

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 - SNAP-N-RACK FLASHED L-FOOT
- 1.3.3 PV RACKING SYSTEM INSTALLATION - SNAPRACK UR-40
- 1.3.4 PV MODULE AND INVERTER INSTALLATION - REC SOLAR REC365TP4 BLACK / ENPHASE IQ7PLUS-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: 30 x 365 = 10.950kW
 PTC: 30 x 340.8 = 10.224 kW
 (30) REC SOLAR REC365TP4 BLACK
 (30) ENPHASE IQ7PLUS-72-2-US

ATTACHMENT TYPE: SNAP-N-RACK FLASHED L-FOOT
 MSP UPGRADE: NO

NEW PV SYSTEM: 10.950 kWp

DUNCAN RESIDENCE

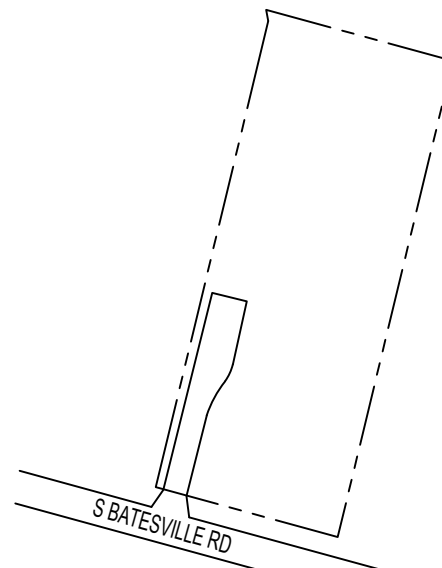
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 LILLINGTON, NC 27546
 ASSESSOR'S #: 130519 0119 25



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AERIAL PHOTO

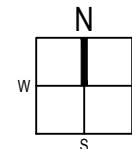
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02

PLAT MAP

NOT TO SCALE



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PROJECT INFORMATION

OWNER

NAME: JESSICA DUNCAN

PROJECT MANAGER

NAME: ANDREW O'DONNELL
 PHONE: 7045256767

CONTRACTOR

NAME: RENU ENERGY SOLUTIONS, LLC
 PHONE: 704-525-6767

AUTHORITIES HAVING JURISDICTION

BUILDING: HARNETT COUNTY
 ZONING: HARNETT COUNTY
 UTILITY: DUKE ENERGY

DESIGN SPECIFICATIONS

OCCUPANCY: II
 CONSTRUCTION: SINGLE-FAMILY
 ZONING: RESIDENTIAL
 GROUND SNOW LOAD: 15 PSF
 WIND EXPOSURE: C
 WIND SPEED: 117 MPH

APPLICABLE CODES & STANDARDS

BUILDING: IBC 2018, IRC 2018
 ELECTRICAL: NEC 2017
 FIRE: IFC 2018



CONTRACTOR

RENU ENERGY SOLUTIONS, LLC

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 ADDRESS: 801 PRESSLEY ROAD SUITE 100,
 CHARLOTTE, NC 28217

LIC. NO.: 76615
 HIC. NO.:
 ELE. NO.: 20334U

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NEW PV SYSTEM: 10.950 kWp

DUNCAN RESIDENCE

170 LETCHER LN
 LILLINGTON, NC 27546
 APN: 130519 0119 25

ENGINEER OF RECORD

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

COVER PAGE

DATE: 10.01.2022

DESIGN BY: A.O.

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 NO 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	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.			
	2.2.1	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	GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS			
	2.2.4	JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.		2.6.1	DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:			
	2.2.5	ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.		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).			
3	2.2.6	ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.		2.6.3	DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH			
	2.2.7	ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.		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).			
	2.3.1	STRUCTURAL NOTES:		2.6.5	ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.			
	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.		2.6.6	MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B).			
	2.3.3	JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.		2.6.7	IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.			
4	2.3.4	ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.		2.7.1	INTERCONNECTION NOTES:			
	2.3.5	ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.		2.7.2	LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 705.12 (B)]			
	2.3.6	WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.		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)].			
	2.4.1	WIRING & CONDUIT NOTES:		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)].			
	2.4.2	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.		2.7.5	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	2.4.3	CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.		2.7.6	FEEDER TAP INTERCONNECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (B)(2)(1)			
	2.4.4	VOLTAGE DROP LIMITED TO 1.5%.		2.7.7	SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42			
	2.4.5	DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.		2.7.8	BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].			
	2.4.6	AC CONDUCTORS COLORED OR MARKED AS FOLLOWS: PHASE A OR L1- BLACK PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE PHASE C OR L3- BLUE, YELLOW, ORANGE**, OR OTHER CONVENTION NEUTRAL- WHITE OR GRAY						
6		IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].						



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NEW PV SYSTEM: 10.950 kWp

**DUNCAN
RESIDENCE**

170 LETCHER LN
LILLINGTON, NC 27546
APN: 130519 0119 25

ENGINEER OF RECORD

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

NOTES

DATE: 10.01.2022

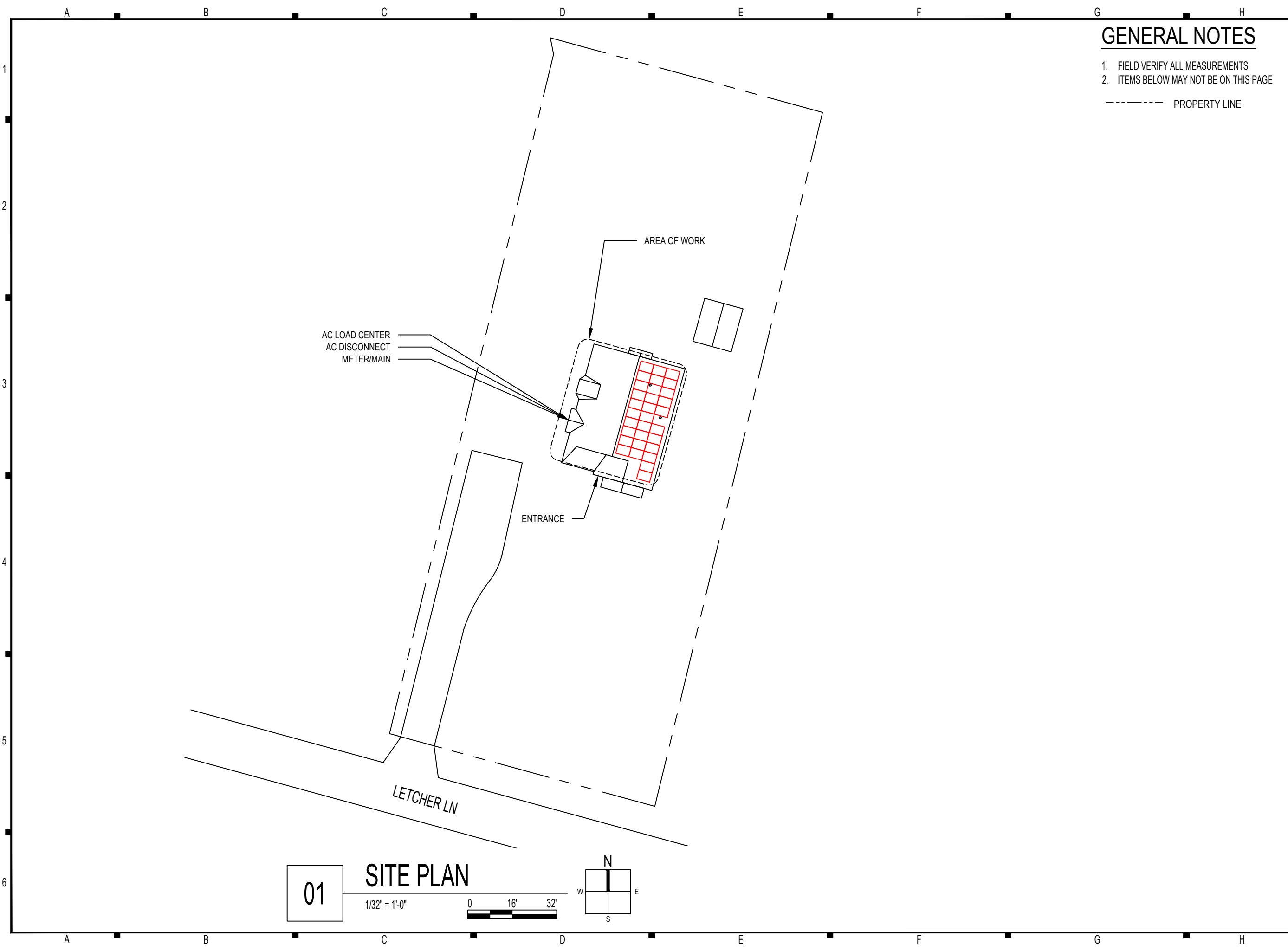
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(SHEET 2)



GENERAL NOTES

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

----- PROPERTY LINE



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ENGINEER OF RECORD

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SITE PLAN

DATE: 10.01.2022

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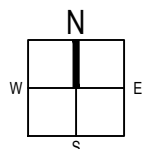
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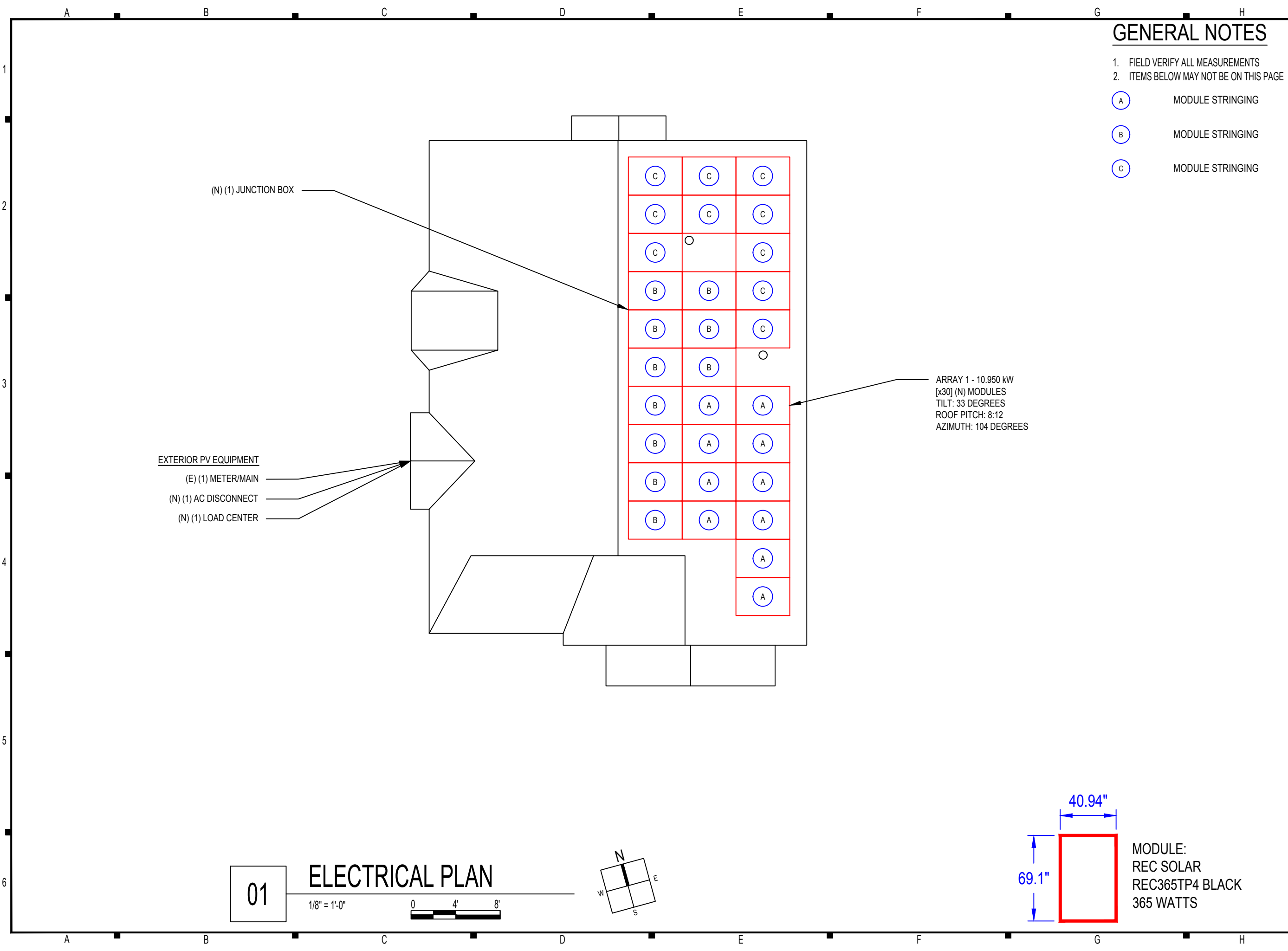
SITE PLAN

1/32" = 1'-0"



A-101.00

(SHEET 3)



GENERAL NOTES

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- (A) MODULE STRINGING
- (B) MODULE STRINGING
- (C) MODULE STRINGING

ARRAY 1 - 10.950 kW
 [x30] (N) MODULES
 TILT: 33 DEGREES
 ROOF PITCH: 8:12
 AZIMUTH: 104 DEGREES

EXTERIOR PV EQUIPMENT
 (E) (1) METER/MAIN
 (N) (1) AC DISCONNECT
 (N) (1) LOAD CENTER

(N) (1) JUNCTION BOX



CONTRACTOR

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ELECTRICAL PLAN

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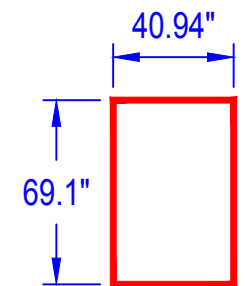
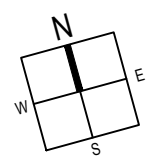
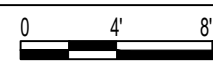
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 (SHEET 4)

01

ELECTRICAL PLAN

1/8" = 1'-0"



MODULE:
 REC SOLAR
 REC365TP4 BLACK
 365 WATTS

GENERAL NOTES

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— — — ROOF TRUSSES



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SOLAR ATTACHMENT PLAN

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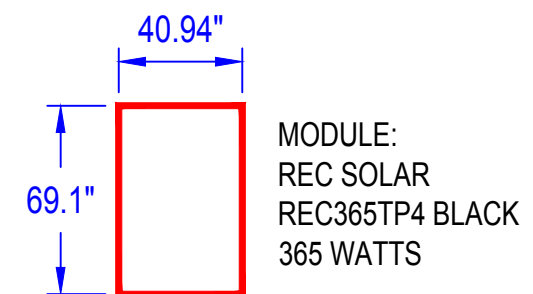
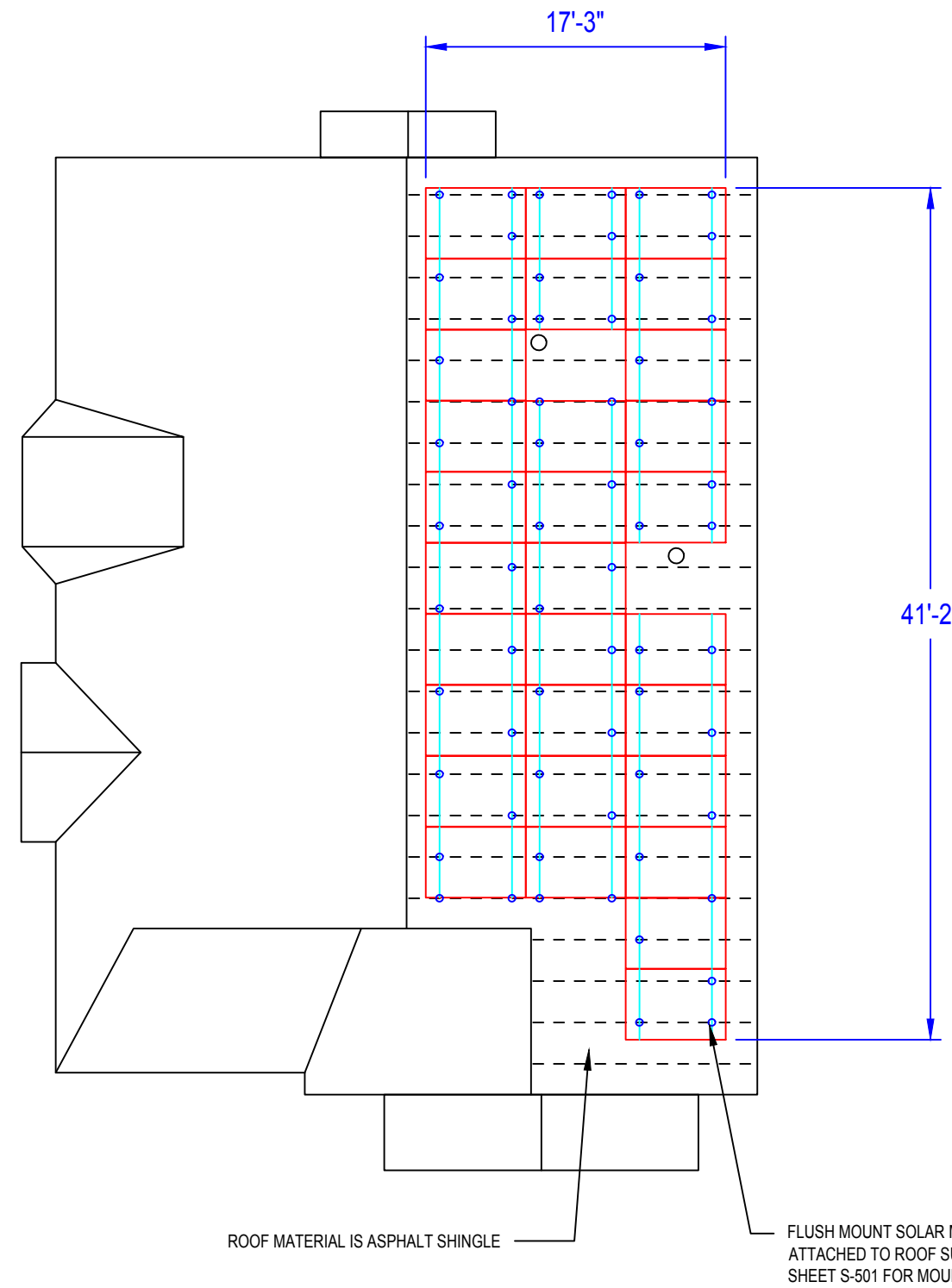
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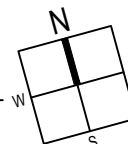


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SOLAR ATTACHMENT PLAN

1/8" = 1'-0"

0 4' 8'



A B C D E F G H
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CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	TYPICAL	CONDUCTOR	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERMINAL
1	3	12 AWG THWN-2, COPPER	FREE AIR	N/A	N/A	6 AWG BARE, COPPER	0.91 (37.1 °C)	1	12.1A	15.13A	30A	28.8A	75°C	25A
2	1	10 AWG THWN-2, COPPER	0.75" DIA	6	20A	10 AWG THWN-2, COPPER	0.91 (37.1 °C)	0.8	12.1A	15.13A	40A	29.12A	75°C	35A
3	1	8 AWG THWN-2, COPPER	0.75" DIA	2	50A	8 AWG THWN-2, COPPER	0.91 (37.1 °C)	1	36.3A	45.38A	55A	50.05A	75°C	50A
4	1	6 AWG THWN-2, COPPER	0.75" DIA	2	N/A	6 AWG THWN-2, COPPER	0.91 (37.1 °C)	1	36.3A	45.38A	75A	68.25A	75°C	65A

- (A) MODULE STRINGING
- (B) MODULE STRINGING
- (C) MODULE STRINGING

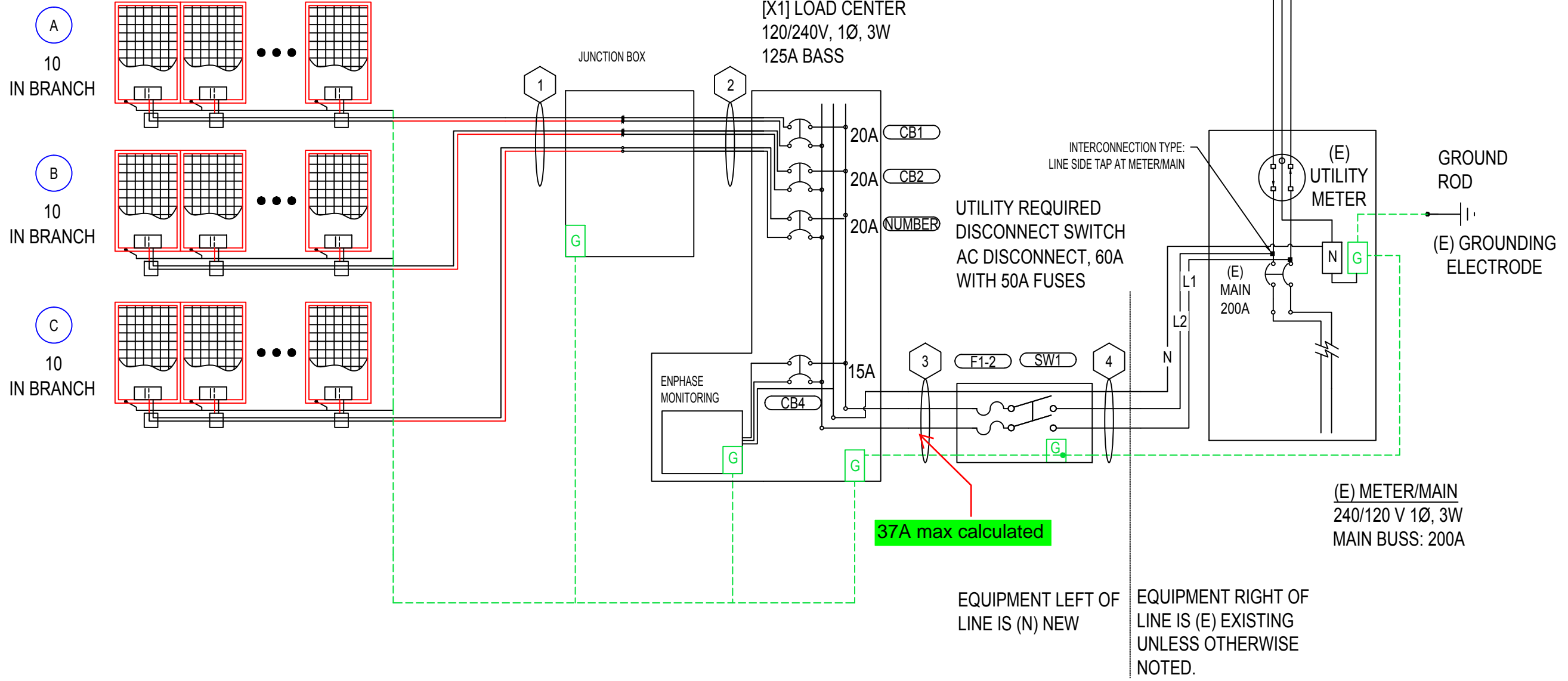
DC PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS TO BE INSTALL IN METAL RACEWAY OR METAL ENCLOSURES PER NEC 690.31 (G)

1. PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN DISCONNECT PER NEC 690.12
2. SYSTEM COMPLIANT WITH NEC 690.13

[x30] SOLAR MODULES
MAKE: REC SOLAR
MODEL: REC365TP4 BLACK
RATED POWER: 365W

[x30] MICROINVERTER
MAKE: ENPHASE
MODEL: IQ7PLUS-72-2-US

[X1] LOAD CENTER
120/240V, 1Ø, 3W
125A BASS



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

LINE DIAGRAM

DATE: 10.01.2022

DESIGN BY: A.O.

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(SHEET 6)



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DESIGN TABLES

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DESIGN BY: A.O.

CHECKED BY: M.M.

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(SHEET 7)

SYSTEM SUMMARY				MODULES										
	BRANCH #1	BRANCH #2	BRANCH #3	REF.	QTY.	MAKE AND MODEL	P _{MAX}	P _{TC}	I _{SC}	I _{MP}	V _{OC}	V _{MP}	TEMP. COEFF. OF V _{OC}	FUSE RATING
INVERTERS PER BRANCH	10	10	10	PM1-30	30	REC SOLAR REC365TP4 BLACK	365W	340.8W	11.32A	10.65A	40.8V	34.3V	-0.139V/°C (-0.34%/°C)	20A
MAX AC CURRENT	12.1A	12.1A	12.1A											
MAX AC OUTPUT POWER	2,950W	2,950W	2,950W											
ARRAY STC POWER	10,950W													
ARRAY PTC POWER	10,224W													
MAX AC CURRENT	36.3A													
MAX AC POWER	8,850W													
DERATED (CEC) AC POWER	8,850W													
INVERTERS											OCPDS			
REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	OCPD RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY	REF.	QTY.	RATED CURRENT	MAX VOLTAGE
I1-30	30	ENPHASE IQ7PLUS-72-2-US	240V	FLOATING	20A	290W	1.21A	15A	60V	97.0%	CB1-3	3	20A	240VAC
											CB4	1	15A	240VAC
											F1-2	2	50A	240VAC
DISCONNECTS					ASHRAE EXTREME LOW									
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE	-11.1°C (12.0°F), SOURCE: HARTNETT COUNTY (35.38°; -78.73°)									
SW1	1	EATON DG222NRB OR EQUIV.	60A	240VAC	ASHRAE 2% HIGH									
					37.1°C (98.8°F), SOURCE: HARTNETT COUNTY (35.38°; -78.73°)									
BILL OF MATERIALS														
CATEGORY	MAKE	MODEL NUMBER	REF	QTY	UNIT	QTY/UNIT	DESCRIPTION							
MODULE	REC SOLAR	REC365TP4 BLACK	PM1-30	30	PIECES	1	REC SOLAR REC365TP4 BLACK 365W 60 CELLS, MONOCRYSTALLINE SILICON							
INVERTER	ENPHASE	IQ7PLUS-72-2-US	I1-30	30	PIECES	1	ENPHASE IQ7PLUS-72-2-US 290W INVERTER							
DISCONNECT	EATON	DG222NRB	SW1	1	PIECE	1	EATON DG222NRB, FUSED, 2-POLE, 60A, 240VAC OR EQUIVALENT							
MISC ELECTRICAL EQUIPMENT		GEN-CABLE-CLIP	HDWR33-183	150	PIECES	1	GENERIC CABLE CLIP							
AC COMBINER PANEL		ENPHASE-IQ3C-ES-PANEL	EP1	1	PIECE	1	ENPHASE IQ COMBINER 3C-ES (X-IQ-AM1-240-3C-ES)							
MONITORING		ENPHASE-ENVOY	ENV1	1	PIECE	1	ENPHASE ENVOY							
WIRING	ENPHASE	Q-12-10-240	WR1	30	PIECES	1	ENPHASE ENGAGE (TM) TRUNK CABLE							
WIRING	ENPHASE	Q-TERM-10	EN31	1	BUNDLE	10	ENPHASE ENGAGE (TM) BRANCH TERMINATOR							
WIRING	ENPHASE	Q-SEAL-10	EN32	1	BUNDLE	10	ENPHASE ENGAGE (TM) WATERTIGHT SEALING CAP							
WIRING		GEN-10-AWG-THWN-2-CU-RD	WR2	135	FEET	1	10 AWG THWN-2, COPPER, RED (LINE 1)							
WIRING		GEN-10-AWG-THWN-2-CU-BLK	WR2	135	FEET	1	10 AWG THWN-2, COPPER, BLACK (LINE 2)							
WIRING		GEN-10-AWG-THWN-2-CU-GR	WR2	45	FEET	1	10 AWG THWN-2, COPPER, GREEN (GROUND)							
WIRING		GEN-8-AWG-THWN-2-CU-RD	WR3	10	FEET	1	8 AWG THWN-2, COPPER, RED (LINE 1)							
WIRING		GEN-8-AWG-THWN-2-CU-BLK	WR3	10	FEET	1	8 AWG THWN-2, COPPER, BLACK (LINE 2)							
WIRING		GEN-8-AWG-THWN-2-CU-WH	WR3	10	FEET	1	8 AWG THWN-2, COPPER, WHITE (NEUTRAL)							
WIRING		GEN-8-AWG-THWN-2-CU-GR	WR3	10	FEET	1	8 AWG THWN-2, COPPER, GREEN (GROUND)							
WIRING		GEN-6-AWG-THWN-2-CU-RD	WR4	10	FEET	1	6 AWG THWN-2, COPPER, RED (LINE 1)							
WIRING		GEN-6-AWG-THWN-2-CU-BLK	WR4	10	FEET	1	6 AWG THWN-2, COPPER, BLACK (LINE 2)							
WIRING		GEN-6-AWG-THWN-2-CU-WH	WR4	10	FEET	1	6 AWG THWN-2, COPPER, WHITE (NEUTRAL)							
WIRING		GEN-6-AWG-THWN-2-CU-GR	WR4	10	FEET	1	6 AWG THWN-2, COPPER, GREEN (GROUND)							
WIREWAY	ENPHASE	ET-SPLK-05	EN6	1	BUNDLE	5	ENPHASE ENGAGE (TM) ENGAGE COUPLER							
WIREWAY		GEN-0.75" DIA	WW2-4	65	FEET	1	CONDUIT, 0.75" DIA							
OCPD	GENERIC MANUFACTURER	GEN-CB-20A-240VAC	CB1-3	3	PIECES	1	CIRCUIT BREAKER, 20A, 240VAC							
OCPD	GENERIC MANUFACTURER	GEN-CB-15A-240VAC	CB4	1	PIECE	1	CIRCUIT BREAKER, 15A, 240VAC							
OCPD	GENERIC MANUFACTURER	GEN-FU-50A-240VAC	F1-2	2	PIECES	1	FUSE, 50A, 240VAC							
TRANSITION BOX	GENERIC MANUFACTURER	GEN-AWB-TB-4-4X	JB1	1	PIECE	1	TRANSITION/PASS-THROUGH BOX, WITH 4 TERMINAL BLOCKS							



CONTRACTOR

RENU ENERGY SOLUTIONS, LLC

PHONE: 704-525-6767

ADDRESS: 801 PRESSLEY ROAD SUITE 100,
CHARLOTTE, NC 28217

LIC. NO.: 76615

HIC. NO.:

ELE. NO.: 20334U

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DRAWING SET WITHOUT WRITTEN
PERMISSION FROM CONTRACTOR IS IN
VIOLATION OF U.S. COPYRIGHT LAWS
AND WILL BE SUBJECT TO CIVIL
DAMAGES AND PROSECUTIONS.

NEW PV SYSTEM: 10.950 kWp

**DUNCAN
RESIDENCE**

170 LETCHER LN
LILLINGTON, NC 27546
APN: 130519 0119 25

ENGINEER OF RECORD

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

PLACARDS

DATE: 10.01.2022

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

E-603.00

(SHEET 8)

LABELING NOTES

- 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]

WARNING

ELECTRICAL SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

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

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

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

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

DIRECTORY

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

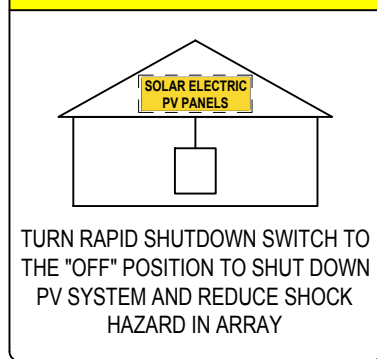
WHERE THE PV SYSTEMS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE PROVIDED AT EACH PV SYSTEM DISCONNECTING MEANS. PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS [NEC 690.4(D),(E)]

WARNING

POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

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

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN



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

WARNING: PHOTOVOLTAIC POWER SOURCE

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

PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OUTPUT CURRENT **36.3** A
NOMINAL OPERATING AC VOLTAGE **240** V

LABEL 3
AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS (4" X 2"). [NEC 690.54]

CAUTION

SOLAR ELECTRIC SYSTEM CONNECTED

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

PHOTOVOLTAIC SOLAR AC DISCONNECT

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

WARNING

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

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

WARNING

SOLAR ELECTRIC CIRCUIT BREAKER IS BACKFED

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

A B C D E F G H

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS



CONTRACTOR

RENU ENERGY SOLUTIONS, LLC

PHONE: 704-525-6767
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 CHARLOTTE, NC 28217

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 HIC. NO.:
 ELE. NO.: 20334U

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 DAMAGES AND PROSECUTIONS.

NEW PV SYSTEM: 10.950 kWp

DUNCAN RESIDENCE

170 LETCHER LN
 LILLINGTON, NC 27546
 APN: 130519 0119 25

ENGINEER OF RECORD

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

ASSEMBLY DETAILS

DATE: 10.01.2022

DESIGN BY: A.O.

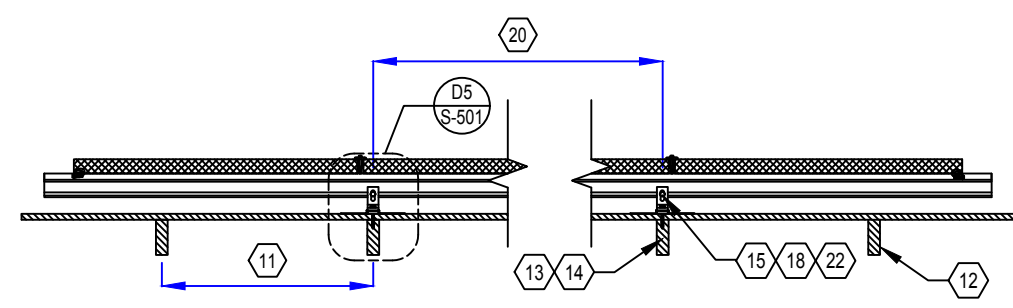
CHECKED BY: M.M.

REVISIONS

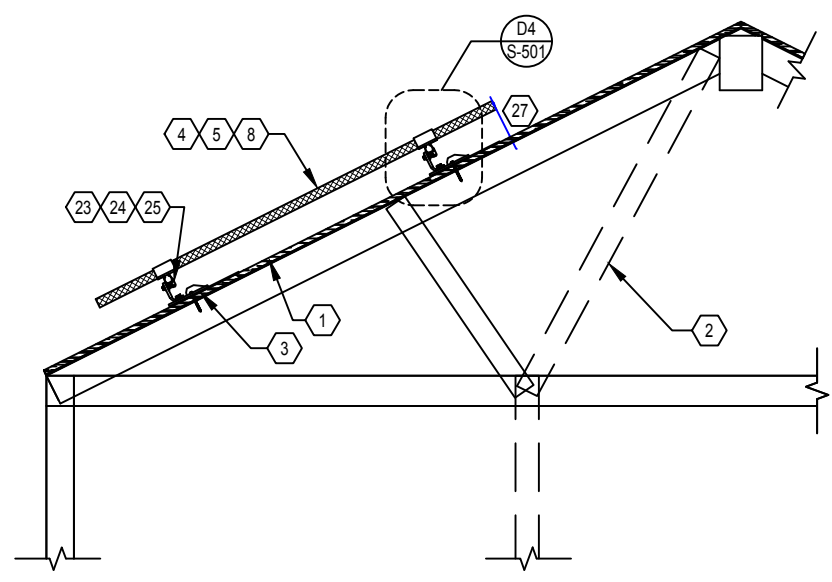
S-501.00
 (SHEET 9)

SHEET KEYNOTES

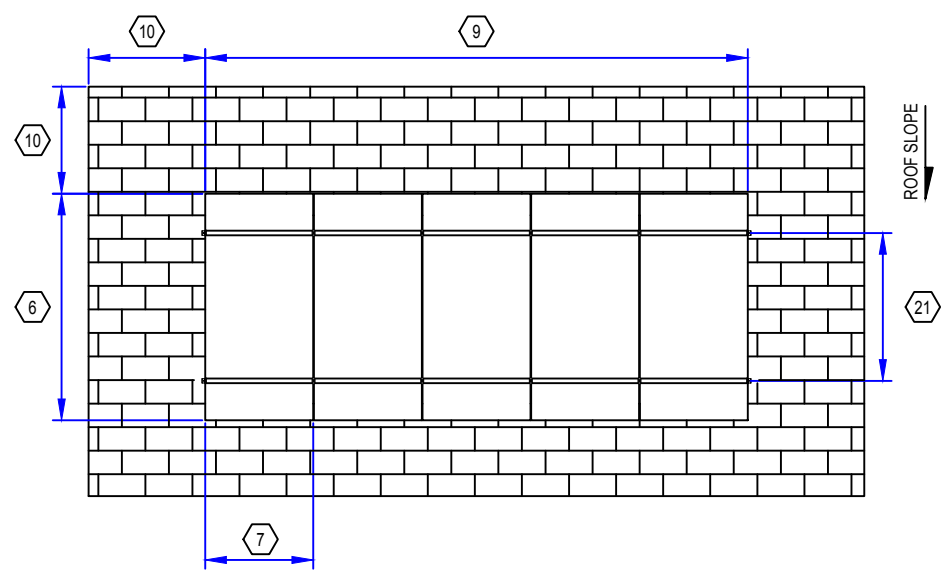
1. ROOF MATERIAL: ASPHALT SHINGLE
2. ROOF STRUCTURE: TRUSS
3. ATTACHMENT TYPE: SNAP N RACK FLASHED L-FOOT
4. MODULE MANUFACTURER: REC SOLAR
5. MODULE MODEL: REC365TP4 BLACK
6. MODULE LENGTH: 69.1 IN.
7. MODULE WIDTH: 40.94 IN.
8. MODULE WEIGHT: 44 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: NO FIRE CODE ENFORCED
11. TRUSS SPACING: 24 IN. O.C.
12. TRUSS SIZE: 2X4 IN (NOM)
13. LAG BOLT DIAMETER: 5/16 IN.
14. LAG BOLT EMBEDMENT: 2-3/4 IN.
15. TOTAL # OF ATTACHMENTS: 64
16. TOTAL AREA: 589.37 SQ. FT.
17. TOTAL WEIGHT: 1477.37 LBS.
18. WEIGHT PER ATTACHMENT: 23.08 LBS.
19. DISTRIBUTED LOAD: 2.51 PSF.
20. MAX. HORIZONTAL STANDOFF: 48 IN.
21. MAX. VERTICAL STANDOFF: IN ACCORDANCE WITH
MODULE MANUFACTURER'S
22. INSTRUCTIONS.STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER (OR EQUIV.): SNAP N RACK
24. RAIL MODEL (OR EQUIVALENT): UR-40
25. RAIL WEIGHT: 0.42 PLF.
26. MAX. TRUSS SPAN: 103 IN.
27. MODULE CLEARANCE: 3 IN. MIN., 6 IN. MAX.



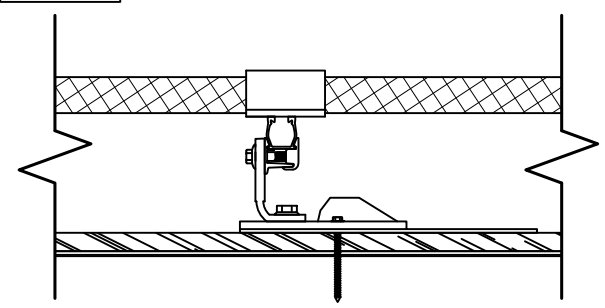
D2 RACKING DETAIL (LONGITUDINAL)
 NOT TO SCALE



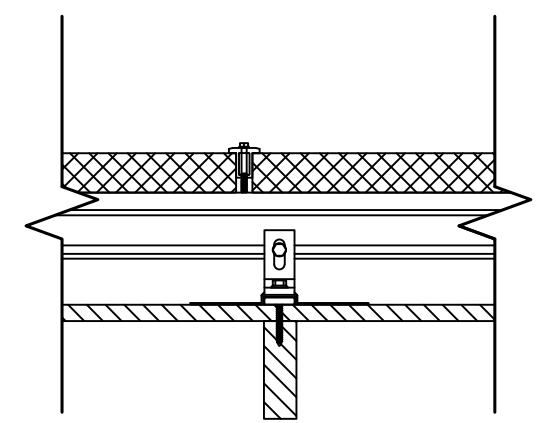
D1 RACKING DETAIL (TRANSVERSE)
 NOT TO SCALE



D3 RACKING DETAIL (TOP)
 NOT TO SCALE



D4 DETAIL (TRANSVERSE)
 NOT TO SCALE



D5 DETAIL (LONGITUDINAL)
 NOT TO SCALE

A B C D E F G H



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APN: 130519 0119 25

ENGINEER OF RECORD

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

RESOURCE DOCUMENT

DATE: 10.01.2022

DESIGN BY: A.O.

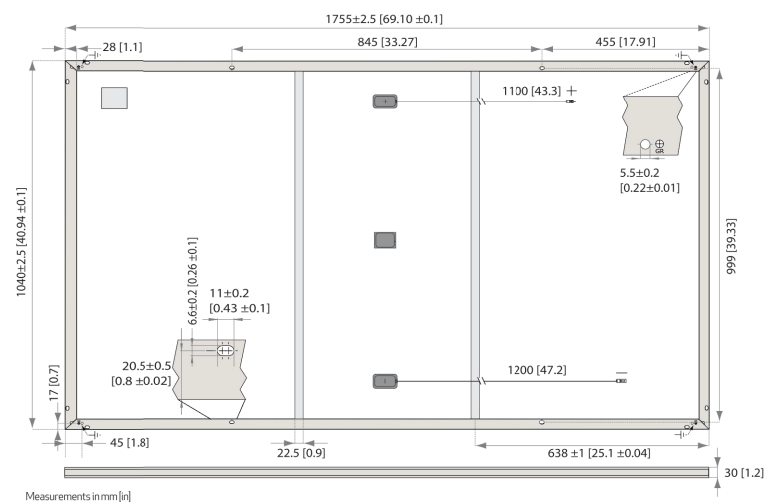
CHECKED BY: M.M.

REVISIONS

R-001.00

(SHEET 10)

REC TWINPEAK 4 BLACK SERIES



GENERAL DATA

Cell type: 120 half-cut mono c-Si p-type cells
6 strings of 20 cells in series
Glass: 0.13" (3.2 mm) solar glass with
anti-reflection surface treatment
Backsheet: Highly resistant polymeric
construction (black)
Frame: Anodized aluminum (black)
Junction box: 3-part, 3 bypass diodes, IP68 rated
in accordance with IEC 62790
Cable: 12 AWG (4 mm²) PV wire, 43 + 47" (1.1 m + 1.2 m)
in accordance with EN 50618
Connectors: Stäubli MC4 PV-KBT4/KST4, 12 AWG (4 mm²)
in accordance with IEC 62852
IP68 only when connected
Origin: Made in Singapore

MECHANICAL DATA

Dimensions: 69.1 x 40.94 x 1.2 in (1755 x 1040 x 30 mm)
Area: 19.70 sq ft (1.83 m²)
Weight: 44.0 lbs (20.0 kg)

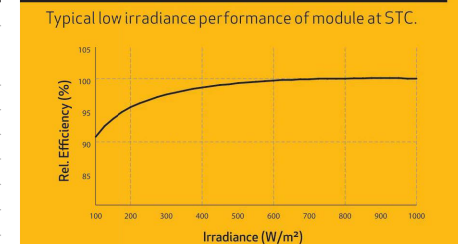
MAXIMUM RATINGS

Operational temperature: -40 ... +185°F (-40 ... +85°C)
Maximum system voltage: 1000 V
Maximum test load (front): +7000 Pa (146 psf)
Maximum test load (rear): -4000 Pa (83.5 psf)
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: 44.6°C (±2°C)
Temperature coefficient of P_{MAX}: -0.34%/°C
Temperature coefficient of V_{OC}: -0.26%/°C
Temperature coefficient of I_{SC}: 0.04%/°C
*The temperature coefficients stated are linear values

TEMPERATURE RATINGS



ELECTRICAL DATA @ STC Product code*: RECxxxTP4 Black

Power Output - P _{MAX} (Wp)	355	360	365	370
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V _{MPP} (V)	33.5	33.9	34.3	34.7
Nominal Power Current - I _{MPP} (A)	10.60	10.62	10.65	10.68
Open Circuit Voltage - V _{OC} (V)	40.5	40.6	40.8	41.0
Short Circuit Current - I _{SC} (A)	11.19	11.26	11.32	11.38
Panel Efficiency (%)	19.4	19.7	20.0	20.3

Values at standard test conditions (STC: air mass AM 1.5, irradiance 1000 W/m², temperature 25°C), based on a production spread with a tolerance of P_{MAX}, V_{OC} & I_{SC} ±3% within one watt class. *Where xxx indicates the nominal power class (P_{MAX}) at STC above.

ELECTRICAL DATA @ NMOT Product code*: RECxxxTP4 Black

Power Output - P _{MAX} (Wp)	269	272	276	280
Nominal Power Voltage - V _{MPP} (V)	31.4	31.7	32.1	32.5
Nominal Power Current - I _{MPP} (A)	8.56	8.58	8.60	8.63
Open Circuit Voltage - V _{OC} (V)	37.9	38.0	38.2	38.4
Short Circuit Current - I _{SC} (A)	9.04	9.10	9.15	9.19

Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m², temperature 20°C, windspeed 1 m/s). *Where xxx indicates the nominal power class (P_{MAX}) at STC indicated 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
System Size	Any	<25 kW 25-500 kW
Product Warranty (yrs)	20	25
Power Warranty (yrs)	25	25
Labor Warranty (yrs)	0	25
Power in Year 1	98%	98%
Annual Degradation	0.5%	0.5%
Power in Year 25	86%	86%

See warranty documents for details. Conditions apply.

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



SOLAR'S MOST TRUSTED REC

**REC TWINPEAK 4
BLACK SERIES**

**PREMIUM SOLAR PANELS
WITH SUPERIOR PERFORMANCE**

REC TwinPeak 4 Black Series solar panels feature an aesthetically-pleasing full-black design with high panel efficiency and power output, enabling customers to get the most out of the space used for the installation.

Combined with industry-leading product quality and the reliability of a strong and established European brand, REC TwinPeak 4 Black Series panels are ideal for residential and commercial rooftops worldwide.



**MORE POWER
OUTPUT PER FT²**



**FEATURING REC'S PIONEERING
TWIN DESIGN**



**100%
PID FREE**



**SUPER-STRONG
FRAME**



ELIGIBLE

Enphase IQ 7, IQ7+ and IQ 7X Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7, IQ 7+ and IQ 7X Micro integrate seamlessly with the Enphase IQ Envoy™, Enphase Q Aggregator™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

The IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.

Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell, 72-cell*, and 96-cell** modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell modules.

** The IQ 7X is required to support 96-cell modules.



To learn more about Enphase offerings, visit enphase.com



Enphase IQ 7, IQ 7+ and IQ 7X Microinverters

INPUT DATA (DC)	IQ7-60-2-US		IQ7PLUS-72-2-US		IQ7X-96-2-US	
Commonly used module pairings ¹	195 W - 330 W +		235 W - 400 W +		235 W - 400 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules		96-cell PV modules	
Maximum input DC voltage	48 V		60 V		80 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V		53 V - 64 V	
Operating range	16 V - 48 V		16 V - 60 V		25 V - 80 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V		30 V / 80 V	
Max DC short circuit current (module Isc)	15 A		15 A		10 A	
Overvoltage class DC port	II		II		II	
DC port backfeed current	0 A		0 A		0 A	
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)	IQ 7 Microinverter		IQ 7+ Microinverter		IQ 7X Microinverter	
Peak output power	250 VA		295 VA		320 VA	
Maximum continuous output power	240 VA		290 VA		315 VA	
Nominal (L-L) voltage/range ²	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A	1.15 A	1.21 A	1.39 A	1.31 A	1.51 A
Nominal frequency	60 Hz		60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit	16 (240 VAC) 13 (208 VAC)		13 (240 VAC) 11 (208 VAC)		12 (240 VAC) 10 (208 VAC)	
Overvoltage class AC port	III		III		III	
AC port backfeed current	0 A		0 A		0 A	
Power factor setting	1.0		1.0		1.0	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	@240 V	@208 V	@240 V	@208 V	@240 V	@208 V
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	96.5 %	97.0 %	96.5 %
MECHANICAL DATA	IQ 7 Microinverter		IQ 7+ Microinverter		IQ 7X Microinverter	
Ambient temperature range	-40°C to +65°C		-40°C to +65°C		-40°C to +60°C	
Relative humidity range	4% to 100% (condensing)					
Connector type	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)					
Dimensions (WxHxD)	212 mm x 175 mm x 30.2 mm (without bracket)					
Weight	.92 kg (2.03 lbs)					
Cooling	Natural convection - No fans					
Approved for wet locations	Yes					
Pollution degree	PD3					
Enclosure	Class II double-insulated					
Environmental category / UV exposure rating	NEMA Type 6 / outdoor					
FEATURES						
Communication	Power line					
Monitoring	Enlighten Manager and MyEnlighten monitoring options Compatible with Enphase IQ Envoy					
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.					
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEE1547, 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 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.					

1. No enforced DC/AC ratio. See the compatibility calculator at enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.

To learn more about Enphase offerings, visit enphase.com

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CONTRACTOR

RENU ENERGY SOLUTIONS, LLC

PHONE: 704-525-6767

ADDRESS: 801 PRESSLEY ROAD SUITE 100,
CHARLOTTE, NC 28217

LIC. NO.: 76615

HIC. NO.:

ELE. NO.: 20334U

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DAMAGES AND PROSECUTIONS.

NEW PV SYSTEM: 10.950 kWp

DUNCAN RESIDENCE

170 LETCHER LN
LILLINGTON, NC 27546
APN: 130519 0119 25

ENGINEER OF RECORD

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

RESOURCE DOCUMENT

DATE: 10.01.2022

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

R-002.00

(SHEET 11)

Enphase IQ Combiner 3-ES/3C-ES

X-IQ-AM1-240-3-ES
X-IQ-AM1-240-3C-ES

The **Enphase IQ Combiner 3-ES/3C-ES™** with Enphase IQ Envoy™ and integrated LTE-M1 cell modem (included only with IQ Combiner 3C-ES) consolidates interconnection equipment into a single enclosure and streamlines PV 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 Envoy for communication and control
- Includes LTE-M1 cell modem (included only with IQ Combiner 3C-ES)
- Includes solar shield to match Ensemble esthetics 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

- Reduced size from IQ Combiner+ (X-IQ-AM1-240-2)
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A 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 Combiner SKU's
- UL listed



To learn more about Enphase offerings, visit enphase.com



Enphase IQ Combiner 3-ES / 3C-ES

MODEL NUMBER	
IQ Combiner 3-ES (X-IQ-AM1-240-3-ES)	IQ Combiner 3-ES with Enphase IQ Envoy 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 Encharge storage system and Enpower smart switch and to deflect heat.
IQ Combiner 3C-ES (X-IQ-AM1-240-3C-ES)	IQ Combiner 3C-ES with Enphase IQ Envoy printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect LTE-M1 (CELLMODEM-M1), 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 Encharge storage system and Enpower smart switch and to deflect heat.
ACCESSORIES and REPLACEMENT PARTS (not included, order separately)	
Ensemble Communications Kit (COMMS-CELLMODEM-M1)	Includes COMMS-KIT-01 and CELLMODEM-M1 with 5-year data plan for Ensemble sites
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	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
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for Combiner 3-ES / 3C-ES
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3-ES / 3C-ES (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3-ES / 3C-ES
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 Envoy breaker included
Envoy breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Envoy
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	<ul style="list-style-type: none"> • 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 4G based LTE-M1 cellular modem (included only with IQ Combiner 3C-ES). 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, 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 Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit enphase.com

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NEW PV SYSTEM: 10.950 kWp

DUNCAN RESIDENCE

170 LETCHER LN
LILLINGTON, NC 27546
APN: 130519 0119 25

ENGINEER OF RECORD

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

RESOURCE DOCUMENT

DATE: 10.01.2022

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

R-003.00

(SHEET 12)



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 APN: 130519 0119 25

ENGINEER OF RECORD

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

RESOURCE DOCUMENT

DATE: 10.01.2022

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

R-004.00
 (SHEET 13)

27.01.2021

QIJW.E341165 - Photovoltaic Rapid Shutdown System Equipment | UL Product iQ

UL Product iQ™



QIJW.E341165 - Photovoltaic Rapid Shutdown System
 Equipment

Photovoltaic Rapid Shutdown System Equipment

See General Information for Photovoltaic Rapid Shutdown System Equipment

ENPHASE ENERGY INC
 1420 N McDowell Blvd
 Petaluma, CA 94954-6515 USA

E341165

Cat. No.	Function	Ratings
Photovoltaic rapid shutdown system equipment		
M190-60, -72	Inverter/AC Attenuator	Input: 16-48VDC Output: 120/208 or 120/240, 190W
M210-84	Inverter/AC Attenuator	Input: 16-48VDC Output: 120/208 or 120/240, 210 W
M215-60	Inverter/AC Attenuator	Input: 16-48VDC Output: 120/208 or 120/240, 215W
M250-60, -72	Inverter/AC Attenuator	Input: 16-48VDC Output: 120/208 or 120/240, 250W
IQ6PLUS-72-X-US*(a)(b) IQ6PLUS-72-ACM*(b)	Inverter/AC Attenuator	Input: 16-62VDC Output: 208 or 240, 280W
IQ6-60-X-US*(a)(b) IQ6-60-ACM-US*(b)	Inverter/AC Attenuator	Input: 16-62VDC Output: 208 or 240, 230W
IQ7-60 (c)	Inverter/AC Attenuator	Input: 27-37DC Output: 208 or 240, 240W
IQ7PLUS-72 (c)	Inverter/AC Attenuator	Input: 27-45VDC Output: 208 or 240, 290W
IQ7X-96 (c)	Inverter/AC Attenuator	Input: 53-64 VDC Output: 208 or 240, 315W
IQ7XS-96 (c)	Inverter/AC Attenuator	Input: 53-64VDC Output: 208 or 240, 315W
IQ7A, may be f/b S, may be f/b 66 or -72 (c)	Inverter/AC Attenuator	Input: 25-79.5VDC Output: 349W (240V) / 290W (208V)
IQ7A-72 (c)	Inverter/AC Attenuator	Input: 25-79.5VDC Output: 349W (240V) / 290W (208V)
IIQ7PD-72-2-US	Inverter/AC Attenuator	Input: 22-40VDC Output: 208 or 240, 190W
IQ7PD-84-2-US	Inverter/AC Attenuator	Input: 31-50VDC Output: 208 or 240, 210W

<https://iq.ulprospector.com/en/profile?e=122509>

27.01.2021

QIJW.E341165 - Photovoltaic Rapid Shutdown System Equipment | UL Product iQ

M175IQ7-208	Inverter/AC Attenuator	Input: 16-60VDC Output: 208, 175W
M175IQ7-240	Inverter/AC Attenuator	Input: 16-60VDC Output: 240, 175W
M190IQ7-208	Inverter/AC Attenuator	Input: 16-60VDC Output: 208, 190W
M190IQ7-240	Inverter/AC Attenuator	Input: 16-60VDC Output: 240, 190W
M200IQ7-208	Inverter/AC Attenuator	Input: 16-60VDC Output: 208, 200W
M200IQ7-240	Inverter/AC Attenuator	Input: 44-65VDC Output: 240, 200W
M210IQ7-208	Inverter/AC Attenuator	Input: 16-60VDC Output: 208, 210W
M210IQ7-240	Inverter/AC Attenuator	Input: 16-60VDC Output: 240, 210W
M215IQ7-208	Inverter/AC Attenuator	Input: 16-60VDC Output: 208, 215W
M215IQ7-240	Inverter/AC Attenuator	Input: 16-60VDC Output: 240, 215W
M250IQ7-208	Inverter/AC Attenuator	Input: 16-60VDC Output: 208, 240W
M250IQ7-240	Inverter/AC Attenuator	Input: 16-60VDC Output: 240, 240W
S230IQ7-208	Inverter/AC Attenuator	Input: 27-45VDC Output: 208, 220W
S230IQ7-240	Inverter/AC Attenuator	Input: 27-45VDC Output: 240, 220W
S280IQ7-208	Inverter/AC Attenuator	Input: 27-45VDC Output: 208, 270W
S280IQ7-240	Inverter/AC Attenuator	Input: 27-45VDC Output: 240, 270W
IQ6IQ7-US	Inverter/AC Attenuator	Input: 27-37VDC Output: 240-120 / 208, 230W
IQ6PLUSIQ7-US	Inverter/AC Attenuator	Input: 27-37VDC Output: 240-120 / 208, 280W

(a) - Where x may be 2, 5, or B.

(b) - Where * may be any combination of letters or numbers or hyphen or none

(c) - May be f/b -2, 5, -E, or -ACM, f/b US, may be f/b -NM, may be f/b -RMA&, where "&" may be optional alphanumeric characters.

Last Updated on 2020-09-10

1/3

<https://iq.ulprospector.com/en/profile?e=122509>

2/3



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APN: 130519 0119 25

ENGINEER OF RECORD

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

RESOURCE DOCUMENT

DATE: 10.01.2022

DESIGN BY: A.O.

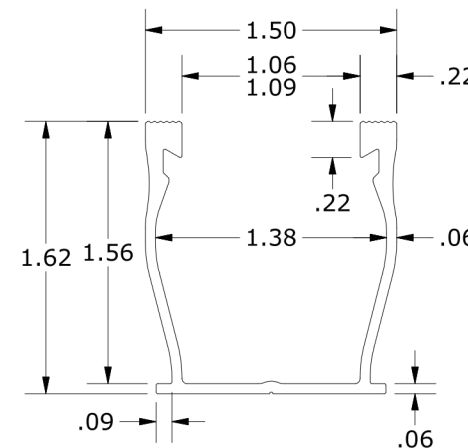
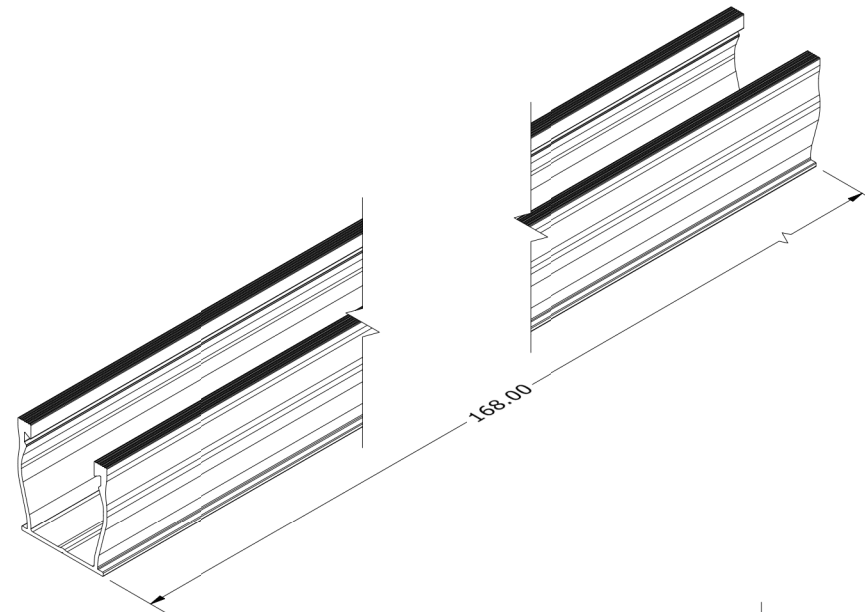
CHECKED BY: M.M.

REVISIONS

R-005.00

(SHEET 14)

DESCRIPTION: SNAPNRACK, UR-40 RAIL	DRAWN BY: mwatkins	<p>595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE (415) 580-6900 • FAX (415) 580-6902</p> <p><small>THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SUNRUN SOUTH LLC.</small></p>
PART NUMBER(S): 232-02449, 232-02450, 232-02451	REVISION: A	



UR-40 RAIL PROPERTIES	
SKU	FINISH
232-02449	MILL
232-02450	CLEAR
232-02451	BLACK

ALL DIMENSIONS IN INCHES

MATERIALS:	6000 SERIES ALUMINUM	OPTIONS:
DESIGN LOAD (LBS):	N/A	CLEAR / BLACK ANODIZED
ULTIMATE LOAD (LBS):	N/A	MILL FINISH
TORQUE SPECIFICATION:	N/A LB-FT	BUNDLES OF 144
CERTIFICATION:	UL 2703, FILE E359313	
WEIGHT (LBS):	5.85	

A B C D E F G H

1
2
3
4
5
6

A B C D E F G H



CONTRACTOR

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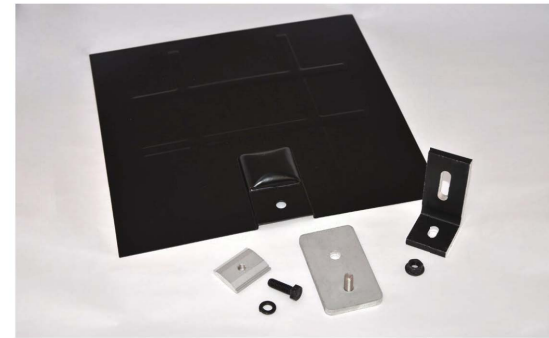
REVISIONS

R-006.00

(SHEET 15)

SERIES 100 UL FLASHED L FOOT KIT

SnapNrack Solar Mounting Solutions



Flashed L Foot Kit Parts



Flashed L Foot Kit Assembled

The SnapNrack line of solar mounting solutions is designed to reduce total installation costs. The system's technical innovations have been proven to drive down costs and improve installation quality on more than 350 MW of solar installations.

Flashed L Foot Simplified

SnapNrack Series 100 Flashed L Foot Kit is an innovative solution to provide a long lasting watertight seal over the life of the system. The Flashed L Foot provides a fully flashed roof fastener for attachment to composition roof with no required cutting of shingles. The L Foot is engineered for maximum adjustability for a clean level installation.

- 1" slotted bolt connection
- 1" spacers available for increased adjustability
- Clear or Black anodized aluminum components (both available with black flashing)
- No Cutting of shingles



Flashed L Foot in 4 Simple Steps:

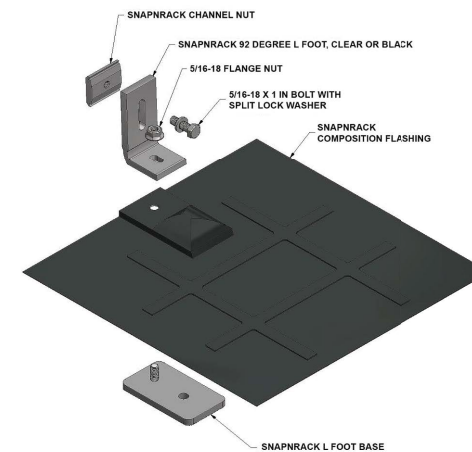
- 1) Locate a rafter in the roof using a pilot drill
- 2) Install base to the roof on top of the composition shingle
- 3) Use a breaker bar to separate the composition shingles above the base, and install the flashing
- 4) Attach the L foot on top and proceed with rail installation and leveling

Place order with your distributor. Purchase material for a single project or order in bulk for additional savings

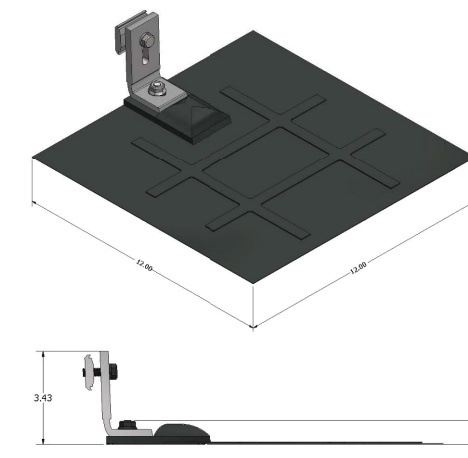


Patent Pending

Flashed L Foot Kit Assembly



Flashed L Foot Kit Dimensions



SnapNrack Flashed L Foot Technical Data <small>Patent Pending</small>	
Materials	<ul style="list-style-type: none"> • 6000 Series Aluminum L Foot & Base • Stainless Steel Hardware • Galvanized Steel Flashing w/ black all weather coating
Material Finish	• Clear and black anodized aluminum
Weight	• 1.3 lbs
Design Uplift Load	• 350 lbs Uplift
Design Ultimate Load	• 1,000 lbs Uplift
Warranty	• 10 Year material and workmanship

SnapNrack™
Solar Mounting Solutions
(877) 732-2860 www.SnapNrack.com

Printed on recycled paper using soy based inks.

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