

# MOISES SALAZAR RUIZ NEW GRID-INTERACTIVE PHOTOVOLTAIC SYSTEM DC SYSTEM SIZE (11.20 KW)



EXPERT SOLAR LLC  
ADD: 14520 MCCORMICK  
DRTAMPA, FL 33626  
CONTACT: (800) 340-0681

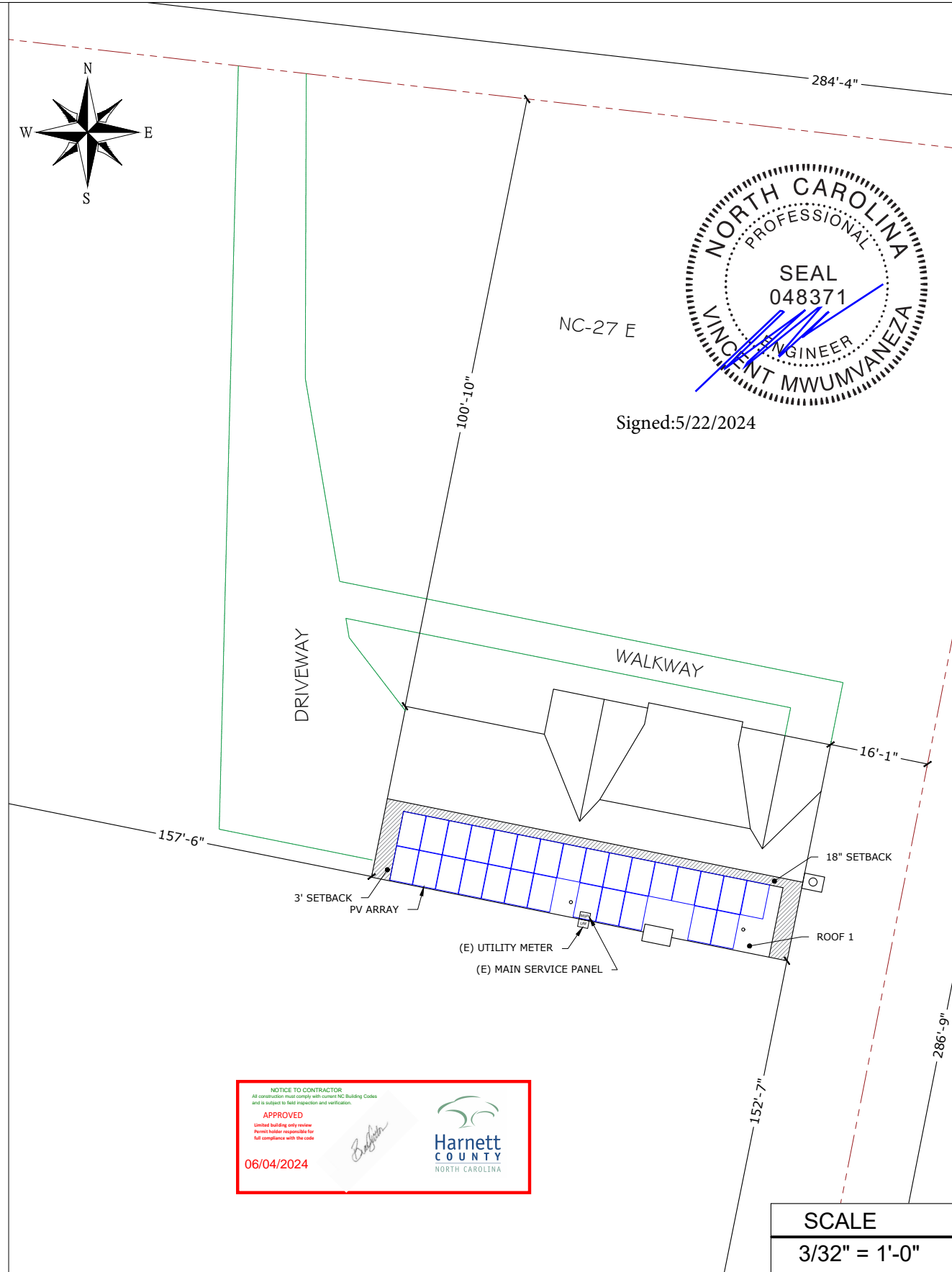
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SYSTEM DETAILS	
DESCRIPTION	NEW GRID-INTERACTIVE PHOTOVOLTAIC SYSTEM WITHOUT BATTERY STORAGE
DC RATING OF SYSTEM	SYSTEM SIZE :11.20 KW DC STC
AC RATING OF SYSTEM	9.10 KW
AC OUTPUT CURRENT	37.80 A
NO. OF MODULES	(28) LONGI LR5-54HABB-400M (400W) SOLAR MODULES
NO. OF INVERTERS	(28) ENPHASE IQ8M-72-2-US MICROINVERTERS
POINT OF CONNECTION	LINE SIDE TAP IN THE MSP
ARRAY STRINGING	(1) BRANCH OF 10 MODULES (2) BRANCHES OF 09 MODULES

SITE DETAILS	
ASHRAE EXTREME LOW	-10°C
ASHRAE 2% HIGH	36°C
GROUND SNOW LOAD	15 PSF
WIND SPEED	118MPH (ASCE 7-16)
RISK CATEGORY	II
WIND EXPOSURE CATEGORY	C

GOVERNING CODES	
NORTH CAROLINA RESIDENTIAL CODE 2018 (NCRC)	
NORTH CAROLINA BUILDING CODE 2018 (NCBC)	
NORTH CAROLINA FIRE CODE 2018 (NCFC)	
NORTH CAROLINA ELECTRIC CODE, NCEC 2017 CODE BOOK, NFPA 70	

SHEET INDEX	
SHEET NO.	SHEET NAME
A - 00	SITE MAP & VICINITY MAP
S - 01	ROOF PLAN & MODULES
S - 02	ARRAY LAYOUT
S - 03	STRUCTURAL ATTACHMENT DETAIL
E - 01	ELECTRICAL LINE DIAGRAM
E - 02	WIRING CALCULATIONS
E - 03	SYSTEM LABELING
DS - 01	MODULE DATASHEET
DS - 02	INVERTER DATASHEET
DS - 03	COMBINER BOX DATASHEET
DS - 04	ATTACHMENT DATASHEET
DS - 05	RACKING DATASHEET
DS - 06	B-TAP DATASHEET

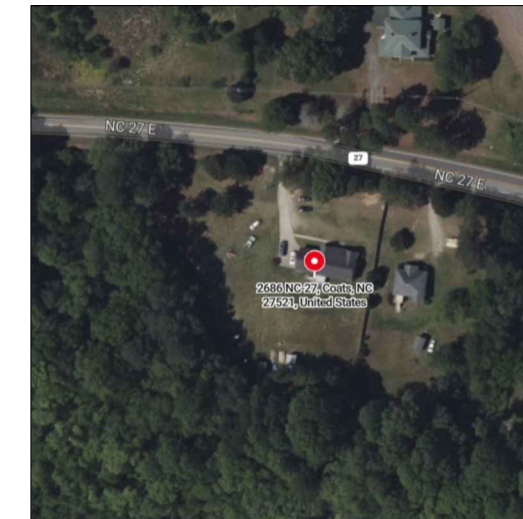


Signed:5/22/2024

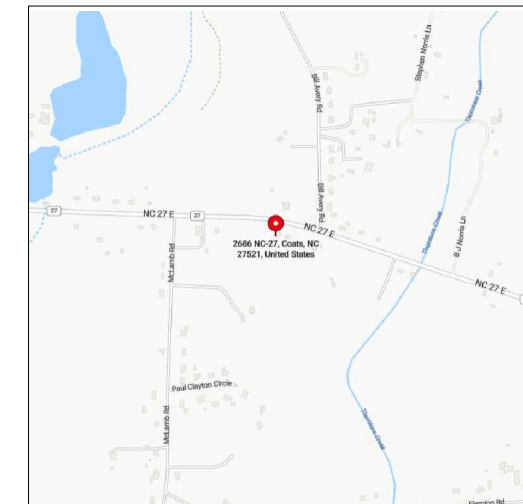


**SCALE**  
3/32" = 1'-0"

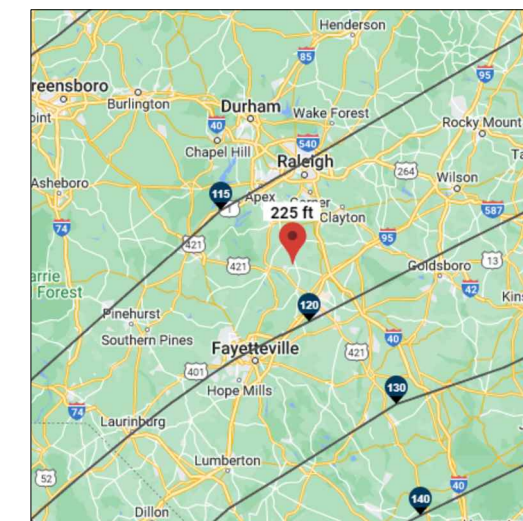
**SITE MAP (N.T.S)**



**VICINITY MAP**



**WIND FLOW MAP**



**MOISES SALAZAR RUIZ**

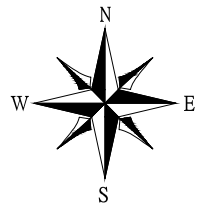
2686 NC-27,  
COATS, NC 27521

REV	DESCRIPTION	DATE
1	CONNECTED THE N-G BIND TO THE EXISTING GROUNDING	05-22-2024

PERMIT DEVELOPER	
DATE	05/03/2024
DESIGNER	ORK
REVIEWER	

SHEET NAME  
**SITE MAP & VICINITY MAP**

SHEET NUMBER  
**A-00**



**MODULE TYPE, DIMENSIONS & WEIGHT**

NUMBER OF MODULES = 28 MODULES  
 MODULE TYPE = LONGI LR5-54HABB-400M (400W) SOLAR MODULES  
 WEIGHT = 49.6 LBS / 22.5 KG.  
 MODULE DIMENSIONS = 67.79" X 44.65" = 21.02 SF

NUMBER OF INVERTER = 28 INVERTER  
 INVERTER TYPE = ENPHASE IQ8M-72-2-US MICROINVERTERS

DC SYSTEM SIZE: 11.20 KW  
 AC SYSTEM SIZE: 9.10 KW



**GENERAL INSTALLATION PLAN NOTES:**

1) ROOF ATTACHMENTS TO TRUSSES SHALL BE INSTALLED AS SHOWN IN SHEET S-02 AND AS FOLLOWS FOR EACH WIND ZONE:

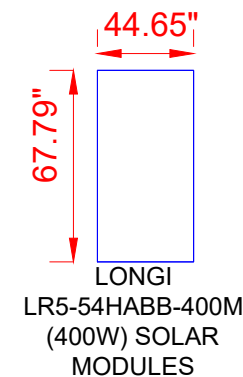
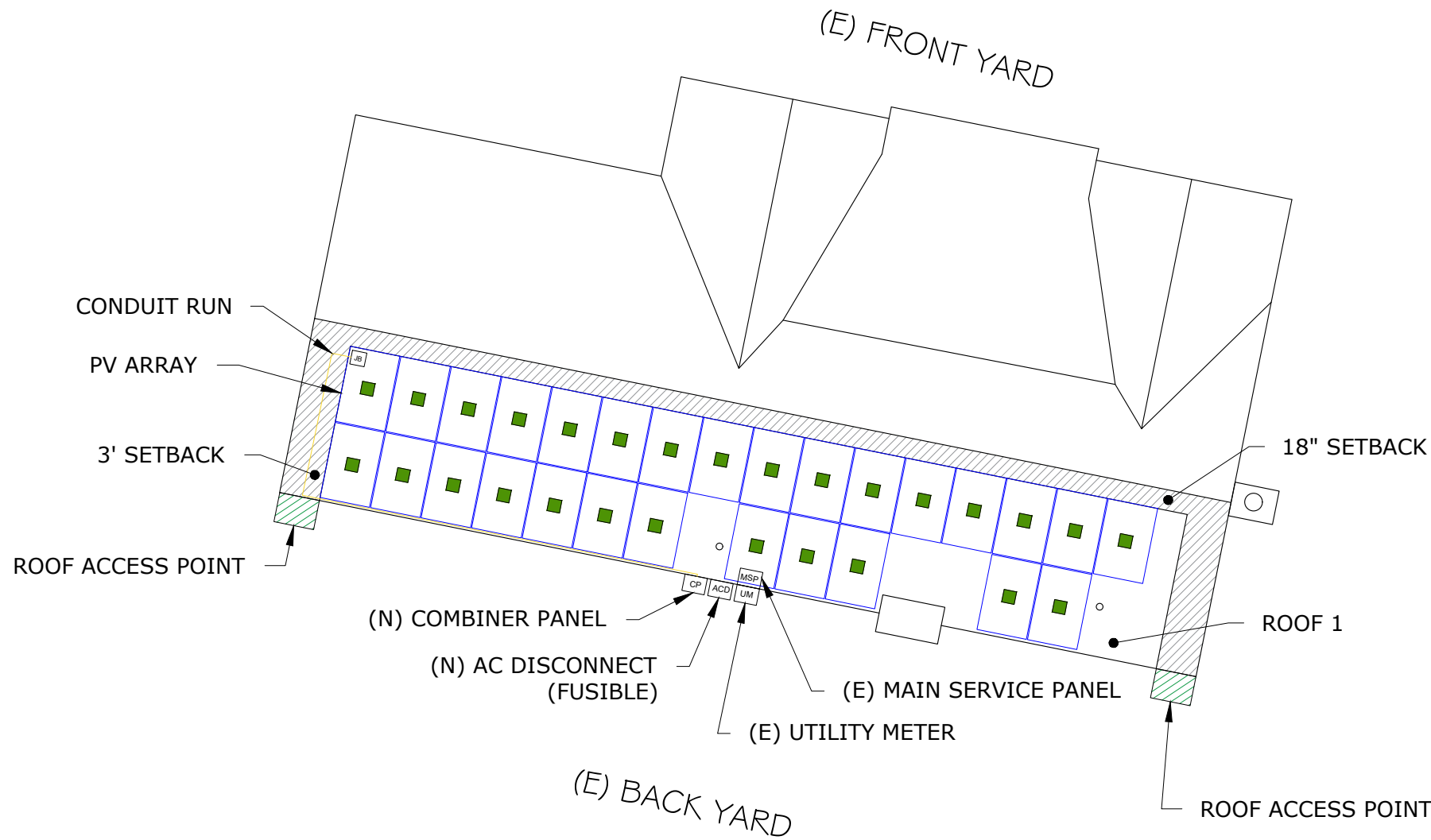
WIND ZONE 1: MAX SPAN 4'-0" O.C.  
 WIND ZONE 2: MAX SPAN 4'-0" O.C.  
 WIND ZONE 3: MAX SPAN 2'-0" O.C.

2) EXISTING RESIDENTIAL BUILDING ROOF WITH MEAN ROOF HEIGHT 15FT AND 2"X4" WOOD ROOF TRUSSES SPACED 24" O.C.

CONTRACTOR TO FIELD VERIFY AND SHALL REPORT TO THE ENGINEER IF ANY DISCREPANCIES EXIST BETWEEN PLANS AND IN FIELD CONDITIONS.

I CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH NCBC: NORTH CAROLINA BUILDING CODE 2018 BUILDING STRUCTURE WILL SAFELY ACCOMMODATE LATERAL AND UPLIFT WIND LOADS, AND EQUIPMENT DEAD LOADS

NOTES:  
 1. LOCATION OF JUNCTION BOX(ES), AC DISCONNECT(S), AC COMBINER PANEL(S), AND OTHER ELECTRICAL EQUIPMENT(S) RELEVANT TO PV INSTALLATION SUBJECT TO CHANGE BASED ON SITE CONDITIONS.  
 2. SETBACKS AT RIDGES CAN BE REDUCED TO 18 INCHES IN COMPLIANCE WITH NCBC 2018:  
 TOTAL PLAN VIEW AREA = 2400 SQFT  
 TOTAL PV AREA = 28(67.79 IN)(44.65 IN)/(144 IN^2)  
 = 588.55 SQFT  
 ( 588.55 SQFT/ 2400 SQFT)100 = 24.52 %  
 TOTAL PV AREA POPULATES 24.52 % OF TOTAL PLAN VIEW AREA AND IS WITHIN THE 33% REQUIREMENT.



**LEGENDS**

- UM - UTILITY METER
- MSP - MAIN SERVICE PANEL
- CP - COMBINER PANEL
- JB - JUNCTION BOX
- ACD - AC DISCONNECT
- [Hatched Box] - FIRE SETBACK
- [Green Hatched Box] - ROOF ACCESS POINT
- [Square with Circle] - VENT, ATTIC FAN (ROOF OBSTRUCTION)
- [Dashed Line] - CONDUIT

**SCALE**

3/16" = 1'-0"



Signature with Seal

MOISES SALAZAR RUIZ

2686 NC-27,  
 COATS, NC 27521

REV	DESCRIPTION	DATE
1	CONNECTED THE NG BIND TO THE EXISTING GROUNDING	05-22-2024

PERMIT DEVELOPER	
DATE	05/03/2024
DESIGNER	ORK
REVIEWER	

SHEET NAME  
**ROOF PLAN & MODULES**

SHEET NUMBER  
**S-01**

**ROOF DESCRIPTION:**

**(ROOF #1)**

MODULES - 28  
 ROOF TILT - 30°  
 ROOF AZIMUTH - 190°  
 TRUSSES SIZE - 2"X4" @ 24" O.C.



**WIND LOAD INFORMATION:**  
 THIS SYSTEM HAS BEEN DESIGN TO MEET THE REQUIREMENTS OF THE 7TH EDITION OF THE NORTH CAROLINA BUILDING CODE AND USED THE FOLLOWING DESIGN PARAMETERS:  
 ULTIMATE WIND SPEED: 118 MPH  
 EXPOSURE CATEGORY: B  
 RISK CATEGORY: II  
 MEAN ROOF HEIGHT: 15FT  
 ROOF SLOPE: 27°-45°

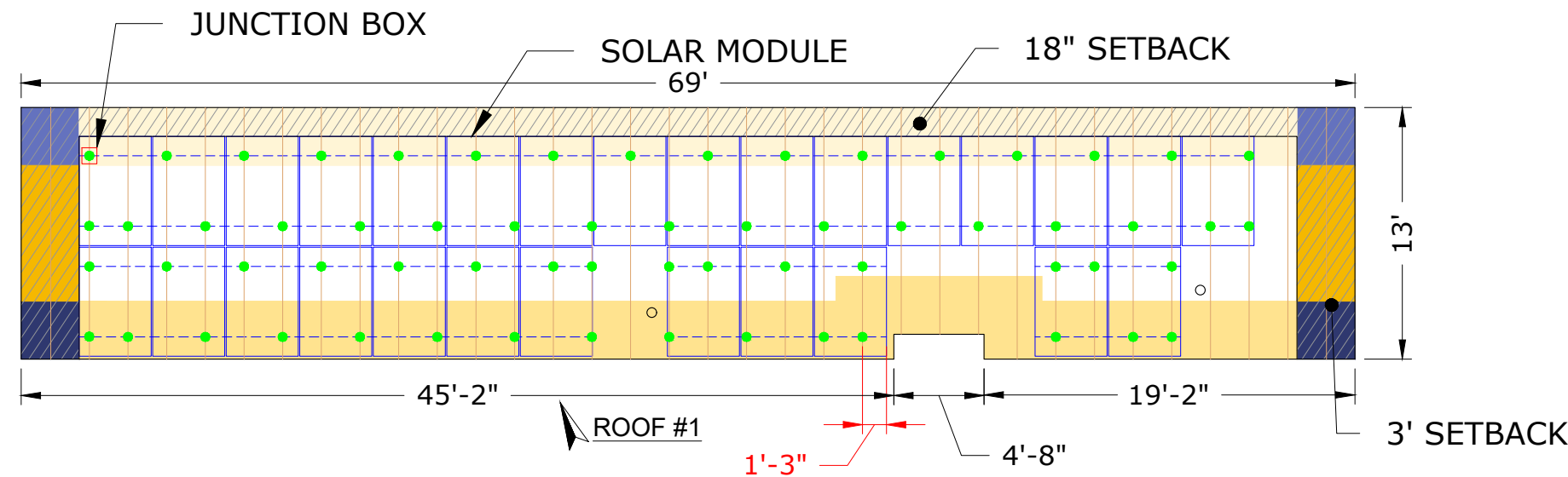
**NOTE:**  
 MAX CANTILIVER: 1'-3"

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**LEGENDS**

- FIRE SETBACK
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- PV ROOF ATTACHMENT
- RAILS
- RAFTERS / TRUSSES
- WIND ZONE 1**
- WIND ZONE 1
- WIND ZONE 1'
- WIND ZONE 2**
- WIND ZONE (2)
- WIND ZONE (2r)
- WIND ZONE (2e)
- WIND ZONE (2n)
- WIND ZONE 3**
- WIND ZONE (3)
- WIND ZONE (3r)
- WIND ZONE (3e)

**SCALE**  
 1/4" = 1'-0"

REV	DESCRIPTION	DATE
1	CONNECTED THE N-G BIND TO THE EXISTING GROUNDING	05-22-2024

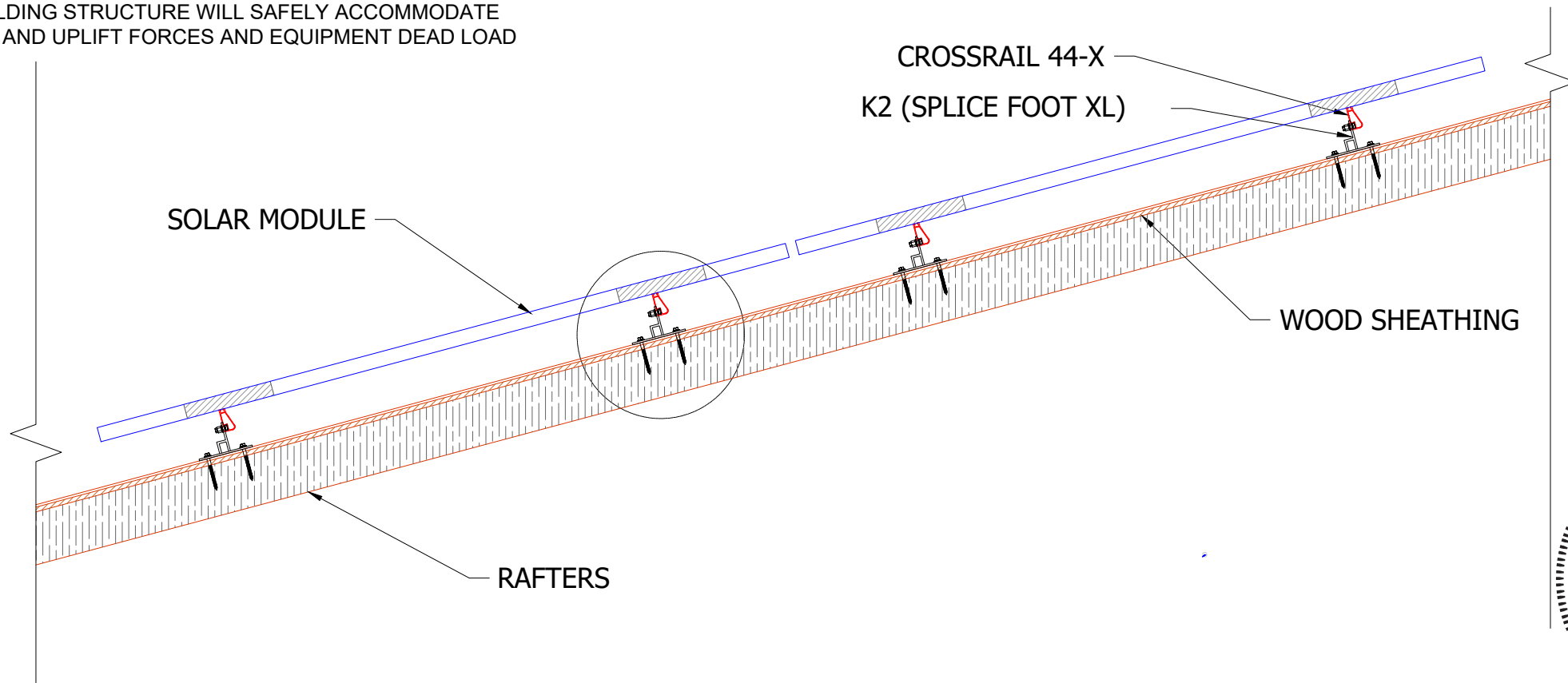
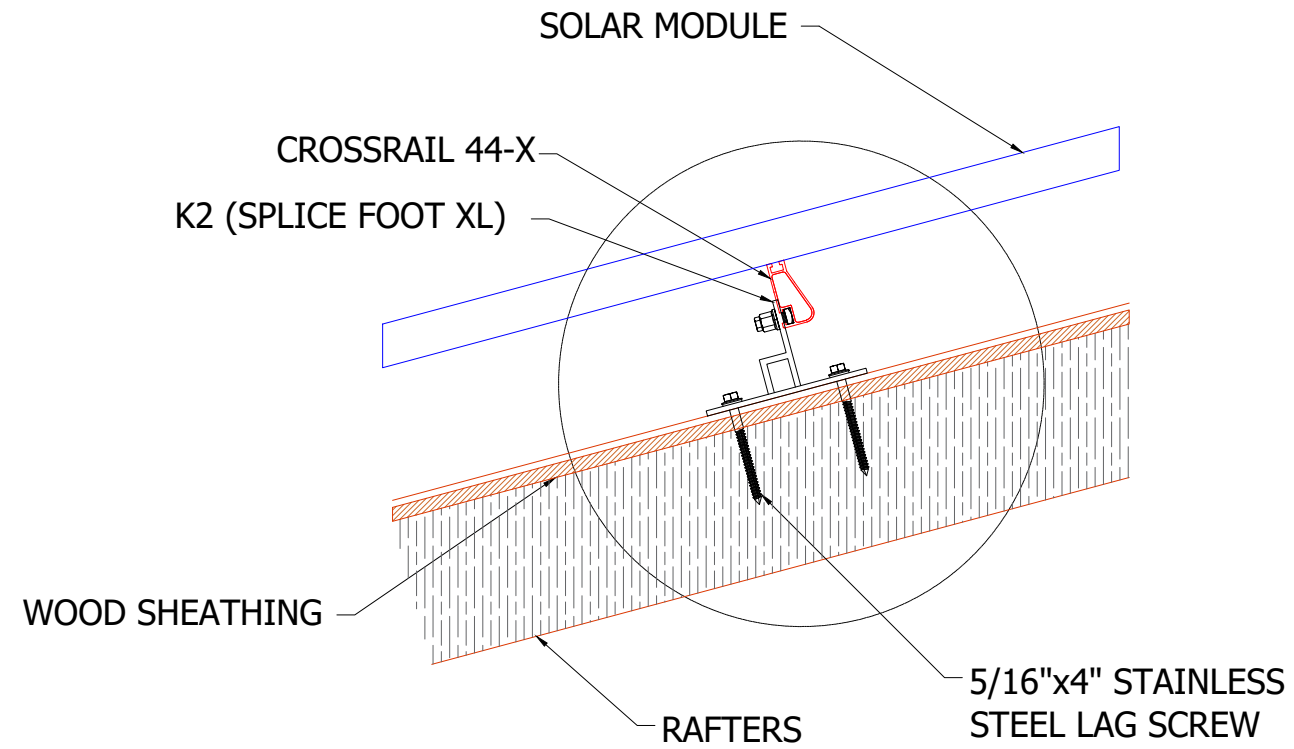
PERMIT DEVELOPER	
DATE	05/03/2024
DESIGNER	ORK
REVIEWER	

SHEET NAME  
**ARRAY LAYOUT**

SHEET NUMBER  
**S-02**

# PHOTOVOLTAIC MODULE GENERAL NOTES:

1. APPLICABLE CODE: NORTH CAROLINA BUILDING CODE 2018 & ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.
2. BOLT DIAMETER AND EMBEDMENT LENGTHS ARE DESIGNED PER NDS(2012) REQUIREMENTS. ALL BOLT CAPACITIES ARE BASED ON A WOOD ROOF TRUSS AS EMBEDMENT MATERIAL.
3. ALL WIND DESIGN CRITERIA AND PARAMETERS ARE FOR HIP AND GABLE RESIDENTIAL ROOFS, CONSIDERING FROM A 27° TO A MAXIMUM 45° (6/12 TO A MAXIMUM 12/12 PITCH) ROOF IN SCHEDULE. ALL RESIDENTIAL ROOFS SHALL NOT EXCEED 30'-0" MEAN ROOF HEIGHT.
4. ROOF SEALANTS SHALL CONFIRM TO ASTM C920 AND ASTM 6511.
5. THIS SHEET REFLECTS STRUCTURAL CONNECTIONS ONLY. REFER TO MANUFACTURER'S MANUAL FOR ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL AND SOLAR SPECS.
6. ALL ALUMINIUM COMPONENTS SHALL BE ANODIZED ALUMINIUM 6105-T5 UNLESS OTHERWISE NOTED.
7. LAG BOLTS SHALL BE ASTM A276 STAINLESS STEEL UNLESS OTHERWISE NOTED.
8. ALL RAILING AND MODULES SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
9. I CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH NCBC:NORTH CAROLINA BUILDING CODE 2018 AND NCRC:NORTH CAROLINA RESIDENTIAL CODE 2018 BUILDING STRUCTURE WILL SAFELY ACCOMMODATE CALCULATED WIND LATERAL AND UPLIFT FORCES AND EQUIPMENT DEAD LOAD



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1	CONNECTED THE N-G BIND TO THE EXISTING GROUNDING	05-22-2024

PERMIT DEVELOPER	
DATE	05/03/2024
DESIGNER	ORK
REVIEWER	

SHEET NAME  
**STRUCTURAL ATTACHMENT DETAILS**

SHEET NUMBER  
**S-03**

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1	CONNECTED THE N-G BIND TO THE EXISTING GROUNDING	05-22-2024

PERMIT DEVELOPER	
DATE	05/03/2024
DESIGNER	ORK
REVIEWER	

SHEET NAME  
**ELECTRICAL LINE DIAGRAM**

SHEET NUMBER  
**E-01**

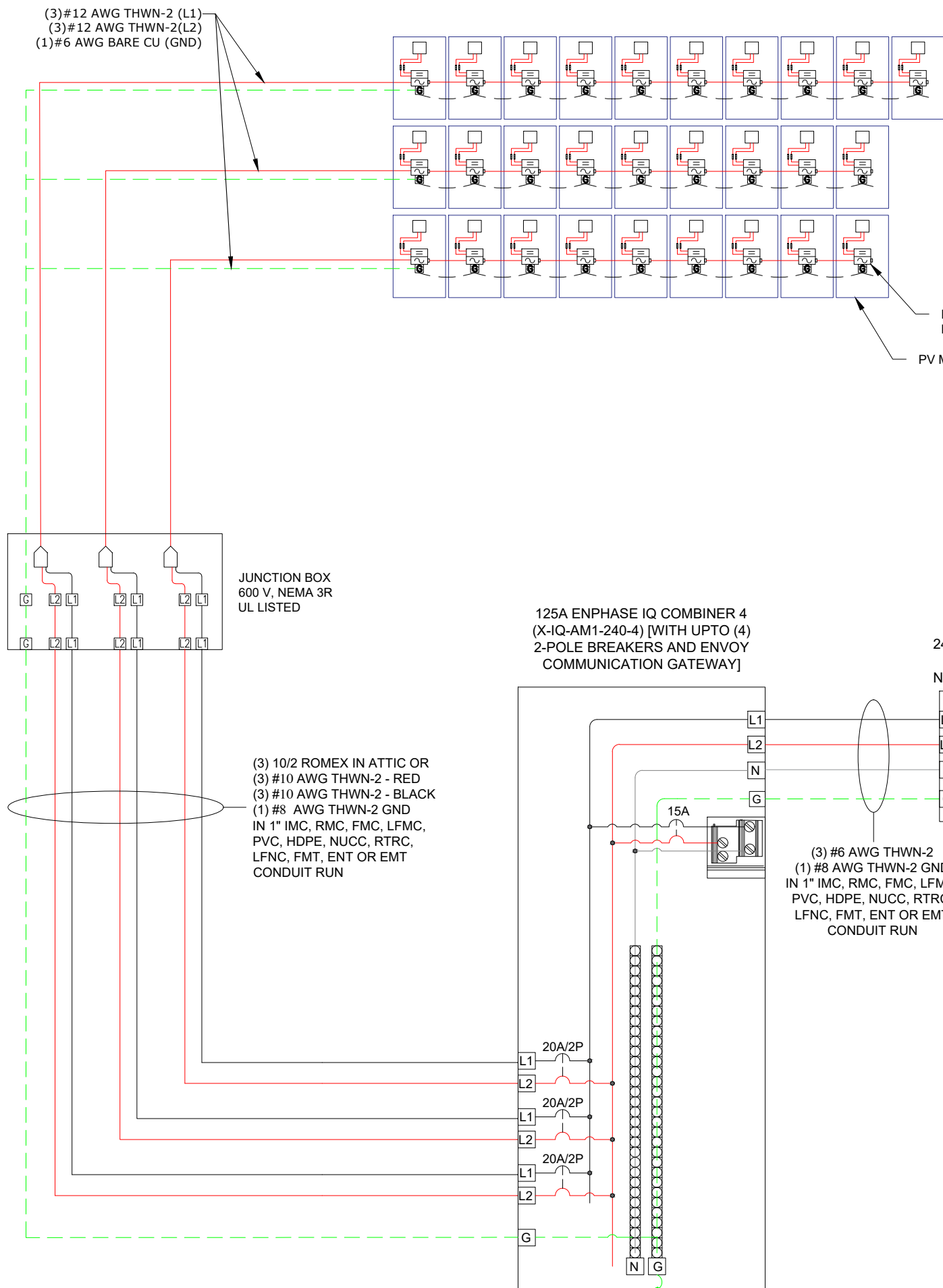
**NOTE:**

- SUBJECT PV SYSTEMS HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NCEC 2017, NFPA 70 AND THOSE SET FORTH BY THE NORTH CAROLINA ENERGY CENTER CERTIFICATION, INCLUDING MAXIMUM NUMBER OF MODULE STRINGS, MAXIMUM NUMBER OF MODULES PER STRING, MAXIMUM OUTPUT, MODULE MANUFACTURER AND MODEL NUMBER, INVERTER MANUFACTURER AND MODEL NUMBER, AS APPLICABLE.
- PROVIDE TAP BOX IN COMPLIANCE WITH 312.8 IF PANEL GUTTER SPACE IS INADEQUATE

SOLAR ARRAY (11.20 KW -DC STC)  
 MICROINVERTERS (9.10KW-AC RATINGS)  
 (28) LONGI LR5-54HABB-400M (400W) SOLAR MODULES  
 (28) ENPHASE IQ8M-72-2-US MICROINVERTERS  
 (1) BRANCH OF 10 MODULES  
 (2) BRANCHES OF 09 MODULES



Signed : 5/22/2024



**ELECTRICAL CALCULATIONS:**

**1. CURRENT CARRYING CONDUCTOR**

**(A) BEFORE IQ COMBINER PANEL**

AMBIENT TEMPERATURE = 36°C

CONDUIT INSTALLED AT MINIMUM DISTANCE OF 7/8 INCHES ABOVE ROOF .....NEC 310.15(B)(2)

TEMPERATURE DERATE FACTOR - 0.91 ...NEC 310.15(B)(1)

GROUPING FACTOR - 0.8...NEC 310.15(C)(1)

**CONDUCTOR AMPACITY**

= (INV O/P CURRENT ) x 1.25 / A.T.F / G.F ...NEC 690.8(A)(1)(E) AND NEC 690.8 (B)(2)

= [(10 x 1.35) x 1.25] / 0.91 / 0.8

= 23.18 A

SELECTED CONDUCTOR - #10 THWN-2 ...NEC 310.16

**(B) AFTER IQ COMBINER PANEL**

TEMPERATURE DERATE FACTOR - 0.91

GROUPING FACTOR - 1

**CONDUCTOR AMPACITY**

=(TOTAL INV O/P CURRENT) x 1.25 / 0.91 / 1 ...NEC 690.8(A)(1)(E) AND NEC 690.8 (B)(1)

=[(28x 1.35) x 1.25] / 0.91 / 1

=51.92 A

SELECTED CONDUCTOR - #6 THWN-2 ...NEC 310.16

**2. PV OVER CURRENT PROTECTION**

=TOTAL INVERTER O/P CURRENT x 1.25 ...NEC 690.9(B)

=(28 x 1.35) x 1.25 = 47.25 A

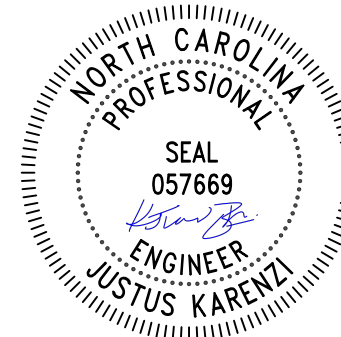
SELECTED OCPD = 50A

SELECTED EQUIPMENT GROUND CONDUCTOR (EGC) = #8 THWN-2 ... NEC 250.122

DATA PER PANEL	
NOMINAL OPERATING AC VOLTAGE -	240 V
NOMINAL OPERATING AC FREQUENCY-	60 HZ
MAXIMUM AC POWER-	325 VA
MAXIMUM AC CURRENT-	1.35 A
MAXIMUM OVERCURRENT DEVICE RATING FOR AC MODULE PROTECTION PER CIRCUIT-	20 A

**ELECTRICAL NOTES**

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL AND LABELED FOR ITS APPLICATION.
- COPPER CONDUCTORS SHALL BE RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.THE TERMINALS ARE RATED FOR 75 DEGREE C ROMEX/NM-B (NONMETALLIC-SHEATHED) CABLE MAY BE USED FOR BOTH EXPOSED AND CONCEALED WORK IN NORMALLY DRY LOCATIONS AT TEMPERATURES NOT TO EXCEED 90°C (WITH AMPACITY LIMITED TO THAT FOR 60°C CONDUCTORS) AS SPECIFIED IN THE NATIONAL ELECTRICAL CODE. VOLTAGE RATING FOR NM-B CABLE IS 600 VOLTS.
- CONDUCTOR TERMINATION AND SPLICING AS PER NEC 110.14 WIRING, CONDUIT AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.265. WORKING CLEARANCES AROUND ALL NEW AND EXISTING
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE.
- UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
- MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
- RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
- CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
- CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).



Signed : 5/22/2024

MODULE SPECIFICATION	
MODEL NO.	LONGI LR5-54HABB-400M (400W) SOLAR MODULES
PEAK POWER	390W
RATED VOLTAGE (Vmpp)	30.94 V
RATED CURRENT (Impp)	12.93 A
OPEN CIRCUIT VOLTAGE (Voc)	37.05 V
SHORT CIRCUIT CURRENT (Isc)	13.72 A

INVERTER SPECIFICATIONS	
MANUFACTURER	ENPHASE
MODEL NO.	IQ8M-72-2-US
MAX DC INPUT VOLTAGE	60 V
MAX OUTPUT POWER	325 VA
NOMINAL AC OUTPUT VOLTAGE	240 V
NOMINAL AC OUTPUT CURRENT	1.35A



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MOISES SALAZAR RUIZ

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REV	DESCRIPTION	DATE	CONNECTED THE N-G BIND TO THE EXISTING GROUNDING		
			1		
		05-25-2024			

PERMIT DEVELOPER

DATE 05/03/2024

DESIGNER ORK

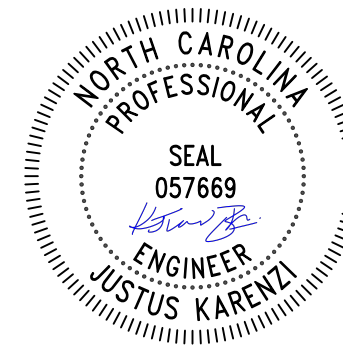
REVIEWER

SHEET NAME

WIRING CALCULATIONS

SHEET NUMBER

E-02



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Signature with Seal

**PHOTOVOLTAIC SYSTEM AC DISCONNECT**  
 RATED AC OPERATING CURRENT 37.8 AMPS  
 AC NOMINAL OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:  
 AC DISCONNECT, INVERTER  
 (PER CODE: NEC 690.54)

**PHOTOVOLTAIC SYSTEM**  
**EQUIPPED WITH RAPID**  
**SHUTDOWN**

LABEL LOCATION:  
 AC DISCONNECT, DC DISCONNECT, POINT OF  
 INTERCONNECTION  
 (PER CODE: NEC 690.56(C)(3))

**WARNING**  
 DEDICATED SOLAR PANELS DO  
 NOT CONNECT ANY OTHER LOADS

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

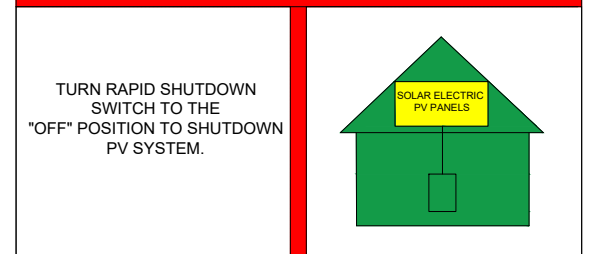
LABEL LOCATION:  
 AC DISCONNECT, POINT OF INTERCONNECTION,  
 COMBINER PANEL  
 (PER CODE: NEC 690.13(B))

**WARNING**  
 INVERTER OUTPUT CONNECTION DO NOT  
 RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:  
 POINT OF INTERCONNECTION, MAIN SERVICE DISCONNECT  
 (PER CODE: NEC 705.12 (B)(2)(c))  
 [Not required if panelboard is rated not less than sum of ampere ratings  
 of all overcurrent devices supplying it]

**WARNING**  
 INVERTER OUTPUT CONNECTION  
 DO NOT RELOCATE THIS  
 OVERCURRENT DEVICE

**EMERGENCY RESPONDER THIS**  
**SOLAR PV SYSTEM IS EQUIPPED**  
**WITH RAPID SHUTDOWN**



NEC690.56(C)(1) AND NFPA 111.12.2.1.1.1.1, 11.12.2.1.4

**WARNING PHOTOVOLTAIC**  
**POWER SOURCE**

LABEL LOCATION:  
 CONDUIT RUNWAY  
 (PER CODE: NEC690.31(G)(3)(4))  
 NEC 690.31(D)(2)

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

LABEL LOCATION:  
 MAIN SERVICE DISCONNECT  
 (NEC 705.12(B)(3-4) & NEC 690.59)

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

**EMERGENCY CONTACT**  
**(800) 340-0681**

**AUXILIARY GENERATION**  
**DISCONNECT**

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SHEET NAME  
**SYSTEM LABELING**

SHEET NUMBER  
**E-03**

**ADHESIVE FASTENED SIGNS:**  
 \*ANSI Z535.4-2011 PRODUCT SAFETY SIGNS AND LABELS, PROVIDES GUIDELINES FOR SUITABLE FONT SIZES, WORDS, COLORS, SYMBOLS, AND LOCATION REQUIREMENTS FOR LABELS. NEC 110.21(B)(1)  
 \*THE LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED. NEC 110.21(B)(3)  
 \*ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT. IFC 605.11.1.3







## IQ8M and IQ8A Microinverters

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



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



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



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

\*Only when installed with IQ System Controller 2, meets UL 1741.  
\*\*IQ8M and IQ8A support split-phase, 240V installations only.

### Easy to install

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

### High productivity and reliability

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

### Microgrid-forming

- Complies with the latest advanced grid support\*\*
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB 3<sup>rd</sup> Ed.)

### Note:

IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, etc) in the same system.

## IQ8M and IQ8A Microinverters

INPUT DATA (DC)		IQ8M-72-2-US	IQ8A-72-2-US
Commonly used module pairings <sup>1</sup>	W	260 – 460	295 – 500
Module compatibility		54-cell / 108 half-cell, 60-cell / 120 half-cell, 66-cell / 132 half-cell and 72-cell / 144 half-cell	
MPPT voltage range	V	30 – 45	32 – 45
Operating range	V		16 – 58
Min. / Max. start voltage	V		22 / 58
Max. input DC voltage	V		60
Max. continuous input DC current	A		12
Max. input DC short-circuit current	A		25
Max. module I <sub>sc</sub>	A		20
Overtoltage class DC port			II
DC port backfeed current	mA		0
PV array configuration		1 x 1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		IQ8M-72-2-US	IQ8A-72-2-US
Peak output power	VA	330	366
Max. continuous output power	VA	325	349
Nominal (L-L) voltage / range <sup>2</sup>	V		240 / 211 – 264
Max. continuous output current	A	1.35	1.45
Nominal frequency	Hz		60
Extended frequency range	Hz		47 – 68
AC short circuit fault current over 3 cycles	Arms		2
Max. units per 20 A (L-L) branch circuit <sup>3</sup>			11
Total harmonic distortion			<5%
Overtoltage 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	%	97.8	97.7
CEC weighted efficiency	%	97.5	97
Night-time power consumption	mW		60
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (H x W x D)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
Weight		1.08 kg (2.38 lbs)	
Cooling		Natural convection – no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB 3 <sup>rd</sup> Ed.), 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, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.	

(1) Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at <https://link.enphase.com/module-compatibility>. (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.

Signature with Seal

MOISES SALAZAR RUIZ

2686 NC-27,  
COATS, NC 27521

REV	DESCRIPTION	DATE	REVISIONS		
			CONNECTED THE N-G BIND TO THE EXISTING GROUNDING		
1		05-22-2024			

PERMIT DEVELOPER	
DATE	05/03/2024
DESIGNER	ORK
REVIEWER	

SHEET NAME	INVERTER DATASHEET
SHEET NUMBER	DS-02

## IQ Combiner 4/4C



X-IQ-AM1-240-4C  
X2-IQ-AM1-240-4C (IEEE 1547:2018)

X-IQ-AM1-240-4  
X2-IQ-AM1-240-4 (IEEE 1547:2018)

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

### Smart

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

### Simple

- Mounts on single stud with centered brackets
- Supports bottom, back and side conduit entry
- Allows up to four 2-pole branch circuits for 240VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

### Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed
- X2-IQ-AM1-240-4 and X2-IQ-AM1-240-4C comply with IEEE 1547:2018 (UL 1741-SB, 3<sup>rd</sup> Ed.)



To learn more about Enphase offerings, visit [enphase.com](http://enphase.com)  
IQ-C-4-4C-DS-0103-EN-US-12-29-2022



## IQ Combiner 4/4C

### MODEL NUMBER

IQ Combiner 4 X-IQ-AM1-240-4 X2-IQ-AM1-240-4 (IEEE 1547:2018)	IQ Combiner 4 with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 ± 0.5%) and consumption monitoring (± 2.5%). Includes a silver solar shield to match the IQ Battery and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C X-IQ-AM1-240-4C X2-IQ-AM1-240-4C (IEEE 1547:2018)	IQ Combiner 4C with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 ± 0.5%) and consumption monitoring (± 2.5%). Includes Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.

### ACCESSORIES AND REPLACEMENT PARTS (not included, order separately)

Supported microinverters	IQ6, IQ7, and IQ8. (Do not mix IQ6/7 Microinverters with IQ8)
Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
X-IQ-NA-HD-125A	Hold-down kit for Eaton circuit breaker with screws
Consumption monitoring CT (CT-200-SPLIT/CT-200-CLAMP)	A pair of 200A split core current transformers

### ELECTRICAL SPECIFICATIONS

Rating	Continuous duty
System voltage	120/240VAC, 60 Hz
Eaton BR series busbar rating	125A
Max. continuous current rating	65A
Max. continuous current rating (input from PV/storage)	64A
Max. fuse/circuit rating (output)	90A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation/95A with IQ Gateway breaker included
IQ Gateway breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	200A solid core pre-installed and wired to IQ Gateway

### MECHANICAL DATA

Dimensions (WxHxD)	37.5 cm x 49.5 cm x 16.8 cm (14.75 in x 19.5 in x 6.63 in). Height is 53.5 cm (21.06 in) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
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	• 20A to 50A breaker inputs: 14 to 4 AWG copper conductors • 60A 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.
Altitude	Up to 3,000 meters (9,842 feet)

### INTERNET CONNECTION OPTIONS

Integrated Wi-Fi	IEEE 802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Mobile Connect cellular modem is required for all Enphase Energy System installations.
Ethernet	Optional, IEEE 802.3, Cat5E (or Cat6) UTP Ethernet cable (not included)

### COMPLIANCE

Compliance, IQ Combiner	CA Rule 21 (UL 1741-SA) IEEE 1547:2018 - UL 1741-SB, 3 <sup>rd</sup> Ed. (X2-IQ-AM1-240-4 and X2-IQ-AM1-240-4C) CAN/CSA C22.2 No. 107.1, Title 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

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IQ-C-4-4C-DS-0103-EN-US-12-29-2022



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Signature with Seal

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COATS, NC 27521

REV	DESCRIPTION	DATE
		05-22-2024
1	CONNECTED THE NEG BOND TO THE EXISTING GROUNDING	

### PERMIT DEVELOPER

DATE	05/03/2024
DESIGNER	ORK
REVIEWER	

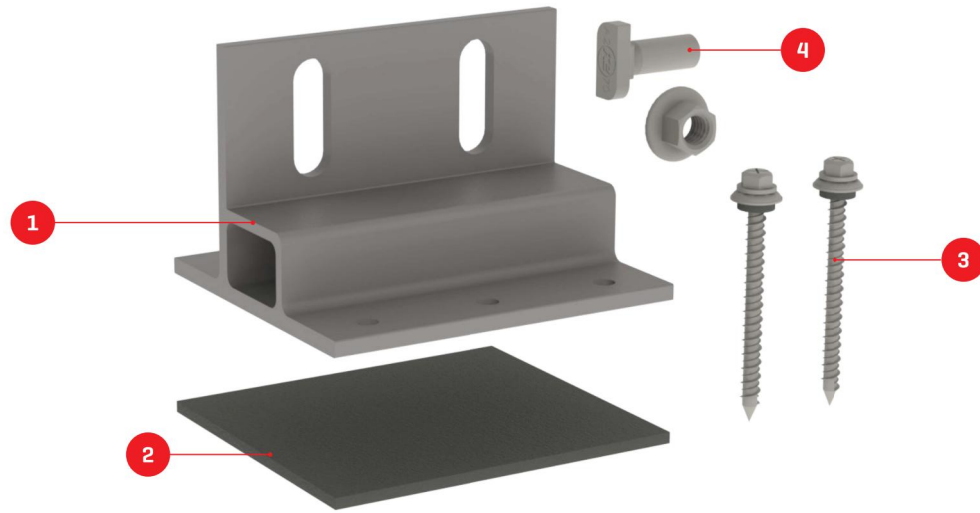
### SHEET NAME

ENVOY  
DATASHEET

### SHEET NUMBER

DS-03

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# Splice Foot XL

Patent Pending

## TECHNICAL SHEET

Item Number	Description	Part Number
1	Splice Foot XL	4000162   Splice Foot XL Kit, Mill
2	K2 FlexFlash Butyl	
3	M5 x 60 lag screws	
4	T-Bolt & Hex Nut Set	

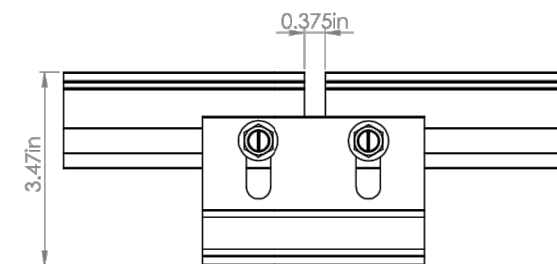
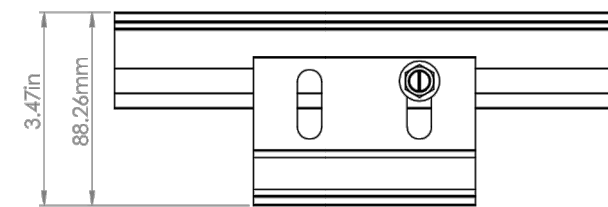
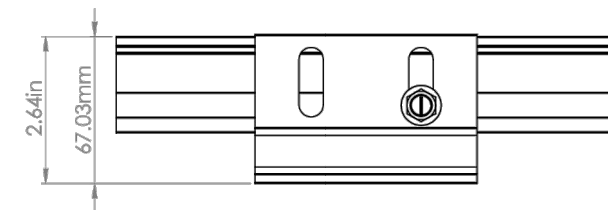
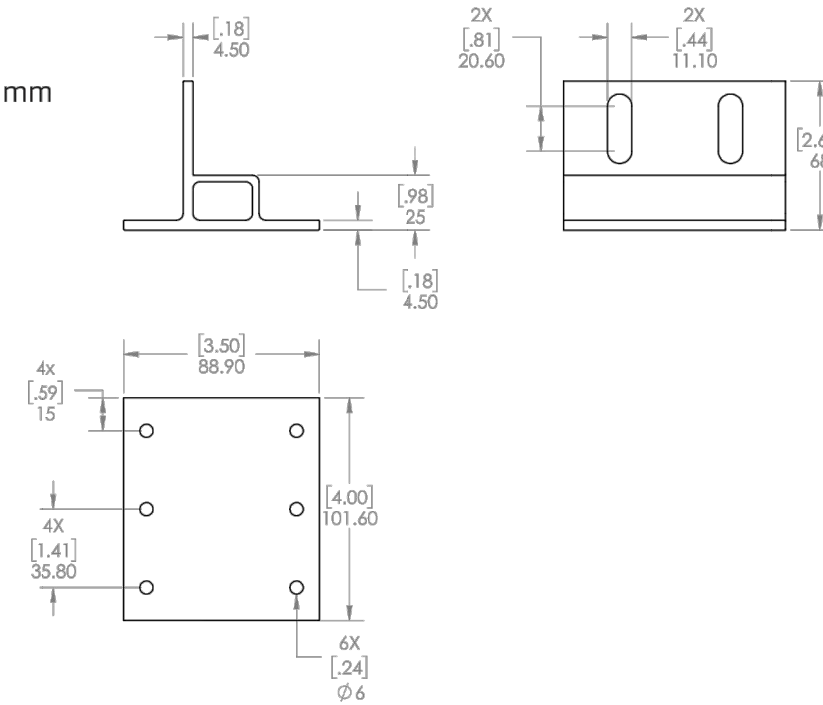
### Technical Data

	Splice Foot XL
Roof Type	Composition shingle
Material	Aluminum with stainless steel hardware
Finish	Mill
Roof Connection	M5 x 60 lag screws
Code Compliance	UL 2703
Compatibility	CrossRail 44-X, 48-X, 48-XL, 80

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Units: [in] mm



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COATS, NC 27521

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1	CONNECTED THE N-G BIND TO THE EXISTING GROUNDING	05-22-2024

PERMIT DEVELOPER

DATE 05/03/2024

DESIGNER ORK

REVIEWER

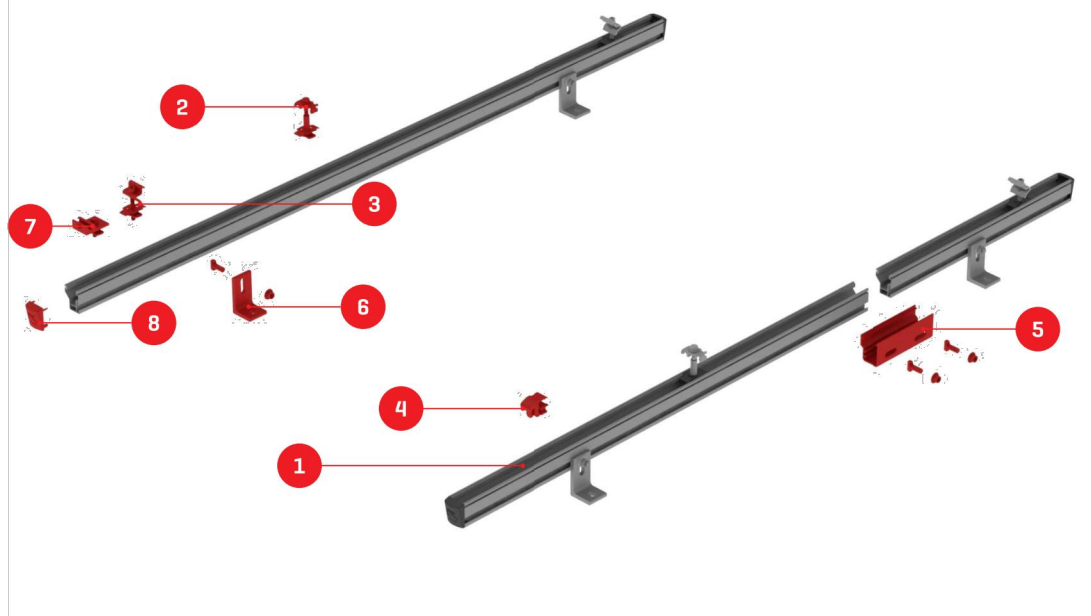
SHEET NAME

ATTACHMENT DATASHEET

SHEET NUMBER

DS-04

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# CrossRail System

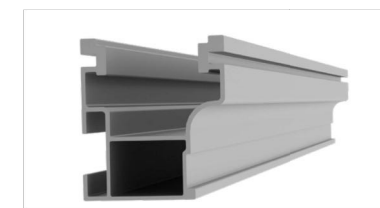
## TECHNICAL SHEET

Item Number	Description	Part Number
1	CrossRail 44-X (shown) all CR profiles applicable	4000019 (166" mill), 4000020 (166" dark) , 4000021 (180" mill), 4000022 (180" dark)
2	CrossRail Mid Clamp	4000601-H (mill), 4000602-H (dark)
3	CrossRail (Standard) End Clamp	4000429 (mill), 4000430 (dark)
4	Yeti Hidden End Clamp for CR	4000050-H
5	CrossRail 44-X Rail Connector (shown) CR 48-X, 48-XL Rail Connector available	4000051 (mill), 4000052 (dark)
6	L-Foot Slotted Set	4000630 (mill), 4000631 (dark)
7	Everest Ground Lug	4000006-H
8	CrossRail 44-X End Cap (shown) CrossRail 48-X, 48-XL and 80 available	4000067

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## CROSSRAIL 44-X



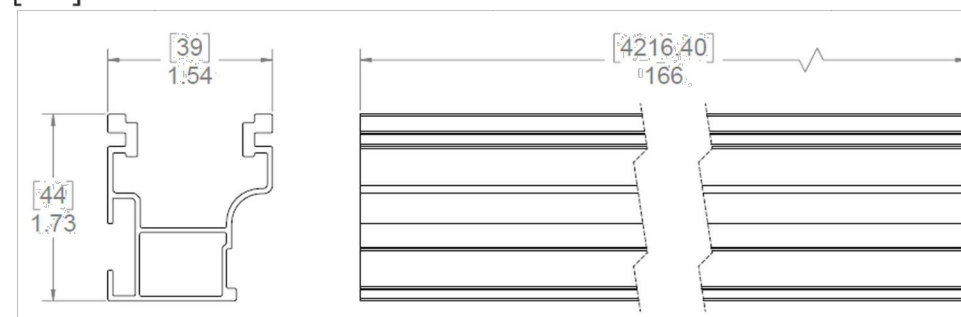
### Mechanical Properties

	CrossRail 44-X
Material	6000 Series Aluminum
Ultimate Tensile Strength	37.7 ksi [260 MPa]
Yield Strength	34.8 ksi [240 MPa]
Weight	0.47 lbs/ft [0.699 kg/m]
Finish	Mill or Dark Anodized

### Sectional Properties

	CrossRail 44-X
Sx	0.1490 in3 [0.3785 cm3]
Sy	0.1450 in3 [0.3683 cm3]
A [X-Section]	0.4050 in2 [1.0287 cm2]

Units: [mm] in



Notes:

- Structural values and span charts determined in accordance with Aluminum Design Manual and ASCE 7-16
- UL2703 Listed System for Fire and Bonding



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REV	DESCRIPTION	DATE
1	CONNECTED THE NEG BIND TO THE EXISTING GROUNDING	05-22-2024

PERMIT DEVELOPER

DATE 05/03/2024

DESIGNER ORK

REVIEWER

SHEET NAME

RACKING  
DATASHEET

SHEET NUMBER

DS-05

# BUCHANAN BTAP®

## INSULATION-PIERCING TAP CONNECTORS | CONECTORES DE DERIVACIÓN QUE PERFORAN EL AISLAMIENTO

Self-declared by IDEAL Industries, Inc. to be "Suitable for use on the line side of service equipment" based on ANSI C119.5 testing conducted in an ISO 17025 accredited lab.

### Installation Instructions:

**Warning**

Improperly installed electrical wiring can be dangerous and cause electrical fires. The connector chosen must be sized to the wires being used. Consult local building code before doing any electrical work. For assistance, refer to an instructional book or consult a qualified electrician.

**Warning**

Contact with electricity can cause serious injury or death. Use on insulated cable only. (RHH, RHW(-2), THHN, THHW, THW, THWN, USE, XHHW(-2)). Consult factory for other insulation types). If the installation is to be made on an energized run, the tap conductor must be under no load and must not be grounded. Use electrically insulated gloves. De-energize the run cable if there are any questions of these conditions being met.

- Determine the direction for the tap conductor to exit and discard one end cap. **See figure 1.**
- Position the main (or feeder) side of the connector around the run cable and tighten the bolt finger tight. **See figure 2.** If required, loosen the bolt slightly to allow the connector to open completely. **DISASSEMBLY NOT RECOMMENDED.** The plastic "Turbo" spacer holds the connector open which eases installation and ensures proper connections.
- Cut the end of the tap cable squarely. **DO NOT STRIP CABLE INSULATION.**
- Insert the tap cable into the tap side of the connector until it is seated in the remaining end cap. **See figure 3.**
- Continue tightening the torque regulating bolt with a standard box or socket wrench until the torque regulating piece breaks away. If the connector has two (2) assembly bolts, alternately tighten until the hexagonal torque devices break away. **See figures 4a & 4b.** Note that the plastic "turbo" spacer on the side will also break. To make the installation even easier and to relieve torque from the cables, a second wrench can be used on the hexagonal piece on the bottom of the connector.

**DO NOT use gripping type pliers, pipe, open ended or adjustable wrenches** as these may damage the hexagonal torque regulating device. A torque wrench is not required.

**MAKE SURE ONLY THE TOP HEXAGONAL TORQUE DEVICE OF THE BOLT HEAD IS USED FOR ASSEMBLY. THE SECOND HEX PIECE (CLOSER TO THE BODY OF THE CONNECTOR) IS USED FOR DISASSEMBLY.**

Note: The torque regulating bolt ensures the correct torque is applied to the conductors without using a torque wrench. Important information such as run and tap ranges, voltage ratings and material/temperature ratings is marked on the connector.

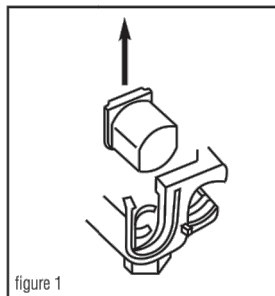


figure 1

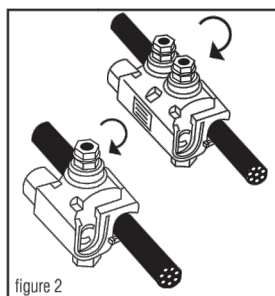


figure 2

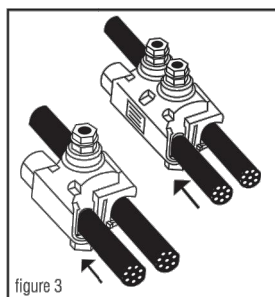


figure 3

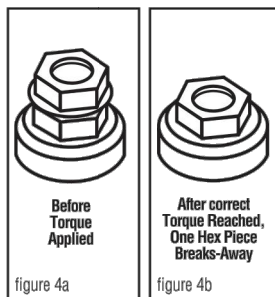
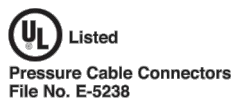


figure 4a

figure 4b



Autodeclarado por IDEAL Industries, Inc. como "Adecuado para usar en el lado de la línea del equipo de servicio" según las pruebas ANSI C119.5 realizadas en un laboratorio acreditado ISO 17025.

### Instalación Instrucciones:

**Advertencia**

Los cables eléctricos mal instalados pueden ser peligrosos y provocar incendios. El conector escogido debe ser de un tamaño adecuado para los cables que se utilicen. Consulte los códigos de construcción locales antes de efectuar trabajos eléctricos. Si necesita ayuda, consulte un libro de instrucciones o consulte con un electricista capacitado.

**Advertencia**

Use sólo en cable aislado. (RHH, RHW(-2), THHN, THHW, THW, THWN, USE, XHHW(-2)). Consulte con la fábrica para obtener información sobre otros tipos de aislamiento). Si se va a hacer la instalación sobre un cable con corriente el conductor derivado debe estar libre de carga y no debe estar aterado. Use guantes con aislamiento eléctrico. Quite la corriente al cable del cual se hace la derivación si no se pueden cumplir estas condiciones. El contacto con electricidad puede producir lesiones graves o mortales.

- Determine la dirección en la que el conductor derivado saldrá y deseche la tapa terminal sobrante. **Vea la ilustración 1.**
  - Coloque el lado principal (o de alimentación) del conector alrededor del cual se hace la derivación y apriete firmemente el dedo del perno. **Vea la ilustración 2.** Si hace falta, afloje el perno ligeramente para permitir que el conector se abra completamente. **NO ES RECOMENDABLE DESARMAR EL CONECTOR.** El espaciador "Turbo" de plástico mantiene al conector abierto, lo cual facilita la instalación y asegura que las conexiones se hagan correctamente.
  - Corte el extremo del cable de derivación perpendicularmente a su eje. **NO PELE EL AISLAMIENTO DEL CABLE.**
  - Inserte el cable de derivación en el lado de derivación del conector hasta que tope contra la tapa terminal que queda. **Vea la ilustración 3.**
  - Continúe apretando este perno que regula la torsión con una llave estándar o de cubo hasta que la pieza que regula la torsión se parta y se separe. Si el conector tiene dos (2) pernos de ensamblaje, apriételes alternativamente hasta que el dispositivo de regulación de torció se parta. **Vea la ilustración 4a y 4b.** Observe que el espaciador "turbo" de plástico en el costado también se fracturará. Para hacer esta instalación aún más fácil y para aliviar la torsión de los cables, se puede usar una segunda llave sobre la pieza hexagonal al fondo del conector.
- NO USE alicates de presión, llaves de turbo, llaves comunes o ajustables** ya que éstas pueden dañar el dispositivo hexagonal que regula la torsión. No se requiere una llave de torsión.
- ASEGÚRESE QUE SE USE, PARA EL ENSAMBLADO, SÓLO EL DISPOSITIVO SUPERIOR DE REGULACIÓN DE TORSIÓN DE LA CABEZA DEL PERNO. LA SEGUNDA PIEZA HEXAGONAL (LA MÁS CERCANA AL CUERPO DEL CONECTOR) SE USA SÓLO PARA DESARMAR EL CONECTOR.**

Nota: El perno regulador de torsión garantiza la aplicación de la torsión correcta a los conductores sin usar una llave de torsión. La información importante de longitud de cable pelado y de toma, las clasificaciones de materiales y temperatura está marcada en el conector.

## B-TAP® INSULATION PIERCING TAP CONNECTORS TORQUE AND CURRENT RATINGS

(Solid and/or Stranded)

CATALOG#	MAIN	TAP	NOMINAL TORQUE	TAP CURRENT RATING (IN AMPS)*
BTC2/0-14	2/0-4	10-14+	80 IN. LBS.	40
BTC1/0-10	1/0-8	2-10++	80 IN. LBS.	130
BTC4/0-10	4/0-3	2-10+++	125 IN. LBS.	130
BTC4/0-6	4/0-2	1/0-6	160 IN. LBS.	170
BTC4/0-2	4/0-2	4/0-2	160 IN. LBS.	260
BTC250-6	250-4	4/0-6	160 IN. LBS.	260
BTC250-4	250-1	3/0-4	160 IN. LBS.	225
BTC250-2	250-1/0	4/0-2	160 IN. LBS.	260
BTC350-1/0	350-1/0	350-1/0	330 IN. LBS.	350
BTC500-4	500-2/0	4/0-4	330 IN. LBS.	260
BTC500-1/0	500-4/0	350-1/0	330 IN. LBS.	350
BTC500-14	750-3/0	10-14 +++	80 IN. LBS.	40
BTC750-250	750-250	500-250	330 IN. LBS.	430

+10-14 Cu SOLID/STRANDED; 10-12 Al SOLID/STRANDED  
 ++2-10 Cu SOLID/STRANDED; 2-10 Al STRANDED  
 +++2-10 Cu SOLID/STRANDED; 2-8 Al STRANDED  
 ++++10-14 Cu SOLID/STRANDED; 10-12 Al STRANDED

Full line is 600V dual-rated, 194°F(90°C)

\* Based on NEC Table 310-16 1996 (Not more than 3 insulated conductors in a raceway at ambient temperature of 30° C) for the largest tap wire size.

**Warning:** Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

**Advertencia:** Cáncer y Daño Reproductivo - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

One year limited warranty. See [idealind.com](http://idealind.com) for more information.

Garantía limitada de un año. Visite [www.idealind.com](http://www.idealind.com) para obtener detalles de la garantía.

## BUCHANAN

1800 S. Prairie Drive  
 Sycamore, IL, U.S.A.  
 800-435-0705 • [www.idealind.com](http://www.idealind.com)

ND 9053-3  
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Signature with Seal

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2686 NC-27,  
 COATS, NC 27521

REV	DESCRIPTION	DATE
1	CONNECTED THE NEG BIND TO THE EXISTING GROUNDING	05-22-2024

### PERMIT DEVELOPER

DATE	05/03/2024
DESIGNER	ORK
REVIEWER	

### SHEET NAME

RACKING DATASHEET

### SHEET NUMBER

DS-06