

# PHOTOVOLTAIC ROOF MOUNT SYSTEM

20 MODULES-ROOF MOUNTED - 7.900 KW DC, 6.000 KW AC

876 HERITAGE WAY, CAMERON, NC 28326



TOP TIER SOLAR SOLUTIONS

1530 CENTER PARK DR #2911,  
CHARLOTTE, NC 28217,  
UNITED STATES

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	04/06/23	



Wyssling Consulting, PLLC  
76 N Meadowbrook Drive Alpine UT 84004  
North Carolina CDA # P-2308  
Signed 4/06/2023

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## PROJECT DATA

PROJECT ADDRESS: 876 HERITAGE WAY, CAMERON, NC 28326  
OWNER: SAULO RODRIGUEZ RAMIREZ  
DESIGNER: ESR

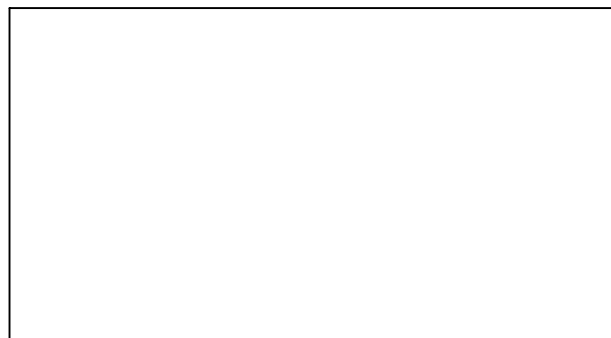
SCOPE: 7.900 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 20 MISSION SOLAR: MSE395SX9R 395W PV MODULES WITH 20 SOLAREEDGE: S440 POWER OPTIMIZERS AND 01 SOLAREEDGE: SE6000H-US (240V) INVERTER

AUTHORITIES HAVING JURISDICTION:  
BUILDING: HARNETT COUNTY  
ZONING: HARNETT COUNTY  
UTILITY: CENTRAL EMC

## 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
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- PV-10+ EQUIPMENT SPECIFICATIONS

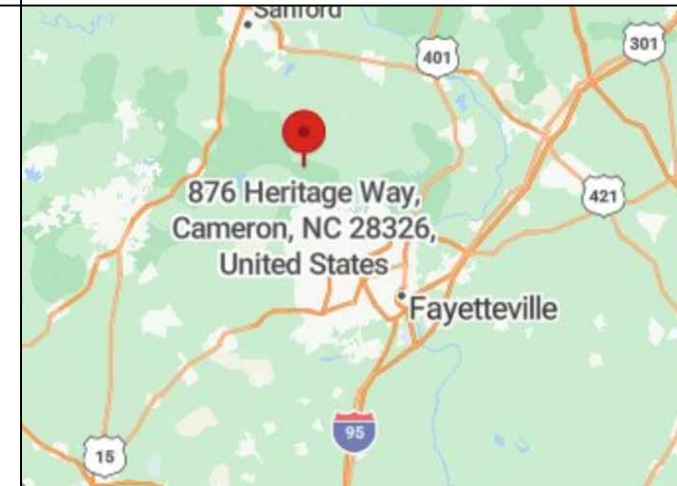
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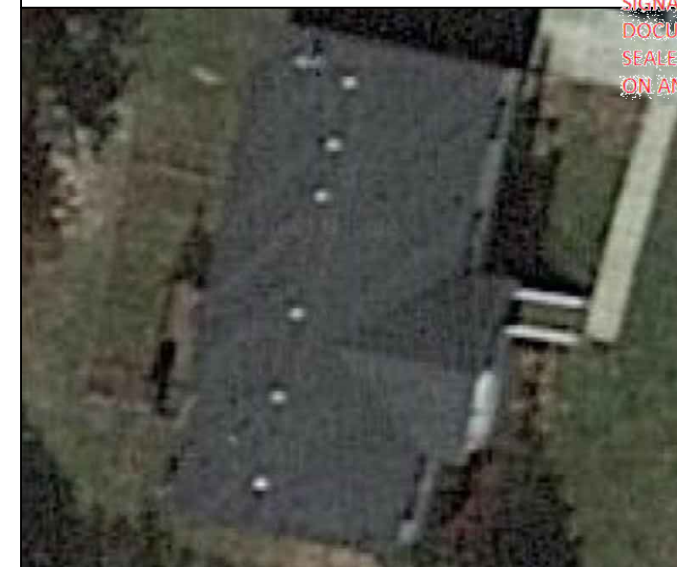
## GENERAL NOTES

- 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 CEC 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 SINAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SINAGE 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.

## VICINITY MAP

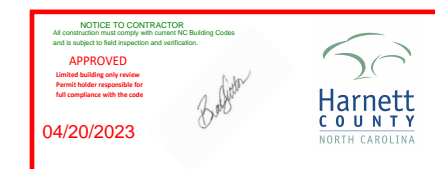


## HOUSE PHOTO



## CODE REFERENCES

2018 NORTH CAROLINA BUILDING CODE  
2018 NORTH CAROLINA RESIDENTIAL CODE  
2018 NORTH CAROLINA FIRE CODE  
2017 NATIONAL ELECTRICAL CODE



PROJECT NAME & ADDRESS  
**SAULO RODRIGUEZ RAMIREZ RESIDENCE**  
876 HERITAGE WAY,  
CAMERON, NC 28326

DRAWN BY  
**ESR**

SHEET NAME  
**COVER SHEET**

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

SHEET NUMBER  
**PV-1**

# PROJECT DESCRIPTION:

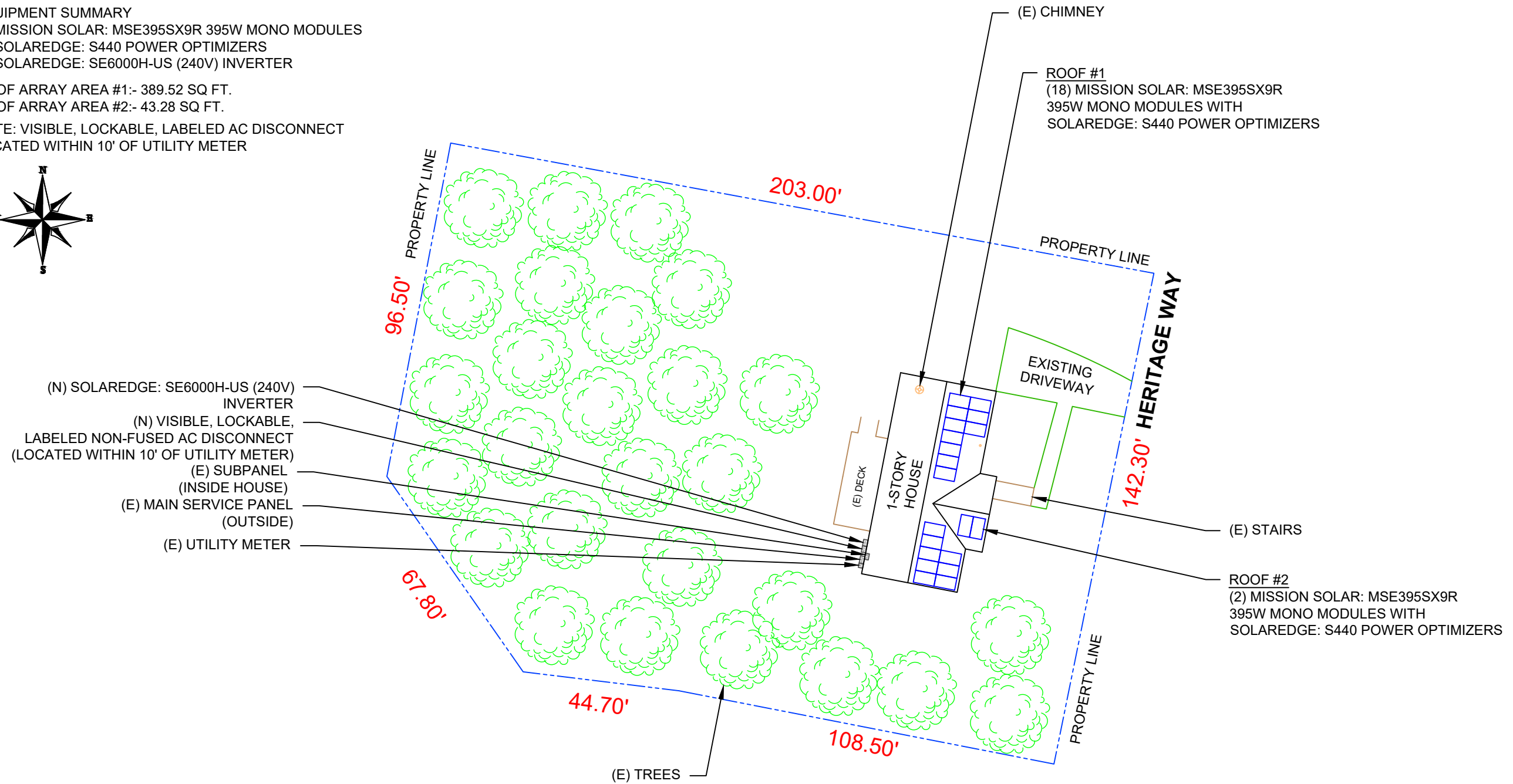
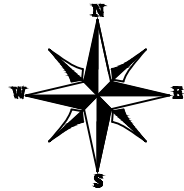
20 X MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES  
 DC SYSTEM SIZE: 7.900KW DC  
 AC SYSTEM SIZE: 6.000KW AC

## EQUIPMENT SUMMARY

20 MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 20 SOLAREEDGE: S440 POWER OPTIMIZERS  
 01 SOLAREEDGE: SE6000H-US (240V) INVERTER

ROOF ARRAY AREA #1:- 389.52 SQ FT.  
 ROOF ARRAY AREA #2:- 43.28 SQ FT.

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



- (N) SOLAREEDGE: SE6000H-US (240V) INVERTER
- (N) VISIBLE, LOCKABLE, LABELED NON-FUSED AC DISCONNECT (LOCATED WITHIN 10' OF UTILITY METER)
- (E) SUBPANEL (INSIDE HOUSE)
- (E) MAIN SERVICE PANEL (OUTSIDE)
- (E) UTILITY METER



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SHEET NAME  
**SITE PLAN**

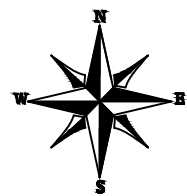
SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-2**

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

# MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 20 MODULES  
 MODULE TYPE = MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 MODULE WEIGHT = 48.5 LBS / 22.0KG.  
 MODULE DIMENSIONS = 75.08" x 41.50" = 21.64 SF



ROOF DESCRIPTION					
ROOF TYPE			ASPHALT SHINGLE		
ROOF LAYER			1 LAYER		
ROOF	# OF MODULES	ROOF PITCH	AZIMUTH	TRUSS SIZE	TRUSS SPACING
#1	18	18°	101°	2"X4"	24"
#2	2	18°	191°	2"X4"	24"

ARRAY AREA & ROOF AREA CALC'S		
TOTAL PV ARRAY AREA (SQ. FT.)	TOTAL ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
432.80	1680.43	26

**TOP TIER SOLAR SOLUTIONS**

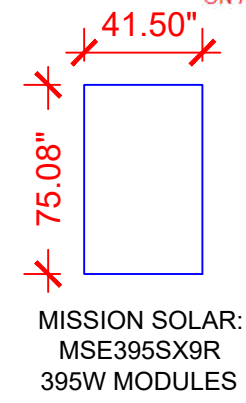
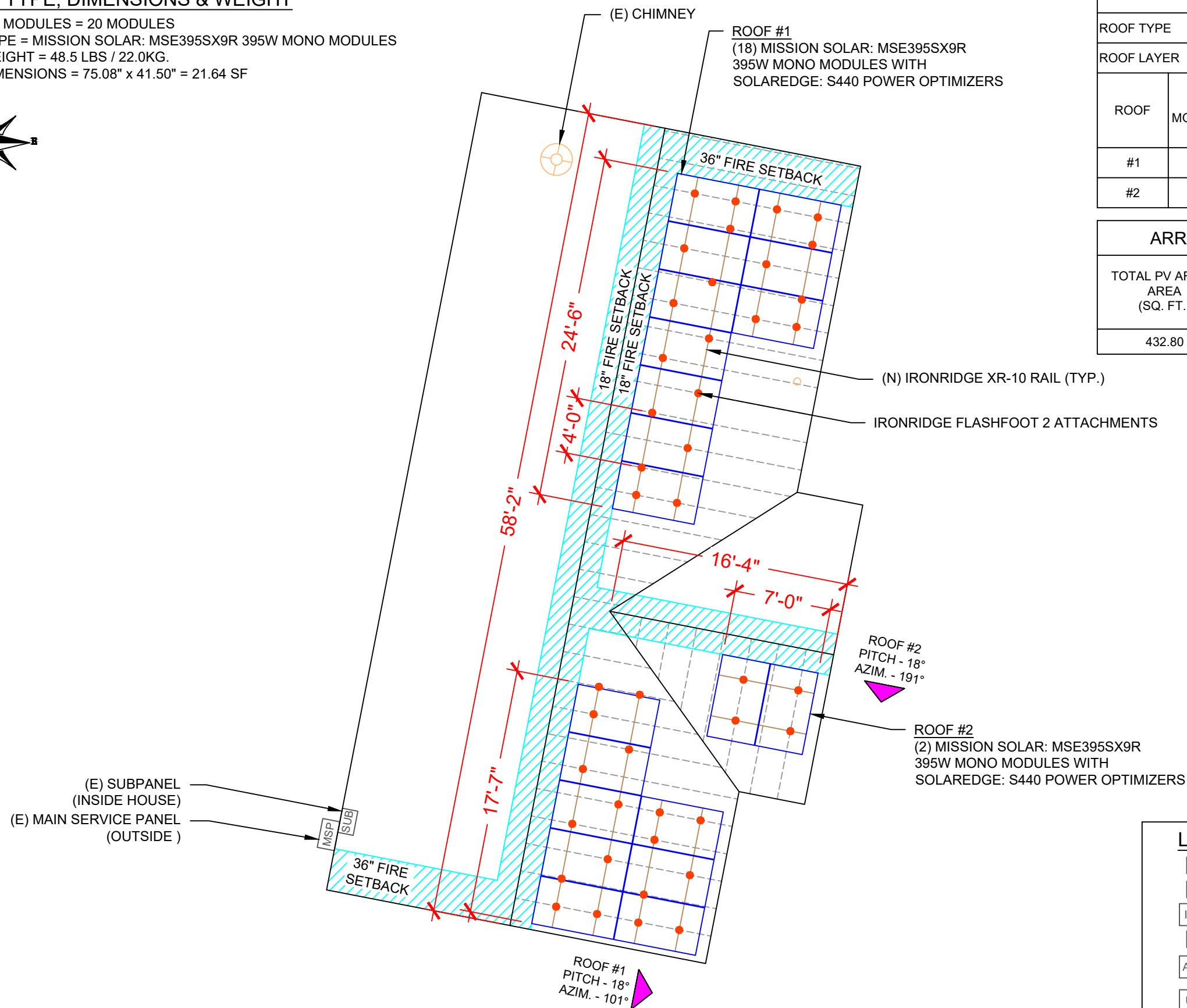
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LEGEND	
[JB]	- JUNCTION BOX
[SD]	- SOLADECK
[INV]	- INVERTER
[CB]	- COMBINER BOX
[ACD]	- AC DISCONNECT
[UM]	- UTILITY METER
[MSP]	- MAIN SERVICE PANEL
○	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
●	- ROOF ATTACHMENT
---	- TRUSS
---	- CONDUIT

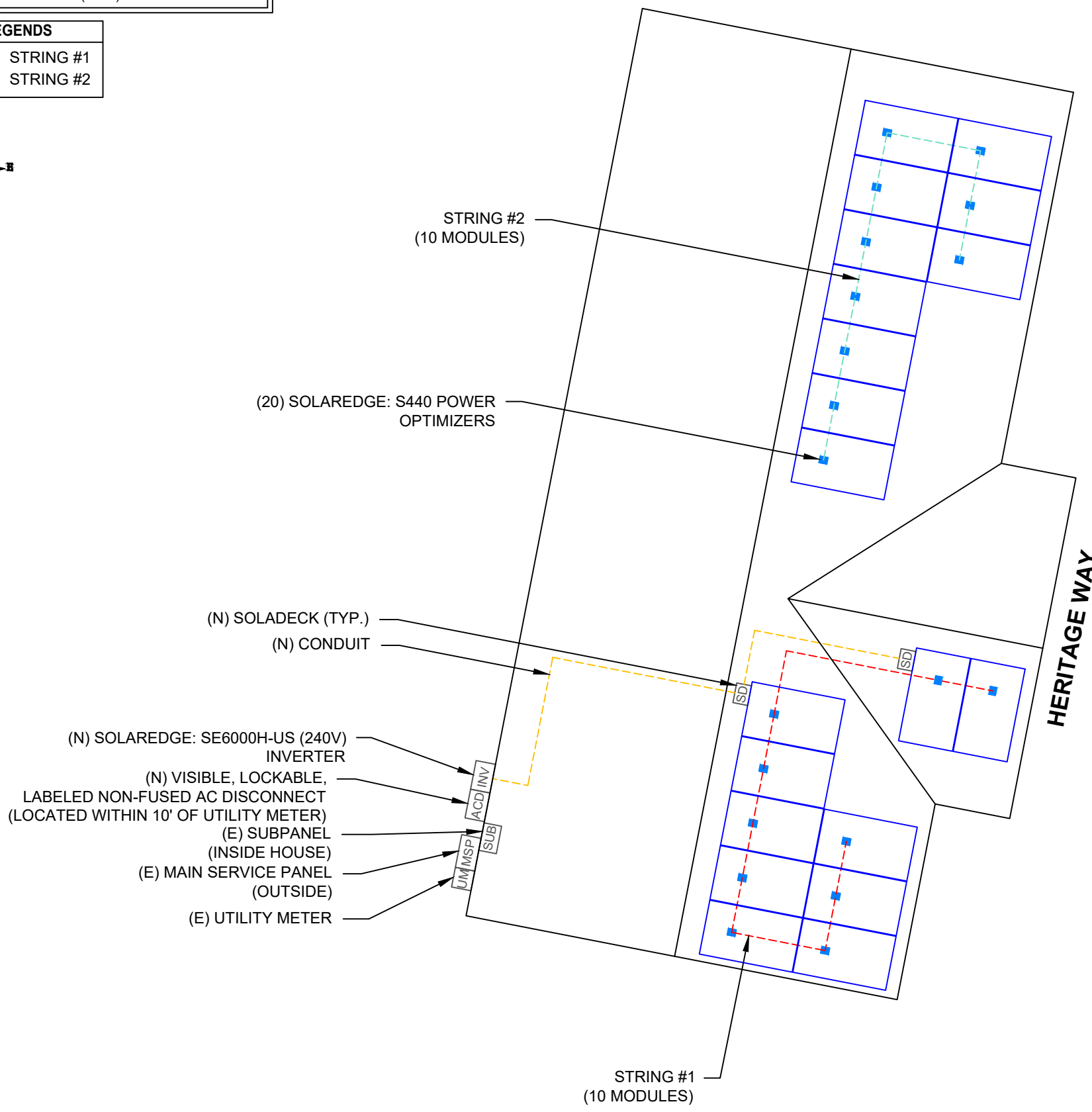
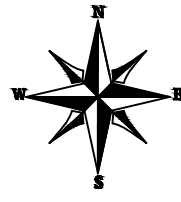
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DRAWN BY <b>ESR</b>
SHEET NAME <b>ROOF PLAN &amp; MODULES</b>
SHEET SIZE <b>ANSI B 11" X 17"</b>
SHEET NUMBER <b>PV-3</b>

DC SYSTEM SIZE: 7.900KW DC  
 AC SYSTEM SIZE: 6.000KW AC  
 (20) MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 WITH (20) SOLAREEDGE: S440 POWER OPTIMIZERS  
 LOCATED UNDER EACH PANEL AND  
 01 SOLAREEDGE: SE6000H-US (240V) INVERTER

**STRING LEGENDS**  
 - - - - - STRING #1  
 - - - - - STRING #2



BILL OF MATERIALS	
EQUIPMENT DESCRIPTION	QTY
SOLAR PV MODULES: MISSION SOLAR: MSE395SX9R 395W MODULE	20
OPTIMIZERS: SOLAREEDGE: S440 POWER OPTIMIZERS	20
INVERTER: SOLAREEDGE: SE6000H-US (240V) INVERTER	01
SOLADECKS	2
AC DISCONNECT: NON-FUSED AC DISCONNECT 60A , 240V NEMA 3R, UL LISTED	1
IRONRIDGE XR10 RAIL (RAIL 168" (14 FEET) BLACK) (XR-10-168B)	14
BONDED SPLICE, XR10 (XR10-BOSS-01-M1)	4
UNIVERSAL MODULE CLAMP, BLACK (UFO-CL-01-B1)	50
STOPPER SLEEVE, 40MM, BLACK (UFO-STP-40MM-B1)	20
GROUNDING LUG (XR-LUG-03-A1)	5
IRONRIDGE FLASHFOOT 2 ATTACHMENTS	45
SQUARE-BOLT BONDING HARDWARE (BHW-SQ-02-A1)	45

**TOP TIER**  
 SOLAR SOLUTIONS

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 RAMIREZ  
 RESIDENCE**

876 HERITAGE WAY,  
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**LEGEND**

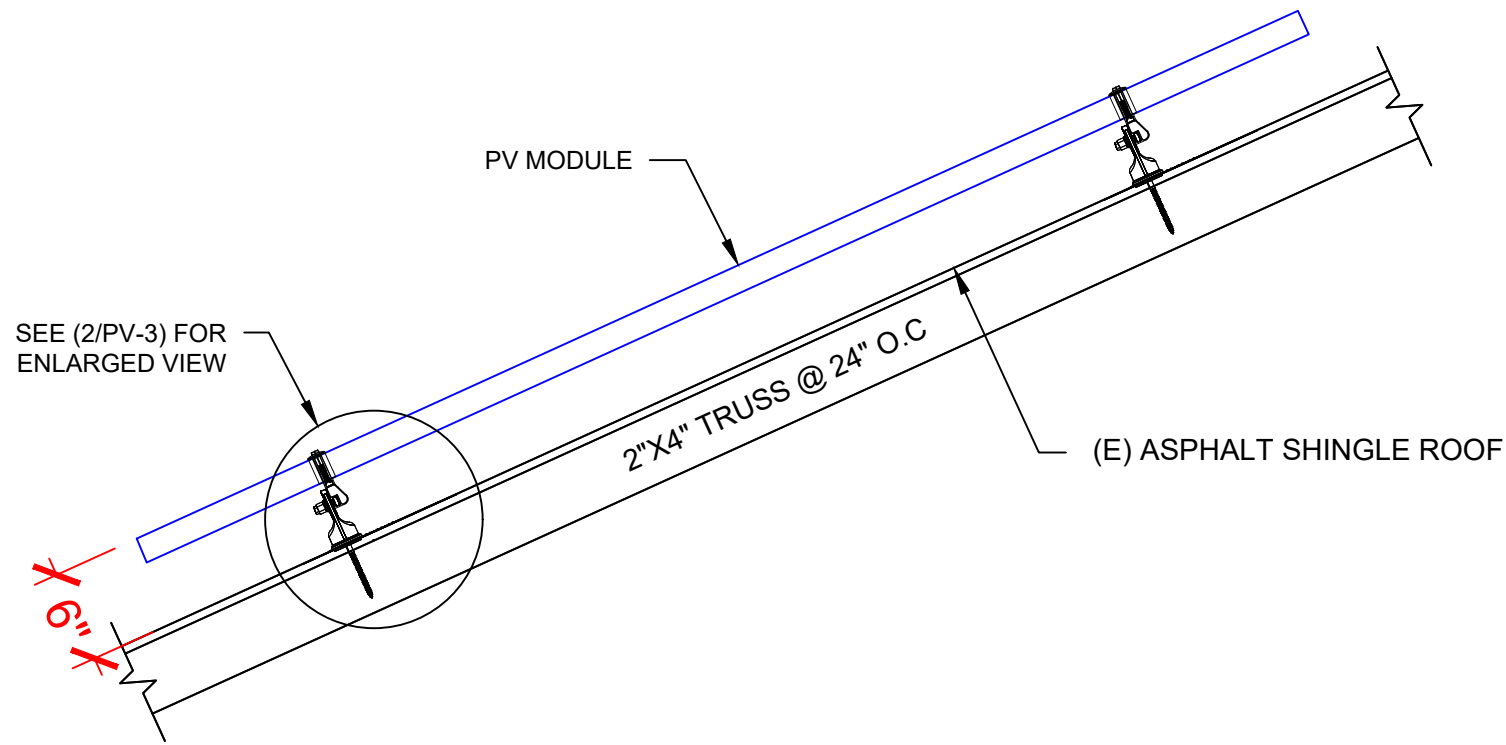
- [JB] - JUNCTION BOX
- [SD] - SOLADECK
- [INV] - INVERTER
- [CB] - COMBINER BOX
- [ACD] - AC DISCONNECT
- [UM] - UTILITY METER
- [MSP] - MAIN SERVICE PANEL
- [ ] - VENT, ATTIC FAN (ROOF OBSTRUCTION)
- - ROOF ATTACHMENT
- - - - - TRUSS
- - - - - CONDUIT

DRAWN BY  
**ESR**

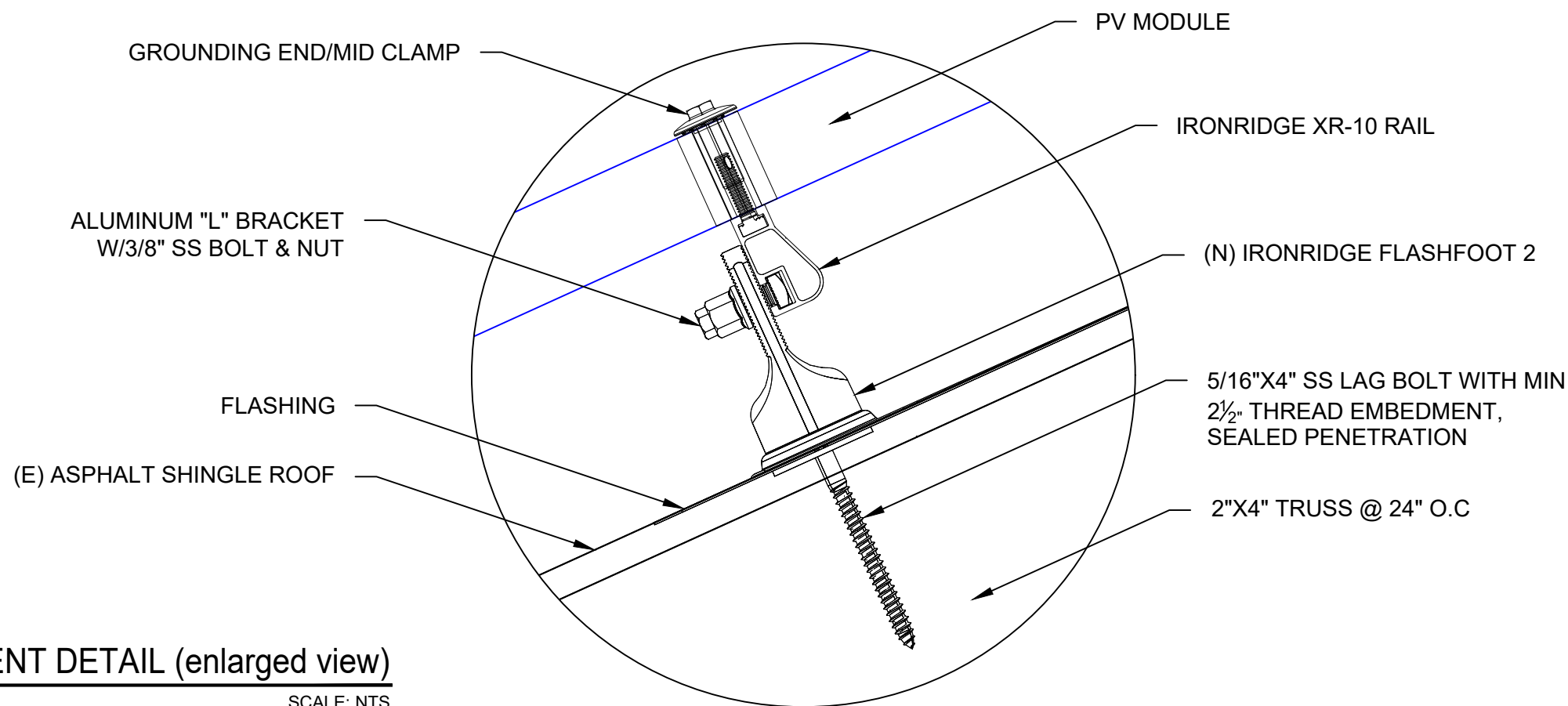
SHEET NAME  
**ELECTRICAL PLAN**

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

SHEET NUMBER  
**PV-4**



**1** | **STRUCTURAL ATTACHMENT (Side view)**  
 PV-5 | SCALE: N.T.S



**2** | **ATTACHMENT DETAIL (enlarged view)**  
 PV-5 | SCALE: NTS



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SHEET NAME  
**STRUCTURAL DETAIL**

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

SHEET NUMBER  
**PV-5**

DC SYSTEM SIZE: 7.900KW DC  
AC SYSTEM SIZE: 6.000KW AC

(20) MISSION SOLAR: MSE395SX9R 395W MONO MODULES WITH (20) SOLAREDEGE: S440 POWER OPTIMIZERS LOCATED UNDER EACH PANEL (240V) AND (01) SOLAREDEGE: SE6000H-US (240V) INVERTER LOCATED UNDER EACH PANEL (240V)  
(2) STRINGS OF 10 MODULES ARE CONNECTED IN SERIES

**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:**

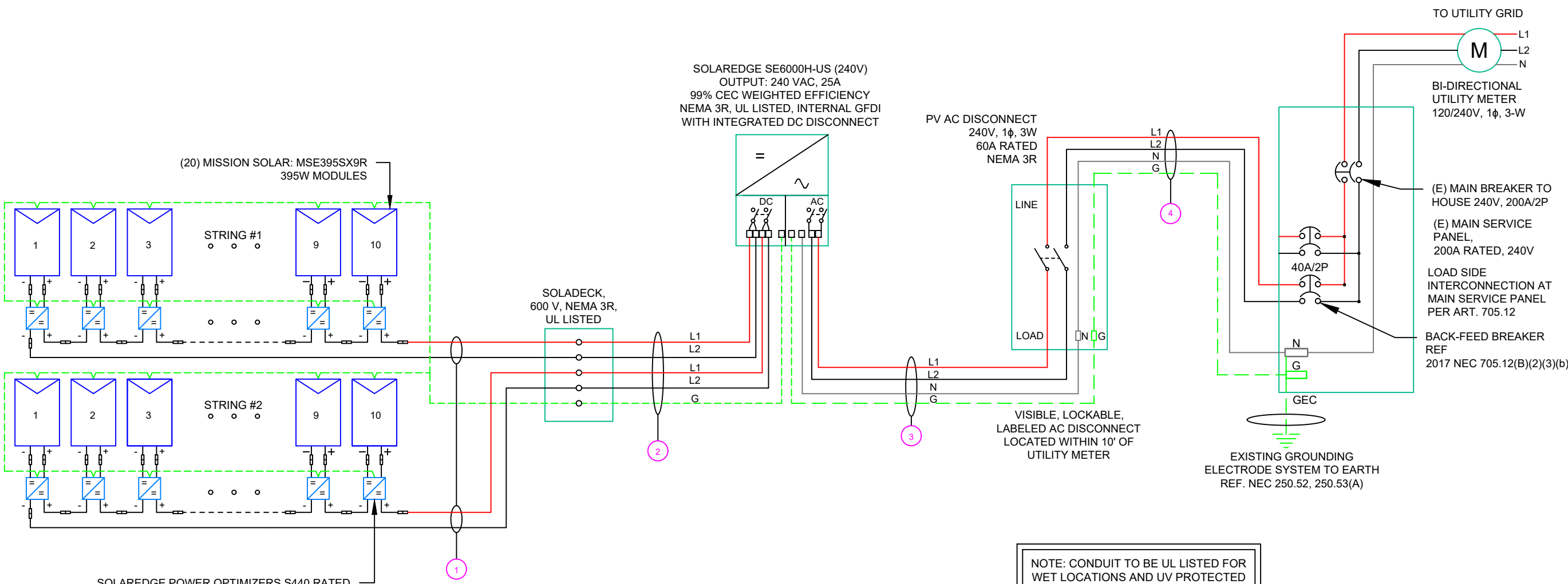
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3.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

**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 - SOLADECK 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.

**RACKING NOTE:**

1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER



NOTE: CONDUIT TO BE UL LISTED FOR WET LOCATIONS AND UV PROTECTED

QTY	CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
① (4)	#10AWG -	PV WIRE/USE-2	N/A	N/A
(1)	#6AWG -	BARE COPPER IN FREE AIR		
② (4)	#10AWG -	CU, THWN-2	EMT OR LFMC IN ATTIC	3/4"
(1)	#10AWG -	CU, THWN-2 GND		
③ (2)	#8AWG -	CU, THWN-2	EMT, LFMC OR PVC	3/4"
(1)	#8AWG -	CU, THWN-2 N		
(1)	#10AWG -	CU, THWN-2 GND		
④ (2)	#8AWG -	CU, THWN-2	EMT, LFMC OR PVC	3/4"
(1)	#8AWG -	CU, THWN-2 N		
(1)	#10AWG -	CU, THWN-2 GND		

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**ESR**

SHEET NAME  
**ELECTRICAL LINE DIAGRAM**

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

SHEET NUMBER  
**PV-6**

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	MISSION SOLAR: MSE395SX9R 395W MODULE
VMP	36.99V
IMP	10.68A
VOC	45.18V
ISC	11.24A
TEMP. COEFF. VOC	-0.259%/°C
MODULE DIMENSION	75.08"L x 41.50"W x 1.57"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	SOLAREEDGE: SE6000H-US (240V) INVERTER
NOMINAL AC POWER	6.000 kW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	25A

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

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-11°
AMBIENT TEMP (HIGH TEMP 2%)	38°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.259%/°C

AC FEEDER CALCULATIONS																						
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD 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 (%)
INVERTER 1	AC DISCONNECT	240	25	31.25	40	CU #8 AWG	CU #10 AWG	CU #8 AWG	50	PASS	38	2	55	0.91	1	50.05	PASS	5	0.778	0.081	3/4" EMT	24.5591
AC DISCONNECT	POI	240	25	31.25	40	CU #8 AWG	CU #10 AWG	CU #8 AWG	50	PASS	38	2	55	0.91	1	50.05	PASS	5	0.778	0.081	3/4" EMT	24.5591

CUMULATIVE VOLTAGE 0.162

DC FEEDER CALCULATIONS																						
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	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 (%)	
STRING 1	SOLADECK	380	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.049	N/A	#N/A	
STRING 2	SOLADECK	380	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	5	1.24	0.049	N/A	#N/A	
SOLADECK	INVERTER	380	15.00	18.75	20	CU #10 AWG	CU #10 AWG	35	PASS	38	4	40	0.91	0.8	29.12	PASS	35	1.24	0.343	3/4" EMT	19.79362	

String 1 Voltage Drop 0.392  
String 2 Voltage Drop 0.392

#### ELECTRICAL NOTES

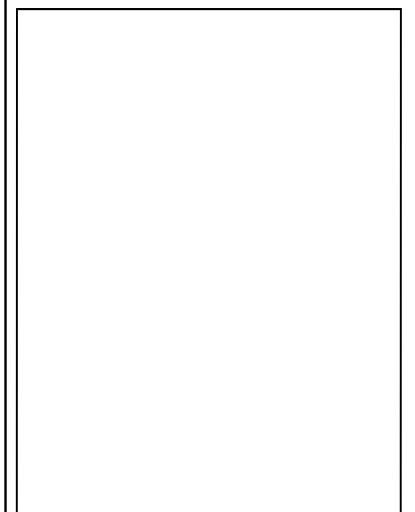
- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF SOLADECK, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSKO GBL-4DBT LAY-IN LUG.
- 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.



#### TOP TIER SOLAR SOLUTIONS

1530 CENTER PARK DR #2911,  
CHARLOTTE, NC 28217,  
UNITED STATES

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	04/06/2023	



PROJECT NAME & ADDRESS

**SAULO RODRIGUEZ  
RAMIREZ  
RESIDENCE**

876 HERITAGE WAY,  
CAMERON, NC 28326

DRAWN BY  
**ESR**

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: PHOTOVOLTAIC  
POWER SOURCE**

EVERY 10' ON CONDUIT & ENCLOSURES

LABEL- 2:  
LABEL LOCATION:  
EMT/CONDUIT RACEWAY  
SOLADECK / JUNCTION BOX  
CODE REF: NEC 690.31 (D)(2)

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

LABEL- 3:  
LABEL LOCATION:  
AC DISCONNECT  
INVERTER  
MAIN SERVICE PANEL  
SUBPANEL  
MAIN SERVICE DISCONNECT  
CODE REF: NEC 690.13(B)

**WARNING DUAL POWER SOURCE  
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM**

LABEL- 4:  
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- 5:  
LABEL LOCATION:  
MAIN SERVICE PANEL  
SUBPANEL  
MAIN SERVICE DISCONNECT  
CODE REF: NEC 110.27(C) & OSHA 1910.145 (f) (7)

**CAUTION**  
**PHOTOVOLTAIC SYSTEM CIRCUIT IS  
BACKFEED**

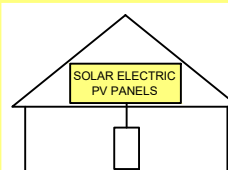
LABEL- 6:  
LABEL LOCATION:  
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
CODE REF: NEC 705.12(D) & NEC 690.59

**WARNING**  
POWER SOURCE OUTPUT  
CONNECTION. DO NOT  
RELOCATE THIS  
OVERCURRENT DEVICE

LABEL- 7:  
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- 8:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: [NEC 690.56(C)(1)(A)]

**RAPID SHUTDOWN SWITCH  
FOR SOLAR PV SYSTEM**

LABEL- 9:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: NEC 690.56(C)(2)

**PHOTOVOLTAIC  
AC DISCONNECT**

LABEL- 10:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: NEC 690.13(B)

**PHOTOVOLTAIC  
DC DISCONNECT**

LABEL- 11:  
LABEL LOCATION:  
INVERTER  
CODE REF: NEC 690.13(B)

**PHOTOVOLTAIC  
AC DISCONNECT**  
NOMINAL OPERATING AC VOLATGE **240 V**  
RATED AC OUTPUT CURRENT **25.00 A**

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

**INVERTER  
AC DISCONNECT**  
NOMINAL OPERATING AC VOLATGE **240 V**  
RATED AC OUTPUT CURRENT **25.00 A**

LABEL- 13:  
LABEL LOCATION:  
INVERTER  
CODE REF: NEC 690.54

**MAXIMUM VOLTAGE **480 V****  
**MAXIMUM CIRCUIT CURRENT **16.5 A****  
**MAXIMUM RATED OUTPUT  
CURRENT OF THE CHARGE  
CONTROLLER OR DC-TO-DC  
CONVERTER (IF INSTALLED)**

LABEL- 14:  
LABEL LOCATION:  
INVERTER  
CODE REF: NEC 690.53

**MAIN PHOTOVOLTAIC  
SYSTEM DISCONNECT**

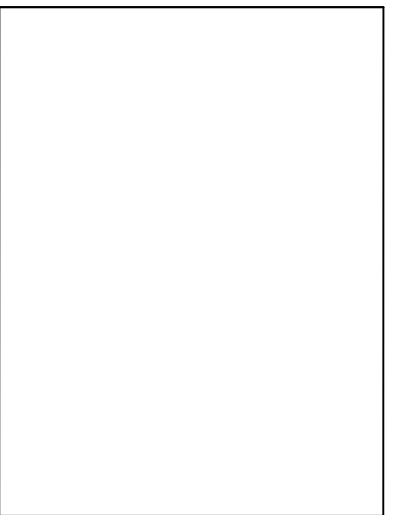
LABEL- 15:  
LABEL LOCATION:  
MAIN SERVICE DISCONNECT (ONLY IF MAIN SERVICE DISCONNECT IS PRESENT)  
CODE REF: NEC 690.13(B)

**TOP TIER  
SOLAR SOLUTIONS**

**TOP TIER SOLAR SOLUTIONS**

1530 CENTER PARK DR #2911,  
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UNITED STATES

REVISIONS		
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INITIAL DESIGN	04/06/2023	



PROJECT NAME & ADDRESS

**SAULO RODRIGUEZ  
RAMIREZ  
RESIDENCE**

876 HERITAGE WAY,  
CAMERON, NC 28326

DRAWN BY  
**ESR**

SHEET NAME  
**LABELS**

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

SHEET NUMBER  
**PV-8**

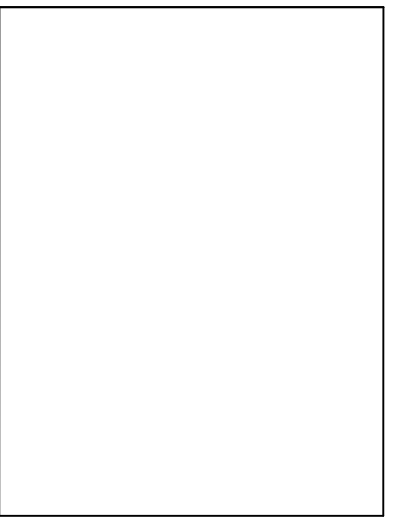




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REVISIONS		
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PROJECT NAME & ADDRESS

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RAMIREZ  
RESIDENCE**

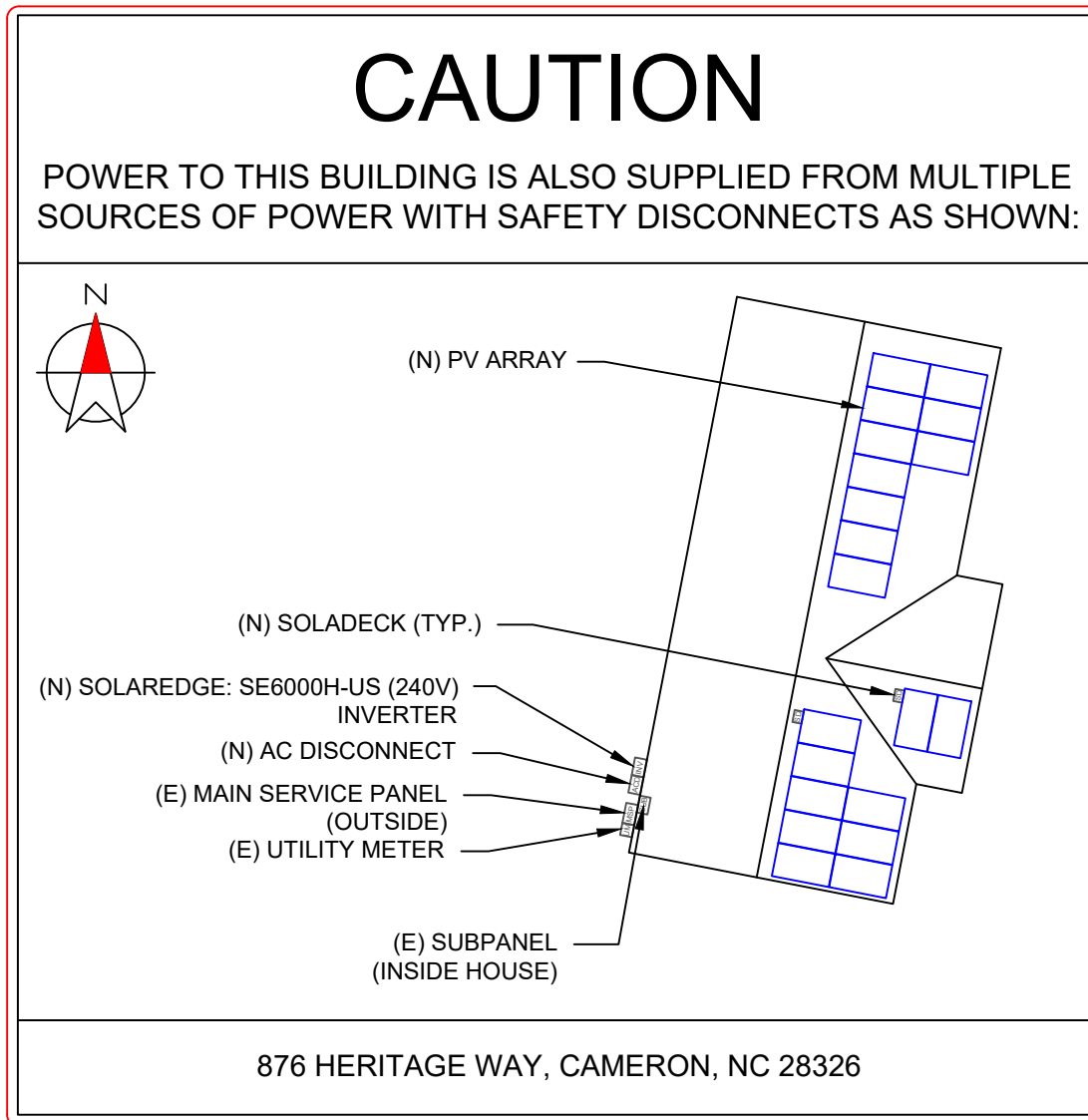
876 HERITAGE WAY,  
CAMERON, NC 28326

DRAWN BY  
**ESR**

SHEET NAME  
**PLACARD**

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

SHEET NUMBER  
**PV-9**



**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])  
[NEC 690.56(C)(1)(A)]

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 [NEC 690.56(C)(1)(A)].

# MSE PERC 66

MISSION SOLAR ENERGY



## 395W

Class leading power output **-0 to +3%**

Positive Power Tolerance



## True American Quality True American Brand

Mission Solar Energy is headquartered in San Antonio, Texas where we manufacture our modules. We produce American, high-quality solar modules ensuring the highest-in-class power output and best-in-class reliability. Our product line is tailored for residential, commercial and utility applications. Every Mission Solar Energy solar module is certified and surpasses industry standard regulations, proving excellent performance over the long term.

Demand the best. Demand Mission Solar Energy.



### Certified Reliability

- Tested to UL 61730 & IEC Standards
- PID resistant
- Resistance to salt mist corrosion



### Advanced Technology

- 9 Busbar
- Passivated Emitter Rear Contact
- Ideal for all applications



### Extreme Weather Resilience

- Up to 5,400 Pa front load & 3,600 Pa back load
- Tested load to UL 61730
- 40 mm frame



### BAA Compliant for Government Projects

- Buy American Act
- American Recovery & Reinvestment Act

### FRAME-TO-FRAME WARRANTY

Degradation guaranteed not to exceed 2% in year one and 0.58% annually from years two to 30 with 84.08% capacity guaranteed in year 25. For more information, visit [www.missionsolar.com/warranty](http://www.missionsolar.com/warranty)

### CERTIFICATIONS

CEC



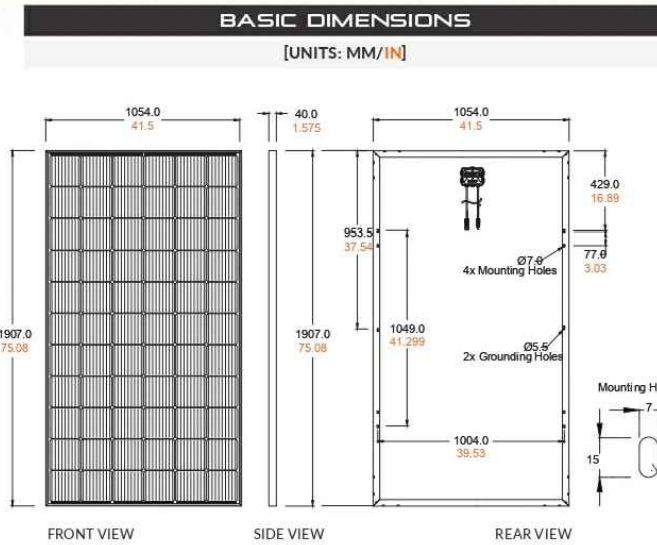
UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

If you have questions or concerns about certification of our products in your area, please contact Mission Solar Energy.



Class Leading  
**390-400W**

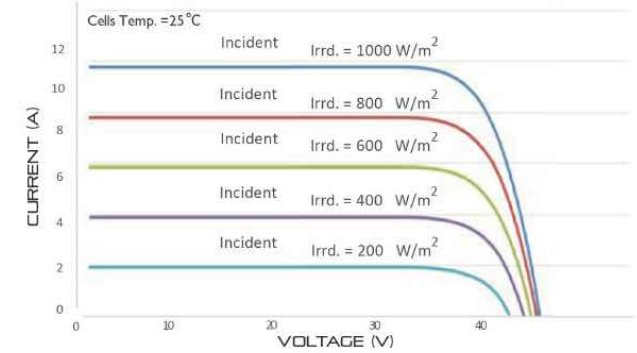
# MSE PERC 66



### CURRENT-VOLTAGE CURVE

MSE385SX9R: 385WP, 66 CELL SOLAR MODULE

Current-voltage characteristics with dependence on irradiance and module temperature



### CERTIFICATIONS AND TESTS

IEC	61215, 61730, 61701
UL	61730



CEC



## Mission Solar Energy

8303 S. New Braunfels Ave., San Antonio, Texas 78235  
[www.missionsolar.com](http://www.missionsolar.com) | [info@missionsolar.com](mailto:info@missionsolar.com)

Mission Solar Energy reserves the right to make specification changes without notice.  
C-SA2-MKTG-0027 REV 4 03/18/2022

### ELECTRICAL SPECIFICATION

PRODUCT TYPE	MSExxxSX9R (xxx = P <sub>max</sub> )				
Power Output	P <sub>max</sub>	W <sub>p</sub>	<b>390</b> <b>395</b> <b>400</b>		
Module Efficiency	%	19.4	19.7	19.9	
Tolerance	%	0/+3	0/+3	0/+3	
Short Circuit Current	I <sub>sc</sub>	A	11.19	11.24	11.31
Open Circuit Voltage	V <sub>oc</sub>	V	45.04	45.18	45.33
Rated Current	I <sub>mp</sub>	A	10.63	10.68	10.79
Rated Voltage	V <sub>mp</sub>	V	36.68	36.99	37.07
Fuse Rating	A	20	20	20	
System Voltage	V	1,000	1,000	1,000	

### TEMPERATURE COEFFICIENTS

Normal Operating Cell Temperature (NOCT)	43.75°C (±3.7%)
Temperature Coefficient of P <sub>max</sub>	-0.367%/°C
Temperature Coefficient of Voc	-0.259%/°C
Temperature Coefficient of I <sub>sc</sub>	0.033%/°C

### OPERATING CONDITIONS

Maximum System Voltage	1,000Vdc
Operating Temperature Range	-40°F to 185°F (-40°C to +85°C)
Maximum Series Fuse Rating	20A
Fire Safety Classification	Type 1*
Front & Back Load (UL Standard)	Up to 5,400 Pa front and 3,600 Pa back load, Tested to UL 61730
Hail Safety Impact Velocity	25mm at 23 m/s

\*Mission Solar Energy uses quality sourced materials that result in a Type 1 fire rating. Please note, the "Fire Class" Rating is designated for the fully-installed PV system, which includes, but is not limited to, the module, the type of mounting used, pitch and roof composition.

### MECHANICAL DATA

Solar Cells	P-type mono-crystalline silicon
Cell Orientation	66 cells (6x11)
Module Dimension	1,907mm x 1,054mm x 40mm
Weight	48.5 lbs. (22 kg)
Front Glass	3.2mm tempered, low-iron, anti-reflective
Frame	40mm Anodized
Encapsulant	Ethylene vinyl acetate (EVA)
Junction Box	Protection class IP67 with 3 bypass-diodes
Cable	1.2m, Wire 4mm <sup>2</sup> (12AWG)
Connector	Staubli PV-KBT4/6II-UR and PV-KST4/6II-UR, MC4, Renhe 05-8

### SHIPPING INFORMATION

Container Feet	Ship To	Pallet	Panels	390W Bin
53'	Most States	30	780	304.20 kW
Double Stack	CA	26	676	263.64 kW

### PALLET [26 PANELS]

Weight	Height	Width	Length
1,300 lbs. (572 kg)	47.56 in (120.80 cm)	46 in (116.84 cm)	77 in (195.58 cm)

# TOP TIER SOLAR SOLUTIONS

### TOP TIER SOLAR SOLUTIONS

1530 CENTER PARK DR #2911,  
CHARLOTTE, NC 28217,  
UNITED STATES

### REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	04/06/2023	

### PROJECT NAME & ADDRESS

SAULO RODRIGUEZ  
RAMIREZ  
RESIDENCE  
876 HERITAGE WAY,  
CAMERON, NC 28326

### DRAWN BY

ESR

SHEET NAME  
**EQUIPMENT SPECIFICATION**

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

### SHEET NUMBER

PV-10

# Power Optimizer For Residential Installations

S440, S500



POWER OPTIMIZER

## Enabling PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- Detects abnormal PV connector behavior, preventing potential safety issues\*
- Module-level voltage shutdown for installer and firefighter safety
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- Faster installations with simplified cable management and easy assembly using a single bolt
- Flexible system design for maximum space utilization
- Compatible with bifacial PV modules

\*Functionality subject to inverter model and firmware version

[solaredge.com](http://solaredge.com)



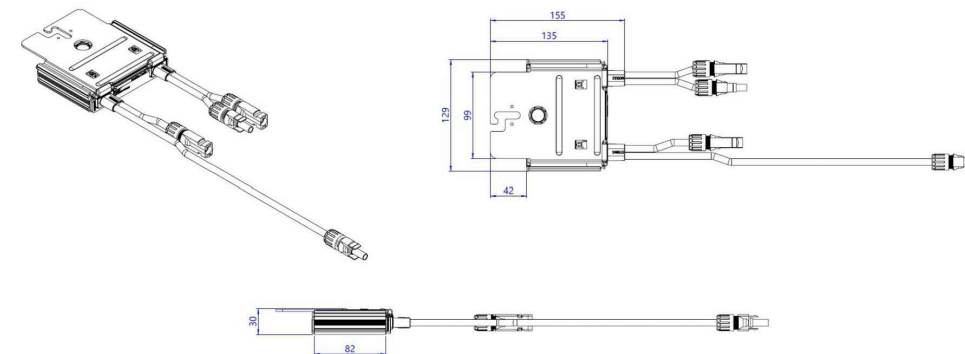
## Power Optimizer For Residential Installations S440, S500

	S440	S500	UNIT
Rated Input DC Power <sup>(1)</sup>	440	500	W
Absolute Maximum Input Voltage (Voc)		60	Vdc
MPPT Operating Range		8 - 60	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15	Adc
Maximum Efficiency		99.5	%
Weighted Efficiency		98.6	%
Overvoltage Category		II	
<b>OUTPUT DURING OPERATION</b>			
Maximum Output Current		15	Adc
Maximum Output Voltage		60	Vdc
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)</b>			
Safety Output Voltage per Power Optimizer		1	Vdc
<b>STANDARD COMPLIANCE</b>			
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3, CISPR11, EN-55011		
Safety	IEC62109-1 (class II safety), UL1741		
Material	UL94 V-0, UV Resistant		
RoHS	Yes		
Fire Safety	VDE-AR-E 2100-712:2013-05		
<b>INSTALLATION SPECIFICATIONS</b>			
Maximum Allowed System Voltage		1000	Vdc
Dimensions (W x L x H)		129 x 155 x 30	mm
Weight (including cables)		655 / 1.5	gr / lb
Input Connector		MC4 <sup>(2)</sup>	
Input Wire Length		0.1	m
Output Connector		MC4	
Output Wire Length		(+) 2.3, (-) 0.10	m
Operating Temperature Range <sup>(3)</sup>		-40 to +85	°C
Protection Rating		IP68 / NEMA6P	
Relative Humidity		0 - 100	%

(1) Rated power of the module at STC will not exceed the Power Optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed  
 (2) For other connector types please contact SolarEdge  
 (3) For ambient temperature above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Using a SolarEdge Inverter	Single Phase HD-Wave	Three Phase	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500	8	16	18
Maximum String Length (Power Optimizers)		25	50	
Maximum Nominal Power per String <sup>(4)</sup>		5700	11250 <sup>(5)</sup>	12750 <sup>(6)</sup>
Parallel Strings of Different Lengths or Orientations			Yes	

(4) If the inverters rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power. Refer to: <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>  
 (5) For the 230/400V grid: it is allowed to install up to 13,500W per string when the maximum power difference between each string is 2,000W  
 (6) For the 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W  
 (7) It is not allowed to mix S-series and P-series Power Optimizers in new installations



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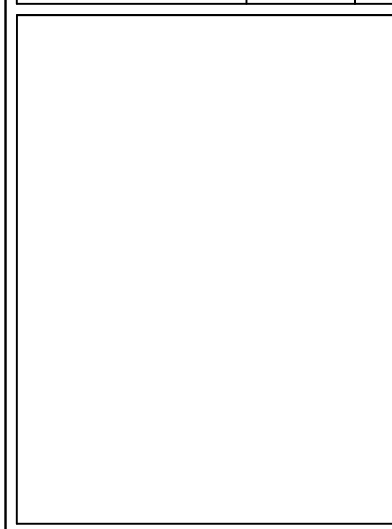
CE RoHS

**TOP TIER**  
SOLAR SOLUTIONS

TOP TIER SOLAR SOLUTIONS

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CAMERON, NC 28326

DRAWN BY  
ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-11

# Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / **SE6000H-US** / SE7600H-US / SE10000H-US / SE11400H-US

12-25  
YEAR  
WARRANTY



INVERTERS

## Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

solaredge.com



## Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US		
<b>OUTPUT</b>									
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac	
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac	
AC Frequency (Nominal)	59.3 - 60 - 60.5 <sup>1)</sup>							Hz	
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A	
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A	
GFDI Threshold	1							A	
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes								
<b>INPUT</b>									
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W	
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W	
Transformer-less, Ungrounded	Yes								
Maximum Input Voltage	480							Vdc	
Nominal DC Input Voltage	380				400			Vdc	
Maximum Input Current @240V <sup>2)</sup>	8.5	10.5	13.5	16.5	20	27	30.5	Adc	
Maximum Input Current @208V <sup>2)</sup>	-	9	-	13.5	-	-	27	Adc	
Max. Input Short Circuit Current	45							Adc	
Reverse-Polarity Protection	Yes								
Ground-Fault Isolation Detection	600ka Sensitivity								
Maximum Inverter Efficiency	99	99.2						%	
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%	
Nighttime Power Consumption	< 2.5							W	
<b>ADDITIONAL FEATURES</b>									
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)								
Revenue Grade Data, ANSI C12.20	Optional <sup>3)</sup>								
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect								
<b>STANDARD COMPLIANCE</b>									
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07								
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)								
Emissions	FCC Part 15 Class B								
<b>INSTALLATION SPECIFICATIONS</b>									
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG				1" Maximum / 14-4 AWG				
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG				1" Maximum / 1-3 strings / 14-6 AWG				
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174				21.3 x 14.6 x 7.3 / 540 x 370 x 185				in / mm
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6				lb / kg	
Noise	< 25				< 50				dBA
Cooling	Natural Convection								
Operating Temperature Range	-13 to +140 / -25 to +60 <sup>4)</sup> (-40°F / -40°C option) <sup>5)</sup>							°F / °C	
Protection Rating	NEMA 4X (Inverter with Safety Switch)								

<sup>1)</sup> For other regional settings please contact SolarEdge support.  
<sup>2)</sup> A higher current source may be used; the inverter will limit its input current to the values stated.  
<sup>3)</sup> Revenue grade inverter P/N: SExxxxH-US000NNC2.  
<sup>4)</sup> For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>  
<sup>5)</sup> -40 version P/N: SExxxxH-US000NNU4

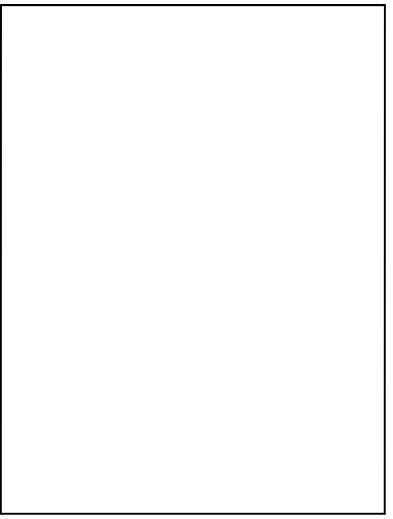
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RoHS



**TOP TIER SOLAR SOLUTIONS**  
 1530 CENTER PARK DR #2911,  
 CHARLOTTE, NC 28217,  
 UNITED STATES

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	04/06/2023	



PROJECT NAME & ADDRESS  
**SAULO RODRIGUEZ  
 RAMIREZ  
 RESIDENCE**  
 876 HERITAGE WAY,  
 CAMERON, NC 28326

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT  
 SPECIFICATION**

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

SHEET NUMBER  
**PV-12**



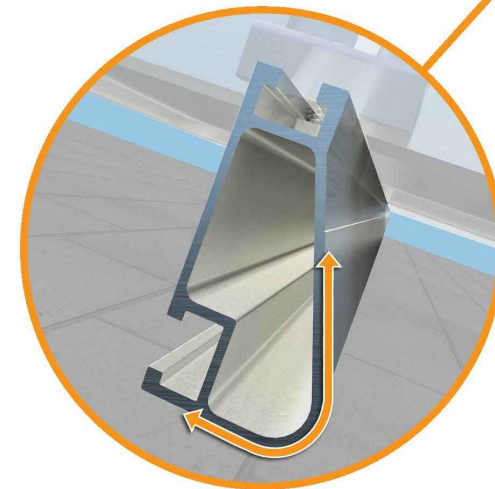
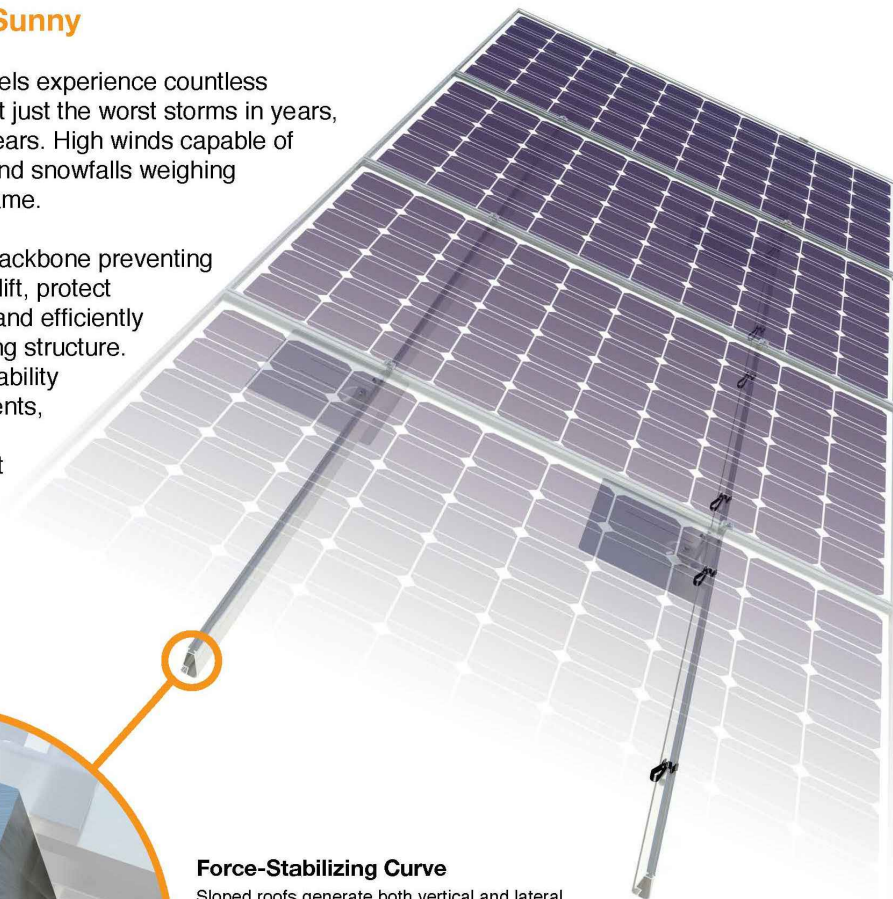
Tech Brief

## XR Rail Family

### Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



#### Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

#### Compatible with Flat & Pitched Roofs



XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

#### Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



Tech Brief

## XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



**XR10**

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



**XR100**

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



**XR1000**

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

## Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit [IronRidge.com](http://IronRidge.com) for detailed span tables and certifications.

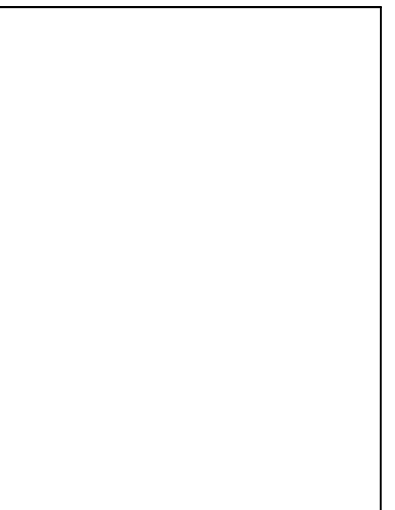
Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100						
	120						
	140	XR10		XR100		XR1000	
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						



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SAULO RODRIGUEZ  
RAMIREZ  
RESIDENCE  
876 HERITAGE WAY,  
CAMERON, NC 28326

#### DRAWN BY

ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

#### SHEET NUMBER

PV-13

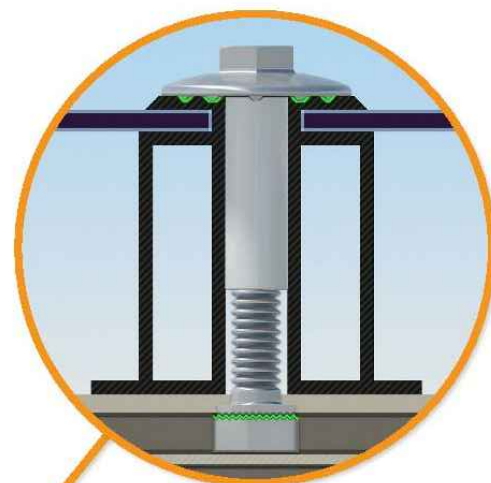


## UFO Family of Components

### Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



#### Universal Fastening Object (UFO)

The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.



#### Stopper Sleeve

The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.



#### Bonded Splice

Each Bonded Splice uses self-drilling screws to form a secure connection. No bonding strap needed.



#### Grounding Lug

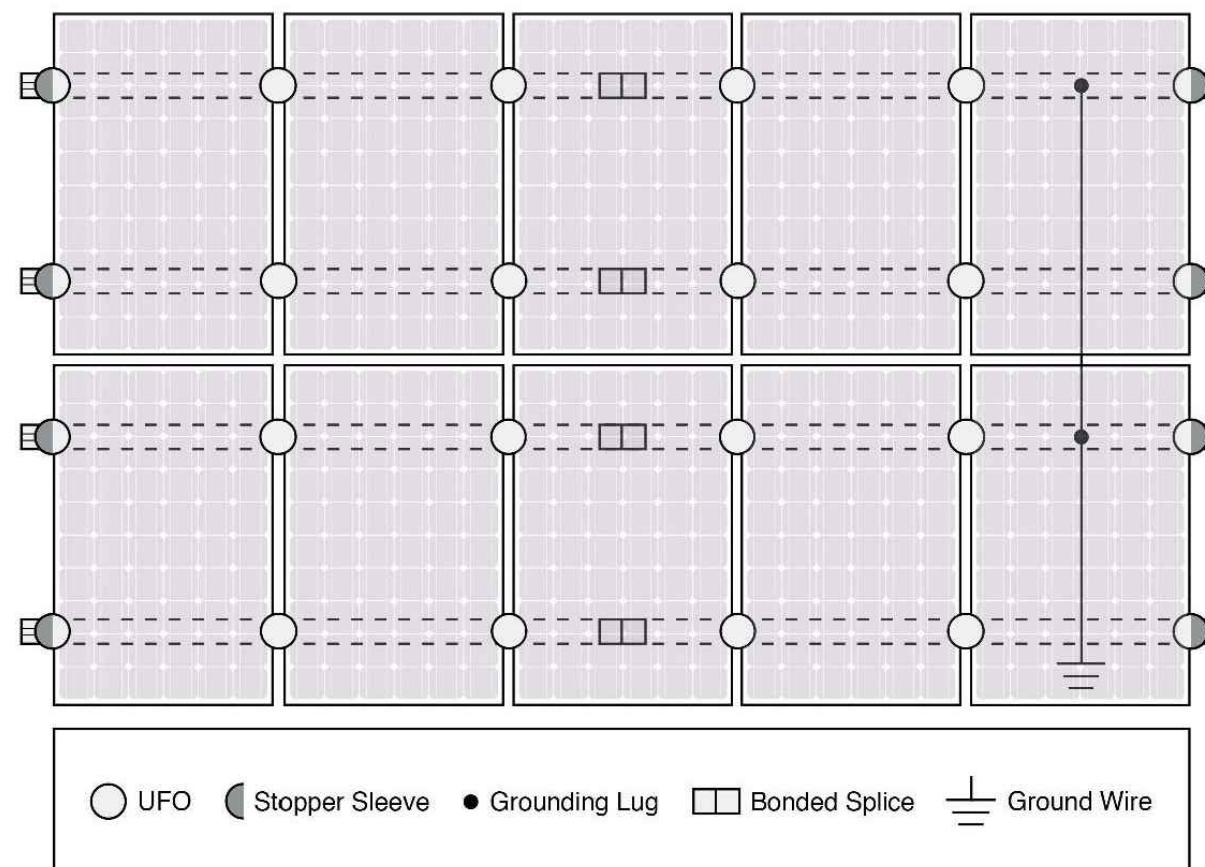
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



#### Bonded Attachments

The bonding bolt attaches and bonds the L-foot to the rail. It is installed with the same socket as the rest of the system.

### System Diagram



Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

### UL Certification

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

Go to [IronRidge.com/UFO](http://IronRidge.com/UFO)

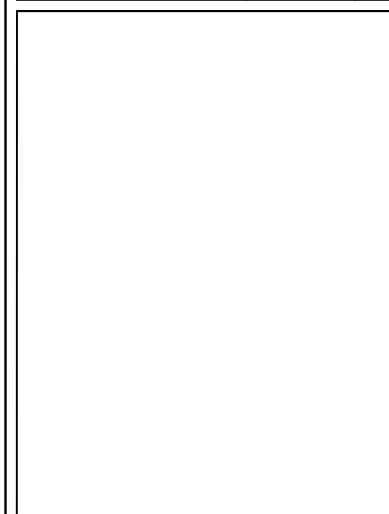
Cross-System Compatibility			
Feature	Flush Mount	Tilt Mount	Ground Mount
XR Rails	✓	✓	XR1000 Only
UFO/Stopper	✓	✓	✓
Bonded Splice	✓	✓	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Enphase - M250-72, M250-60, M215-60, C250-72 Darfon - MIG240, MIG300, G320, G640 SolarEdge - P300, P320, P400, P405, P600, P700, P730		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		



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### PROJECT NAME & ADDRESS

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RAMIREZ  
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876 HERITAGE WAY,  
CAMERON, NC 28326

DRAWN BY  
ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-14



Tech Brief

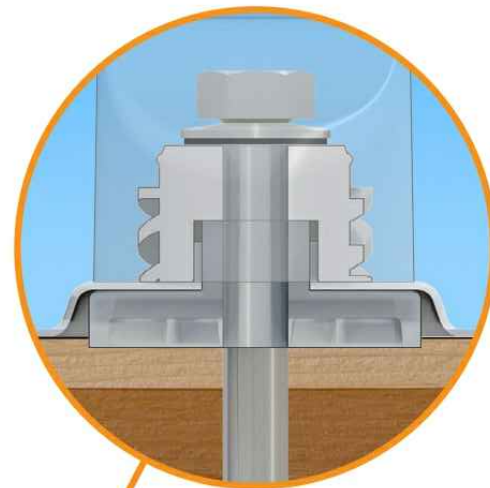
## FlashFoot2

### The Strongest Attachment in Solar

IronRidge FlashFoot2 raises the bar in solar roof protection. The unique water seal design is both elevated and encapsulated, delivering redundant layers of protection against water intrusion. In addition, the twist-on Cap perfectly aligns the rail attachment with the lag bolt to maximize mechanical strength.

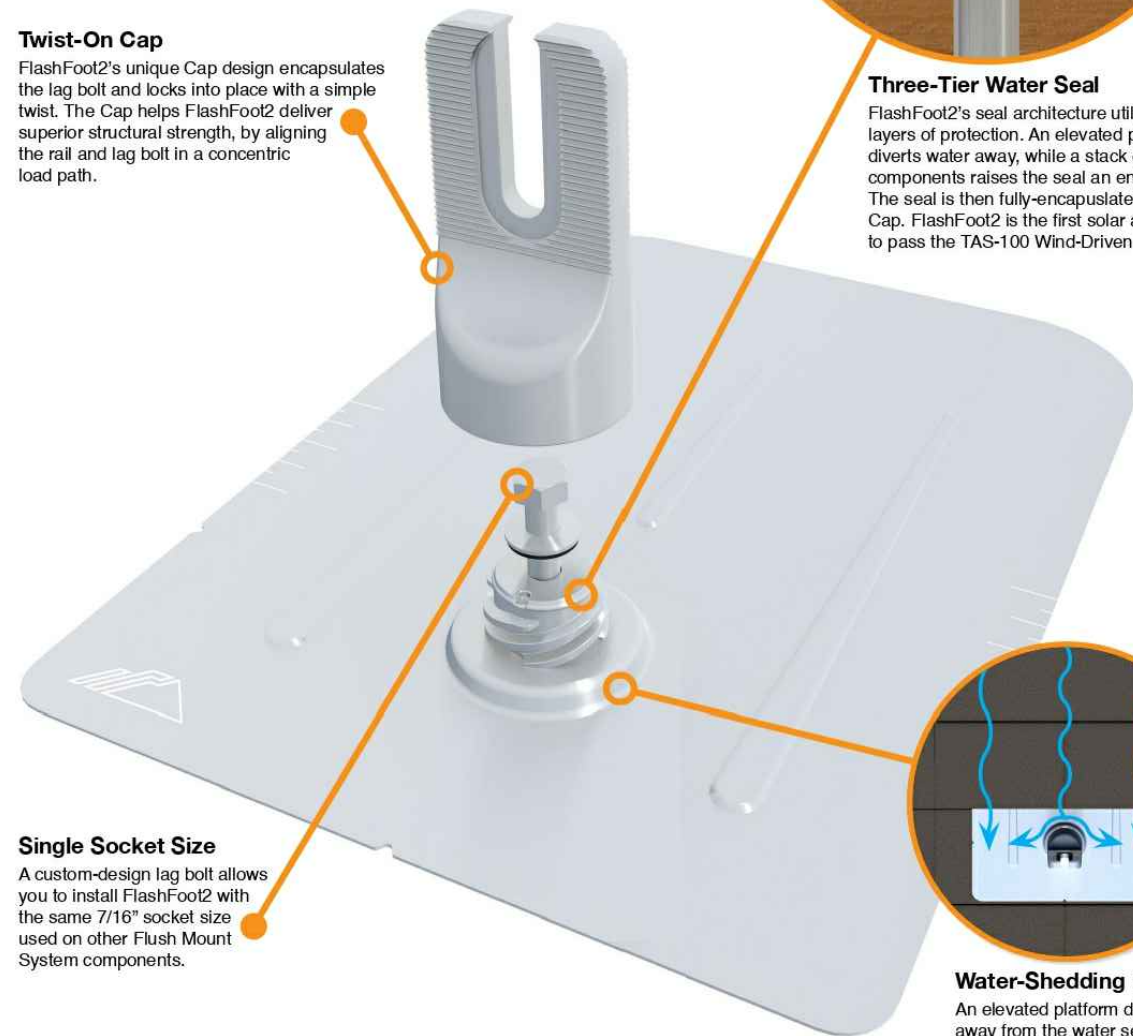
#### Twist-On Cap

FlashFoot2's unique Cap design encapsulates the lag bolt and locks into place with a simple twist. The Cap helps FlashFoot2 deliver superior structural strength, by aligning the rail and lag bolt in a concentric load path.



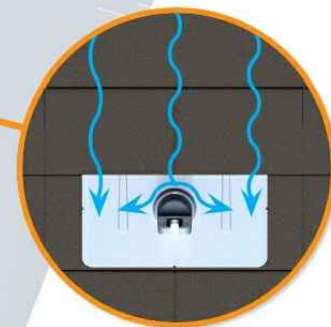
#### Three-Tier Water Seal

FlashFoot2's seal architecture utilizes three layers of protection. An elevated platform diverts water away, while a stack of rugged components raises the seal an entire inch. The seal is then fully-encapsulated by the Cap. FlashFoot2 is the first solar attachment to pass the TAS-100 Wind-Driven Rain Test.



#### Single Socket Size

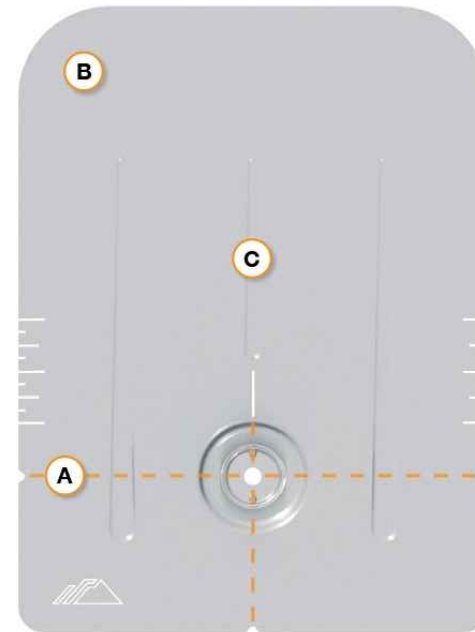
A custom-design lag bolt allows you to install FlashFoot2 with the same 7/16" socket size used on other Flush Mount System components.



#### Water-Shedding Design

An elevated platform diverts water away from the water seal.

### Installation Features



#### A Alignment Markers

Quickly align the flashing with chalk lines to find pilot holes.

#### B Rounded Corners

Makes it easier to handle and insert under the roof shingles.

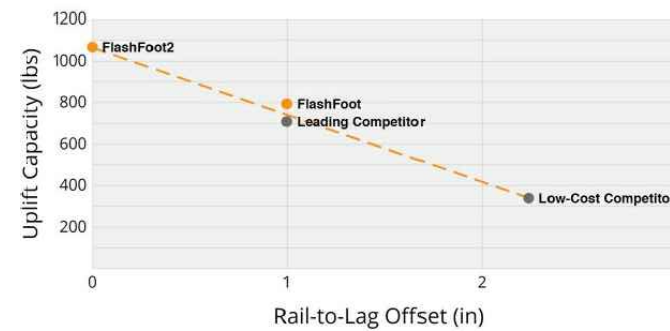
#### C Reinforcement Ribs

Help to stiffen the flashing and prevent any bending or crinkling during installation.

### Benefits of Concentric Loading

Traditional solar attachments have a horizontal offset between the rail and lag bolt, which introduces leverage on the lag bolt and decreases uplift capacity.

FlashFoot2 is the only product to align the rail and lag bolt. This concentric loading design results in a stronger attachment for the system.



### Testing & Certification

#### Structural Certification

Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7.

#### Water Seal Ratings

Water Sealing Tested to UL 441 Section 27 "Rain Test" and TAS 100-95 "Wind Driven Rain Test" by Intertek. Ratings applicable for composition shingle roofs having slopes between 2:12 and 12:12.

#### UL 2703

Conforms to UL 2703 Mechanical and Bonding Requirements. See Flush Mount Install Manual for full ratings.

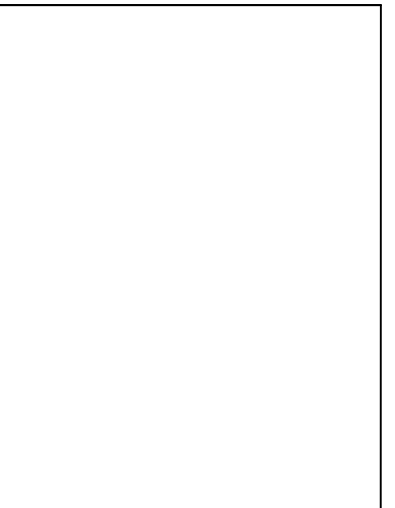
Tech Brief



### TOP TIER SOLAR SOLUTIONS

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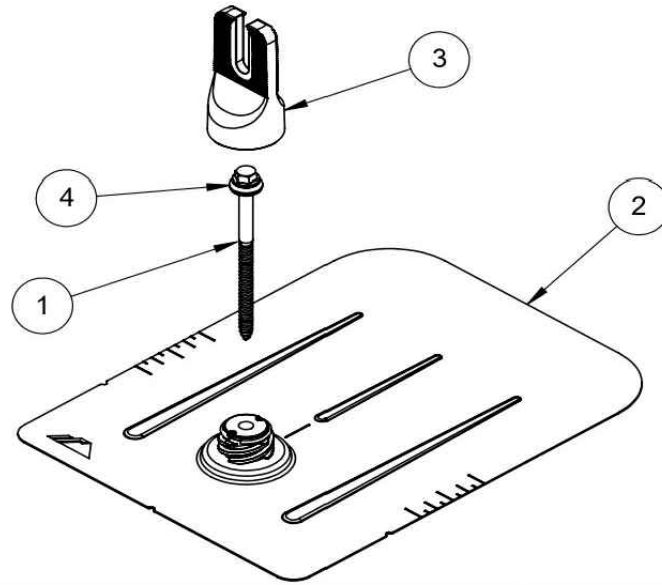
PROJECT NAME & ADDRESS  
**SAULO RODRIGUEZ  
RAMIREZ  
RESIDENCE**  
876 HERITAGE WAY,  
CAMERON, NC 28326

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT  
SPECIFICATION**

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

SHEET NUMBER  
**PV-15**

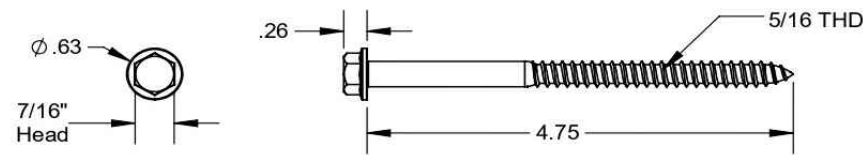


ITEM NO.	DESCRIPTION	Qty in Kit
1	BOLT LAG 5/16 X 4.75"	1
2	ASSY, FLASHING	1
3	ASSY, CAP	1
4	WASHER, EPDM BACKED	1

FLASHFOOT 2

Part Number	Description
FF2-02-M2	FlashFoot2® (Mill)
FF2-02-B2	FlashFoot2® (Black)

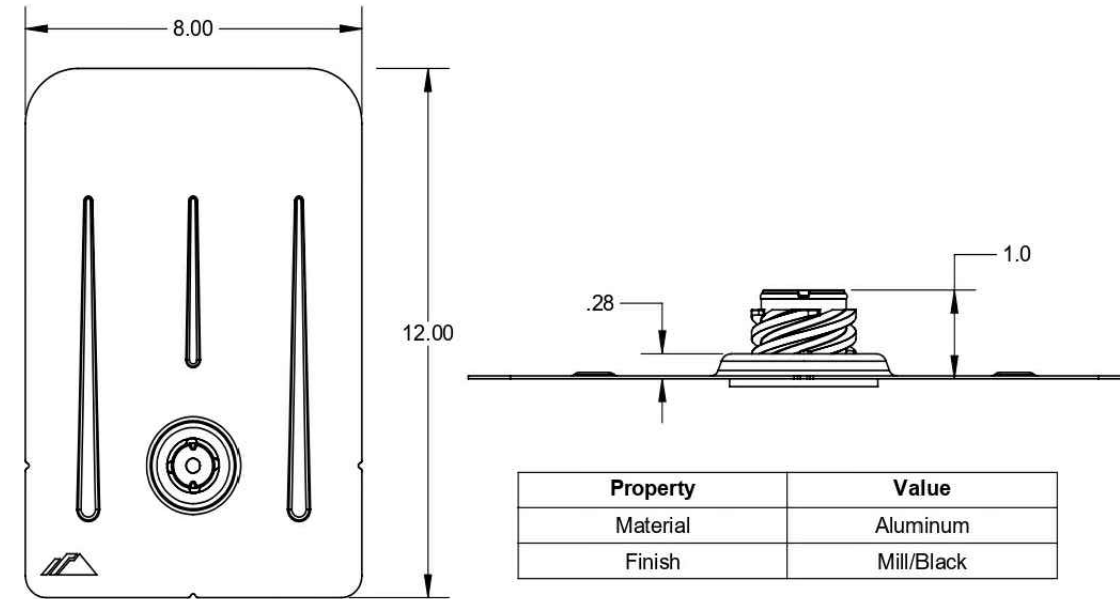
1) Bolt, Lag 5/16 x 4.75



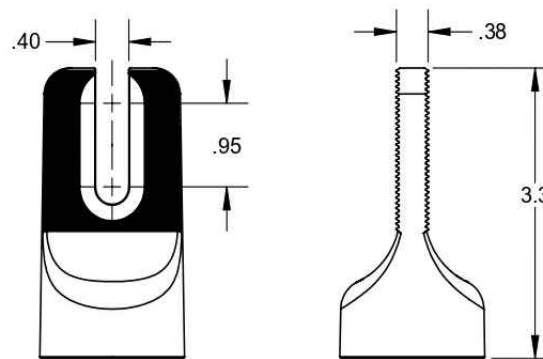
Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v2.0

2) Assy, Flashing

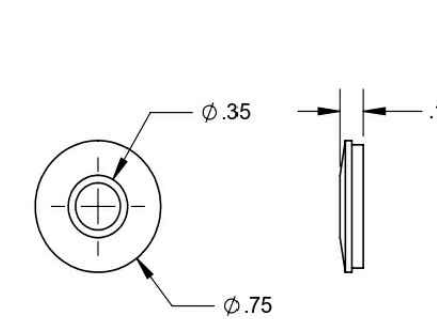


3) Assy, Cap



Property	Value
Material	Aluminum
Finish	Mill/Black

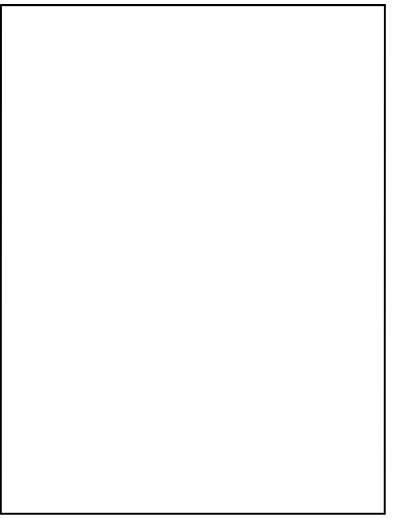
4) Washer, EPDM Backed



Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v2.0

REVISIONS		
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SAULO RODRIGUEZ  
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SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-16



# SolaDeck

FLASHED PV ROOF-MOUNT COMBINER/ENCLOSURE

## Basic Features

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included



SolaDeck Model SD 0783



## SolaDeck UL50 Type 3R Enclosures

Available Models:  
 Model SD 0783 - (3" fixed Din Rail)  
 Model SD 0786 - (6" slotted Din Rail)



## SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.  
 Max Rated - 600VDC, 120AMPS

**Model SD 0783-41** 3" Fixed Din Rail fastened using Norlock System

### \*\*Typical System Configuration

- 4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
- 1- Power Distribution Block 600VDC 175AMP
- 1- Bus Bar with UL lug

**Model SD 0786-41** 6" Slotted Din Rail fastened using steel studs

### \*\*Typical System Configuration

- 4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
- 4- Din Rail Mounted Terminal Blocks
- Bus Bars with UL lug

\*\*Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.



Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.



Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.



Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

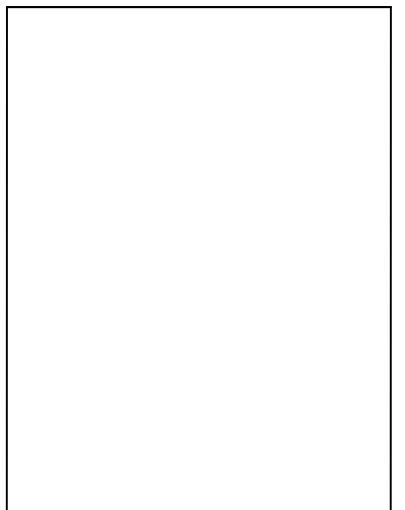
RSTC Enterprises, Inc • 2219 Heimstead Road • Eau Claire, WI 54703  
 For product information call 1(866) 367-7782

**TOP TIER**  
 SOLAR SOLUTIONS

## TOP TIER SOLAR SOLUTIONS

1530 CENTER PARK DR #2911,  
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 PV-17