

# PHOTOVOLTAIC ROOF MOUNT SYSTEM

12 MODULES-ROOF MOUNTED - 4.740 kW DC, 6.000 kW AC

2474 DOCS RD, SPRING LAKE, NC 28390



**TOP TIER SOLAR SOLUTIONS**

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

## PROJECT DATA

PROJECT ADDRESS: 2474 DOCS RD,  
SPRING LAKE, NC 28390

OWNER: ELIZABETH MOORE

DESIGNER: ESR

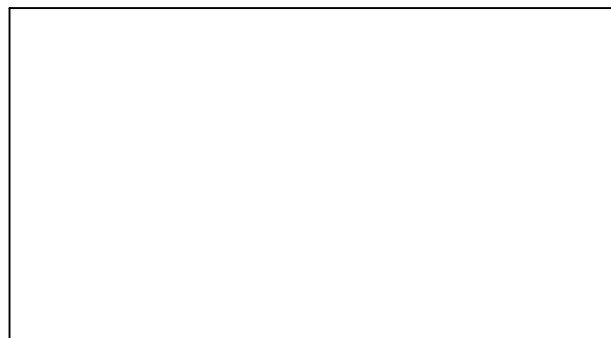
SCOPE: 4.740 KW DC ROOF MOUNT  
SOLAR PV SYSTEM WITH  
12 MISSION SOLAR: MSE395SX9R 395W  
PV MODULES WITH  
12 SOLAREEDGE: S440 POWER OPTIMIZERS AND  
01 SOLAREEDGE: SE6000H-US (240V/6000W)  
INVERTER

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
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PV-7	WIRING CALCULATIONS
PV-8	LABELS
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## SIGNATURE



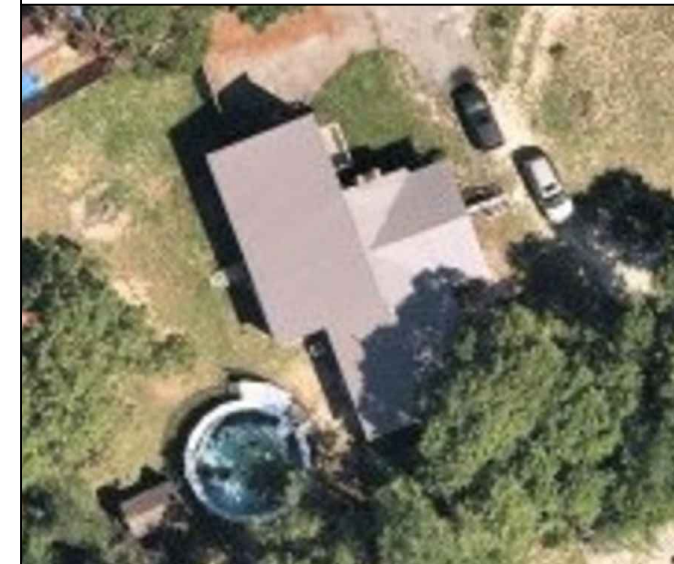
## GENERAL NOTES

- 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

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	09/06/2023	



STRUCTURAL ONLY  
09/06/2023

PROJECT NAME & ADDRESS

ELIZABETH MOORE  
RESIDENCE  
2474 DOCS RD,  
SPRING LAKE, NC 28390

DRAWN BY

ESR

SHEET NAME

COVER SHEET

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-1

# PROJECT DESCRIPTION:

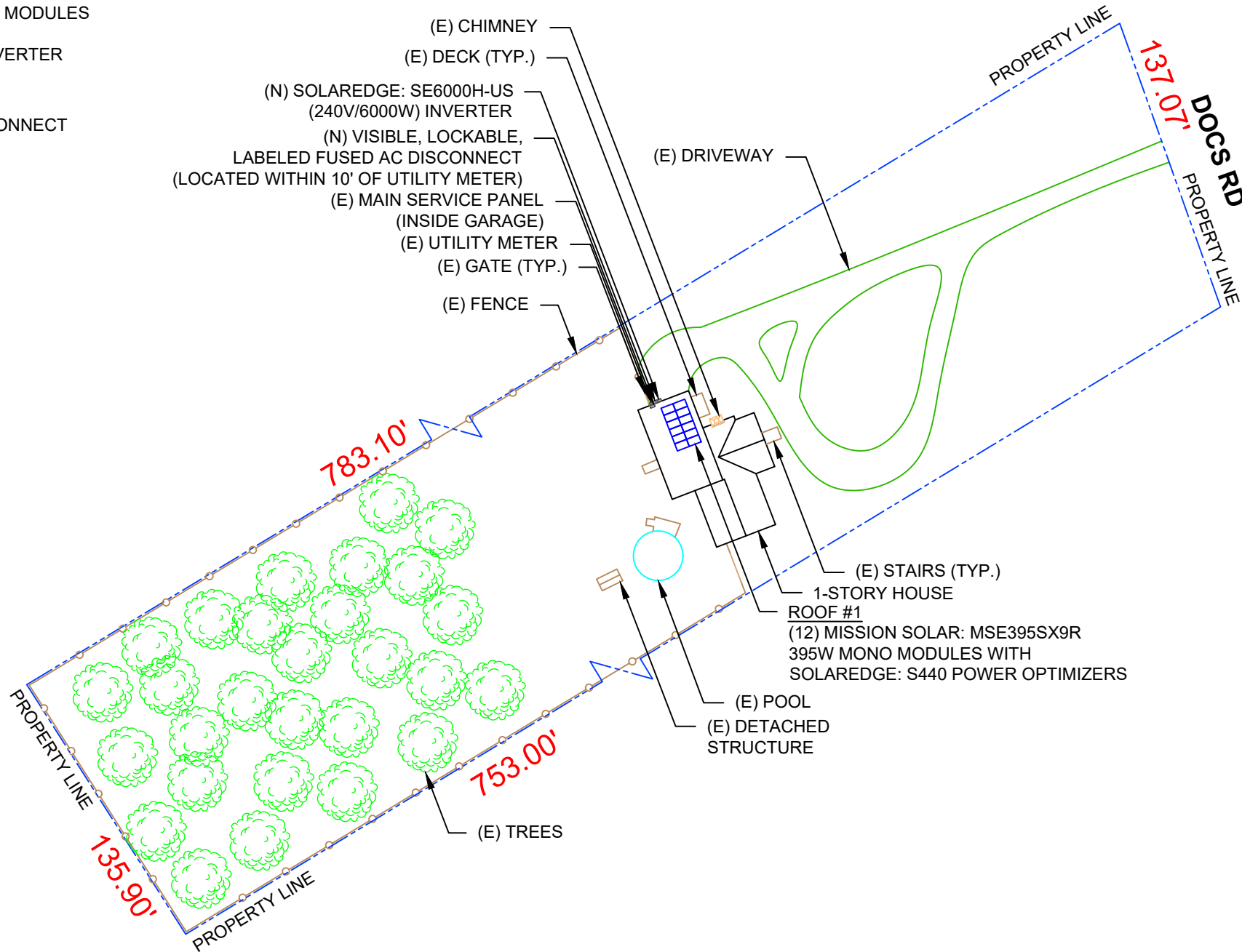
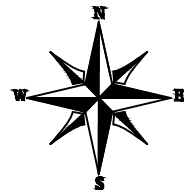
12 X MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES  
 DC SYSTEM SIZE: 4.740 kW DC  
 AC SYSTEM SIZE: 6.000 kW AC

## EQUIPMENT SUMMARY

12 MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 12 SOLAREEDGE: S440 POWER OPTIMIZERS  
 01 SOLAREEDGE: SE6000H-US (240V/6000W) INVERTER

ROOF ARRAY AREA #1:- 259.68 SQ FT.

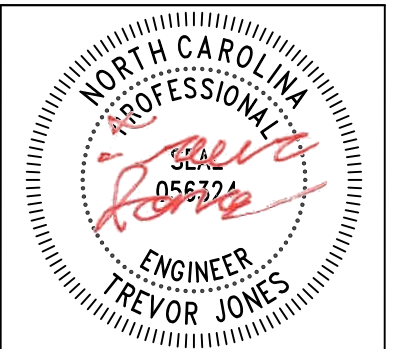
NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT  
 LOCATED WITHIN 10' OF UTILITY METER



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 SPRING LAKE, NC 28390

DRAWN BY  
**ESR**

SHEET NAME  
**SITE PLAN**

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

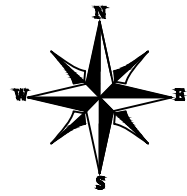
SHEET NUMBER  
**PV-2**

**1** | **SITE PLAN**  
 PV-2 | SCALE: 1/64" = 1'-0"

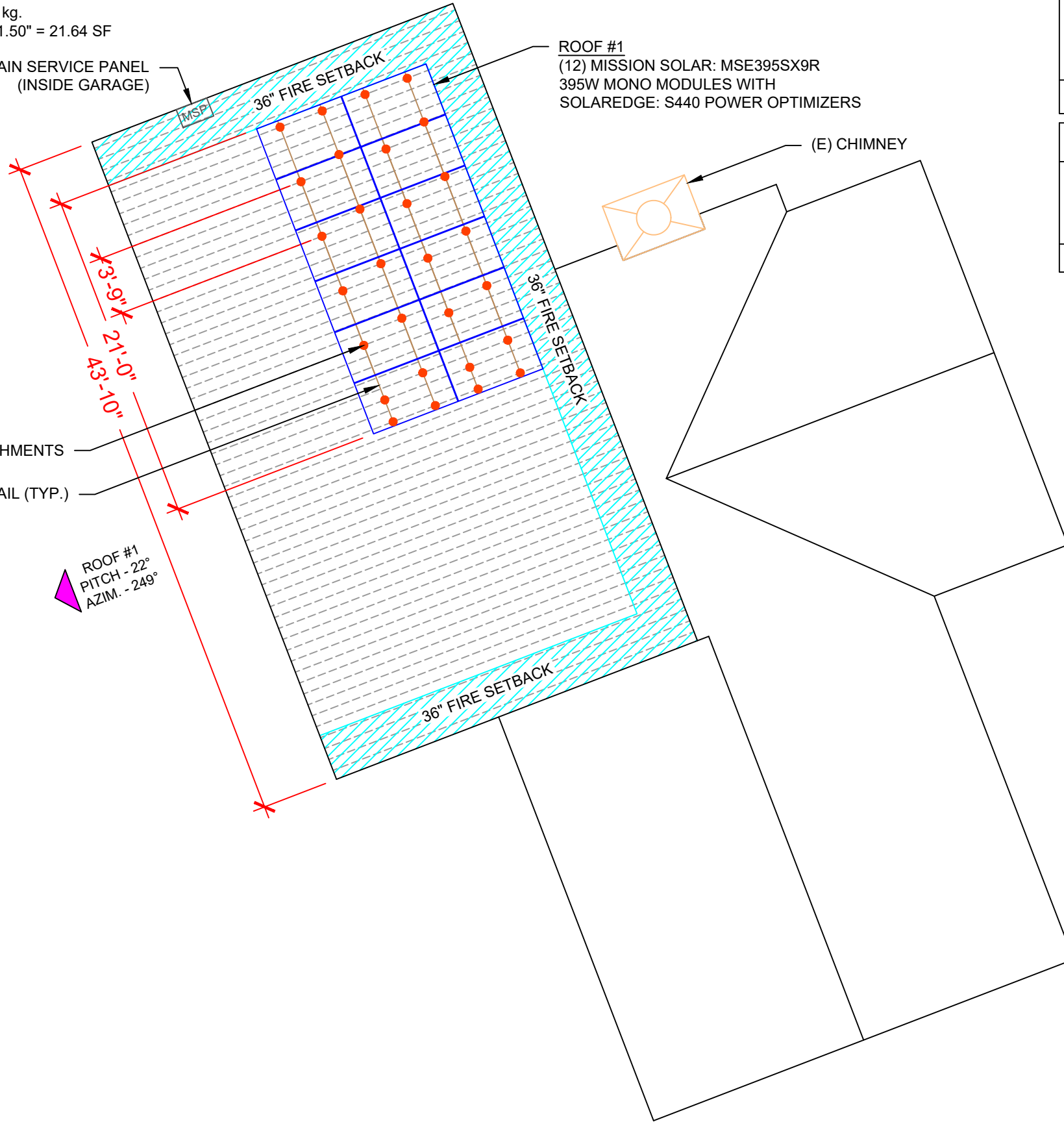
DESIGN SPECIFICATION  
 OCCUPANCY: II  
 CONSTRUCTION: SINGLE-FAMILY  
 ZONING: RESIDENTIAL  
 GROUND SNOW LOAD: REFER STRUCTURAL LETTER  
 WIND EXPOSURE: REFER STRUCTURAL LETTER  
 WIND SPEED: REFER STRUCTURAL LETTER

**MODULE TYPE, DIMENSIONS & WEIGHT**

NUMBER OF MODULES = 12 MODULES  
 MODULE TYPE = MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 MODULE WEIGHT = 48.5 LBS / 22.0 kg.  
 MODULE DIMENSIONS = 75.08" x 41.50" = 21.64 SF



(E) MAIN SERVICE PANEL  
 (INSIDE GARAGE)



ROOF #1  
 (12) MISSION SOLAR: MSE395SX9R  
 395W MONO MODULES WITH  
 SOLAREGE: S440 POWER OPTIMIZERS

(E) CHIMNEY

ROOF #1  
 PITCH - 22°  
 AZIM. - 249°

ROOF DESCRIPTION				
ROOF TYPE				METAL
ROOF	# OF MODULES	ROOF PITCH	AZIMUTH	SEAM SPACING
#1	12	22°	249°	9"

ARRAY AREA & ROOF AREA CALC'S		
TOTAL PV ARRAY AREA (SQ. FT.)	TOTAL ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
259.68	2513.23	10

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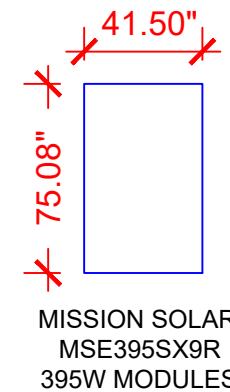
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**NORTH CAROLINA PROFESSIONAL ENGINEER**

SEAL  
 056324

TREVOR JONES

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**LEGEND**

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

PROJECT NAME & ADDRESS

**ELIZABETH MOORE RESIDENCE**

2474 DOCS RD,  
 SPRING LAKE, NC 28390

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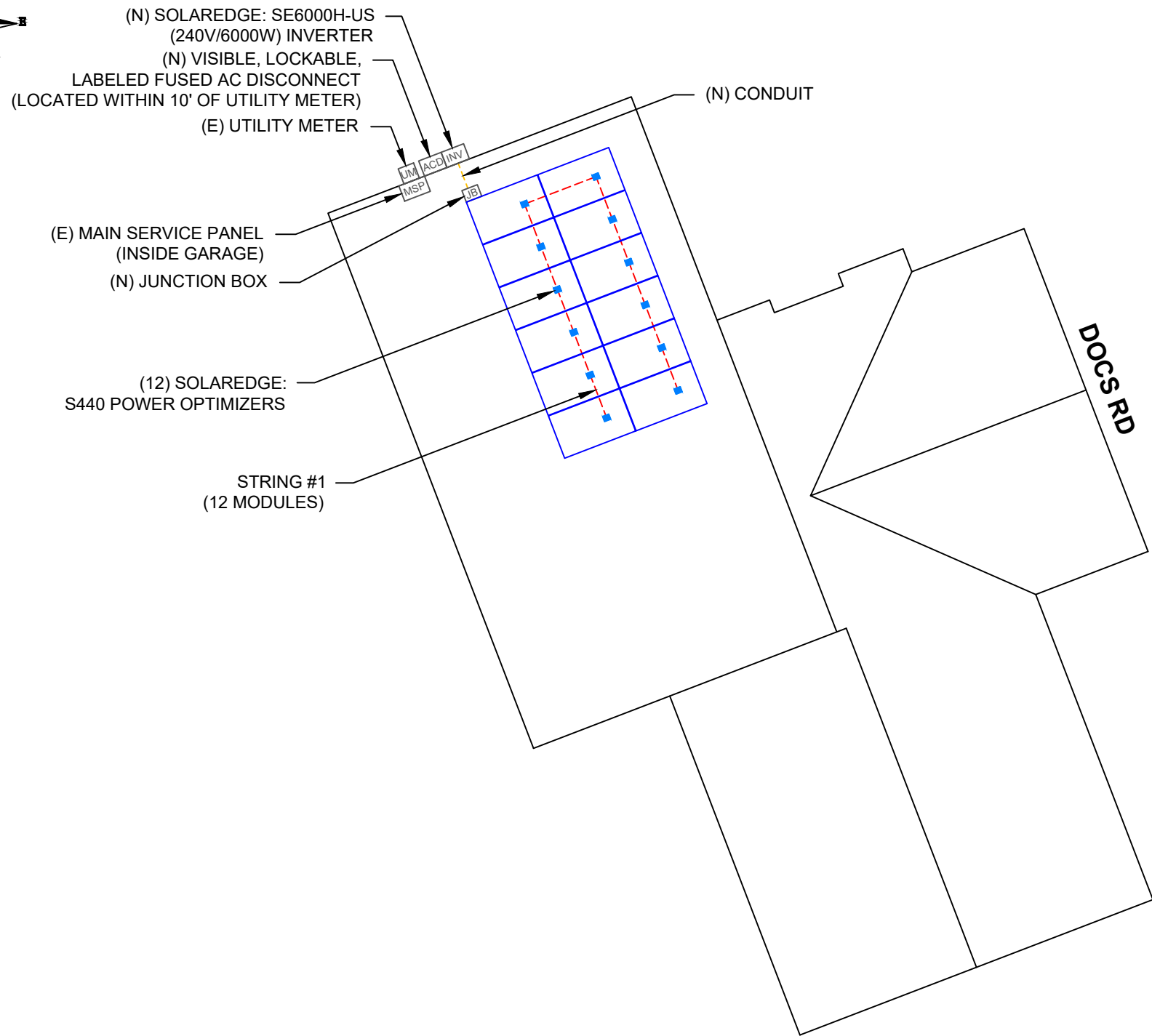
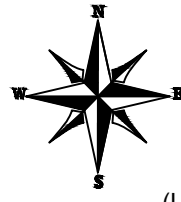
SHEET NAME  
**ROOF PLAN & MODULES**

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

SHEET NUMBER  
**PV-3**

DC SYSTEM SIZE: 4.740 kW DC  
 AC SYSTEM SIZE: 6.000 kW AC  
 (12) MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 WITH (12) SOLAREEDGE: S440 POWER OPTIMIZERS  
 LOCATED UNDER EACH PANEL AND  
 01 SOLAREEDGE: SE6000H-US (240V/6000W) INVERTER

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



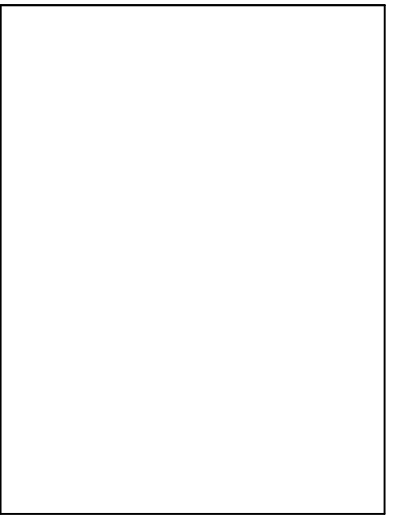
BILL OF MATERIALS	
EQUIPMENT DESCRIPTION	QTY
SOLAR PV MODULES: MISSION SOLAR: MSE395SX9R 395W MODULE	12
OPTIMIZERS: SOLAREEDGE: S440 POWER OPTIMIZERS	12
INVERTER: SOLAREEDGE: SE6000H-US (240V/6000W) INVERTER	01
JUNCTION BOX: 6"X6"X4" UL LISTED, STEEL WATER TIGHT NEMA TYPE 3R, UL LISTED	1
AC DISCONNECT: FUSED AC DISCONNECT, 60A FUSED, (2) 35A FUSES 240V NEMA 3R, UL LISTED	1
IRONRIDGE XR10 RAIL (RAIL 168" (14 FEET) CLEAR) (XR-10-168A)	8
BONDED SPLICE, XR10 (XR10-BOSS-01-M1)	4
UNIVERSAL MODULE CLAMP, CLEAR (UFO-CL-01-A1)	28
STOPPER SLEEVE, 40MM, MILL (UFO-STP-40MM-M1)	8
GROUNDING LUG (XR-LUG-03-A1)	2
S-5! PROTEA BRACKET ATTACHMENTS	26
SQUARE-BOLT BONDING HARDWARE (BHW-SQ-02-A1)	26

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 SOLAR SOLUTIONS

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**ESR**

SHEET NAME  
**ELECTRICAL PLAN**

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

SHEET NUMBER  
**PV-4**

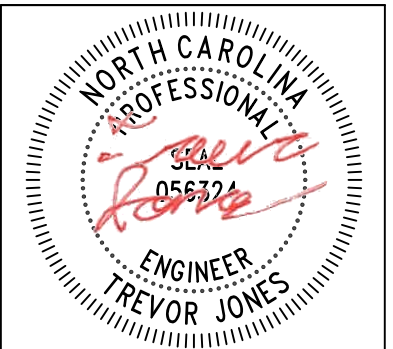
**LEGEND**

<span style="border: 1px solid black; padding: 2px;">JB</span>	- JUNCTION BOX
<span style="border: 1px solid black; padding: 2px;">INV</span>	- INVERTER
<span style="border: 1px solid black; padding: 2px;">ACD</span>	- AC DISCONNECT
<span style="border: 1px solid black; padding: 2px;">UM</span>	- UTILITY METER
<span style="border: 1px solid black; padding: 2px;">MSP</span>	- MAIN SERVICE PANEL
<span style="border: 1px solid black; padding: 2px;">SUB</span>	- SUB PANEL
<span style="border: 1px solid black; border-radius: 50%; padding: 2px;"> </span>	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
<span style="color: red;">●</span>	- ROOF ATTACHMENT
- - -	- SEAM
- - - - -	- CONDUIT

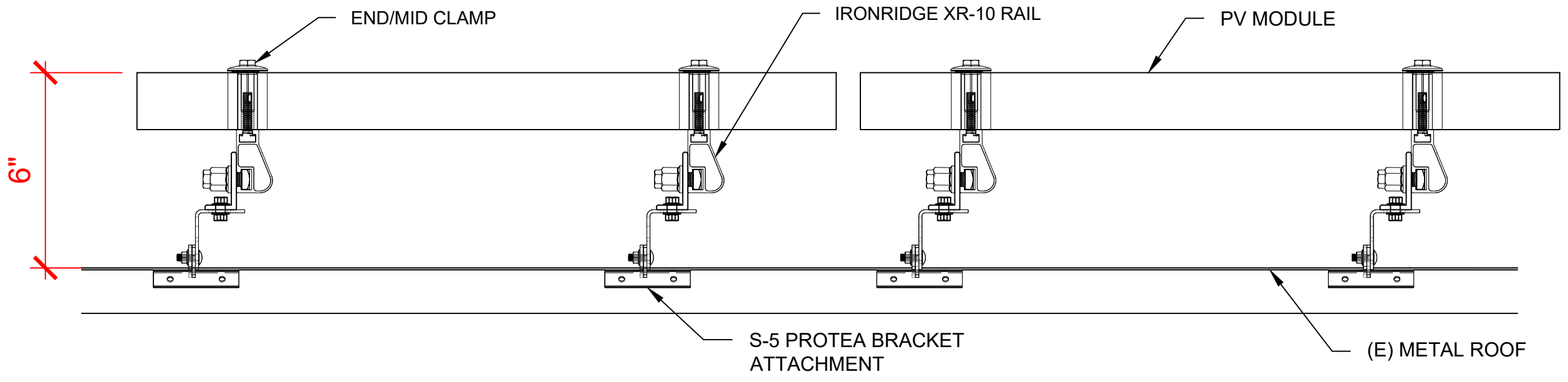


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**1** | STRUCTURAL ATTACHMENT (Side view)  
 PV-5 | SCALE: N.T.S

PROJECT NAME & ADDRESS

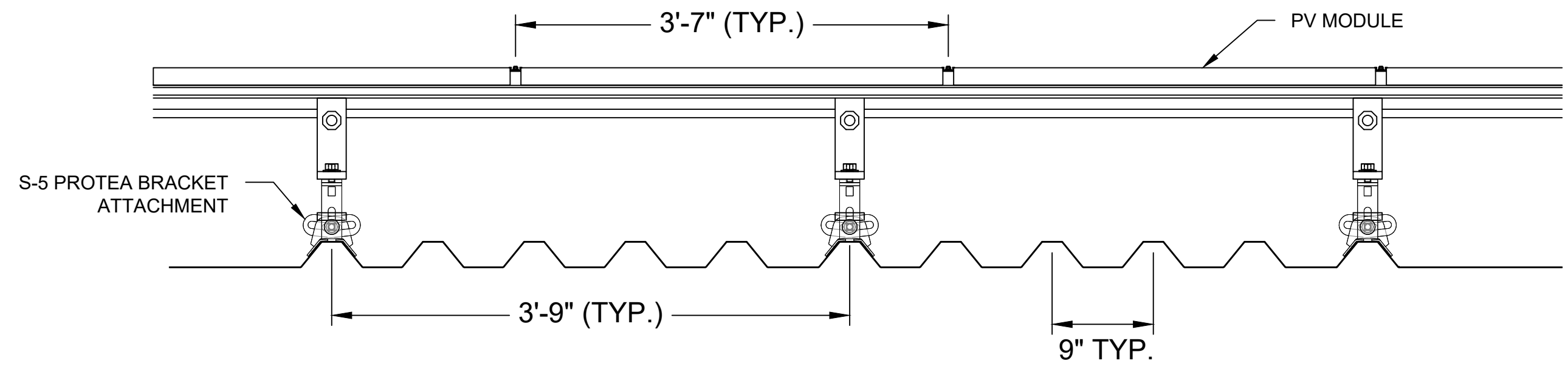
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 SPRING LAKE, NC 28390

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SHEET NAME  
**STRUCTURAL DETAIL**

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

SHEET NUMBER  
**PV-5**



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

DC SYSTEM SIZE: 4.740 kW DC  
AC SYSTEM SIZE: 6.000 kW AC

(12) MISSION SOLAR: MSE395SX9R 395W MONO MODULES WITH (12) SOLAREEDGE: S440 POWER OPTIMIZERS LOCATED UNDER EACH PANEL (240V) AND (01) SOLAREEDGE: SE6000H-US (240V/6000W) INVERTER (01) STRING OF 12 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. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOX 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

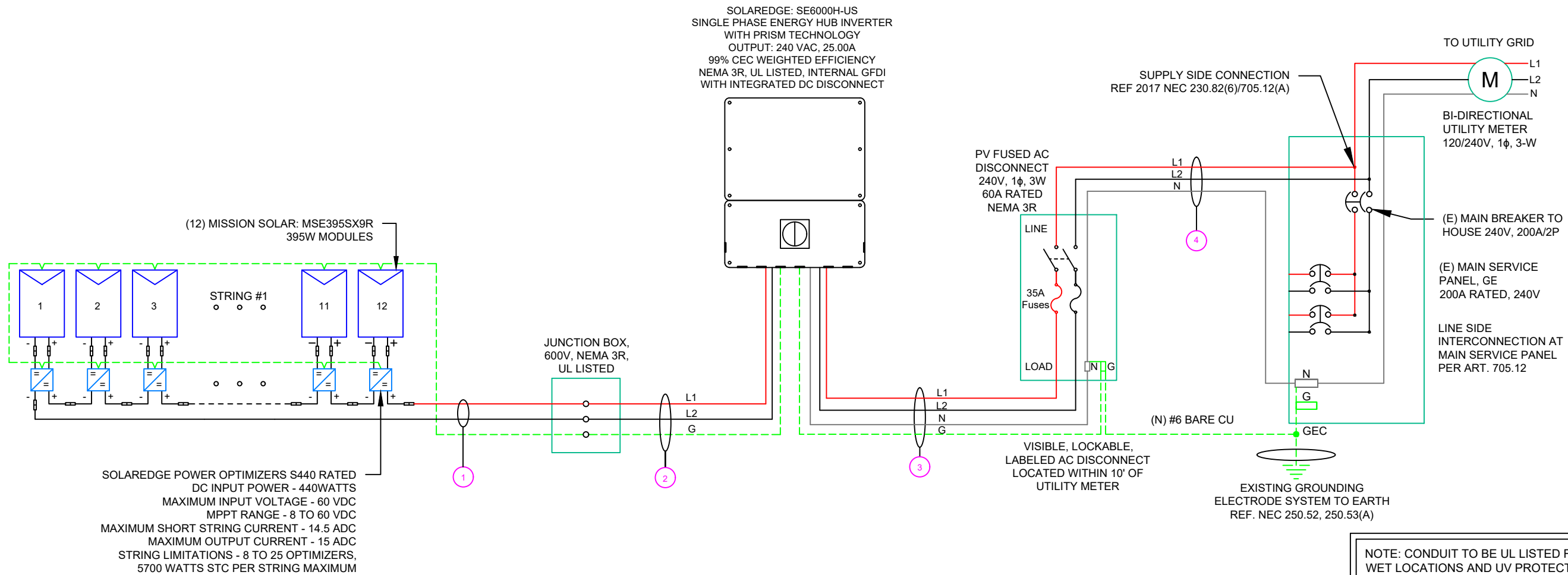
**TOP TIER**  
SOLAR SOLUTIONS

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SHEET NAME

ELECTRICAL LINE DIAGRAM

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-6

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

1 ELECTRICAL LINE DIAGRAM

PV-6

SCALE: NTS

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/6000W) INVERTER
NOMINAL AC POWER	6.000 kW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	25.00A

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

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



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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	AC DISCONNECT	240	25	31.25	35	CU #6 AWG	CU #6 AWG	CU #6 AWG	65	PASS	38	2	75	0.91	1	68.25	PASS	5	0.491	0.051	3/4" EMT	38.0488
AC DISCONNECT	POI	240	25	31.25	35	CU #6 AWG	N/A	CU #6 AWG	65	PASS	38	2	75	0.91	1	68.25	PASS	5	0.491	0.051	3/4" EMT	28.5366

CUMULATIVE VOLTAGE DROP 0.102

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	JUNCTION BOX	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
JUNCTION BOX	INVERTER	380	15.00	18.75	20	CU #10 AWG	CU #10 AWG	35	PASS	38	2	40	0.91	1	36.4	PASS	20	1.24	0.196	3/4" EMT	11.87617

String 1 Voltage Drop 0.245

**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 JUNCTION BOX, 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.

PROJECT NAME & ADDRESS  
**ELIZABETH MOORE RESIDENCE**  
 2474 DOCS RD,  
 SPRING LAKE, NC 28390

DRAWN BY  
**ESR**

SHEET NAME  
**WIRING CALCULATIONS**

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

SHEET NUMBER  
**PV-7**

**PHOTOVOLTAIC POWER SOURCE**

EVERY 10' ON CONDUIT & ENCLOSURES

LABEL- 1:  
 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- 2:  
 LABEL LOCATION:  
 AC DISCONNECT  
 CODE REF: NEC 690.13(B)

**WARNING**

**DUAL POWER SUPPLY**

SOURCE: UTILITY GRID AND  
 PV SOLAR ELECTRIC SYSTEM

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

**SOLAR PV BREAKER:**

**BREAKER IS BACKFED  
 DO NOT RELOCATE**

LABEL-4:  
 LABEL LOCATION:  
 MAIN SERVICE PANEL  
 CODE REF: NEC 705.12(C) & NEC 690.59

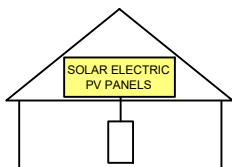
**WARNING**

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

LABEL- 5:  
 LABEL LOCATION:  
 MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
 SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
 CODE REF: NEC 705.12(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- 6:  
 LABEL LOCATION:  
 AC DISCONNECT  
 CODE REF: [NEC 690.56(C)(1)(A)]

**RAPID SHUTDOWN SWITCH  
 FOR SOLAR PV SYSTEM**

LABEL- 7:  
 LABEL LOCATION:  
 AC DISCONNECT  
 MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
 CODE REF: NEC 690.56(C)(2)

**DC DISCONNECT**

LABEL- 8:  
 LABEL LOCATION:  
 INVERTER  
 CODE REF: NEC 690.13(B)

**AC DISCONNECT  
 PHOTOVOLTAIC SYSTEM  
 POWER SOURCE**

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

LABEL- 9:  
 LABEL LOCATION:  
 AC DISCONNECT  
 CODE REF: NEC 690.54

MAXIMUM VOLTAGE **480 V**  
 MAXIMUM CIRCUIT CURRENT **16.50 A**  
 MAXIMUM RATED OUTPUT  
 CURRENT OF THE CHARGE  
 CONTROLLER OR DC-TO-DC  
 CONVERTER (IF INSTALLED)

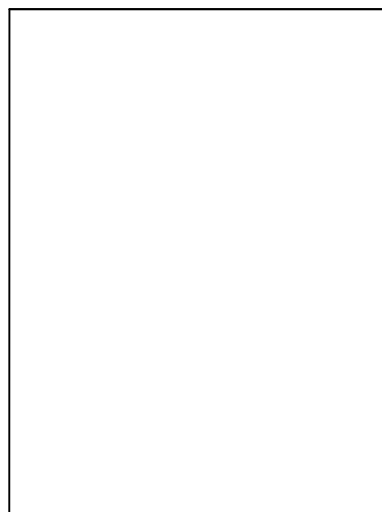
LABEL- 10:  
 LABEL LOCATION:  
 ON THE RIGHT SIDE OF THE INVERTER (PRE-EXISTING ON THE INVERTER)  
 CODE REF: NEC 690.53



**TOP TIER SOLAR SOLUTIONS**

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

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DESCRIPTION	DATE	REV
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PROJECT NAME & ADDRESS

ELIZABETH MOORE  
 RESIDENCE  
 2474 DOCS RD,  
 SPRING LAKE, NC 28390

DRAWN BY  
**ESR**

SHEET NAME  
**LABELS**

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

SHEET NUMBER  
**PV-8**



MSE PERC 66

MISSION SOLAR ENERGY



**395W** Positive Power Tolerance  
Class leading power output -0 to +3%



## 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

### CERTIFICATIONS

CEC



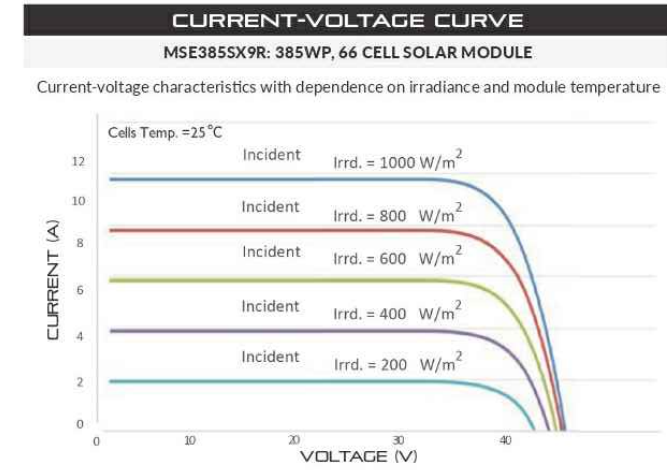
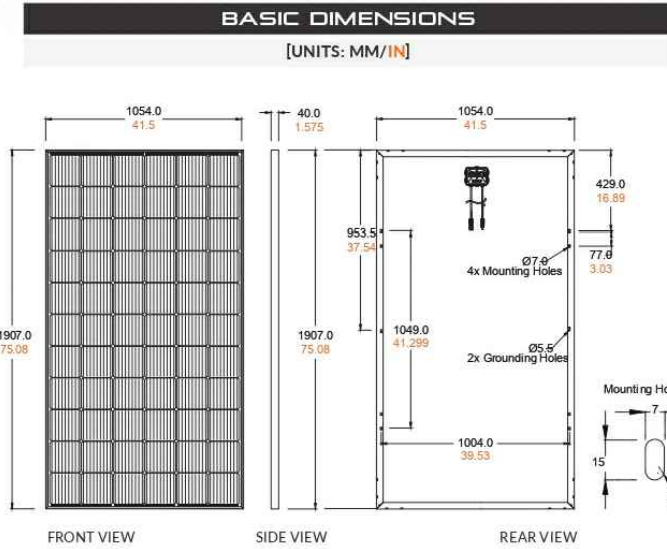
UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

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



**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 | 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	MSE <sub>XXX</sub> SX9R (XXX = P <sub>max</sub> )	390	395	400
Power Output	P <sub>max</sub> W <sub>p</sub>	390	395	400
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 V <sub>oc</sub>	-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)

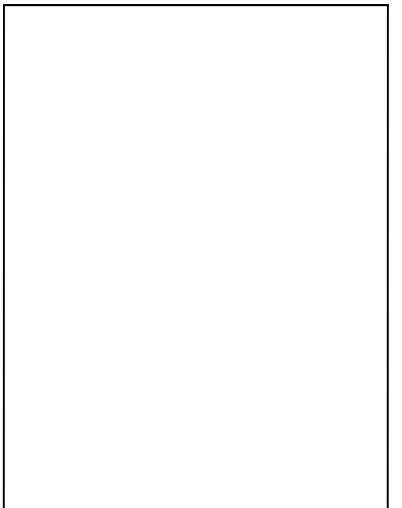
**TOP TIER**  
SOLAR SOLUTIONS

TOP TIER SOLAR SOLUTIONS

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

**REVISIONS**

DESCRIPTION	DATE	REV
INITIAL DESIGN	09/06/2023	



PROJECT NAME & ADDRESS

ELIZABETH MOORE  
RESIDENCE

2474 DOCS RD,  
SPRING LAKE, NC 28390

DRAWN BY  
ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-9

# Power Optimizer For Residential Installations

S440 / S500 / S500B / S650B



POWER OPTIMIZER

## Enabling PV power optimization at the module level

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

\*Functionality subject to inverter model and firmware version

solaredge.com

**solar**edge

## Power Optimizer For Residential Installations

S440 / S500 / S500B / S650B

	S440	S500	S500B	S650B	UNIT
<b>INPUT</b>					
Rated Input DC Power <sup>(1)</sup>	440	500		650	W
Absolute Maximum Input Voltage (Voc)	60		125	85	Vdc
MPPT Operating Range	8 – 60		12.5 – 105	12.5 – 85	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		80		Vdc
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)</b>					
Safety Output Voltage per Power Optimizer		1 ± 0.1			Vdc
<b>STANDARD COMPLIANCE<sup>(2)</sup></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 2100-712:2018-12				
<b>INSTALLATION SPECIFICATIONS</b>					
Maximum Allowed System Voltage		1000			Vdc
Dimensions (W x L x H)	129 x 155 x 30		129 x 165 x 45		mm
Weight	720		790		gr
Input Connector		MC4 <sup>(3)</sup>			
Input Wire Length		0.1			m
Output Connector		MC4			
Output Wire Length		(+) 2.3, (-) 0.10			m
Operating Temperature Range <sup>(4)</sup>		-40 to +85			°C
Protection Rating		IP68			
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 details about CE compliance, see Declaration of Conformity – CE.

(3) For other connector types please contact SolarEdge.

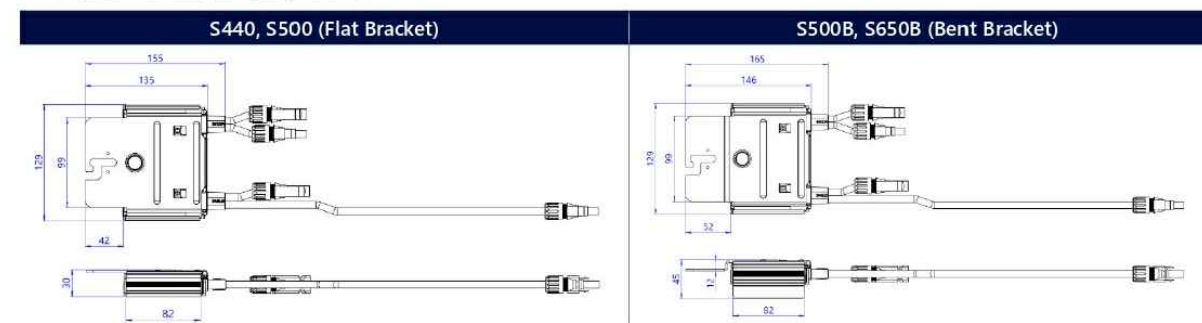
(4) Power de-rating is applied for ambient temperatures above +85°C for S440 and S500, and for ambient temperatures above +75°C for S500B. Refer to the Power Optimizers Temperature De-Rating Technical Note for details.

PV System Design Using a SolarEdge Inverter <sup>(5)</sup>	SolarEdge Home Wave Inverter Single Phase	SolarEdge Home Short String Inverter Three Phase	Three Phase for 230/400V Grid	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500: 8 S500B, S650B: 6	9 8	16	18	
Maximum String Length (Power Optimizers)	25	20	50	50	
Maximum Continuous Power per String	5700	5625	11250	12750	W
Maximum Allowed Connected Power per String (In multiple string designs, the maximum is permitted only when the difference in connected power between strings is 2,000W or less)	See <sup>(6)</sup>	See <sup>(6)</sup>	13500	15000	W
Parallel Strings of Different Lengths or Orientations			Yes		

(5) It is not allowed to mix S-series and P-series Power Optimizers in new installations in the same string.

(6) If the inverter's rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverter's maximum input DC power.

Refer to Application Note: Single String Design Guidelines.



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CE RoHS

**TOP TIER**  
SOLAR SOLUTIONS

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

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	09/06/2023	

PROJECT NAME & ADDRESS

ELIZABETH MOORE  
RESIDENCE

2474 DOCS RD,  
SPRING LAKE, NC 28390

DRAWN BY

ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-10

# Single Phase Energy Hub Inverter with Prism Technology

For North America

SE3000H-US / SE3800H-US / **SE6000H-US** / SE7600H-US / SE10000H-US / SE11400H-US<sup>(1)</sup>



HOME BACKUP

## Optimized battery storage with HD-Wave technology

- Record-breaking 99% weighted efficiency with 200% DC oversizing
- Multi-inverter, scalable storage solution
- Small, lightweight, and easy to install
- With enhanced battery power up to 10kW
- Modular design, future ready with optional upgrades to:
  - DC-coupled storage for full or partial home backup
  - Integrated arc fault protection and rapid shutdown for NEC 2014, NEC 2017 and NEC 2020, per article 690.11 and 690.12
  - Built-in consumption monitoring
  - Embedded revenue grade production data, ANSI C12.20 Class 0.5
  - Direct connection to the SolarEdge smart EV charger

solaredge.com



# Single Phase Energy Hub Inverter with Prism Technology

For North America

SE3000H-US / SE3800H-US / **SE6000H-US** / SE7600H-US / SE10000H-US / SE11400H-US<sup>(1)</sup>

	SE3000H-US	SE3800H-US	<b>SE6000H-US</b>	SE7600H-US	SE10000H-US	SE11400H-US	UNITS
<b>OUTPUT - AC ON GRID</b>							
Rated AC Power	3000	3800 @ 240V 3300 @ 208V	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	W
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	W
AC Frequency Range (min - nom - max)	59.3 - 60 - 60.5 <sup>2)</sup>						Hz
Maximum Continuous Output Current @ 240V	12.5	16	25	32	42	47.5	A
Maximum Continuous Output Current @ 208V	-	16	24	-	-	48.5	A
GFDI Threshold	1						A
Total Harmonic Distortion (THD)	<3						%
Power Factor	1, adjustable -0.85 to 0.85						
Utility Monitoring/Islanding Protection/Country Configurable Thresholds	Yes						
Charge Battery from AC (if allowed)	Yes						
Typical Nighttime Power Consumption	<2.5						W
<b>OUTPUT - AC BACKUP<sup>(3)</sup></b>							
Rated AC Power in Backup Operation <sup>4)</sup>	3000	3800 7600*	6000	7600 10300*	10000	10300	W
AC L-L Output Voltage Range in Backup	211 - 264						Vac
AC L-N Output Voltage Range in Backup	105 - 132						Vac
AC Frequency Range in Backup (min - nom - max)	55 - 60 - 65						Hz
Maximum Continuous Output Current in Backup Operation	12.5	16 32*	25	32 43*	42	43	A
GFDI	1						A
THD	<5						%
<b>OUTPUT - SMART EV CHARGER AC</b>							
Rated AC Power	9600						W
AC Output Voltage Range	211 - 264						Vac
On-Grid AC Frequency Range (min - nom - max)	59.3 - 60 - 60.5						Hz
Maximum Continuous Output Current @ 240V (grid, PV and battery)	40						Aac
<b>INPUT - DC (PV AND BATTERY)</b>							
Transformer-less, Ungrounded	Yes						
Max Input Voltage	480						Vdc
Nom DC Input Voltage	380						Vdc
Reverse-Polarity Protection	Yes						
Ground-Fault Isolation Detection	600kΩ Sensitivity						
<b>INPUT - DC (PV)</b>							
Maximum DC Power @ 240V	6000	7600 15200*	12000	15200 22800*	22000	22800	W
Maximum DC Power @ 208V	-	6600	10000	-	-	20000	W
Maximum Input Current <sup>(5)</sup> @ 240V	8.5	10.5 20*	16.5	20 31*	27	31	Adc
Maximum Input Current <sup>(5)</sup> @ 208V	-	9	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45						Adc
Maximum Inverter Efficiency	99		99.2				%
CEC Weighted Efficiency	99					99 @ 240V 98.5 @ 208V	%
2-pole Disconnection	Yes						

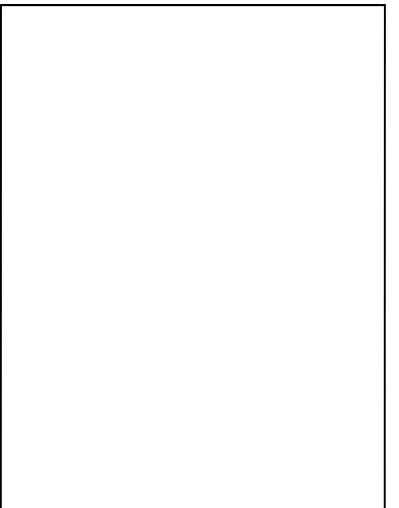
\* Supported with PN SExxxxH-USMxxxxxx or SExxxxH-USMxxxxxx  
 (1) These specifications apply to inverters with part numbers SExxxxH-USMxxxxxx or SExxxxH-USMxxxxxx and connection unit model number DCD-1PH-US-PXH-F-x  
 (2) For other regional settings please contact SolarEdge support  
 (3) Not designed for standalone applications and requires AC for commissioning. Backup functionality is only supported for 240V grid  
 (4) Rated AC power in Backup Operation are valid for installations with multiple inverters. For a single backup inverter operation, rated AC power in Backup is 90% of the value stated  
 (5) A higher current source may be used; the inverter will limit its input current to the values stated

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INITIAL DESIGN	09/06/2023	



PROJECT NAME & ADDRESS

ELIZABETH MOORE  
RESIDENCE

2474 DOCS RD,  
SPRING LAKE, NC 28390

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT SPECIFICATION**

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

SHEET NUMBER  
**PV-11**

# / Single Phase Energy Hub Inverter with Prism Technology

For North America

SE3000H-US / SE3800H-US / **SE6000H-US** / SE7600H-US / SE10000H-US / SE11400H-US<sup>(1)</sup>

	SE3000H-US	SE3800H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	UNITS
<b>INPUT - DC (BATTERY)</b>							
Supported Battery Types	SolarEdge Energy Bank, LG RESU Prime <sup>(6)</sup>						
Number of Batteries per Inverter	Up to 3 SolarEdge Energy Bank; up to 2 LG RESU Prime						
Continuous Power <sup>(7)</sup>	6000	7600		10000			W
Peak Power <sup>(7)</sup>	6000	7600		10000			W
Max Input Current	16	20		26.5			Adc
2-pole Disconnection	Yes						
<b>SMART ENERGY CAPABILITIES</b>							
Consumption Metering	Built-in <sup>(8)</sup>						
Backup & Battery Storage	With Backup Interface (purchased separately) for service up to 200A; Up to 3 inverters						
EV Charging	Direct connection to Smart EV charger						
<b>ADDITIONAL FEATURES</b>							
Supported Communication Interfaces	RS485, Ethernet, Cellular <sup>(9)</sup> , Wi-Fi (optional), SolarEdge Energy Net (optional)						
Revenue Grade Metering, ANSI C12.20	Built-in <sup>(8)</sup>						
Integrated AC, DC and Communication Connection Unit	Yes						
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi Access Point for local connection						
DC Voltage Rapid Shutdown (PV and Battery)	Yes, according to NEC 2014, NEC 2017 and NEC 2020 690.12						
<b>STANDARD COMPLIANCE</b>							
Safety	UL1741, UL1741 SA, UL1741 PCS, UL1699B, UL1998, UL9540, CSA 22.2						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14H						
Emissions	FCC part 15 class B						
<b>INSTALLATION SPECIFICATIONS</b>							
AC Output and EV AC Output Conduit Size / AWG Range	1" maximum / 14-4 AWG						
DC Input (PV and Battery) Conduit Size / AWG Range	1" maximum / 14-6 AWG						
Dimensions with Connection Unit (H x W x D)	17.7 x 14.6 x 6.8 / 450 x 370 x 174		17.7 x 14.6 x 6.8 / 450 x 370 x 174 17.7 x 14.6 x 6.8 / 450 x 370 x 174*	17.7 x 14.6 x 6.8 / 450 x 370 x 174			in / mm
Weight with Connection Unit	26 / 11.8		26 / 11.8 41.7 / 18.9*	41.7 / 18.9			lb / kg
Noise	< 25	< 25 < 50*	< 25	< 50			dBA
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 <sup>(10)</sup>						
Protection Rating	NEMA 4						

(6) The part numbers SExxxxH-USxMxxxx only support the SolarEdge Energy Bank. The part numbers SExxxxH-USxNxxxx support both SolarEdge Energy Bank and LG RESU Prime batteries. Requires supporting inverter firmware.

(7) Discharge power is limited up to the inverter rated AC power for on-grid and backup applications.

(8) For consumption metering current transformers should be ordered separately: SECT-SPL-225A-T-20 or SEACT0750-400NA-20 units per box. Revenue grade metering is only for production metering.

(9) Information concerning the Data Plan's terms & conditions is available in the following link:

<https://www.solaredge.com/sites/default/files/se-communication-plan-terms-and-conditions-eng.pdf>

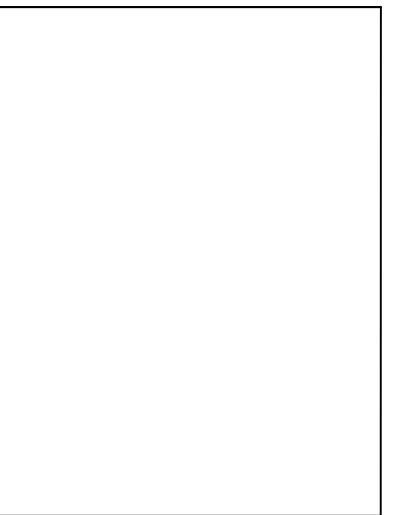
(10) Full power up to at least 50°C / 122°F; for power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>



TOP TIER SOLAR SOLUTIONS

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PROJECT NAME & ADDRESS	
ELIZABETH MOORE RESIDENCE	2474 DOCS RD, SPRING LAKE, NC 28390

DRAWN BY ESR
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SHEET NAME EQUIPMENT SPECIFICATION
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SHEET SIZE ANSI B 11" X 17"
-----------------------------------

SHEET NUMBER PV-12
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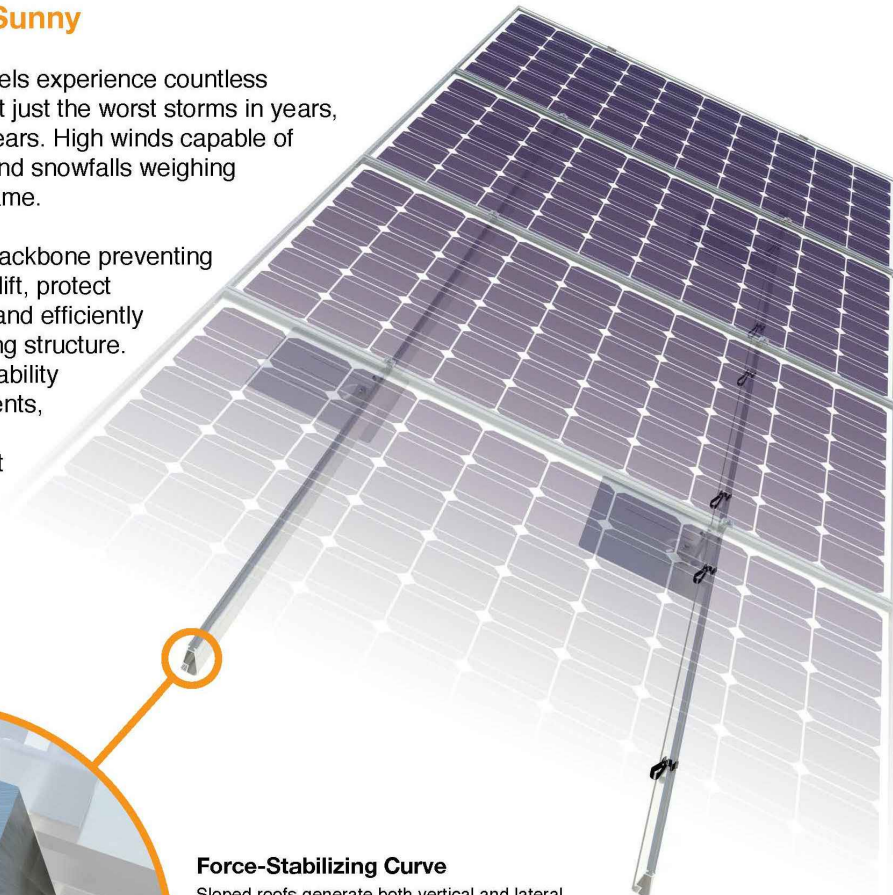


## XR Rail Family

### 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.



## 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.

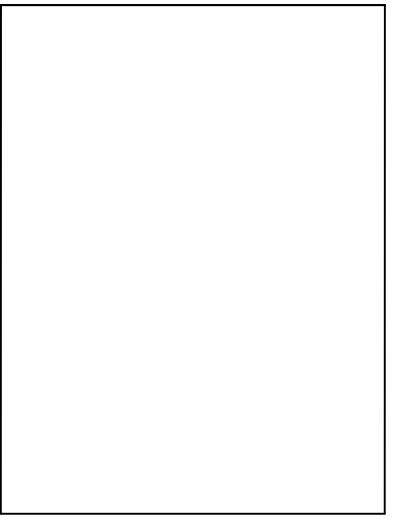
Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100						
	120						
	140	XR10		XR100		XR1000	
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						



### TOP TIER SOLAR SOLUTIONS

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

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	09/06/2023	



#### PROJECT NAME & ADDRESS

ELIZABETH MOORE  
RESIDENCE

2474 DOCS RD,  
SPRING LAKE, NC 28390

DRAWN BY  
ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-13

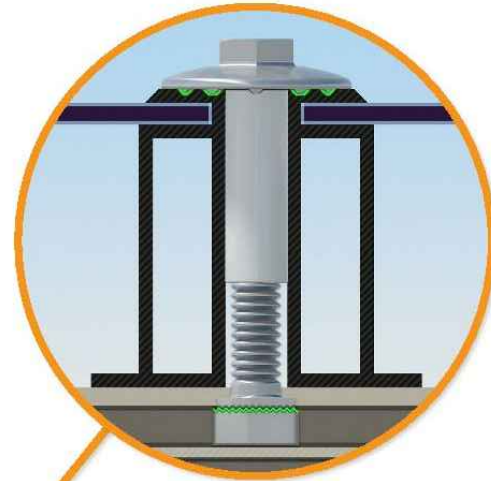


## UFO Family of Components

### 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

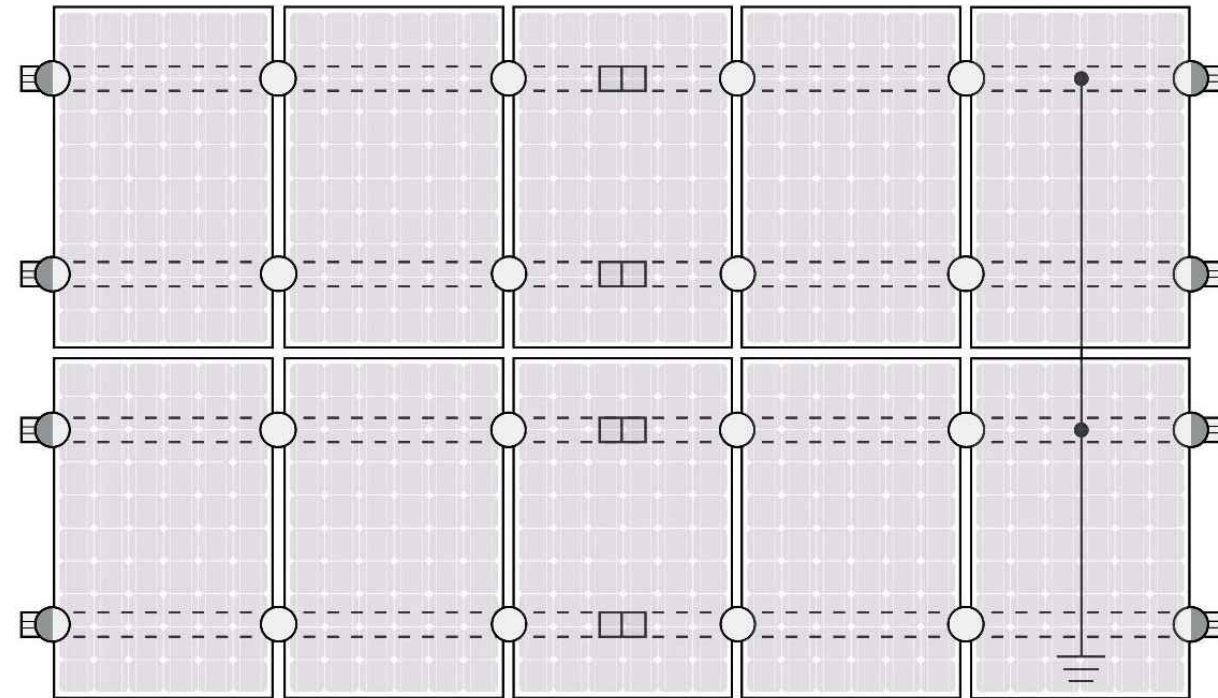
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



#### 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



○ UFO    ◐ Stopper Sleeve    ● Grounding Lug    □ Bonded Splice    ⊥ Ground Wire

⚠ 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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# S-5!<sup>®</sup>

## The Right Way!

### ProteaBracket™

ProteaBracket™ is the most versatile standing seam metal roof attachment solution on the market, fitting most trapezoidal sheet profiles with and without intermediate insulation. It features an adjustable attachment base and multiple solar module attachment options (illustrated on back) to accommodate varying widths and heights. There are no messy sealants to apply and no chance for leaks; the ProteaBracket comes with factory-applied, adhesive rubber sealant to ensure quick installation and a weather-proof fit.

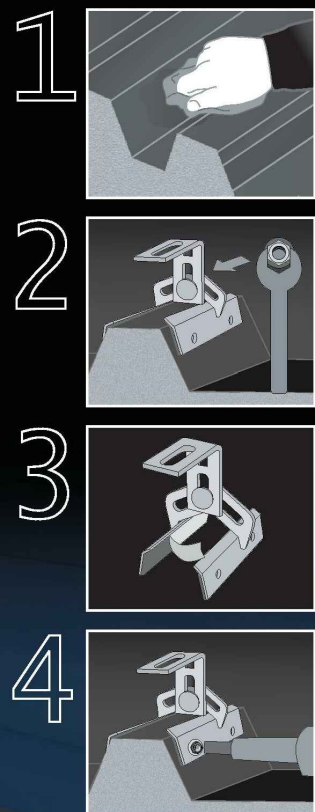
Installation is simple! The ProteaBracket is mounted directly onto the crown of the panel, straddling the profile. No surface preparation is necessary; simply wipe away excess oil and debris, align, and apply. Secure ProteaBracket through its pre-punched holes, using the hardened drill point S-5!<sup>®</sup> screws.

ProteaBracket is the perfect match for our S-5-PV Kit and spares you the hassle of cold-bridging! For a solar attachment solution that is both economical and easy to use, choose ProteaBracket.\*

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

S-5!<sup>®</sup> ProteaBracket™ is a versatile bracket that adjusts easily to most trapezoidal roof profiles.

888-825-3432 | www.S-5.com



ProteaBracket™

# S-5!<sup>®</sup>

## The Right Way!

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal exposed-fastened metal roof profiles! No messy sealants to apply. The factory-applied adhesive rubber sealant weather-proofs and makes installation easy!

Each ProteaBracket™ comes with a factory-applied, adhesive rubber sealant on the base. A structural A2 stainless steel bimetal attachment bracket, ProteaBracket is compatible with most common metal roofing materials. All four pre-punched holes must be used to achieve tested strength. Mounting hardware is furnished with the ProteaBracket. For design assistance, ask your distributor, or visit [www.S-5.com](http://www.S-5.com) for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications. S-5!<sup>®</sup> holding strength is unmatched in the industry.

### Multiple Attachment Options:

Side Rail Option



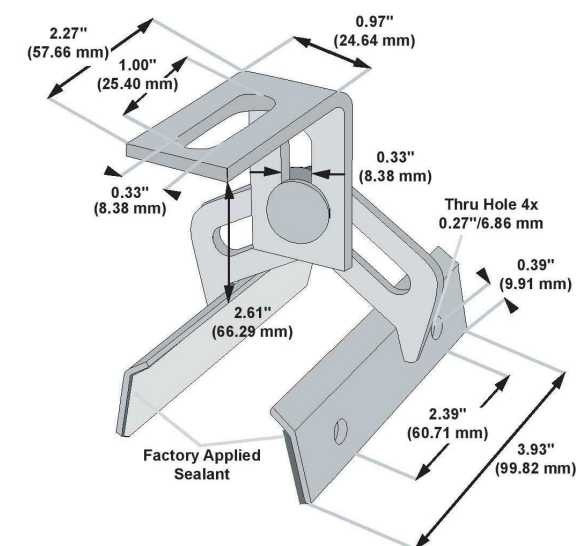
Top Rail Option



S-5-PV Kit Option

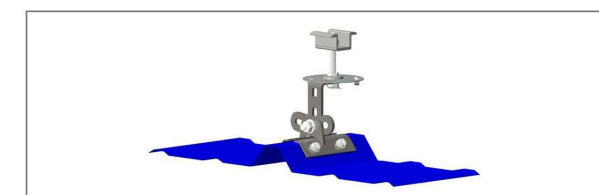


### ProteaBracket™



Please note: All measurements are rounded to the second decimal place.

### Example Applications



S-5-PV Kit demonstrated with a ProteaBracket on a trapezoidal profile.

### Example Profile



#### S-5!<sup>®</sup> Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents, and trademarks, visit the S-5!<sup>®</sup> website at [www.S-5.com](http://www.S-5.com).

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