WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
Scott E. Wyssling, PE
Coleman D. Larsen, SE, PE
Gregory T. Elvestad, PE

76 North Meadowbrook Drive
Alpine, UT 84004
office (201) 874-3483
swyssling@wysslingconsulting.com

March 4, 2025

EPC Solar
379 Douglas Road East Suite A
Oldsmar, FL 34677

Re: Engineering Services
Smith Residence
149 Hawksmoore Lane, Lillington, NC
12.400 kW System

Scott Wyssling, PE

Digitally signed by Scott Wyssling, PE
DN: C=US, S=Utah, L=Alpine, O=Wyssling Consulting, CN="Scott Wyssling, PE", E=swyssling@wysslingconsulting.com
Reason: I am the author of this document
Location:
Date: 2025.03.04 11:52:32-07'00'
Foxit PDF Editor Version: 13.0.1

To Whom It May Concern:

We have received information regarding solar panel installation on the roof of the above referenced structure. Our evaluation of the structure is to verify the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar system.

A. Site Assessment Information

1. Site visit documentation identifying attic information including size and spacing of framing for the existing roof structure.
2. Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information will be utilized for approval and construction of the proposed system.

B. Description of Structure:

Roof Framing: Assumed 2x6 dimensional lumber at 24” on center.
Roof Material: Composite Asphalt Shingles
Roof Slope: 30 degrees
Attic Access: Inaccessible
Foundation: Permanent

C. Loading Criteria Used

- **Dead Load**
  - Existing Roofing and framing = 7 psf
  - New Solar Panels and Racking = 3 psf
  - TOTAL = 10 PSF
- **Live Load** = 20 psf (reducible) – 0 psf at locations of solar panels
- **Ground Snow Load** = 10 psf
- **Wind Load** based on ASCE 7-10
  - Ultimate Wind Speed = 120 mph (based on Risk Category II)
  - Exposure Category C

Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the 2018 North Carolina Residential Code. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.

D. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent Ironridge installation manual. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. The maximum allowable withdrawal force for a #14 lag bolt is 229 lbs per inch of penetration as identified in the National Design Standards (NDS) of timber construction specifications. Based on a minimum penetration depth of 2", the allowable capacity per connection is greater than the design withdrawal force (demand). Considering the variable factors for the existing roof framing and installation tolerances, the connection using two #14 diameter lag bolt with a minimum of 2" embedment will be adequate and will include a sufficient factor of safety.
3. Considering the wind speed, roof slopes, size and spacing of framing members, and condition of the roof, the panel supports shall be placed no greater than 48" on center.

Based on the above evaluation, this office certifies that with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. This evaluation is in conformance with the *2018 North Carolina Residential Code*, current industry standards, and is based on information supplied to us at the time of this report.

Should you have any questions regarding the above or if you require further information do not hesitate to contact me.

Very truly yours,

Scott E. Wyssling, PE
North Carolina License No. 46546
North Carolina COA P-2308

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed 3/04/2025

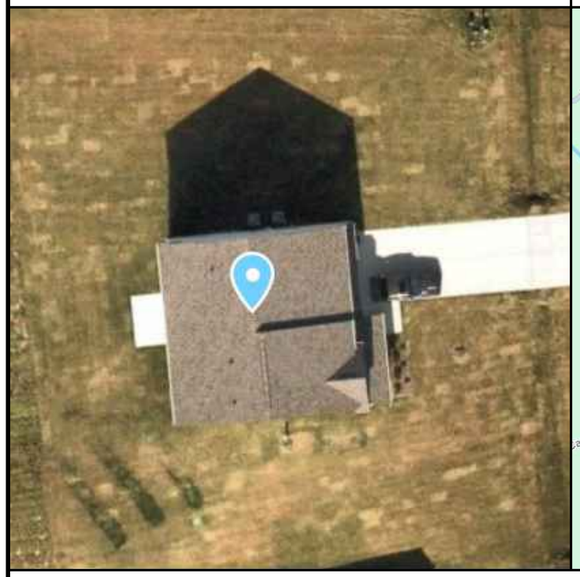
THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

NEW PV SYSTEM DESIGN

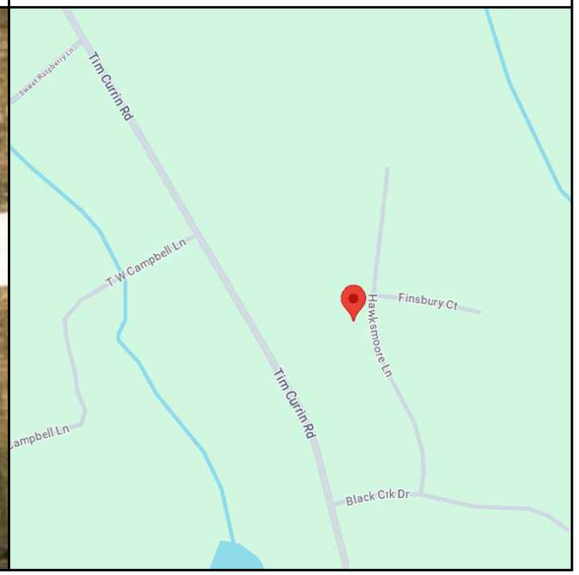
31 MODULES - 12.400 kW DC, 8.990 kW AC SYSTEM SIZE

SMITH RESIDENCE - 149 HAWKSMOORE LANE, LILLINGTON, NC 27546 APN: 0528577249.000

AERIAL MAP
NTS



VICINITY MAP
NTS



GOVERNING CODES

2017 NATIONAL ELECTRIC CODE
2018 NORTH CAROLINA BUILDING CODE
2018 NORTH CAROLINA RESIDENTIAL CODE
2018 NORTH CAROLINA FIRE PREVENTION CODE
2018 NORTH CAROLINA FUEL GAS CODE
2018 NORTH CAROLINA EXISTING BUILDING CODE
2018 NORTH CAROLINA ENERGY CONSERVATION CODE
2018 NORTH CAROLINA MECHANICAL CODE
2018 NORTH CAROLINA PLUMBING CODE

AS ADOPTED BY HARNETT COUNTY INCLUDING ANY AMENDMENTS OR ADDITIONAL LISTED REQUIREMENTS. DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF DUKE ENERGY PROGRESS UTILITY.

EQUIPMENT IS COMPATIBLE WITH UL2703, UL1741, AND UL1703 AS APPLICABLE

DESIGN CRITERIA

WIND SPEED: 120 MPH
GROUND SNOW LOAD: 10 PSF
ASCE: 7-10
EXPOSURE CATEGORY: C
BUILDING OCCUPANCY: R-3
CONSTRUCTION TYPE: TYPE V-B
SPRINKLERS: NO

SHEET INDEX

SCOPE OF WORK

SYSTEM SIZE: 12.400kW DC / 8.990kW AC SYSTEM SIZE
PV MODULE: (31) LONGI LR5-54HABB-400M (BLACK ON BLACK)
INVERTER: (31) ENPHASE IQ8PLUS-72-M-US
COMBINER: (1) 125A ENPHASE X-IQ-AM1-240-5/5C
AC DISCONNECT: (1) 60A FUSED AC DISCONNECT

ROOF STORIES: 2
ROOF TYPE(S): COMP SHINGLE
MOUNTING(S) & RACKING(S): IRONRIDGE QUICKMOUNT HALO ULTRAGRIP WITH IRONRIDGE XR10 RAIL
FLASHING: IRONRIDGE ULTRAGRIP FLASHING
ROOF BEING REPLACED: NO
ROOF CONDITION: GOOD
ROOF HEIGHT: 25 FEET
ROOF CONSTRUCTION: GABLE

INTERCONNECTION: LINE SIDE TAP
MAIN SERVICE PANEL LOCATION: 1ST FLOOR
MAIN SERVICE PANEL RATING: (E) 200A
MAIN BREAKER RATING: (E) 200A
OCPD: 50A FUSE

METER NUMBER: 343 670 393
METER LOCATION: 1ST FLOOR

ARRAY	TILT	AZIMUTH
1	30°	265°

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DATE	REVISION	COMMENT

DESIGN ENGINEER

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RESIDENCE
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APN: 0528577249.000
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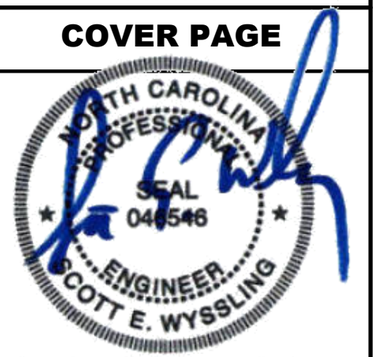
9198880378

COVER PAGE



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76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed 3/04/2025

SCOTT E WYSSLING, PE
NC LICENSE NO 46546

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

PV-1

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

N

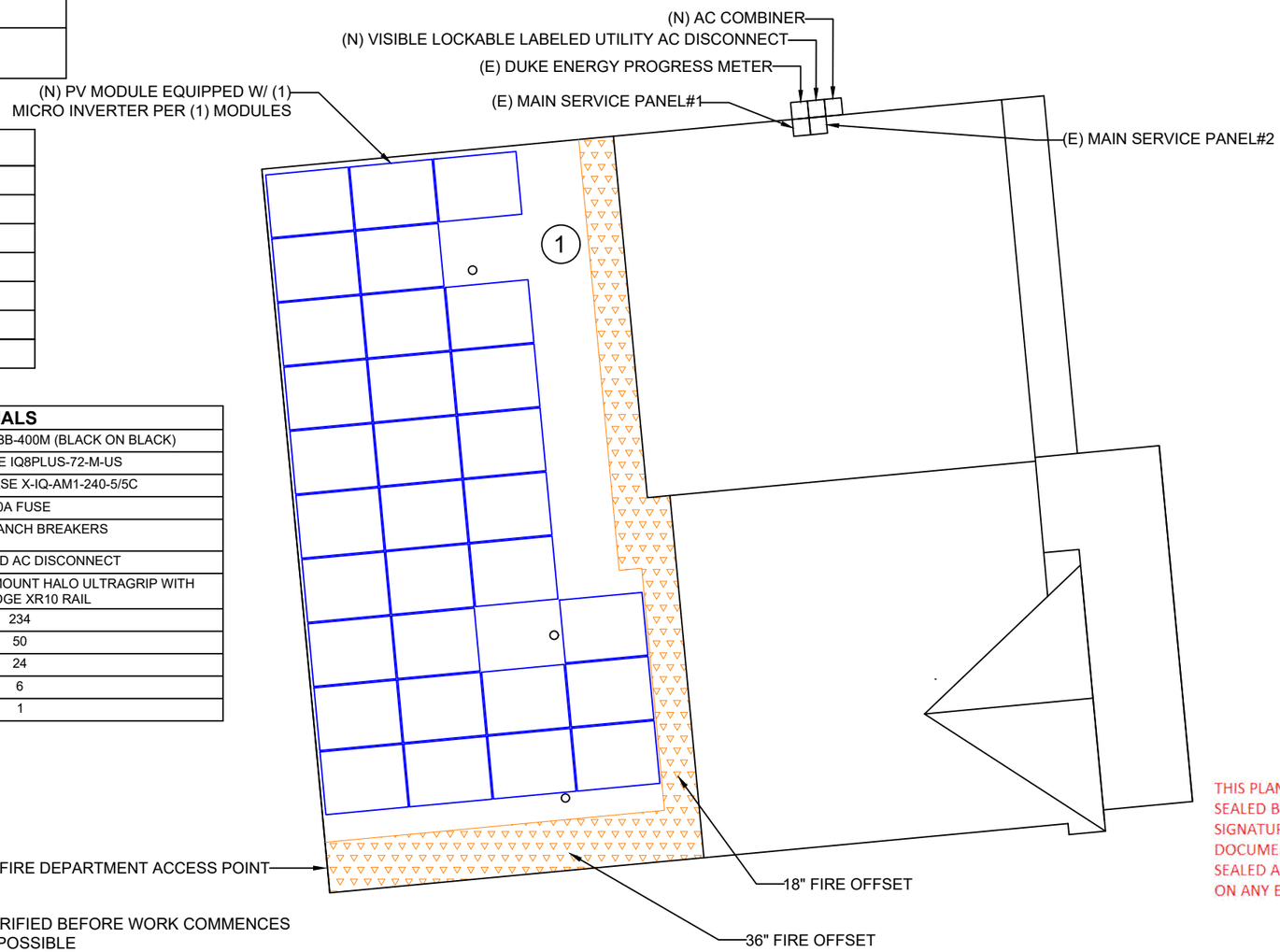
ROOF DESCRIPTION							
ROOF #	ROOF TYPE	TILT	PITCH	AZIMUTH	ROOF FRAMING	MODULE COUNT	ARRAY SQ. FT.
1	COMP SHINGLE	30°	7:12	265°	2X6@24" O.C. RAFTERS	31	653.48

TOTAL ROOF AREA SQ. FT.	2086.8624	TOTAL ARRAY SQ. FT.	653.48	ROOF COVER %	31.31

SYSTEM INFORMATION	
MODULE COUNT/TYPE	(31) LONGI LR5-54HABB-400M (BLACK ON BLACK)
INVERTER COUNT/TYPE	(31) ENPHASE IQ8PLUS-72-M-US
MODULE WEIGHT	49.60 LBS
MODULE DIMENSIONS	68" x 44.65"
UNIT WEIGHT OF ARRAY	2.35 PSF

LEGEND	
ROOF VENT (TYP.)	□
PLUMBING VENT (TYP.)	○
A/C UNIT	A/C
SATELLITE DISH	
ELECTRICAL MAST	
CHIMNEY	○
FIRECODE PATHWAY	

BILL OF MATERIALS	
MODULE	(31) LONGI LR5-54HABB-400M (BLACK ON BLACK)
INVERTER	(31) ENPHASE IQ8PLUS-72-M-US
COMBINER	(1) 125A ENPHASE X-IQ-AM1-240-5/5C
FUSE	50A FUSE
BRANCH BREAKERS	(3) 20A BRANCH BREAKERS
AC DISCONNECT	(1) 60A FUSED AC DISCONNECT
RACKING	(71) IRONRIDGE QUICKMOUNT HALO ULTRAGRIP WITH IRONRIDGE XR10 RAIL
RAIL LENGTH (FT)	234
MID CLAMPS	50
END CLAMPS	24
GROUND LUGS	6
JUNCTION BOXES	1



SITE PLAN NOTES

1. ALL OBSTRUCTIONS MUST BE VERIFIED BEFORE WORK COMMENCES
2. CONDUIT TO BE RUN IN ATTIC IF POSSIBLE
3. VISIBLE LOCKABLE LABELED UTILITY AC DISCONNECT WILL BE INSTALLED WITHIN 10' OF DUKE ENERGY PROGRESS METER.
4. AC DISCONNECT SHALL BE READILY ACCESSIBLE 24/7
5. REQUIRED ELECTRICAL CLEARANCE TO BE MAINTAINED
6. MAIN SERVICE PANEL LOCATION: 1ST FLOOR
7. METER LOCATION: 1ST FLOOR

SCALE: 1/8" = 1'-0"

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DESIGN ENGINEER

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OLDSMAR, FL

SMITH
RESIDENCE
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COORDINATES: 35.363694, -78.913472
APN: 0528577249.000
D2iaakurdi@gmail.com
9198880378

SITE PLAN

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed 3/04/2025

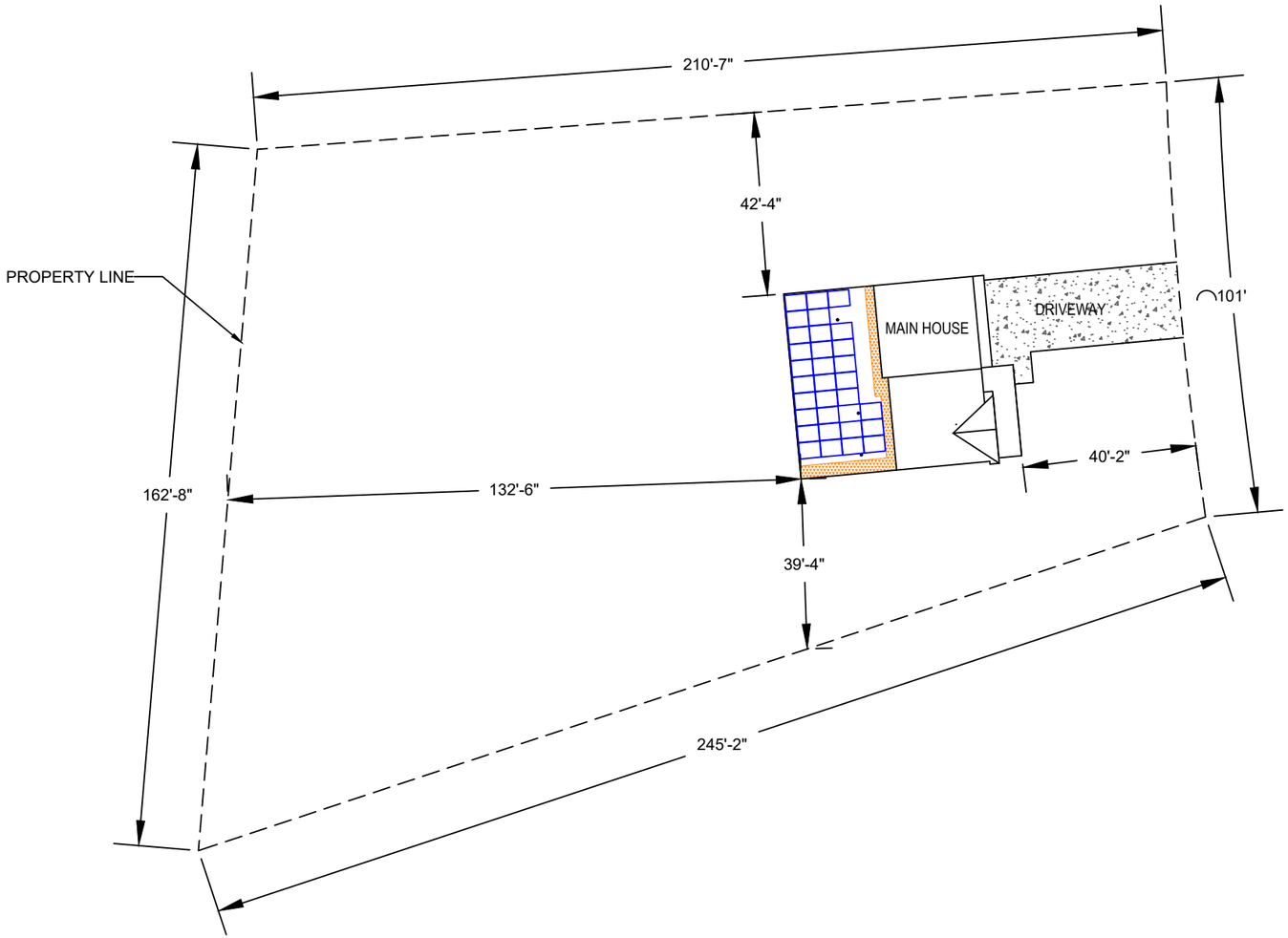
SCOTT E WYSSLING, PE
NC LICENSE NO 46546

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

PV-2

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025



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SCALE: 1/32" = 1'-0"

(ON BLACK)
C

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PROPERTY PLAN

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed 3/04/2025
SCOTT E WYSSLING, PE
NC LICENSE NO 46546

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

PV-3

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

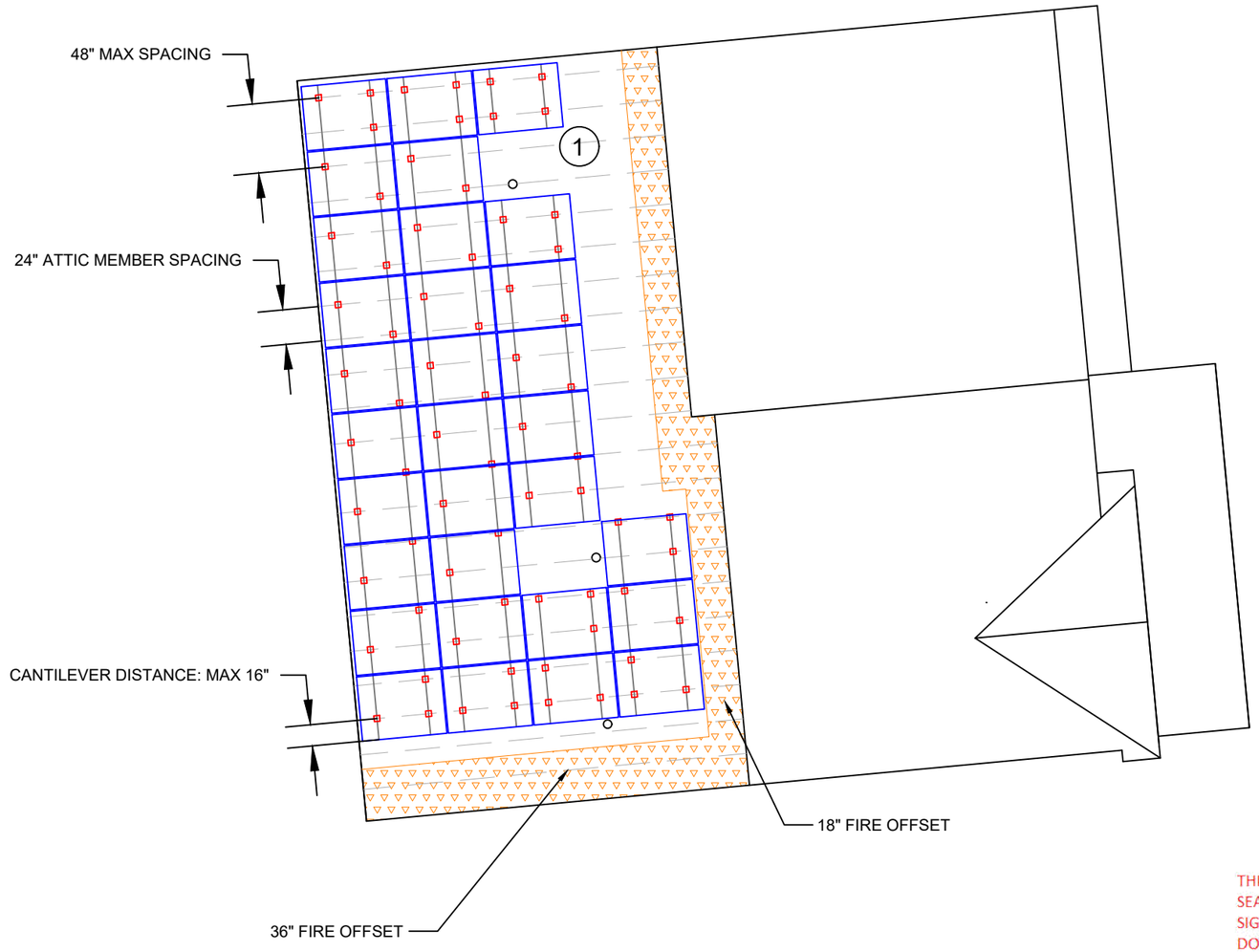
N

ATTACHMENT DESCRIPTION

ROOF #	ROOF TYPE	TILT	ARRAY TILT	AZIMUTH	ROOF FRAMING	TOTAL POINTS	MAX SPACING	MAX CANTILEVER	ATTACHMENT	MIN EMBEDMENT
1	COMP SHINGLE	30°	30°	265°	2X6@24" O.C. RAFTERS	71	48"	16"	(2) #14 SCREW	2"

PV MODULES: (31) LONGI LR5-54HABB-400M (BLACK ON BLACK)
ROOF TYPE(S): COMP SHINGLE
ROOF CONDITION: GOOD
MOUNTING TYPE(S): IRONRIDGE QUICKMOUNT HALO ULTRAGRIP WITH IRONRIDGE XR10 RAIL
FLASHING: IRONRIDGE ULTRAGRIP FLASHING
ROOF HEIGHT: 25'
ROOF FRAMING MATERIAL: WOOD
DECKING THICKNESS: 1/2 "

TOTAL ATTACHMENTS: 71



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EXACT LOCATION OF ROOF FRAMING MAY VARY; INSTALLER TO FOLLOW ENGINEER (WHERE APPLICABLE) AND MANUFACTURER INSTRUCTIONS/GUIDELINES WHEN INSTALLING.

SCALE: 1/8" = 1'-0"

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ATTACHMENT PLAN

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed 3/04/2025
SCOTT E WYSSLING, PE
NC LICENSE NO 46546

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

PV-4

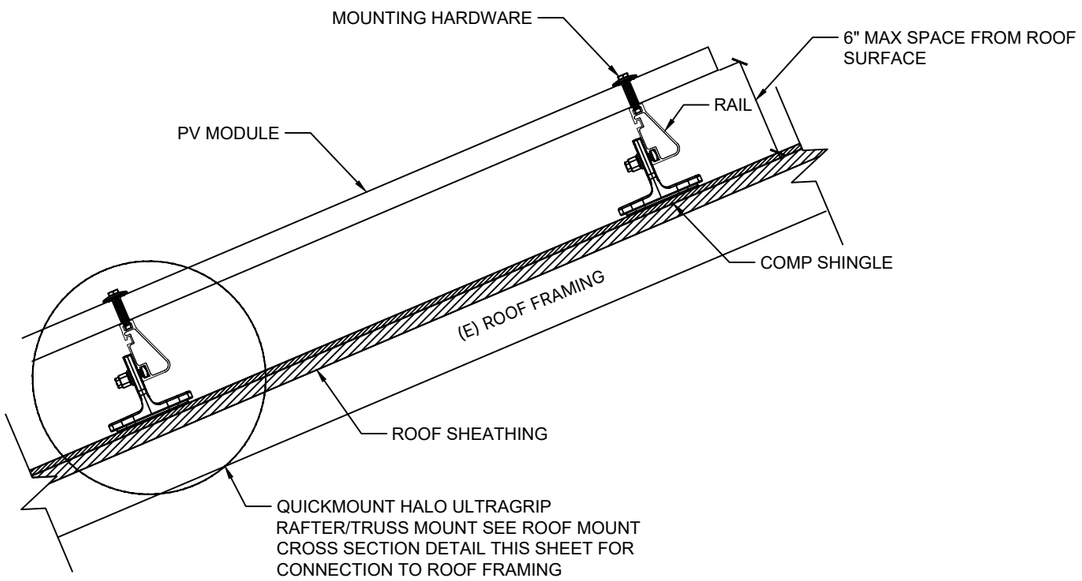
AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

ROOF SECTIONS	R1	WIND SPEED: 120 MPH	GROUND SNOW LOAD: 10 PSF	ROOF TYPE: COMP SHINGLE	ROOF LAYERS (IF APPLICABLE): 1

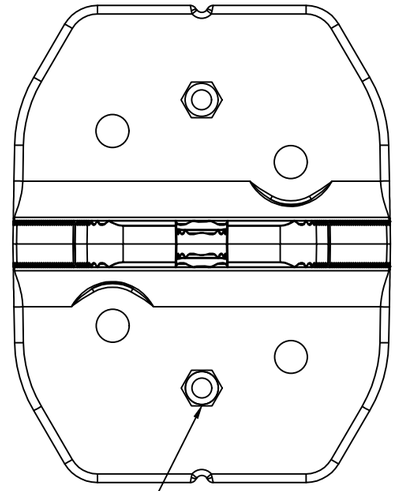
GENERAL ROOF MOUNT DETAIL

NTS



ROOF MOUNT PLAN VIEW DETAIL

NTS



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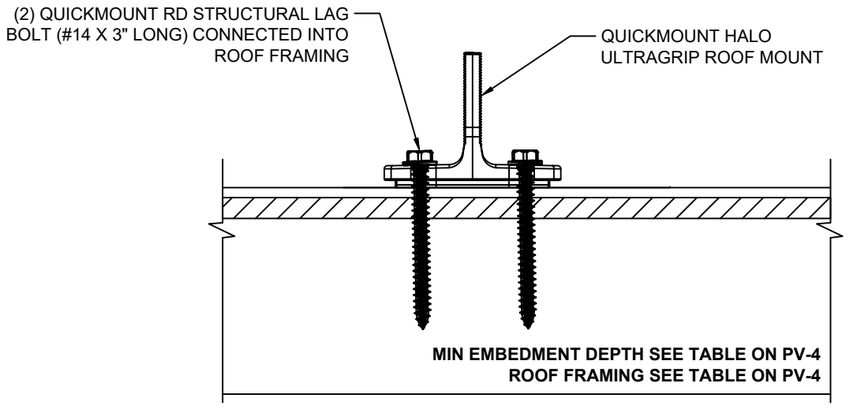
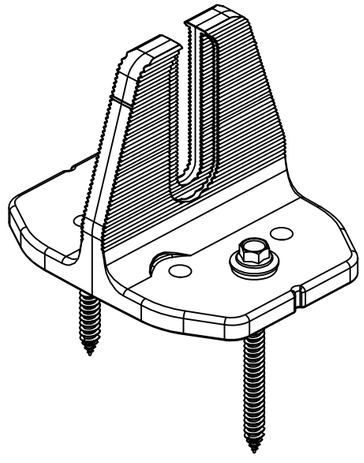


NOTE: ALL ROOF PENETRATIONS MUST BE SEALED OR FLASHED USING APPROVED MEANS

ROOF MOUNT CROSS SECTION DETAIL

NTS



ROOF MOUNT

NTS

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MOUNTING DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

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North Carolina COA # P-2308

Signed 3/04/2025
SCOTT E WYSSLING, PE
NC LICENSE NO 46546

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

PV-5

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

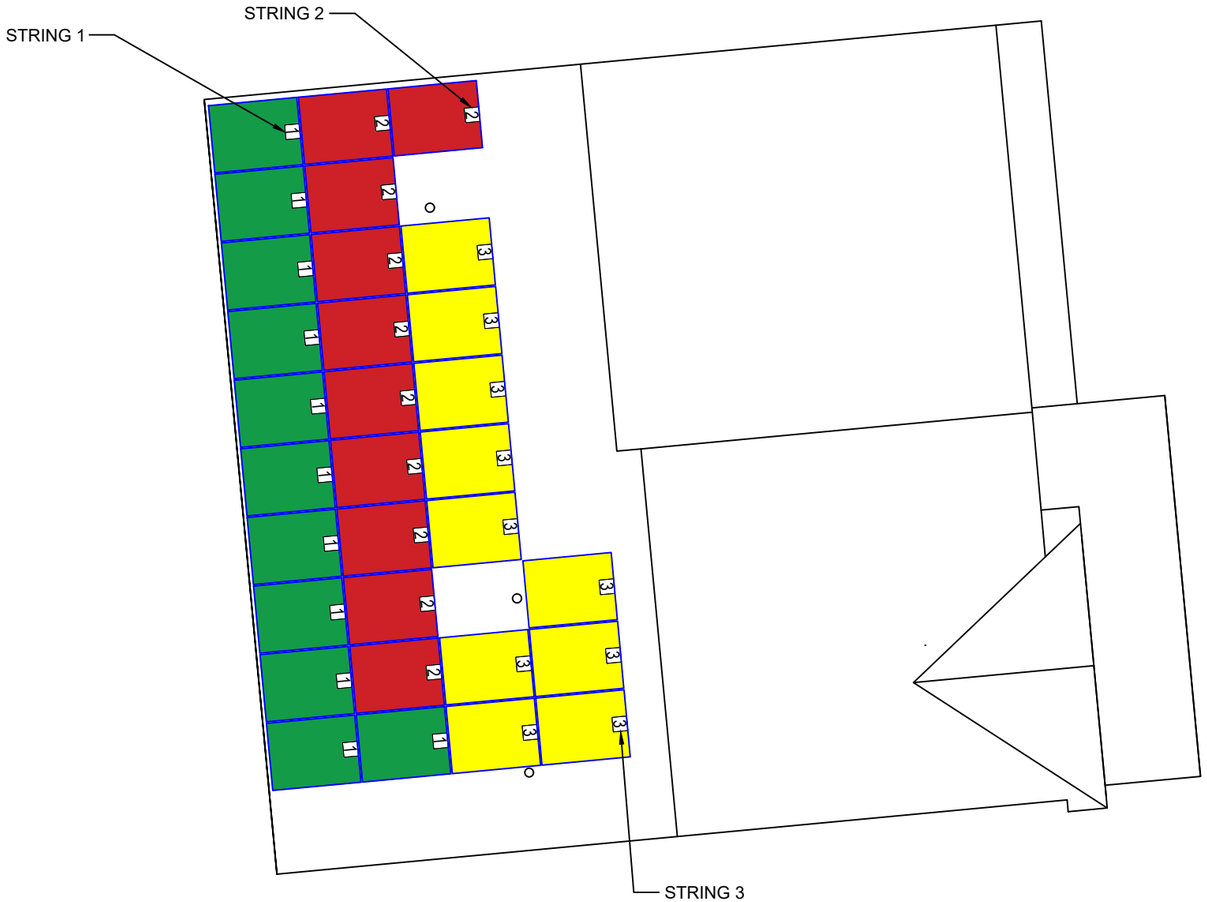
N

MODULE: (31) LONGI LR5-54HABB-400M (BLACK ON BLACK)
INVERTER: (31) ENPHASE IQ8PLUS-72-M-US
COMBINER: (1) 125A ENPHASE X-IQ-AM1-240-5/5C

STRING 1: (11) MODULES

STRING 2: (10) MODULES

STRING 3: (10) MODULES



SCALE: 1/8" = 1'-0"

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STRING PLAN

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

EE-1

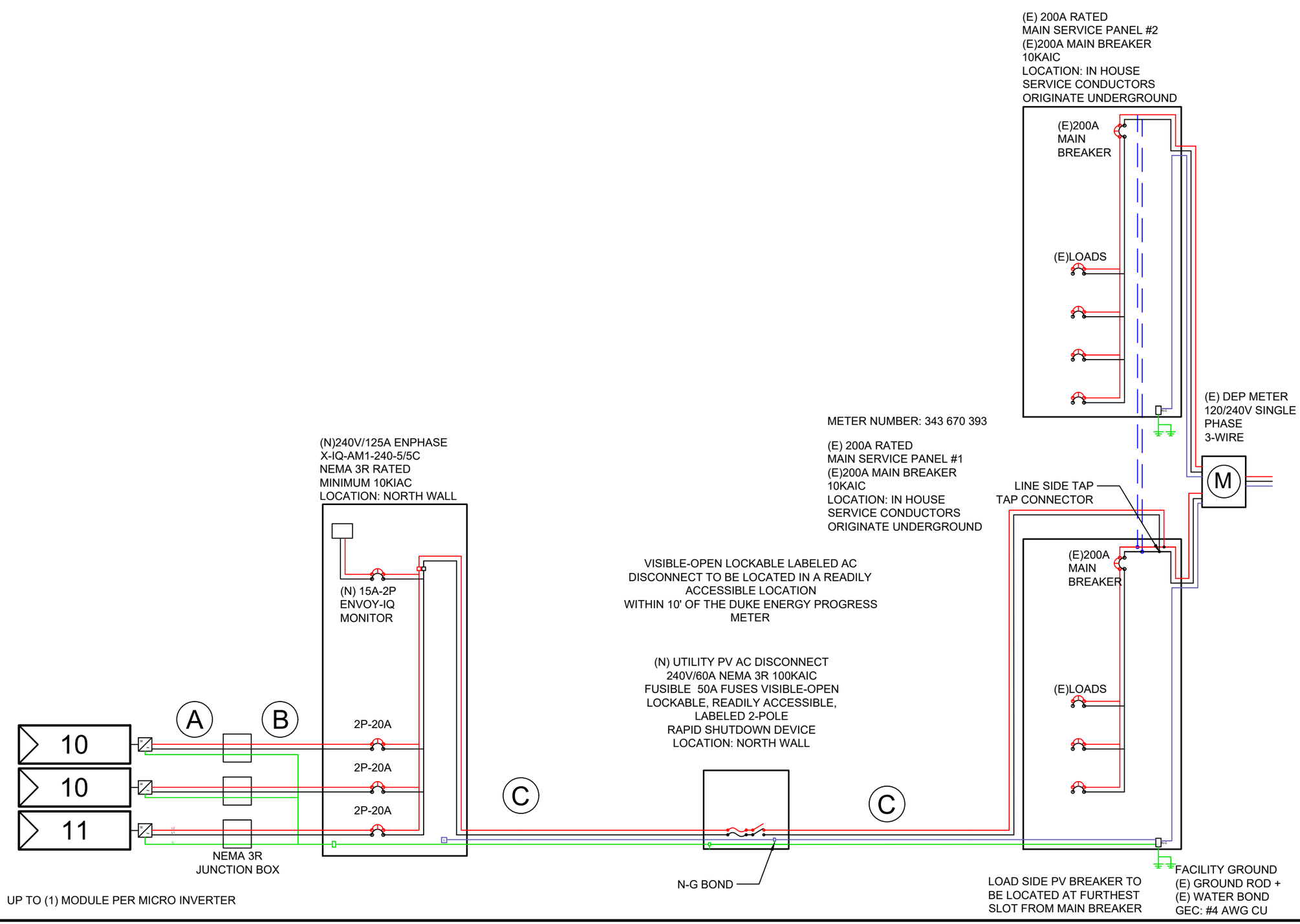
AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

MODULE TYPE: (31) LONGI LR5-54HABB-400M (BLACK ON BLACK)
INVERTER TYPE: (31) ENPHASE IQ8PLUS-72-M-US 240V

CONDUCTOR SCHEDULE

TAG	# WIRES IN CONDUIT	MINIMUM WIRE SIZE	TYPE, MATERIAL	MINIMUM GROUND WIRE SIZE	GROUND TYPE,MATERIAL	CONDUIT	AMPS (BEFORE 125% SAFETY FACTOR)	TOTAL AMPS	WIRE AMPERAGE RATING TABLE 310.15(B)(16)	MINIMUM OCPD
A	3	#12 AWG	Q CABLE	#6 AWG	BARE CU	3/4 EMT	13.31	16.64	25	20
B	3	#10 AWG	THWN-2, CU	#12 AWG	THWN-2, CU	3/4 EMT	13.31	16.64	35	20
C	4	#6 AWG	THWN-2, CU	#8 AWG	THWN-2, CU	3/4 EMT	37.51	46.89	65	50



UP TO (1) MODULE PER MICRO INVERTER

DESIGN ENGINEER

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THREE LINE DIAGRAM

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

EE-2

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

PV MODULE	
MODEL	LONGI LR5-54HABB-400M (BLACK ON BLACK)
PMAX	400W
VOC	37.05V
VMP	30.94V
IMP	12.93A
ISC	13.72A
MAX SERIES FUSE RATING	30A

INVERTER	
MODEL	ENPHASE IQ8PLUS-72-M-US
MAX INPUT DC VOLTAGE	60V
MAX DC CURRENT	12A
MAX OUTPUT POWER	290W
MAXIMUM CONT. OUTPUT CURRENT	1.21A
CEC EFFICIENCY	0.97
NOMINAL AC VOLTAGE	240V
MAX UNITS PER 20A CIRCUIT	13

INTERCONNECTION PER NEC 705.12 (B) "120% RULE"	
MSP RATING	200A
MAIN DISCONNECT RATING	200A
TOTAL BACK FEED REQUIRED	46.8875A
OCPD RATING	50A
(MSP RATING * 1.2)-MAIN DISCONNECT	(200A * 1.2)-200 >=46.8875A, GOOD

ELECTRICAL CALCULATIONS

TAG A
FROM MODULES TO JUNCTION BOX

LARGEST STRING: 11 MODULES
NUMBER OF INVERTERS: 11
AMPS PER INVERTER: 1.21
11 * 1.21A = 13.31A * 1.25 = 16.64A TOTAL AMPS

CONDUCTOR SIZE: #12 AWG
CONDUCTOR MAX: 25A, GOOD
OCPD: 20A, GOOD

TAG B
FROM JUNCTION BOX TO AC COMBINER

LARGEST STRING: 11 MODULES
NUMBER OF INVERTERS: 11
AMPS PER INVERTER: 1.21
11 * 1.21A = 13.31A * 1.25 = 16.64A TOTAL AMPS

CONDUCTOR SIZE: #10 AWG
CONDUCTOR MAX: 35A, GOOD
OCPD: 20A, GOOD

TAG C
FROM AC COMBINER TO INTERCONNECTION

TOTAL MODULES: 31
TOTAL INVERTERS: 31
AMPS PER INVERTER: 1.21A
31 * 1.21A = 37.51A * 1.25 = 46.89A TOTAL AMPS

CONDUCTOR SIZE: #6 AWG
CONDUCTOR MAX: 65A, GOOD
OCPD: 50A, GOOD

TEMPERATURE CORRECTED VOC				
MODULE VOC	VOC COEFFICIENT	COLDEST TEMPERATURE	ADJUSTED VOC	INVERTER MAX
37.05	-0.265	-39	40.78	60, GOOD

DESIGN ENGINEER

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CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

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COA NO. P-2308

SOLAR COMPANY/CLIENT

EPC SOLAR
379 DOUGLAS RD EAST SUITE A
OLDSMAR, FL

SMITH
RESIDENCE
149 HAWKSMOORE LANE
LILLINGTON, NC 27546
COORDINATES: 35.363694, -78.913472
APN: 0528577249.000
D2iaakurdi@gmail.com
9198880378

ELECTRICAL NOTES

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

EE-3

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

1) **PHOTOVOLTAIC AC DISCONNECT**
MAXIMUM AC OPERATING CURRENT: 37.51
NOMINAL OPERATING AC VOLTAGE: 240

AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS [NEC 690.56]

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

AT POINT OF INTERCONNECTION [NEC 705.12(C),690.59]

3) **MAIN PHOTOVOLTAIC SYSTEM DISCONNECT**

EACH PV SYSTEM DISCONNECTING MEANS SHALL PLAINLY INDICATE WHETHER IN THE OPEN (OFF) OR CLOSED (ON) POSITION AND BE PERMANENTLY MARKED [NEC 690.13(B)]

4) PHOTOVOLTAIC
DC DISCONNECT

AT EACH DC DISCONNECTING MEANS [NEC 690.13(B)]

5) PHOTOVOLTAIC
AC DISCONNECT

AT EACH AC DISCONNECTING MEANS [NEC 690.13(B)]

6) **WARNING: PHOTOVOLTAIC POWER SOURCE**

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 [NEC 690.31(D)(2)]

7) **⚠WARNING**
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND LOAD SIDES
MAY BE ENERGIZED IN THE OPEN POSITION

AT BUILDING OR STRUCTURE MAIN DISCONNECTING MEANS [NEC 690.12(E), NEC 690.13(B)]

8) ⚠ WARNING
PHOTOVOLTAIC SYSTEM
COMBINER PANEL
DO NOT ADD LOADS

AT AC COMBINER PANEL [NEC 690.13(B)]

9) **⚠WARNING**
INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

A PERMANENT WARNING LABEL SHALL BE APPLIED TO THE DISTRIBUTION EQUIPMENT ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER [NEC 705.12(B)(2)] (BREAKER INTERCONNECTION ONLY)

10) SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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

FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY: THE TITLE "SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN" SHALL UTILIZED CAPITALIZED CHARACTERS WITH A MINIMUM HEIGHT OF 3/8 IN. IN BLACK ON YELLOW BACKGROUND, AND THE REMAINING CHARACTERS SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3/16 IN. IN BLACK ON WHITE BACKGROUND [NEC 690.12(D)]

11) RAPID SHUTDOWN SWITCH FOR SOLAR PV

A RAPID SHUTDOWN SWITCH SHALL HAVE A LABELED LOCATED ON OR NO MORE THAN 8 FT FROM THE SWITCH THAT INCLUDES THIS WORDING. THE LABEL SHALL BE REFLECTIVE, WITH ALL LETTERS CAPITALIZED AND HAVING A MINIMUM HEIGHT OF 3/8 IN., IN WHITE ON RED BACKGROUND [NEC 690.12(D)(2)]

12) MAIN BREAKER DERATED TO 200A, NO UP-SIZING PERMITTED

ON THE DEAD FRONT OF MSP

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 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] THEY SHALL BE PERMANENTLY ATTACHED, WEATHER/SUNLIGHT RESISTANT, AND SHALL NOT BE HAND WRITTEN PER NEC 110.21(B)
5. APPLICABLE LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]

DESIGN ENGINEER

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LABELS

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

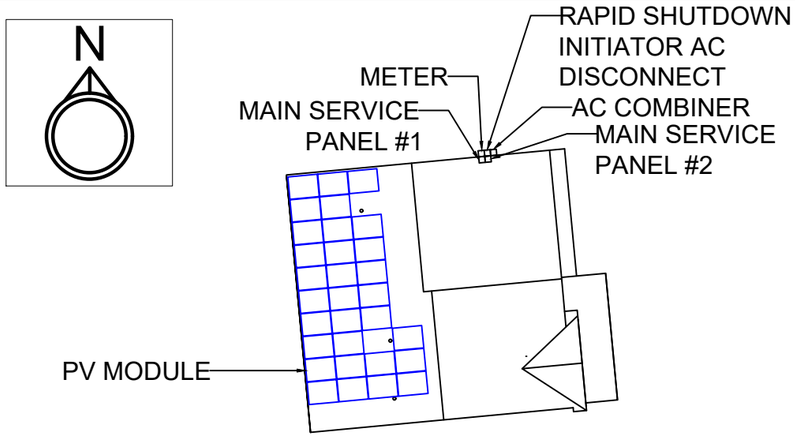
EE-4

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

CAUTION

MULTIPLE SOURCES OF POWER
POWER IS SUPPLIED TO THIS BUILDING FROM THE FOLLOWING SOURCES WITH DISCONNECTS AS SHOWN.



149 HAWKSMOORE LANE LILLINGTON,NC 27546

LOCATION: MSP
NEC 705.10

DESIGN ENGINEER

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SOLAR COMPANY/CLIENT

EPC Solar by Choice

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PLACARD

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

EE-5

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND REVIEW ALL MANUFACTURER INSTALLATION DOCUMENTS PRIOR TO INITIATING CONSTRUCTION.
2. ALL COMPONENTS SHALL BE NEW AND LISTED BY A RECOGNIZED ELECTRICAL TESTING LABORATORY AND LISTED FOR THEIR SPECIFIC APPLICATION.
3. OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED OR BETTER.
4. ACCESS TO ELECTRICAL COMPONENTS OVER 150 VOLTS TO GROUND SHALL BE RESTRICTED TO QUALIFIED PERSONNEL.
5. CONTRACTOR SHALL OBTAIN ELECTRICAL PERMITS PRIOR TO INSTALLATION AND SHALL COORDINATE ALL INSPECTIONS, TESTING COMMISSIONING, AND ACCEPTANCE WITH THE HOMEOWNER, UTILITY CO. AND CITY INSPECTORS AS NEEDED.
6. EACH MODULE TO BE GROUNDED USING THE SUPPLIED CONNECTION POINT PER THE MANUFACTURER'S REQUIREMENTS. ALL PV MODULES, EQUIPMENT, AND METALLIC COMPONENTS ARE TO BE BONDED. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CANNOT BE VERIFIED OR IS ONLY METALLIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
7. DC CONDUCTORS SHALL BE RUN IN EMT AND/OR MC (METAL CLAD CABLE) AND SHALL BE LABELED.
8. EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH APPLICABLE NEC.
9. CONFIRM LINE SIDE VOLTAGE AT THE ELECTRIC UTILITY SERVICE PRIOR TO CONNECTING INVERTER. VERIFY SERVICE VOLTAGE IS WITHIN INVERTER VOLTAGE OPERATIONAL RANGE.
10. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER CODE.
11. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE, AND FOR ROOF-MOUNTED SYSTEMS, WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF OF THE ROOF SURFACE.
12. ALL ROOF PENETRATIONS MUST BE SEALED OR FLASHED.
13. EQUIPMENT MAY BE SUBSTITUTED FOR SIMILAR EQUIPMENT BASED ON AVAILABILITY, SUBSTITUTED EQUIPMENT SHALL COMPLY WITH DESIGN CRITERIA.
14. REMOVAL OF AN INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BONDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR AND THE PHOTOVOLTAIC SOURCE AND/OR OUTPUT CIRCUIT GROUNDED CONDUCTORS.
15. WHENEVER A DISCREPANCY IN THE QUALITY OF EQUIPMENT ARISES ON THE DRAWING OR SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIAL AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS TO ENSURE COMPLETE COMPLIANCE AND LONGEVITY OF THE OPERABLE SYSTEM REQUIRED BY THE ENGINEERS.
16. AC DISCONNECT SHALL BE LOCATED WITHIN 10' OF DUKE ENERGY PROGRESS METER. AC DISCONNECT SHALL BE LOCATED ON SAME WALL OF HOUSE WHERE POSSIBLE. IF AC DISCONNECT CANNOT BE WITHIN 10' OF METER, THEN PHOTOS SHALL BE PROVIDED OF THE OBSTRUCTION FOR REVIEW.
17. IF APPLICABLE, ENERGY STORAGE SYSTEM (ESS) CAN BE USED DURING ON-GRID OPERATION TO SHIFT GENERATION FOR TIME OF USE (TOU) AND WILL NOT OPERATE OFF GRID.

GENERAL ELECTRICAL NOTES

1. CONDUIT A AND B AMPS EQUAL TO LARGEST STRING ON TAG.
2. CONDUIT A SHALL BE RUN THROUGH ATTIC IF POSSIBLE.
3. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND/OR LISTED FOR SUCH USE, AND FOR ROOF-MOUNTED SYSTEMS, WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF OF THE ROOF SURFACE.
4. EQUIPMENT MAY BE SUBSTITUTED FOR SIMILAR EQUIPMENT BASED ON AVAILABILITY, SUBSTITUTED EQUIPMENT SHALL COMPLY WITH DESIGN CRITERIA. WIRE SIZES ARE BASED ON MINIMUMS AND ARE NOT MEANT TO LIMIT UPSIZING AS REQUIRED BY FIELD CONDITIONS/AVAILABILITY.
5. WIRING SHALL COMPLY WITH MAXIMUM CONTINUOUS CURRENT OUTPUT AT 25°C AND MAXIMUM VOLTAGE AT 600V; WIRE SHALL BE WET RATED AT 90°C.
6. EXPOSED PHOTOVOLTAIC SYSTEM CONDUCTORS ON THE ROOF WILL BE TYPE 2 OR PV-TYPE WIRE.
7. PHOTOVOLTAIC SYSTEM CONDUCTORS SHALL BE IDENTIFIED AND GROUPED. THE MEANS OF IDENTIFICATION SHALL BE PERMITTED BY SEPERATE COLOR-CODING, MARKING TAPE, TAGGING OR OTHER APPROVED MEANS.
8. ALL CONDUCTORS AND TERMINATIONS SHALL BE RATED FOR INSTALL LOCATION
9. ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE RAIN-TIGHT AND APPROVED FOR USE IN WET LOCATIONS.
10. ALL METALLIC RACEWAYS AND EQUIPMENT SHALL BE BONDED AND ELECTRICALLY CONTINUOUS.
11. WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, CONTRACTOR SHALL SIZE THEM ACCORDING TO APPLICABLE CODES.
12. REMOVAL OF A UTILITY-INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BUILDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR AND THE PV SOURCE AND/OR OUTPUT CIRCUIT GROUNDED CONDUCTOR.
13. FOR GROUNDED SYSTEMS, THE PHOTOVOLTAIC SOURCE AND OUTPUT CIRCUITS SHALL BE PROVIDED WITH A GROUND-FAULT PROTECTION DEVICE OR SYSTEM THAT DETECTS A GROUND FAULT, INDICATES THAT FAULT HAS OCCURRED, AND AUTOMATICALLY DISCONNECTS ALL CONDUCTORS OR CAUSES THE INVERTER TO AUTOMATICALLY CEASE SUPPLYING POWER TO OUTPUT CIRCUITS.
14. FOR UNGROUNDED SYSTEMS, THE INVERTER IS EQUIPPED WITH GROUND FAULT PROTECTION AND A GFI FUSE PORT FOR GROUND FAULT INDICATION.
15. PV MODULE FRAMES SHALL BE BONDED TO RACKING RAIL OR BARE COPPER GEC/GEC PER THE MODULE MANUFACTURER'S LISTED INSTRUCTION SHEET.
16. PV MODULE RACKING RAIL SHALL BE BONDED TO BARE COPPER GEC VIA WEEB LUG, IL SCO GBL-4DBT LAY IN LUG, OR EQUIVALENT LISTED LUG.
17. THE PHOTOVOLTAIC INVERTER WILL BE LISTED AS UL 1741 COMPLIANT.
18. RACKING AND BONDING SYSTEM TO BE UL2703 RATED.
19. ANY REQUIRED GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR SPLICES OR JOINTS AS BUSBARS WITHIN LISTED EQUIPMENT
20. WHEN BACKFEED BREAKER IS THE METHOD OF UTILITY INTERCONNECTION, THE BREAKERS SHALL NOT READ "LINE AND LOAD."
21. WHEN APPLYING THE 120% RULE, THE SOLAR BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR FROM THE MAIN BREAKER.
22. THE WORKING CLEARANCE AROUND THE EXISTING ELECTRICAL EQUIPMENT AS WELL AS THE NEW ELECTRICAL EQUIPMENT WILL BE MAINTAINED.
23. LISTED CONDUIT AND CONDUCTOR SIZES ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UPSIZING AS REQUIRED BY FIELD CONDITIONS/AVAILABILITY.
24. ENPHASE IQ8PLUS-72-M-US INVERTERS HAVE INTEGRATED GROUND AND DOUBLE INSULATION. NO GEG OR EGC IS REQUIRED. THE DC CIRCUIT IS ISOLATED AND INSULATED FROM GROUND AND MEETS THE REQUIREMENTS OF NEC.
25. CALCULATIONS ARE BASED ON A) ASHRAE #2 AVERAGE HIGH = 32°C B)NEC TABLE 310.15(B)2(a) 75° DERATE FACTOR = 0.96 C) NEC TABLE NEC 310.15(B)(16) 75°C.
26. SUPPLEMENTAL GROUNDING ELECTRODE TO BE INSTALLED NO CLOSER THAN 6' FROM EXISTING WHEN REQUIRED. NEC 250.53(A)(2) DOES NOT REQUIRE IT IF CONTRACTOR CAN PROVE THAT A SINGLE ROD HAS A RESISTANCE TO EARTH OF 25 OHMS OR LESS.
27. WHEN CABLE, INCLUDING PV CABLE(S), IS RUN BETWEEN ARRAYS OR TO JUNCTION BOXES IT SHALL BE ENCLOSED IN CONDUIT. [NEC 300.4, 690.31(A) AND (C)]
28. THE CABLE CONNECTORS USED ON THE OUTPUT SIDE OF THE OPTIMIZER OR MICROINVERTER TOGETHER WITH THE ARRAY CABLE USED BETWEEN THEM ARE OF THE SAME MANUFACTURER OR ARE LISTED FOR COMPATIBILITY. [NEC 690.33(C)]
29. SOME WIRE CONNECTORS SUPPLY INSTRUCTIONS FOR THE PRELIMINARY PREPARATION OF CONDUCTORS, SUCH AS USE OF CONDUCTOR TERMINATION COMPOUND (ANTIOXIDANT COMPOUND). SOME CONNECTORS ARE SHIPPED PRE-FILLED WITH CONDUCTOR TERMINATION COMPOUND (ANTIOXIDANT COMPOUND). FOR NON-PREFILLED CONNECTORS, CONDUCTOR TERMINATION COMPOUND MAY BE USED IF RECOMMENDED BY THE CONNECTOR MANUFACTURER AS PRELIMINARY PREPARATION OF THE CONDUCTOR.

DESIGN ENGINEER

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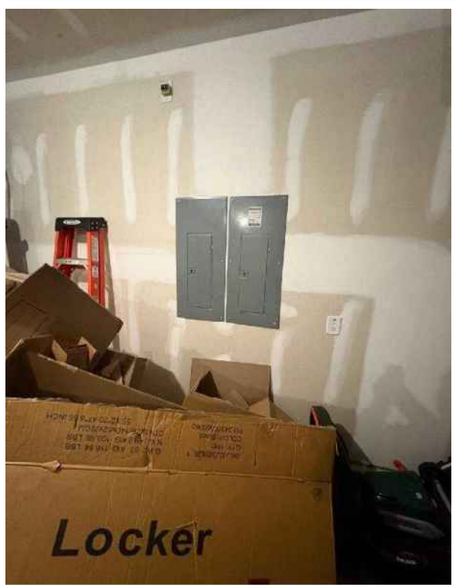
DESIGN NOTES

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

PV-6

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025



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SITE PHOTOS

DC SYSTEM SIZE: 12.400kW
AC SYSTEM SIZE: 8.990kW

PV-7

AHJ: HARNETT COUNTY
UTILITY: DEP

DRAWN BY: HUP
INITIAL DESIGN DATE: 03/04/2025

Hi-MO 5

LR5-54HABB
390~415M

- Suitable for distributed projects
- Advanced module technology delivers superior module efficiency
  - M10 Gallium-doped Wafer • Integrated Segmented Ribbons • 9-busbar Half-cut Cell
- Globally validated bifacial energy yield
- High module quality ensures long-term reliability

25-year Warranty for Materials and Processing

30-year Warranty for Extra Linear Power Output

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730
ISO9001:2015: ISO Quality Management System
ISO14001: 2015: ISO Environment Management System
ISO45001: 2018: Occupational Health and Safety
IEC62941: Guideline for module design qualification and type approval

LONGi

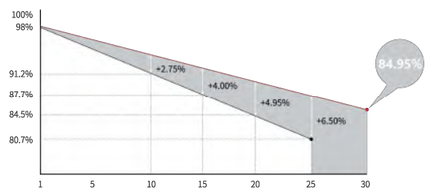
Hi-MO 5

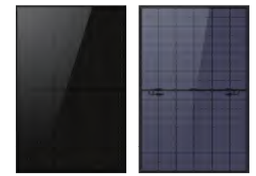
LR5-54HABB 390~415M

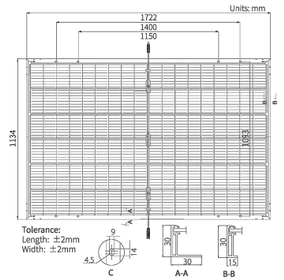
21.3%	0~3%	<2%	0.45%	HALF-CELL
MAX MODULE EFFICIENCY	POWER TOLERANCE	FIRST YEAR POWER DEGRADATION	YEAR 2-30 POWER DEGRADATION	Lower operating temperature

Additional Value

30-Year Power Warranty







Mechanical Parameters

Cell Orientation	108 (6×18)
Junction Box	IP68, three diodes
Output Cable	4mm², ±1200mm length can be customized
Glass	Dual glass, 2.0+1.6mm heat strengthened glass
Frame	Anodized aluminum alloy frame
Weight	22.5kg
Dimension	1722×1134×30mm
Packaging	36pcs per pallet / 216pcs per 20' GP / 936pcs or 792pcs(Only for USA) per 40' HC

Electrical Characteristics

STC : AM1.5 1000W/m² 25℃ NOCT : AM1.5 800W/m² 20℃ 1m/s

Test uncertainty for Pmax: ±3%

Module Type	LR5-54HABB-390M		LR5-54HABB-395M		LR5-54HABB-400M		LR5-54HABB-405M		LR5-54HABB-410M		LR5-54HABB-415M	
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	390	291.5	395	295.2	400	299.0	405	302.7	410	306.5	415	310.2
Open Circuit Voltage (Voc/V)	36.58	34.39	36.81	34.61	37.05	34.84	37.29	35.06	37.53	35.29	37.77	35.51
Short Circuit Current (Isc/A)	13.57	10.95	13.65	11.01	13.72	11.07	13.79	11.13	13.87	11.19	13.94	11.25
Voltage at Maximum Power (Vmp/V)	30.47	28.43	30.70	28.64	30.94	28.86	31.18	29.09	31.42	29.31	31.66	29.54
Current at Maximum Power (Imp/A)	12.80	10.26	12.87	10.31	12.93	10.36	12.99	10.41	13.05	10.45	13.11	10.50
Module Efficiency(%)	20.0		20.2		20.5		20.7		21.0		21.3	

Electrical characteristics with different rear side power gain (reference to 400W front)

Pmax /W	Voc/V	Isc /A	Vmp/V	Imp /A	Pmax gain
420	37.05	14.41	30.94	13.58	5%
440	37.05	15.09	30.94	14.22	10%
460	37.15	15.78	31.04	14.87	15%
480	37.15	16.46	31.04	15.52	20%
500	37.15	17.15	31.04	16.16	25%

Operating Parameters

Operational Temperature	-40℃ ~ +85℃
Power Output Tolerance	0 ~ 3%
Voc and Isc Tolerance	±3%
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	30A
Nominal Operating Cell Temperature	45±2℃
Protection Class	Class II
Bifaciality	70±5%
Fire Rating	UL Similar type 38 * IEC Class C

*Reference Standard: UL61730 Second Edition, Dated October 28, 2022

Mechanical Loading

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.050%/℃
Temperature Coefficient of Voc	-0.265%/℃
Temperature Coefficient of Pmax	-0.340%/℃

LONGi

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Web: www.longi.com

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MODULE

ENPHASE

DATA SHEET

IQ8 and IQ8+ Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC), which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built using advanced 55-nm technology with high-speed digital logic and has superfast 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.

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 that have integrated MC4 connectors.

UL CERTIFIED SAFETY

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

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

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

NOTE:

- IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, and so on) in the same system.
- IQ Microinverters ship with default settings that meet North America's IEEE 1547 interconnection standard requirements. Region-specific adjustments may be requested by an Authority Having Jurisdiction (AHJ) or utility representative according to the IEEE 1547 interconnection standard. An IQ Gateway is required to make these changes during installation.

* Meets UL 1741 only when installed with IQ System Controller 2 or 3.
** IQ8 and IQ8+ support split-phase, 240 V installations only.

IQ8 and IQ8+ Microinverters

INPUT DATA (DC)	UNITS	IQ8-60-M-US	IQ8PLUS-72-M-US
Commonly used module pairings [1]	W	235–350	235–440
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	27–37	27–45
Operating range	V	16–48	16–58
Minimum/Maximum start voltage	V	22/48	22/58
Maximum input DC voltage	V	50	60
Maximum continuous input DC current	A	10	12
Maximum input DC short-circuit current	A	25	
Maximum module (I_{sc})	A	20	
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 max. 20 A per branch circuit	
OUTPUT DATA (AC)	**UNITS**	**IQ8-60-M-US**	**IQ8PLUS-72-M-US**
Peak output power	VA	245	300
Maximum continuous output power	VA	240	290
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°	
Minimum and Maximum grid voltage [2]	V	211-264	
Maximum continuous output current	A	1.0	1.21
Nominal frequency	Hz	60	
Extended frequency range	Hz	47–68	
AC short circuit fault current over three cycles	Arms	2	
Max units per 20 A (L-L) branch circuit [3]	–	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	%	97.7	
CEC weighted efficiency	%	97	
Nighttime power consumption	mW	23	25
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		Stäubli MC4	
Dimensions (H × W × D)		212 mm (8.3") × 175 mm (6.9") × 30.2 mm (1.2")	
Weight		1.1 kg (2.43 lbs)	
Cooling		Natural convection–no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion-resistant polymeric enclosure	
Environmental category/UV exposure rating		NEMA Type 6/outdoor	

(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.

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INVERTER

ENPHASE

DATA SHEET

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

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
- Factory installed hold-down kit
- 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 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/ X-IQ-AM1-240-5-HDK)	IQ Combiner 5 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 a silver solar shield to deflect heat. IQ-AM1-240-5-HDK includes a factory installed hold-down kit compatible with all the circuit breakers mentioned in the **Accessories and Replacement Parts** section.
IQ Combiner 5C (X-IQ-AM1-240-5C / X-IQ-AM1-240-5C-HDK)	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. IQ-AM1-240-5C-HDK includes a factory installed hold-down kit compatible with all the circuit breakers mentioned in the **Accessories and Replacement Parts** section.
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 one IQ Gateway breaker and four 20 A breakers 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-2 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). Not required for X-IQ-AM1-240-5-HDK/X-IQ-AM1-240-5C-HDK.
XA-COMMS2-PCBA-5	Replacement COMMS-KIT-2 printed circuit board (PCB) for IQ Combiner 5/5C
ELECTRICAL SPECIFICATIONS	
Rating	80 A
System voltage and frequency	120/240 VAC or 120/208 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

[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.

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COMBINER PANEL

ACCESSORIES AND REPLACEMENT PARTS (NOT INCLUDED, ORDER SEPARATELY)	
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
MECHANICAL DATA	
Dimensions (W × H × D)	37.5 cm × 49.5 cm × 16.8 cm (14.75" × 19.5" × 6.63"). Height is 53.5 cm (21.06") with mounting brackets.
Weight	7.5 kg (16.5 lb)
Ambient temperature range	-40°C to 46°C (-40°F to 115°F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors • Always follow local code requirements for conductor sizing
Communication (in-premise connectivity)	Built-in CTRL board for wired communication with the IQ Battery 5P and the IQ System Controller 3/3G. Integrated power line communication for IQ Series Microinverters.
Altitude	Up to 2,600 meters (8,530 feet)
COMMUNICATION INTERFACES	
Integrated Wi-Fi	802.11b/g/n (dual band 2.4 GHz/5 GHz) for connecting the Enphase Cloud through the internet.
Wi-Fi range (recommended)	10 m (32.8 feet)
Bluetooth	BLE4.2, 10 m range to configure Wi-Fi SSID
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included) for connecting to the Enphase Cloud through the internet.
Cellular/Mobile Connect	CELLMODEM-M1-06-SP-05 or CELLMODEM-M1-06-AT-05 (included with the IQ Combiner 5C)
Digital I/O	Digital input/output for grid operator control
USB 2.0	Mobile Connect, COMMS-KIT-01 for IQ Battery 3/3T/10/10T, COMMS-KIT-02 for IQ Battery 5P
Access point (AP) mode	For connection between the IQ Gateway and a mobile device running the Enphase Installer App
Metering ports	Up to two Consumption CTs, one IQ Battery CT, and one Production CT
Power line communication	90–110 kHz
Web API	See https://developer-v4.enphase.com
Local API	See Guide for local API
COMPLIANCE	
IQ Combiner with IQ Gateway	UL 1741, CAN/CSA C22.2 No. 107.1, Title 47 CFR, Part 15, Class B, ICES 003, NOM-208-SCFI-2016, UL 61010-1, CAN/CSA 22.2 No. 61010-1, IEEE 1547: 2018 (UL 1741-SB, 3rd Ed.), IEEE 2030.5/CSIP Compliant, Production metering: ANSI C12.20 accuracy class 0.5 (PV production)

COMPATIBILITY		
PV	Microinverters	IQ6, IQ7, and IQ8 Series Microinverters
COMMS-KIT-01[2]	IQ System Controller	EP200G101-M240US00
	IQ System Controller 2	EP200G101-M240US01
	IQ Battery	ENCHARGE-3-1P-NA, ENCHARGE-10-1P-NA, ENCHARGE-3T-1P-NA, ENCHARGE-10T-1P-NA
COMMS-KIT-02[3]	IQ System Controller 3	SC200D111C240US01, SC200G111C240US01
	IQ Battery	IQBATTERY-5P-1P-NA

[2] For information about IQ Combiner 5/5C compatibility with the 2nd-generation batteries, refer to the compatibility matrix.
[3] IQ Combiner 5/5C comes pre-equipped with COMMS-KIT-02.

Accessories

Mobile Connect

4G-based LTE-M1 cellular modem with a 5-year data plan (CELLMODEM-M1-06-SP-05 for T-Mobile and CELLMODEM-M1-06-AT-05 for AT&T)

Circuit breakers

BRK-10A-2-240V Circuit breaker, 2-pole, 10 A, Eaton BR210
BRK-15A-2-240V Circuit breaker, 2-pole, 15 A, Eaton BR215
BRK-20A-2P-240V Circuit breaker, 2-pole, 20 A, Eaton BR220
BRK-15A-2P-240V-B Circuit breaker, 2-pole, 15 A, Eaton BR215B with hold-down kit support
BRK-20A-2P-240V-B Circuit breaker, 2-pole, 20 A, Eaton BR220B with hold-down kit support

CT-200-SOLID

200 A revenue-grade solid-core Production CT with <0.5% error rate (replacement SKU)

CT-200-CLAMP

200 A clamp-style consumption and battery metering CT with <2.5% error rate (replacement SKU)

IQC-5-5C-DSH-00007-6.0-EN-US-2024-09-30

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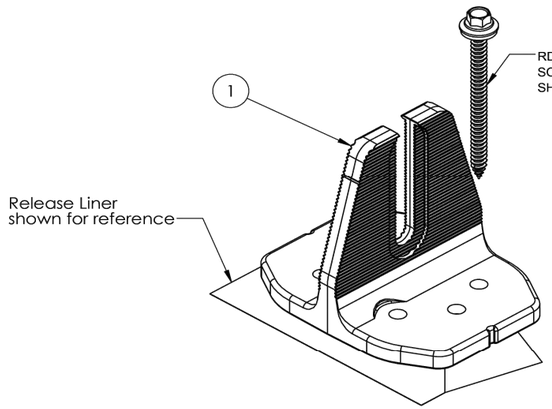
COMBINER PANEL

Cut Sheet

IRONRIDGE

QuickMount® Halo UltraGrip®

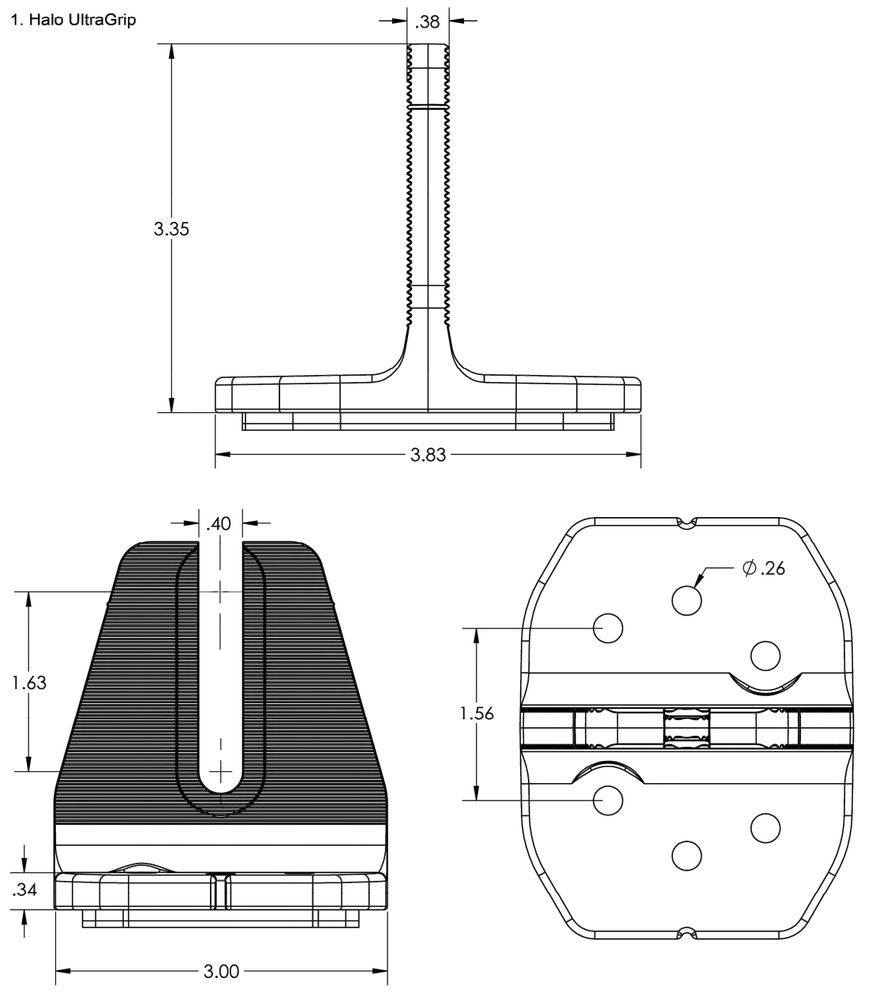


ITEM NO	DESCRIPTION	QTY IN KIT
1	QM Halo UltraGrip(Mill or Black)	1

PART NUMBER	DESCRIPTION
QM-HUG-01-M1	Halo UltraGrip - Mill
QM-HUG-01-B1	Halo UltraGrip - Black

Cut Sheet

1. Halo UltraGrip



Property	Value
Material	300 Series Aluminium
Finish	Mill or Black

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QM-HUG-01-B1 or QM-HUG-01-M1 Cut Sheet Rev 1.01

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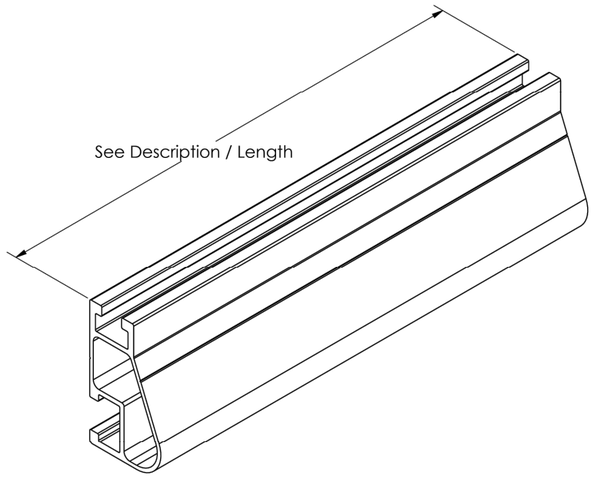
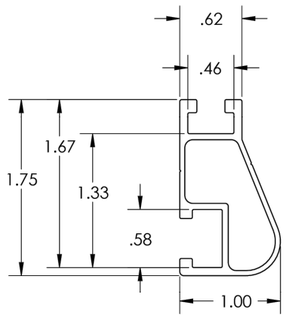
ATTACHMENT

Cut Sheet

IRONRIDGE

XR10® Rail





Rail Section Properties	
Property	Value
Total Cross-Sectional Area	0.363 in^2
Section Modulus (X-axis)	0.136 in^3
Moment of Inertia (X-axis)	0.124 in^4
Moment of Inertia (Y-axis)	0.032 in^4
Torsional Constant	0.076 in^3
Polar Moment of Inertia	0.033 in^4

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-10-132A	XR-10-132B	XR10, Rail 132" (11 Feet)	6000-Series Aluminum	4.67 lbs.
XR-10-168A	XR-10-168B	XR10, Rail 168" (14 Feet)		5.95 lbs.
XR-10-204A	XR-10-204B	XR10, Rail 204" (17 Feet)		7.22 lbs.

v1.01

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