

# PHOTOVOLTAIC ROOF MOUNT SYSTEM

12 MODULES-ROOF MOUNTED - 4.740 KW DC, 3.480 KW AC

47 JUNO DR, BROADWAY, NC 27505



TOP TIER SOLAR SOLUTIONS

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

| REVISIONS      |          |     |
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| DESCRIPTION    | DATE     | REV |
| INITIAL DESIGN | 03/20/23 |     |



Wyssling Consulting, PLLC  
76 N Meadowbrook Drive Alpine UT 84004  
North Carolina CDA # P-2308  
Signed 3/20/2023

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## PROJECT DATA

PROJECT ADDRESS: 47 JUNO DR, BROADWAY, NC 27505

OWNER: KIMBERLY JOSEY

DESIGNER: ESR

SCOPE: 4.740 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 12 MISSION SOLAR: MSE395SX9R 395W PV MODULES WITH 12 ENPHASE IQ8PLUS-72-2-US 290W MICRO INVERTERS EQUIPPED WITH RAPID SHUTDOWN

AUTHORITIES HAVING JURISDICTION:  
BUILDING: HARNETT COUNTY  
ZONING: HARNETT COUNTY  
UTILITY: DUKE ENERGY

## SHEET INDEX

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PV-2 SITE PLAN  
PV-3 ROOF PLAN & MODULES  
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PV-6 ELECTRICAL LINE DIAGRAM  
PV-7 WIRING CALCULATIONS  
PV-8 LABELS  
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PV-10+ EQUIPMENT SPECIFICATIONS

## SIGNATURE



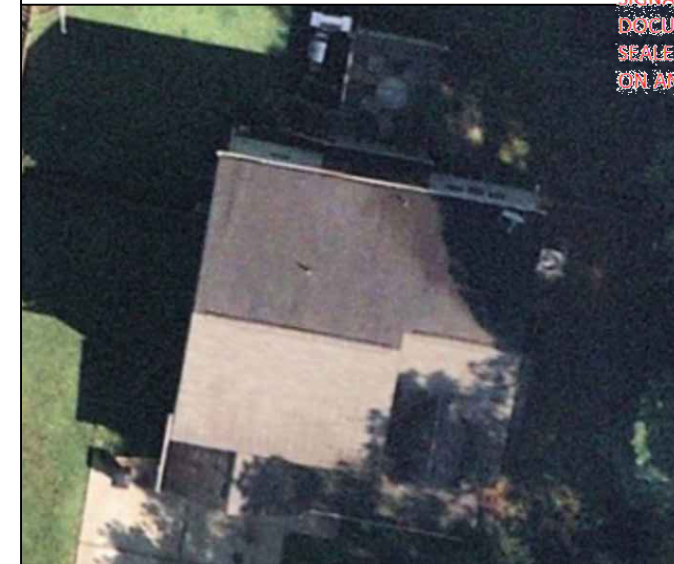
## GENERAL NOTES

- 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

PROJECT NAME & ADDRESS

KIMBERLY JOSEY  
RESIDENCE  
47 JUNO DR,  
BROADWAY, NC 27505

DRAWN BY

ESR

SHEET NAME

COVER SHEET

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-1

# PROJECT DESCRIPTION:

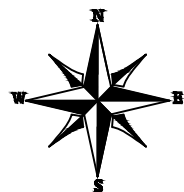
12 X MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES  
 DC SYSTEM SIZE: 12 x 395 = 4.740KW DC  
 AC SYSTEM SIZE: 12 x 290 = 3.480KW AC

## EQUIPMENT SUMMARY

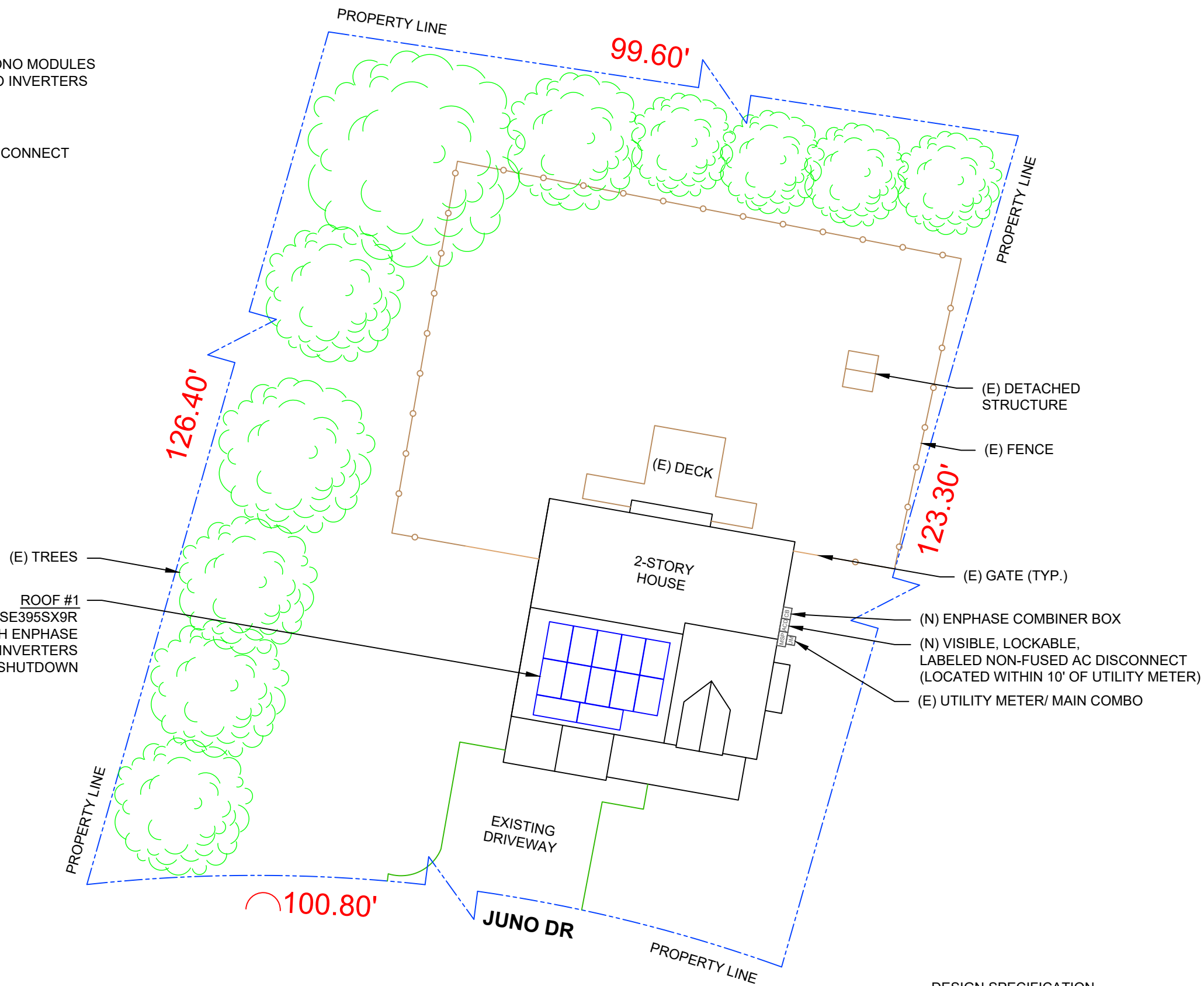
12 MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 12 ENPHASE IQ8PLUS-72-2-US 290W MICRO INVERTERS  
 EQUIPPED WITH RAPID SHUTDOWN

ROOF ARRAY AREA #1:- 259.68 SQ FT.

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



ROOF #1  
 (12) MISSION SOLAR: MSE395SX9R  
 395W MONO MODULES WITH ENPHASE  
 IQ8PLUS-72-2-US 290W MICRO INVERTERS  
 EQUIPPED WITH RAPID SHUTDOWN



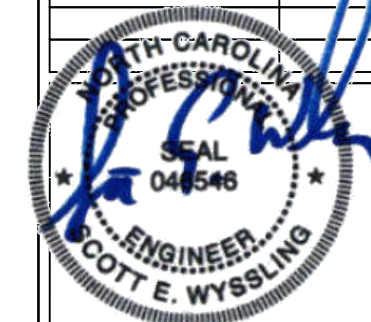
**DESIGN SPECIFICATION**  
 OCCUPANCY: II  
 CONSTRUCTION: SINGLE-FAMILY  
 ZONING: RESIDENTIAL  
 GROUND SNOW LOAD: REFER STRUCTURAL LETTER  
 WIND EXPOSURE: REFER STRUCTURAL LETTER  
 WIND SPEED: REFER STRUCTURAL LETTER



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 RESIDENCE  
 47 JUNO DR,  
 BROADWAY, NC 27505

DRAWN BY

ESR

SHEET NAME

SITE PLAN

SHEET SIZE

ANSI B  
 11" X 17"

SHEET NUMBER

PV-2

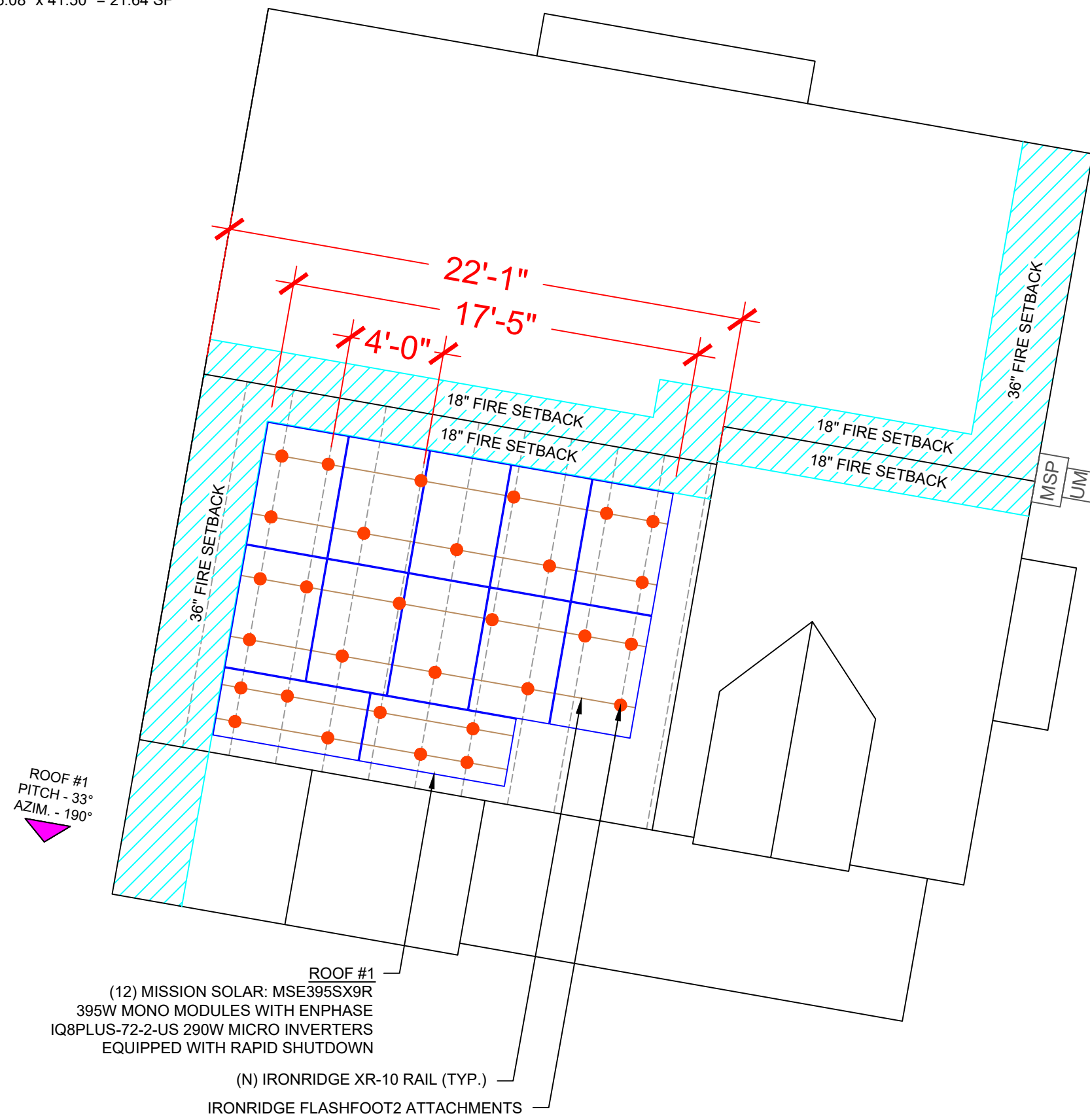
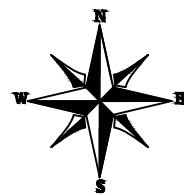
1 | SITE PLAN

PV-2 | SCALE: 1/16" = 1'-0"



**MODULE TYPE, DIMENSIONS & WEIGHT**

NUMBER OF MODULES = 12 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 #1  
 PITCH - 33°  
 AZIM. - 190°

ROOF #1  
 (12) MISSION SOLAR: MSE395SX9R  
 395W MONO MODULES WITH ENPHASE  
 IQ8PLUS-72-2-US 290W MICRO INVERTERS  
 EQUIPPED WITH RAPID SHUTDOWN

(N) IRONRIDGE XR-10 RAIL (TYP.)  
 IRONRIDGE FLASHFOOT2 ATTACHMENTS

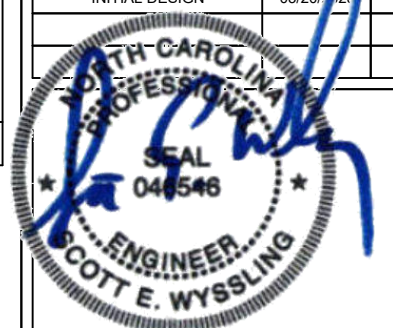
| ROOF DESCRIPTION |              |            |                 |            |               |
|------------------|--------------|------------|-----------------|------------|---------------|
| ROOF TYPE        |              |            | ASPHALT SHINGLE |            |               |
| ROOF LAYER       |              |            | 1 LAYER         |            |               |
| ROOF             | # OF MODULES | ROOF PITCH | AZIMUTH         | TRUSS SIZE | TRUSS SPACING |
| #1               | 12           | 33°        | 190°            | 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 (%) |
| 259.68                        | 1374.63                   | 19                             |

**TOP TIER SOLAR SOLUTIONS**

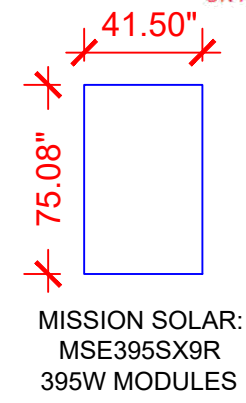
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(E) UTILITY METER/ MAIN COMBO

**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

PROJECT NAME & ADDRESS

**KIMBERLY JOSEY RESIDENCE**  
 47 JUNO DR,  
 BROADWAY, NC 27505

DRAWN BY  
**ESR**

SHEET NAME  
**ROOF PLAN & MODULES**

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

SHEET NUMBER  
**PV-3**

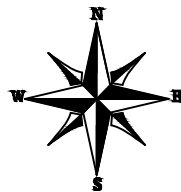
**1 ROOF PLAN & MODULES**

PV-3 SCALE: 3/16" = 1'-0"

DC SYSTEM SIZE: 12 x 395 = 4.740KW DC  
 AC SYSTEM SIZE: 12 x 290 = 3.480KW AC  
 (12) MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 WITH (12) ENPHASE IQ8PLUS-72-2-US 290W MICRO  
 INVERTERS EQUIPPED WITH RAPID SHUTDOWN  
 LOCATED UNDER EACH PANEL (240V)

**CIRCUIT LEGENDS**

--- CIRCUIT #1



| BILL OF MATERIALS   |     |
|---|-----|
| EQUIPMENT DESCRIPTION   | QTY |
| SOLAR PV MODULES: MISSION SOLAR: MSE395SX9R 395W MODULE   | 12  |
| MICRO INVERTERS: ENPHASE IQ8PLUS-72-2-US 290W MICRO INVERTERS EQUIPPED WITH RAPID SHUTDOWN  | 12  |
| SOLADECK  | 1   |
| COMBINER BOX: ENPHASE IQ COMBINER X-IQ-AM1-240-4/4C 120/240VAC, 1φ, 3W 125A RATED BUS BAR, NEMA 3R SOLAR LOADS ONLY UL 1741 COMPLIANT | 1   |
| 20A BREAKER   | 1   |
| AC DISCONNECT: NON-FUSED AC DISCONNECT 30A, 240V NEMA 3R, UL LISTED   | 1   |
| IRONRIDGE XR10 RAIL (RAIL 168" (14 FEET) BLACK) (XR-10-168B)  | 10  |
| BONDED SPLICE, XR10 (XR10-BOSS-01-M1)   | 4   |
| UNIVERSAL MODULE CLAMP, BLACK (UFO-CL-01-B1)  | 30  |
| STOPPER SLEEVE, 40MM, BLACK (UFO-STP-40MM-B1)   | 12  |
| GROUNDING LUG (XR-LUG-03-A1)  | 3   |
| IRONRIDGE FLASHFOOT2 ATTACHMENTS  | 31  |
| SQUARE-BOLT BONDING HARDWARE (BHW-SQ-02-A1)   | 31  |

- (N) ENPHASE COMBINER BOX
- (N) VISIBLE, LOCKABLE, LABELED NON-FUSED AC DISCONNECT (LOCATED WITHIN 10' OF UTILITY METER)
- (E) UTILITY METER/ MAIN COMBO

| 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                            |



**TOP TIER SOLAR SOLUTIONS**  
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 RESIDENCE**  
 47 JUNO DR,  
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DRAWN BY  
**ESR**

SHEET NAME  
**ELECTRICAL PLAN**

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

SHEET NUMBER  
**PV-4**



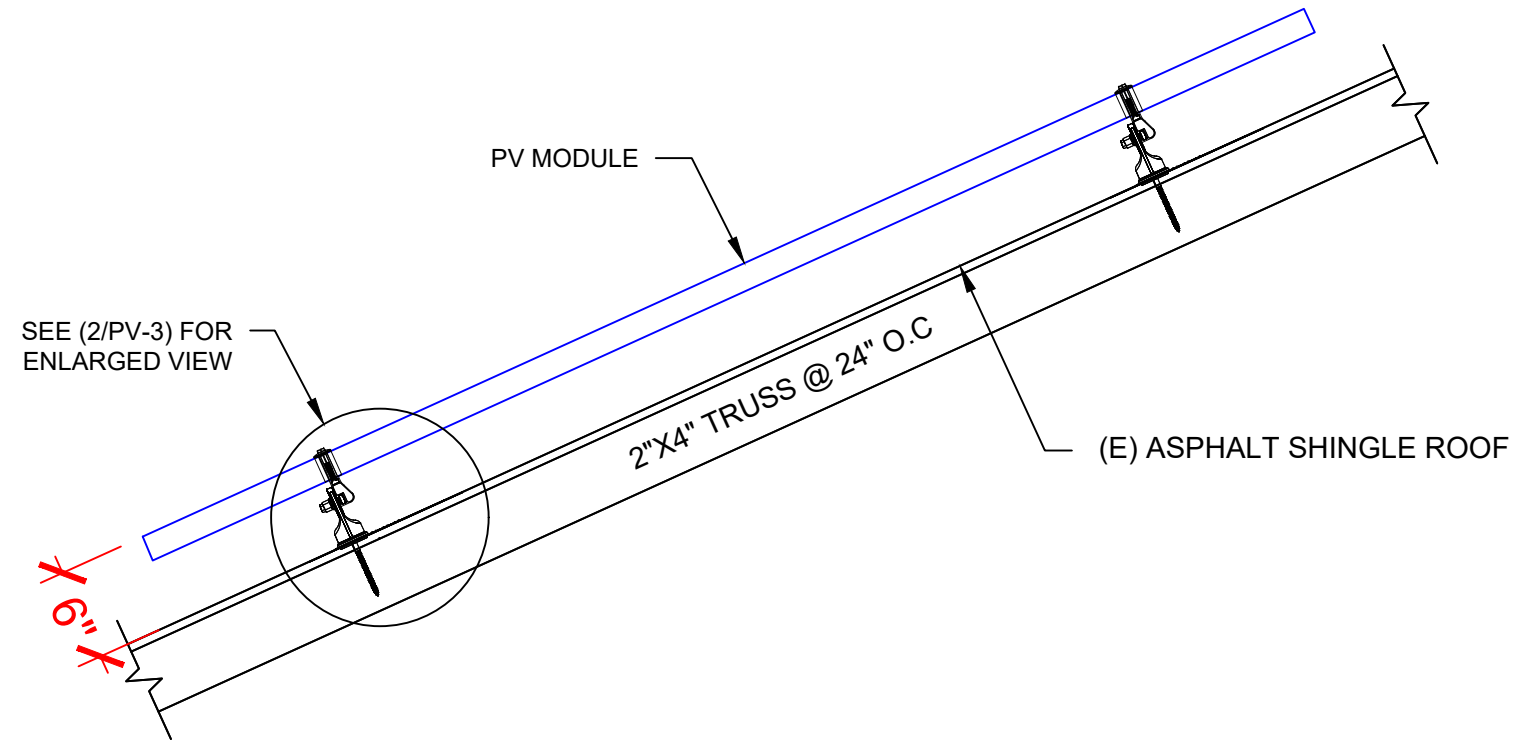
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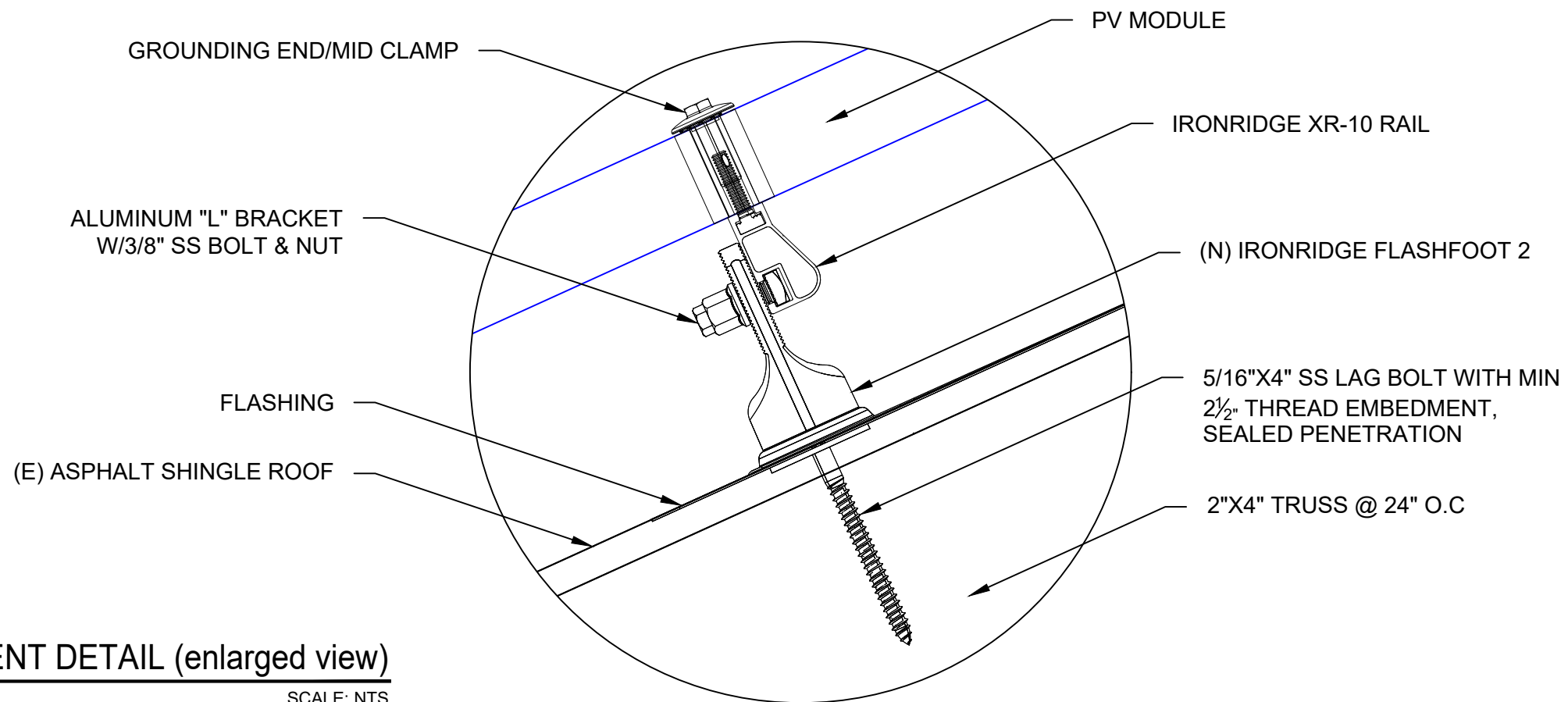


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**1** | **STRUCTURAL ATTACHMENT (Side view)**  
 PV-5 | SCALE: N.T.S



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

PROJECT NAME & ADDRESS  
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 BROADWAY, NC 27505

DRAWN BY  
**ESR**

SHEET NAME  
**STRUCTURAL DETAIL**

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

SHEET NUMBER  
**PV-5**

DC SYSTEM SIZE: 12 x 395 = 4.740KW DC  
 AC SYSTEM SIZE: 12 x 290 = 3.480KW AC

(12) MISSION SOLAR: MSE395SX9R 395W MONO MODULES  
 WITH (12) ENPHASE IQ8PLUS-72-2-US 290W MICRO INVERTERS  
 EQUIPPED WITH RAPID SHUTDOWN  
 LOCATED UNDER EACH PANEL (240V)  
 (1) BRANCH CIRCUIT OF 12 MODULES ARE CONNECTED IN PARALLEL

**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:**

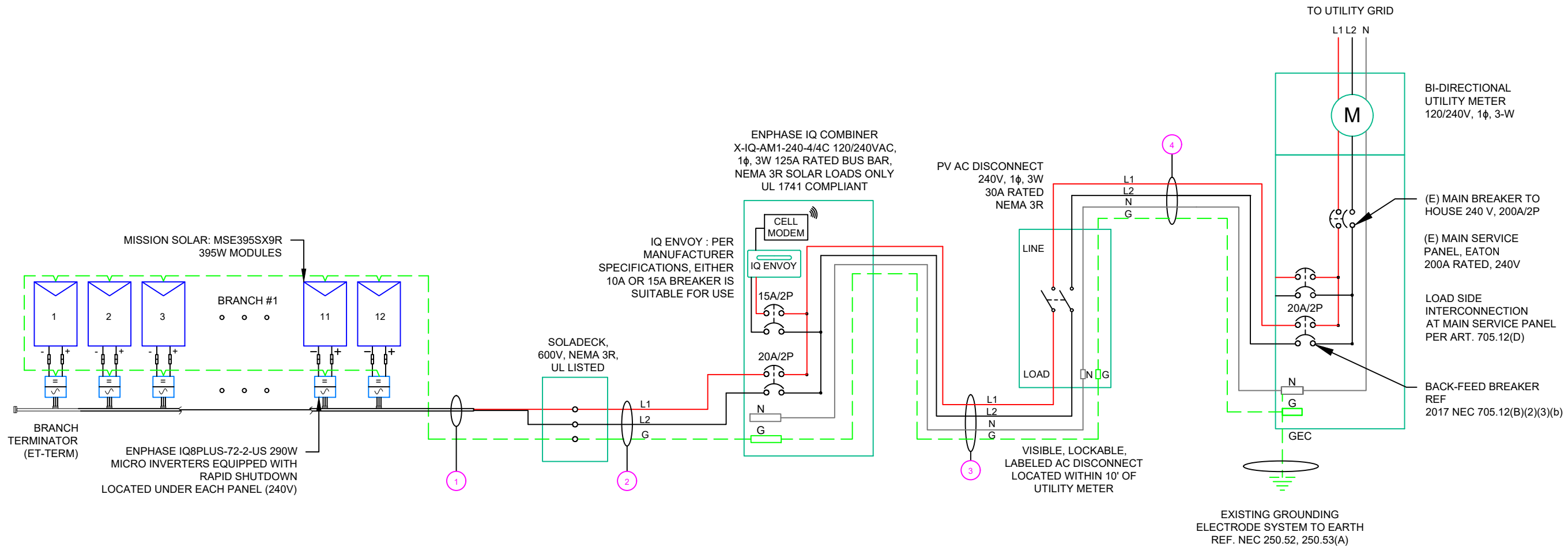
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3. 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 (2) | #12AWG - ENPHASE ENGAGE CABLE (L1 & L2 NO NEUTRAL) | N/A                  | N/A          |
| 1 (1) | #6AWG - BARE COPPER IN FREE AIR                    |                      |              |
| 2 (2) | #10AWG - CU, THWN-2                                | EMT OR LFMC IN ATTIC | 3/4"         |
| 1 (1) | #10AWG - CU, THWN-2 GND                            |                      |              |
| 2 (2) | #10AWG - CU, THWN-2                                | EMT, LFMC OR PVC     | 3/4"         |
| 1 (1) | #10AWG - CU, THWN-2 N                              |                      |              |
| 1 (1) | #10AWG - CU, THWN-2 GND                            |                      |              |
| 2 (2) | #10AWG - CU, THWN-2                                | EMT, LFMC OR PVC     | 3/4"         |
| 1 (1) | #10AWG - CU, THWN-2 N                              |                      |              |
| 1 (1) | #10AWG - CU, THWN-2 GND                            |                      |              |

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DRAWN BY  
**ESR**

SHEET NAME  
**ELECTRICAL LINE DIAGRAM**

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

SHEET NUMBER  
**PV-6**



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

| SOLAR MODULE SPECIFICATIONS |                                       |
|-----------------------------|---------------------------------------|
| MANUFACTURER / MODEL #      | 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)  |

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

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



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| AC 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 (%) |
| CIRCUIT 1        | SOLADECK            | 240         | 14.52                    | 18.15        | 20            | N/A          | BARE COPPER #6 AWG | CU #12 AWG     | 25                | PASS              | 38                 | 2                              | 30                | 0.91  | 1  | 27.3                      | PASS              |                      |                                | 0.5                     | N/A          | #N/A             |
| SOLADECK         | COMBINER PANEL 1    | 240         | 14.52                    | 18.15        | 20            | N/A          | CU #10 AWG         | CU #10 AWG     | 35                | PASS              | 38                 | 2                              | 40                | 0.91  | 1  | 36.4                      | PASS              | 30                   | 1.24                           | 0.450                   | 3/4" EMT     | 11.87617         |
| COMBINER PANEL 1 | AC DISCONNECT       | 240         | 14.52                    | 18.15        | 20            | CU #10 AWG   | CU #10 AWG         | CU #10 AWG     | 35                | PASS              | 38                 | 2                              | 40                | 0.91  | 1  | 36.4                      | PASS              | 5                    | 1.24                           | 0.075                   | 3/4" EMT     | 15.8349          |
| AC DISCONNECT    | POI                 | 240         | 14.52                    | 18.15        | 20            | CU #10 AWG   | CU #10 AWG         | CU #10 AWG     | 35                | PASS              | 38                 | 2                              | 40                | 0.91  | 1  | 36.4                      | PASS              | 5                    | 1.24                           | 0.075                   | 3/4" EMT     | 15.8349          |

Circuit 1 Voltage Drop 1.100

**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.

PROJECT NAME & ADDRESS

KIMBERLY JOSEY  
RESIDENCE  
47 JUNO DR,  
BROADWAY, NC 27505

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

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

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

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

**⚠ WARNING**  
**TURN OFF PHOTOVOLTAIC AC  
DISCONNECT PRIOR TO  
WORKING INSIDE PANEL**

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

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

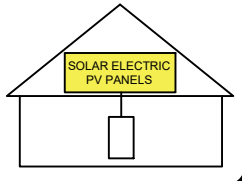
LABEL- 5:  
LABEL LOCATION:  
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
CODE REF: NEC 705.12(B)(3-4) & NEC 690.59

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

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

**SOLAR PV SYSTEM EQUIPPED  
WITH RAPID SHUTDOWN**

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



LABEL- 7:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: FFPC 11.12.1.1.1.1 & NEC 690.56(C)

**RAPID SHUTDOWN SWITCH  
FOR SOLAR PV SYSTEM**

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

**PHOTOVOLTAIC  
AC DISCONNECT**

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

**PHOTOVOLTAIC  
AC DISCONNECT**

|                              |         |
|------------------------------|---------|
| NOMINAL OPERATING AC VOLATGE | 240 V   |
| RATED AC OUTPUT CURRENT      | 14.52 A |

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

**MAIN PHOTOVOLTAIC  
SYSTEM DISCONNECT**

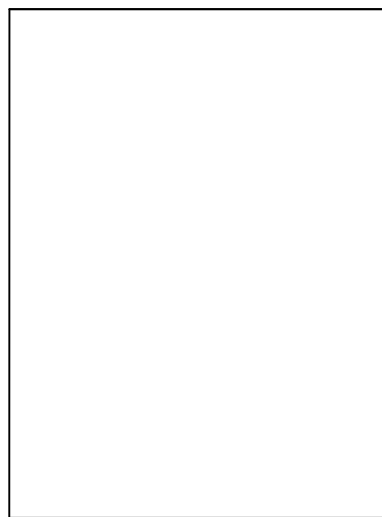
LABEL- 11:  
LABEL LOCATION:  
MAIN SERVICE DISCONNECT (ONLY IF MAIN SERVICE DISCONNECT IS PRESENT)  
CODE REF: NEC 690.13(B)

**TOP TIER**  
SOLAR SOLUTIONS

**TOP TIER SOLAR SOLUTIONS**

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

| REVISIONS      |            |     |
|----------------|------------|-----|
| DESCRIPTION    | DATE       | REV |
| INITIAL DESIGN | 03/20/2023 |     |
|                |            |     |
|                |            |     |



PROJECT NAME & ADDRESS

**KIMBERLY JOSEY  
RESIDENCE**

**47 JUNO DR,  
BROADWAY, NC 27505**

DRAWN BY  
**ESR**

SHEET NAME  
**LABELS**

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

SHEET NUMBER  
**PV-8**

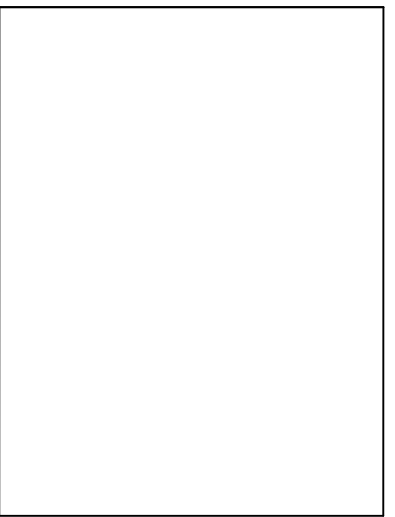




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UNITED STATES

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|                |            |     |



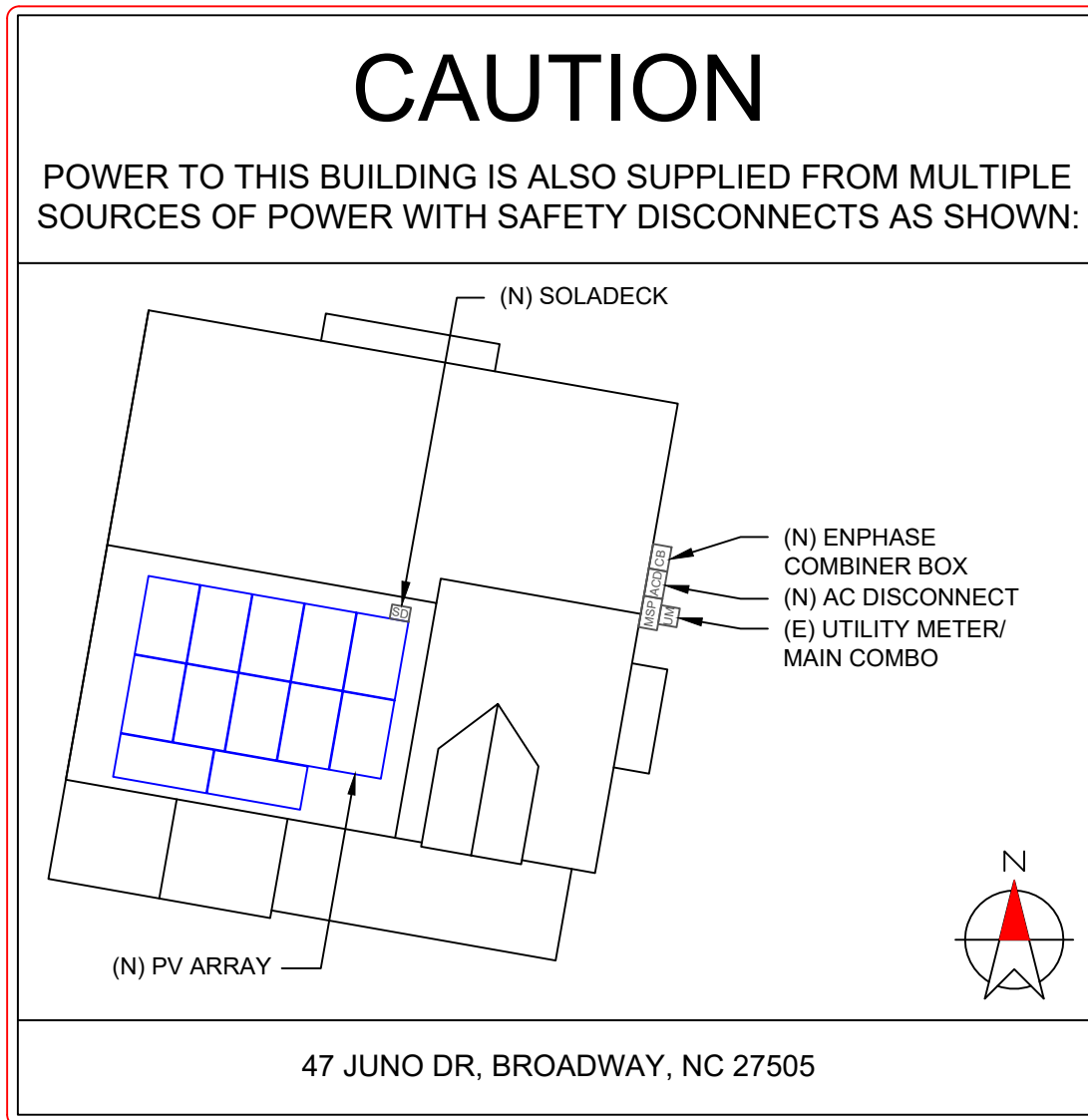
| PROJECT NAME & ADDRESS      |                                   |
|-----------------------------|-----------------------------------|
| KIMBERLY JOSEY<br>RESIDENCE | 47 JUNO DR,<br>BROADWAY, NC 27505 |

|                        |
|------------------------|
| DRAWN BY<br><b>ESR</b> |
|------------------------|

|                              |
|------------------------------|
| SHEET NAME<br><b>PLACARD</b> |
|------------------------------|

|   |
|---|
| SHEET SIZE<br><b>ANSI B<br/>11" X 17"</b> |
|---|

|                             |
|-----------------------------|
| SHEET NUMBER<br><b>PV-9</b> |
|-----------------------------|



**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])  
PER FFPC 11.12.2.1.4

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 FFPC 11.12.2.1.1.2

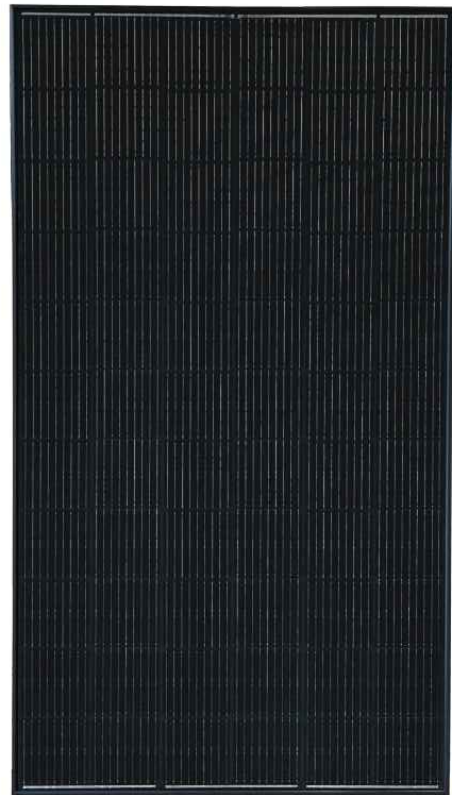
MSE PERC 66



**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

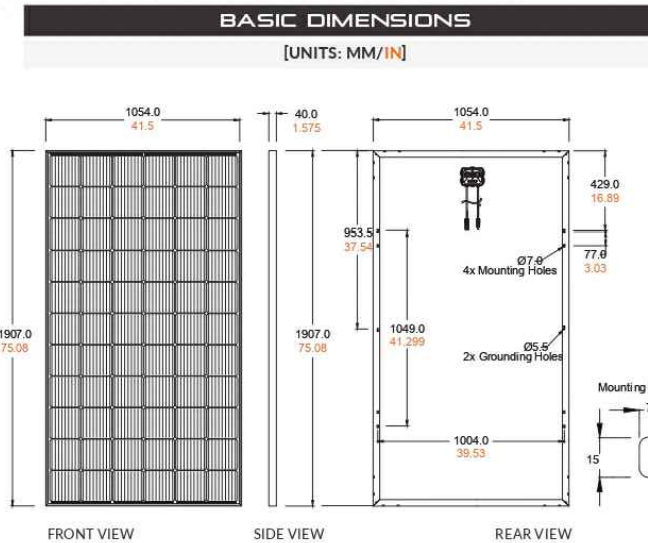


UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

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



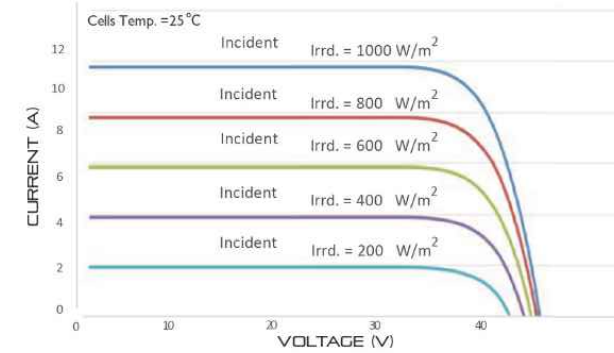
Class Leading  
**390-400W**



### 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

[www.missionsolar.com](http://www.missionsolar.com) | [info@missionsolar.com](mailto:info@missionsolar.com)

MSE PERC 66

| ELECTRICAL SPECIFICATION |                                      |                |       |       |       |
|--------------------------|--------------------------------------|----------------|-------|-------|-------|
| PRODUCT TYPE             | MSExxxSX9R (xxx = P <sub>max</sub> ) |                |       |       |       |
| 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) |           |

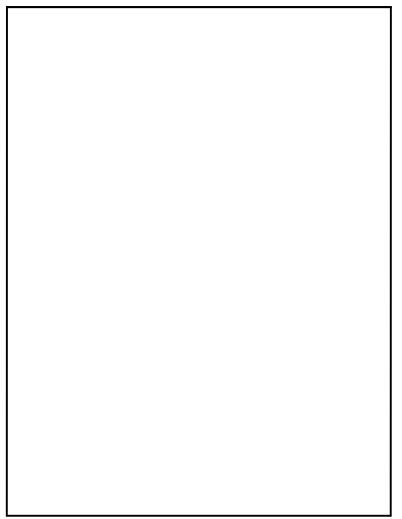
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**TOP TIER**  
SOLAR SOLUTIONS

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

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| DESCRIPTION    | DATE       | REV |
| INITIAL DESIGN | 03/20/2023 |     |
|                |            |     |



PROJECT NAME & ADDRESS

KIMBERLY JOSEY  
RESIDENCE  
47 JUNO DR,  
BROADWAY, NC 27505

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT SPECIFICATION**

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

SHEET NUMBER  
**PV-10**





## IQ8 and IQ8+ Microinverters

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



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



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



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



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

### Easy to install

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

### High productivity and reliability

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

### Microgrid-forming

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

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

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

## IQ8 and IQ8+ Microinverters

| INPUT DATA (DC)                                      |                  | IQ8-60-2-US   | IQ8PLUS-72-2-US  |
|--|------------------|---|--|
| Commonly used module pairings <sup>1</sup>           | W                | 235 – 350   | 235 – 440  |
| Module compatibility                                 |                  | 60-cell/120 half-cell   | 60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell |
| MPPT voltage range                                   | V                | 27 – 37   | 29 – 45  |
| Operating range                                      | V                | 25 – 48   | 25 – 58  |
| Min/max start voltage                                | V                | 30 / 48   | 30 / 58  |
| Max input DC voltage                                 | V                | 50  | 60   |
| Max DC current <sup>2</sup> [module Isc]             | A                |   | 15   |
| Overvoltage class DC port                            |                  |   | II   |
| DC port backfeed current                             | mA               |   | 0  |
| PV array configuration                               |                  | 1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit |  |
| OUTPUT DATA (AC)                                     |                  | IQ8-60-2-US   | IQ8PLUS-72-2-US  |
| Peak output power                                    | VA               | 245   | 300  |
| Max continuous output power                          | VA               | 240   | 290  |
| Nominal (L-L) voltage/range <sup>3</sup>             | V                | 240 / 211 – 264   |  |
| Max continuous output current                        | A                | 1.0   | 1.21   |
| Nominal frequency                                    | Hz               | 60  |  |
| Extended frequency range                             | Hz               | 50 – 68   |  |
| AC short circuit fault current over 3 cycles         | A <sub>rms</sub> | 2   |  |
| Max units per 20 A (L-L) branch circuit <sup>4</sup> |                  | 16  | 13   |
| Total harmonic distortion                            |                  | <5%   |  |
| Overvoltage class AC port                            |                  | III   |  |
| AC port backfeed current                             | mA               | 30  |  |
| Power factor setting                                 |                  | 1.0   |  |
| Grid-tied power factor (adjustable)                  |                  | 0.85 leading – 0.85 lagging   |  |
| Peak efficiency                                      | %                | 97.5  | 97.6   |
| CEC weighted efficiency                              | %                | 97  | 97   |
| Night-time power consumption                         | mW               | 60  |  |
| MECHANICAL DATA                                      |                  |   |  |
| Ambient temperature range                            |                  | -40°C to +60°C (-40°F to +140°F)  |  |
| Relative humidity range                              |                  | 4% to 100% (condensing)   |  |
| DC Connector type                                    |                  | MC4   |  |
| Dimensions (HxWxD)                                   |                  | 212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")  |  |
| Weight   |                  | 1.08 kg (2.38 lbs)  |  |
| Cooling  |                  | Natural convection – no fans  |  |
| Approved for wet locations                           |                  | Yes   |  |
| Pollution degree                                     |                  | PD3   |  |
| Enclosure  |                  | Class II double-insulated, corrosion resistant polymeric enclosure  |  |
| Environ. category / UV exposure rating               |                  | NEMA Type 6 / outdoor   |  |
| COMPLIANCE   |                  |   |  |
| Certifications                                       |                  | CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEET547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 1071-01 |  |

(1) No enforced DC/AC ratio. See the compatibility calculator at <https://link.enphase.com/module-compatibility>  
 (2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

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UNITED STATES

REVISIONS

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PROJECT NAME & ADDRESS

KIMBERLY JOSEY  
RESIDENCE  
47 JUNO DR,  
BROADWAY, NC 27505

DRAWN BY

ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER

PV-11



# Enphase IQ Combiner 4/4C

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



X-IQ-AM1-240-4C

X-IQ-AM1-240-4

The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

### Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

### Simple

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

### Reliable

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

## Enphase IQ Combiner 4/4C

| MODEL NUMBER  |  |
|---|--|
| IQ Combiner 4 (X-IQ-AM1-240-4)  | IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.  |
| IQ Combiner 4C (X-IQ-AM1-240-4C)  | IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat. |
| ACCESSORIES AND REPLACEMENT PARTS (not included, order separately)  |  |
| Ensemble Communications Kit<br>COMMS-CELLMODEM-M1-06<br>CELLMODEM-M1-06-SP-05<br>CELLMODEM-M1-06-AT-05            | - Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites<br>- 4G based LTE-M1 cellular modem with 5-year Sprint data plan<br>- 4G based LTE-M1 cellular modem with 5-year AT&T data plan  |
| Circuit Breakers<br>BRK-10A-2-240V<br>BRK-15A-2-240V<br>BRK-20A-2P-240V<br>BRK-15A-2P-240V-B<br>BRK-20A-2P-240V-B | Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers.<br>Circuit breaker, 2 pole, 10A, Eaton BR210<br>Circuit breaker, 2 pole, 15A, Eaton BR215<br>Circuit breaker, 2 pole, 20A, Eaton BR220<br>Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support<br>Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support  |
| EPLC-01   | Power line carrier (communication bridge pair), quantity - one pair  |
| XA-SOLARSHIELD-ES   | Replacement solar shield for IQ Combiner 4/4C  |
| XA-PLUG-120-3   | Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)   |
| XA-ENV-PCBA-3   | Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C   |
| X-IQ-NA-HD-125A   | Hold down kit for Eaton circuit breaker with screws.   |
| ELECTRICAL SPECIFICATIONS   |  |
| Rating  | Continuous duty  |
| System voltage  | 120/240 VAC, 60 Hz   |
| Eaton BR series busbar rating   | 125 A  |
| Max. continuous current rating  | 65 A   |
| Max. continuous current rating (input from PV/storage)  | 64 A   |
| Max. fuse/circuit rating (output)   | 90 A   |
| Branch circuits (solar and/or storage)  | Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)   |
| Max. total branch circuit breaker rating (input)  | 80A of distributed generation / 95A with IQ Gateway breaker included   |
| Envy breaker  | 10A or 15A rating GE/Siemens/Eaton included  |
| Production metering CT  | 200 A solid core pre-installed and wired to IQ Gateway   |
| Consumption monitoring CT (CT-200-SPLIT)  | A pair of 200 A split core current transformers  |
| MECHANICAL DATA   |  |
| Dimensions (WxHxD)  | 37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets.   |
| Weight  | 7.5 kg (16.5 lbs)  |
| Ambient temperature range   | -40° C to +46° C (-40° to 115° F)  |
| Cooling   | Natural convection, plus heat shield   |
| Enclosure environmental rating  | Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction  |
| Wire sizes  | • 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors<br>• 60 A breaker branch input: 4 to 1/0 AWG copper conductors<br>• Main lug combined output: 10 to 2/0 AWG copper conductors<br>• Neutral and ground: 14 to 1/0 copper conductors<br>Always follow local code requirements for conductor sizing.   |
| Altitude  | To 2000 meters (6,560 feet)  |
| INTERNET CONNECTION OPTIONS   |  |
| Integrated Wi-Fi  | 802.11b/g/n  |
| Cellular  | CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.  |
| Ethernet  | Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)  |
| COMPLIANCE  |  |
| Compliance, IQ Combiner   | UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003<br>Production metering: ANSI C12.20 accuracy class 0.5 (PV production)<br>Consumption metering: accuracy class 2.5  |
| Compliance, IQ Gateway  | UL 60601-1/CANCSA 22.2 No. 61010-1   |

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

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**TOP TIER**  
SOLAR SOLUTIONS

TOP TIER SOLAR SOLUTIONS

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

### REVISIONS

| DESCRIPTION    | DATE       | REV |
|----------------|------------|-----|
| INITIAL DESIGN | 03/20/2023 |     |
|                |            |     |
|                |            |     |

### PROJECT NAME & ADDRESS

KIMBERLY JOSEY  
RESIDENCE

47 JUNO DR,  
BROADWAY, NC 27505

DRAWN BY

ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-12



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







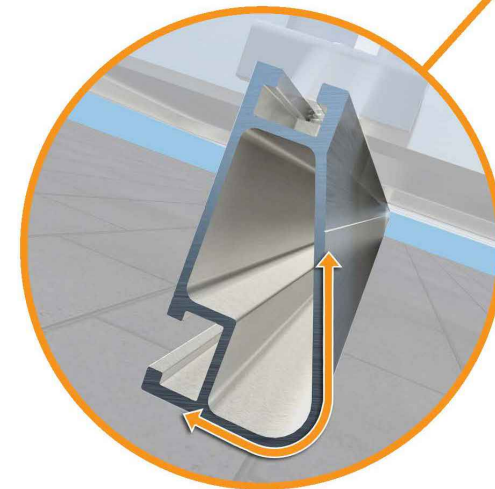
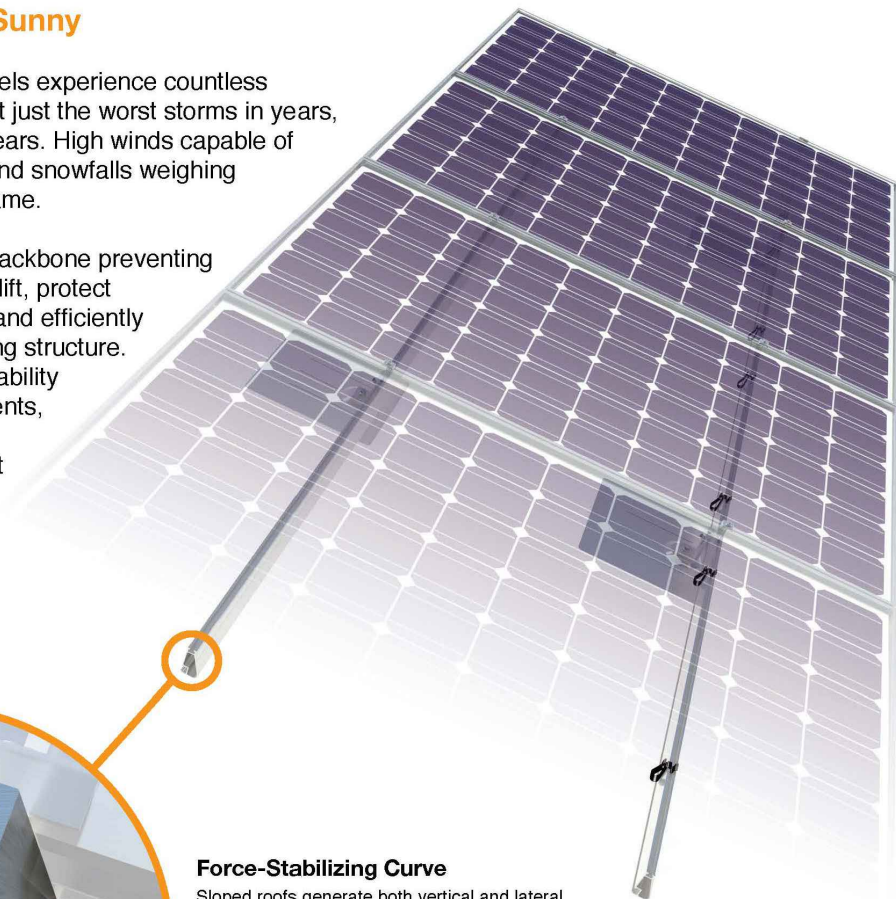
Tech Brief

## 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.



### 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.

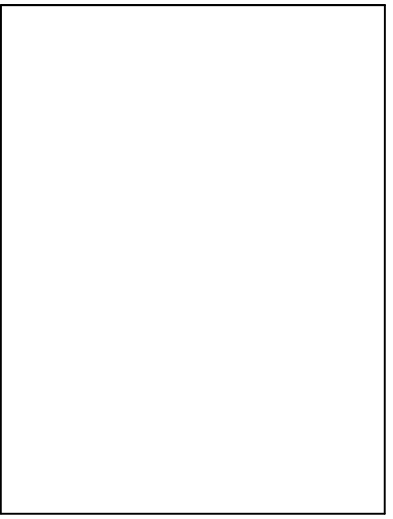
| Load       |            | Rail Span |       |       |    |        |     |
|------------|------------|-----------|-------|-------|----|--------|-----|
| Snow (PSF) | Wind (MPH) | 4'        | 5' 4" | 6'    | 8' | 10'    | 12' |
| None       | 100        |           |       |       |    |        |     |
|            | 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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1530 CENTER PARK DR #2911,  
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UNITED STATES

| REVISIONS      |            |     |
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| INITIAL DESIGN | 03/20/2023 |     |
|                |            |     |
|                |            |     |



#### PROJECT NAME & ADDRESS

**KIMBERLY JOSEY  
RESIDENCE**

47 JUNO DR,  
BROADWAY, NC 27505

DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT  
SPECIFICATION**

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

SHEET NUMBER  
**PV-13**



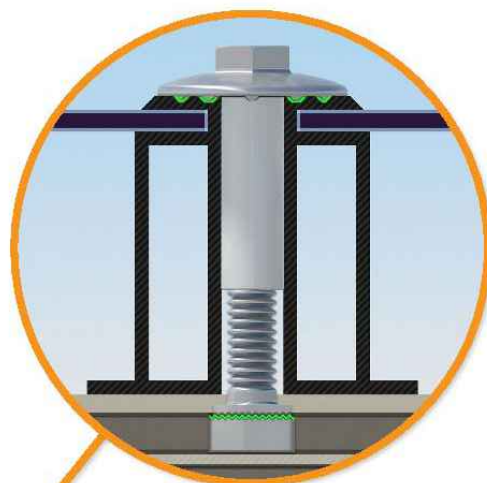


## UFO Family of Components

### 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

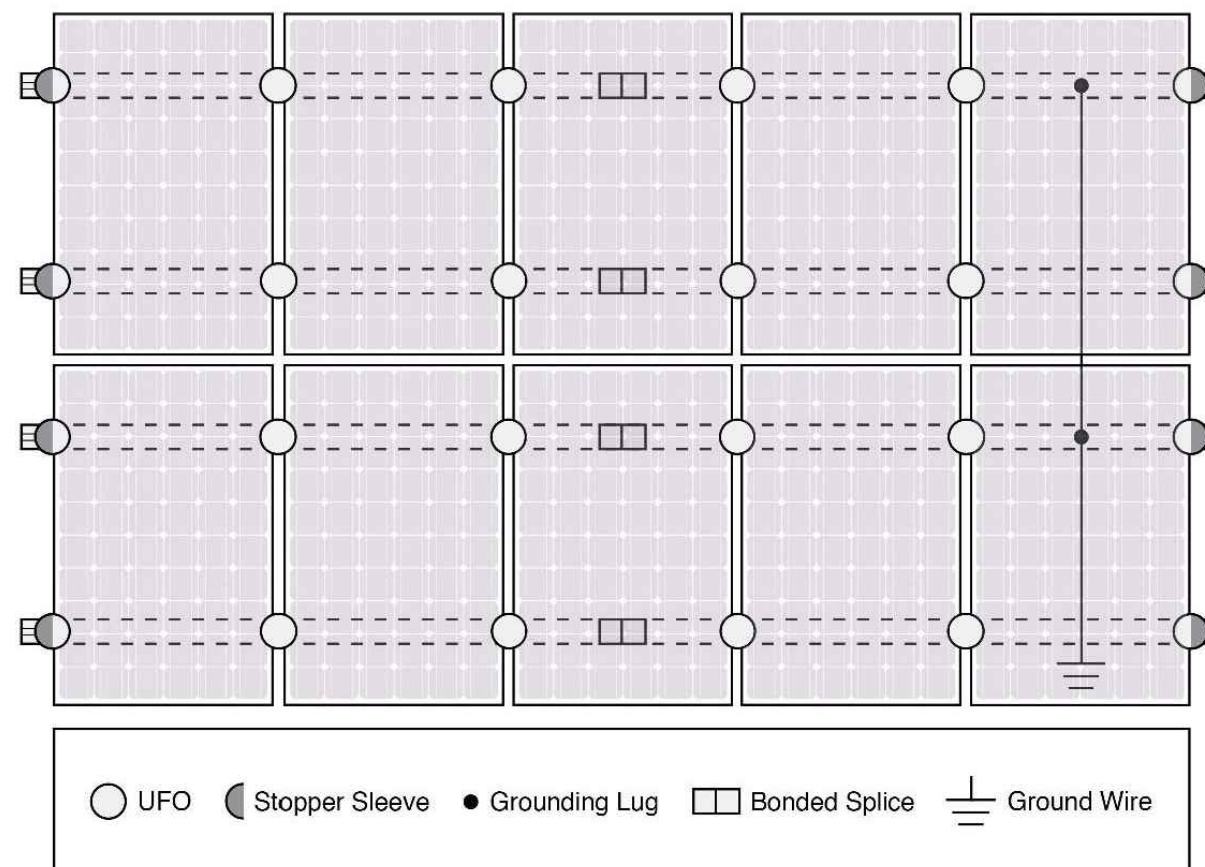
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



#### 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<br>Darfon - MIG240, MIG300, G320, G640<br>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<br>Refer to installation manuals for a detailed list.                                      |            |              |

**TOP TIER**  
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47 JUNO DR,  
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#### DRAWN BY

ESR

SHEET NAME  
EQUIPMENT  
SPECIFICATION

#### SHEET SIZE

ANSI B  
11" X 17"

#### SHEET NUMBER

PV-14





Tech Brief

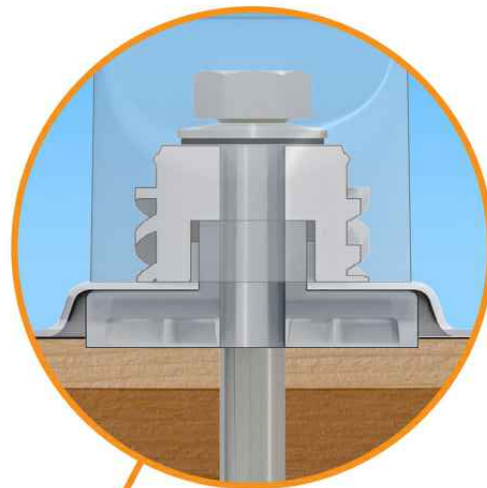
## FlashFoot2

### 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.

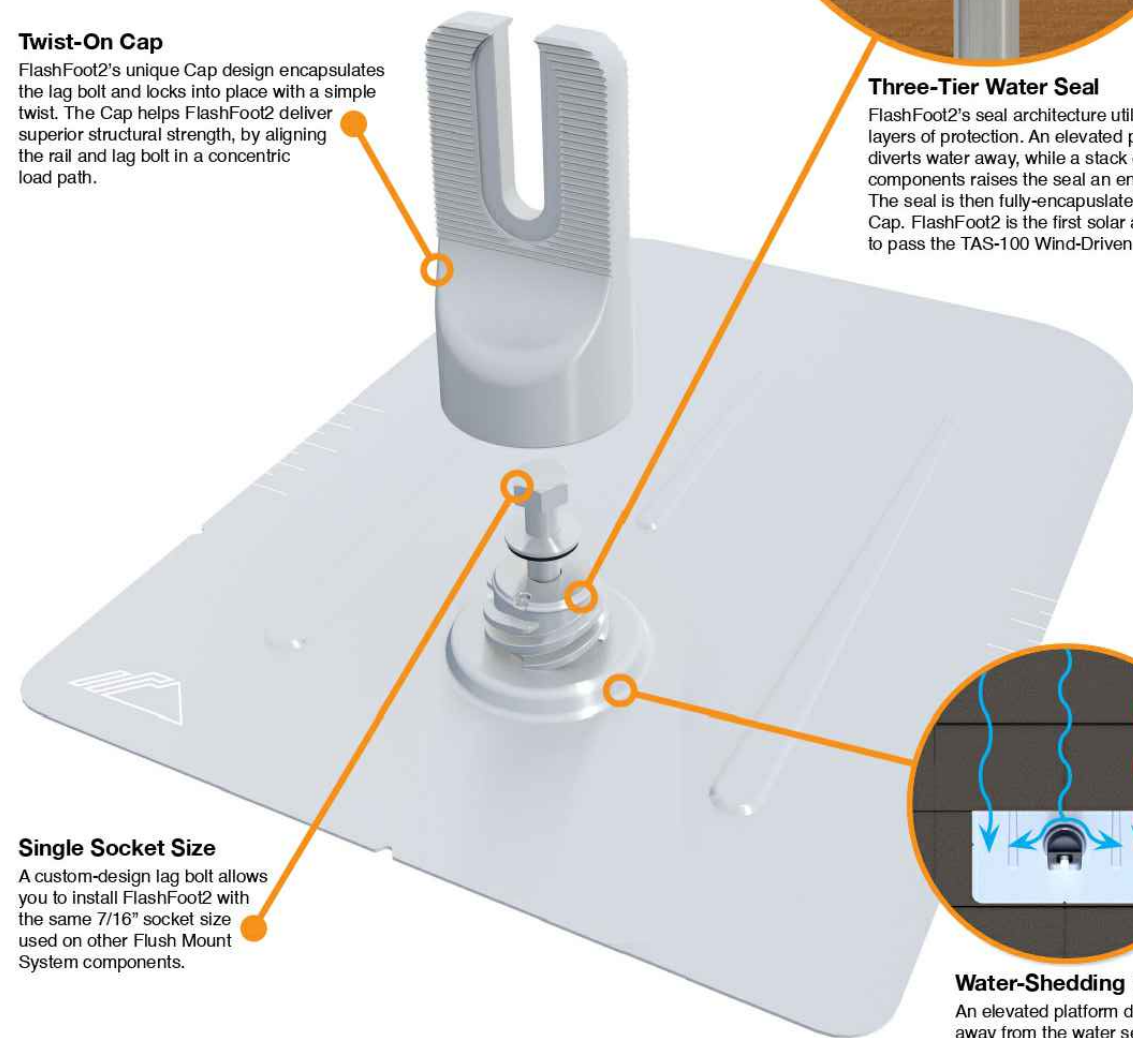
#### Twist-On Cap

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.



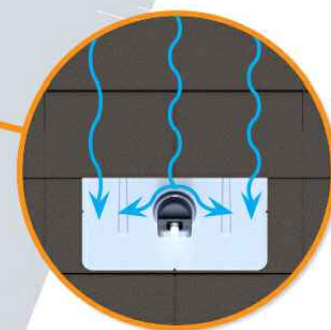
#### Three-Tier Water Seal

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

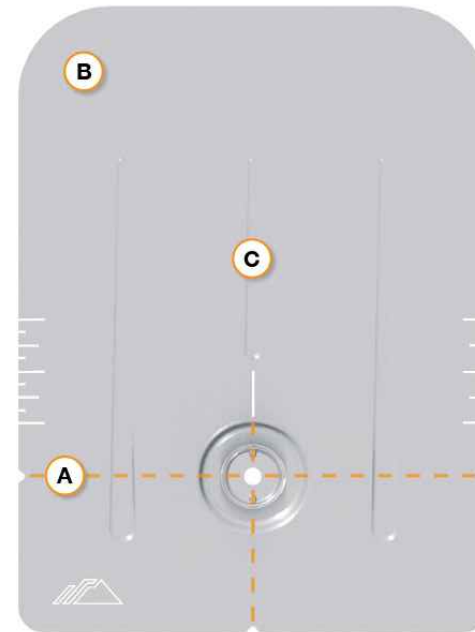
A custom-design lag bolt allows you to install FlashFoot2 with the same 7/16" socket size used on other Flush Mount System components.



#### 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.

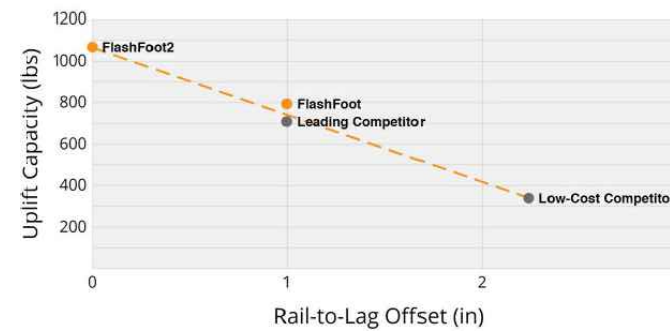
#### C Reinforcement Ribs

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.

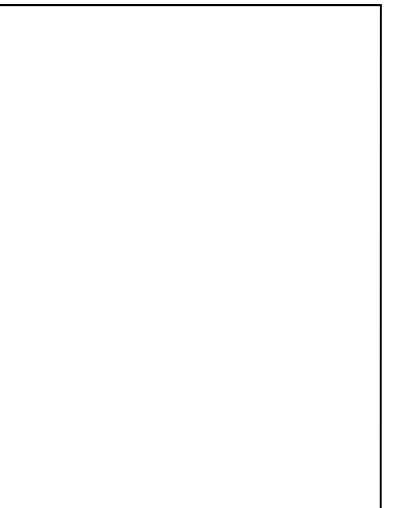
Tech Brief



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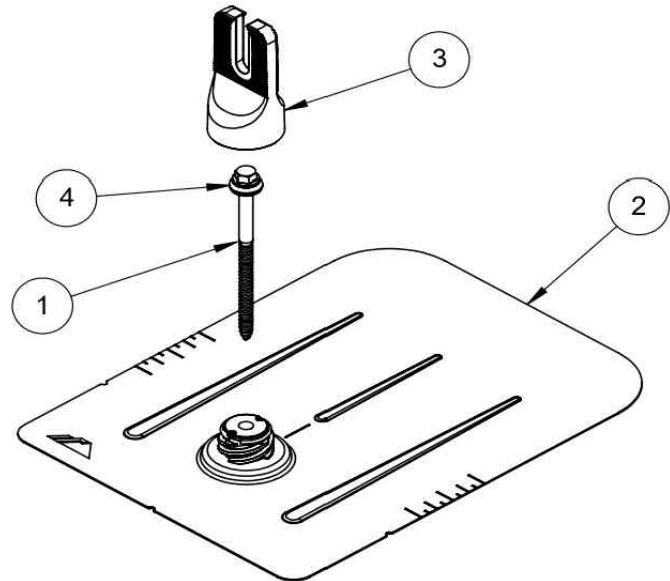
47 JUNO DR,  
BROADWAY, NC 27505

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SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-15

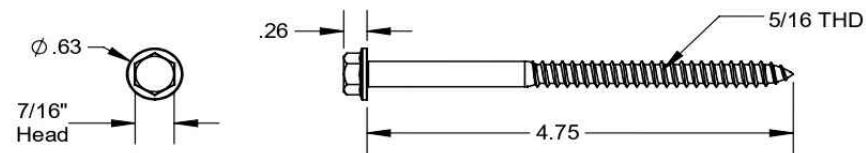


| ITEM NO. | DESCRIPTION           | Qty in Kit |
|----------|-----------------------|------------|
| 1        | BOLT LAG 5/16 X 4.75" | 1          |
| 2        | ASSY, FLASHING        | 1          |
| 3        | ASSY, CAP             | 1          |
| 4        | WASHER, EPDM BACKED   | 1          |

FLASHFOOT 2

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

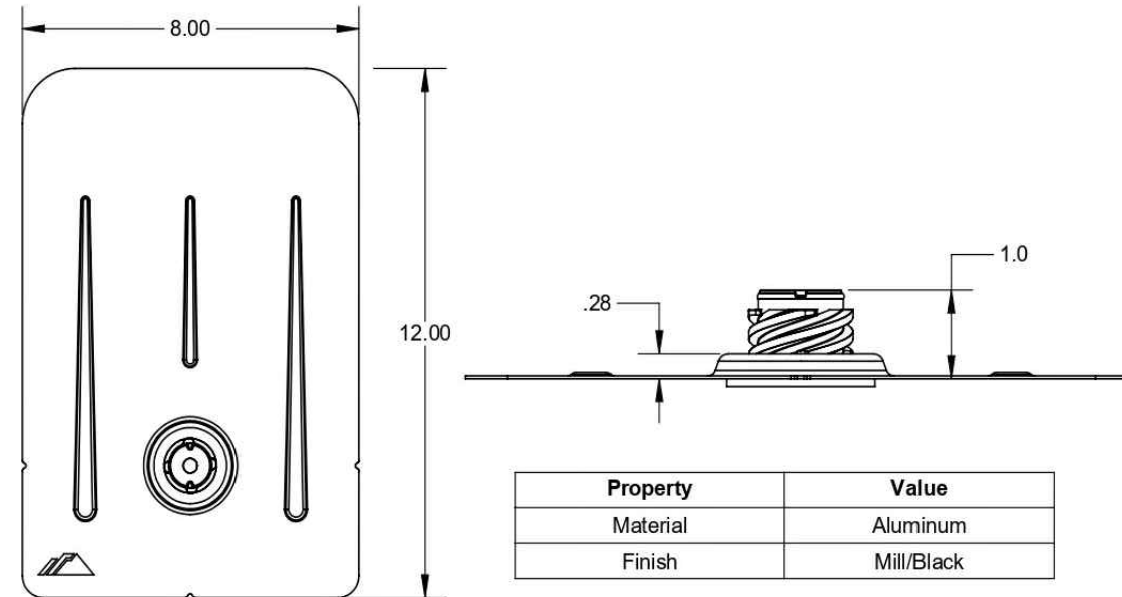
1) Bolt, Lag 5/16 x 4.75



| Property | Value                      |
|----------|----------------------------|
| Material | 300 Series Stainless Steel |
| Finish   | Clear                      |

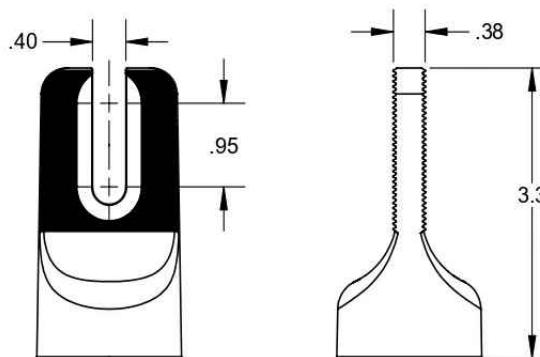
v2.0

2) Assy, Flashing



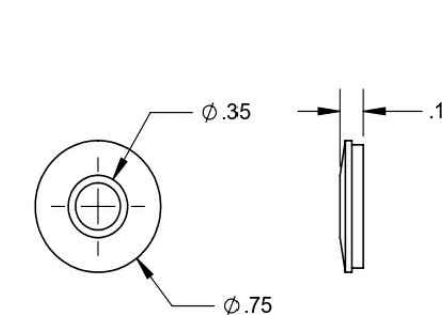
| Property | Value      |
|----------|------------|
| Material | Aluminum   |
| Finish   | Mill/Black |

3) Assy, Cap



| Property | Value      |
|----------|------------|
| Material | Aluminum   |
| Finish   | Mill/Black |

4) Washer, EPDM Backed

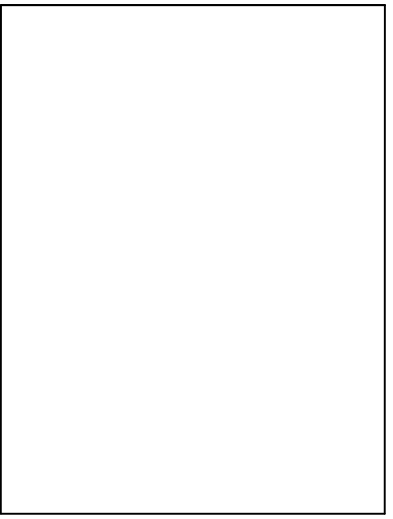


| Property | Value                      |
|----------|----------------------------|
| Material | 300 Series Stainless Steel |
| Finish   | Clear                      |

v2.0

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CHARLOTTE, NC 28217,  
UNITED STATES

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DRAWN BY  
**ESR**

SHEET NAME  
**EQUIPMENT  
SPECIFICATION**

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**  
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ESR

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**EQUIPMENT  
 SPECIFICATION**

### SHEET SIZE

**ANSI B  
 11" X 17"**

### SHEET NUMBER

**PV-17**