RB ENGINEERING
LEADING THE WAY
Structural Engineering Firm
NC License No. C-2499

168 Quade Drive
Cary, North Carolina 27513
www.rbengineering.com

Phone: 919-677-9662 / Cell: 919-280-2695 / Fax: 919-677-9663 *E-mail: rbittler@rbengineering.com*

Mr. Max Middleton
Yes! Solar Solutions of the Triangle
E-mail: mmiddleton@yessolarsolutions.com

October 9, 2020

Subject: Proposed roof solar panels – Dawkins Residence
5267 NC 27 E
Coats, North Carolina 27521

File No.: RB-206550

Dear Max:

RB Engineering, Inc. is pleased to provide the following summary engineering letter concerning the subject project. The roof system is constructed with timber trusses at 24 inches on center, an OSB roof deck and a composition asphalt shingle roof. We have reviewed the proposed solar layout and have structurally evaluated the additional proposed roof loading with the following conclusions:

- The total surface area of the new proposed solar array (43 PV modules) is approximately 780 SF. The solar panel installation has been evaluated for an ultimate design wind speed of 115 mph.
- The subject roof mounted PV system attachment method is structurally adequate to transfer the design uplift loads in accordance with the current North Carolina residential building code.
- The existing roof system is structurally adequate to transfer the applicable design loads - including the additional or modified design loading (dead, wind and snow loads) due to the proposed solar panel installation - in accordance with the current North Carolina residential building code.

Our services were provided in accordance with the standard of practice for structural engineering and within the limits imposed by scope, schedule, and budget. If you have any questions or if I can be of further assistance to you on this project, please contact me at (919) 677-9662.

Respectfully submitted,

Ron Bittler, PE
President / Structural Engineer
RB Engineering, Inc.

Ron Bittler, PE

Digitally signed by Ron Bittler, PE
DN: cn=Ron Bittler, PE, o=RB Engineering, Inc., ou, email=rbittler@rbengineering.com, c=US
Date: 2020.10.09 14:28:22 -04'00'

GENERAL NOTES

1.1.1 **PROJECT NOTES:**

1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (CEC) 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 INTERCONCECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION

1.1.4 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 CEC 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

1.1.5 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO CEC 690.7.

1.1.6 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 [CEC 110.3].

1.1.7 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 CEC 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 ULTRA RAIL COMP KIT

1.3.3 PV RACKING SYSTEM INSTALLATION - SNAPNRACK UR-40

1.3.4 PV MODULE AND INVERTER INSTALLATION - REC REC330TP3M / SOLAR EDGE SE11400H-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 DISCONCECTS

1.3.10 PV FINAL COMMISSIONING

1.3.11 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV

1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

SCOPE OF WORK

SYSTEM SIZE:	STC: 43 x 330W = 14.190kW PTC: 43 x 308.8W = 13.278kW (43) REC REC330TP3M (1) SOLAR EDGE SE11400H-US (240V) (1) TESLA BACKUP GATEWAY 2 (2) TESLA POWERWALL 2 AC
ATTACHMENT TYPE:	SNAP-N-RACK ULTRA RAIL COMP KIT
MSP UPGRADE:	NO

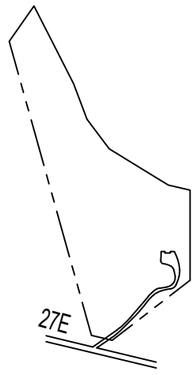
NEW PV SYSTEM: 14.190 kWp

DAWKINS RESIDENCE

5267 NC-27E
COATS, NC 27521
ASSESSOR'S #: 1600-26-8872.000

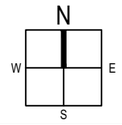
01 AERIAL PHOTO

NOT TO SCALE



02 PLAT MAP

NOT TO SCALE



SHEET LIST TABLE

PROJECT INFORMATION

OWNER

NAME:	RAY DAWKINS
PHONE:	919-413-2250
E-MAIL:	RAY.DAWKINS@ICLOUD.COM

PROJECT MANAGER

NAME:	MAXWELL D. MIDDLETON
PHONE:	9193390453

CONTRACTOR

NAME:	YES SOLAR SOLUTIONS
PHONE:	919-459-2846

AUTHORITIES HAVING JURISDICTION

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

DESIGN SPECIFICATIONS

OCCUPANCY:	II
CONSTRUCTION:	SINGLE-FAMILY
ZONING:	RESIDENTIAL
GROUND SNOW LOAD:	15 PSF
WIND EXPOSURE:	B
WIND SPEED:	118 MPH

APPLICABLE CODES & STANDARDS

BUILDING:	NCSBC 2018 NCSRC 2018
ELECTRICAL:	NEC 2017
FIRE:	NCSFC 2018

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
ADDRESS: 202 NORTH DIXON AVENUE
CARY, NC 27513

LIC. NO.: 67356
HIC. NO.:
ELE. NO.: 31227-U

NEW PV SYSTEM: 14.190 kWp

DAWKINS RESIDENCE

5267 NC-27E
COATS, NC 27521
APN: 1600-26-8872.000

ENGINEER OF RECORD

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

COVER PAGE

DATE: 10.08.2020

DESIGN BY: V.H.

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 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 CEC 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 CEC 110.26.

2.2.3 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY CEC 690.31 (A),(C) AND CEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).

2.2.3 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO CEC 690.34.

2.2.4 ADDITIONAL AC DISCONCECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONCECT.

2.2.5 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO CEC APPLICABLE CODES.

2.2.6 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 RAIL 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 **GROUNDING NOTES:**

2.4.2 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVISES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.

2.4.3 PV SYSTEMS REQUIRE AN EQUIPMENT GROUNDING CONDUCTOR. ALL METAL ELECTRICAL EQUIPMENT AND STRUCTURAL COMPONENTS BONDED TO GROUND, IN ACCORDANCE WITH 250.134 OR 250.136(A). ONLY THE DC CONDUCTORS ARE UNGROUNDED.

2.4.4 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO CEC 690.43 AND MINIMUM CEC TABLE 250.122.

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

2.4.6 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.

2.4.7 THE GROUNDING CONCECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.

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

2.4.9 THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH CEC 690.47 AND CEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO CEC 250, CEC 690.47 AND AHJ.

2.4.10 DC PV ARRAYS SHALL BE PROVIDED WITH DC GROUND-FAULT PROTECTION MEETING THE REQUIREMENTS OF 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS

2.5.1 **INTERCONCECTION NOTES:**

2.5.2 LOAD-SIDE INTERCONCECTION SHALL BE IN ACCORDANCE WITH [CEC 705.12 (B)]

2.5.3 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120% OF BUSBAR RATING [CEC 705.12(B)(2)(3)].

2.5.4 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 [CEC 705.12(B)(2)(3)].

2.5.5 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 CEC 705.12 (B)(2)(3)(C).

2.5.6 FEEDER TAP INTERCOCECTION (LOAD SIDE) ACCORDING TO CEC 705.12 (B)(2)(1)

2.5.7 SUPPLY SIDE TAP INTERCONCECTION ACCORDING TO CEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH CEC 230.42

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

2.6.1 **DISCONCECTION AND OVER-CURRENT PROTECTION NOTES:**

2.6.2 DISCONCECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONCECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).

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

2.6.4 BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED. THEREFORE BOTH MUST OPEN WHERE A DISCONCECT IS REQUIRED, ACCORDING TO CEC 690.13.

2.6.5 ISOLATING DEVICES OR EQUIPMENT DISCONCECTING MEANS SHALL BE INSTALLED IN CIRCUITS CONCECTED TO EQUIPMENT AT A LOCATION WITHIN THE EQUIPMENT, OR WITHIN SIGHT AND WITHIN 10 FT OF THE EQUIPMENT. AN EQUIPMENT DISCONCECTING MEANS SHALL BE PERMITTED TO BE REMOTE FROM THE EQUIPMENT WHERE THE EQUIPMENT DISCONCECTING MEANS CAN BE REMOTELY OPERATED FROM WITHIN 10 FT OF THE EQUIPMENT, ACCORDING TO CEC 690.15 (A).

2.6.6 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)

2.6.7 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO CEC 690.8, 690.9, AND 240.

2.6.8 BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED, THEREFORE BOTH REQUIRE OVER-CURRENT PROTECTION, ACCORDING TO CEC 240.21. (SEE EXCEPTION IN CEC 690.9)

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

2.7.1 **WIRING & CONDUIT NOTES:**

2.7.2 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.

2.7.3 ALL CONDUCTORS SIZED ACCORDING TO CEC 690.8, CEC 690.7.

2.7.4 EXPOSED PV SOURCE CIRCUITS AND OUTPUT CIRCUITS SHALL USE WIRE LISTED AND IDENTIFIED AS PHOTOVOLTAIC (PV) WIRE [690.31 (C)]. PV MODULES WIRE LEADS SHALL BE LISTED FOR USE ON PV ARRAYS, ACCORDING TO CEC 690.31 (A).

2.7.5 PV WIRE BLACK WIRE MAY BE FIELD-MARKED WHITE [CEC 200.6 (A)(6)].

2.7.6 MODULE WIRING SHALL BE LOCATED AND SECURED UNDER THE ARRAY.

2.7.7 ACCORDING TO CEC 200.7, UNGROUNDED SYSTEMS DC CONDUCTORS COLORED OR MARKED AS FOLLOWS:

DC POSITIVE- RED, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN

DC NEGATIVE- BLACK, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN

2.7.8 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 GREY

* IN 4-WIRE DELTA CONCECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [CEC 110.15].

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846

ADDRESS: 202 NORTH DIXON AVENUE
CARY, NC 27513

LIC. NO.: 67356
HIC. NO.:
ELE. NO.: 31227-U

NEW PV SYSTEM: 14.190 kWp

DAWKINS RESIDENCE

5267 NC-27E
COATS, NC 27521
APN: 1600-26-8872.000

ENGINEER OF RECORD

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

NOTES

DATE: 10.08.2020

DESIGN BY: V.H.

CHECKED BY: M.M.

REVISIONS

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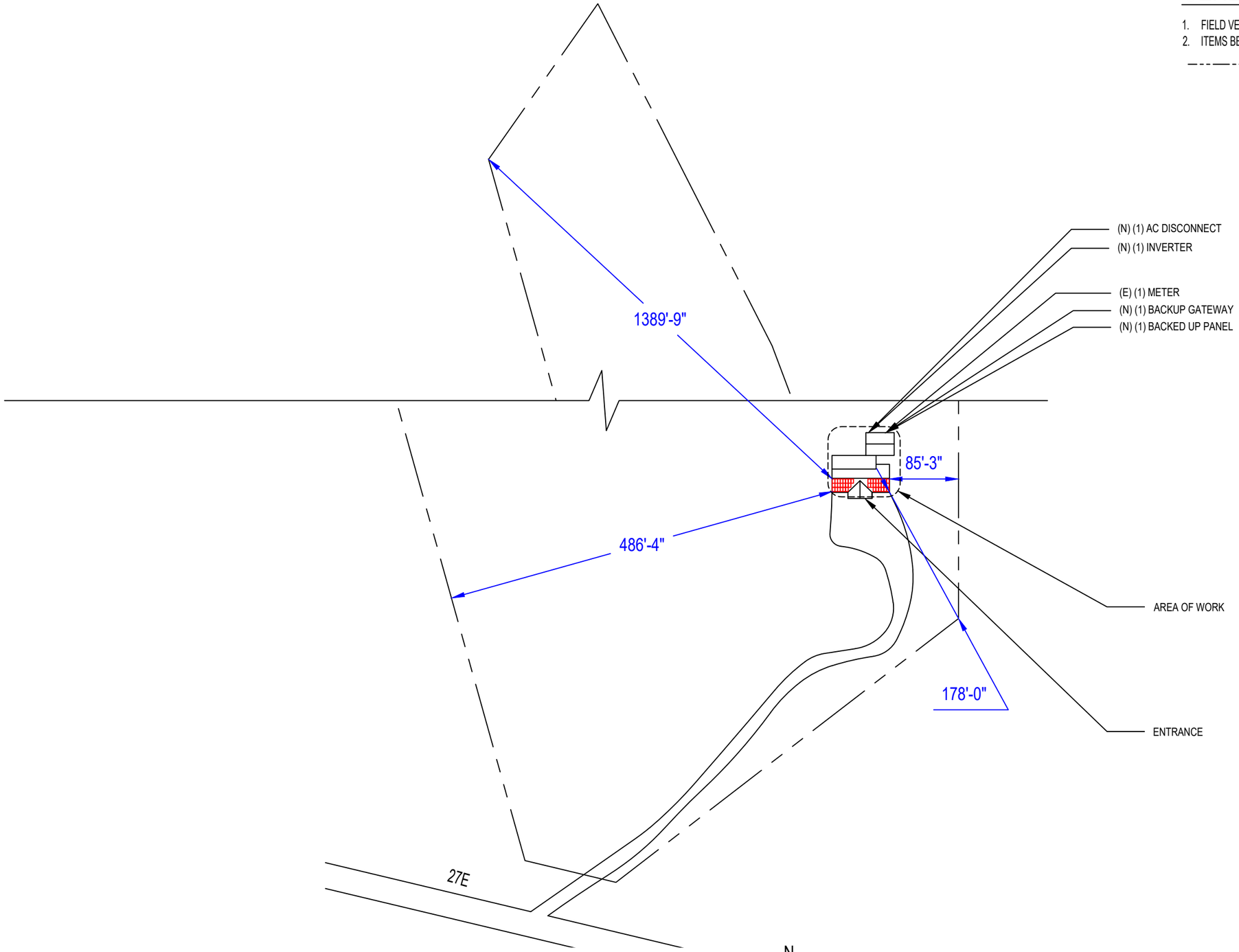
(SHEET 2)

GENERAL NOTES

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

PROPERTY LINE



01 SITE PLAN

1/128" = 1'-0"

0 32' 64'

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
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SITE PLAN

DATE: 10.08.2020
DESIGN BY: V.H.
CHECKED BY: M.M.

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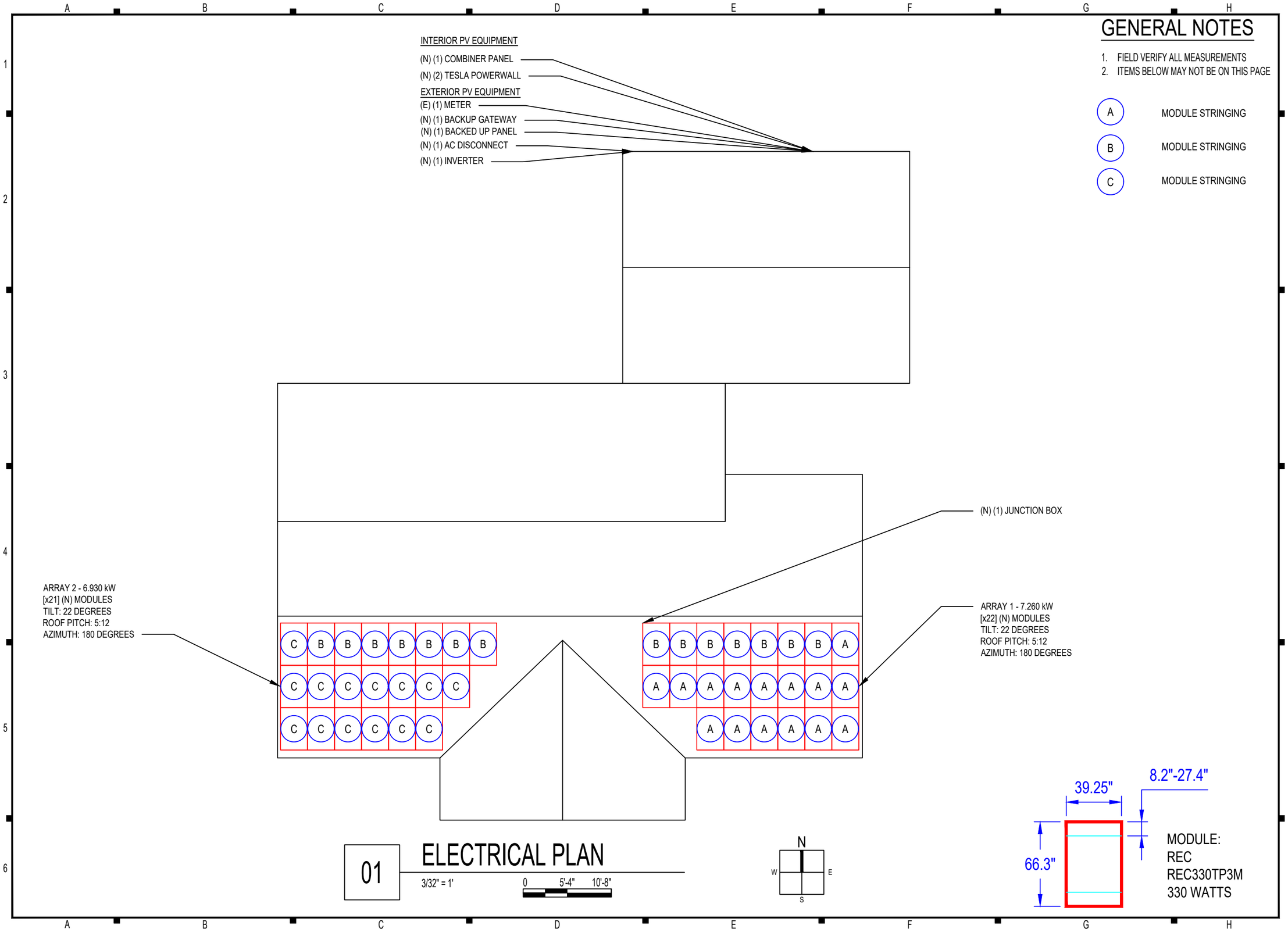
(SHEET 3)



01 ELECTRICAL PLAN

3/32" = 1'

0 5'-4" 10'-8"

MODULE:
REC
REC330TP3M
330 WATTS

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

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846

ADDRESS: 202 NORTH DIXON AVENUE
CARY, NC 27513

LIC. NO.: 67356
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5267 NC-27E
COATS, NC 27521
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ENGINEER OF RECORD

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

ELECTRICAL PLAN

DATE: 10.08.2020

DESIGN BY: V.H.

CHECKED BY: M.M.

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(SHEET 4)

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
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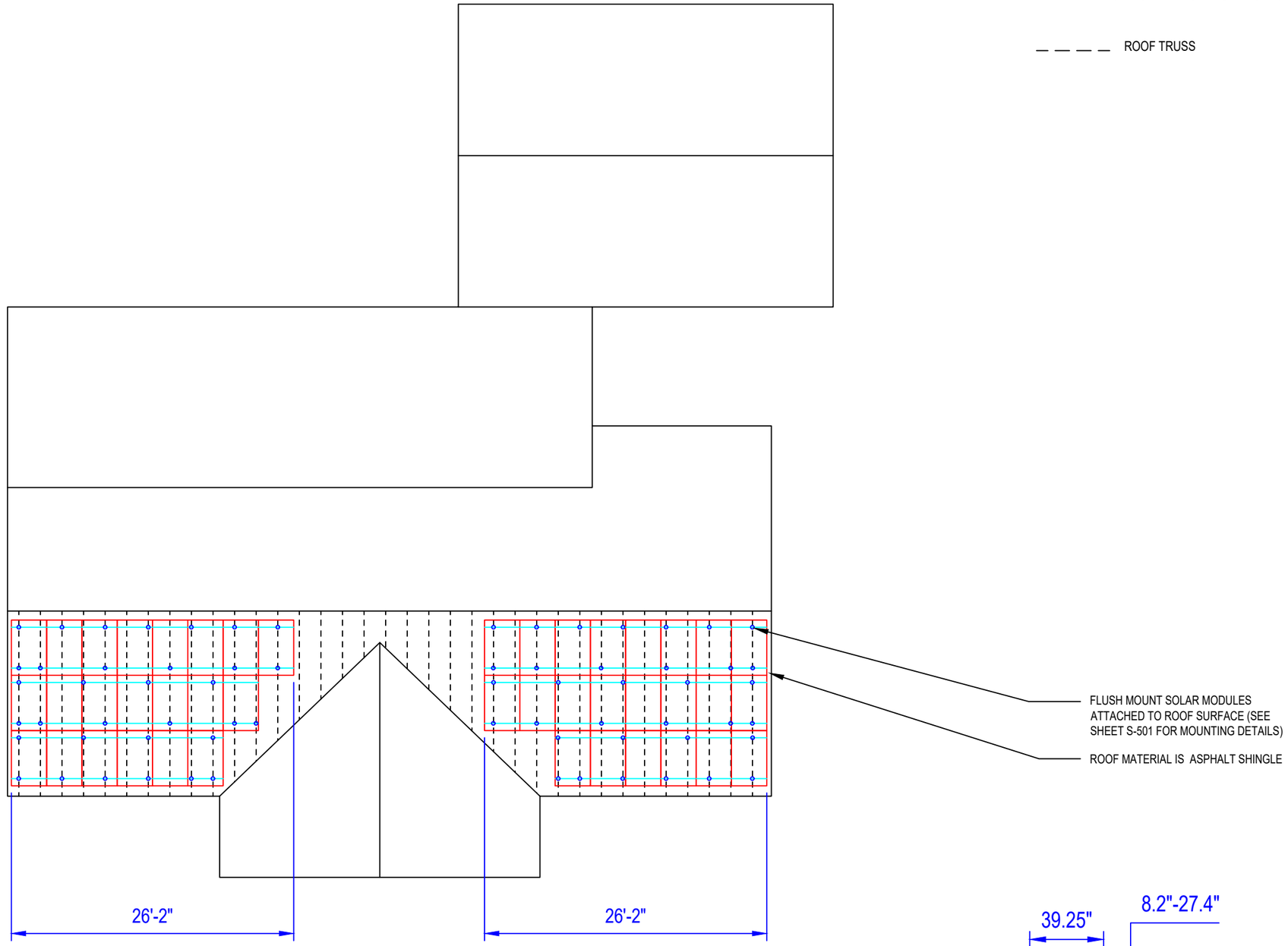
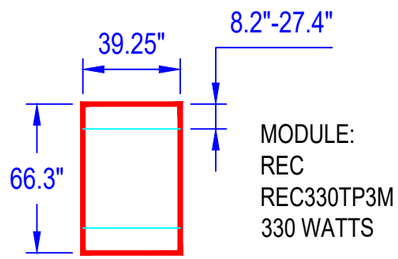


01 SOLAR ATTACHMENT PLAN

3/32" = 1'

0 5'-4" 10'-8"

N W E S



MODULE:
REC
REC330TP3M
330 WATTS

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
ADDRESS: 202 NORTH DIXON AVENUE
CARY, NC 27513

LIC. NO.: 67356
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NEW PV SYSTEM: 14.190 kWp

DAWKINS RESIDENCE

5267 NC-27E
COATS, NC 27521
APN: 1600-26-8872.000

ENGINEER OF RECORD

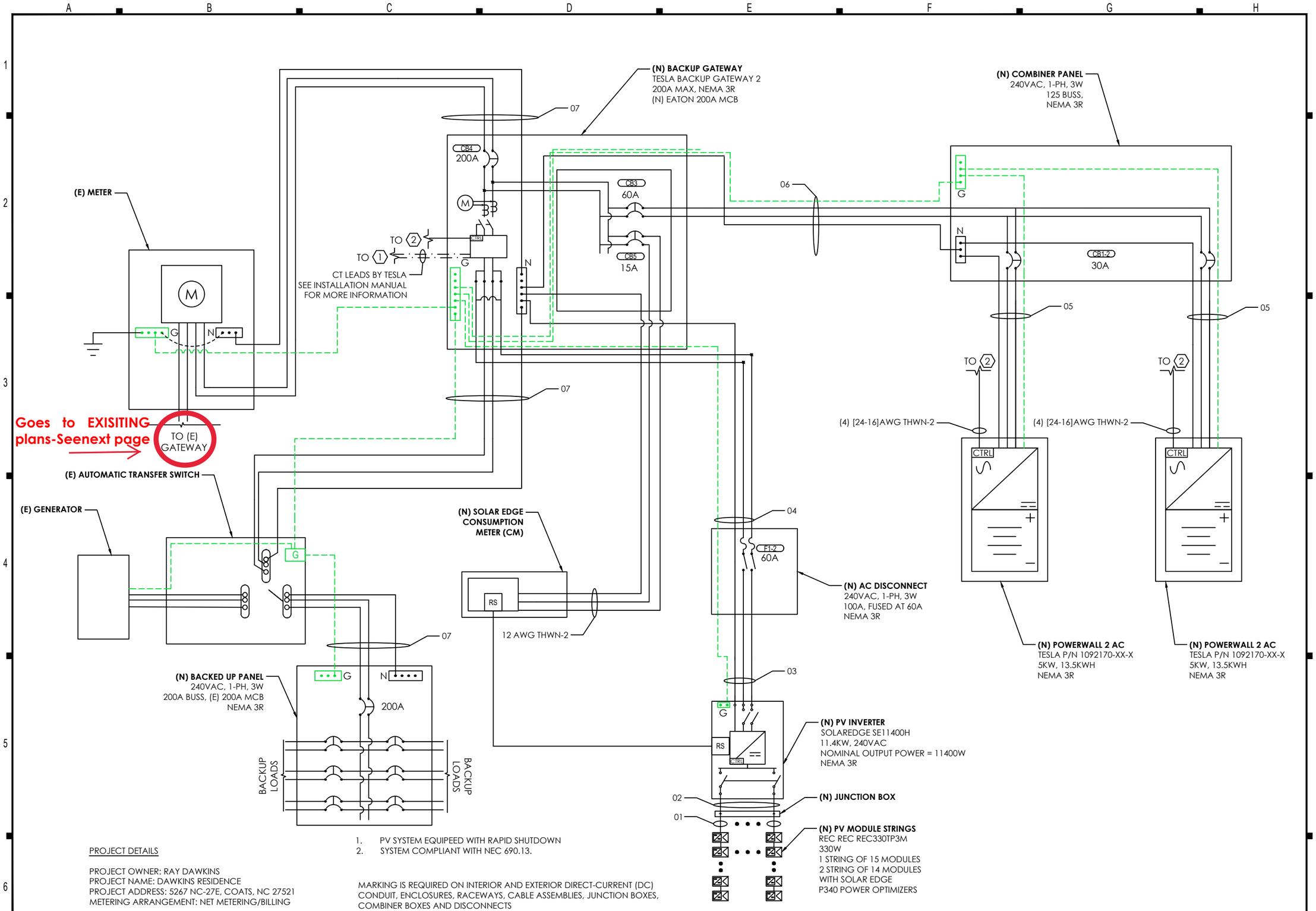
PAPER SIZE: 11" x 17" (ANSI B)

SOLAR ATTACHMENT PLAN

DATE: 10.08.2020
DESIGN BY: V.H.
CHECKED BY: M.M.

REVISIONS

A-103.00
(SHEET 5)



PROJECT DETAILS

PROJECT OWNER: RAY DAWKINS
PROJECT NAME: DAWKINS RESIDENCE
PROJECT ADDRESS: 5267 NC-27E, COATS, NC 27521
METERING ARRANGEMENT: NET METERING/BILLING

1. PV SYSTEM EQUIPEED WITH RAPID SHUTDOWN
2. SYSTEM COMPLIANT WITH NEC 690.13.

MARKING IS REQUIRED ON INTERIOR AND EXTERIOR DIRECT-CURRENT (DC) CONDUIT, ENCLOSURES, RACEWAYS, CABLE ASSEMBLIES, JUNCTION BOXES, COMBINER BOXES AND DISCONNECTS

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
ADDRESS: 202 NORTH DIXON AVENUE
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LIC. NO.: 67356
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ENGINEER OF RECORD

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

LINE DIAGRAM

DATE: 10.08.2020
DESIGN BY: V.H.
CHECKED BY: M.M.

REVISIONS

E-601.00
(SHEET 6)

PV Module Information
Mission Solar MSE295SQ5T
Open circuit voltage = 40.11 V
Maximum permissible system voltage = 1000 V
Short circuit current = 9.52 A
Maximum power at STC = 295 W
Maximum power voltage = 32.72 V
Maximum power current = 9.03 A

Inverter 1 Information
SolarEdge 10000H-US
Nominal output power = 10000 W
Maximum output power = 10000 W
Nominal DC input voltage = 400 V
Maximum useable DC input current = 27 A
Nominal AC output voltage = 240 V
Maximum Continuous AC current = 42 A

Module Optimizer Information
SolarEdge P320
Maximum module wattage = 320 W
MPPT operating range = 8 - 48 Vdc
Maximum Voc = 48 V
Maximum Isc = 11 Adc
Maximum output Current = 15 Adc

Array Information
Mission Solar 295W / 10,620 W PV Array
2 Strings of 18 Modules and Optimizers

Label per 690.53 on inverter #1 DC disconnect
Maximum Voltage = 480 V
Maximum Circuit Current = 26.55 A
Max. Rated DC-DC Current = 30 A

Storage Information
Tesla Powerwall 2 Storage Battery and Battery Inverter
Maximum output Power = 7000 W
Operating output Voltage = 240 V
Maximum Peak Current = 29.17
Operating output Current = 20.83 A

****All SolarEdge Inverters are Rapid Shutdown Compliant per NEC 690.12****

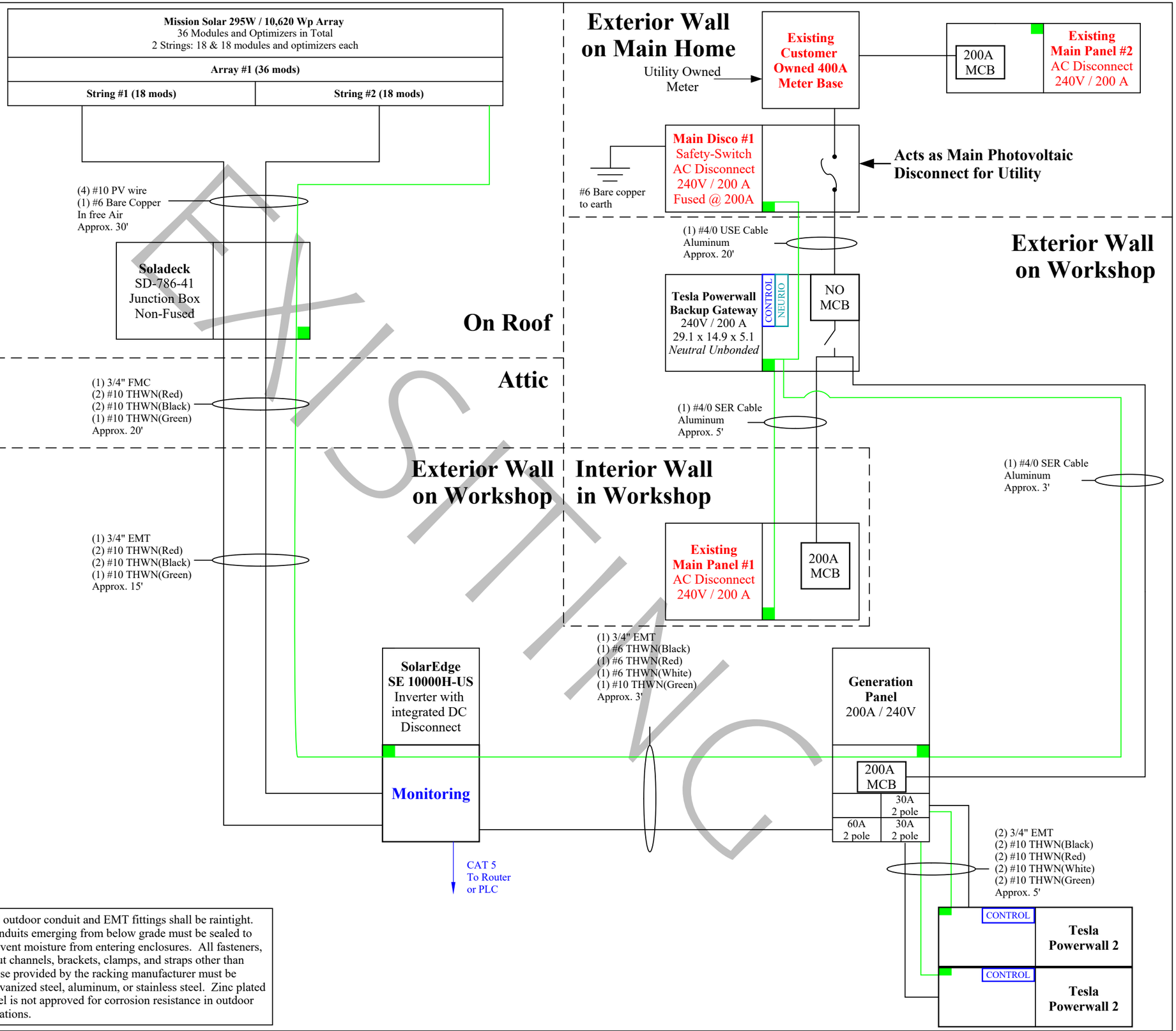
All work shall comply with the 2017 National Electrical Code (NEC) and all applicable local electrical code requirements.

Labeling
Contractor will supply labels per NEC Article 110, 225.37, 690, and 705.

Interconnection Standards Compliance
The inverters listed have been tested to be in compliance with UL1741 Standard for Inverters, Converters, Controllers, and Interconnection System Equipment for Use With Distributed Energy Resources.

The inverters listed have been tested to be in compliance with IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems. UL 1741 is the standard applied by Underwriters Labatory to the Inverter to verify it meets the recommendations of IEEE 1547. Refer to both documents for details of these recommendations and test procedures.

All outdoor conduit and EMT fittings shall be raintight. Conduits emerging from below grade must be sealed to prevent moisture from entering enclosures. All fasteners, strut channels, brackets, clamps, and straps other than those provided by the racking manufacturer must be galvanized steel, aluminum, or stainless steel. Zinc plated steel is not approved for corrosion resistance in outdoor locations.



PV 5
Single Line Diagram

Drawn By: Darren Q
Approved By: Rob Smith
Date: 12/19/2018
Rev. Date: 4/8/2019
Rev. Number: 1 DQ
Scale: NTS

YES SOLAR SOLUTIONS
202 N. Dixon Ave.
Cary, NC 27513
Phone: 919.459.4155
GC License: 67356
EC License: 31227

Ray Dawkins
5267 NC 27 E.
Coats, NC 27521

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
01	3	10 AWG PV WIRE, COPPER	FREE AIR	2	N/A	6 AWG BARE, COPPER	0.91 (37.1 °C)	1	15A	18.75A	55A	50.05A	75°C	50A
02	1	10 AWG THWN-2, COPPER	0.75" DIA EMT	6	N/A	10 AWG THWN-2, COPPER	0.91 (37.1 °C)	0.8	15A	18.75A	40A	29.12A	75°C	35A
03	1	6 AWG THWN-2, COPPER	0.75" DIA EMT	2	60A	6 AWG THWN-2, COPPER	0.91 (37.1 °C)	1	47.5A	59.38A	75A	68.25A	75°C	65A
04	1	6 AWG THWN-2, COPPER	0.75" DIA EMT	2	N/A	6 AWG THWN-2, COPPER	0.91 (37.1 °C)	1	47.5A	59.38A	75A	68.25A	75°C	65A
05	2	10 AWG THWN-2, COPPER	0.5" DIA EMT	2	30A	10 AWG THWN-2, COPPER	0.91 (37.1 °C)	1	-	30A	40A	36.4A	75°C	35A
06	1	6 AWG THWN-2, COPPER	0.75" DIA EMT	2	60A	10 AWG THWN-2, COPPER	0.91 (37.1 °C)	1	-	60A	75A	68.25A	75°C	65A
07	3	3/O AWG THWN-2, COPPER	2" DIA EMT	2	N/A	6 AWG THWN-2, COPPER	0.91 (37.1 °C)	1	-	200A	225A	204.75A	75°C	200A

SYSTEM SUMMARY

	INVERTER #1		
	STRING #1	STRING #2	STRING #3
POWERBOX MAX OUTPUT CURRENT	15A	15A	15A
OPTIMIZERS IN SERIES	15	14	14
NOMINAL STRING VOLTAGE	400V	400V	400V
ARRAY OPERATING CURRENT	12.38A	11.55A	11.55A
ARRAY STC POWER	14,190W		
ARRAY PTC POWER	13,278W		
MAX AC CURRENT	47.5A		
MAX AC POWER	11,400W		
DERATED (CEC) AC POWER	11,400W		

MODULES

REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-43	43	REC REC330TP3M	330W	308.8W	10.39A	9.62A	39.9V	34.3V	-0.112V/°C (-0.28%/°C)	20A

POWER OPTIMIZERS

REF.	QTY.	MODEL	RATED INPUT POWER	MAX OUTPUT CURRENT	MAX INPUT ISC	MAX DC VOLTAGE	WEIGHTED EFFICIENCY
PO1-43	43	SOLAR EDGE P340	340W	15A	11A	48V	98.8%

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	1	SOLAR EDGE SE11400H-US (240V)	240V	FLOATING	60A	11400W	47.5A	30.5A	480V	99.0%

DISCONNECTS

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

OCPDS

REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1-2	2	30A	240VAC
CB3	1	60A	240VAC
CB4	1	200A	240VAC
CB5	1	15A	240VAC
F1-2	2	60A	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°)

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
ADDRESS: 202 NORTH DIXON AVENUE
CARY, NC 27513

LIC. NO.: 67356
HIC. NO.:
ELE. NO.: 31227-U

NEW PV SYSTEM: 14.190 kWp

DAWKINS RESIDENCE

5267 NC-27E
COATS, NC 27521
APN: 1600-26-8872.000

ENGINEER OF RECORD

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

DESIGN TABLES

DATE: 10.08.2020
DESIGN BY: V.H.
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]
1.6 ALL SIGNAGE MUST BE PERMANENTLY ATTACHED AND BE WEATHER RESISTANT/SUNLIGHT RESISTANT AND CANNOT BE HAND-WRITTEN PER NEC 110.21(B)

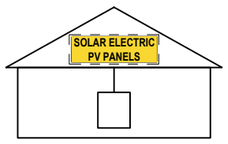
⚠ WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

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

⚠ WARNING
POWER SOURSE
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



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

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

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL 4
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]

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

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

⚠ CAUTION
SOLAR ELECTRIC SYSTEM CONNECTED

LABEL 6
AT UTILITY METER (5 3/4" X 1 1/8")
[NEC 690.56(B)]

⚠ WARNING
TRIPLE POWER SUPPLY
SOURCES: UTILITY GRID, BATTERY 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
NORTH 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)]

PHOTOVOLTAIC SOLAR AC DISCONNECT

LABEL 9
AT EACH AC DISCONNECTING MEANS
(4" X 1").
[NEC 690.13(B)].

PHOTOVOLTAIC SOLAR DC DISCONNECT

LABEL 10
AT EACH DC DISCONNECTING MEANS
(4" X 1").
[NEC 690.13(B)].

PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OUTPUT CURRENT 47.5 A
NOMINAL OPERATING AC VOLTAGE 240 V

LABEL 11
AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS (4" X 2").
[NEC 690.54]

⚠ DIRECT CURRENT PHOTOVOLTAIC POWER SOURSE ⚠

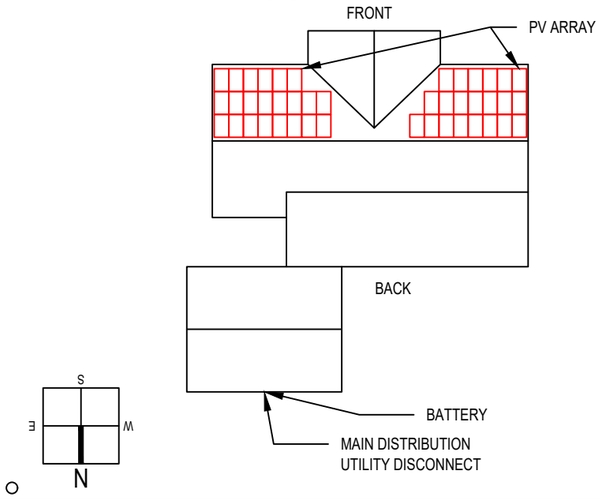
MAXIMUM VOLTAGE: 480 V DC
MAXIMUM CIRCUIT CURRENT: 30.5 A DC

MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER 45 A DC

LABEL 12
AT EACH DC DISCONNECTING MEANS (3" X 4").
[NEC 690.53].

!CAUTION!

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



YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
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CARY, NC 27513

LIC. NO.: 67356
HIC. NO.:
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DAWKINS RESIDENCE

5267 NC-27E
COATS, NC 27521
APN: 1600-26-8872.000

ENGINEER OF RECORD

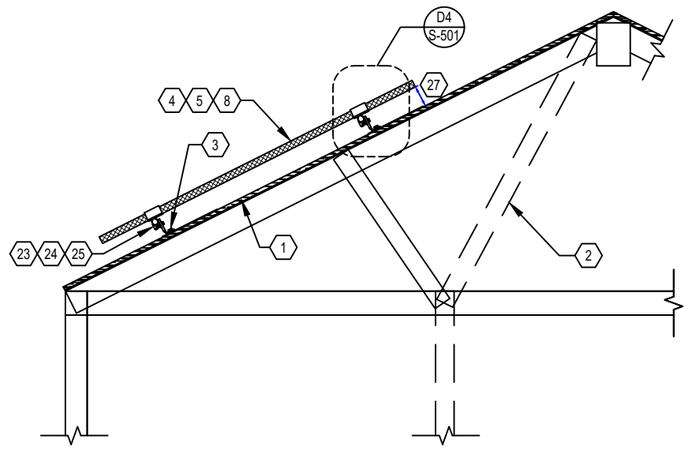
PAPER SIZE: 11" x 17" (ANSI B)

PLACARDS

DATE: 10.08.2020
DESIGN BY: V.H.
CHECKED BY: M.M.

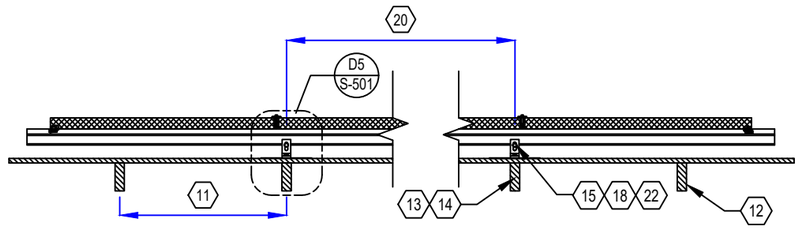
REVISIONS

E-603.00
(SHEET 8)



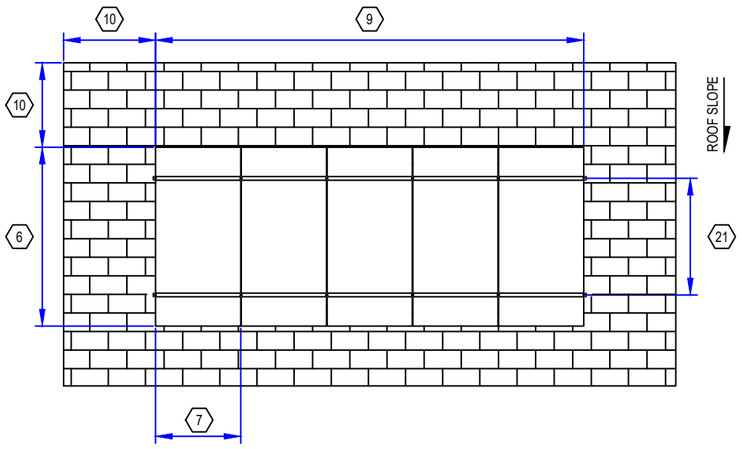
D1 RACKING DETAIL (TRANSVERSE)

NOT TO SCALE



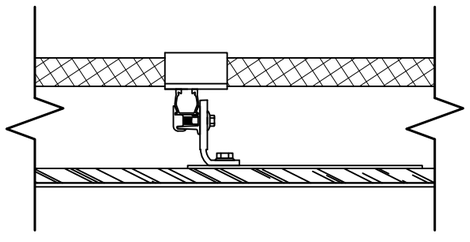
D2 RACKING DETAIL (LONGITUDINAL)

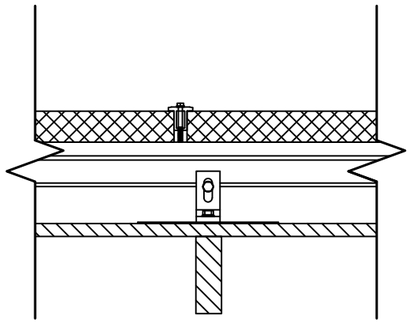
NOT TO SCALE



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 ULTRA RAIL COMP KIT
4. MODULE MANUFACTURER: REC
5. MODULE MODEL: REC330TP3M
6. MODULE LENGTH: 66.3"
7. MODULE WIDTH: 39.25"
8. MODULE WEIGHT: 41.7 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 NOMINAL
13. LAG BOLT DIAMETER: 5/16 IN.
14. LAG BOLT EMBEDMENT: 2-1/2 IN.
15. TOTAL # OF ATTACHMENTS: 67
16. TOTAL AREA: 777.07 SQ. FT.
17. TOTAL WEIGHT: 1971.44 LBS.
18. WEIGHT PER ATTACHMENT: 29.42 LBS.
19. DISTRIBUTED LOAD: 2.54 PSF
20. MAX. HORIZONTAL STANDOFF: 72 IN.
21. MAX. VERTICAL STANDOFF: LANDSCAPE: 26 IN., PORTRAIT: 33 IN.
22. STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER (OR EQUIV.): SNAP N RACK
24. RAIL MODEL (OR EQUIVALENT): UR-40 RAIL
25. RAIL WEIGHT: 0.42 PLF.
26. MAX. TRUSS SPAN: N/A
27. MODULE CLEARANCE: 3 IN. MIN., 6 IN. MAX.

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
ADDRESS: 202 NORTH DIXON AVENUE
CARY, NC 27513

LIC. NO.: 67356
HIC. NO.:
ELE. NO.: 31227-U

NEW PV SYSTEM: 14.190 kWp

DAWKINS RESIDENCE

5267 NC-27E
COATS, NC 27521
APN: 1600-26-8872.000

ENGINEER OF RECORD

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

ASSEMBLY DETAILS

DATE: 10.08.2020
DESIGN BY: V.H.
CHECKED BY: M.M.

REVISIONS

S-501.00
(SHEET 9)

SOLAR'S MOST TRUSTED REC

REC TWINPEAK 3 MONO BLACK SERIES

PREMIUM SOLAR PANELS WITH SUPERIOR PERFORMANCE

REC TwinPeak 3 Mono Black Series solar panels feature an innovative 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 3 Mono Black panels are ideal for residential and commercial rooftops worldwide.

MORE POWER OUTPUT PER M²

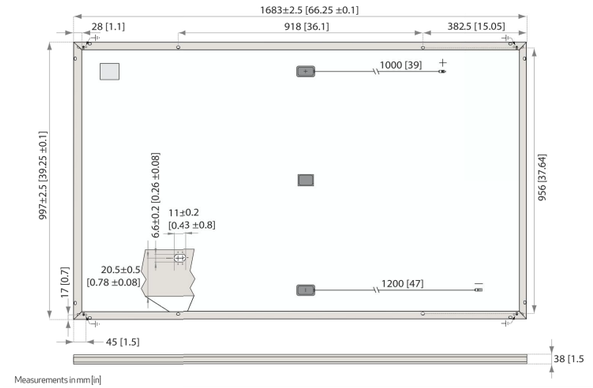
IMPROVED PERFORMANCE IN SHADED CONDITIONS

100% PID FREE

REDUCES BALANCE OF SYSTEM COSTS

ELIGIBLE FOR REC 25 YEAR PROTRUST WARRANTY

REC TWINPEAK 3 MONO BLACK SERIES



Measurements in mm [in]

ELECTRICAL DATA @ STC	Product code*: RECxxxTP3M Black				
Power Output - P_{MAX} (Wp)	315	320	325	330	335
Watt Class Sorting - (W)	-0/+5	-0/+5	-0/+5	-0/+5	-0/+5
Nominal Power Voltage - V_{MPP} (V)	33.6	33.8	34.1	34.3	34.6
Nominal Power Current - I_{MPP} (A)	9.40	9.50	9.54	9.62	9.69
Open Circuit Voltage - V_{OC} (V)	38.7	39.1	39.5	39.9	40.2
Short Circuit Current - I_{SC} (A)	10.30	10.30	10.36	10.39	10.42
Panel Efficiency (%)	18.8	19.1	19.4	19.7	20.0

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. At a low irradiance of 200 W/m² at least 95% of the STC module efficiency will be achieved.
*Where xxx indicates the nominal power class (P_{MAX}) at STC indicated above.

ELECTRICAL DATA @ NMOT	Product code*: RECxxxTP3M Black				
Power Output - P_{MAX} (Wp)	235	238	242	246	250
Nominal Power Voltage - V_{MPP} (V)	31.3	31.5	31.7	31.9	32.2
Nominal Power Current - I_{MPP} (A)	7.51	7.57	7.63	7.70	7.75
Open Circuit Voltage - V_{OC} (V)	36.1	36.4	36.8	37.1	37.5
Short Circuit Current - I_{SC} (A)	8.23	8.26	8.29	8.31	8.34

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

UL 1703, Fire classification: Type 2; IEC 61215, IEC 61730; ISO 9001: 2015, ISO 14001: 2004, OHSAS 18001: 2007

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	97.5%	97.5%	97.5%
Annual Degradation	0.7%	0.7%	0.7%
Power in Year 25	80.7%	80.7%	80.7%

See warranty documents for details. Some conditions apply.

20.0% EFFICIENCY

20 YEAR PRODUCT WARRANTY

25 YEAR LINEAR POWER OUTPUT WARRANTY

TEMPERATURE RATINGS

Nominal Module Operating Temperature:	44.6°C (±2°C)
Temperature coefficient of P_{MAX}:	-0.37 %/°C
Temperature coefficient of V_{OC}:	-0.28 %/°C
Temperature coefficient of I_{SC}:	0.04 %/°C

GENERAL DATA

Cells:	120 half-cut mono-Si p-type PERC cells 6 strings of 20 cells in series
Glass:	0.13" (3.2 mm) solar glass with anti-reflective surface treatment
Back sheet:	Highly resistant polyester polyolefin construction (black)
Frame:	Anodized aluminum (black)
Junction box:	3-part with 3 bypass diodes, IP67 rated 12 AWG (4 mm²) PV wire, 39" + 47" (1.0 m + 1.2 m)
Connectors:	Stäubli MC4 PV-KBT4/PV-KST4, 12 AWG (4 mm²)

MAXIMUM RATINGS

Operational temperature:	-40 ... +185°F (-40 ... +85°C)
Maximum system voltage:	1000 V
Design load (+): snow Maximum test load (+):	3600 Pa (75.2 lbs/ft²)* 5400 Pa (112.8 lbs/ft²)*
Design load (-): wind Maximum test load (-):	1600 Pa (33.4 lbs/ft²)* 2400 Pa (50 lbs/ft²)*
Max series fuse rating:	20 A
Max reverse current:	20 A

* Calculated using a safety factor of 1.5
** See installation manual for mounting instructions

MECHANICAL DATA

Dimensions:	66.3 x 39.25 x 1.5 (1683 x 997 x 38 mm)
Area:	17.98 ft² (1.68 m²)
Weight:	41.7 lbs (18.9 kg)

Note! Specifications subject to change without notice.

Specifications subject to change without notice.

Ref: PM-DS-0716 Rev: A (05.20)

REC Group is an international pioneering solar energy company dedicated to empowering consumers with clean, affordable solar power in order to facilitate global energy transitions. Committed to quality and innovation, REC offers photovoltaic modules with leading high quality, backed by an exceptional low warranty claims rate of less than 100ppm. Founded in Norway in 1996, REC employs 2,000 people and has an annual solar panel capacity of 1.8 GW. With over 10 GW installed worldwide, REC is empowering more than 16 million people with clean solar energy. REC Group is a Bluestar Elkem company with headquarters in Norway, operational headquarters in Singapore, and regional bases in North America, Europe, and Asia-Pacific.

REC

www.recgroup.com

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

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ENGINEER OF RECORD

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

RESOURCE DOCUMENT

DATE: 10.08.2020

DESIGN BY: V.H.

CHECKED BY: M.M.

REVISIONS

R-001.00

(SHEET 10)

Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US

INVERTERS

12-25 YEAR WARRANTY

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

solaredge.com

solaredge

Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/
SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXXBXX4							
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5[1]							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current @240V[2]	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V[2]	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600kΩ Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

[1] For other regional settings please contact SolarEdge support
[2] A higher current source may be used; the inverter will limit its input current to the values stated

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
ADDRESS: 202 NORTH DIXON AVENUE
CARY, NC 27513

LIC. NO.: 67356
HIC. NO.:
ELE. NO.: 31227-U

NEW PV SYSTEM: 14.190 kWp

DAWKINS RESIDENCE

5267 NC-27E
COATS, NC 27521
APN: 1600-26-8872.000

ENGINEER OF RECORD

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

RESOURCE DOCUMENT

DATE: 10.08.2020
DESIGN BY: V.H.
CHECKED BY: M.M.

REVISIONS

R-002.00
(SHEET 11)

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P485 / P505

POWEROPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

solaredge.com

solaredge

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P485 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for high-voltage modules)	P485 (for high-voltage modules)	P505 (for higher current modules)	
INPUT								
Rated Input DC Power[1]	320	340	370	400	405	485	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125[2]		83[2]	Vdc
MPPT Operating Range	8 - 48		8 - 60	8 - 80	12.5 - 105		12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11			10.1			14	Adc
Maximum DC Input Current	13.75			12.5			17.5	Adc
Maximum Efficiency	99.5							%
Weighted Efficiency	98.8						98.6	%
Overvoltage Category	II							
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)								
Maximum Output Current	15							Adc
Maximum Output Voltage	60				85			Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)								
Safety Output Voltage per Power Optimizer	1 ± 0.1							Vdc
STANDARD COMPLIANCE								
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3							
Safety	IEC62109-1 (class II safety), UL1741							
Material	UL94 V-0 , UV Resistant							
RoHS	Yes							
INSTALLATION SPECIFICATIONS								
Maximum Allowed System Voltage	1000							Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters							
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1			129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 159 x 49.5 / 5.1 x 6.3 x 1.9		129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	630 / 1.4			750 / 1.7	845 / 1.9		1064 / 2.3	gr / lb
Input Connector	MC4[3]					Single or dual MC4[3][4]	MC4[3]	
Input Wire Length	0.16 / 0.52							m / ft
Output Wire Type / Connector	Double Insulated / MC4							
Output Wire Length	0.9 / 2.95		1.2 / 3.9	1.2 / 3.9	1.2 / 3.9		1.2 / 3.9	m / ft
Operating Temperature Range[5]	-40 - +85 / -40 - +185							°C / °F
Protection Rating	IP68 / NEMA6P							
Relative Humidity	0 - 100							%

(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed
(2) NEC 2017 requires max input voltage be not more than 80V
(3) For other connector types please contact SolarEdge
(4) For dual version for parallel connection of two modules use the P485. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer
(5) For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details.

PV System Design Using a SolarEdge Inverter[6][7]		Single Phase HD-Wave	Single phase	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400	8		10	18	
	P405, P485, P505	6		8	14	
Maximum String Length (Power Optimizers)		25		25	50[8]	
Maximum Power per String		5700 (6000 with SE7600-US - SE11400-US)	5250	6000[9]	12750[10]	W
Parallel Strings of Different Lengths or Orientations		Yes				

(6) For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
(7) It is not allowed to mix P405/P485/P505 with P320/P340/P370/P400 in one string
(8) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
(9) For 208V grid: it is allowed to install up to 6,500W per string when the maximum power difference between each string is 1,000W
(10) For 277/480V grid: it is allowed to install up to 17,550W per string when the maximum power difference between each string is 2,000W

Intertek RoHS

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

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RESOURCE DOCUMENT

DATE: 10.08.2020
DESIGN BY: V.H.
CHECKED BY: M.M.

REVISIONS

R-003.00
(SHEET 12)

METERING

Energy Meter with Modbus Connection

for North America

SE-MTR240-NN-S-S1

Energy Meter for Residential Installations:

- Simple installations and connectivity
- Type NEMA 3R enclosure for outdoor protection
- Provides high accuracy meter readings
- Communicates over RS485 to provide monitoring data
- Suitable for export limitation, consumption monitoring and StorEdgeTM applications

solaredge.com

solaredge

Energy Meter with Modbus Connection

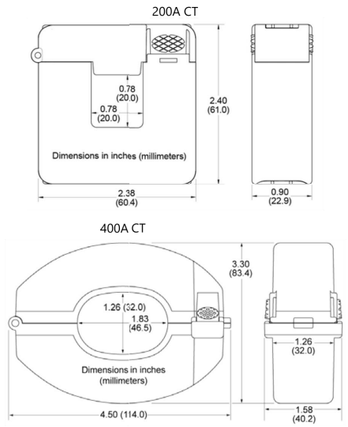
for North America

SE-MTR240-NN-S-S1

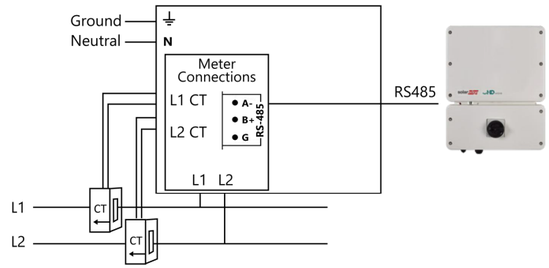
SUPPORTED INVERTERS	SINGLE PHASE INVERTERS		UNITS
ELECTRICAL SERVICE			
AC Input Voltage (Nominal)	240		Vac
AC Frequency (Nominal)	60		Hz
Max AC Input Current	100		mA
Connector Type	Terminal block - 22 to 12		AWG
Grids supported	L1 / L2 / N / PE L1 / L2 / PE		
Power Consumption (Nominal)	3		W
METER ACCURACY (@ 77°F / 25°C, PF:0.7- 1)			
1 - 100% of Rated Current CT	±1.0		%
CURRENT TRANSFORMERS[1]			
Nominal Input (at CT Rated Current)	CT1, CT2: 0.333		Vac RMS
Rated RMS current[2]	200	400	A
Dimensions (Internal / External)	0.8 x 0.8; 2.4 x 2.4 / 20 x 20; 61 x 61	1.26 x 1.83; 3.3 x 4.5 / 32 x 46.5; 83.4 x 114	in/mm
STANDARD COMPLIANCE			
Safety	UL 1741:2010 Ed.2(Supplement SA)+R: 07 Sep 2016		
Emmissions	FCC 47 CFR Part 15 Subpart B		
ENVIRONMENTAL			
Operating Temperatures	-40 to +140 / -40 to +60		°F / °C
Relative Humidity (noncondensing)	5-90		%
Enclosure type	High impact, ABS and/or ABS/PC plastic UL 94V-0, IEC FV-0		
Protection Rating	NEMA Type 3R		
INSTALLATION SPECIFICATIONS			
Dimensions (HxWxD)	8.1 x 12.4 x 4.6 / 206.6 x 316 x 117.5		in / mm
Weight	3.9 / 1.8		lb / kg
Conduit Entry Diameters	0.75 or 1 / 19 or 25		in
Mounting Type	Bracket mount		

[1] Current Transformers should be ordered separately: SEACT0750-200NA-20 (200A) or SEAC"1250-400NA-20 (400A), 20 per box
[2] For other ratings contact SolarEdge

Current Transformer Dimensions



Connecting the Energy Meter



* Current Transformers (CTs) should be ordered separately: SEACT0750-200NA-20 (200A); SEACT1250-400NA-20 (400A). Each comes in boxes of 20.

FC RoHS

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

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ELE. NO.: 31227-U

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COATS, NC 27521
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CHECKED BY: M.M.

REVISIONS

R-004.00
(SHEET 13)

POWERWALL
Backup Gateway 2

The Backup Gateway 2 for Tesla Powerwall provides energy management and monitoring for solar self-consumption, time-based control, and backup.

The Backup Gateway 2 controls connection to the grid, automatically detecting outages and providing a seamless transition to backup power. When equipped with a main circuit breaker, the Backup Gateway 2 can be installed at the service entrance. When the optional internal panelboard is installed, the Backup Gateway 2 can also function as a load center.

The Backup Gateway 2 communicates directly with Powerwall, allowing you to monitor energy use and manage backup energy reserves from any mobile device with the Tesla app.

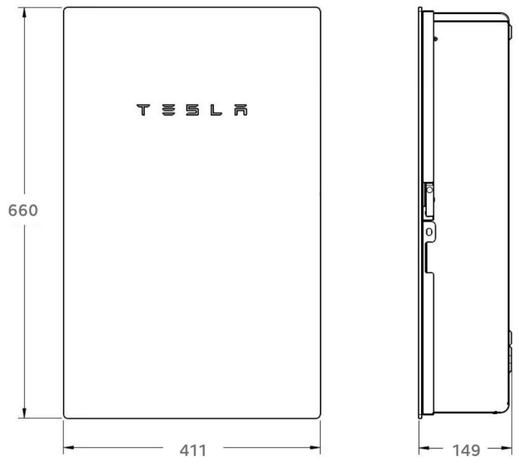
PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Current Rating	200 A
Maximum Input Short Circuit Current	10 kA[1]
Overcurrent Protection Device	100-200A; Service Entrance Rated[1]
Overvoltage Category	Category IV
AC Meter	Revenue accurate (+/– 0.2 %)
Primary Connectivity	Ethernet, Wi-Fi
Secondary Connectivity	Cellular (3G, LTE/4G)[2]
User Interface	Tesla App
Operating Modes	Support for solar self-consumption, time-based control, backup, and off-grid
Backup Transition	Automatic disconnect for seamless backup
Modularity	Supports up to 10 AC-coupled Powerwalls
Optional Internal Panelboard	200A 6-space / 12 circuit Eaton BR Circuit Breakers
Warranty	10 years

[1] When protected by Class J fuses, Backup Gateway 2 is suitable for use in circuits capable of delivering not more than 22kA symmetrical amperes.
[2] The customer is expected to provide internet connectivity for Backup Gateway 2; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

MECHANICAL SPECIFICATIONS

Dimensions	660 mm x 411 mm x 149 mm (26 in x 16 in x 6 in)
Weight	20.4 kg (45 lb)
Mounting options	Wall mount, Semi-flush mount



COMPLIANCE INFORMATION

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS CSA 22.2 0.19, CSA 22.2 205
Emissions	FCC Part 15, ICES 003

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
ADDRESS: 202 NORTH DIXON AVENUE
CARY, NC 27513

LIC. NO.: 67356
HIC. NO.:
ELE. NO.: 31227-U

NEW PV SYSTEM: 14.190 kWp

DAWKINS RESIDENCE

5267 NC-27E
COATS, NC 27521
APN: 1600-26-8872.000

ENGINEER OF RECORD

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

RESOURCE DOCUMENT

DATE: 10.08.2020
DESIGN BY: V.H.
CHECKED BY: M.M.

REVISIONS

R-005.00
(SHEET 14)

POWERWALL 2 AC

The Tesla Powerwall is a fully-integrated AC battery system for residential or light commercial use. Its rechargeable lithium-ion battery pack provides energy storage for solar self-consumption, load shifting and backup power.

Powerwall's electrical interface provides a simple connection to any home or building. Its revolutionary compact design achieves market-leading energy density and is easy to install, enabling owners to quickly realize the benefits of reliable, clean power.

PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	208 V, 220 V, 230 V, 277 V, 100/200 V, 120/240 V
Feed-In Type	Single & Split-Phase
Grid Frequency	50 and 60 Hz
AC Energy[1]	13.2 kWh
Real Power, max continuous[2]	5 kW (charge and discharge)
Real Power, peak (10 s)[2]	7 kW (discharge only)
Apparent Power, max continuous[2]	5.8 kVA (charge and discharge)
Apparent Power, peak (10 s)[2]	7.2 kVA (discharge only)
Imbalance for Single-Phase Loads	100%
Power Factor Output Range	+/– 1.0 adjustable
Power Factor (full-rated power)	+/– 0.85
Depth of Discharge	100%
Internal Battery DC Voltage	50 V
Round Trip Efficiency[1,3]	89.0%
Warranty	10 years

[1]Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
[2]Values region-dependent.
[3]AC to battery to AC, at beginning of life.

ENERGY GATEWAY SPECIFICATIONS

User Interface	Tesla App
Connectivity	Wi-Fi, Ethernet, 3G
AC Meter	Revenue grade
Operating Modes	Support for wide range of usage scenarios
Backup Operation	Optional automatic disconnect switch
Modularity	Supports up to 9 AC-coupled Powerwalls

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Storage Temperature	–30°C to 60°C (–22°F to 140°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Altitude	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring)
Noise Level @ 1m	<40 dBA at 30°C (86°F)

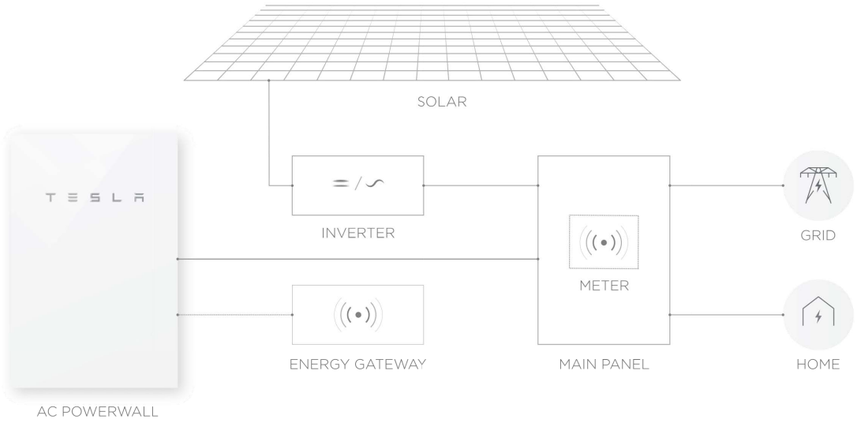
MECHANICAL SPECIFICATIONS

Dimensions	1150 mm x 755 mm x 155 mm (45.3 in x 29.7 in x 6.1 in)
Weight	122 kg (269 lbs)
Mounting options	Floor or wall mount

COMPLIANCE INFORMATION

Safety	UL 1642, UL 1741, UL 1973, UL 9540, UN 38.3, IEC 62109-1, IEC 62619, CSA C22.2.107.1
Grid Standards	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003, EN 61000 Class B
Environmental	RoHS Directive 2011/65/EU, WEEE Directive 2012/19/EU, 2006/66/EC
Seismic	AC156, IEEE 693-2005 (high)

TYPICAL SYSTEM LAYOUT



TESLA POWERWALL 2

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

PHONE: (919) 459-2846
ADDRESS: 202 NORTH DIXON AVENUE CARY, NC 27513

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DATE: 10.08.2020
DESIGN BY: V.H.
CHECKED BY: M.M.

REVISIONS

R-006.00
(SHEET 15)

DESCRIPTION:

SNAPNRACK, UR-40 RAIL

PART NUMBER(S):

232-02449, 232-02450, 232-02451

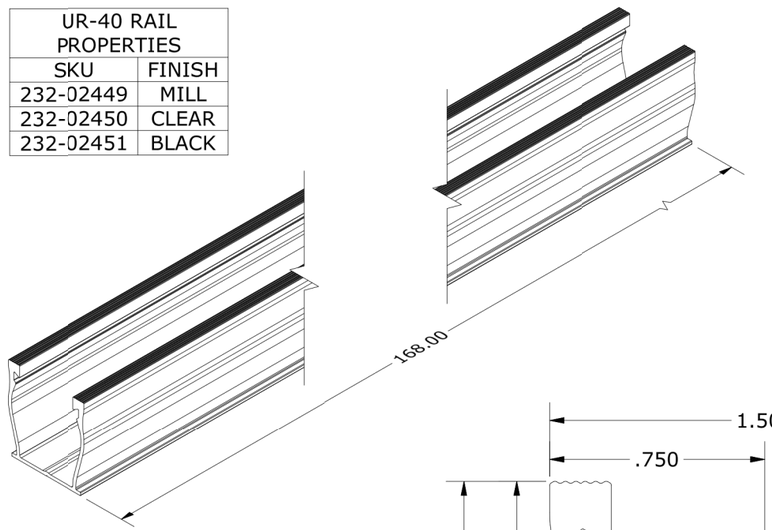
DRAWN BY: mwatkins

REVISION: B

SnapNrack™ Solar Mounting Solutions

595 MARKET STREET. 29TH FLOOR • SAN FRANCISCO, CA 94105 USA
PHONE (415) 580-6900 • FAX (415) 580-6902

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



EQUIVALENT PROPERTIES	
A	0.357 in²
Ixx	0.125 in⁴
Iyy	0.132 in⁴
Sx (TOP)	0.150 in³
Sx (BOT)	0.158 in³
Sy (LEFT)	0.175 in³
Sy (RIGHT)	0.175 in³

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	BOXES OF 8
WEIGHT (LBS):	5.85	

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

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ENGINEER OF RECORD

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

RESOURCE DOCUMENT

DATE: 10.08.2020

DESIGN BY: V.H.

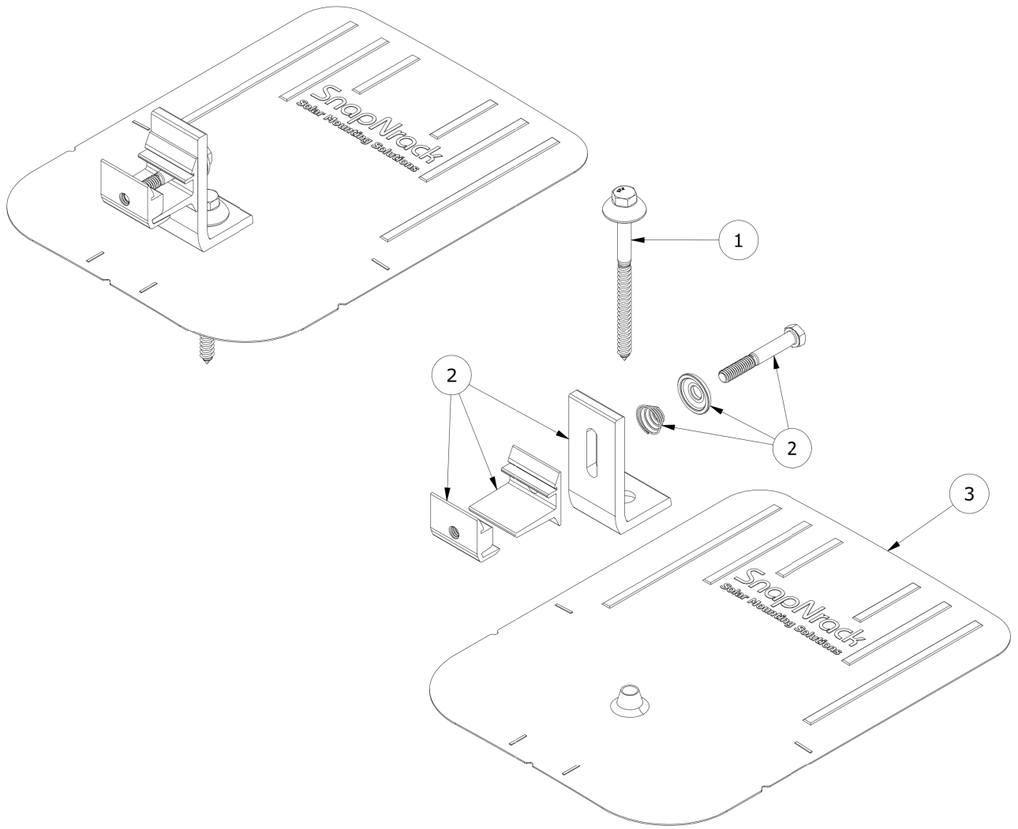
CHECKED BY: M.M.

REVISIONS

R-007.00

(SHEET 16)

DESCRIPTION:	DRAWN BY:	SnapNrack™ Solar Mounting Solutions
SNAPNRACK, ULTRA RAIL COMP KIT	mwatkins	595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE (415) 580-6900 • FAX (415) 580-6902
PART NUMBER(S): SEE BELOW	REVISION: B	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.



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	242-92266	SNAPNRACK, UMBRELLA LAG, TYPE 3, 4IN, SS
2	1	242-01219, 242-01220	SNAPNRACK, ULTRA FOOT FOR U FLASHING, SILVER / BLACK
3	1	232-01375, 232-01376	SNAPNRACK, COMP FLASHING, 9IN X 12IN, SILVER / BLACK ALUM

MATERIALS:	6000 SERIES ALUMINUM, STAINLESS STEEL, RUBBER
DESIGN LOAD (LBS):	405 UP, 788 DOWN, 236 SIDE
ULTIMATE LOAD (LBS):	2006 UP, 4000 DOWN, 1070 SIDE
TORQUE SPECIFICATION:	12 LB-FT
CERTIFICATION:	UL 2703, FILE E359313
WEIGHT (LBS):	0.80

DESCRIPTION:	DRAWN BY:	SnapNrack™ Solar Mounting Solutions
SNAPNRACK, ULTRA RAIL COMP KIT	mwatkins	595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE (415) 580-6900 • FAX (415) 580-6902
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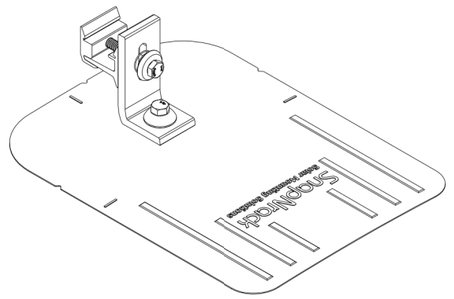
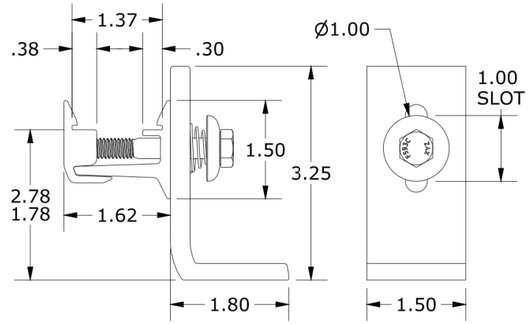
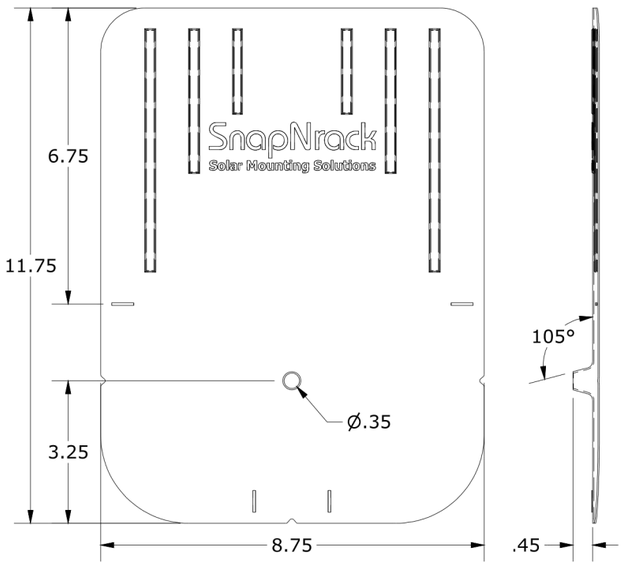
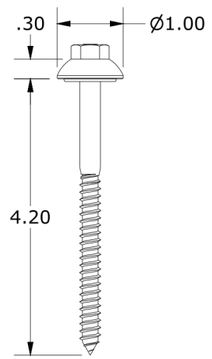


UMBRELLA L FOOT PROPERTIES	
SKU	DESCRIPTION
242-01219	ULTRA RAIL UMBRELLA L FOOT, SILVER
242-01220	ULTRA RAIL UMBRELLA L FOOT, BLACK



COMP FLASHING PROPERTIES	
SKU	DESCRIPTION
232-01375	COMP FLASHING, 9" X 12", BLACK ALUM
232-01376	COMP FLASHING, 9" X 12", SILVER ALUM





ALL DIMENSIONS IN INCHES

YES SOLAR SOLUTIONS

CONTRACTOR

YES SOLAR SOLUTIONS

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