

April 24, 2023  
Revised June 9, 2023

Lumio Solar  
12600 Challenger Parkway, Suite 200  
Orlando, FL 32826

Scott Wyssling,  
PE

Digitally signed by Scott Wyssling, PE  
DN: c=US, s=Utah, L=Alpine, O=Wyssling Consulting, OU=Engineering,  
CN="Scott Wyssling, PE", E=swyssling@wysslingconsulting.com  
Reason: I am the author of this document  
Location: your signing location here  
Date: 2023.06.09 14:34:50-0600  
Foxit PDF Editor Version: 11.1.0

Re: Engineering Services  
Johnson Residence  
615 Southwest Oleander Place, Lake City FL  
15.600 kW System

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:** 2x6 dimensional lumber at 24" on center.  
**Roof Material:** Metal Roofing  
**Roof Slopes:** 14.04 degrees  
**Attic Access:** Accessible  
**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** = 0 psf
- **Wind Load** based on ASCE 7-16
  - Ultimate Wind Speed = 130 mph (based on Risk Category II)
  - Exposure Category B

*Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the FBC 2020 7<sup>th</sup> Edition, including provisions allowing existing structures to not require strengthening if the new loads do not exceed existing design loads by 105% for gravity elements and 110% for seismic elements. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.*

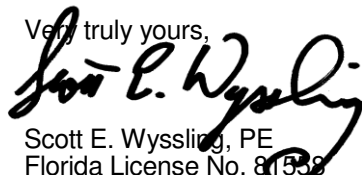
**D. Solar Panel Anchorage**

1. The solar panels shall be mounted in accordance with the most recent S-5! 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. System will be attached to the metal roofing material utilizing the patented S-5! Connection. Installation of the connections shall be in accordance with the manufacturer's recommendations.
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 *FBC 2020 7<sup>th</sup> Edition*, current industry standards and practice, 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  
Florida License No. 81558  
Florida COA No. RY34912

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



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Florida License # RY34912

Date Signed 6/9/2023



**SCOPE OF WORK:**  
TO INSTALL A ROOF MOUNTED SOLAR PHOTOVOLTAIC SYSTEM AT THE OWNER RESIDENCE LOCATED AT 615 SOUTHWEST OLEANDER PLACE, LAKE CITY, FL 32025.


SYSTEM DC RATING: 15.60 KWDC  
SYSTEM AC RATING: 11.33 KWAC

- GENERAL NOTES:**
- THESE CONSTRUCTION DOCUMENTS HAVE BEEN BASED ON FIELD INSPECTIONS AND OTHER INFORMATION AVAILABLE AT THE TIME. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS IN CONSTRUCTION DETAILS.
  - CONTRACTOR HAS THE FULL RESPONSIBILITY TO CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK. ANY WORK STARTED BEFORE CONSULTATION AND ACCEPTANCE BY THE ENGINEER SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBJECT TO CORRECTION BY THEM WITHOUT ADDITIONAL COMPENSATION.
  - THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR THE PROPER INSTALLATION AND COMPLETION OF THE WORK WITH APPROVED MATERIALS.
  - THE EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE INSTALLED ONLY BY QUALIFIED PEOPLE. A QUALIFIED PERSON IS ONE WHO HAS SKILLS AND KNOWLEDGE RELATED TO THE CONSTRUCTION AND OPERATION OF THE ELECTRICAL EQUIPMENT AND INSTALLATIONS AND HAS RECEIVED SAFETY TRAINING TO RECOGNIZE AND AVOID THE HAZARDS INVOLVED. (NEC 690.4(C), NEC 2017).
  - NEW CONDUIT ROUTING SHOWN IS ESSENTIALLY SCHEMATIC. CONTRACTOR SHALL LAY OUT RUNS TO SUIT FIELD CONDITIONS AND THE COORDINATION REQUIREMENTS OF OTHER TRADES.
  - ARRAY WIRING SHOULD NOT BE READILY ACCESSIBLE EXCEPT TO QUALIFIED PERSONNEL.
  - THE AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH.

SHEET INDEX	
CS-0	COVER SHEET & BOM
E-1	STRING LAYOUT & SIGNAGE
E-2	ELECTRICAL DIAGRAM & CALCS.
E-3+	EQUIPMENT SPECIFICATIONS


GOVERNING CODES	
2017 NEC	
2018 NFPA / 2020 FFPC	
2020 FBC	
2018 IRC	
AUTHORITY HAVING JURISDICTION (AHJ): COUNTY OF MARION	
UTILITY COMPANY: FPL	

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	39	Q CELLS Q.PEAK DUO BLK ML-G10+ 400
MICROINVERTER	39	ENPHASE IQ8PLUS-72-2-US
JUNCTION BOX	1	JUNCTION BOX, NEMA 3R, UL LISTED
COMBINER BOX	1	ENPHASE IQ COMBINER 4/4C W/ IQ ENVOY (X-IQ-AM1-240-4)
AC DISCONNECT	1	60A FUSED AC DISCONNECT, 240V, NEMA 3R, UL LISTED




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**ATLANTIC KEY ENERGY LLC**  
12600 CHALLENGER PARKWAY  
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1 (407) 988-0273



PROJECT NAME & ADDRESS

MARIANNE JOHNSON  
RESIDENCE  
PROJECT # P-0074754  
615 SOUTHWEST OLEANDER PLACE  
LAKE CITY, FL 32025

SIGNATURE WITH SEAL

REVISIONS		
DESCRIPTION	DATE	REV
LAYOUT	6/9/23	A

Drawn by: A.A.  
Date: 04/24/2023

SHEET NAME
COVER SHEET & BOM
SHEET NUMBER
CS-0

LEGEND

X

(E)

(N)

M

MSP

ACD

CB

- MODULE STRING ID

- EXISTING

- NEW

- UTILITY METER

- MAIN SERVICE PANEL

- AC DISCONNECT

- COMBINER BOX

LC

SP

JB

SCT

BAT

ICD

BUL

- LOAD CENTER

- SUBPANEL

- JUNCTION BOX

- STRING CENTER TAP

- CONDUIT

- ENERGY STORAGE

- INTERCONNECTION DEVICE

- BACK UP LOADS PANEL

**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.
- ALL LABELS AND MARKINGS FOR PHOTOVOLTAIC SYSTEMS WILL BE REFLECTIVE AND MEET ALL REQUIREMENTS.

WARNING

ELECTRIC SHOCK HAZARD


DO NOT TOUCH TERMINALS  
TERMINALS ON BOTH THE LINE AND  
LOAD SIDES MAY BE ENERGIZED  
IN THE OPEN POSITION

LABEL LOCATION:  
COMBINER BOX/ EMT  
ENCLOSURES/ AC DISCONNECT/  
MAIN SERVICE PANEL  
PER CODE: NEC 2017, 690.13(B)

EMERGENCY RESPONDER

SOLAR PV SYSTEM EQUIPPED  
WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN  
SWITCH TO THE "OFF"  
POSITION TO SHUT  
DOWN THE ENTIRE PV  
SYSTEM



LABEL LOCATION:  
RAPID SHUTDOWN (AC DISCONNECT)  
PER CODE: NEC 690.56 (C)(1) &  
NFPA111.12.2.1.1.1.1, 11.12.2.1.4  
SHALL BE REFLECTIVE, WITH ALL  
LETTERS CAPITALIZED AND HAVING A  
MINIMUM HEIGHT OF 3/8 IN. (9.5 MM), IN  
WHITE ON RED BACKGROUND.

WARNING: PHOTOVOLTAIC  
POWER SOURCE

LABEL LOCATION:  
CONDUIT/ RACEWAY/ ENCLOSURES/  
COMBINER BOX/ AC DISCONNECT  
PER CODE: NEC2017, 690.31(G)(3)(4)

PHOTOVOLTAIC  
AC DISCONNECT

LABEL LOCATION:  
AC DISCONNECT/ BREAKER/  
POINTS OF CONNECTION  
PER CODE: NEC2017, 690.13(B)

PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT 57.2 A

NOMINAL OPERATING AC VOLTAGE 240 V

LABEL LOCATION:  
AC DISCONNECT  
PER CODE: NEC2017, 690.54

RAPID SHUTDOWN  
SWITCH FOR  
SOLAR PV SYSTEM

LABEL LOCATION:  
RAPID SHUTDOWN  
(AC DISCONNECT)  
PER CODE: NEC 690.58 (C)(3)

WARNING

DUAL POWER SOURCE

SOURCES: UTILITY GRID AND  
PV SOLAR ELECTRIC SYSTEM

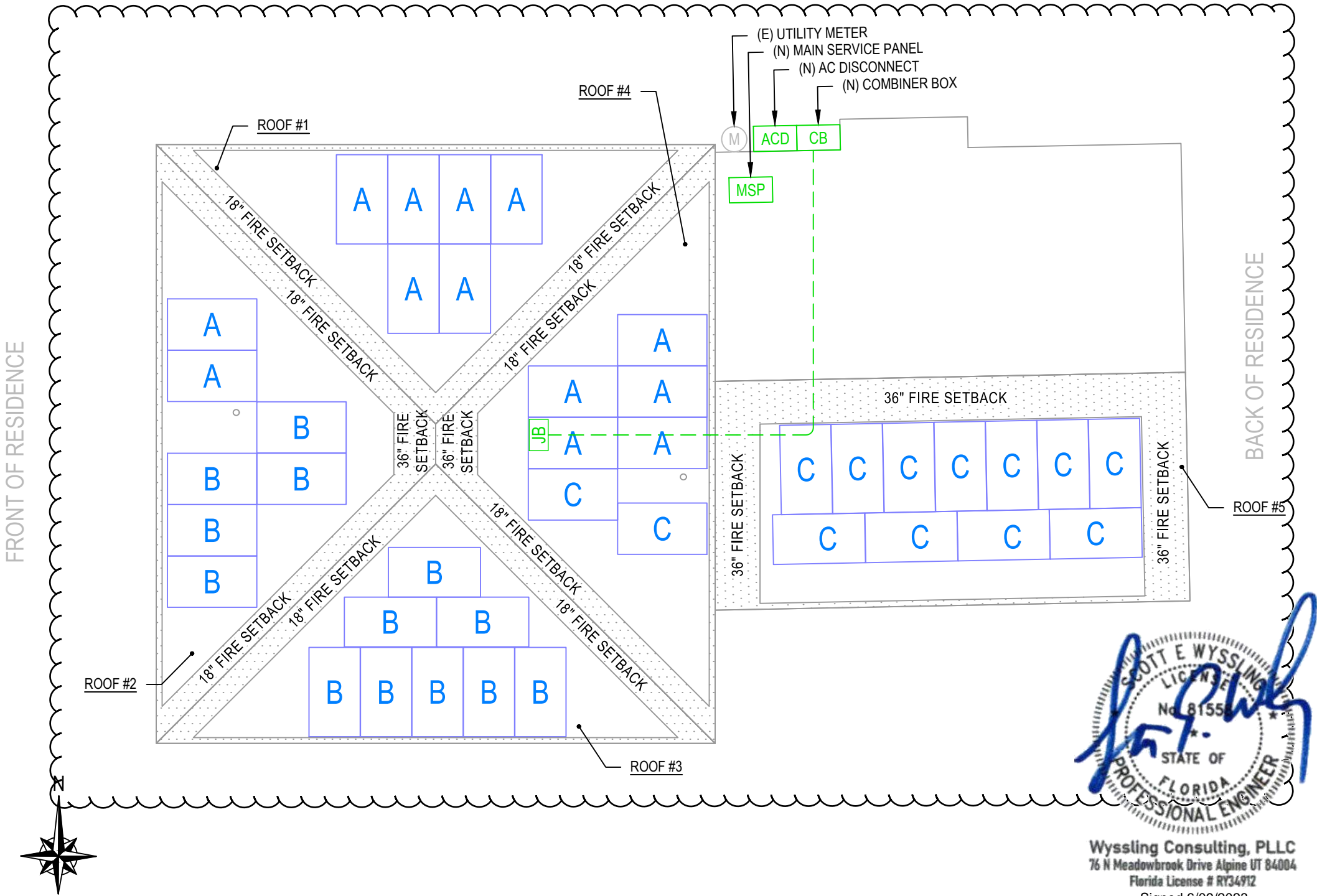
LABEL LOCATION:  
POINT OF INTERCONNECTION  
PER CODE: NEC 2017, 705.12(B)

FOR SERVICE, CONTACT  
LUMIO

1 (888) 586-4649

LIC #: EC-13011870

LABEL LOCATION:  
POINT-OF-INTERCONNECTION OR AT  
MAIN SERVICE DISCONNECT (MSP)  
PER CODE: NEC 705.12(B)(2)(3)(b)



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AKE  
SOLAR

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Lumio

PROJECT NAME & ADDRESS

MARIANNE JOHNSON  
RESIDENCE  
PROJECT # P-0074754  
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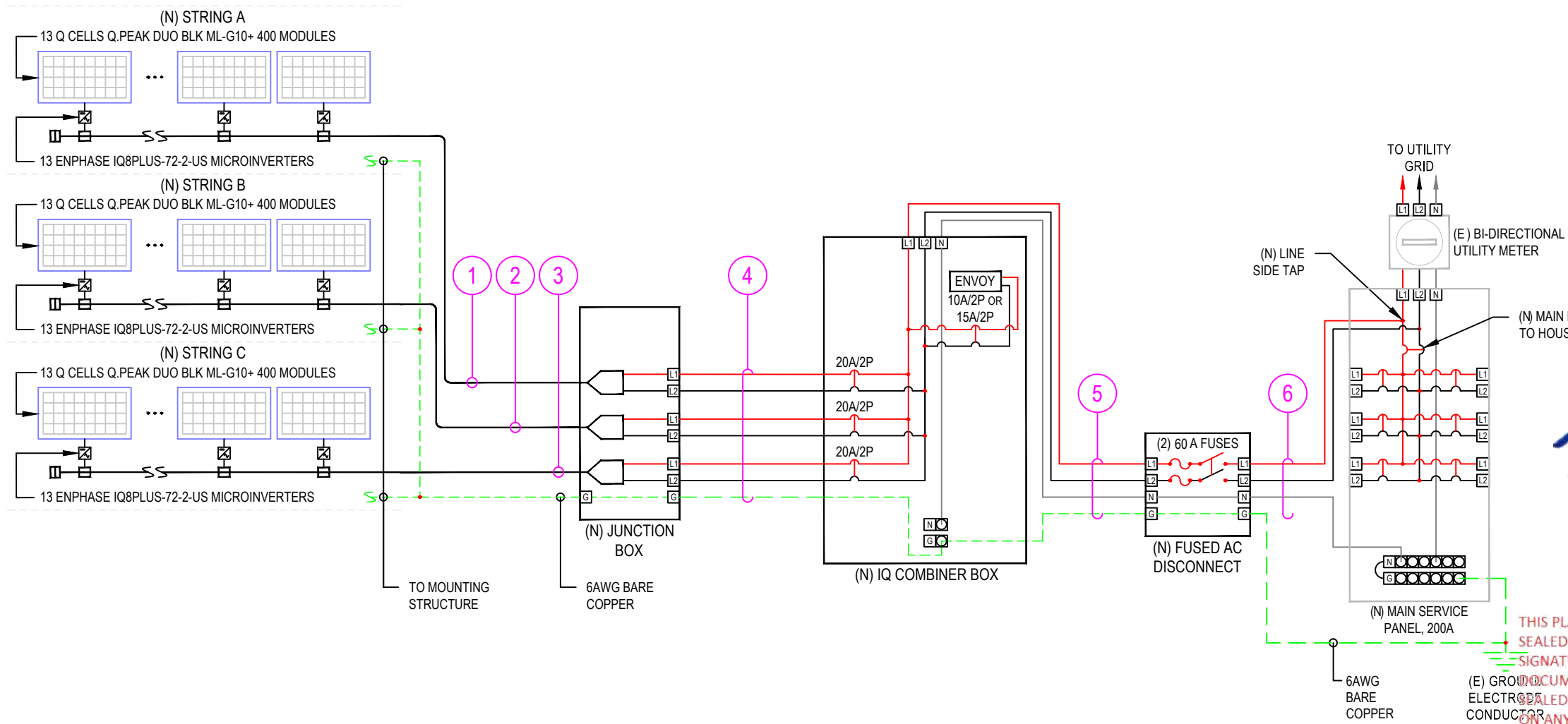
Drawn by: A.A.

Date: 04/24/2023

SHEET NAME  
STRING LAYOUT &  
SIGNAGE  
SHEET NUMBER



ID	INITIAL CONDUCTOR LOCATION	FINAL CONDUCTOR LOCATION	MIN. CONDUCTOR SIZE (AWG)		MIN. DIA CONDUIT SIZE (IN.)	# OF PARALLEL CIRCUITS	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD (A)	MIN. EGC SIZE (AWG)		TEMP. CORR. FACTOR		CONDUIT FILL FACTOR	CONT. CURRENT (A)	MAX. CURRENT (A)	BASE AMP. (A)	DERATED AMP. (A)	TERM. AMP. RATING (A)	LENGTH (FT)	VOLTAGE DROP (%)
1	STRING A	JUNCTION BOX	12	Q CABLE	N/A	1	2	N/A	6	BARE COPPER	0.76	55°C	N/A	15.73	19.66	30	N/A	N/A	72.00	0.76
2	STRING B	JUNCTION BOX	12	Q CABLE	N/A	1	2	N/A	6	BARE COPPER	0.76	55°C	N/A	15.73	19.66	30	N/A	N/A	78.00	0.82
3	STRING C	JUNCTION BOX	12	Q CABLE	N/A	1	2	N/A	6	BARE COPPER	0.76	55°C	N/A	15.73	19.66	30	N/A	N/A	68.00	0.72
4	JUNCTION BOX	COMBINER BOX	10	THWN-2 COPPER	0.75 LTNM	3	6	20	10	THWN-2 COPPER	0.76	55°C	0.8	15.73	19.66	40	24.3	35	47.00	0.77
5	COMBINER BOX	AC DISCONNECT	6	THWN-2 COPPER	0.75 LTNM	1	3	60	10	THWN-2 COPPER	0.96	34°C	1	47.19	58.99	75	72.0	65	5.00	0.10
6	AC DISCONNECT	MSP	6	THWN-2 COPPER	0.75 LTNM	1	3	N/A	-	-	0.96	34°C	1	47.19	58.99	75	72.0	65	5.00	0.10



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<b>NOTE:</b> 1. LTNM OR EQUIVALENT TYPE CONDUIT		(E) - EXISTING (N) - NEW
<b>DESIGN TEMPERATURE SPECIFICATIONS</b>		
RECORD LOW TEMP	-6°C	
AMBIENT TEMP. (HIGH TEMP. 2%)	34°C	
CONDUIT HEIGHT	1.0"	
CONDUCTOR TEMP. RATE (ROOF)	55°C	

INSULATION PIERCING CONNECTORS WILL BE USED FOR LINE/LOAD SIDE CONNECTION.

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SHEET NAME  
**ELECTRICAL LINE DIAGRAM & CALCS.**  
SHEET NUMBER  
**E-2**

E-3



Enphase IQ Combiner 4/4C

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

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

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EQUIPMENT SPECIFICATIONS

SHEET NUMBER

E-4