# 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 - SNAPNRACK 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 |

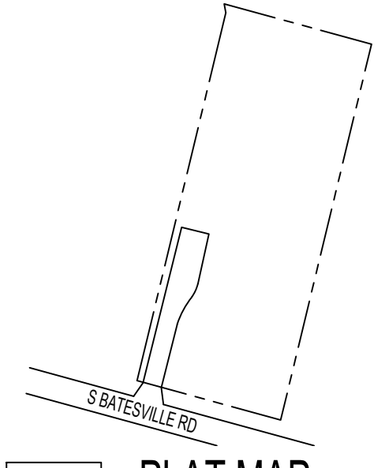
# NEW PV SYSTEM: 10.950 kWp

# DUNCAN RESIDENCE

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

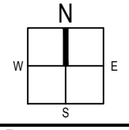
01 AERIAL PHOTO

NOT TO SCALE




02 PLAT MAP

NOT TO SCALE




## SHEET LIST TABLE


| SHEET NUMBER | SHEET TITLE |
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| A-102 | ELECTRICAL PLAN |
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| E-601 | LINE DIAGRAM |
| E-602 | DESIGN TABLES |
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| R-002 | RESOURCE DOCUMENT |
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| R-005 | RESOURCE DOCUMENT |
| R-006 | RESOURCE DOCUMENT |


## 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

**PHONE:** 704-525-6767
**ADDRESS:** 801 PRESSLEY ROAD SUITE 100, CHARLOTTE, NC 28217

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




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)

2.1.1 **SITE NOTES:**

2.1.2 A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.

2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.

2.1.4 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.

2.1.5 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.

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.

2.2.1 **EQUIPMENT LOCATIONS:**

2.2.2 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.

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).

2.2.4 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.

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.

2.2.7 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

2.3.1 **STRUCTURAL NOTES:**

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.

2.3.3 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.

2.3.4 ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.

2.3.5 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.

2.3.6 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

2.4.1 **WIRING & CONDUIT NOTES:**

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.

2.4.3 CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.

2.4.4 VOLTAGE DROP LIMITED TO 1.5%.

2.4.5 DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.

2.4.6 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

IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

4.5.1 **GROUNDING NOTES:**

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.

2.5.3 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.

2.5.4 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).

2.5.5 EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MICROINVERTER MANUFACTURERS' INSTRUCTIONS.

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.

2.5.7 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.

2.5.8 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]

2.5.9 GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS

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).

2.6.3 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH

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).

2.6.5 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.

2.6.6 MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B).

2.6.7 IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.

2.7.1 **INTERCONNECTION NOTES:**

2.7.2 LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 705.12 (B)]

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)].

2.7.4 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)].

2.7.5 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).

2.7.6 FEEDER TAP INTERCONNECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (B)(2)(1)

2.7.7 SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42

2.7.8 BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].

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**ELE. NO.:** 20334U



NEW PV SYSTEM: 10.950 kWp

# DUNCAN RESIDENCE

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

**ENGINEER OF RECORD**

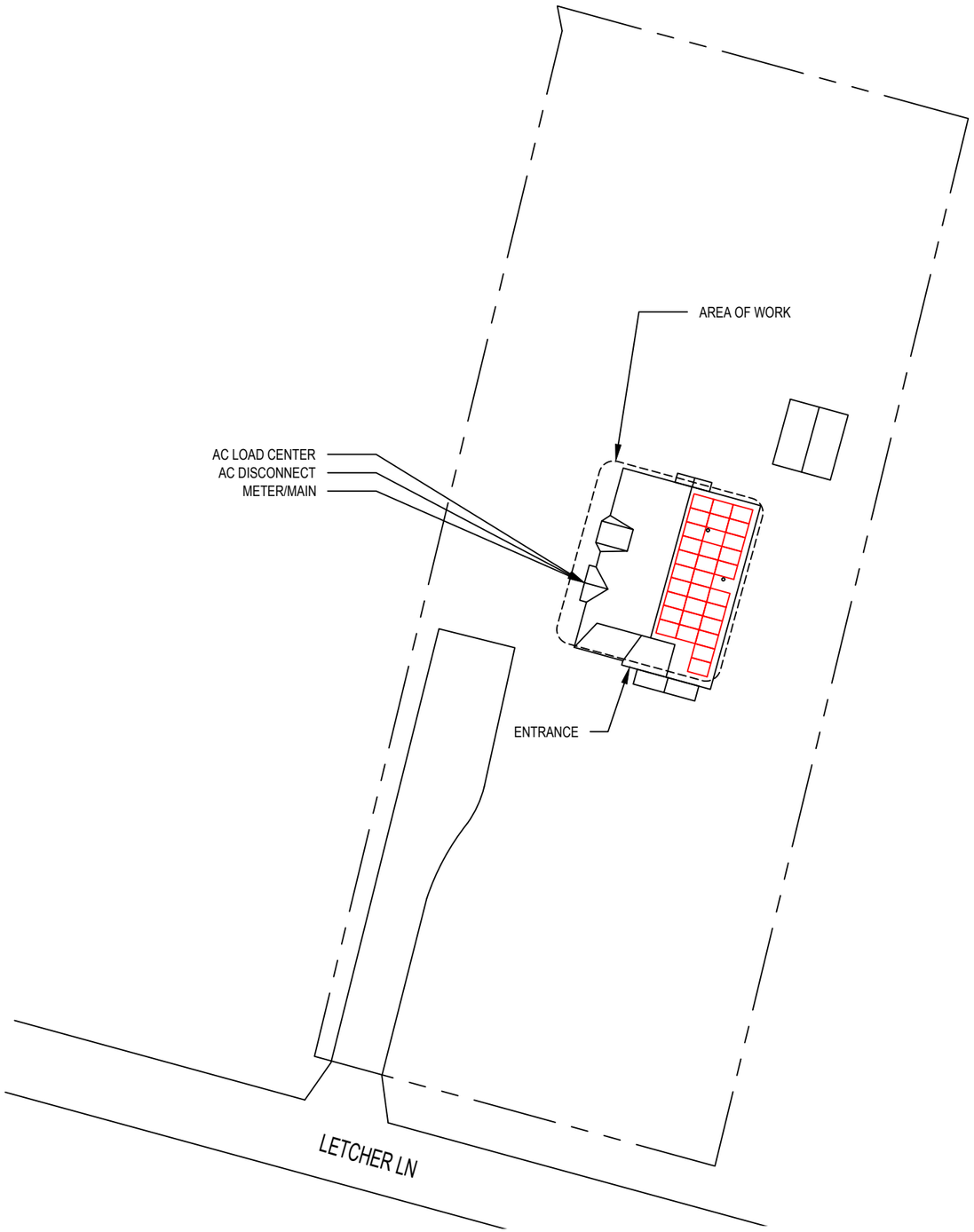
PAPER SIZE: 11" x 17" (ANSI B)

NOTES

**DATE:** 10.01.2022
**DESIGN BY:** A.O.
**CHECKED BY:** M.M.

REVISIONS

G-001.00
(SHEET 2)




01 SITE PLAN

1/32" = 1'-0"

0 16' 32'

N W E S

## GENERAL NOTES

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

PROPERTY LINE

**CONTRACTOR**

RENU ENERGY SOLUTIONS, LLC

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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**

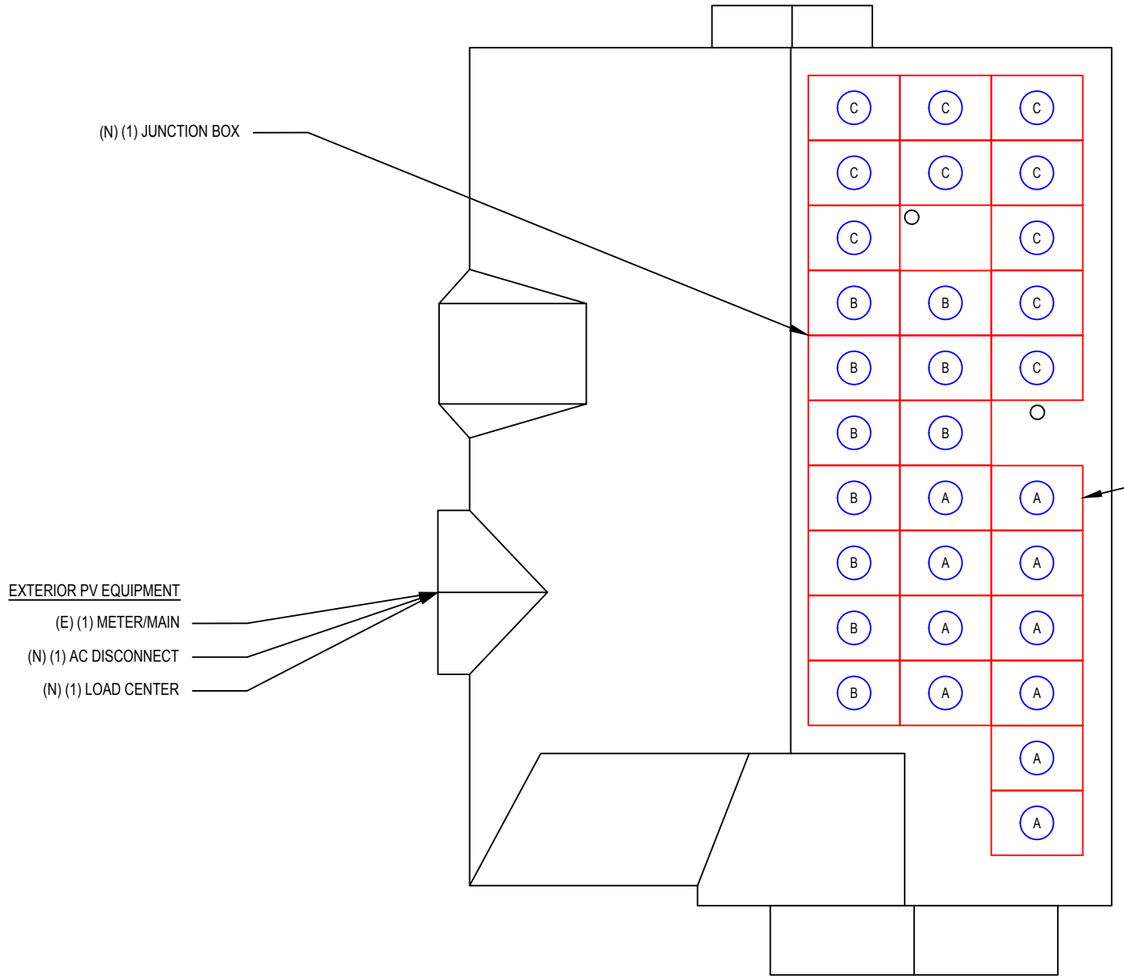
PAPER SIZE: 11" x 17" (ANSI B)

SITE PLAN

**DATE:** 10.01.2022
**DESIGN BY:** A.O.
**CHECKED BY:** M.M.

REVISIONS

A-101.00
(SHEET 3)




# GENERAL NOTES

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

(A) MODULE STRINGING

(B) MODULE STRINGING

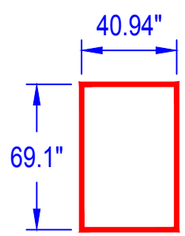
(C) MODULE STRINGING

01 ELECTRICAL PLAN

1/8" = 1'-0"

0 4' 8'

N E S W




MODULE:
REC SOLAR
REC365TP4 BLACK
365 WATTS

**CONTRACTOR**

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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)

ELECTRICAL PLAN

**DATE:** 10.01.2022
**DESIGN BY:** A.O.
**CHECKED BY:** M.M.

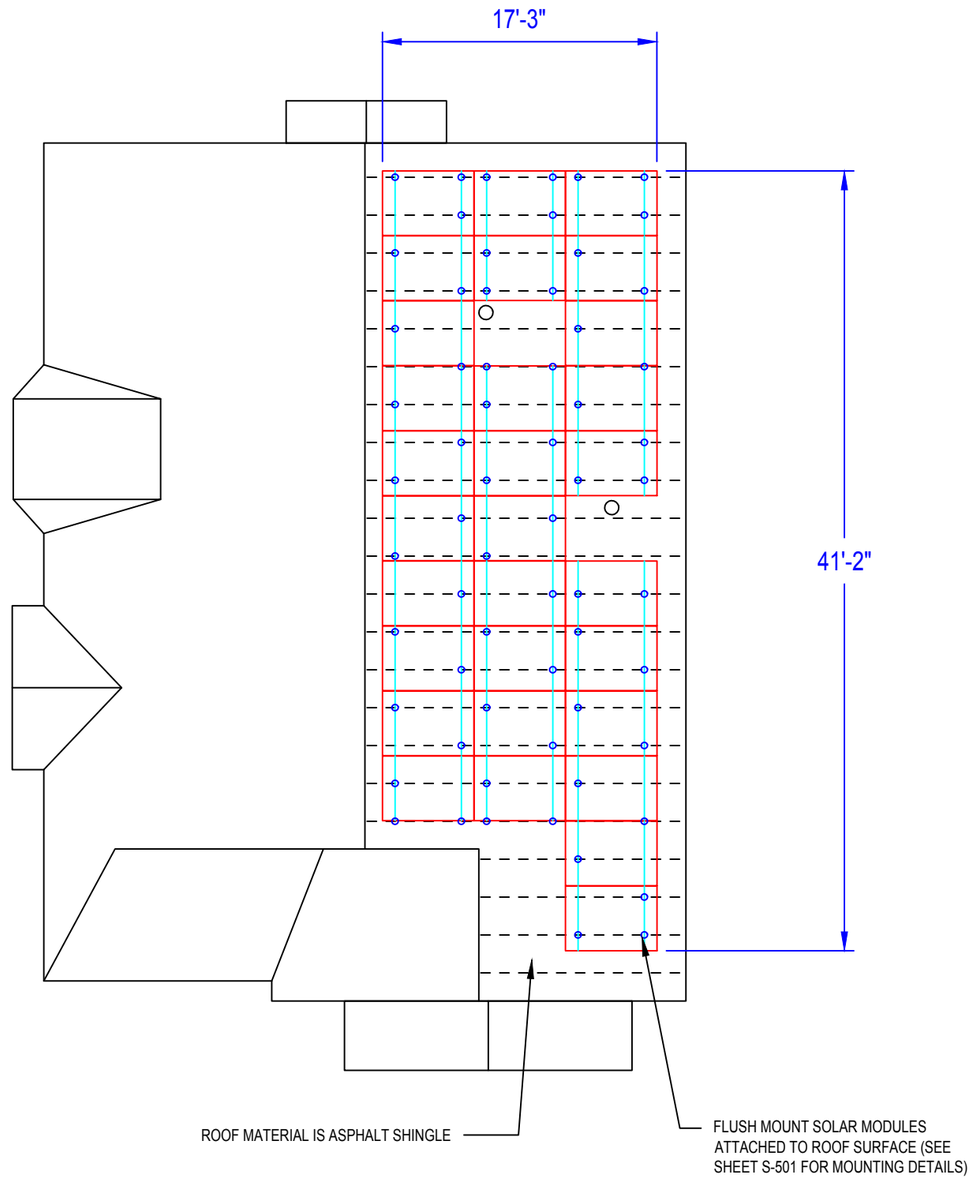
REVISIONS

A-102.00
(SHEET 4)

# GENERAL NOTES

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

— — — ROOF TRUSSES

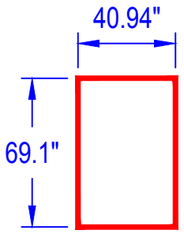



01 SOLAR ATTACHMENT PLAN

1/8" = 1'-0"

0 4' 8'

N E S W




MODULE:
REC SOLAR
REC365TP4 BLACK
365 WATTS

## CONTRACTOR

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

## ENGINEER OF RECORD

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

SOLAR ATTACHMENT PLAN

**DATE:** 10.01.2022
**DESIGN BY:** A.O.
**CHECKED BY:** M.M.

REVISIONS

A-103.00
(SHEET 5)

## 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 |

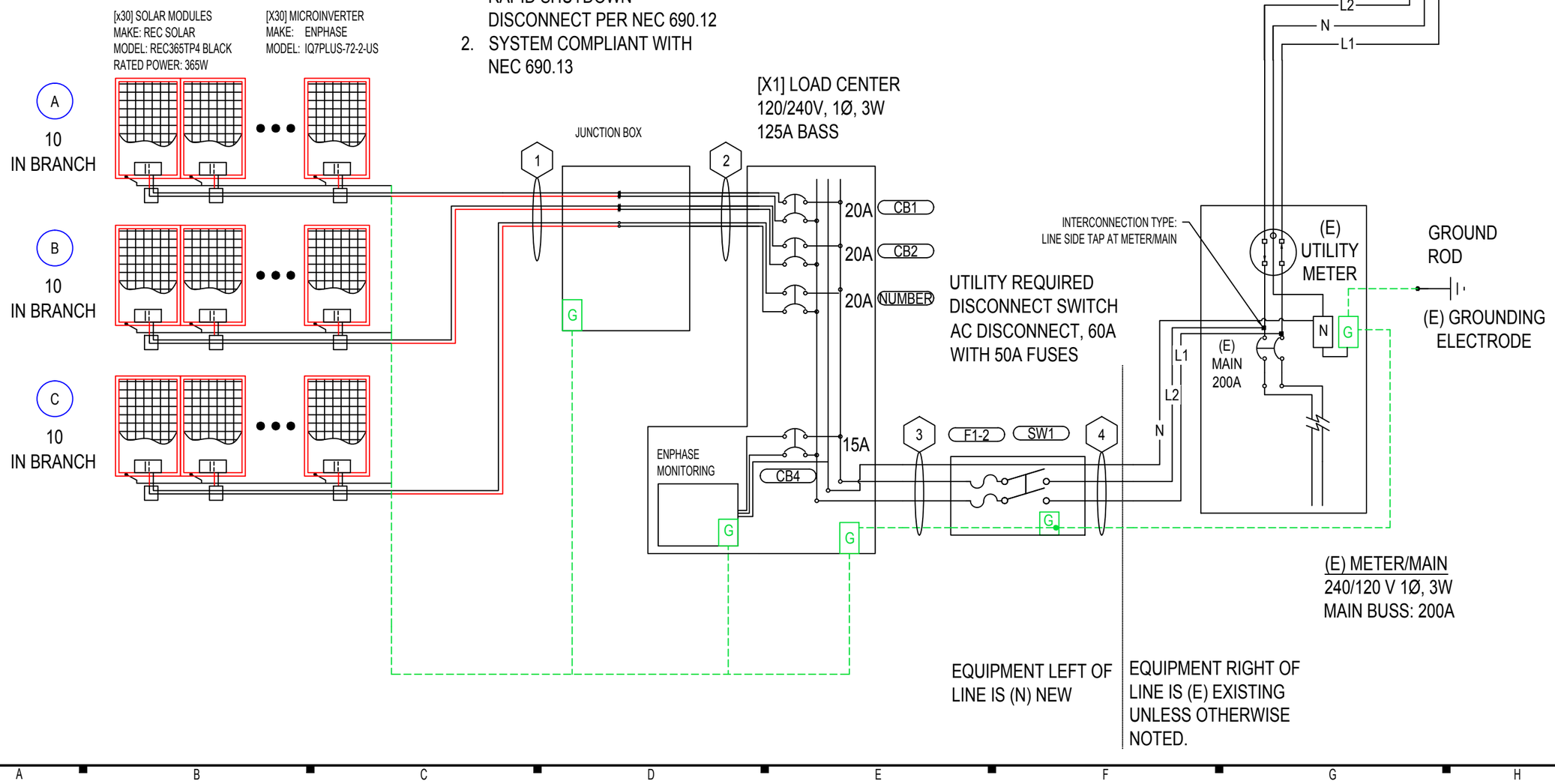
A MODULE STRINGING

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





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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)

LINE DIAGRAM

**DATE:** 10.01.2022
**DESIGN BY:** A.O.
**CHECKED BY:** M.M.

REVISIONS

E-601.00

(SHEET 6)

| SYSTEM SUMMARY | | | |
|---|---|---|---|
| | BRANCH #1 | BRANCH #2 | BRANCH #3 |
| INVERTERS PER BRANCH | 10 | 10 | 10 |
| 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 | | |

| MODULES | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| REF. | QTY. | MAKE AND MODEL | PMAX | PTC | ISC | IMP | VOC | VMP | TEMP. COEFF. OF VOC | FUSE RATING |
| 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 |

| 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 |
| I1-30 | 30 | ENPHASE IQ7PLUS-72-2-US | 240V | FLOATING | 20A | 290W | 1.21A | 15A | 60V | 97.0% |

| DISCONNECTS | | | | |
|---|---|---|---|---|
| REF. | QTY. | MAKE AND MODEL | RATED CURRENT | MAX RATED VOLTAGE |
| SW1 | 1 | EATON DG222NRB OR EQUIV. | 60A | 240VAC |

| OCPDS | | | |
|---|---|---|---|
| REF. | QTY. | RATED CURRENT | MAX VOLTAGE |
| CB1-3 | 3 | 20A | 240VAC |
| CB4 | 1 | 15A | 240VAC |
| F1-2 | 2 | 50A | 240VAC |

| | |
|---|---|
| ASHRAE EXTREME LOW | -11.1°C (12.0°F), SOURCE: HARTNETT COUNTY (35.38°; -78.73°) |
| 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

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




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)

DESIGN TABLES

**DATE:** 10.01.2022
**DESIGN BY:** A.O.
**CHECKED BY:** M.M.

REVISIONS

E-602.00
(SHEET 7)

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].

**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)].

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]

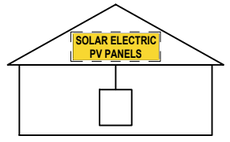
PHOTOVOLTAIC SOLAR AC DISCONNECT

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

**RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM**

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

**SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN**




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

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

**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)]

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: 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]

**CAUTION**
**SOLAR ELECTRIC SYSTEM CONNECTED**

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


**CONTRACTOR**

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




NEW PV SYSTEM: 10.950 kWp

# DUNCAN RESIDENCE

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

**ENGINEER OF RECORD**

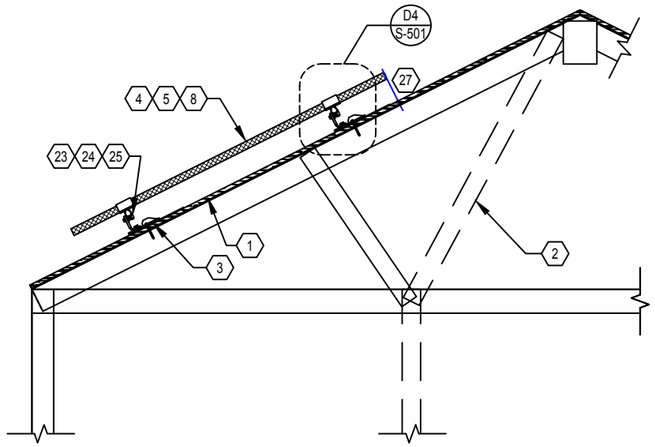
PAPER SIZE: 11" x 17" (ANSI B)

PLACARDS

**DATE:** 10.01.2022
**DESIGN BY:** A.O.
**CHECKED BY:** M.M.

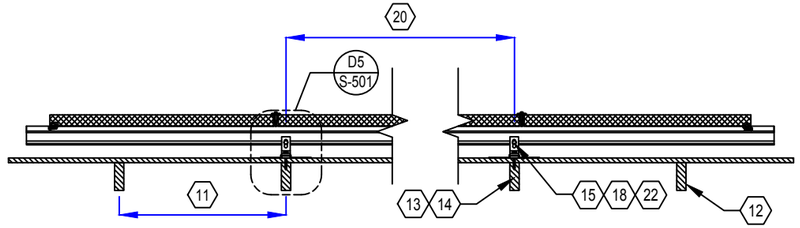
REVISIONS

E-603.00
(SHEET 8)



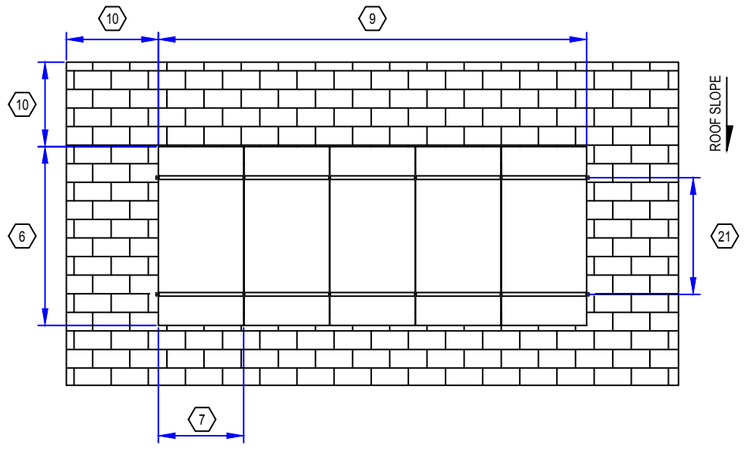

## D1 RACKING DETAIL (TRANSVERSE)

NOT TO SCALE



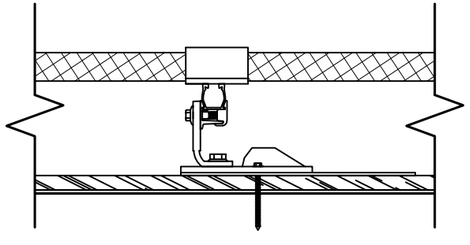

## D2 RACKING DETAIL (LONGITUDINAL)

NOT TO SCALE



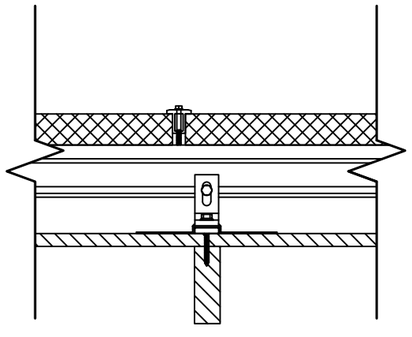

## D3 RACKING DETAIL (TOP)

NOT TO SCALE



## D4 DETAIL (TRANSVERSE)

NOT TO SCALE



## D5 DETAIL (LONGITUDINAL)

NOT TO SCALE

## GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS

## 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.


**CONTRACTOR**

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**ELE. NO.:** 20334U




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)

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

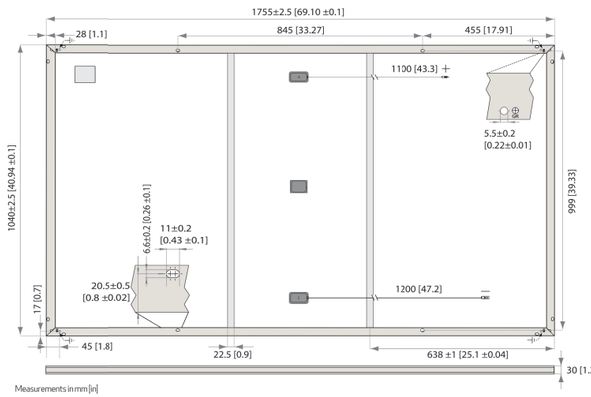
FEATURING REC'S PIONEERING TWIN DESIGN

100% PID FREE

SUPER-STRONG FRAME

ELIGIBLE

# REC TWINPEAK 4 BLACK SERIES




Measurements in mm [in]

| 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 | Yes |
| System Size | Any | ≤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 | 0.5% | 0.5% | 0.5% |
| Power in Year 25 | 86% | 86% | 86% |

See warranty documents for details. Conditions apply.

### 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)

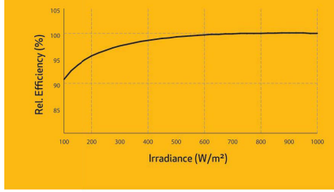
### TEMPERATURE RATINGS *

| | |
|---|---|
| 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

Typical low irradiance performance of module at STC.




Specifications subject to change without notice

Ref: PM-DS-07-29 Rev: A (05.21)

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.

REC
www.recgroup.com

## CONTRACTOR

RENU ENERGY SOLUTIONS, LLC

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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-001.00
(SHEET 10)

Data Sheet
Enphase Microinverters

PRELIMINARY / US

# 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.


CERTIFIED
SAFETY US-CA
E341165

To learn more about Enphase offerings, visit **enphase.com**

### 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.

ENPHASE

## 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 curent over 3 cycles | 5.8 Arms | | 5.8 Arms | | 5.8 Arms | |
| Maximum units per 20 A (L-L) branch circuit | 16 (240 VAC)<br>13 (208 VAC) | | 13 (240 VAC)<br>11 (208 VAC) | | 12 (240 VAC)<br>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** | **@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 | -40ºC to +65ºC | -40ºC to +65ºC | -40ºC to +60ºC |
| 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<br>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)<br>UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01<br>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**

ENPHASE


2017-11-15 PRELIM

**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



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)

Data Sheet
Enphase Networking

# 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.


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

X-IQ-AM1-240-3-ES

### 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

UL LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

## 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<br>BRK-10A-2-240<br>BRK-15A-2-240<br>BRK-20A-2P-240 | Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers.<br>Circuit breaker, 2 pole, 10A, Eaton BR210<br>Circuit breaker, 2 pole, 15A, Eaton BR215<br>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 | • 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors<br>• 60 A breaker branch input: 4 to 1/0 AWG copper conductors<br>• Main lug combined output: 10 to 2/0 AWG copper conductors<br>• Neutral and ground: 14 to 1/0 copper conductors<br>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).<br>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<br>Production metering: ANSI C12.20 accuracy class 0.5 (PV production)<br>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**



ENPHASE

**CONTRACTOR**

RENU ENERGY SOLUTIONS, LLC

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



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)

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** E341165
1420 N McDowell Blvd
Petaluma, CA 94954-6515 USA

| 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 |





| | | |
|---|---|---|
| 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



**CONTRACTOR**

RENU ENERGY SOLUTIONS, LLC

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



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)

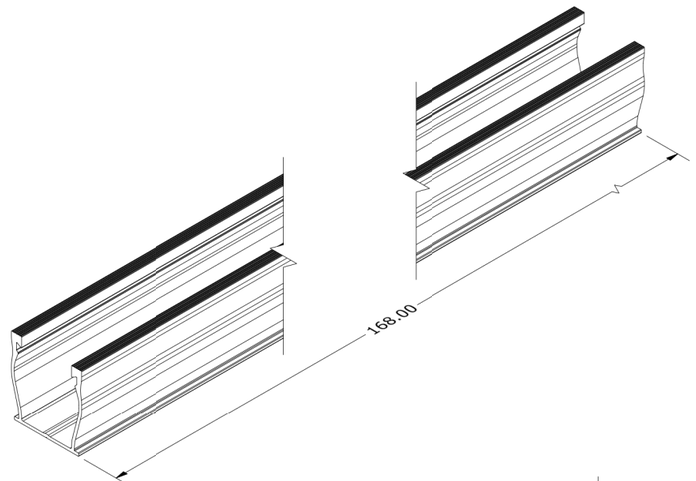
RESOURCE DOCUMENT

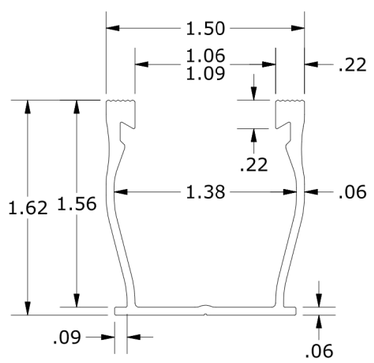
**DATE:** 10.01.2022
**DESIGN BY:** A.O.
**CHECKED BY:** M.M.

REVISIONS

R-004.00
(SHEET 13)

| DESCRIPTION: | DRAWN BY: | SnapNrack™ Solar Mounting Solutions |
|---|---|---|
| SNAPNRACK, UR-40 RAIL | mwatkins | |
| PART NUMBER(S): | REVISION: | 595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA<br>PHONE (415) 580-6900 • FAX (415) 580-6902 |
| 232-02449, 232-02450, 232-02451 | A | 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. |




| 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 | |

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REVISIONS

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(SHEET 14)

# SERIES 100 UL
# FLASHED L FOOT KIT

SnapNrack Solar Mounting Solutions

Flashed L Foot Kit Parts

Flashed L Foot Kit Assembled

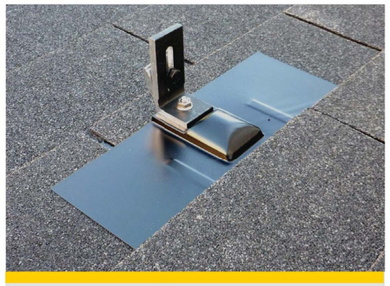
The SnapNrack line of solar mounting solutions is designed to reduce total installation costs. The system's technical innovations have been proven to drive down costs and improve installation quality on more than 350 MW of solar installations.

### 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

Patent Pending



### 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

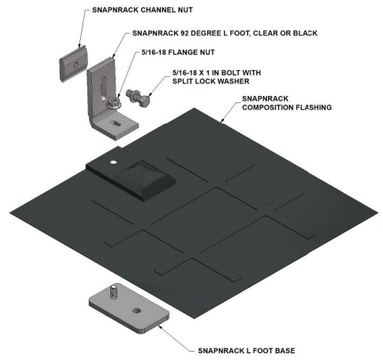
3) Use a breaker bar to separate the composition shingles above the base, and install the flashing

4) Attach the L foct on top and proceed with rail installation and leveling

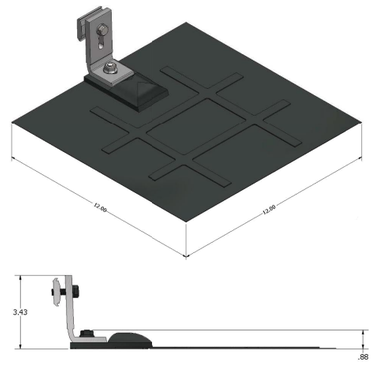
Place order with your distributor. Purchase material for a single project or order in bulk for additional savings

UL LISTED
PV Mounting System
2703

### Flashed L Foot Kit Assembly




### Flashed L Foot Kit Dimensions




| SnapNrack Flashed L Foot Technical Data Patent Pending | |
|---|---|
| Materials | • 6000 Series Aluminum L Foot & Base<br>• Stainless Steel Hardware<br>• 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 worksmanship |

SnapNrack™
Solar Mounting Solutions

(877) 732-2860 www.SnapNrack.com

Printed on recycled paper using soy based inks.



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