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May 20, 2022

Ecovole
2300 Main Street
Kansas City, MO 64108

Re: Engineering Services
Bird Residence
129 Northwest Mackenzie Drive, Lee's Summit
MO
17.200 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 rafters 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.
3. The addition of solar panels will not exceed the height of the existing building
4. The outermost part of the solar panels will be less than 6 inches off the existing slope of the existing roof.

B. Description of Structure:

Roof Framing: 2 x 6 dimensional lumber spaced at 24" on center with a knee wall at midspan.

Roof Material: Composite Asphalt Shingles

Roof Slope: 45 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** = 20 psf
- **Wind Load** based on ASCE 7-16
 - Ultimate Wind Speed = 115 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 2018 International Residential Code,, 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 rafters will support the additional panel loading without damage, if installed correctly.

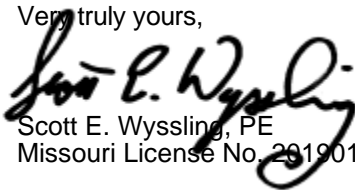
D. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent "IronRidge Installation Manual", which can be found on the IronRidge website (<http://IronRidge.com/>). 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 $\frac{5}{16}$ " lag screw is 235 lbs per inch of penetration as identified in the National Design Standards (NDS) of timber construction specifications. Based on a minimum penetration depth of $2\frac{1}{2}$ ", 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 one $\frac{5}{16}$ " diameter lag screw with a minimum of $2\frac{1}{2}$ " embedment will be adequate and will include a sufficient factor of safety.
3. Considering the wind speed, roof slopes, size and spacing of rafters, and condition of the roof, the panel supports shall be placed no greater than 48" on centers.
4. Panel supports connections shall be staggered to distribute load to adjacent rafters.

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 IRC, 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
Missouri License No. 2019011786



Wyssling Consulting
76 N Meadowbrook Drive, Alpine UT 84004
COA #2020037943
Date Signed 5/20/22

GENERAL NOTES

- 1.1.1 **PROJECT NOTES:**
- 1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
- 1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
- 1.1.4 GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE MICROINVERTER IN ACCORDANCE WITH NEC 690.41(B)
- 1.1.5 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4:
- PV MODULES: UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE
- INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519
- COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY
- 1.1.6 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
- 1.1.7 ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
- 1.1.8 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.

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

- 1.3.1 **WORK INCLUDES:**
- 1.3.2 PV ROOF ATTACHMENTS - ROOFTECH RT-MINI
- 1.3.3 PV RACKING SYSTEM INSTALLATION - UNIRAC LIGHT
- 1.3.4 PV MODULE AND INVERTER INSTALLATION - REC ALPHA REC400AA PURE BLACK / ENPHASE IQ8M-72-2-US
- 1.3.5 PV EQUIPMENT GROUNDING
- 1.3.6 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
- 1.3.7 PV LOAD CENTERS (IF INCLUDED)
- 1.3.8 PV METERING/MONITORING (IF INCLUDED)
- 1.3.9 PV DISCONNECTS
- 1.3.10 PV GROUNDING ELECTRODE & BONDING TO (E) GEC
- 1.3.11 PV FINAL COMMISSIONING
- 1.3.12 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV
- 1.3.13 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

SCOPE OF WORK

SYSTEM SIZE: STC: 43 X 400W = 17.200KW DC
PTC: 43 X 381W = 16.383KW DC
(43) REC ALPHA REC400AA PURE BLACK
(43) ENPHASE IQ8M-72-2-US

ATTACHMENT TYPE: ROOFTECH RT-MINI

MSP UPGRADE: NO

NEW PV SYSTEM: 17.200 kWp
BIRD RESIDENCE

129 NW MACKENZIE DR,
LEE'S SUMMIT, MO 64081

ASSESSOR'S #: 62-330-04-05-00-0-00-000



01

AERIAL PHOTO

NOT TO SCALE

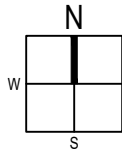


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02

PLAT MAP

NOT TO SCALE



SHEET LIST TABLE

SHEET NUMBER	SHEET TITLE
T-001	COVER PAGE
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E-602	DESIGN TABLES
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S-501	ASSEMBLY DETAILS
R-001	RESOURCE DOCUMENT
R-002	RESOURCE DOCUMENT
R-003	RESOURCE DOCUMENT
R-004	RESOURCE DOCUMENT
R-005	RESOURCE DOCUMENT

PROJECT INFORMATION

OWNER
NAME: JEREMY BIRD 913-206-4786

PROJECT MANAGER
NAME: KEATON D
PHONE: 8163517803

CONTRACTOR
NAME: ECOVOLE
PHONE: 8163517803

AUTHORITIES HAVING JURISDICTION
BUILDING: LEE'S SUMMIT MO
ZONING: LEE'S SUMMIT MO
UTILITY: EVERGY MO

DESIGN SPECIFICATIONS
OCCUPANCY: II
CONSTRUCTION: SINGLE-FAMILY
ZONING: RESIDENTIAL
GROUND SNOW LOAD: 20 PSF
WIND EXPOSURE: B
WIND SPEED: 115 MPH

APPLICABLE CODES & STANDARDS
BUILDING: IBC 2017, IMC 2018
ELECTRICAL: NEC 2017
FIRE: IFC 2018
PLUMBING: IPC 2018
GAS: IFGC 2018
ICC/ANSI A117.1-2009



CONTRACTOR

ECOVOLE

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MO 64108

LIC. NO.: 206086

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NEW PV SYSTEM: 17.200 kWp

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APN: 62-330-04-05-00-0-00-000

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

COVER PAGE

DATE: 05.08.2022

DESIGN BY: T.R.

CHECKED BY: M.M.

REVISIONS

T-001.00

(SHEET 1)

	A	B	C	D	E	F	G	H
1	2.1.1	SITE NOTES:		4.5.1	GROUNDING NOTES:			
	2.1.2	A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.		2.5.2	GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.			
	2.1.3	THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH STORAGE BATTERIES.		2.5.3	PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.			
	2.1.4	THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.		2.5.4	METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).			
	2.1.5	PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.		2.5.5	EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MICROINVERTER MANUFACTURERS' INSTRUCTIONS.			
	2.1.6	ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.		2.5.6	EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.			
2	2.2.1	EQUIPMENT LOCATIONS:		2.5.7	THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.			
	2.2.2	ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.		2.5.8	GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]			
	2.2.3	WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).		2.5.9	THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.			
	2.2.4	JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.		2.5.10	GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS			
	2.2.5	ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.						
	2.2.6	ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.						
3	2.2.7	ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.		2.6.1	DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:			
				2.6.2	DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).			
	2.3.1	STRUCTURAL NOTES:		2.6.3	DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH			
	2.3.2	RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAI MANUFACTURER'S INSTRUCTIONS.		2.6.4	PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690.12(A) THROUGH (D).			
	2.3.3	JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.		2.6.5	ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.			
	2.3.4	ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.		2.6.6	MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B).			
4	2.3.5	ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.		2.6.7	IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.			
	2.3.6	WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.		2.7.1	INTERCONNECTION NOTES:			
				2.7.2	LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 705.12 (B)]			
	2.4.1	WIRING & CONDUIT NOTES:		2.7.3	THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(D)(2)(3)].			
	2.4.2	ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.		2.7.4	THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR, PV DEDICATED BACKFEED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(B)(2)(3)].			
	2.4.3	CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.		2.7.5	AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (B)(2)(3)(C).			
5	2.4.4	VOLTAGE DROP LIMITED TO 1.5%.		2.7.6	FEEDER TAP INTERCONNECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (B)(2)(1)			
	2.4.5	DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.		2.7.7	SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42			
	2.4.6	AC CONDUCTORS COLORED OR MARKED AS FOLLOWS:		2.7.8	BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].			
		PHASE A OR L1- BLACK						
		PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE						
		PHASE C OR L3- BLUE, YELLOW, ORANGE**, OR OTHER CONVENTION						
6		NEUTRAL- WHITE OR GRAY						
		IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].						



CONTRACTOR

ECOVOLVE

PHONE: 8163517803

ADDRESS: 2300 MAIN ST., KANSAS CITY, MO 64108

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HIC. NO.:

ELE. NO.:

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NEW PV SYSTEM: 17.200 kWp

BIRD
RESIDENCE
129 NW MACKENZIE DR,
LEE'S SUMMIT, MO 64081
APN: 62-330-04-05-00-0-00-000

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

NOTES

DATE: 05.08.2022

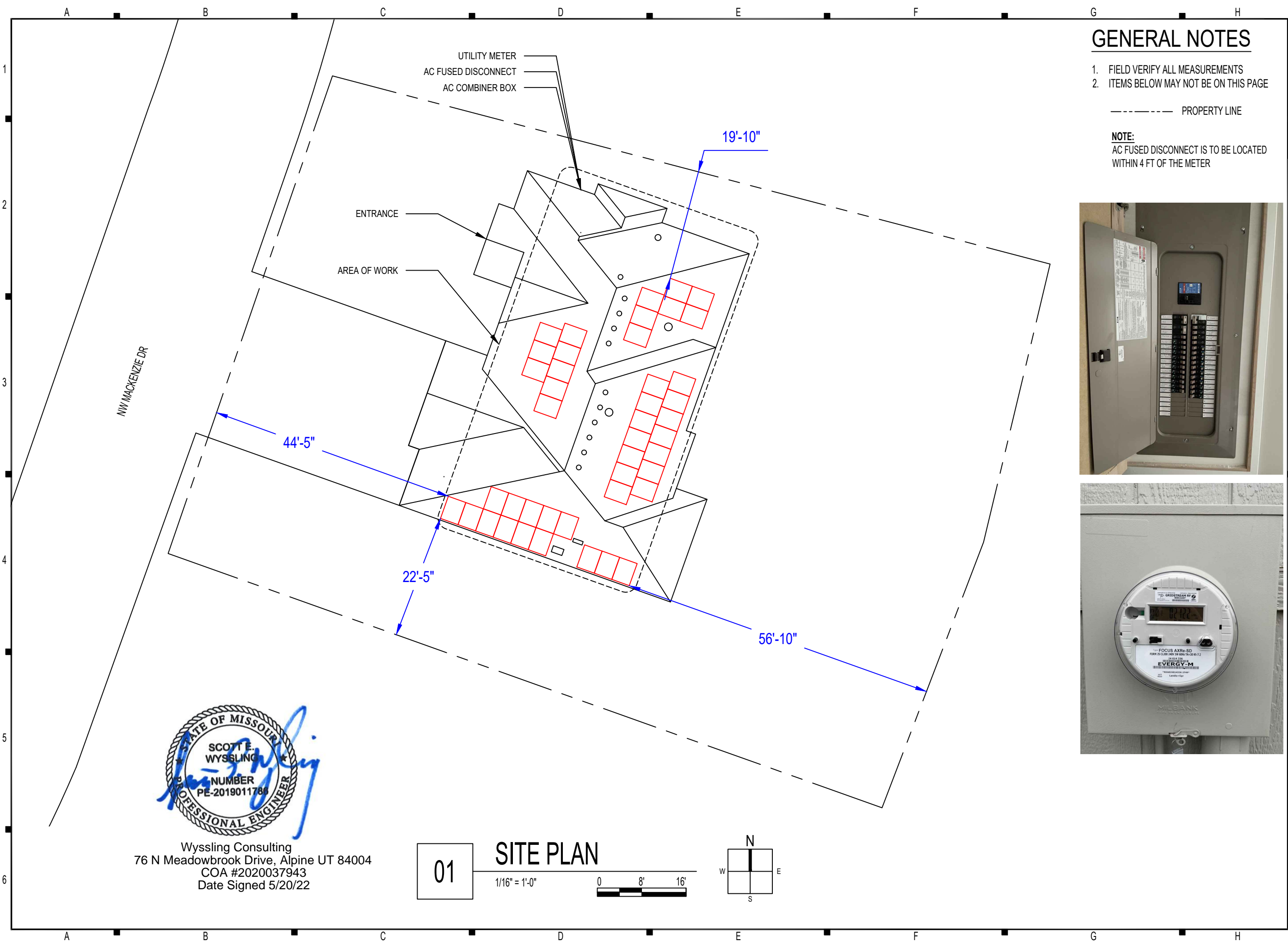
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REVISIONS



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76 N Meadowbrook Drive, Alpine UT 84004
COA #2020037943
Date Signed 5/20/22



GENERAL NOTES

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

----- PROPERTY LINE

NOTE:
AC FUSED DISCONNECT IS TO BE LOCATED
WITHIN 4 FT OF THE METER



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PAPER SIZE: 11" x 17" (ANSI B)

SITE PLAN

DATE: 05.08.2022

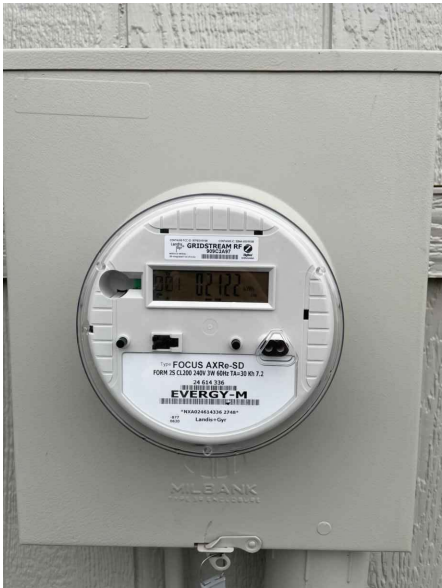
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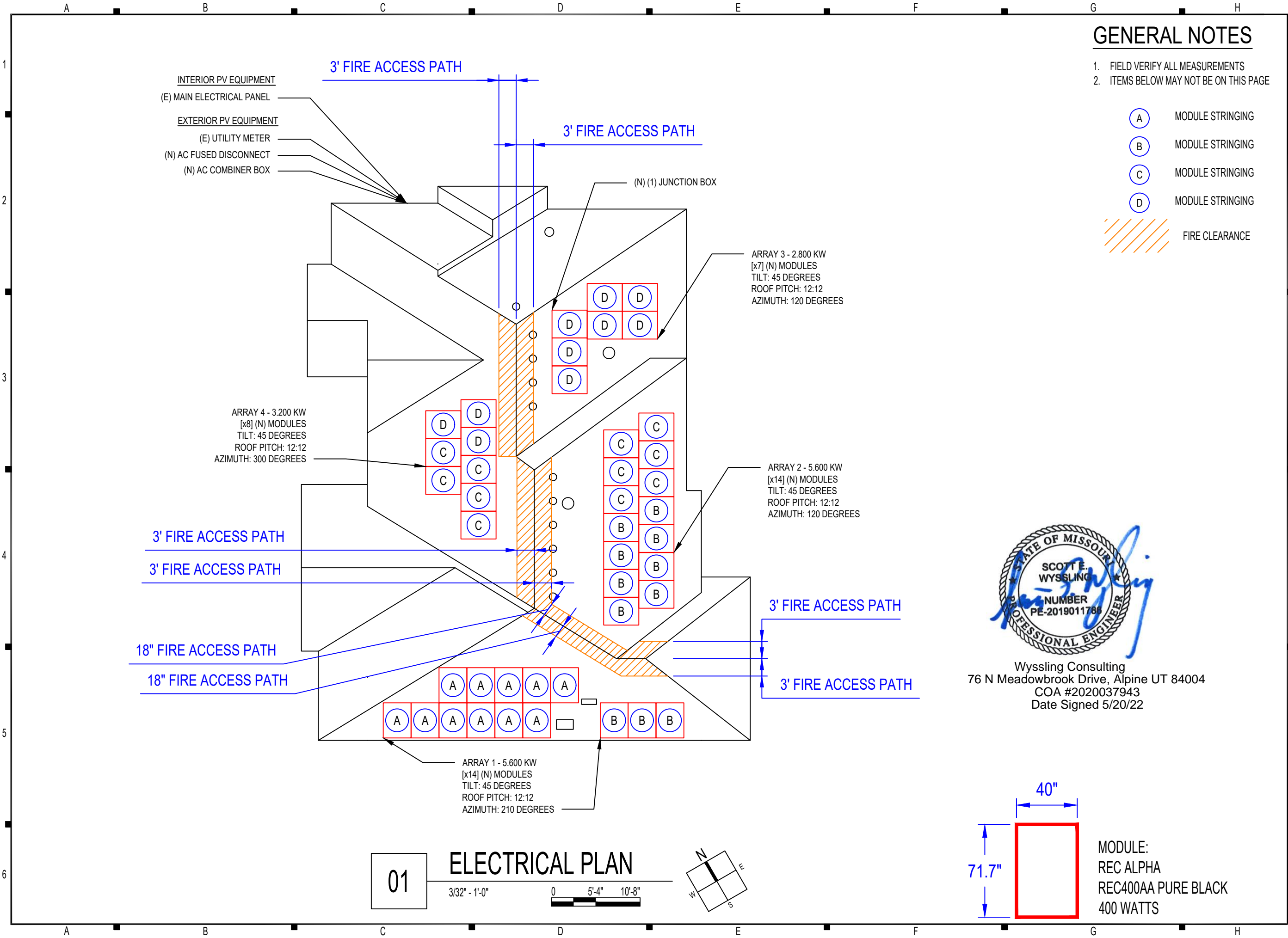
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(SHEET 3)





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ELECTRICAL PLAN

DATE: 05.08.2022

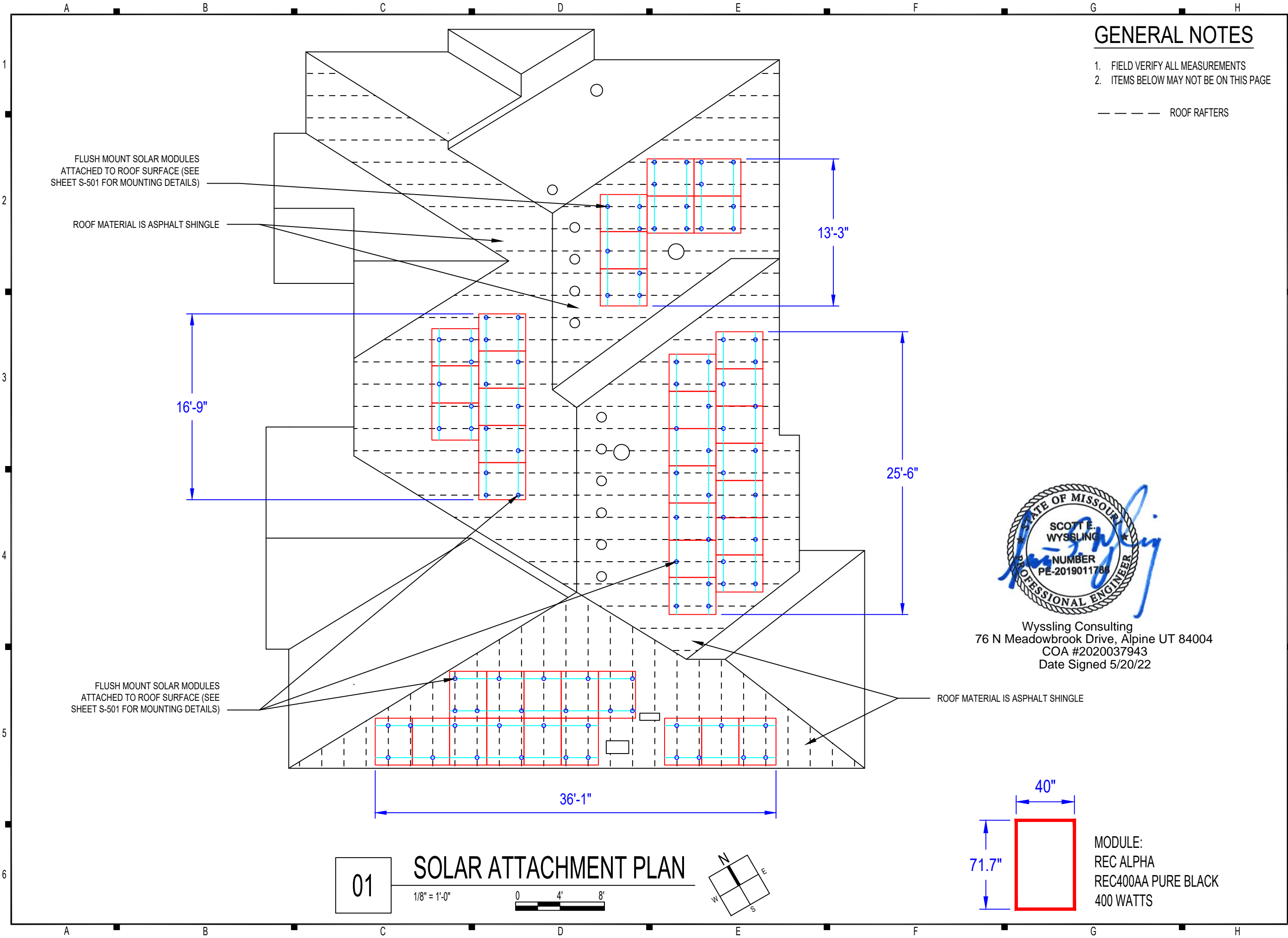
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(SHEET 4)



GENERAL NOTES

- 1. FIELD VERIFY ALL MEASUREMENTS
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--- ROOF RAFTERS



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Date Signed 5/20/22

PAPER SIZE: 11" x 17" (ANSI B)

SOLAR ATTACHMENT PLAN

DATE: 05.08.2022

DESIGN BY: T.R.

CHECKED BY: M.M.

REVISIONS

A-103.00

(SHEET 5)

SYSTEM SUMMARY				
	BRANCH #1	BRANCH #2	BRANCH #3	BRANCH #4
INVERTERS PER BRANCH	11	11	11	10
MAX AC CURRENT	14.85A	14.85A	14.85A	13.5A
MAX AC OUTPUT POWER	3,630W	3,630W	3,630W	3,300W
ARRAY STC POWER	17,200W			
ARRAY PTC POWER	16,383W			
MAX AC CURRENT	58.050000A			
MAX AC POWER	14,190W			
DERATED (CEC) AC POWER	14,190W			

MODULES											
REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING	
PM1-43	43	REC ALPHA REC400AA PURE BLACK	400W	381W	10.1A	9.51A	48.8V	42.1V	-0.117V/°C (-0.24%/°C)	25A	

INVERTERS											
REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	OCPD RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY	
I1-43	43	ENPHASE IQ8M-72-2-US	240V	FLOATING	20A	325W	1.35A	15A	60V	97.0%	

DISCONNECTS				
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	EATON DG223NRB OR EQUIV.	100A	240VAC

OCPDS			
REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1-4	4	20A	240VAC
CB5	1	10A	240VAC
F1-2	2	80A	240VAC

ASHRAE EXTREME LOW	-22.6°C (-8.7°F), SOURCE: CHARLES B WHEELER D (39.12°; -94.59°)
ASHRAE 2% HIGH	36.2°C (97.2°F), SOURCE: CHARLES B WHEELER D (39.12°; -94.59°)

BILL OF MATERIALS							
CATEGORY	MAKE	MODEL NUMBER	REF	QTY	UNIT	QTY/UNIT	DESCRIPTION
MODULE	REC ALPHA	REC400AA PURE BLACK	PM1-43	43	PIECES	1	REC ALPHA REC400AA PURE BLACK 400W 0
INVERTER	ENPHASE	IQ8M-72-2-US	I1-43	43	PIECES	1	ENPHASE IQ8M-72-2-US 325W INVERTER
DISCONNECT	EATON	DG223NRB	SW1	1	PIECE	1	EATON DG223NRB, FUSED, 2-POLE, 100A, 240VAC OR EQUIVALENT
MISC ELECTRICAL EQUIPMENT		GEN-CABLE-CLIP	HDWR46-261	215	PIECES	1	GENERIC CABLE CLIP
AC COMBINER PANEL		ENPHASE-IQ4-PANEL	EP1	1	PIECE	1	ENPHASE IQ COMBINER 4 (X-IQ-AM1-240-4)
MONITORING		ENPHASE-ENVOY	ENV1	1	PIECE	1	ENPHASE ENVOY
WIRING	ENPHASE	Q-12-20-200	EN1-43	43	PIECES	1	ENPHASE ENGAGE (TM) TRUNK CABLE
WIRING	ENPHASE	Q-TERM-10	EN44	1	BUNDLE	10	ENPHASE ENGAGE (TM) BRANCH TERMINATOR
WIRING	ENPHASE	Q-SEAL-10	EN45	1	BUNDLE	10	ENPHASE ENGAGE (TM) WATERTIGHT SEALING CAP
WIRING		GEN-10-AWG-THWN-2-CU-RD	WR1	180	FEET	1	10 AWG THWN-2, COPPER, RED (LINE 1)
WIRING		GEN-10-AWG-THWN-2-CU-BLK	WR1	180	FEET	1	10 AWG THWN-2, COPPER, BLACK (LINE 2)
WIRING		GEN-10-AWG-THWN-2-CU-GR	WR1	45	FEET	1	10 AWG THWN-2, COPPER, GREEN (GROUND)
WIRING		GEN-4-AWG-THWN-2-CU-RD	WR2-3	20	FEET	1	4 AWG THWN-2, COPPER, RED (LINE 1)
WIRING		GEN-4-AWG-THWN-2-CU-BLK	WR2-3	20	FEET	1	4 AWG THWN-2, COPPER, BLACK (LINE 2)
WIRING		GEN-4-AWG-THWN-2-CU-WH	WR2-3	20	FEET	1	4 AWG THWN-2, COPPER, WHITE (NEUTRAL)
WIRING		GEN-4-AWG-THWN-2-CU-GR	WR2-3	20	FEET	1	4 AWG THWN-2, COPPER, GREEN (GROUND)
WIREWAY	ENPHASE	ET-SPLK-05	EN7	1	BUNDLE	5	ENPHASE ENGAGE (TM) ENGAGE COUPLER
WIREWAY		GEN-EMT-0.75" DIA	WW1	45	FEET	1	EMT CONDUIT, 0.75" DIA
WIREWAY		GEN-EMT-1" DIA	WW2-3	20	FEET	1	EMT CONDUIT, 1" DIA
OCPD	GENERIC MANUFACTURER	GEN-CB-20A-240VAC	CB1-4	4	PIECES	1	CIRCUIT BREAKER, 20A, 240VAC
OCPD	GENERIC MANUFACTURER	GEN-CB-10A-240VAC	CB5	1	PIECE	1	CIRCUIT BREAKER, 10A, 240VAC
OCPD	GENERIC MANUFACTURER	GEN-FU-80A-240VAC	F1-2	2	PIECES	1	FUSE, 80A, 240VAC
TRANSITION BOX	GENERIC MANUFACTURER	GEN-AWB-TB-4-4X	JB1	1	PIECE	1	TRANSITION/PASS-THROUGH BOX, WITH 4 TERMINAL BLOCKS



Wyssling Consulting
76 N Meadowbrook Drive, Alpine UT 84004
COA #2020037943
Date Signed 5/20/22



CONTRACTOR

ECOVOLVE

PHONE: 8163517803
ADDRESS: 2300 MAIN ST., KANSAS CITY, MO 64108

LIC. NO.: 206086
HIC. NO.:
ELE. NO.:

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AND WILL BE SUBJECT TO CIVIL
DAMAGES AND PROSECUTIONS.

NEW PV SYSTEM: 17.200 kWp

BIRD
RESIDENCE

129 NW MACKENZIE DR,
LEE'S SUMMIT, MO 64081
APN: 62-330-04-05-00-0-00-000

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

DESIGN TABLES

DATE: 05.08.2022

DESIGN BY: T.R.

CHECKED BY: M.M.

REVISIONS

E-602.00

(SHEET 7)

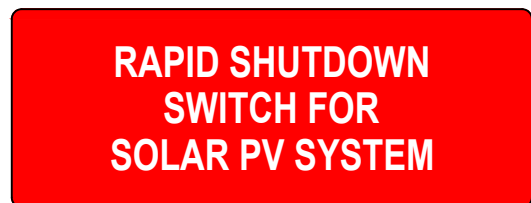
1.1 LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535

1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.

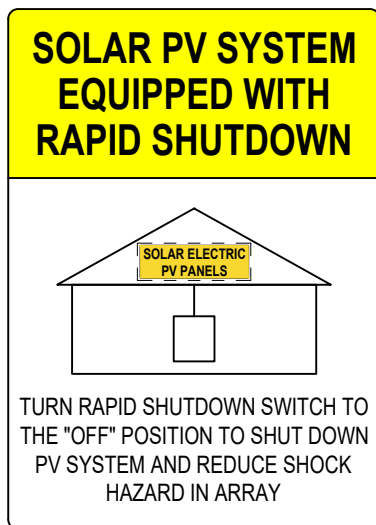
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.

1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.

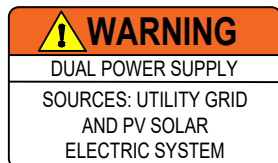
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]



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



LABEL 6
AT RAPID SHUTDOWN SYSTEM
(3 3/4" X 5 1/4"). [NEC 690.56(C)(1)(A)]



WARNING
SOLAR ELECTRIC
CIRCUIT BREAKER
IS BACKFED

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

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

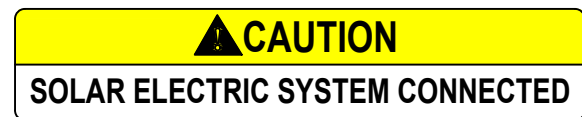
INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED
PHOTOVOLTAIC SYSTEM DISCONNECT LOCATED
NORTH SIDE OF THE HOUSE

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

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



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

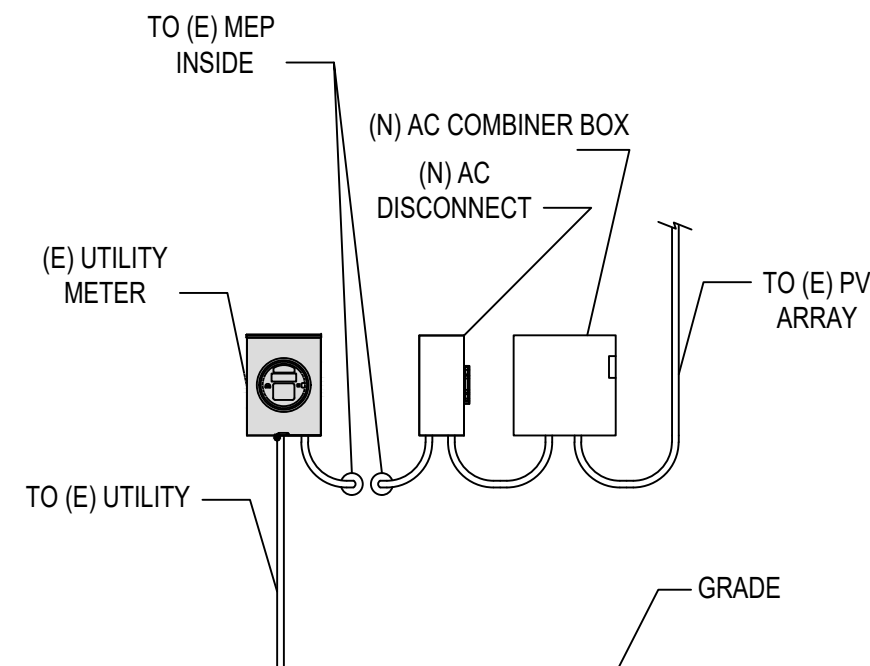
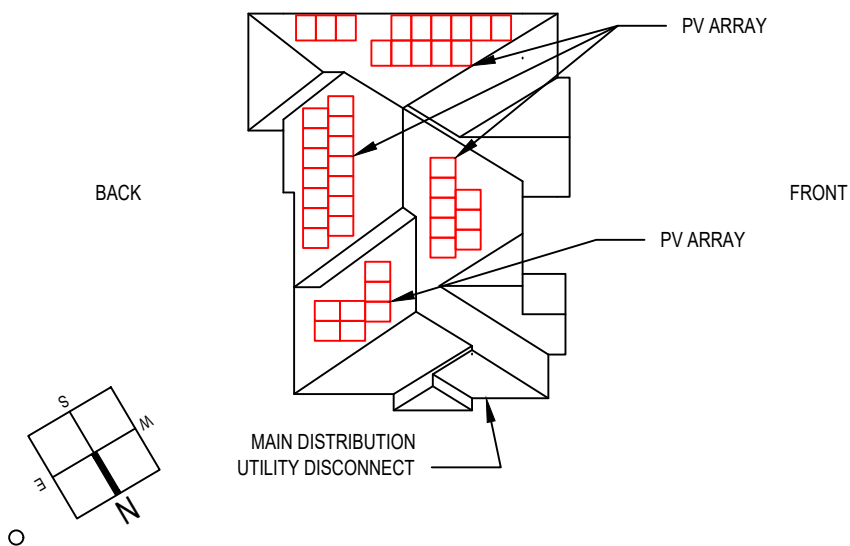


LABEL 10
AT UTILITY METER (5 3/4" X
[NEC 690.56(B)]



Wyssling Consulting
76 N Meadowbrook Drive, Alpine UT 84004
COA #2020037943
Date Signed 5/20/22

!CAUTION!
POWER TO THIS BUILDING IS ALSO SUPPLIED
FROM ROOF MOUNTED SOLAR ARRAYS WITH
SAFETY DISCONNECTS AS SHOWN:



01

EQUIPMENT ELEVATION

NOT TO SCALE



CONTRACTOR

ECOVOLFE

PHONE: 8163517803
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 MO 64108

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NEW PV SYSTEM: 17.200 kWp

BIRD RESIDENCE

129 NW MACKENZIE DR,
LEE'S SUMMIT, MO 64081
APN: 62-330-04-05-00-0-00-000

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

PLACARDS

DATE: 05.08.2022

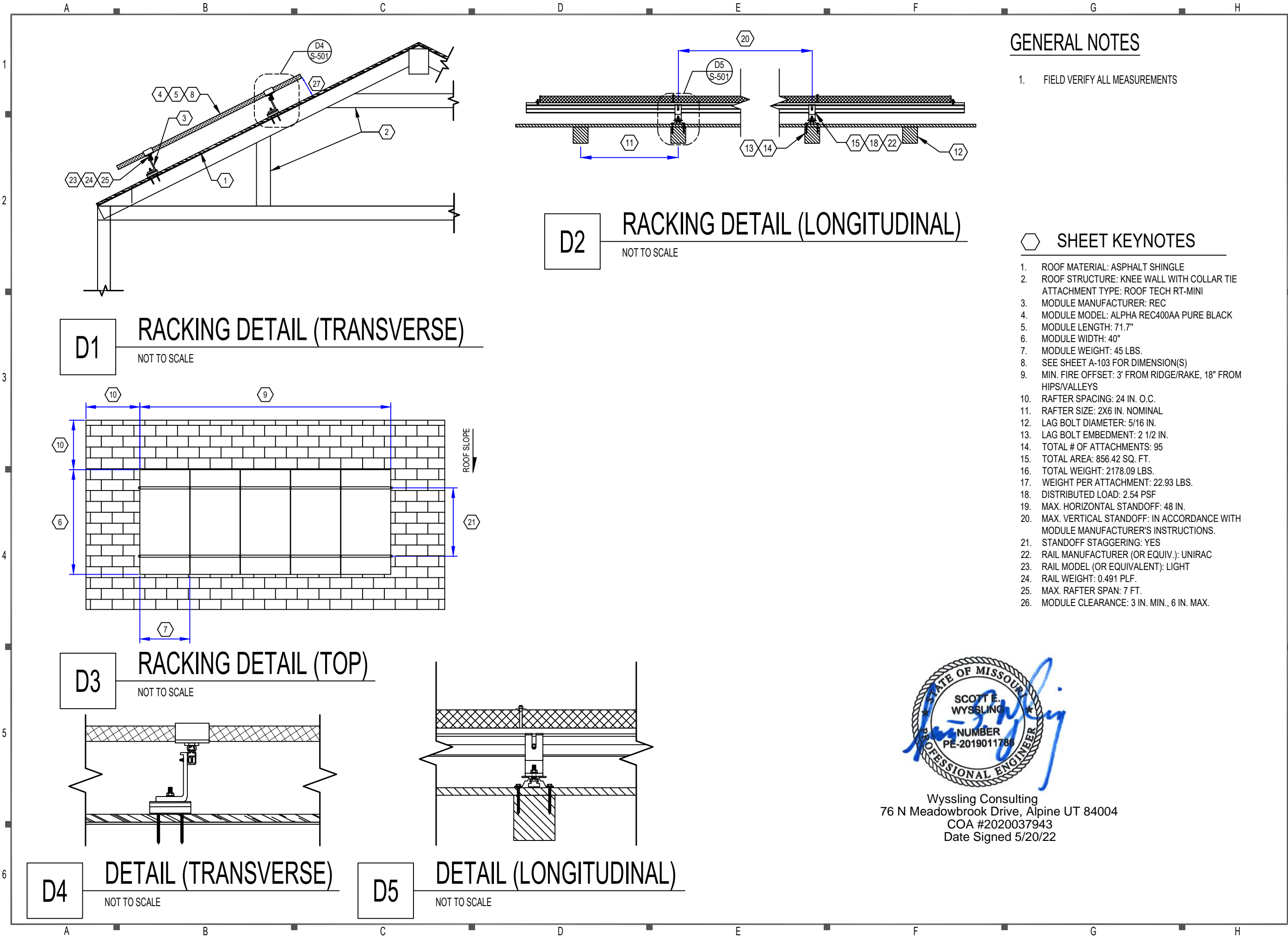
DESIGN BY: T.R.

CHECKED BY: M.M.

REVISIONS

E-603.00

(SHEET 8)



CONTRACTOR

ECOVOLE

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MO 64108

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APN: 62-330-04-05-00-0-00-000

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

ASSEMBLY DETAILS

DATE: 05.08.2022

DESIGN BY: T.R.

CHECKED BY: M.M.

REVISIONS

S-501.00

(SHEET 9)



Wyssling Consulting
76 N Meadowbrook Drive, Alpine UT 84004
COA #2020037943
Date Signed 5/20/22

SOLAR'S MOST TRUSTED





REC ALPHA[®] PURE
BLACK SERIES
PRODUCT SPECIFICATIONS

400W_P
20.3 $\frac{W}{FT^2}$

PRODUCT
LABORATORY
PERFORMANCE

REC
25 YEAR
PROTRUST
WARRANTY
ELIGIBLE




LEAD-FREE
ROHS COMPLIANT

EXPERIENCE



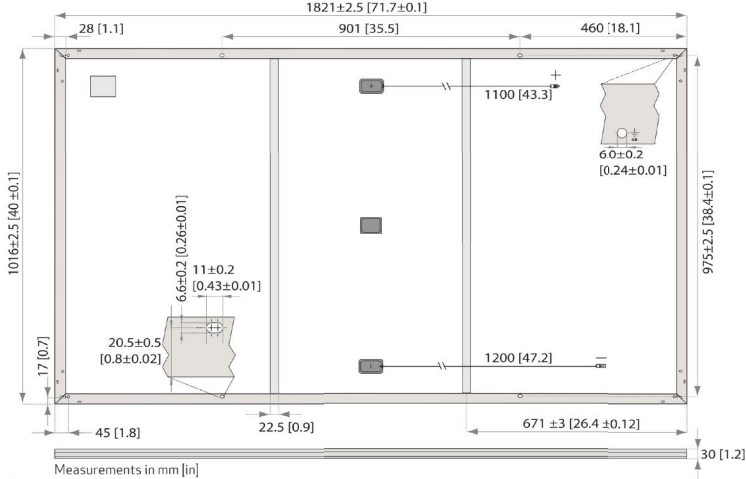
PERFORMANCE



SOLAR'S MOST TRUSTED

PRODUCT SPECIFICATIONS

REC ALPHA PURE BLACK SERIES > PRODUCT SPECIFICATIONS



Measurements in mm [in]

GENERAL DATA

Cell type:	132 half-cut REC heterojunction cells with lead-free, gapless technology 6 strings of 22 cells in series	Connectors:	Stäubli MC4 PV-KBT4/KST4; 12 AWG (4 mm ²) in accordance with IEC 62852 IP68 only when connected
Glass:	0.13 in (3.2 mm) solar glass with anti-reflection surface treatment	Cable:	12 AWG (4 mm ²) PV wire, 43+47 in (1.1+1.2 m) in accordance with EN 50618
Backsheet:	Highly resistant polymer (black)	Dimensions:	71.7 x 40 x 1.2 in (1821 x 1016 x 30 mm)
Frame:	Anodized aluminum (black)	Weight:	45 lbs (20.5 kg)
Junction box:	3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790	Origin:	Made in Singapore

ELECTRICAL DATA

	Product Code*: RECxxxAA Pure Black				
Power Output - P _{MAX} (Wp)	385	390	395	400	405
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V _{MPP} (V)	41.2	41.5	41.8	42.1	42.4
Nominal Power Current - I _{MPP} (A)	9.35	9.40	9.45	9.51	9.56
Open Circuit Voltage - V _{OC} (V)	48.5	48.6	48.7	48.8	48.9
Short Circuit Current - I _{SC} (A)	9.99	10.03	10.07	10.10	10.14
Power Density (W/sq ft)	19.3	19.6	19.8	20.1	20.3
Panel Efficiency (%)	20.8	21.1	21.3	21.6	21.9

STC





Power Output - P _{MAX} (Wp)	293	297	301	305	309
Nominal Power Voltage - V _{MPP} (V)	38.8	39.1	39.4	39.7	40.0
Nominal Power Current - I _{MPP} (A)	7.55	7.59	7.63	7.68	7.72
Open Circuit Voltage - V _{OC} (V)	45.7	45.8	45.9	46.0	46.1
Short Circuit Current - I _{SC} (A)	8.07	8.10	8.13	8.16	8.19

NMOT

Values at standard test conditions (STC: air mass AM1.5, irradiance 10.75 W/sq ft (1000 W/m²), temperature 77°F (25°C), based on a production spread with a tolerance of P_{MAX}, V_{OC} & I_{SC} ±3% within one watt class. Nominal module operating temperature (NMOT: air mass AM1.5, irradiance 800 W/m², temperature 68°F (20°C), windspeed 3.3 ft/s (1 m/s). *Where xxx indicates the nominal power class (P_{MAX}) at STC above.

CERTIFICATIONS

IEC 61215:2016, IEC 61730:2016, UL 61730 (Pending)
ISO 14001:2004, ISO 9001:2015, OHSAS 18001:2007, IEC 62941



WARRANTY

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

See warranty documents for details. Conditions apply

MAXIMUM RATINGS

Operational temperature:	-40 ... +185°F (-40 ... +85°C)
Maximum system voltage:	1000 V
Maximum test load (front):	+7000 Pa (146 lbs/sq ft)*
Maximum test load (rear):	-4000 Pa (83.5 lbs/sq ft)*
Max series fuse rating:	25 A
Max reverse current:	25 A

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

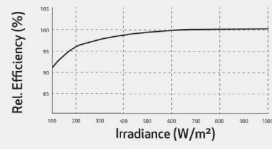
TEMPERATURE RATINGS*

Nominal Module Operating Temperature:	44°C (±2°C)
Temperature coefficient of P _{MAX} :	-0.26 %/°C
Temperature coefficient of V _{OC} :	-0.24 %/°C
Temperature coefficient of I _{SC} :	0.04 %/°C

*The temperature coefficients stated are linear values

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



Ref: PM-DS-12-01-Rev-A 03.21



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NEW PV SYSTEM: 17.200 kWp

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ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

DATE: 05.08.2022

DESIGN BY: T.R.

CHECKED BY: M.M.

REVISIONS

R-001.00

(SHEET 10)



DATA SHEET



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 super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



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



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



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



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

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IQ8MA-DS-0003-01-EN-US-2022-03-17

Easy to install

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

High productivity and reliability

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

Microgrid-forming

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

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

** IQ8M and IQ8A supports split phase, 240V installations only.

IQ8M and IQ8A Microinverters

INPUT DATA (DC)		IQ8M-72-2-US		IQ8A-72-2-US	
Commonly used module pairings ¹	W	260 – 460		295 – 500	
Module compatibility		60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell			
MPPT voltage range	V	33 – 45		36 – 45	
Operating range	V	25 – 58			
Min/max start voltage	V	30 / 58			
Max input DC voltage	V	60			
Max DC current ² [module Isc]	A	15			
Overvoltage class DC port		II			
DC port backfeed current	mA	0			
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
OUTPUT DATA (AC)		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 ³	V	240 / 211 – 264			
Max continuous output current	A	1.35		1.45	
Nominal frequency	Hz	60			
Extended frequency range	Hz	50 – 68			
AC short circuit fault current over 3 cycles	Arms	2			
Max units per 20 A (L-L) branch circuit ⁴		11			
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	%	97.6		97.6	
CEC weighted efficiency	%	97		97.5	
Night-time power consumption	mW	60			
MECHANICAL DATA					
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)			
Relative humidity range		4% to 100% (condensing)			
DC Connector type		MC4			
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")			
Weight		1.08 kg (2.38 lbs)			
Cooling		Natural convection – no fans			
Approved for wet locations		Yes			
Pollution degree		PD3			
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure			
Environ. category / UV exposure rating		NEMA Type 6 / outdoor			
COMPLIANCE					
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, 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 Shut Down 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) No enforced DC/AC ratio. See the compatibility calculator at <https://link.enphase.com/module-compatibility>
(2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8MA-DS-0003-01-EN-US-2022-03-17



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ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

DATE: 05.08.2022

DESIGN BY: T.R.

CHECKED BY: M.M.

REVISIONS

R-002.00

(SHEET 12)

Enphase IQ Combiner 4/4C

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



To learn more about Enphase offerings, visit enphase.com



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

Smart

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

Simple

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

Reliable

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

Enphase IQ Combiner 4/4C

MODEL NUMBER

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

ACCESSORIES AND REPLACEMENT PARTS

Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	(not included, order separately) - 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

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ELE. NO.:

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NEW PV SYSTEM: 17.200 kWp

BIRD RESIDENCE

129 NW MACKENZIE DR,
LEE'S SUMMIT, MO 64081
APN: 62-330-04-05-00-0-00-000

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

DATE: 05.08.2022

DESIGN BY: T.R.

CHECKED BY: M.M.

REVISIONS

R-003.00

(SHEET 13)



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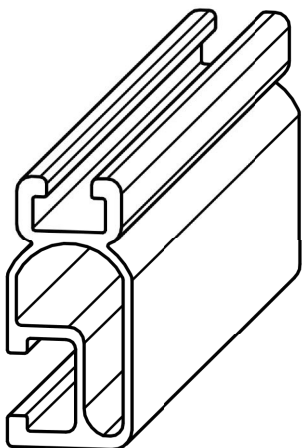
DESIGN BY: T.R.

CHECKED BY: M.M.

REVISIONS

R-004.00

(SHEET 13)



1/4" BOLT LOCATION

1 11/16"

3/8" BOLT LOCATION

PART # TABLE		
P/N	DESCRIPTION	LENGTH
315168M	SM LIGHT RAIL 168" MILL	168"
315168D	SM LIGHT RAIL 168" DRK	168"
315240M	SM LIGHT RAIL 240" MILL	240"
315240D	SM LIGHT RAIL 240" DRK	240"

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DETAIL
DESCRIPTION:	LIGHT RAIL
REVISION DATE:	9/11/2017

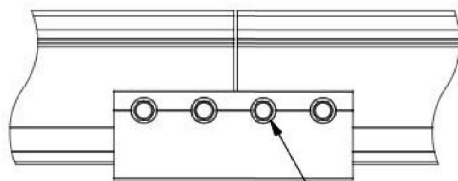
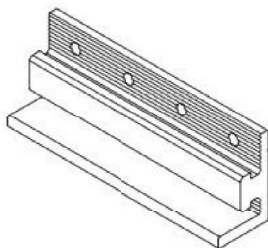
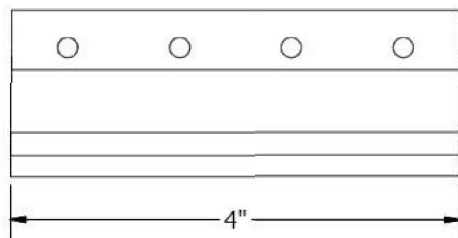
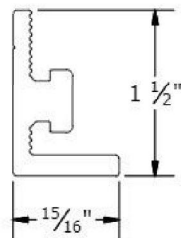
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE
NOMINAL

PRODUCT PROTECTED BY
ONE OR MORE US PATENTS
LEGAL NOTICE

SM-P02

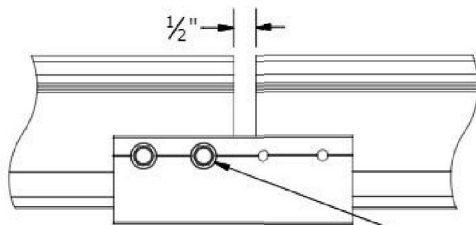
SHEET

BONDING SPLICE BAR



TYPICAL SPLICE BAR DETAIL

#12 X 3/4" SELF DRILLING SS SCREWS INCLUDED



TYPICAL EXPANSION JOINT DETAIL

NOTE THAT ONLY 2 SCREWS ARE
USED AT AN EXPANSION JOINT.
THE SPLICE BAR DOES NOT BOND
ACROSS AN EXPANSION JOINT.
SEE INSTALLATION GUIDE FOR
INSTRUCTION.

PART # TABLE	
P/N	DESCRIPTION
303018C	BND SPLICE BAR SERRATED CLR
303018D	BND SPLICE BAR SERRATED DRK

UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	BONDING SPLICE BAR
REVISION DATE:	9/27/2017

DRAWING NOT TO SCALE
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LEGAL NOTICE

SM-A05

SHEET

RT-MINI

Self-flashing base for asphalt & metal roof-top PV mounting systems

RT-MINI is suitable for mounting any rail system with a conventional L-Foot.

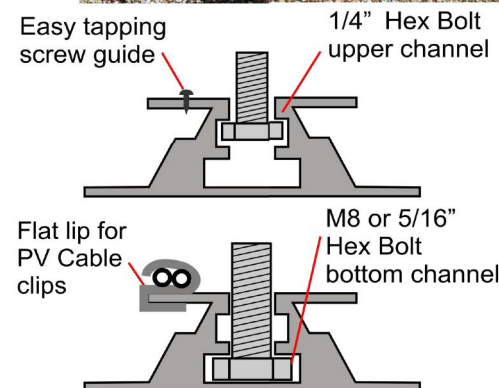


Dual bolt design: M8 or 5/16" for L-Foot & 1/4" for EMC



Call Now for more details
858-935-6064

Roof Tech
Smarter PV mounting solutions from top of roof to bottom line®
www.roof-tech.us info@roof-tech.us



Flexible Flashing certified by the International Code Council (ICC)

Engineered to ASTM D 1761 (Standard Test Methods for Mechanical Fasteners in Wood)

Components

RT2-00-MINIBK
PAT : PENDING



MINI base : 20 ea.
Screw : 40 ea.
Extra RT-Butyl : 10 ea.

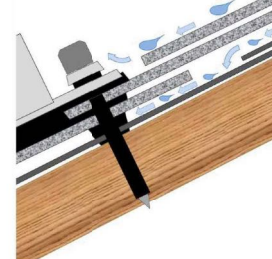
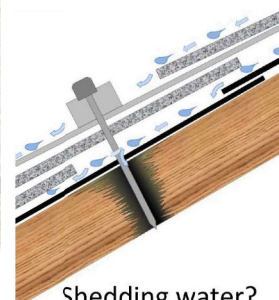
Optional item

5 x 60mm Mounting screw (RT2-04-SD5-60) : 100 ea./Bag
5/16" Hex bolt, washer & nut set (RT-04-BN30SL-US) : 100 ea./Bag
RT-Butyl (RT2-04-BUTYLT) : 10 ea./Box

RT-Butyl is Roof Tech's flexible flashing used in 700,000 residential PV systems for the last 24 years. It is the first PV mounting system with Flexible Flashing certified by the ICC.

Metal Flashing Retrofit

Flexible Flashing



Shedding water?

100% Waterproof

ICC ESR-3575

ASTM2140 testing UV testing (7500 hrs.)



P.E. Stamped Letters available at www.roof-tech.us/support

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www.roof-tech.us info@roof-tech.us
10620 Trenea Street, Suite 230, San Diego, CA 92131
858.935.6064



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REVISIONS

R-005.00

(SHEET 14)