUS-72-2-US INVERTER/ ENPHASE ENCHARGE 10T BATTERY
- 1.3.4 PV EQUIPMENT ROOF MOUNT
- 1.3.5 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
- 1.3.6 PV LOAD CENTERS (IF INCLUDED)
- 1.3.7 PV METERING/MONITORING (IF INCLUDED)
- 1.3.8 PV DISCONNECTS
- 1.3.9 PV GROUNDING ELECTRODE & BONDING TO (E) GEC
- 1.3.10 PV FINAL COMMISSIONING
- 1.3.11 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV
- 1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

**PROJECT INFORMATION**

**OWNER**  
NAME: LAURA NILES

**CONTRACTOR NAME**

ADT SOLAR LLC  
PHONE: 5052180838

**SCOPE OF WORK**

SYSTEM SIZE: STC: 37 X 395W= 14.62 KW DC  
PTC: 37 x 372.75W = 13.79 KW DC  
(37) CANADIAN SOLAR INC. CS3N-395MS  
(37) ENPHASE IQ8PLUS-72-2-US  
(02) ENPHASE ENCHARGE 10T

ATTACHMENT TYPE: ROOF MOUNT  
MSP UPGRADE: YES  
UTILITY METER UPGRADE: YES

**AUTHORITIES HAVING JURISDICTION**

BUILDING: COLUMBIA COUNTY (FL)  
ZONING: COLUMBIA COUNTY (FL)  
UTILITY: FLORIDA POWER & LIGHT CO. - FPL (FL)

**DESIGN SPECIFICATION**

OCCUPANCY: II  
CONSTRUCTION: SINGLE-FAMILY  
ZONING: RESIDENTIAL  
GROUND SNOW LOAD: REFER STRUCTURAL LETTER  
WIND EXPOSURE: REFER STRUCTURAL LETTER  
WIND SPEED: 117 MPH

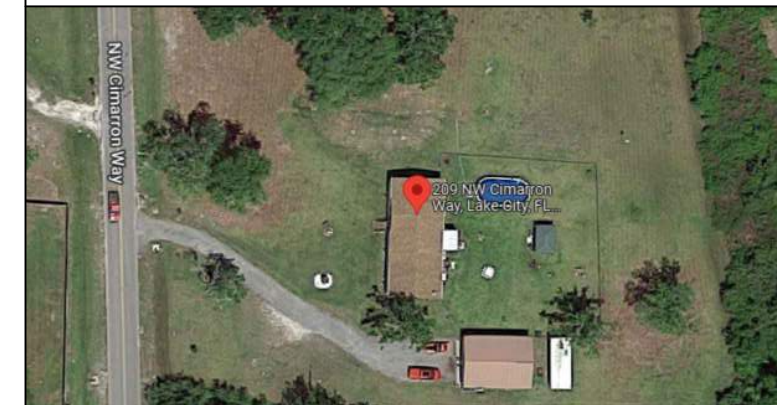
**APPLICABLE CODES & STANDARDS**

BUILDING: IBC 2018, IRC 2018, FBC 2020 (7TH EDITION)  
ELECTRICAL: NEC 2020  
FIRE: IFC 2020

### VICINITY MAP



### SATELLITE VIEW



### SHEET INDEX

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R-001	RESOURCE DOCUMENT
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R-010	RESOURCE DOCUMENT
R-011	RESOURCE DOCUMENT
R-012	RESOURCE DOCUMENT

2.1.1 SITE NOTES:

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

2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH STORAGE BATTERIES.

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

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

2.1.6 ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.

2.2.1 EQUIPMENT LOCATIONS:

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

2.2.3 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).

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

2.2.5 ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.

2.2.6 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.

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

2.3.1 STRUCTURAL NOTES:

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

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

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

2.3.5 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.

2.3.6 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

2.4.1 WIRING & CONDUIT NOTES:

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

2.4.3 CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.

2.4.4 VOLTAGE DROP LIMITED TO 1.5%.

2.4.5 DC WIRING LIMITED TO MODULE FOOTPRINT.

MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.

2.4.6 AC CONDUCTORS COLORED OR MARKED AS FOLLOWS: PHASE A OR L1- BLACK PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE PHASE C OR L3- BLUE, YELLOW, ORANGE\*\*, OR OTHER CONVENTION NEUTRAL- WHITE OR GREY IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

2.5.1 GROUNDING NOTES:

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

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

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

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

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

MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.

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

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

2.5.9 THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.

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

2.6.1 DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:

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

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

2.6.4 PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690.12(A) THROUGH (D).

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

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

2.6.7 IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.

2.7.1 INTERCONNECTION NOTES:

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

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

2.7.4 THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR, PV DEDICATED BACKFEED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(B)(2)(3)].

2.7.5 AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (B)(2)(3)(C).

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

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

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

**CONTRACTOR**



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

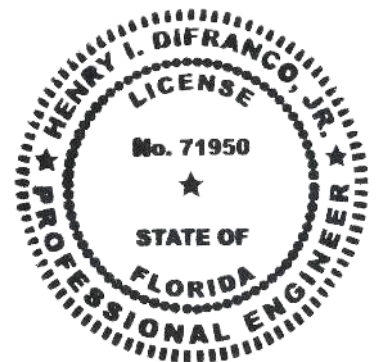
PROJECT NAME & ADDRESS

LAURA NILES  
**209 NORTHWEST  
CIMARRON WAY, LAKE  
CITY,  
FL 32055**

COUNTY: -COLUMBIA COUNTY

**SYSTEM SIZE**

DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC



This item has been digitally signed and sealed by Henry I. DiFranco, Jr., P.E. on January 9, 2023. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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

SHEET TITLE

**NOTES**

DRAWN DATE 1/9/2023

DRAWN BY VG

SHEET NUMBER

**G-002**

**MAIN HOUSE**

TOTAL ROOF SQUARE FOOTAGE IS: 2411.8838 FT<sup>2</sup>  
 TOTAL ARRAY SQUARE FOOTAGE IS: 372.50 FT<sup>2</sup>  
 % COVERED BY SOLAR IS: 15.44%

**DETACHED STRUCTURE**

TOTAL ROOF SQUARE FOOTAGE IS: 1278.2999 FT<sup>2</sup>  
 TOTAL ARRAY SQUARE FOOTAGE IS: 438.24 FT<sup>2</sup>  
 % COVERED BY SOLAR IS: 34.28%

DC SIZE 37 X 395W = 14.615 kW DC-STC  
 AC SIZE 37X 290W = 10.730 kW AC

(37) CANADIAN SOLAR INC. CS3N-395MS  
 (37) ENPHASE IQ8PLUS-72-2-US  
 (02) ENPHASE ENCHARGE 10T  
  
 ADDRESS : 209 NORTHWEST CIMARRON WAY  
 CITY ZIP : LAKE CITY, FL 32055

**CONTRACTOR**  
  
 22171 MCH RD  
 MANDEVILLE, LA 70471  
 PHONE: 9152011490  
  
 PROJECT NAME & ADDRESS  
 LAURA NILES  
**209 NORTHWEST CIMARRON WAY, LAKE CITY, FL 32055**  
 COUNTY:-COLUMBIA COUNTY

**SYSTEM SIZE**  
 DC SIZE: 14.615 kW DC-(STC)  
 AC SIZE: 10.730 kW AC



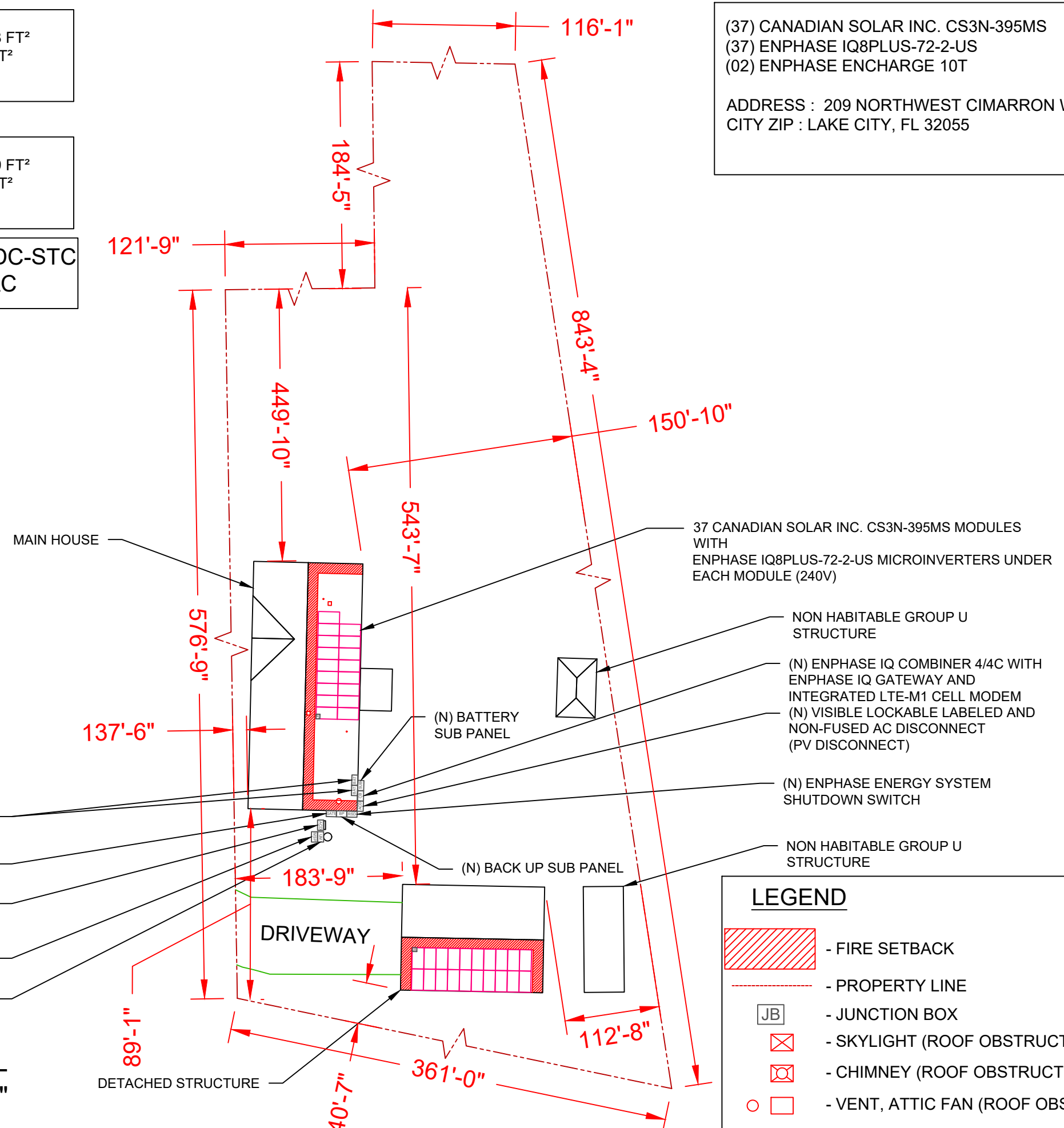
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**SHEET TITLE**  
**SITE PLAN**

DRAWN DATE 1/9/2023  
 DRAWN BY VG

SHEET NUMBER  
**A-101**



**LEGEND**

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

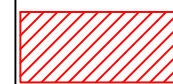





**1 | SITE PLAN**  
**SCALE: 1/32" = 1'-0"**

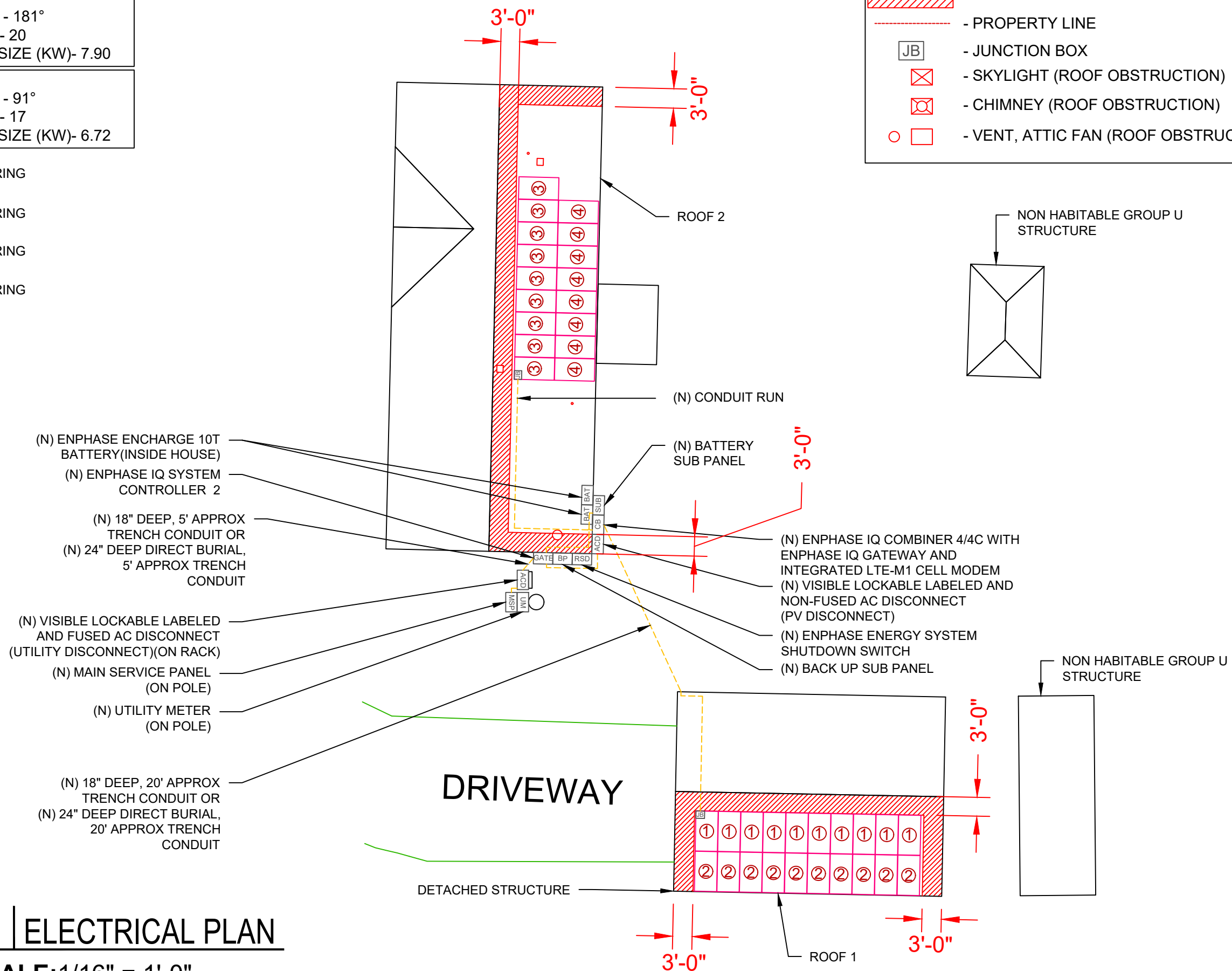
### ROOF SECTION(S)

ROOF 1	TILT - 14° AZIMUTH - 181° MODULE - 20 SYSTEM SIZE (KW)- 7.90
ROOF 2	TILT - 14° AZIMUTH - 91° MODULE - 17 SYSTEM SIZE (KW)- 6.72

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

### LEGEND

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



- (N) ENPHASE ENCHARGE 10T BATTERY (INSIDE HOUSE)
- (N) ENPHASE IQ SYSTEM CONTROLLER 2
- (N) 18" DEEP, 5' APPROX TRENCH CONDUIT OR (N) 24" DEEP DIRECT BURIAL, 5' APPROX TRENCH CONDUIT
- (N) VISIBLE LOCKABLE LABELED AND FUSED AC DISCONNECT (UTILITY DISCONNECT)(ON RACK)
- (N) MAIN SERVICE PANEL (ON POLE)
- (N) UTILITY METER (ON POLE)
- (N) 18" DEEP, 20' APPROX TRENCH CONDUIT OR (N) 24" DEEP DIRECT BURIAL, 20' APPROX TRENCH CONDUIT

- (N) ENPHASE IQ COMBINER 4/4C WITH ENPHASE IQ GATEWAY AND INTEGRATED LTE-M1 CELL MODEM
- (N) VISIBLE LOCKABLE LABELED AND NON-FUSED AC DISCONNECT (PV DISCONNECT)
- (N) ENPHASE ENERGY SYSTEM SHUTDOWN SWITCH
- (N) BACK UP SUB PANEL

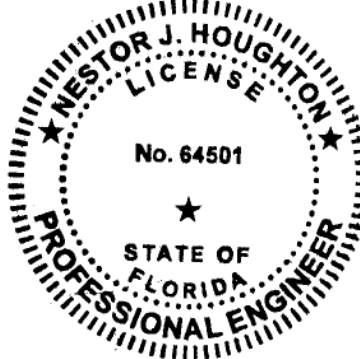
**CONTRACTOR**



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

PROJECT NAME & ADDRESS  
LAURA NILES  
**209 NORTHWEST CIMARRON WAY, LAKE CITY, FL 32055**  
COUNTY:-COLUMBIA COUNTY

**SYSTEM SIZE**  
DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC



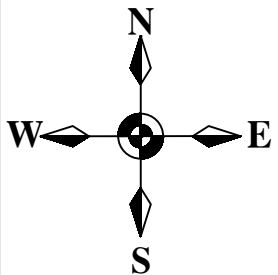
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FLORIDA FIRM NO. 30649

SHEET TITLE  
**ELECTRICAL PLAN**





DRAWN DATE	1/9/2023
DRAWN BY	VG

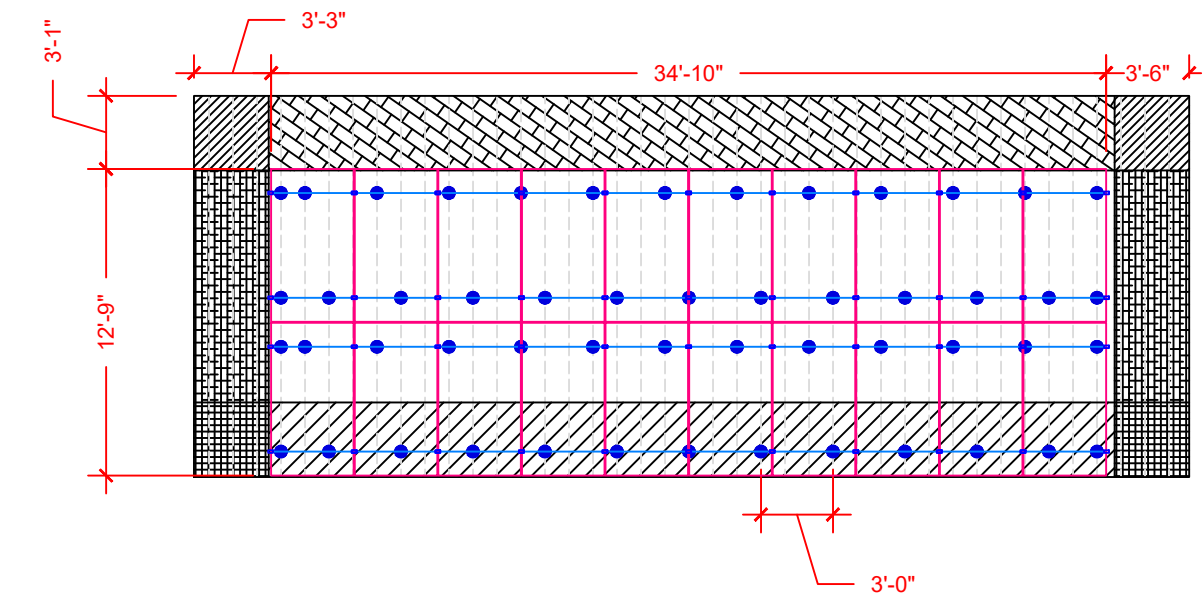
SHEET NUMBER  
**A-102**



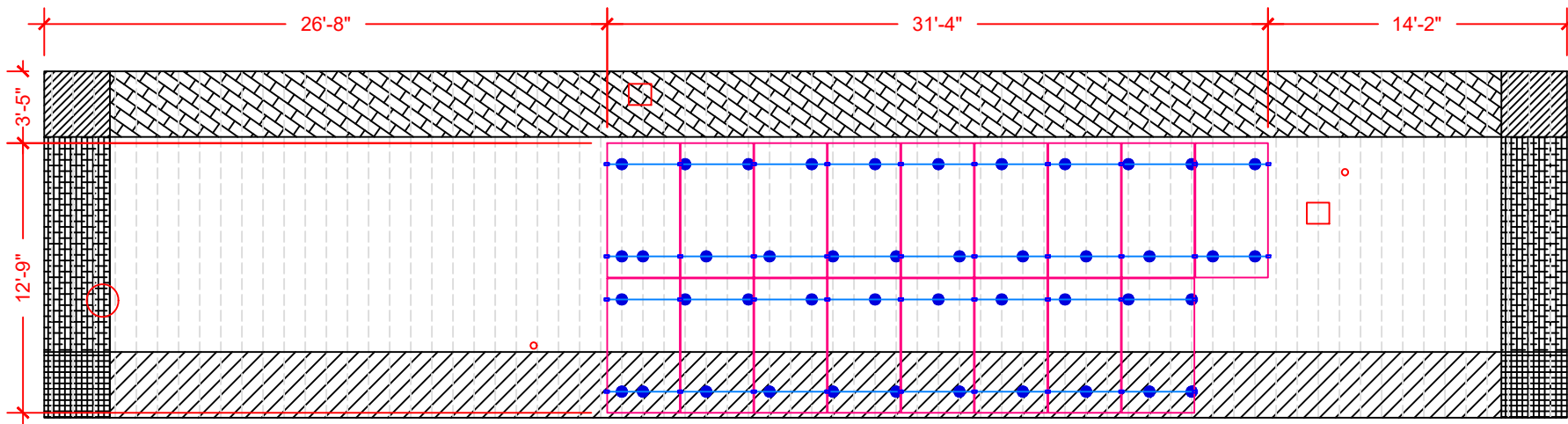
**1 | ELECTRICAL PLAN**  
**SCALE: 1/16" = 1'-0"**



-  - CLAMP
-  - S5-PROTEABRACKET-AL
-  - RAIL
-  - TRAPEZOIDAL METAL SEAM @ 12" O.C.









**ARRAY 1**  
TILT- 14 DEG  
AZIMUTH - 181 DEG



**ARRAY 2**  
TILT- 14 DEG  
AZIMUTH - 91 DEG

- Note 1: Windspeed value is design 3-sec gust in accordance with ASCE 7-16
- Note 2: a) Metal roof brackets require screws into purlins and deck  
 b) Do not install SolarFoot brackets into OSB deck without separate written instructions from the Engineer  
 c) Installers must verify metal panels are 26 gauge or thicker before use of proteabacket
- Note 3: These drawings were prepared under my supervision. I have researched the code and to the best of my knowledge And belief, these drawings comply with the 2020 Florida Building Code.
- Note 4: Installer shall adjust mount spacing by zone to match prescribed values on engineer's calculation letter
- Note 5: Maximum rail cantilever distance beyond outermost mount is One-third the zone-specific mount spacing.

BOM	
ITEM	NEEDED
CANADIAN SOLAR INC. CS3N-395MS	37
ENPHASE IQ8PLUS-72-2-US	37
INVERTER MOUNT CLIPS	37
TRUNK CABLE	44
COMBINER BOX	1
SPLIT-CORE TRANSFORMERS	2
S5-PROTEABRACKET-AL	96
INVERTER T-BOLTS	37
RAIL (TOTAL STICKS)	18
SPLICES	14
END CLAMPS	16
MID CLAMPS	66
GROUND LUGS	8
SOLADECK	2
TP-LINK	1
TERMINAL BLOCKS	10
ZIPTIES	100
TRUNK BRANCH TERMINATOR	4
TRUNK WATER TIGHT COVER	4

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)

**WIND ZONE CALCULATIONS =**

OFFSET  
 DISTANCE = a = 0.4 X h = (0.4 x 15') = 6'  
 OR = a = 0.1 X L = (0.1 x 31.10') = 3.10'

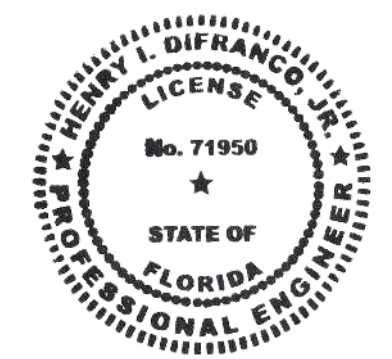
**CONTRACTOR**



22171 MCH RD  
 MANDEVILLE, LA 70471  
 PHONE: 9152011490

PROJECT NAME & ADDRESS  
 LAURA NILES  
**209 NORTHWEST  
 CIMARRON WAY, LAKE  
 CITY,  
 FL 32055**  
 COUNTY:-COLUMBIA COUNTY

**SYSTEM SIZE**  
 DC SIZE: 14.615 KW DC-(STC)  
 AC SIZE: 10.730 KW AC



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 FLORIDA FIRM NO. 30649

SHEET TITLE  
**ATTACHMENT PLAN**

DRAWN DATE	1/9/2023
DRAWN BY	VG

SHEET NUMBER  
**A-103**

**1 | ATTACHMENT PLAN**  
**SCALE: 1/8"=1'-0"**

All dimensions and information provided by ADT Solar inspection.

**ROOF SECTION(S)**

ROOF 1	ROOF MATERIAL - TRAPEZOIDAL METAL SEAM RAFTER - 2"X6" O.C. SPACING - 24"
ROOF 2	ROOF MATERIAL - TRAPEZOIDAL METAL SEAM TRUSS SIZE - 2"X2" O.C. SPACING - 24"

**CONTRACTOR**



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PHONE: 9152011490

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CIMARRON WAY, LAKE  
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SHEET TITLE

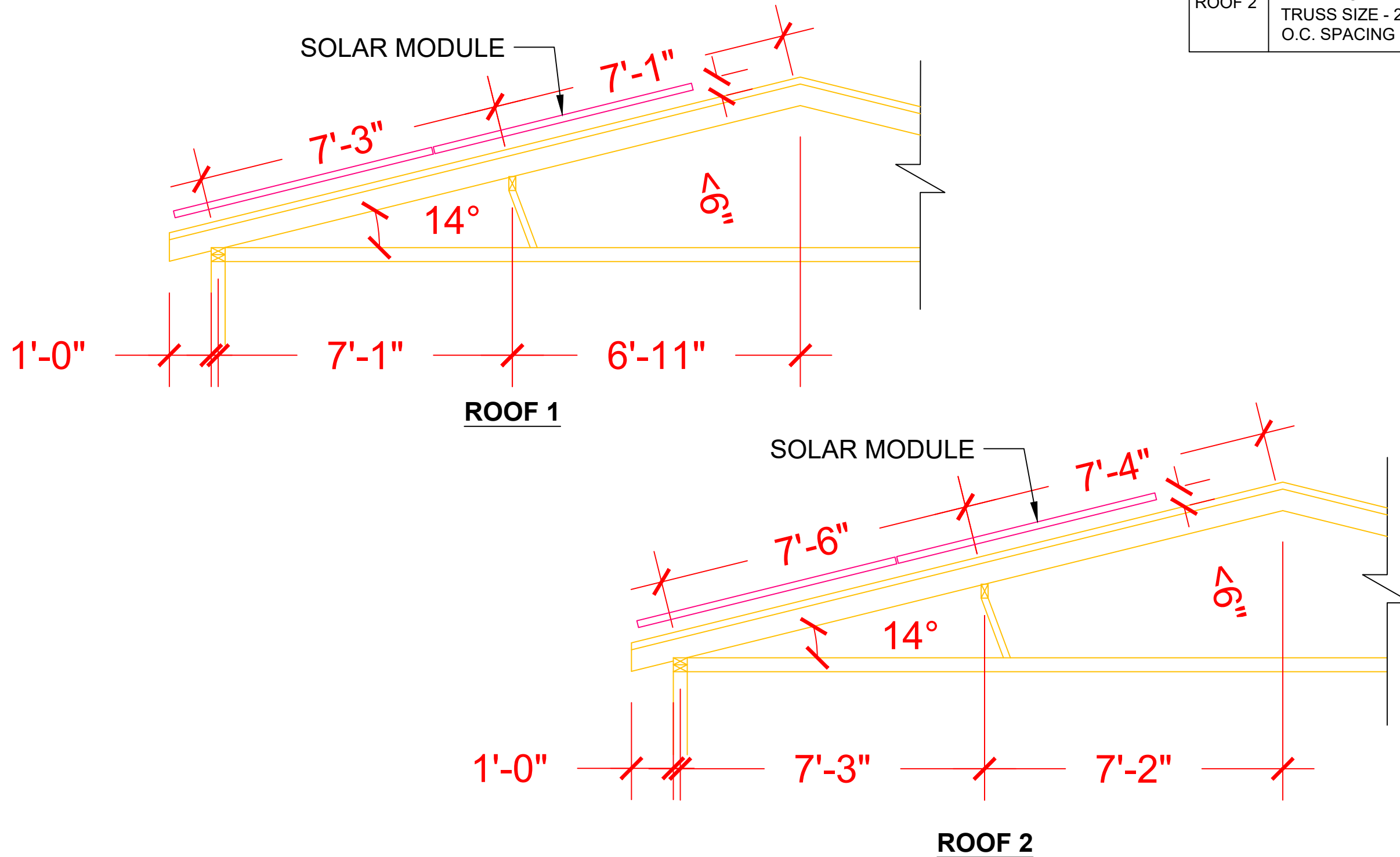
**STRUCTURAL PLAN**

DRAWN DATE 1/9/2023

DRAWN BY VG

SHEET NUMBER

**A-104**



**1 | STRUCTURAL PLAN**  
**SCALE: 3/8" = 1'-0"**

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	CANADIAN SOLAR INC. CS3N-395MS
VMP	37.0V
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)

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

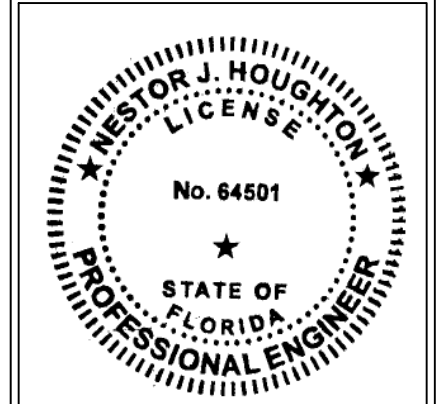
WIRE /CONDUIT SCHEDULE	
TAG	DESCRIPTION
1	(2)#10/2 ROMEX IN ATTIC/ (4)#10 THWN-2 ON EXTERIOR & (1)#10 THWN-2 GROUND / (GN)
1A	(4)#10 THWN-2 & (1)#10 THWN-2 GROUND / (GN) (IN TRENCH 18" DEEP, 20 FEET APPROX. CONDUIT) (4)#8 USE-2 AL & (1)#8 USE-2 AL DIRECT BURIAL (IN TRENCH 24" DEEP, 20 FEET APPROX. CONDUIT)
2	(3)#6 THWN-2 & (1)#10 THWN-2 GROUND / (GN)
3	(2)#8 THWN-2 & (1)#10 THWN-2 GROUND / (GN)
4	(2)#8 THWN-2 & (1)#10 THWN-2 GROUND / (GN)
5	(3)#2 THWN-2 & (1)#8 THWN-2 GROUND / (GN)
6	(1)#6 BARE GROUND
7	(3)#2/0 THWN-2 / (GN)

WIRE /CONDUIT SCHEDULE	
TAG	DESCRIPTION
8	(2)#12 THWN-2 CT WIRES
9	(2)#10 THWN-2 / (GN)
10	(3)#2 THWN-2 & (1)#8 THWN-2 GROUND / (GN) (IN TRENCH 18" DEEP, 5 FEET APPROX. CONDUIT) (3)#1 USE-2 AL & (1)#6 USE-2 AL DIRECT BURIAL (IN TRENCH 24" DEEP, 5 FEET APPROX. CONDUIT)
11	(3)#2 THWN-2 & (1)#8 THWN-2 GROUND / (GN)

FULL SERVICE REPLACEMENT  
 INSTALL NEW 200A METER AND NEW 225A RATED 200A MAIN BREAKER PANEL

**CONTRACTOR**  
  
 22171 MCH RD  
 MANDEVILLE, LA 70471  
 PHONE: 9152011490  
 PROJECT NAME & ADDRESS  
 LAURA NILES  
**209 NORTHWEST CIMARRON WAY, LAKE CITY, FL 32055**  
 COUNTY:-COLUMBIA COUNTY

**SYSTEM SIZE**  
 DC SIZE: 14.615 KW DC-(STC)  
 AC SIZE: 10.730 KW AC



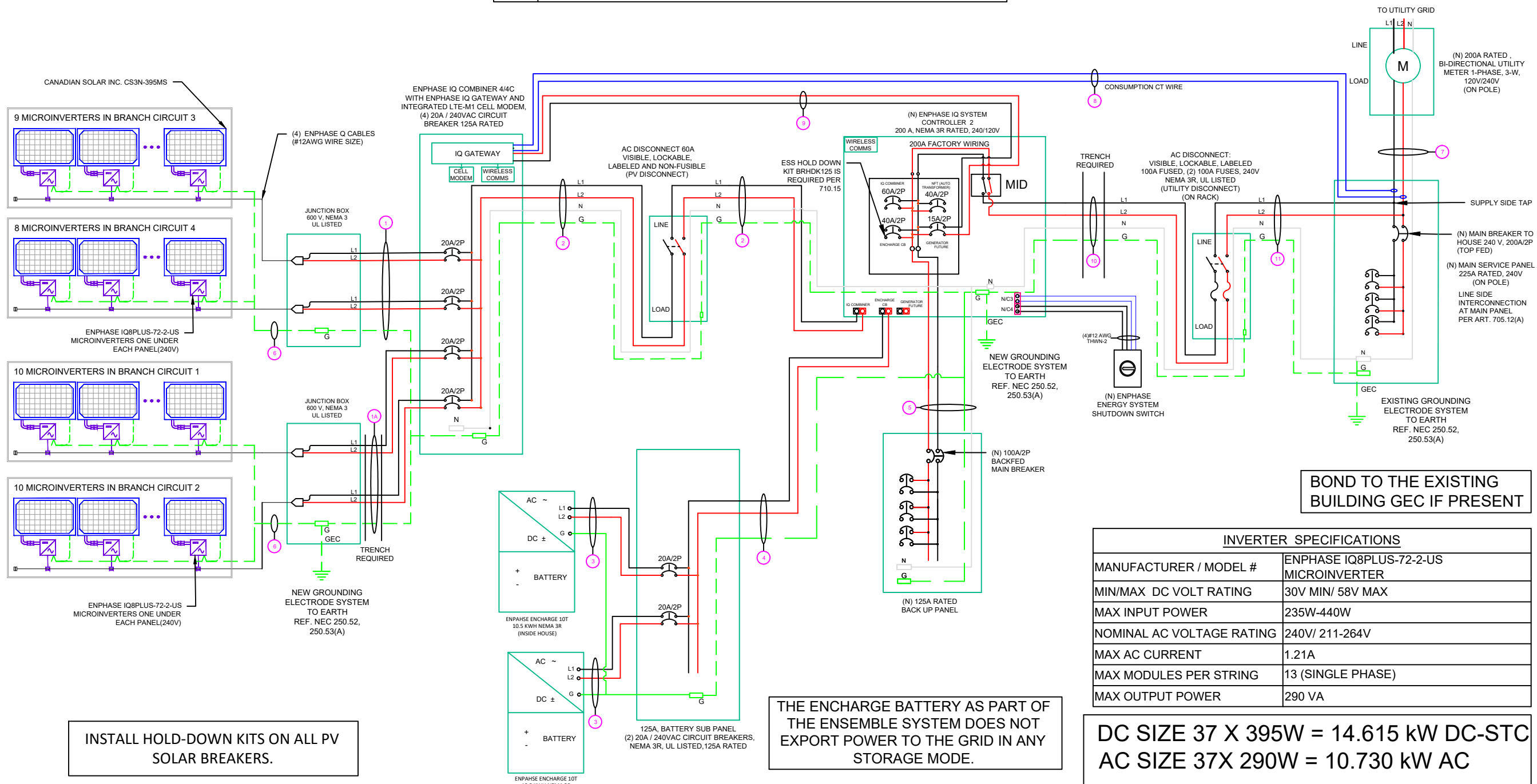
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 MANDEVILLE, LA 70471  
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 INFO@PI-AEC.COM  
 FLORIDA FIRM NO. 30649

SHEET TITLE  
**LINE DIAGRAM**

DRAWN DATE 1/9/2023  
 DRAWN BY VG

SHEET NUMBER  
**E-601**



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

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

## CALCULATIONS:

### 1. CURRENT CARRYING CONDUCTOR

#### (A) BEFORE IQ COMBINER PANEL

AMBIENT TEMPERATURE - (34)°C ...NEC 310.15(B)(3)(c)

TEMPERATURE DERATE FACTOR - 0.96 ...NEC

310.15(B)(2)(a)

GROUPING FACTOR - 0.8...NEC 310.15(B)(3)(a)

#### CONDUCTOR AMPACITY

= (INV O/P CURRENT) x 1.25 / A.T.F / G.F ...NEC 690.8(B)

= [(10 x 1.21) x 1.25] / [0.96 x 0.8]

= 19.69A

SELECTED CONDUCTOR - #10 THWN-2 ...NEC 310.15(B)(16)

#### (B) AFTER IQ COMBINER PANEL

TEMPERATURE DERATE FACTOR - 0.96

GROUPING FACTOR - 1

#### CONDUCTOR AMPACITY

= (TOTAL INV O/P CURRENT) x 1.25 / 0.96 / 1 ...NEC 690.8(B)

= [(37 x 1.21) x 1.25] / [0.96 x 1]

= 58.29 A

SELECTED CONDUCTOR - #6 THWN-2 ...NEC 310.15(B)(16)

#### (C) AFTER ENPHASE ENPOWER CONTROLLER 2

TEMPERATURE DERATE FACTOR - 0.96

GROUPING FACTOR - 1

#### CONDUCTOR AMPACITY

= [(TOTAL INV O/P CURRENT) + (BATTERY MAX

CONTINUOUS CURRENT) x 1.25] / (0.96 x 1) ...NEC 690.8(B)

= [((37 x 1.21) + 32) x 1.25] / [0.96 x 1]

= 99.96 A

SELECTED CONDUCTOR - #2 THWN-2 ...NEC 310.15(B)(16)

### 2. PV OVER CURRENT PROTECTION ...NEC 690.9(D)

= TOTAL INVERTER O/P CURRENT x 1.25

= (37 x 1.21) x 1.25 = 55.96 A

SELECTED OCPD = 60A ...NEC 240.6

### 3. PV & BATTERY OVER CURRENT PROTECTION

...NEC 690.9(B)

= (TOTAL INVERTER O/P CURRENT + BATTERY O/P CURRENT) x 1.25

= [(37 x 1.21) + 32] x 1.25 = 95.96 A

### 4. VOLTAGE DROP CALCULATION FOR TAG 1A

VOLTAGE DROP= (0.2 x LENGTH OF CONDUCTOR x CURRENT x RESISTANCE IN CONDUCTOR) / 240

= (0.2 x 20 x 12.10 x 1.2 ( FOR #10 AWG WIRE) ) / 240

= 0.24%

VOLTAGE DROP IS WITHIN PERMISSIBLE LIMIT OF 2%.HENCE OK

### 5. VOLTAGE DROP CALCULATION FOR TAG 6

VOLTAGE DROP= (0.2 x LENGTH OF CONDUCTOR x CURRENT x RESISTANCE IN CONDUCTOR) / 240

= (0.2 x 5 x 76.77 x 0.19 ( FOR #2 AWG WIRE) ) / 240

= 0.06%

VOLTAGE DROP IS WITHIN PERMISSIBLE LIMIT OF 2%.HENCE OK

## CONTRACTOR



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

## PROJECT NAME & ADDRESS

LAURA NILES

209 NORTHWEST  
CIMARRON WAY, LAKE  
CITY,  
FL 32055

COUNTY:-COLUMBIA COUNTY

## SYSTEM SIZE

DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC



This item has been digitally signed and sealed by Nestor J. Houghton, P.E. on January 9, 2023. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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

## SHEET TITLE

**ELECTRICAL  
CALCULATIONS**

DRAWN DATE 1/9/2023

DRAWN BY VG

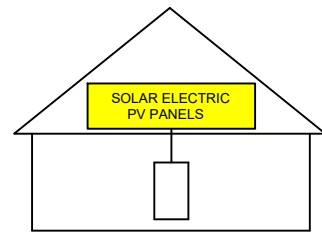
## SHEET NUMBER

**E-602**

**WARNING: PHOTOVOLTAIC POWER SOURCE**

**SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN**

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



**AC DISCONNECT**

**WARNING**  
**ELECTRIC SHOCK HAZARD**  
DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

**PHOTOVOLTAIC SYSTEM AC DISCONNECT**  
OPERATING VOLTAGE: 240 VOLTS  
OPERATING CURRENT: 55.96 AMPS

**SOLAR CONNECTION LINE SIDE TAP**

**AC COMBINER BOX**

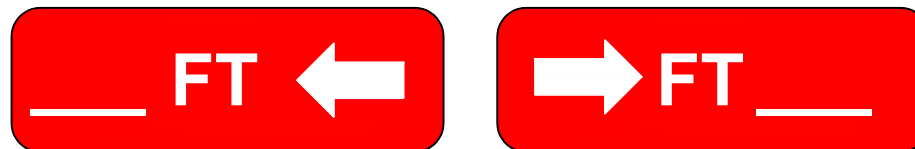
**PHOTOVOLTAIC MICROINVERTERS LOCATED UNDER EACH PV MODULE IN ROOFTOP ARRAY**

**PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN**

RATED AC OUTPUT CURRENT: \_\_\_\_  
NOM. OPERATING VOLTAGE: \_\_\_\_

**WARNING**  
**TRI POWER SOURCES**  
SOURCES: UTILITY GRID, PV SOLAR ELECTRIC SYSTEM AND ESS SYSTEM

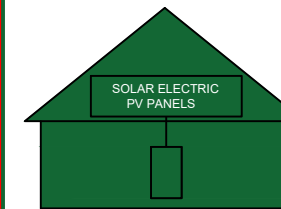
**KW SOLAR DISCONNECT LOCATED**



**WARNING**  
**INVERTER OUTPUT CONNECTION**  
DO NOT RELOCATE THIS OVERCURRENT DEVICE

**EMERGENCY RESPONDER THIS SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN**

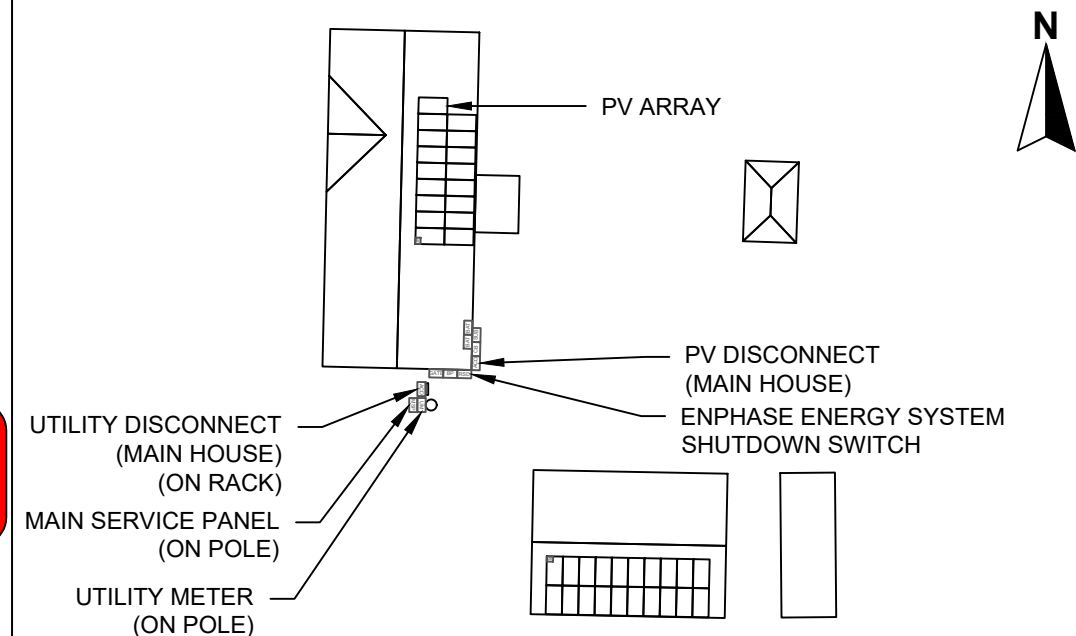
TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUTDOWN ENTIRE PV SYSTEM.



THE LABEL SHALL BE REFLECTIVE, WITH ALL LETTERS CAPITALIZED AND HAVING A MINIMUM HEIGHT OF 3/8 IN. (9.5 MM), IN WHITE ON A RED BACKGROUND.

# CAUTION

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



CONTRACTOR



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

PROJECT NAME & ADDRESS

LAURA NILES  
209 NORTHWEST  
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FLORIDA FIRM NO. 30649

SHEET TITLE

**PLACARD**

DRAWN DATE 1/9/2023  
DRAWN BY VG

SHEET NUMBER  
**E-603**



**HiKuBlack**  
**BLACK FRAME ON BLACK BACKSHEET**  
**MONO PERC MODULE**  
**F30 Frame**  
**380 W ~ 400 W**  
**CS3N-380 | 385 | 390 | 395 | 400MS**

**MORE POWER**

**400 W** Module power up to 400 W  
 Module efficiency up to 19.7%

**\$** 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 5400 Pa, enhanced wind load up to 2400 Pa\*

**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  
 UNI 9177 Reaction to Fire: Class 1 / Take-e-way



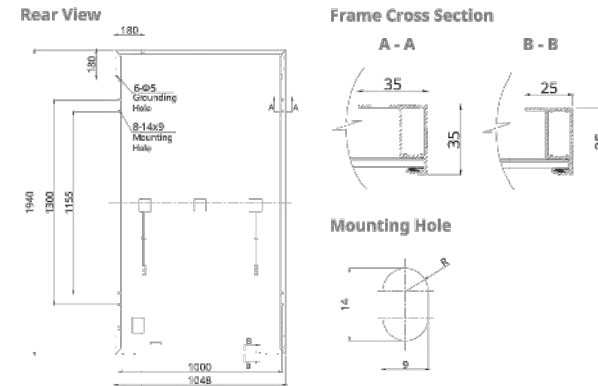
\* The specific certificates applicable to different module types and markets will vary, and therefore not all of the certifications listed herein will simultaneously apply to the products you order or use. Please contact your local Canadian Solar sales representative to confirm the specific certificates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

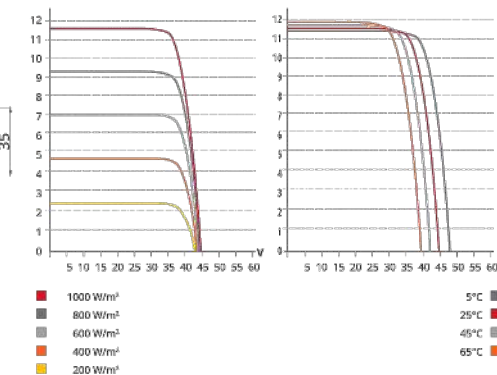
\* For detailed information, please refer to Installation Manual.

**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)

**ENGINEERING DRAWING (mm)**



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



**ELECTRICAL DATA | STC\***

CS3N	380MS	385MS	390MS	395MS	400MS
Nominal Max. Power (Pmax)	380 W	385 W	390 W	395 W	400 W
Opt. Operating Voltage (Vmp)	36.4 V	36.6 V	36.8 V	37.0 V	37.2 V
Opt. Operating Current (Imp)	10.44 A	10.52 A	10.60 A	10.68 A	10.76 A
Open Circuit Voltage (Voc)	43.7 V	43.9 V	44.1 V	44.3 V	44.5 V
Short Circuit Current (Isc)	11.26 A	11.32 A	11.38 A	11.44 A	11.50 A
Module Efficiency	18.7%	18.9%	19.2%	19.4%	19.7%
Operating Temperature	-40°C ~ +85°C				
Max. System Voltage	1000V (IEC/UL)				
Module Fire Performance	TYPE 1 (UL 61730 1500V) or TYPE 2 (UL 61730 1000V) or CLASS C (IEC 61730)				
Max. Series Fuse Rating	20 A				
Application Classification	Class A				
Power Tolerance	0 ~ + 10 W				

**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	22.5 kg (49.6 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	4 mm <sup>2</sup> (IEC), 12 AWG (UL)
Cable Length (Including Connector)	1650 mm (65.0 in) (-) / 1000 mm (39.4 in) (+)*
Connector	T4 or MC4 series
Per Pallet	30 pieces
Per Container (40' HQ)	720 pieces

**ELECTRICAL DATA | NMOT\***

CS3N	380MS	385MS	390MS	395MS	400MS
Nominal Max. Power (Pmax)	285 W	289 W	293 W	296 W	300 W
Opt. Operating Voltage (Vmp)	34.1 V	34.3 V	34.5 V	34.7 V	34.9 V
Opt. Operating Current (Imp)	8.35 A	8.42 A	8.48 A	8.54 A	8.60 A
Open Circuit Voltage (Voc)	41.3 V	41.5 V	41.7 V	41.9 V	42.1 V
Short Circuit Current (Isc)	9.08 A	9.13 A	9.18 A	9.22 A	9.27 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.

**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	41 ± 3°C

**PARTNER SECTION**



\* 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 v2.7J25\_F30\_J4\_NA

**CONTRACTOR**



22171 MCH RD  
 MANDEVILLE, LA 70471  
 PHONE: 9152011490

**PROJECT NAME & ADDRESS**

LAURA NILES  
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**CIMARRON WAY, LAKE**  
**CITY,**  
**FL 32055**  
 COUNTY:-COLUMBIA COUNTY

**SYSTEM SIZE**

DC SIZE: 14.615 KW DC-(STC)  
 AC SIZE: 10.730 KW AC

**SHEET TITLE**  
**RESOURCE**  
**DOCUMENT**

DRAWN DATE 1/9/2023

DRAWN BY VG

**SHEET NUMBER**

**R-001**

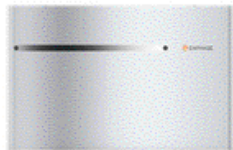


DATA SHEET



## 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-2021-10-19

### 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

## 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 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
Overtoltage 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	10	1.21
Nominal frequency	Hz		60
Extended frequency range	Hz		50 – 68
Max units per 20 A (L-L) branch circuit <sup>4</sup>		16	13
Total harmonic distortion			<5%
Overtoltage 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	
Acoustic noise at 1m		<60 dBA	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01	
Certifications		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-2021-10-19

CONTRACTOR



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AC SIZE: 10.730 KW AC

SHEET TITLE  
**RESOURCE  
DOCUMENT**

DRAWN DATE 1/9/2023

DRAWN BY VG

SHEET NUMBER

**R-002**

# Enphase IQ Combiner 4/4C

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



X-IQ-AM1-240-4C

X-IQ-AM1-240-4

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



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



## Enphase IQ Combiner 4/4C

### MODEL NUMBER

IQ Combiner 4 (X-IQ-AM1-240-4)	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 (X-IQ-AM1-240-4C)	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 BR2 10 Circuit breaker, 2 pole, 15A, Eaton BR2 15 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR2 15B 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
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](http://enphase.com)

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CITY,  
FL 32055**  
COUNTY:-COLUMBIA COUNTY

### SYSTEM SIZE

DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC

### SHEET TITLE RESOURCE DOCUMENT

DRAWN DATE	1/9/2023
DRAWN BY	VG

SHEET NUMBER  
**R-003**



CONTRACTOR



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

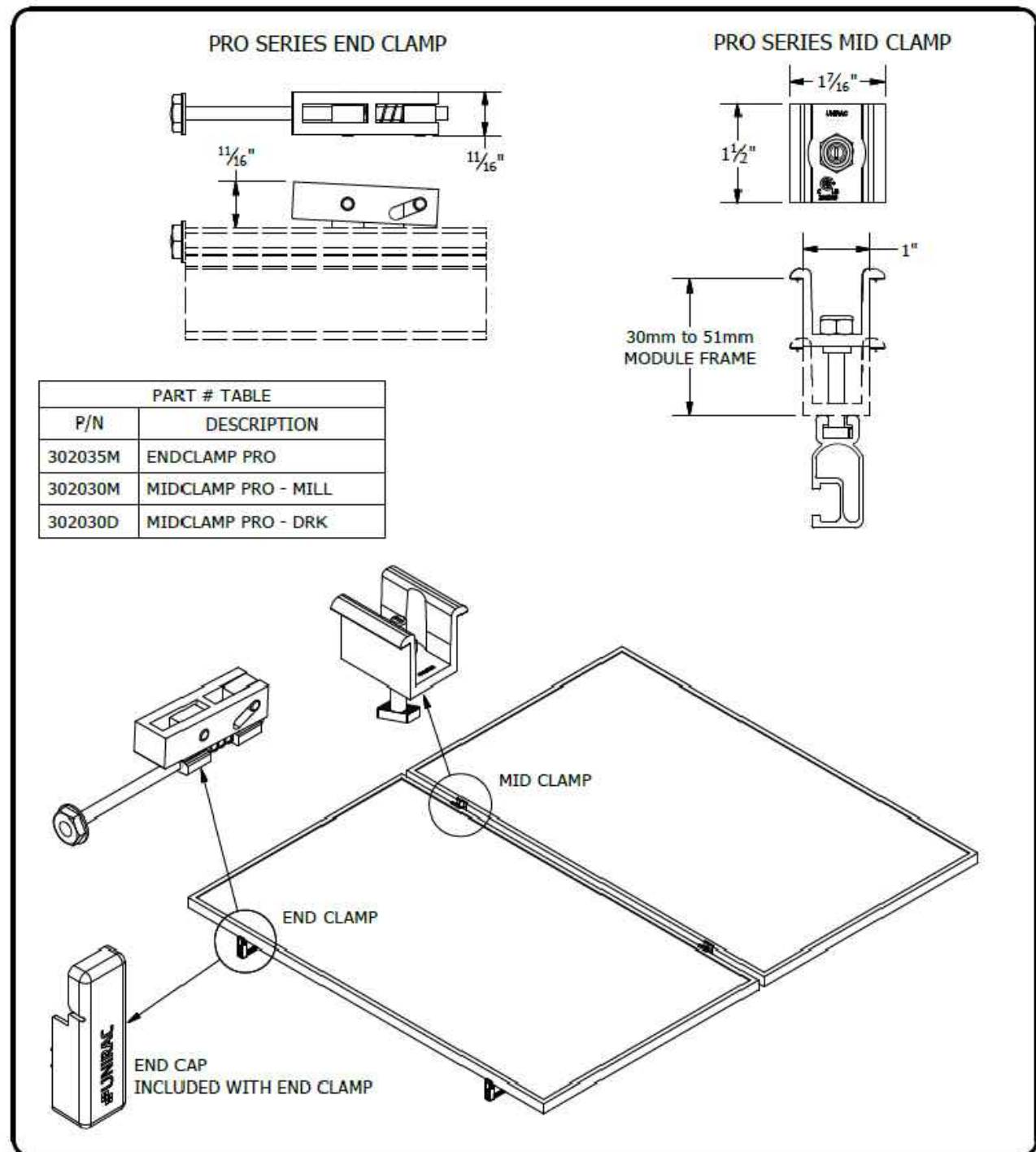
PROJECT NAME & ADDRESS

LAURA NILES  
209 NORTHWEST  
CIMARRON WAY, LAKE  
CITY,  
FL 32055

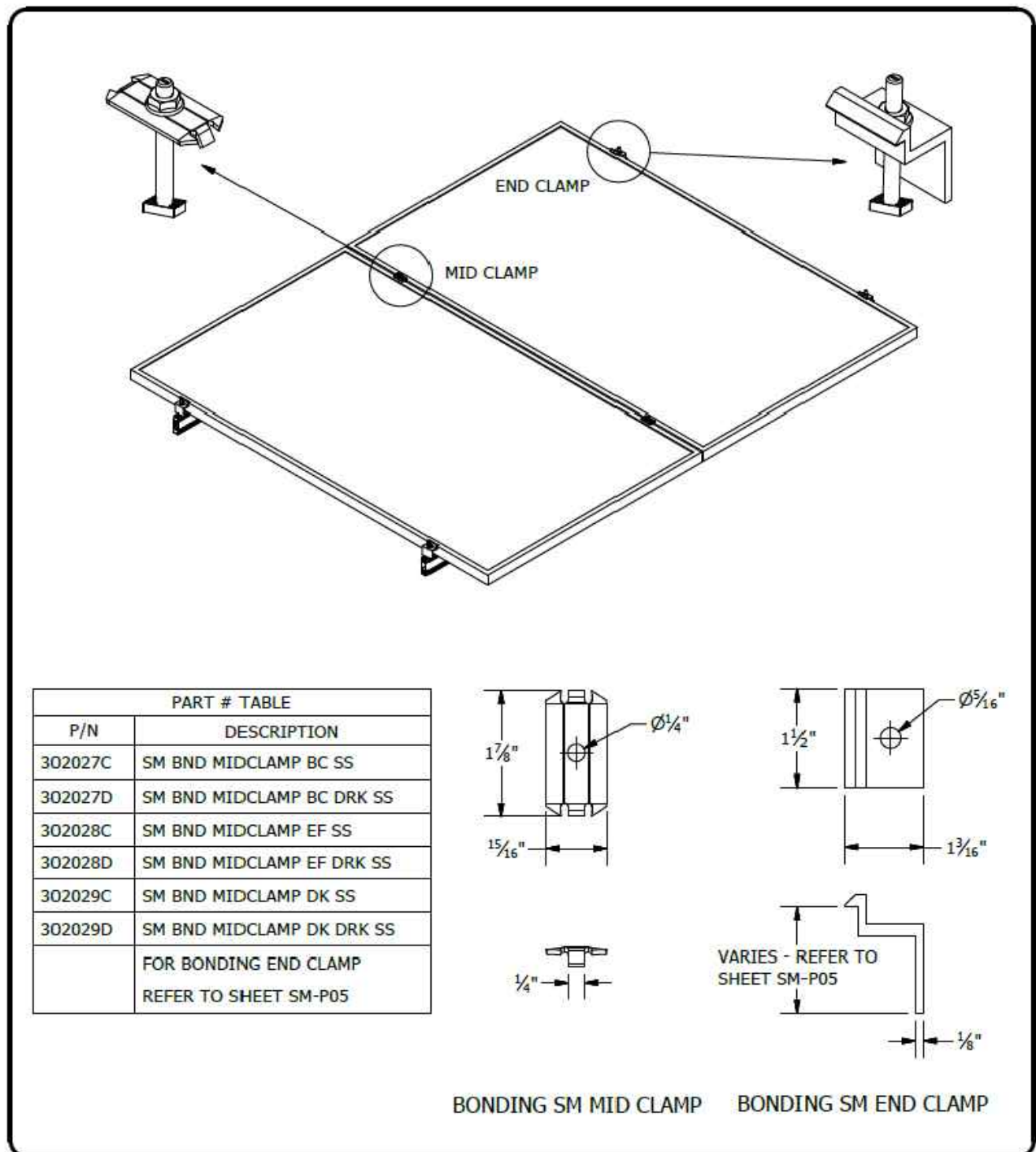
COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC



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	

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

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

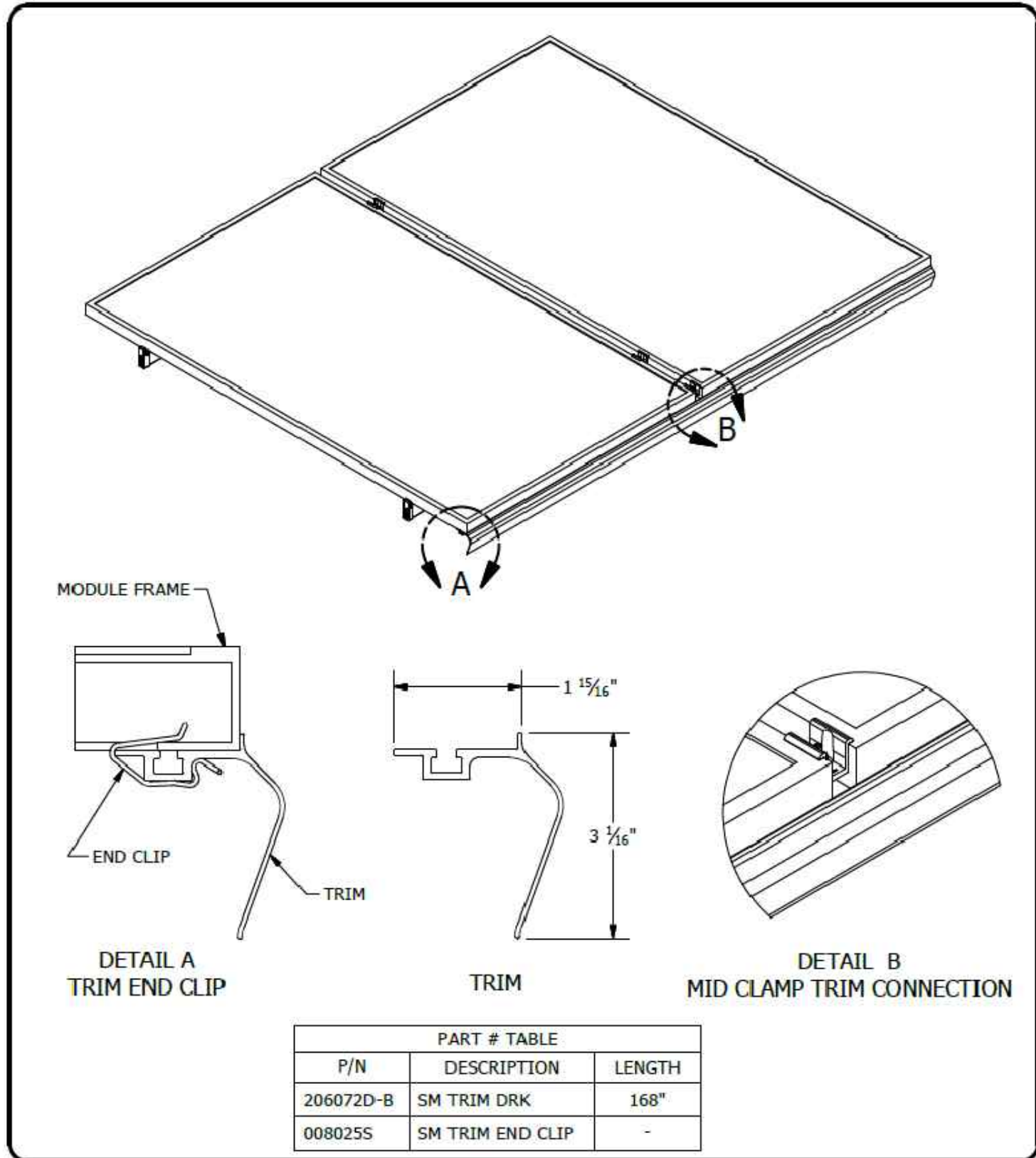
LEGAL NOTICE

SM-A01A  
SHEET

SHEET TITLE  
**RESOURCE DOCUMENT**

DRAWN DATE	1/9/2023
DRAWN BY	VG

SHEET NUMBER  
**R-004**



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

**UNIRAC**  
 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

PRODUCT PROTECTED BY  
 ONE OR MORE US PATENTS  
 LEGAL NOTICE

**SM-A02**  
 SHEET

**CONTRACTOR**  
  
 22171 MCH RD  
 MANDEVILLE, LA 70471  
 PHONE: 9152011490  
 PROJECT NAME & ADDRESS  
 LAURA NILES  
 209 NORTHWEST  
 CIMARRON WAY, LAKE  
 CITY,  
 FL 32055  
 COUNTY:-COLUMBIA COUNTY

**SYSTEM SIZE**  
 DC SIZE: 14.615 KW DC-(STC)  
 AC SIZE: 10.730 KW AC

SHEET TITLE  
**RESOURCE  
 DOCUMENT**

DRAWN DATE	1/9/2023
DRAWN BY	VG

SHEET NUMBER  
**R-005**

**CONTRACTOR**



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

PROJECT NAME & ADDRESS

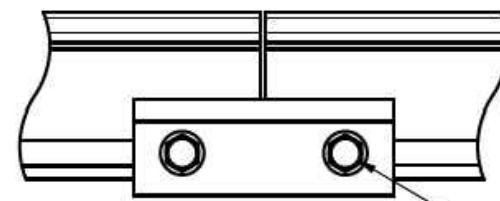
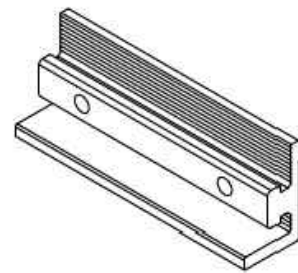
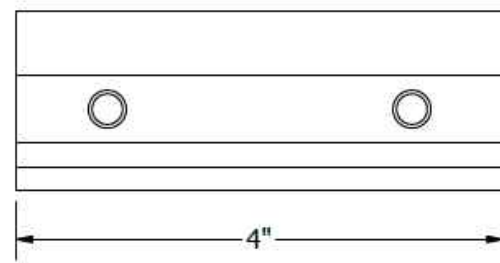
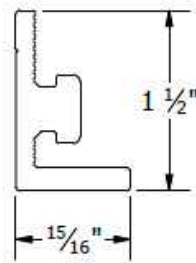
LAURA NILES  
**209 NORTHWEST  
CIMARRON WAY, LAKE  
CITY,  
FL 32055**

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

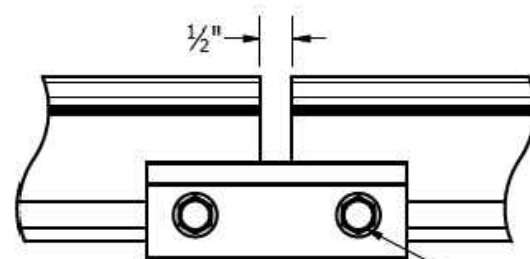
DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC

**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

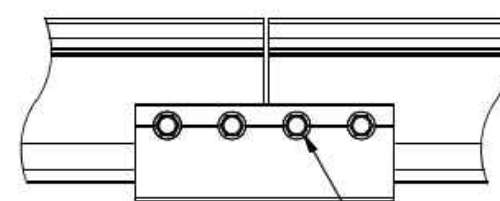
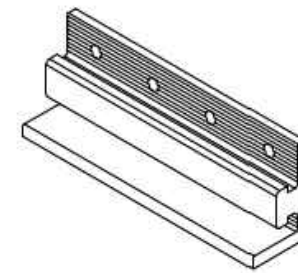
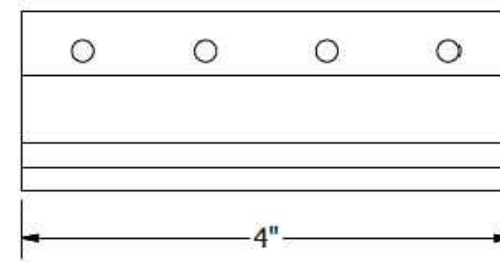
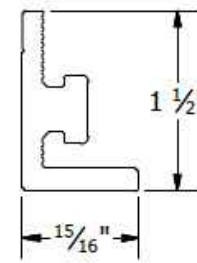
DRAWING NOT TO SCALE  
ALL DIMENSIONS ARE  
NOMINAL

PRODUCT PROTECTED BY  
ONE OR MORE US PATENTS  
LEGAL NOTICE

**SM-A05**

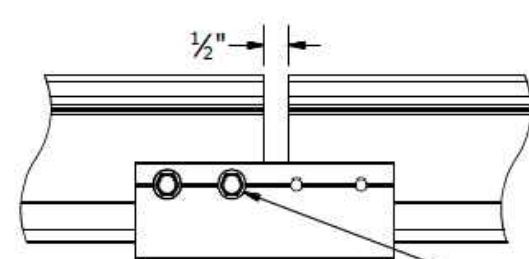
SHEET

**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

SHEET TITLE  
**RESOURCE  
DOCUMENT**

DRAWN DATE 1/9/2023

DRAWN BY VG

SHEET NUMBER

**R-006**

CONTRACTOR



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

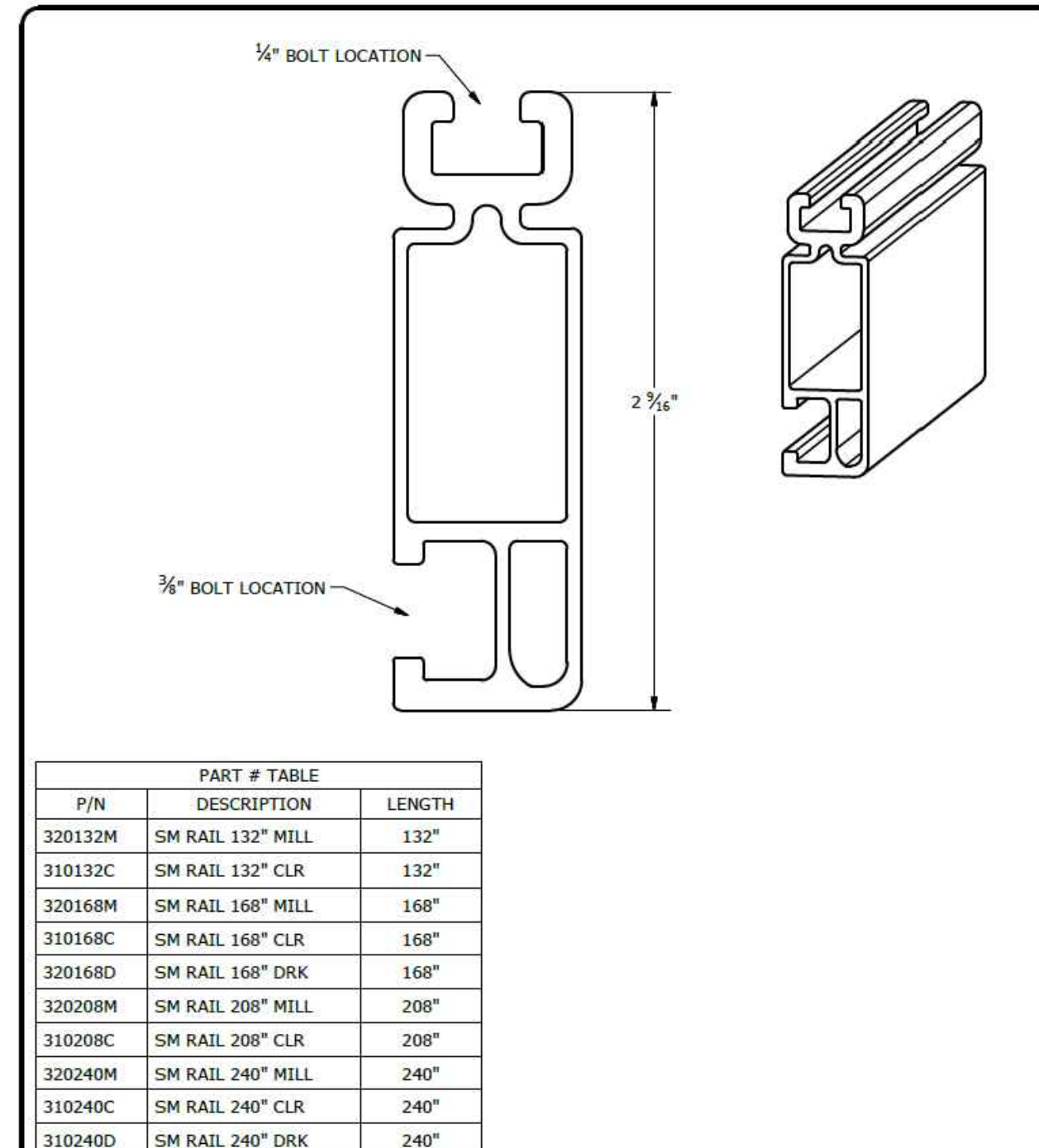
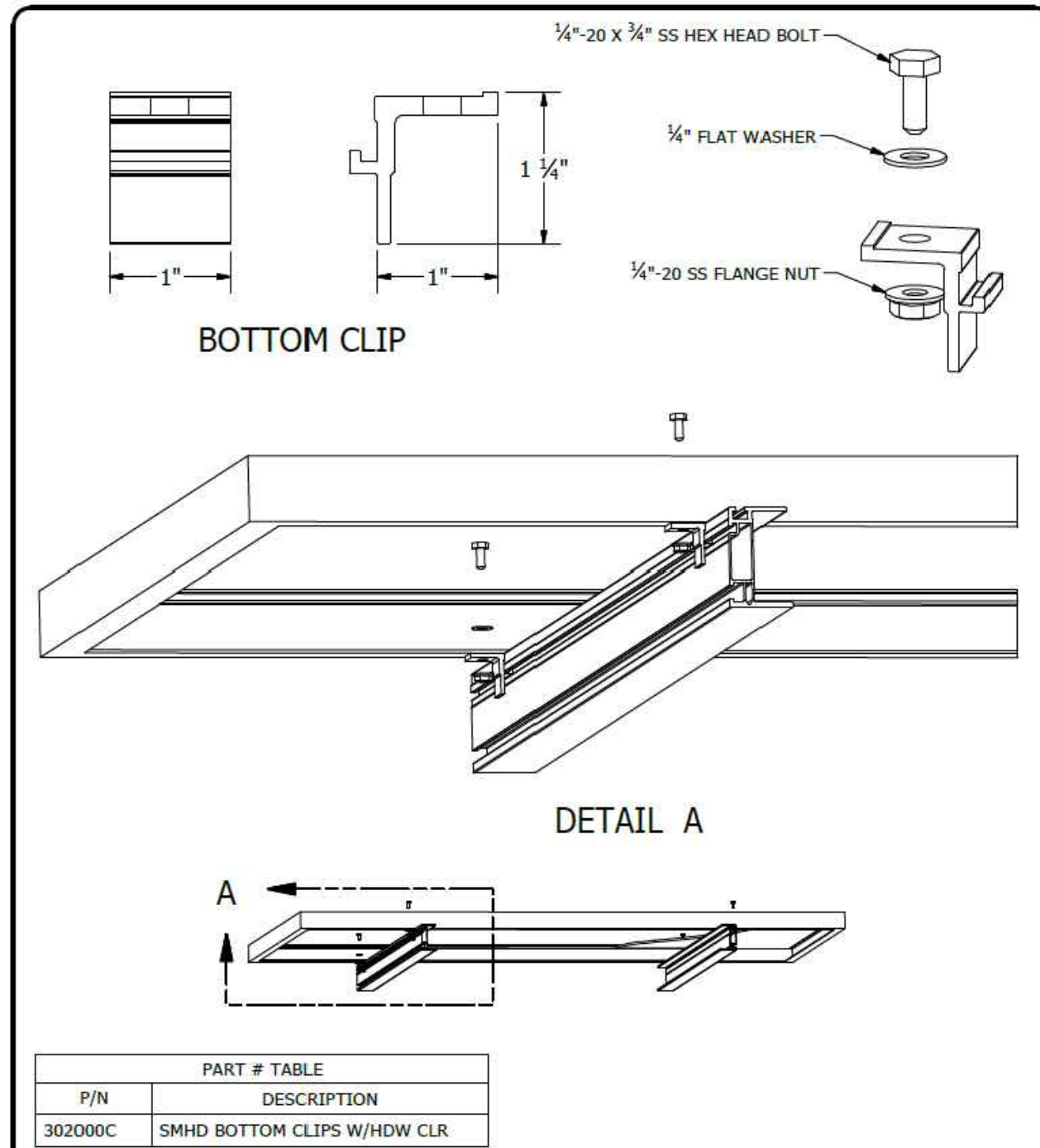
PROJECT NAME & ADDRESS

LAURA NILES  
209 NORTHWEST  
CIMARRON WAY, LAKE  
CITY,  
FL 32055

COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC



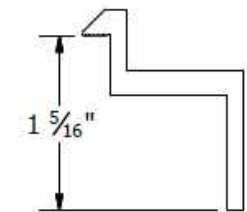
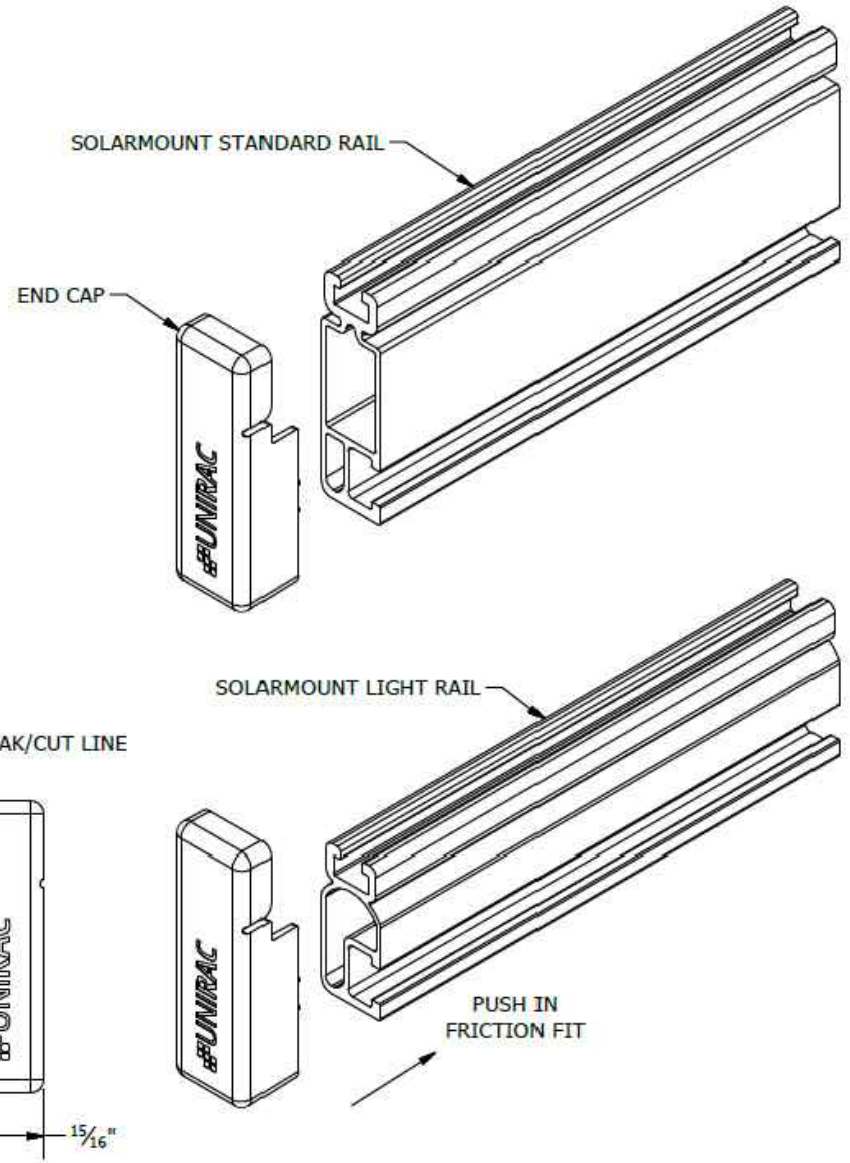
<p>1411 BROADWAY BLVD. NE ALBUQUERQUE, NM 87102 USA PHONE: 505.242.6411 WWW.UNIRAC.COM</p>	PRODUCT LINE: SOLARMOUNT HD	DRAWING NOT TO SCALE ALL DIMENSIONS ARE NOMINAL	SM-A10
	DRAWING TYPE: PART & ASSEMBLY		
DESCRIPTION: BOTTOM CLIP	REVISION DATE: 9/27/2017	SHEET	

<p>1411 BROADWAY BLVD. NE ALBUQUERQUE, NM 87102 USA PHONE: 505.242.6411 WWW.UNIRAC.COM</p>	PRODUCT LINE: SOLARMOUNT	DRAWING NOT TO SCALE ALL DIMENSIONS ARE NOMINAL	SM-P01
	DRAWING TYPE: PART DETAIL		
DESCRIPTION: STANDARD RAIL	REVISION DATE: 9/11/2017	SHEET	

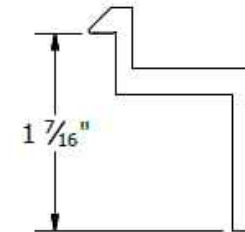
SHEET TITLE <b>RESOURCE DOCUMENT</b>	
DRAWN DATE	1/9/2023
DRAWN BY	VG
SHEET NUMBER <b>R-007</b>	

**NOTES:**

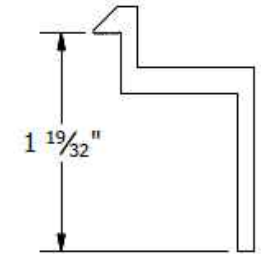
1. END CAP INCLUDED WITH EVERY END CLAMP.
2. END CAP FITS SOLARMOUNT LIGHT AND STANDARD RAIL PROFILES.



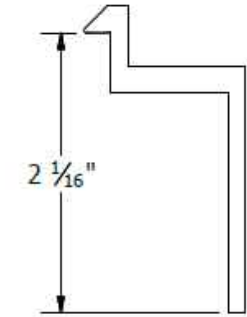
**B CLAMP**  
30mm to 32mm Module Thickness  
(1.18" to 1.26")



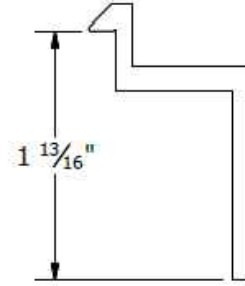
**C CLAMP**  
33mm to 36mm Module Thickness  
(1.30" to 1.42")



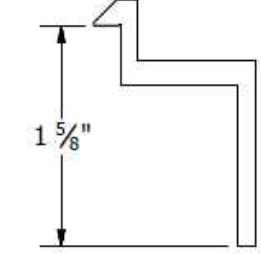
**D CLAMP**  
38mm to 40mm Module Thickness  
(1.50" to 1.57")



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

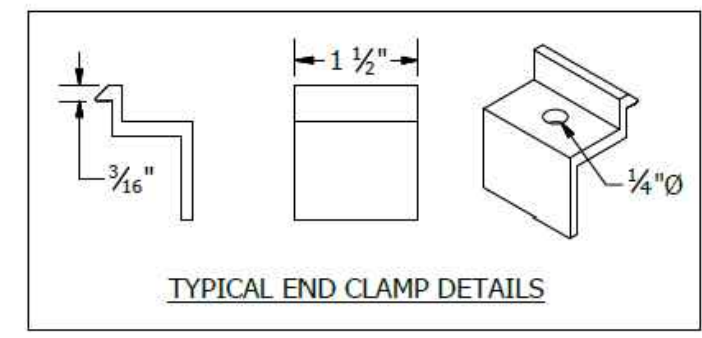


**F CLAMP**  
45mm to 47mm Module Thickness  
(1.77" to 1.85")



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

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



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

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DETAIL
DESCRIPTION:	END 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

**CONTRACTOR**



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

PROJECT NAME & ADDRESS

LAURA NILES  
**209 NORTHWEST  
CIMARRON WAY, LAKE  
CITY,  
FL 32055**  
COUNTY:-COLUMBIA COUNTY

SYSTEM SIZE

DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC

SHEET TITLE

**RESOURCE  
DOCUMENT**

DRAWN DATE	1/9/2023
DRAWN BY	VG

SHEET NUMBER

**R-008**

CONTRACTOR



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

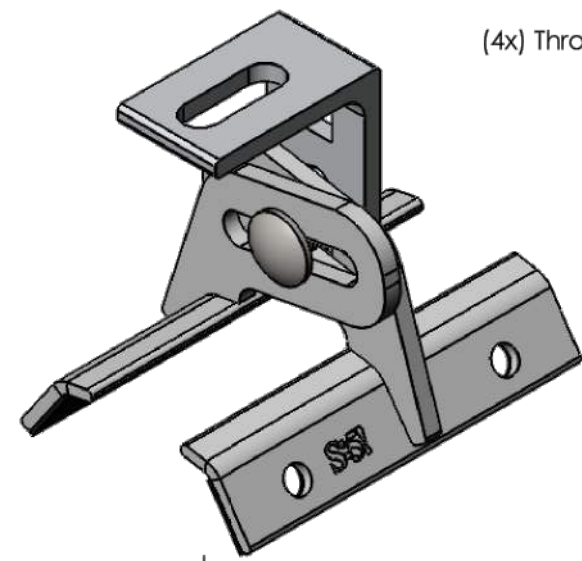
PROJECT NAME & ADDRESS

LAURA NILES  
**209 NORTHWEST  
CIMARRON WAY, LAKE  
CITY,  
FL 32055**

COUNTY:-COLUMBIA COUNTY

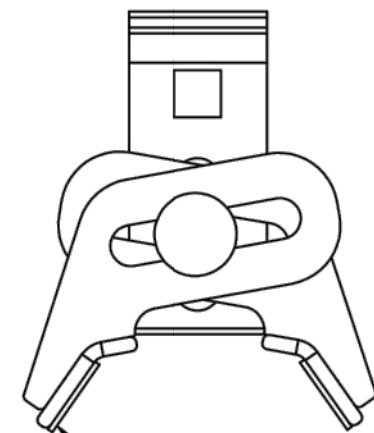
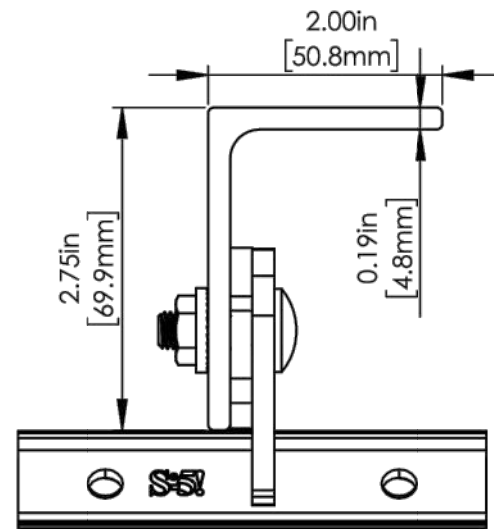
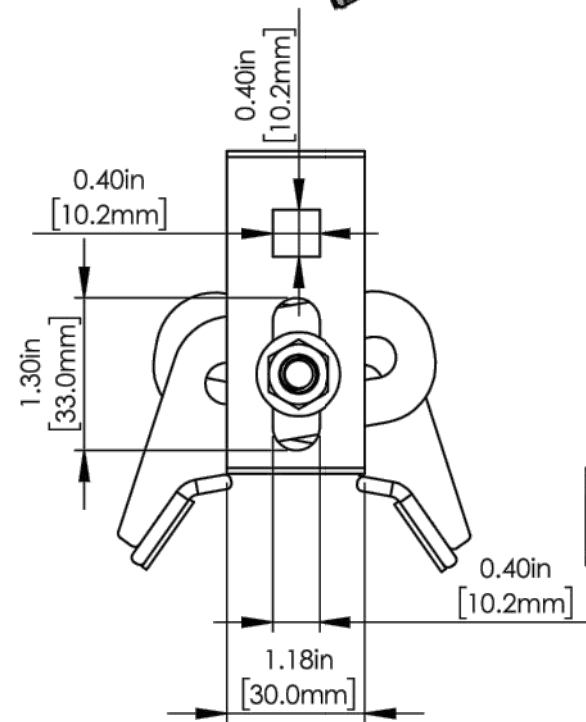
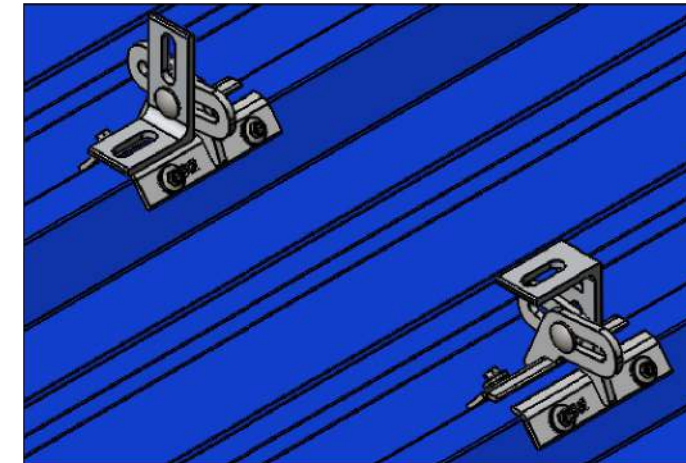
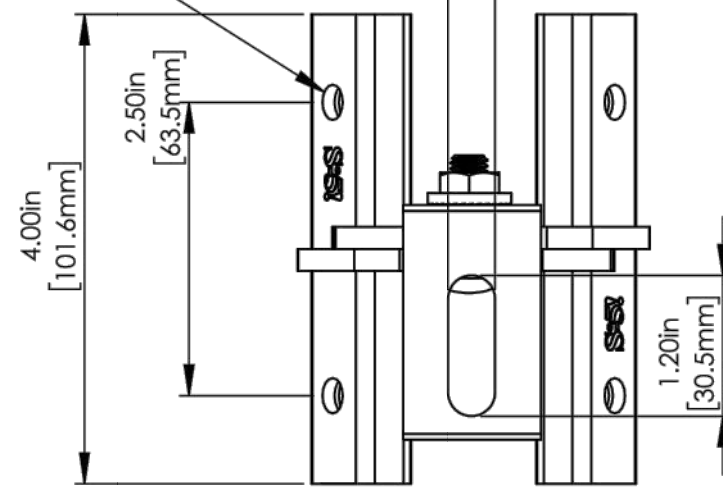
SYSTEM SIZE

DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC



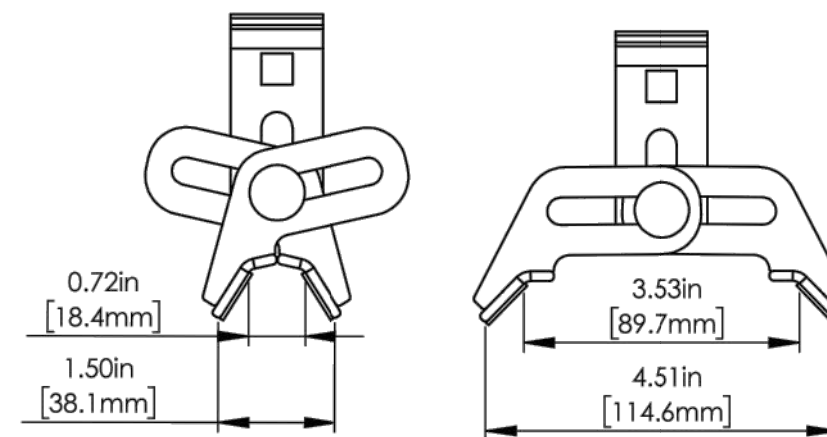
(4x) Through hole for fasteners

0.40in  
[10.2mm]



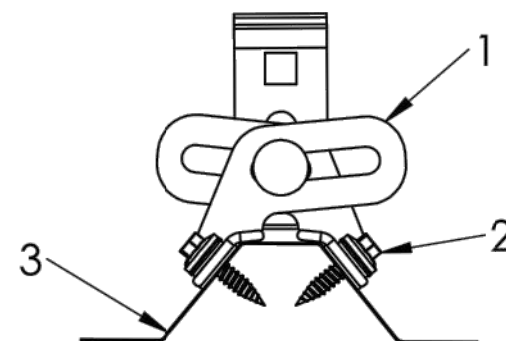
(2x) Factory applied EPDM with sticky adhesive

MIN and MAX Range



General Notes:

1. ProteaBracket
2. 1" Self Tapping Screw
3. Example Rib Roof



**FOR STANDING SEAM SPECIFIC MECHANICAL LOAD TEST INFORMATION AND CLAMP INSTALLATION INFORMATION PLEASE VISIT: WWW.S-5.COM**

MATERIAL: 6061 T6 AL				METAL ROOF INNOVATIONS, LTD. 8750 WALKER RD COLORADO SPRINGS, CO 80908 719-495-0518 719-495-0045(FAX)		
EST ASSEMBLY WEIGHT 179.2 g				TITLE ProteaBracket [CCD]		
SUPPLIED HARDWARE: (4x) 1" Self Tapping Screw	DRAWING NO. PB6-A-0-A_BLF10-A-0-A			DRAWN BY JW	DATE 5/20/2019	
SCALE: 1:2	WEIGHTS: 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.					

SHEET TITLE  
**RESOURCE  
DOCUMENT**

DRAWN DATE 1/9/2023

DRAWN BY VG

SHEET NUMBER

**R-009**

## Enphase IQ System Controller 2

The **Enphase IQ System Controller 2** connects the home to grid power, the IQ Battery system, and solar PV. It provides microgrid interconnection device (MID) functionality by automatically detecting and seamlessly transitioning the home energy system from grid power to backup power in the event of a grid failure. It consolidates interconnection equipment into a single enclosure and streamlines grid independent capabilities of PV and storage installations by providing a consistent, pre-wired solution for residential applications.

### Reliable

- Durable NEMA type 3R enclosure
- Ten-year limited warranty

### Smart

- Controls safe connectivity to the grid
- Automatically detects grid outages
- Provides seamless transition to backup

### Simple

- Connects to the load or service equipment<sup>1</sup> side of the main load panel
- Centered mounting brackets support single stud mounting
- Supports conduit entry from the bottom, bottom left side, and bottom right side
- Supports whole home and partial home backup and subpanel backup
- Up to 200A main breaker support
- Includes neutral-forming transformer for split phase 120/240V backup operation
- IQ System Controller supports backward compatibility with older generation of PV microinverters (M215, M250 and S series), making it simple for home owners to upgrade their systems
- Easy integration with generator from major manufacturers

1. IQ System Controller 2 is not suitable for use as service equipment in Canada.

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



## Enphase IQ System Controller 2

### MODEL NUMBER

EP200G101-M240US01	Enphase IQ System Controller 2 with neutral-forming transformer (NFT), Microgrid Interconnect Device (MID), breakers, and screws. Streamlines grid-independent capabilities of PV and battery installations.
--------------------	--

### ACCESSORIES and REPLACEMENT PARTS

EP200G-NA-XA-E3	Replacement IQ System Controller 2 printed circuit board
EP200G-NA-HD-200A	Eaton type BR circuit breaker hold-down screw kit, BRHDK125
CT-200-SPLIT	200 A split core current transformers for Generator metering (+/- 2.5%)
Circuit breakers (as needed) <sup>2,3</sup>	Not included, must order separately:
• BRK-100A-2P-240V: Main breaker, 2 pole, 100A, 25kAIC, CSR2100	• BRK-20A-2P-240V-B: Circuit breaker, 2 pole, 20A, 10kAIC, BR220B
• BRK-125A-2P-240V: Main breaker, 2 pole, 125A, 25kAIC, CSR2125N	• BRK-30A-2P-240V: Circuit breaker, 2 pole, 30A, 10kAIC, BR230B
• BRK-150A-2P-240V: Main breaker, 2 pole, 150A, 25kAIC, CSR2150N	• BRK-40A-2P-240V: Circuit breaker, 2 pole, 40A, 10kAIC, BR240B
• BRK-175A-2P-240V: Main breaker, 2 pole, 175A, 25kAIC, CSR2175N	• BRK-60A-2P-240V: Circuit breaker, 2 pole, 60A, 10kAIC, BR260
• BRK-200A-2P-240V: Main breaker, 2 pole, 200A, 25kAIC, CSR2200N	• BRK-80A-2P-240V: Circuit breaker, 2 pole, 80A, 10kAIC, BR280
EP200G-HNDL-R1	IQ System Controller 2 installation handle kit (order separately)
EP200G-LITKIT	IQ System Controller 2 literature kit, including labels, feed-through headers, screws, filler plates, and QIG
BRK-20A40A-2P-240V	2 pole, 20A/40A, 10kAIC, BQC220240

### ELECTRICAL SPECIFICATIONS

Assembly rating	Continuous operation at 100% of its rating
Nominal voltage / range (L-L)	240 VAC / 100 - 310 VAC
Voltage measurement accuracy	±1% V nominal (±1.2V L-N and ±2.4V L-L)
Auxiliary contact for load control, excess PV control, and generator two-wire control	24V, 1A
Nominal frequency / range	60 Hz / 56 - 63 Hz
Frequency measurement accuracy	±0.1 Hz
Maximum continuous current rating	160A
Maximum input overcurrent protection device	200A
Maximum output overcurrent protection device	200A
Maximum overcurrent protection device rating for Generator circuit <sup>4</sup>	80A
Maximum overcurrent protection device rating for storage branch circuit <sup>4</sup> (the storage branch circuit can be replaced with PV)	80A
Maximum overcurrent protection device rating for IQB PV combiner branch circuit <sup>4</sup>	80A
Neutral Forming Transformer (NFT)	<ul style="list-style-type: none"> <li>• Breaker rating (pre-installed): 40A between L1 and Neutral; 40A between L2 and Neutral</li> <li>• Continuous rated power: 3600VA</li> <li>• Maximum continuous unbalance current: 30A @ 120V</li> <li>• Peak rated power: 8800VA for 30 seconds</li> <li>• Peak unbalanced current: 80A @ 120V for 30 seconds</li> </ul>

### MECHANICAL DATA

Dimensions (WxHxD)	50cm x 91.6cm x 24.6cm (19.7 in x 36 in x 9.7 in)
Weight	39.4 kg (87 lbs)
Ambient temperature range	-40° C to +50° C (-40° F to 122° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NEMA type 3R, polycarbonate construction
Altitude	To 2500 meters (8200 feet)

### WIRE SIZES

Connections (All lugs are rated to 90C)	<ul style="list-style-type: none"> <li>• Main lugs and backup load lugs</li> <li>• CSR breaker bottom wiring lugs</li> <li>• BR breakers (wire provided)</li> <li>• AC combiner lugs, Encharge lugs, and generator lugs</li> <li>• Neutral (large lugs)</li> </ul>	<ul style="list-style-type: none"> <li>Cu/Al: 1 AWG - 300 KCMIL</li> <li>Cu/Al: 2 AWG - 300 KCMIL</li> <li>6 AWG</li> <li>14 AWG - 2 AWG</li> <li>Cu/Al: 6 AWG - 300 KCMIL</li> </ul>
Neutral and ground bars	<ul style="list-style-type: none"> <li>Large holes (5/16-24 UNF)</li> <li>Small holes (10-32 UNF)</li> </ul>	<ul style="list-style-type: none"> <li>14 AWG - 1/0 AWG</li> <li>14 AWG - 6 AWG</li> </ul>

### COMPLIANCE

Compliance	UL 1741, UL 1741 SA, UL 1741 PCS, UL1998, UL869A <sup>5</sup> , UL67 <sup>5</sup> , UL508 <sup>5</sup> , UL50E <sup>5</sup> , CSA 22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003, AC156. IQ System Controller 2 is approved for Use as Service Equipment in the United States <sup>5</sup> .
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2. Compatible with BRHDK125 Hold-Down Kit to comply with 2017 NEC 710.15E for back-fed circuit breakers.  
3. The IQ System Controller 2 is rated 22 kAIC.  
4. Not included. Installer must provide properly rated breaker per circuit breaker list above.  
5. Sections from these standards were used during the safety evaluation and included in the UL 1741 listing.

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

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## CONTRACTOR



22171 MCH RD  
MANDEVILLE, LA 70471  
PHONE: 9152011490

### PROJECT NAME & ADDRESS

LAURA NILES  
**209 NORTHWEST  
CIMARRON WAY, LAKE  
CITY,  
FL 32055**  
COUNTY: -COLUMBIA COUNTY

### SYSTEM SIZE

DC SIZE: 14.615 KW DC-(STC)  
AC SIZE: 10.730 KW AC

## SHEET TITLE RESOURCE DOCUMENT

DRAWN DATE	1/9/2023
DRAWN BY	VG

SHEET NUMBER  
**R-010**

## Enphase IQ Battery 10T

The **Enphase IQ Battery 10T** all-in-one AC-coupled storage system is **reliable, smart, simple, and safe**. It is comprised of three base IQ Battery 3T storage units, has a total usable energy capacity of 10.08 kWh and twelve embedded grid-forming microinverters with 3.84 kW power rating. It provides backup capability and installers can quickly design the right system size to meet the needs of both new and retrofit solar customers.

### Reliable

- Proven high reliability IQ series microinverters
- Ten-years limited warranty, extendable to 15 years<sup>1</sup>
- Three independent IQ Battery base units
- Twelve embedded IQ8X-BAT microinverters
- Passive cooling (no moving parts/fans)

### Smart

- Grid-forming capability for backup operation
- Remote software and firmware upgrade
- Mobile app-based monitoring and control
- Support for self consumption
- Utility time of use (TOU) optimization

### Simple

- Fully integrated AC battery system
- Quick and easy plug-and-play installation
- Interconnects with standard household AC wiring

### Safe

- Safety tested battery cells and module
- Lithium iron phosphate (LFP) chemistry for maximum safety and longevity



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



## Enphase IQ Battery 10T

MODEL NUMBER	
ENCHARGE-10T-1P-NA	IQ Battery 10T Battery storage system with integrated Enphase IQ series microinverters and battery management unit (BMU). Includes: - Three IQ Battery 3T base units (B03-T01-US00-1-3) - One IQ Battery 10T cover kit with cover, wall mounting bracket, and interconnect cable for wiring between batteries (B10T-C-1290-0)
OUTPUT (AC) @ 240 VAC <sup>2</sup>	
Rated (continuous) output power	3.84 kVA
Peak output power	5.76 kVA (10 seconds)
Nominal voltage / range	240 / 211 – 264 VAC
Nominal frequency / range	60 / 57 – 63 Hz
Rated output current	16 A
Peak output current	24.6A (10 seconds)
Power factor (adjustable)	0.85 leading ... 0.85 lagging
Maximum units per 20 A branch circuit	1 unit (single phase)
Interconnection	Single-phase
Maximum AC short circuit fault current over 3 cycles	69.6 Arms
Round trip efficiency <sup>3</sup>	89%
BATTERY	
Total capacity	10.5 kWh
Usable capacity	10.08 kWh
Round trip efficiency	96%
Nominal DC voltage	67.2 V
Maximum DC voltage	75.6 V
Ambient operating temperature range	-15° C to 55° C (5° F to 131° F) non-condensing
Optimum operating temperature range	0° C to 30° C (32° F to 86° F)
Chemistry	Lithium iron phosphate (LFP)
MECHANICAL DATA	
Dimensions (WxHxD)	1283 x 775 x 188 mm (50.5 x 30.5 x 7.4 in)
Weight	Three individual 40.5 kg (89.3 lbs) base units plus 22.1 kg (48.7 lbs) cover and mounting bracket; total 143.6 kg (316.5 lbs)
Enclosure	Outdoor – NEMA type 3R
IQ8X-BAT microinverter enclosure	NEMA type 6
Cooling	Natural convection – No fans
Altitude	Up to 2500 meters (8200 feet)
Mounting	Wall mount
FEATURES AND COMPLIANCE	
Compatibility	Compatible with grid-tied PV systems. Compatible with Enphase M215/M250 and IQ Series Micros, Enphase IQ System Controller, and Enphase IQ Gateway for backup operation.
Communication	Wireless 2.4 GHz
Services	Backup, self-consumption, TOU, Demand Charge, NEM Integrity
Monitoring	Enphase Installer Platform monitoring options; API integration
Compliance	UL9540, UL9540A <sup>4</sup> , UN 38.3, UL 1998, UL 991, NEMA Type 3R, AC156 EMI: 47 CFR, Part 15, Class B, ICES 003 Cell Module: UL 1973, UN 38.3 Inverters: UL 62109-1, IEC 62109-2, UL 1741SA, CAN/CSA C22.2 No. 107.1-16, and IEEE 1547
LIMITED WARRANTY	
Limited Warranty	>70% capacity, up to 10 years or 4000 cycles <sup>5</sup> , extendable to 15 years <sup>1</sup>

1. Terms and conditions apply.
2. Supported in both grid-connected and backup operation.
3. AC to Battery to AC at 50% power rating.
4. When installed with Wall Mount SKUs (B10T-AWM-1280-0 & B10T-MWM-1280-0). See IQ Battery 3T/10T Installation Guide for details.
5. Whichever occurs first. Restrictions apply.

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

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### SHEET TITLE RESOURCE DOCUMENT

DRAWN DATE 1/9/2023

DRAWN BY VG

### SHEET NUMBER

R-011



**Enphase P/N: EP200G-NA-02-RSD**  
**IMO P/N: SI16-PEL64R-2-ENP**



**Key Features**

- Enclosed Solar Isolator
- 600VDC, 16A
- IP66 / NEMA 4X Protection Rating
- 2 Pole, 1 String
- Grey/Black Enclosure Cover & Handle

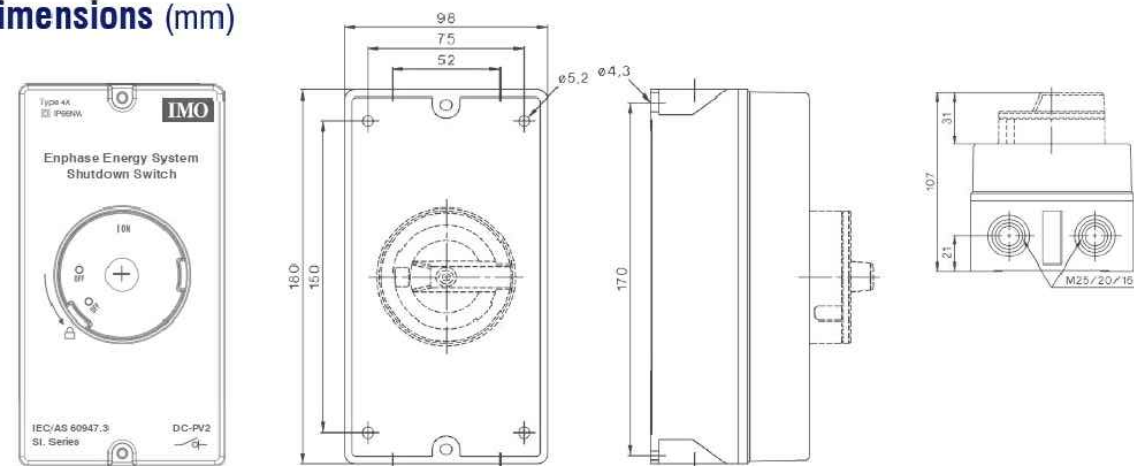


**Technical Data for DC**

Main Contacts	DC	Units	SI16 DC-PV1 (acc. to IEC 60947-3)	SI16 (acc. to UL508i)
Rated Thermal Current $I_{th}$		A		16
Rated Insulation Voltage $U_i^{(1)}$		V		1000
Rated Insulation Voltage $U_i^{(2)}$		V		1500
Distance of Contacts (per pole)		mm		8
Rated Operational Current $I_{op}$	300V	A	16	16
	350V	A	16	16
	400V	A	16	16
	500V	A	16	16
	600V	A	16	16
Rated Conditional Short Circuit Current		kA <sub>as</sub>		5
Max. Fuse Size	gL (pG)	A		40
Mechanical Life		Ops		10,000
Rated Short-time Withstand Current (1s) $I_{st}$		A		800
Short Circuit Making Capacity $I_{sc}$		A		800
Size of Terminal Screw				M4 Pz2
Cable Cross Sections (solid or stranded)		mm / AWG		4 - 16 / 12-10
Tightening Torque		Nm / lb.in		1.7 - 1.8 / 9 - 16
Maximum Operation Ambient Temperature		°C		-40 to +45
Maximum Storage Ambient Temperature		°C		-50 to +90
Power Loss at $I_{max}$		(A) / W		(16) / 1

Contact Resistance per pole 1.75mΩ  
 1) Suitable at overvoltage category I to III, pollution degree 3 (standard industry); Uimp = 8kV.  
 2) Suitable at overvoltage category I to III, pollution degree 2 (min. PFS); Uimp = 8kV.

**Dimensions (mm)**



**CONTRACTOR**



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DRAWN DATE 1/9/2023  
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**R-0012**