GENERAL NOTES

1.1.1 **PROJECT NOTES:**

1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.

1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION .

1.1.4 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4 & NEC 690.60: **PV MODULES:** UL1703, IEC61730, AND IEC61215, AND TYPE 1 FIRE RATING **INVERTERS:** UL 1741 CERTIFIED, IEEE 1547, 929, 519 **COMBINER BOX(ES):** UL 1703 OR UL 1741 ACCESSORY. PV MOUNTING SYSTEM: UL2703, AND CLASS A FIRE RATED PER UL 2703.

1.1.5 NEC 690.35 REFERS SPECIFICALLY TO "UNGROUNDED" PV POWER SYSTEMS. ALSO DESIGNATED AS "TRANSFORMERLESS" BY INVERTER MANUFACTURERS AND "NON-ISOLATED" BY UNDERWRITERS LABORATORY.

1.1.6 INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE LISTED FOR THIS USE [NEC 690.35 (G)].

1.1.7 AS SPECIFIED BY THE AHJ, EQUIPMENT USED IN UNGROUNDED SYSTEMS LABELED ACCORDING TO NEC 690.35 (F).

1.1.8 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.

1.1.9 ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, PHOTOVOLTAIC MOUNTING SYSTEMS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].

1.1.10 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.

1.2.1 **SCOPE OF WORK:**

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

1.3.1 **WORK INCLUDES:**

1.3.2 PHOTOVOLTAIC MOUNTING SYSTEMS - IRONRIDGE HUG

1.3.3 PV RACKING SYSTEM INSTALLATION - IRONRIDGE AIRE RAIL A1

1.3.4 PV MODULE AND INVERTER INSTALLATION - REC SOLAR REC460AA PURE-RX SOLAR MODULES / ENPHASE IQ8X-80-M-US MICROINVERTERS

1.3.5 PV EQUIPMENT GROUNDING

1.3.6 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX

1.3.7 PV LOAD CENTERS (IF INCLUDED)

1.3.8 PV METERING/MONITORING (IF INCLUDED)

1.3.9 PV DISCONNECTS

1.3.10 PV FINAL COMMISSIONING

1.3.11 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV

1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

SCOPE OF WORK

SYSTEM SIZE: STC: 22 X 460W = 10.120KW
PTC: 22 X 438.8W = 9.654KW
(22) REC SOLAR REC460AA PURE-RX MODULES
(22) ENPHASE IQ8X-80-M-US MICROINVERTERS

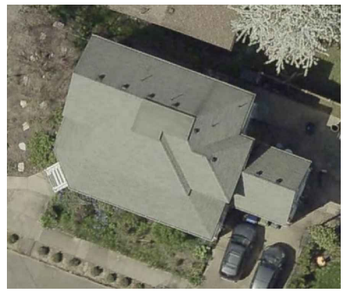
ATTACHMENT TYPE: IRONRIDGE HUG

MSP UPGRADE: NO

NEW PV SYSTEM: 10.120 kWp

CARMEL BENDER RESIDENCE

506 21ST ST NE,
SALEM, OR 97301
ASSESSOR'S #: 073W26AA09900



01 AERIAL PHOTO
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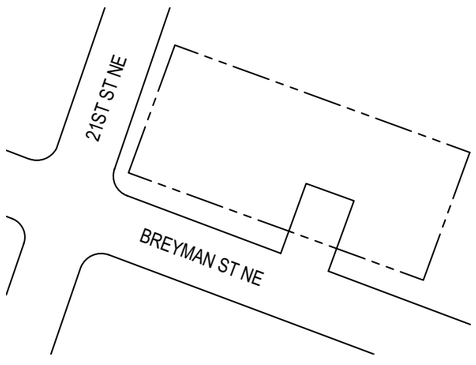

02 PLOT MAP
NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
96171PE
OREGON
MAY 12, 2020
ARASH ZANDIEH
Exp. 06/30/2026

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SHEET LIST TABLE

SHEET NUMBER	SHEET TITLE
G-1	COVER PAGE
G-2	NOTES
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PV-2	SOLAR RACKING PLAN
PV-3	ASSEMBLY DETAILS
PV-4	ELECTRICAL PLAN
PV-5	LINE DIAGRAM
PV-6	DESIGN TABLES
PV-7	PLACARDS & LABELS
PV-8	RESOURCE DOCUMENT
PV-9	RESOURCE DOCUMENT
PV-10	RESOURCE DOCUMENT
PV-11	RESOURCE DOCUMENT
PV-12	RESOURCE DOCUMENT

PROJECT INFORMATION

OWNER
NAME: CARMEL BENDER
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PROJECT MANAGER
NAME: CHARLES BONVILLE
PHONE: 503-874-4142

CONTRACTOR
NAME: EARTHLIGHT TECHNOLOGIES
PHONE: 503-874-4142

AUTHORITIES HAVING JURISDICTION
ELECTRICAL: SALEM CITY
BUILDING: SALEM CITY
ZONING: SALEM CITY
UTILITY: PGE

DESIGN SPECIFICATIONS
OCCUPANCY: R-3
CONSTRUCTION: SINGLE-FAMILY
ZONING: RESIDENTIAL
RISK CATEGORY: II
GROUND SNOW LOAD: 25 PSF
WIND EXPOSURE: B
WIND SPEED: 98 MPH

APPLICABLE CODES & STANDARDS
2023 NEC, 2023 ORSC, 2022 OSSC & 2023 OESC

CONTRACTOR

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CONTRACTOR LICENSE: 201408

earthlight SOLAR AND ENERGY SOLUTIONS

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ASSESSOR'S #: 073W26AA09900
PHONE: 503-544-9909

COVER PAGE

SYSTEM AC SIZE @ STC: 8.360 kW SYSTEM DC SIZE @ STC: 10.120 kW

(22) REC SOLAR REC460AA PURE-RX MODULES
(22) ENPHASE IQ8X-80-M-US MICROINVERTERS

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REV: PERMIT SET
DATE: 12/31/2024

PAGE: G-1

2.1.1 **SITE NOTES**:

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

2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.

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

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

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

2.2.1 **EQUIPMENT LOCATIONS**

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

2.2.3 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31, AND NEC TABLES 310.15 (B)(2) AND 310.15 (C)(1).

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

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

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

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

2.3.1 **STRUCTURAL NOTES:**

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

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

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

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

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

2.4.1 **GROUNDING NOTES:**

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

2.4.3 AS IN CONVENTIONAL PV SYSTEMS, UNGROUNDED PV SYSTEMS REQUIRE AN EQUIPMENT GROUNDING CONDUCTOR. ALL METAL ELECTRICAL EQUIPMENT AND STRUCTURAL COMPONENTS BONDED TO GROUND, IN ACCORDANCE WITH 250.134 OR 250.136. ONLY THE DC CONDUCTORS ARE UNGROUNDED.

2.4.4 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND NEC 690.45.

2.4.5 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURE CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136.

2.4.6 EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.

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

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

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

2.4.10 ACCORDING TO NEC 690.47(A) THE PV ARRAY EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED PER NEC 690.45 AND 250.122.

2.4.11 ACCORDING TO NEC 690.47(B) ADDITIONAL GROUNDING ELECTRODE SHALL BE PERMITTEDTO BE INSTALLED IN ACCORDANCE WITH 250.52 AND 250.54. GROUNDING ELECTRODE SHALL BE PERMITTED TO BE CONNECTED TO PV MODULE FRAME.

2.4.12 IN UNGROUNDED INVERTERS, GROUND FAULT PROTECTION IS PROVIDED BY "ISOLATION MONITOR INTERRUPTOR," AND GROUND FAULT DETECTION PERFORMED BY "RESIDUAL-CURRENT DETECTOR."

2.5.1 **INTERCONNECTION NOTES:**

2.5.2 705.11 SUPPLY SIDE SOURCE CONNECTIONS: AN ELECTRIC PRODUCTION SOURCE, WHERE CONNECTED ON THE SUPPLY SIDE OF THE SERVICE DISCONNECTING MEANS AS PERMITTED IN 230.82(6), SHALL COMPLY WITH 705.11(A) THROUGH (E).

2.5.3 705.12 LOAD SIDE SOURCE CONNECTIONS: SHALL BE IN COMPLY WITH NEC 705.12 (A) THROUGH (E). THE OUTPUT OF AN INTER-CONNECTED ELECTRIC POWER SOURCE SHALL BE PERMITTED TO BE CONNECTED TO THE LOAD SIDE OF THE SERVICE DISCONNECTING MEANS OF THE OTHER SOURCE(S) AT ANY DISTRIBUTION EQUIPMENT OF THE PREMISES. WHERE DISTRIBUTION EQUIPMENT OR FEEDERS ARE FED SIMULTANEOUSLY BY A PRIMARY SOURCE OF ELECTRICITY AND ONE OR MORE OTHER POWER SOURCE AND ARE CAPABLE OF SUPPLYING MULTIPLE BRANCH CIRCUITS OR FEEDERS, OR BOTH, THE INTERCONNECTING EQUIPMENT SHALL COMPLY WITH 705.12(A) THROUGH (E). WHERE A POWER CONTROL SYSTEM (PCS) IS INSTALLED IN ACCORDANCE WITH 705.13, THE SETTINGS OF THE PCS CONTROLLER SHALL BE CONSIDERED THE POWER-SOURCE OUTPUT CIRCUIT CURRENT IN 705.12(A) THROUGH (E).

2.5.4 NEC 705.12(A) DEDICATED OVERCURRENT AND DISCONNECT.
NEC 705.12(B) BUS OR CONDUCTOR AMPERE RATING: THE POWER SOURCE OUTPUT CIRCUIT CURRENT MULTIPLIED BY 125 PERCENT SHALL BE USED IN AMPACITY CALCULATIONS FOR 705.(B)(1) THROUGH (B)(3).
NEC 705.12 (B)(1) FEEDERS. NEC 705.12 (B)(2) TAPS. NEC 705.12 (B)(3) BUSBARS. NEC 705.12 (C) MARKING. 705.12 (D) SUITABLE FOR BACKFEED. 705.12 (E) FASTENING.
NEC 705.12 (B)(3)(1) THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OCPD PROTECTING THE BUSBAR SHALL NOT EXCEED THE AMPACITY OF THE BUSBAR.
NEC 705.12 (B)(3)(2) WHRE TWO SOURCES, ONE PRIMARY AND ANOTHER POWER SOURCE, ARE LOCATED AT OPPOSITE ENDS OF A BUSBAR THAT CONTAINS LOADS, THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT PROTECTIVE DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR.
NEC 705.12 (B)(3)(3) THE SUM OF THE APERE RATINGS OF ALL OCPDS ON PANELBOARDS, BOTH LOAD AND SUPPLY DEVICES, EXCLUDING THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR, SHALL NOT EXCEED THE AMPACITY OF THE BUSBAR. PERMANENT WARNING LABELS SHALL BE APPLIED TO DISTRIBUTION EQUIPMENT DISPLAYING THE FOLLOWING OR EQUIVALENT WORDING: "WARNING: THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT PROTECTIVE DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT PROTECTIVE DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR."

2.5.5 NEUTRAL CONDUCTOR USED SOLELY FOR INSTRUMENTATION, VOLTAGE, DETECTION, OR PHASE DETECTION SHALL BE PERMITTED TO BE SIZED IN ACCORDANCE WITH 250.102 PER 705.28(C)(1).

2.6.1 **DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:**

2.6.2 690.13 PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS SHALL BE PROVIDED TO DISCONNECT PV SYSTEM FROM ALL WIRING SYSTEMS INCLUDING POWER SYSTEMS, ENERGY STORAGE SYSTEMS, AND UTILIZATION EQUIPMENT AND ITS ASSOCIATED PREMISES WIRING.
DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE (WHERE REQUIRED), AND BE A VISIBLE-BREAK SWITCH. WHEN ACCESIBLE TO UNQUALIFIED PERSONS THE DISCONNECT SHALL BE LOCKED OR REQUIRED A TOOL TO OPEN.

2.6.3 PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS PER NEC 690.4(E)

2.6.4 690.15 ISOLATING DEVICE FOR PV EQUIPMENT: DISCONNECTING MEANS SHALL BE PROVIDED TO DISCONNECT AC PV MODULES, FUSES, DC-TO-DC CONVERTERS, INVERTERS AND CHARGE CONTROLLERS FROM ALL CONDUCTORS THAT ARE NOT SOLIDLY GROUNDED. THE ISOLATING DEVICE SHALL BE ONE OF THE FOLLOWING: A MATING CONNECTOR, A FINGER SAFE FUSE HOLDER, AN ISOLATING DEVICE THAT REQUIRES A TOOL TO PLACE THE DEVICE IN OFF POSITION, AN ISOLATING DEVICE LISTED FOR THE INTENDED APPLICATION.

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

2.6.6 BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED, THEREFORE BOTH REQUIRE OVER-CURRENT PROTECTION, ACCORDING TO NEC 240.21.

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

2.6.8 **RAPID SHUTDOWN OF PV SYSTEMS ON BUILDINGS NOTES:**

2.7.1 RAPID SHUTDOWN APPLICABLE TO SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR FIRE FIGHTERS IN ACCORDANCE WITH 690.12(A) THROUGH (D). EXCEPTION: GROUND MOUNTED PV SYSTEMS THAT ENTER BUILDINGS, OF WHICH THE SOLE PURPOSE IS TO HOUSE PV SYSTEM EQUIPMENT, SHALL NOT BE REQUIRED TO COMPLY WITH NEC 690.12.

2.7.2 **690.12(B)(1) OUTSIDE THE ARRAY BOUNDARY**. CONTROLLED CONDUCTORS LOCATED OUTSIDE ARRAY BOUNDARY OR MORE THAN 1 M (3FT) FROM THE POINT OF ENTRY INSIDE A BUILDING SHALL BE LIMITED TO NOT MORE THAN 30V WITHIN 30 SECONDS OF RAPID SHUTDOWN INITIATION TO LESS THAN 30 VOLTS WITHIN 30 SECONDS AFTER SHUTDOWN INITIATION. VOLTAGE SHALL BE MEASURED BETWEEN ANY TWO CONDUCTORS AND BETWEEN ANY CONDUCTOR AND GROUND.

2.7.3 **690.12(B)(2)(2) INSIDE THE ARRAY BOUNDARY**. CONTROLLED CONDUCTORS LOCATED INSIDE THE BOUNDARY SHALL BE LIMITED TO NOT MORE THAN 80 VOLTS WITHIN 30 SECONDS OF RAPID SHUTDOWN INITIATION. VOLTAGE SHALL BE MEASURED BETWEEN ANY TWO CONDUCTORS AND BETWEEN ANY CONDUCTOR TO GROUND.

2.7.4 INITIATION DEVICE. THE INITIATION DEVICE(S) SHALL INITIATE THE RAPID SHUTDOWNFUNCTION OF THE PV SYSTEM. THE DEVICE'S "OFF" POSITION SHALL INDICATE THAT THE RAPID SHUTDOWN FUNCTION HAS BEEN INITIATED FOR ALL PV SYSTEMS CONNECTED TO THAT DEVICE. FOR ONE AND TWO-FAMILY DWELLINGS AN INITIATION DEVICE(S) SHALL BE LOCATED AT A READILY ACCESIBLE LOCATION OUTSIDE THE BUILDING.

2.7.5 FOR A SINGLE PV SYSTEM, THE RAPID SHUTDOWN INITIATION SHALL OCCUR BY THE OPERATION OF ANY SINGLE INITIATION DEVICE. DEVICES SHALL CONSIST OF AT LEAST ONE OR MORE OF THE FOLLOWING: (1) SERVICE DISCONNECTING MEANS, (2) PV SYSTEM DISCONNECTING MEANS, (3) READILY ACCESIBLE SWITCH THAT PLAINLY INDICATES IT IS IN THE "OFF" OR "ON" POSITION.

2.8.1 **WIRING & CONDUIT NOTES:**

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

2.8.3 ALL CONDUCTORS SIZED ACCORDING TO NEC 690.8.

2.8.4 EXPOSED UNGROUNDED PV SOURCE AND OUTPUT CIRCUITS SHALL USE WIRE LISTED AND IDENTIFIED AS PHOTOVOLTAIC (PV) WIRE 690.31 (C).

2.8.5 PV WIRE SHALL BE IDENTIFIED AT THE TIME OF INSTALLATION PER NEC 200.6 (A)(5).

2.8.6 MODULE WIRING SHALL BE LOCATED AND SECURED UNDER THE ARRAY.

2.8.7 AC CONDUCTORS COLORED OR MARKED AS FOLLOWS:
PHASE A OR L1- BLACK
PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE
PHASE C OR L3- BLUE, YELLOW, ORANGE*, OR OTHER CONVENTION
NEUTRAL- WHITE OR GREY

* IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

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ARASH ZANDIEH
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RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION
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ASSESSOR'S #: 073W26AA09900
PHONE: 503-544-9909

NOTES

SYSTEM AC SIZE @ STC: 8.360 kW SYSTEM DC SIZE @ STC: 10.120 kW

(22) REC SOLAR REC460AA PURE-RX MODULES
(22) ENPHASE IQ8X-80-M-US MICROINVERTERS

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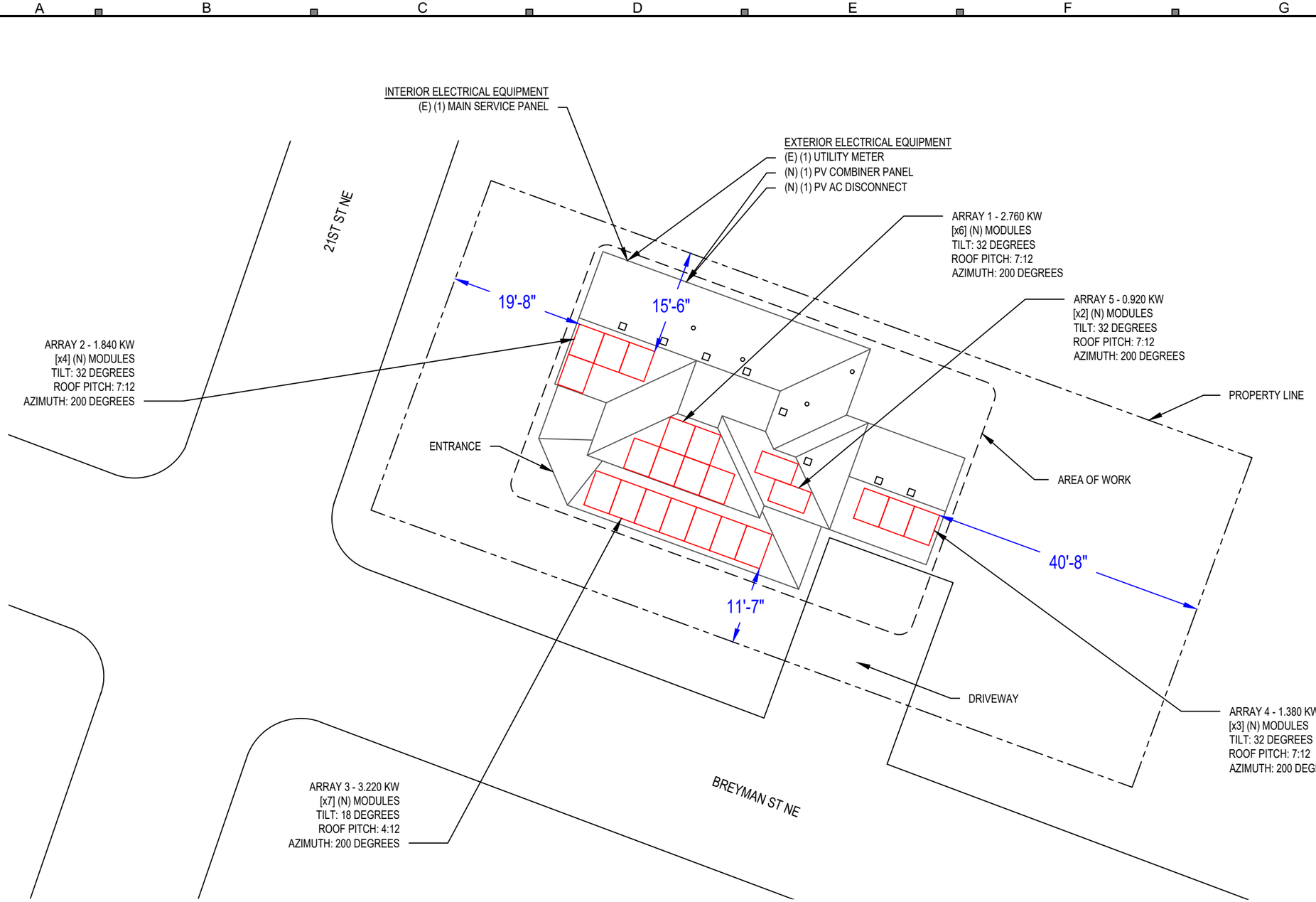

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GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

PROPERTY LINE

REGISTERED PROFESSIONAL ENGINEER
96171PE
OREGON
MAY 12, 2020
ARASH ZANDIEH
Exp. 06/30/2026

01 SITE PLAN

1/16" = 1'-0"

0 8' 16'

N
W E
S

CONTRACTOR

EARTHLIGHT TECHNOLOGIES
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ASSESSOR'S #: 073W26AA09900
PHONE: 503-544-9909

SITE PLAN

SYSTEM AC SIZE @ STC: 8.360 kW SYSTEM DC SIZE @ STC: 10.120 kW

(22) REC SOLAR REC460AA PURE-RX MODULES
(22) ENPHASE IQ8X-80-M-US MICROINVERTERS

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GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
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ROOF RAFTERS

FIRE PATHWAYS PER OSSC

CODE-REQUIRED SETBACKS/CLEARANCE PER ORSC

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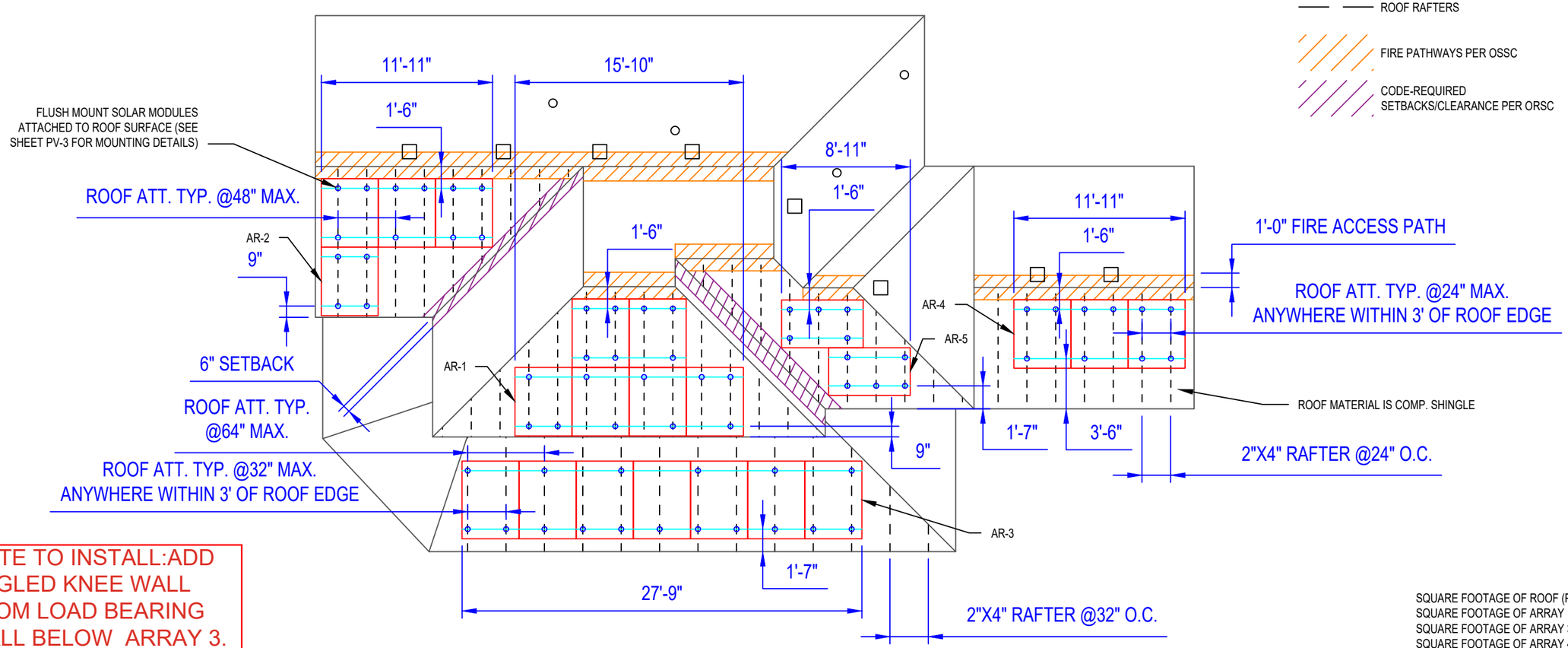

NOTE TO INSTALL:ADD ANGLED KNEE WALL FROM LOAD BEARING WALL BELOW ARRAY 3.

NOTE TO INSTALL:ADD (N) RAFTER SISTERING WHERE THE MAX UNSUPPORTED SPAN FOR 2x6 RAFTERS EXCEEDS 8'-9" FT UNDER THE ARRAY - SEE STRUCTURAL CALCS FOR DETAILS

SQUARE FOOTAGE OF ROOF (PLAN VIEW) = 2233.76 SQ. FT.
SQUARE FOOTAGE OF ARRAY 1, 2, 5 ROOF & CONN. ATTIC = 1447.48 SQ. FT.
SQUARE FOOTAGE OF ARRAY 3 ROOF & CONN. ATTIC = 422.78 SQ. FT.
SQUARE FOOTAGE OF ARRAY 4 ROOF & CONN. ATTIC = 306.91 SQ. FT.
PERCENTAGE OF ROOF COVERED BY THE ARRAY 1 = 9.28%
PERCENTAGE OF ROOF COVERED BY THE ARRAY 2 = 6.19%
PERCENTAGE OF ROOF COVERED BY THE ARRAY 3 = 37.06%
PERCENTAGE OF ROOF COVERED BY THE ARRAY 4 = 21.88%
PERCENTAGE OF ROOF COVERED BY THE ARRAY 5 = 3.09%

REGISTERED PROFESSIONAL ENGINEER
96171PE
OREGON
MAY 12, 2020
ARASH ZANDIEH
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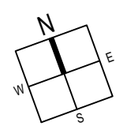
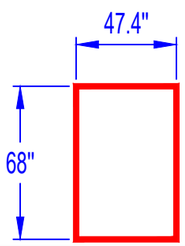
01 SOLAR RACKING PLAN

1/8" = 1'-0"

0 4' 8'





MODULE:
REC SOLAR
REC460AA PURE-RX
460 WATTS

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CARMEL BENDER RESIDENCE

RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION
506 21ST ST NE, SALEM, OR 97301
ASSESSOR'S #: 073W26AA09900
PHONE: 503-544-9909

SOLAR RACKING PLAN

SYSTEM AC SIZE @ STC: 8.360 kW SYSTEM DC SIZE @ STC: 10.120 kW

(22) REC SOLAR REC460AA PURE-RX MODULES
(22) ENPHASE IQ8X-80-M-US MICROINVERTERS

DRAWN: V.D.
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REV: PERMIT SET
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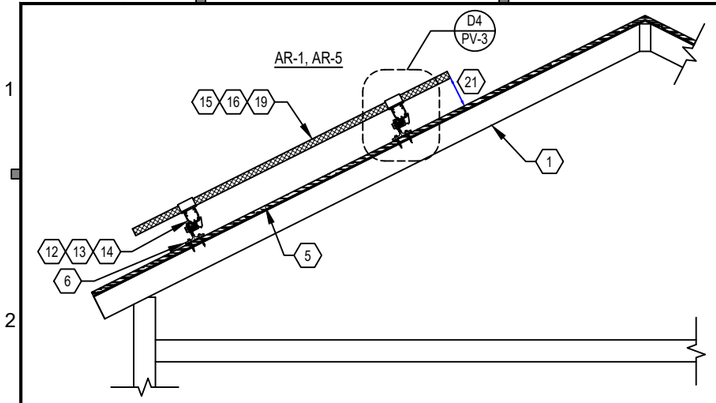
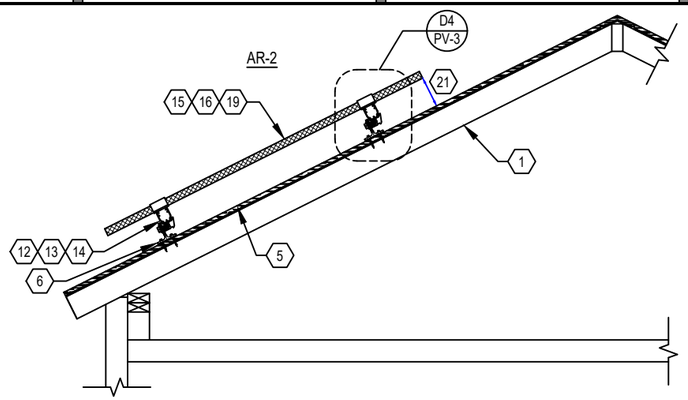
PAGE: PV-2



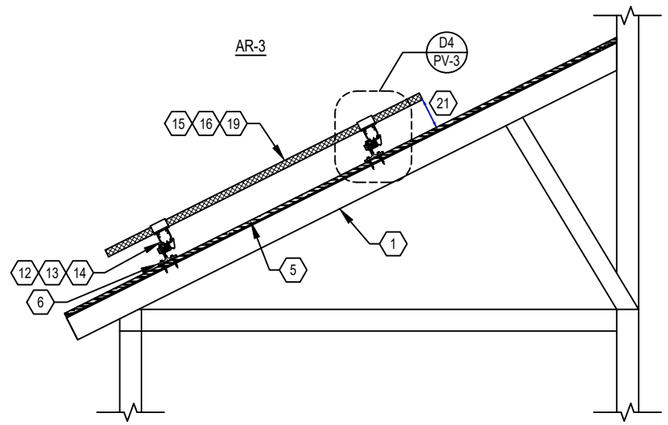
D1.1 RACKING DETAIL (TRANSVERSE)

NOT TO SCALE



D1.2 RACKING DETAIL (TRANSVERSE)

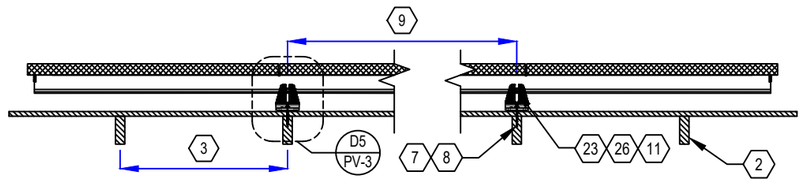
NOT TO SCALE



D1.3 RACKING DETAIL (TRANSVERSE)

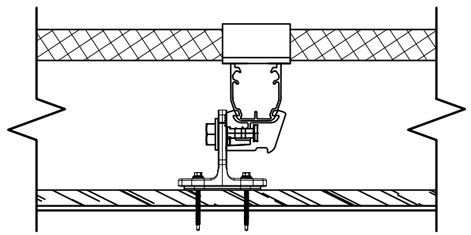
NOT TO SCALE

FOR OFFICIAL USE



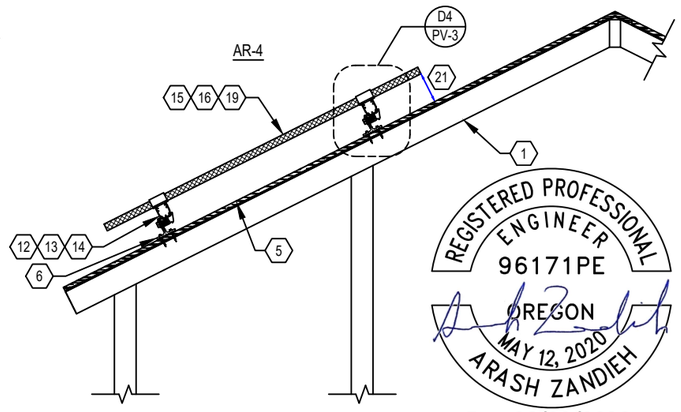
D2 RACKING DETAIL (LONGITUDINAL)

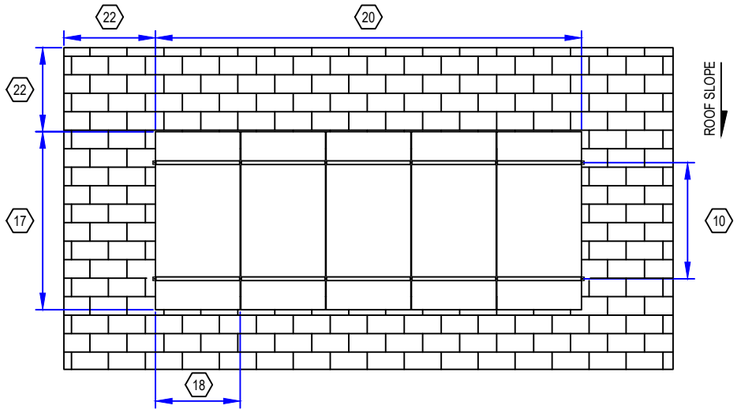
NOT TO SCALE



D4 DETAIL (TRANSVERSE)

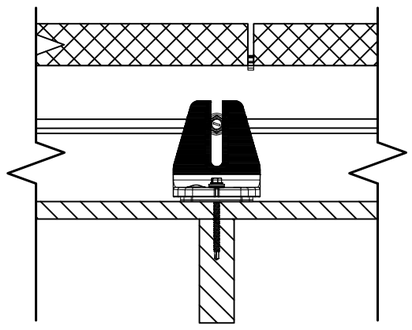
NOT TO SCALE





D3 RACKING DETAIL (TOP)

NOT TO SCALE



D5 DETAIL (LONGITUDINAL)

NOT TO SCALE

D1.4 RACKING DETAIL (TRANSVERSE)

NOT TO SCALE

NOTES:
FOR ARRAY 1 ROOF, ATTACH SISTER RAFTERS ON 4 RAFTERS.
THE PE-CALCULATED MAX ALLOWABLE SPAN WITHOUT SISTERING IS 8' 9".
FOR ARRAY 3 ROOF, CORRECT THE STRUCTURE WITH KNEE BRACES TO THE BEARING WALL. AFTER CORRECTION, THE MAX SPAN WILL BE NO GREATER THAN THE PE-CALCULATED MAXIMUM OF 7'.

REGISTERED PROFESSIONAL ENGINEER
96171PE
OREGON
MAY 12, 2020
ARASH ZANDIEH
Exp. 06/30/2026

SHEET KEYNOTES

1. ROOF STRUCTURE: AR1 - AR3, AR5: SINGLE SPAN RAFTER; AR4: RAFTERS SUPPORTED BY LBW
2. RAFTER SIZE: 2X4 IN. NOMINAL
3. RAFTER SPACING: AR1, AR2, AR4, AR5: 24; AR3: 32 IN. O.C.
4. MAX. RAFTER SPAN: AR1: 7 FT. - 3 IN., AR2: 8 FT. - 9 IN., AR3: 7 FT., AR4: 4 FT. - 6 IN., AR5: 7 FT. - 3 IN.
5. ROOF MATERIAL: COMP. SHINGLE
6. ROOF ATTACHMENT TYPE: IRONRIDGE HUG
7. LAG BOLT DIAMETER: 5/16 IN.
8. LAG BOLT EMBEDMENT: 2 1/2 IN.
9. MAX. HORIZONTAL STANDOFF: AR1, AR2, AR4, AR5: 48; AR3: 64 IN.
10. MAX. VERTICAL STANDOFF: LANDSCAPE: 26 IN., PORTRAIT: 33 IN.
11. STANDOFF STAGGERING: YES
12. RAIL MANUFACTURER (OR EQUIV.): IRONRIDGE
13. RAIL MODEL (OR EQUIVALENT): AIRE RAIL A1
14. RAIL WEIGHT: 0.45 PLF
15. MODULE MANUFACTURER: REC SOLAR
16. MODULE MODEL: REC460AA PURE-RX
17. MODULE LENGTH: 68"
18. MODULE WIDTH: 47.4"
19. MODULE WEIGHT: 50 LBS.
20. SEE PV-2 FOR DIMENSION(S)
21. MODULE CLEARANCE: 0'-4"
22. MODULE MIN. FIRE OFFSET: 12" FROM RIDGE, 0" FROM HIPS, 6" FROM VALLEYS (IF ANY)
23. TOTAL # OF ATTACHMENTS: 68.
24. TOTAL AREA: 492.43 SQ. FT.
25. TOTAL WEIGHT: 1234.76 LBS.
26. WEIGHT PER ATTACHMENT: 18.16 LBS.
27. DISTRIBUTED LOAD: 2.51 PSF

CONTRACTOR

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SILVERTON, OR 97381
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CONTRACTOR LICENSE: 201408

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SOLAR AND ENERGY SOLUTIONS

CARMEL BENDER RESIDENCE

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ASSESSOR'S #: 073W26AA09900
PHONE: 503-544-9909

ASSEMBLY DETAILS

SYSTEM AC SIZE @ STC: 8.360 kW SYSTEM DC SIZE @ STC: 10.120 kW

(22) REC SOLAR REC460AA PURE-RX MODULES
(22) ENPHASE IQ8X-80-M-US MICROINVERTERS

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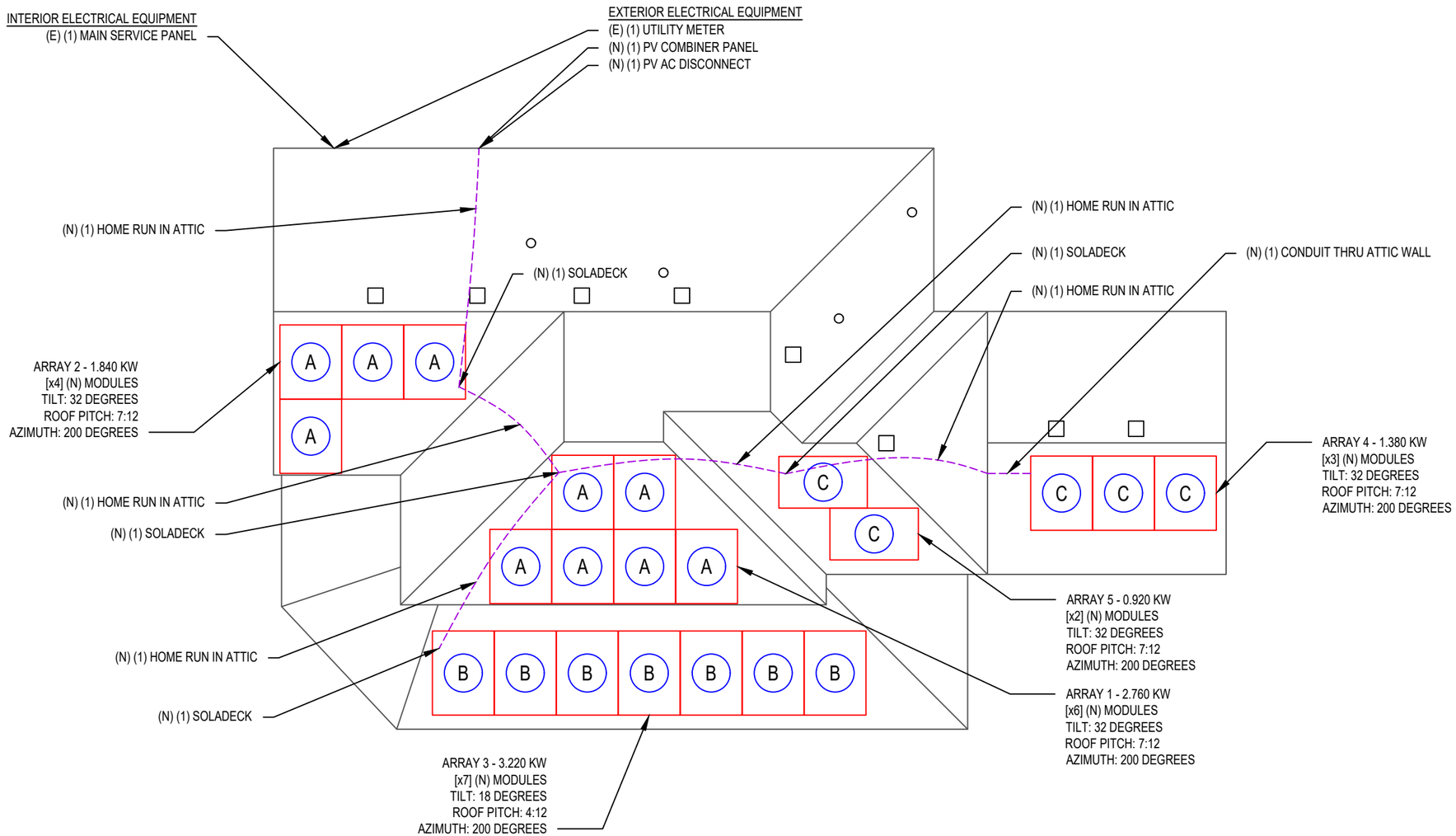
PAGE: PV-3



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GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

A MODULE BRANCH

B MODULE BRANCH

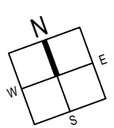
C MODULE BRANCH

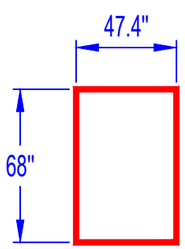
CONDUIT (IN ATTIC)

01 **ELECTRICAL PLAN**

1/8" = 1'-0"

0 4' 8'





MODULE:
REC SOLAR
REC460AA PURE-RX
460 WATTS

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ELECTRICAL PLAN

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PAGE: PV-4

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	TYPICAL	CONDUCTOR	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERMINAL	LENGTH	VOLTAGE DROP
1	3	12 AWG THWN-2 COPPER ENPHASE ENGAGE CABLE	FREE AIR	2	N/A	6 AWG BARE, COPPER	0.96 (33.6 °C)	1	15.8A	19.75A	25A	24A	75°C	25A	42.5 FT.	0.61%
2	1	10 AWG THWN-2, COPPER	0.75" DIA EMT	6	20A	10 AWG THWN-2, COPPER	0.96 (33.6 °C)	0.8	15.8A	19.75A	40A	30.72A	75°C	35A	75 FT.	1.09%
3	1	8 AWG THWN-2, COPPER	0.75" DIA EMT	2	N/A	10 AWG THWN-2, COPPER	0.96 (33.6 °C)	1	34.76A	43.45A	55A	52.8A	75°C	50A	5 FT.	0.10%
4	1	8 AWG THWN-2, COPPER	0.75" DIA EMT	2	45A	10 AWG THWN-2, COPPER	0.96 (33.6 °C)	1	34.76A	43.45A	55A	52.8A	75°C	50A	9 FT.	0.18%

MAX. VD 1.98%

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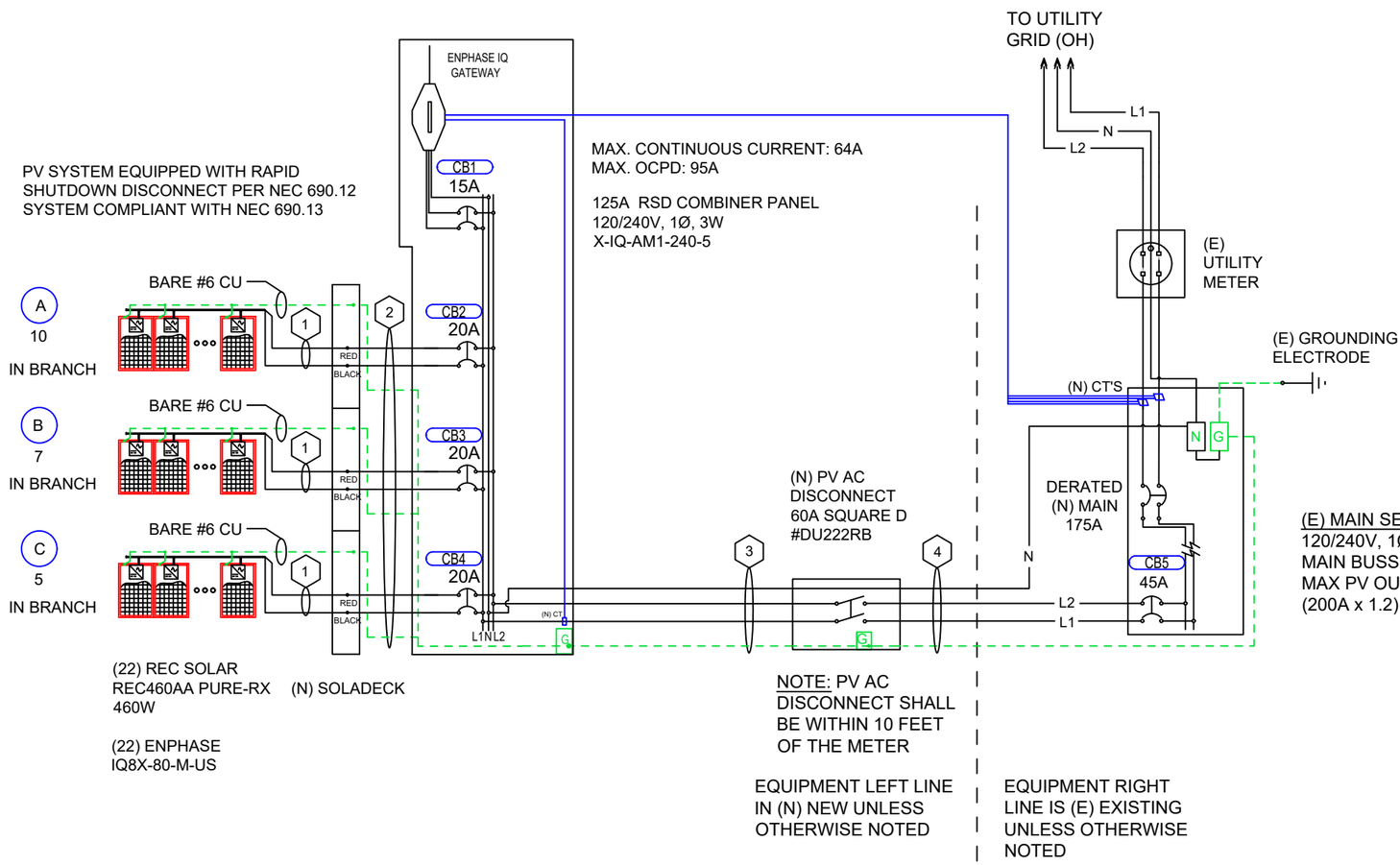
A MODULE BRANCH

B MODULE BRANCH

C MODULE BRANCH



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LINE DIAGRAM

SYSTEM AC SIZE @ STC: 8.360 kW SYSTEM DC SIZE @ STC: 10.120 kW

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PAGE: PV-5

PV SYSTEM SUMMARY			
	BRANCH A	BRANCH B	BRANCH C
INVERTERS PER BRANCH	10	7	5
MAX AC CURRENT	15.8A	11.06A	7.9A
MAX AC OUTPUT POWER	3,800W	2,660W	1,900W
ARRAY STC POWER	10,120W		
ARRAY PTC POWER	9,654W		
MAX AC CURRENT	34.76A		
MAX AC POWER	8,360W		
DERATED (CEC) AC POWER	8,360W		

MODULES										
REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-22	22	REC SOLAR REC460AA PURE-RX	460W	438.8W	8.88A	8.38A	65.3V	54.9V	-0.157V/°C (-0.24%/°C)	25A

INVERTERS										
REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	OCPD RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1-22	22	ENPHASE IQ8X-80-M-US	240V	FLOATING	20A	380W	1.58A	16A	79.5V	96.5%

DISCONNECTS				
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	SQUARE D DU222RB OR EQUIV.	60A	240VAC

OCPDS			
REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1	1	15A	240VAC
CB2-4	3	20A	240VAC
CB5	1	45A	240VAC

ASHRAE EXTREME LOW	-12°C (10.4°F), SOURCE: SALEM\MCNARY (44.91°; -123°)
ASHRAE 2% HIGH	33.6°C (92.5°F), SOURCE: SALEM\MCNARY (44.91°; -123°)

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DESIGN TABLES

SYSTEM AC SIZE @ STC: 8.360 kW SYSTEM DC SIZE @ STC: 10.120 kW

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PAGE: PV-6

1.1 LABELING REQUIREMENTS BASED ON THE 2023 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.

1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.

1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]

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

LABEL 1
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT (2" X 4").
[NEC 690.13].

WARNING
POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL 2
AT POINT OF INTERCONNECTION OVERCURRENT DEVICE (2" X 4").
[NEC 705.12(B)(2)(3)(B)].

AC DISCONNECT
PHOTOVOLTAIC SYSTEM POWER SOURCE
RATED AC OUTPUT CURRENT 34.76 AMPS
NOMINAL OPERATING AC VOLTAGE 240 VOLTS

LABEL 3
AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS (4" X 3").
[NEC 690.54]

PHOTOVOLTAIC SYSTEM DISCONNECT

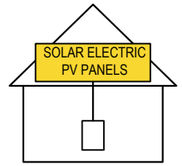
LABEL 4
AT EACH AC DISCONNECTING MEANS (4" X 1").
[NEC 690.13(B)].

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL 5
AT RAPID SHUTDOWN DISCONNECT SWITCH (5 1/4" X 2").
[NEC 690.56(C)(3)].

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 FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND THE CONDUCTORS LEAVING THE ARRAY.

THE LABEL SHALL UTILIZE CAPITALIZED CHARACTERS WITH A MINIMUM HEIGHT OF 3/8" IN BLACK ON YELLOW BACKGROUND, AND THE REMAINING CHARACTERS SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3/16" IN BLACK ON WHITE BACKGROUND.

LABEL 6
AT RAPID SHUTDOWN DEVICE AND MSP ($3\frac{3}{4}$" X $5\frac{1}{4}$"). NEC 690.56(C)(1)(A)

WARNING
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL 7
AT POINT OF INTERCONNECTION (2 3/4" X 1 5/8").
[NEC 705.12(B)(3)]

DIRECTORY
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION (5 3/4" X 1 1/8").
[NEC 690.56(B)]

WHERE THE PV SYSTEMS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE PROVIDED AT EACH PV SYSTEM DISCONNECTING MEANS.
PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS
[NEC 690.4(D),(E)]

PHOTOVOLTAIC POWER SOURCE

LABEL 9
AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS (5 3/4" X 1 1/8").
[NEC 690.31(G)]
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE
[IFC 605.11.1.1]

CAUTION
MULTIPLE SOURCES OF POWER

LABEL 10
AT UTILITY METER (5 3/4" X 1 1/8")
[NEC 690.56(B)]

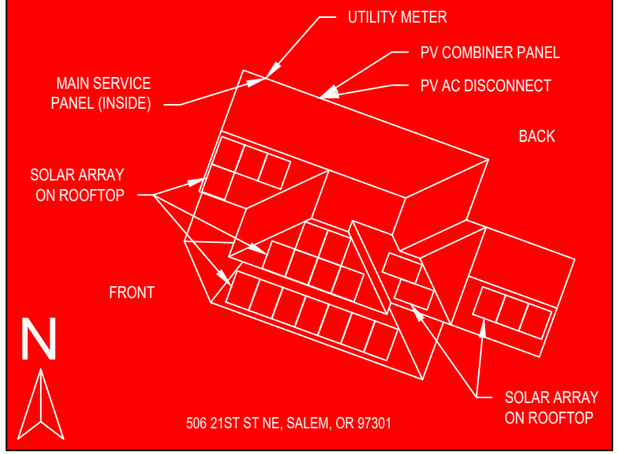
WARNING
SOLAR ELECTRIC CIRCUIT BREAKER IS BACKFED

LABEL 8
AT POINT OF INTERCONNECTION (2" X 1").
[NEC 705.12(B)(3)]

WARNING
PHOTOVOLTAIC SYSTEM COMBINER PANEL DO NOT ADD LOADS

LABEL 12
AT ALL PV COMBINER PANELS

!CAUTION!
MULTIPLE SOURCES OF POWER
SAFETY DISCONNECT(S) AS SHOWN:



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PLACARDS & LABELS

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REC ALPHA® PURE-RX SERIES

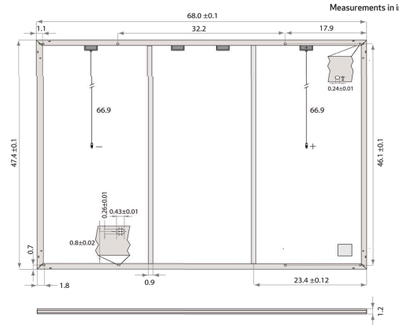
DATASHEET

REC
SOLAR'S MOST TRUSTED

GENERAL DATA

Cell Type	88 half-cut bifacial REC heterojunction cells, with gapless technology
Glass	0.13 in. solar glass with anti-reflective surface treatment in accordance with EN12150
Backsheet	Highly resistant polymer (Black)
Frame	Anodized aluminum (Black)
Junction Box	4-part, 4 bypass diodes, IP68 rated, in accordance with IEC 62790
Connectors	Stäubli MC4 PV-KBT4/KST4 (12AWG) in accordance with IEC 62852. IP68 only when connected
Cable	12 AWG solar cable, 66.9 in. + 66.9 in. in accordance with EN50618
Dimensions	68 x 47.4 x 1.2 in. (22.4 ft²)
Weight	50 lbs
Origin	Made in Singapore

Measurements in inches



ELECTRICAL DATA

PRODUCT CODE*: RECxxxAA Pure-RX

STC	Power Output - P_{MAX} (W_P)	450	460	470
	Watt Class Sorting - (W)	0/+10	0/+10	0/+10
	Nominal Power Voltage - V_{MPP} (V)	54.3	54.9	55.4
	Nominal Power Current - I_{MPP} (A)	8.29	8.38	8.49
	Open Circuit Voltage - V_{OC} (V)	65.1	65.3	65.6
	Short Circuit Current - I_{SC} (A)	8.81	8.88	8.95
	Power Density (W/ft²)	20.1	20.5	21.0
	Panel Efficiency (%)	21.6	22.1	22.6
NMOT	Power Output - P_{MAX} (W_P)	343	350	358
	Nominal Power Voltage - V_{MPP} (V)	51.2	51.7	52.2
	Nominal Power Current - I_{MPP} (A)	6.70	6.77	6.86
	Open Circuit Voltage - V_{OC} (V)	61.3	61.6	61.8
	Short Circuit Current - I_{SC} (A)	7.11	7.17	7.23

Values at standard test conditions (STC: air mass AM 1.5, irradiance 1000 W/m², temperature 77°F (25°C)), based on a production spread with a tolerance of P_{MAX}, V_{OC} & I_{SC} ±3% within one watt class. Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m², temperature 68°F (20°C), windspeed 3.3 ft/s (1 m/s)). *Where xxx indicates the nominal power class (P_{MAX}) at STC above.

MAXIMUM RATINGS*

Operational Temperature	-40 °F - 185 °F
System Voltage	1000 V
Maximum Test Load (front)	+7000 Pa (146 lb/ft²)
Maximum Test Load (rear)	-4000 Pa (83.4 lb/ft²)
Max Series Fuse Rating	25 A
Max Reverse Current	25 A

* See installation manual for mounting instructions. Design load = Test load / 1.5 (safety factor)

TEMPERATURE RATINGS*

Nominal Module Operating Temperature	44 °C ± 2°C
Temperature coefficient of P_{MAX}	-0.24% /K
Temperature coefficient of V_{OC}	-0.24% /K
Temperature coefficient of I_{SC}	0.04% /K

*The temperature coefficients stated are linear values

DELIVERY INFORMATION

Panels per Pallet	33
Panels per 40 ft GP/high cube container	594 (18 Pallets)
Panels per 53 ft truck	792 (24 Pallets)

Available from:

Founded in 1996, REC Group is an international pioneering solar energy company dedicated to empowering consumers with clean, affordable solar power. As Solar's Most Trusted, REC is committed to high quality innovation, and a low carbon footprint in the solar materials and solar panels it manufactures. Headquartered in Norway with operational headquarters in Singapore, REC also has regional hubs in North America, Europe, and Asia-Pacific.

CERTIFICATIONS

IEC 61215:2021; IEC61730:2016; UL61730	
ISO 11925-2	Ignitability (EN 13501-1 Class E)
IEC 62716	Ammonia Resistance
IEC 61701	Salt Mist (SM6)
IEC 61215:2016	Hailstone (35mm)
UL 61730	Fire Type 2
ISO 14001; ISO9001; IEC45001; IEC62941	

Intertek

take-e-way
Take-e-way WEEE-compliant scheme

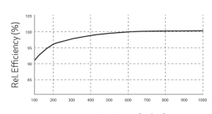
WARRANTY

	Standard	REC ProTrust	
Installed by an REC Certified Professional	No	Yes	Yes
System Size	All	<25 kW	25-500 kW
Product Warranty (yrs)	20	25	25
Power Warranty (yrs)	25	25	25
Labor Warranty (yrs)	0	25	10
Power in Year 1	98%	98%	98%
Annual Degradation	0.25%	0.25%	0.25%
Power in Year 25	92%	92%	92%

The REC ProTrust Warranty is only available on panels purchased through an REC Certified Solar Professional installer. Warranty conditions apply. See www.recgroup.com for more details

LOW LIGHT BEHAVIOR

Typical low irradiance performance of module at STC:



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CARMEL BENDER RESIDENCE

RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION
506 21ST ST NE, SALEM, OR 97301
ASSESSOR'S #: 073W26AA09900
PHONE: 503-544-9909

RESOURCE DOCUMENT

SYSTEM AC SIZE @ STC: 8.360 kW SYSTEM DC SIZE @ STC: 10.120 kW

(22) REC SOLAR REC460AA PURE-RX MODULES
(22) ENPHASE IQ8X-80-M-US MICROINVERTERS

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ENPHASE.

PRELIMINARY DATASHEET

IQ8X Microinverter

Our newest IQ8 Series 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 mode. This chip is built using advanced 55-nm technology with high-speed digital logic and superfast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

IQ8X Microinverter is the latest addition to this family, designed to support PV modules with high input DC voltage and cell counts, such as 80-half-cut cells, 88-half-cut cells and 96-cells.

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

Enphase 25 year limited warranty

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 the IQ8 Series Microinverters with integrated MC4 connectors.

UL CERTIFIED SAFETY

IQ8 Series Microinverters are UL Listed as PV rapid shutdown equipment and conform with regulations when installed according to the manufacturer's instructions.

*Meets UL 1741 only when installed with IQ System Controller 2 and 3.

Easy to install

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

High productivity and reliability

- Produces 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) and IEEE 1547:2018 (UL 1741-SB)

NOTE:

- IQ8 Series Microinverters cannot be mixed with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, and so on) in the same system.
- IQ Gateway is required to change the default grid profile at the time of installation to meet local Authority Having Jurisdiction (AHJ) requirements.

IQ8X Microinverter

INPUT DATA (DC)	UNIT	IQ8X-80-M-US
Commonly used module pairings [1]	W	320–540
Module compatibility	–	To meet compatibility, PV modules must be within the following maximum input DC voltage and maximum module I_{sc} Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator
MPPT voltage range	V	43–60
Operating range	V	25–79.5
Minimum and maximum start voltage	V	30–79.5
Maximum input DC voltage	V	79.5
Maximum continuous operating DC current	A	10
Maximum input DC short-circuit current	A	16
Maximum module I_{sc}	A	13
Overvoltage class DC port	–	II
DC port backfeed current	mA	0
PV array configuration	–	Ungrounded array; no additional DC side protection required; AC side protection requires maximum 20 A per branch circuit

OUTPUT DATA (AC)	UNIT	IQ8X-80-M-US @240 VAC	IQ8X-80-M-US @208 VAC
Peak output power	VA	384	366
Maximum continuous output power	VA	380	360
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°	208, single-phase (L-L), 120° [4]
Minimum and maximum grid voltage [2]	V	211–264	183–229
Max. continuous output current	A	1.58	1.73
Nominal frequency	Hz	60	
Extended frequency range	Hz	47–68	
AC short circuit fault current over three cycles	A_{rms}	2.70	
Maximum units per 20 A (L-L) branch circuit [3]	–	10	9
Total harmonic distortion	%	<5	
Overvoltage class AC port	–	III	
AC port backfeed current	mA	18	
Power factor setting	–	1.0	
Grid-tied power factor (adjustable)	–	0.85 leading ... 0.85 lagging	
Peak efficiency	%	97.3	97.0
CEC weighted efficiency	%	96.5	96.5
Nighttime power consumption	mW	26	12

MECHANICAL DATA	
Ambient temperature range	-40°C to 65°C (-40°F to 149°F)
Relative humidity range	4% to 100% (condensing)
DC connector type	Stäubli MC4
Dimensions (H × W × D); Weight	212 mm (8.3") × 175 mm (6.9") × 30.2 mm (1.2"); 1.1 kg (2.43 lbs)
Cooling	Natural convection – no fans
Approved for wet locations; Pollution degree	Yes; PD3
Enclosure	Class II double-insulated, corrosion-resistant polymeric enclosure
Environmental category; UV exposure rating	NEMA Type 6; outdoor

COMPLIANCE	
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB), FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV rapid shutdown equipment and conforms with NEC 2014, NEC 2017, NEC 2020, and NEC 2023 section 690.12 and C22.1-2018 Rule 64-218 rapid shutdown of PV systems for AC and DC conductors when installed according to the manufacturer's instructions.

(1) No enforced DC/AC ratio.
(2) Nominal voltage range can be extended beyond nominal if required by the utility.
(3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.
(4) IQ8X is not certified for use with Enphase Three Phase Network Protection Relay (NPR-3P-208-NA) and therefore designed for single-phase operation only. Check with the local utility requirements if you wish to install single phase inverter across three phases.

IQ8X-MC4-DSH-00185-2.0-EN-US-2023-11-16

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ENPHASE

DATA SHEET

X-IQ-AM1-240-5
X-IQ-AM1-240-5C

IQ Combiner 5/5C

The IQ Combiner 5/5C consolidates interconnection equipment into a single enclosure and streamlines IQ Series Microinverters and IQ Gateway installation by providing a consistent, pre-wired solution for residential applications. IQ Combiner 5/5C uses wired control communication and is compatible with IQ System Controller 3/3G and IQ Battery 5P.

The IQ Combiner 5/5C, IQ Series Microinverters, IQ System Controller 3/3G, and IQ Battery 5P provide a complete grid-agnostic Enphase Energy System.

IQ Series Microinverters
The high-powered smart grid-ready IQ Series Microinverters (IQ6, IQ7, and IQ8 Series) simplify the installation process.

IQ System Controller 3/3G
Provides microgrid interconnection device (MID) functionality by automatically detecting grid failures and seamlessly transitioning the home energy system from grid power to backup power.

IQ Battery 5P
Fully integrated AC battery system. Includes six field-replaceable IQ8D-BAT Microinverters.

IQ Load Controller
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life.

Enphase 5 year limited warranty

5-year limited warranty

c UL us LISTED

NOM

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect (CELLMODEM-M1-06-SP-05), only with IQ Combiner 5C
- Supports flexible networking: Wi-Fi, Ethernet, or cellular
- Provides production metering (revenue grade) and consumption monitoring

Easy to install

- Mounts to one stud with centered brackets
- Supports bottom, back, and side conduit entries
- Supports up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV branch circuits
- Bluetooth-based Wi-Fi provisioning for easy Wi-Fi setup

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- 5-year limited warranty
- 2-year labor reimbursement program coverage included for both the IQ Combiner SKUs*
- UL1741 Listed

*For country-specific warranty information, see the https://enphase.com/installers/resources/warranty page.

IQ Combiner 5/5C

MODEL NUMBER	
IQ Combiner 5 (X-IQ-AM1-240-5)	IQ Combiner 5 with IQ Gateway printed circuit board for integrated revenue-grade PV production metering (ANSIC12.20 ±0.5%), consumption monitoring (± 2.5%), and IQ Battery monitoring (±2.5%). Includes a silver solar shield to deflect heat.
IQ Combiner 5C (X-IQ-AM1-240-5C)	IQ Combiner 5C with IQ Gateway printed circuit board for integrated revenue-grade PV production metering (ANSI C12.20 ±0.5%), consumption monitoring (±2.5%) and IQ Battery monitoring (±2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05)[1]. Includes a silver solar shield to deflect heat.
WHAT'S IN THE BOX	
IQ Gateway printed circuit board	IQ Gateway is the platform for total energy management for comprehensive, remote maintenance, and management of the Enphase Energy System
Busbar	80 A busbar with support for 1 × IQ Gateway breaker and 4 × 20 A breaker for installing IQ Series Microinverters and IQ Battery 5P
IQ Gateway breaker	Circuit breaker, 2-pole, 10 A/15 A
Production CT	Pre-wired revenue-grade solid-core CT, accurate up to ±0.5%
Consumption CT	Two consumption metering clamp CTs, shipped with the box, accurate up to ±2.5%
IQ Battery CT	One battery metering clamp CT, shipped with the box, accurate up to ±2.5%
CTRL board	Control board for wired communication with IQ System Controller 3/3G and the IQ Battery 5P
Enphase Mobile Connect (only with IQ Combiner 5C)	4G-based LTE-M1 cellular modem (CELLMODEM-M1-06-SP-05) with a 5-year T-Mobile data plan
Accessories kit	Spare control headers for the COMMS-KIT-02 board
ACCESSORIES AND REPLACEMENT PARTS (NOT INCLUDED, ORDER SEPARATELY)	
CELLMODEM-M1-06-SP-05	4G-based LTE-M1 cellular modem with a 5-year T-Mobile data plan
CELLMODEM-M1-06-AT-05	4G-based LTE-M1 cellular modem with a 5-year AT&T data plan
Circuit breakers (off-the-shelf)	Supports Eaton BR2XX, Siemens Q2XX and GE/ABB THQL21XX Series circuit breakers (XX represents 10, 15, 20, 30, 40, 50, or 60). Also supports Eaton BR220B, BR230B, and BR240B circuit breakers compatible with the hold-down kit.
Circuit breakers (provided by Enphase)	BRK-10A-2-240V, BRK-15A-2-240V, BRK-20A-2P-240V, BRK-15A-2P-240V-B, and BRK-20A-2P-240V-B (more details in the "Accessories" section)
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 5/5C
XA-ENV2-PCBA-5	IQ Gateway replacement printed circuit board (PCB) for IQ Combiner 5/5C
X-IQ-NA-HD-125A	Hold-down kit compatible with Eaton BR-B Series circuit breakers (with screws)
XA-COMMS2-PCBA-5	Replacement COMMS-KIT-02 printed circuit board (PCB) for IQ Combiner 5/5C
ELECTRICAL SPECIFICATIONS	
Rating	80 A
System voltage and frequency	120/240 VAC, 60 Hz
Busbar rating	125 A
Fault current rating	10 kAIC
Maximum continuous current rating (input from PV/storage)	64 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR, Siemens Q, or GE/ABB THQL Series distributed generation (DG) breakers only (not included)
Maximum total branch circuit breaker rating (input)	80 A of distributed generation/95 A with IQ Gateway breaker included
IQ Gateway breaker	10 A or 15 A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-CLAMP)	A pair of 200 A clamp-style current transformers is included with the box
IQ Battery metering CT	200 A clamp-style current transformer for IQ Battery metering, included with the box

1. A plug-and-play industrial-grade cell modem for systems of up to 60 microinverters. Available in the United States, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.

IQC-5-5C-DSH-00007-3.0-EN-US-2024-03-01

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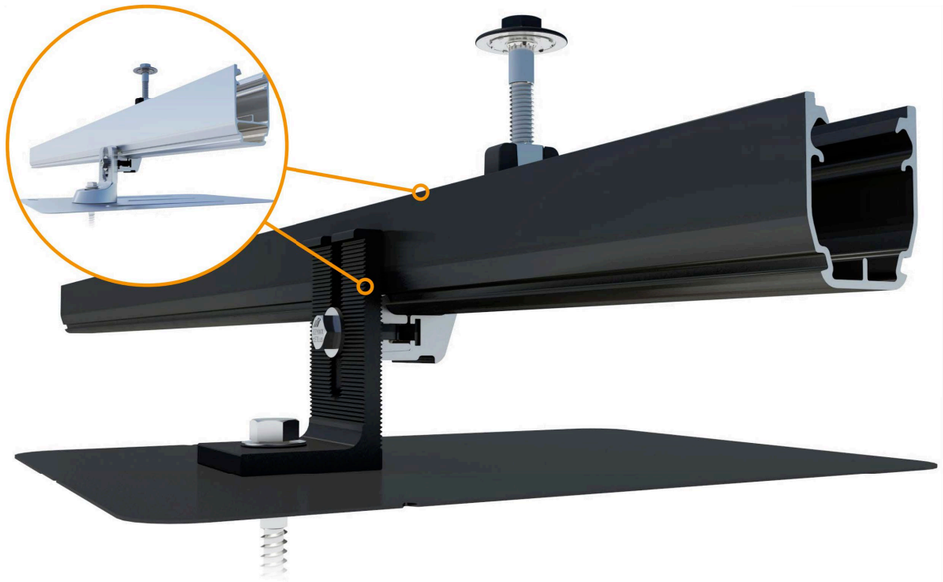
Datasheet

IRONRIDGE

Aire™ Racking System



Breathe easy with accelerated installations.

The Aire™ racking system has been carefully crafted to streamline every part of the installation process, taking out all of the tiresome hassles—so that you get off the roof and on to your next project faster than ever.

Aire™ retains the strength and reliability that IronRidge installers have come to depend on. Whether you're a seasoned installer with years under your belt or just getting started in solar, breathe easy with open Aire™.

Strength Tested
All components have been evaluated for superior structural performance.

PE Certified
Pre-stamped engineering letters are available online for most states.

Class A Fire Rating
Certified to maintain the fire resistance rating of the existing roof structure.

Design Assistant
Free online software makes it simple to create, share, and price projects.

UL 2703 Listed System
Entire system and components meet the latest effective UL 2703 standards.

25-Year Warranty
Products are guaranteed to arrive without any impairing defects.

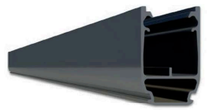
Rails

Aire™ A1 Rail

The lighter, open Aire™ rail for standard conditions.

- 6' spanning capability
- Wire management tray
- Mill or anodized black

Aire™ A2 Rail



The tougher, open Aire™ rail for higher load capacity.

- 8' spanning capability
- Wire management tray
- Mill or anodized black

Aire™ Rail Ties

Structurally connect and bond Aire™ Rails together.

- Reinstallable, up to 5x
- Internal splice design
- No more splice rules

Aire™ Dock

Connects Aire™ Rails to attachments with ease.

- Clicks on, slides easily
- Drops into open slots
- Anodized assembly

Clamps & Grounding

Aire™ Lock Mids

Securely bond between modules to Aire™ Rails.

- Fits 30-40mm modules
- Utilizes UFO® design
- Minimal 1/2" gap

Aire™ Lock Ends

Securely bond modules to Aire™ Rails along ends.

- Fits 30-40mm modules
- Easy rail engagement
- Clean aesthetics

Aire™ Lock Stealth

Securely bonds modules to rail ends, entirely hidden.

- Angled for easy install
- Robust tether leash
- Fits most modules

Aire™ Lug

Bonds Aire™ Rails to grounding conductors.

- Simplified with single bolt
- Low-profile form factor
- Works with 10-6 AWG

Accessories

Aire™ Caps

Block entry and provide a finished look to Aire™ Rails.

- Stay secure on rail ends
- Symmetrical, with drain
- Cover rough-cut ends

Aire™ Clip

Keeps wiring contained in open Aire™ Rail channels.

- No module interference
- Simple press-in design
- Slot for easy removal

Aire™ MLPE Mount

Securely bonds MLPE and accessories to Aire™ Rails.

- Glove-friendly installation
- Lays flush in rail channel
- Low profile form factor

Aire™ All Tile Hook

Attaches rails to tile roofs, with Aire™ Dock included.

- Works on flat, S, & W tiles
- Single-socket installation
- Optional deck flashing

Resources

Design Assistant
Quickly go from rough layout to fully engineered system.
Go to IronRidge.com/design

Approved for FL Hurricane Zones
Aire™ has Florida Product Approval. Additional details can be found on the Florida Building Code website.
Learn More at bit.ly/florida-aire

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Tech Brief

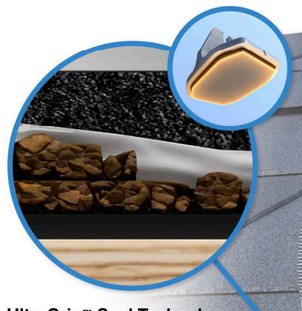
IRONRIDGE

QuickMount® HUG

The Respect Your Roof Deserves

When integrating with a home, solar attachments must be dependable for the lifetime of the rooftop. Due to recent innovations, many asphalt shingles have bonded courses. A mount that protects without the need to pry shingles can really speed things up.

Halo UltraGrip™ (HUG™) is here to respect the roof. Its Halo is a cast-aluminum barrier that encases the UltraGrip, our industrial-grade, foam-and-mastic seal. This allows HUG to accelerate the installation process and provide the utmost in waterproofing protection. Give your roof a HUG.™



Multi-Tiered Waterproofing
HUG utilizes a multi-tiered stack of components to provide revolutionary waterproofing protection. The Halo cast-aluminum, raised-perimeter foundation surrounds the UltraGrip base—a foam-backed mastic seal combination that prevents water intrusion by adhering and sealing with the shingle surface.

Halo UltraGrip™ is part of the QuickMount® product line.

UltraGrip™ Seal Technology
HUG UltraGrip utilizes a state-of-the-art seal design that uses a unique, foam-and-mastic combination. The foam-backed adhesive provides an entirely new flashing system that conforms and adheres to every nook and cranny of composition shingles, filling gaps and shingle step-downs (up to 1/8" in height).

Rafter & Deck Mounting Options
Mount HUG to the roof rafters, the roof deck, or both with our custom-engineered RD (rafter-or-deck) Structural Screw. The RD Structural Screw anchors HUG to the roof with an EPDM sealing washer, completing the stack of waterproofing barriers. See backside for more installation information.

Intertek

Triple Rated & Certified to Respect the Roof™
UL 2703, 441 (27)
TAS 100(A)-95

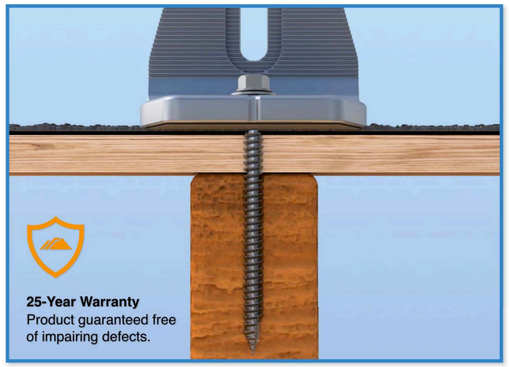
Adaptive, Rafter-Friendly Installation

Hit the rafter? Good to go!
When you find a rafter, you can move on. Only 2 RD Structural Screws are needed.

Miss the rafter? Try it again.
Place another screw to the left or right. If rafter is found, install 3rd and final screw.

Still no luck? Install the rest.
If more than 3 screws miss the rafter, secure six screws to deck mount it.

Trusted Strength & Less Hassle



25-Year Warranty
Product guaranteed free of impairing defects.

Structural capacities of HUG™ were reviewed in many load directions, with racking rail running cross-slope or up-slope in relation to roof pitch.

For further details, see the HUG certification letters for attaching to rafters and decking.

IronRidge designed the HUG, in combination with the RD Structural Screw to streamline installs, which means the following:

- No prying shingles
- No roof nail interference
- No pilot holes necessary
- No sealant (in most cases)
- No butyl shims needed

Attachment Loading

The rafter-mounted HUG has been tested and rated to support 1004 (lbs) of uplift and 368 (lbs) of lateral load.

Structural Design

Parts are designed and certified for compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

HUG passed both the UL 441 Section 27 "Rain Test" and TAS 100(A)-95 "Wind Driven Rain Test" by Intertek.

UL 2703 System

Systems conform to UL 2703 mechanical and bonding requirements. See Flush Mount Manual for more info.

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