

NEW PHOTOVOLTAIC SYSTEM 22.800kW DC / 15.200kW AC
1039 DELMA GRIMES ROAD, COATS, NC 27521

AHJ

NC-COUNTY OF HARNETT

UTILITY

DUKE ENERGY (PROGRESS ENERGY CAROLINAS INC)

CODES AND STANDARDS

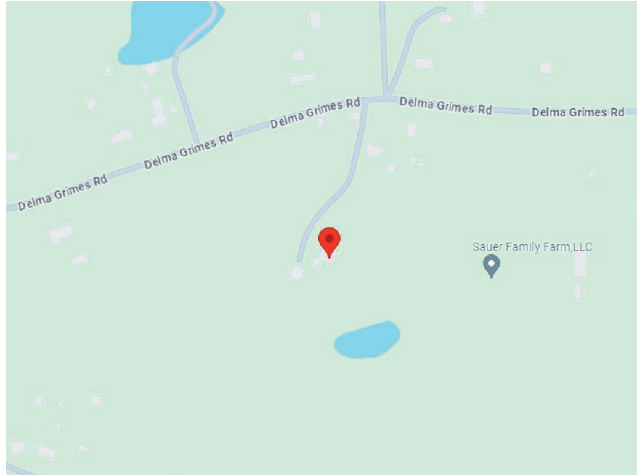
ELECTRIC CODE: NEC 2017 WITH NC AMENDMENTS
 FIRE CODE: NCFC 2018
 BUILDING CODE: NCBC 2018
 RESIDENTIAL CODE: NCRC 2018
 WIND SPEED: 118 MPH
 SNOW LOAD: 15 PSF

HIGH TEMP: 36°C, LOW TEMP: -8.5°C

SCOPE OF WORK

(N) 22.800kW DC / 15.200kW AC ROOF MOUNT PV SYSTEM
 (57) REC SOLAR REC400NP3 BLACK (400W) MODULES
 (2) TESLA SOLAR 7.6kW (1538000-XX-Y) (240V) INVERTERS
 (19) TESLA SOLAR SHUTDOWN DEVICES (MCI-1)

VICINITY MAP



CONTRACTOR INFORMATION



YES SOLAR SOLUTIONS
 ADDRESS: 202 NORTH DIXON AVENUE, CARY, NC 27513
 PHONE NUMBER: (919) 375-0757

CUSTOMER INFORMATION

NAME: GRIMES JR RESIDENCE
 ADDRESS: 1039 DELMA GRIMES ROAD, COATS, NC 27521
 COORDINATES: 35.405154, -78.658851
 APN: 071600014601
 22.800kW DC / 15.200kW AC ROOF MOUNT PV SYSTEM

GENERAL NOTES

1. MODULES ARE LISTED UNDER UL 1703 / UL 61730 AND CONFORM TO THE STANDARDS.
2. INVERTERS ARE LISTED UNDER UL 1741 , 1EEE1547 , UL 1699 , UL 1998 , UL3741 AND CONFORM TO THE STANDARDS.
3. DRAWINGS ARE DIAGRAMMATIC, INDICATING GENERAL ARRANGEMENT OF THE PV SYSTEM. ACTUAL SITE CONDITIONS MAY VARY.
4. WORKING CLEARANCES AROUND THE NEW PV ELECTRICAL EQUIPMENT SHALL BE MAINTAINED IN ACCORDANCE WITH NEC 110.26.
5. ALL GROUND WIRING CONNECTED TO THE MAIN SERVICE GROUNDING IN MAIN SERVICE PANEL / SERVICE EQUIPMENT.
6. ALL CONDUCTORS SHALL BE 600V, 90°C STANDARD COPPER UNLESS OTHERWISE NOTED.
7. WHEN REQUIRED, A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
8. THE SYSTEM WILL NOT BE INTERCONNECTED BY THE CONTRACTOR UNTIL APPROVAL FROM UTILITY IS RECEIVED.
9. ROOF ACCESS POINT SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREES, WIRES OR SIGNS.

10. PV ARRAY COMBINER / JUNCTION BOX PROVIDES TRANSITION FROM ARRAY WIRING TO CONDUIT WIRING.
11. RACKING SYSTEM SHALL BE LISTED TO UL 2703.
12. FIRE RATING OF EXISTING ROOF ASSEMBLY SHALL BE MAINTAINED WITH ADDITIONAL OF PHOTOVOLTAIC SYSTEM.

SHEET CATALOG

- PV-1 COVER SHEET
- PV-2 SITE PLAN-1
- PV-2.1 SITE PLAN-2
- PV-3 MOUNTING DETAILS-1
- PV-3.1 MOUNTING DETAILS-2
- PV-3.2 STRUCTURAL DETAILS
- PV-4 SINGLE LINE DIAGRAM
- PV-4.1 CONDUCTOR SCHEDULE
- PV-4.2 ELECTRICAL CALCULATIONS
- PV-5 PLACARDS
- SS SPEC SHEETS

Ron Bittler, PE
 Digitally signed by Ron Bittler, PE
 DN: cn=Ron Bittler, PE, o, ou, email=rbittler@rbengineering.com, c=US
 Date: 2024.02.16 09:22:34 -05'00'



STRUCTURAL
 02.16.2024

STRUCTURAL REVIEW PROVIDED BY:
 RONALD P. BITTLER, PE
 RB ENGINEERING, INC. (C-2499)
 168 QUADE DRIVE
 CARY, NC 27513
 919-677-9662
 PROJECT #RB-249553



PROJECT ID	AUR-92437
DATE	2/14/2024
CREATED BY	AS
SIGNATURE	

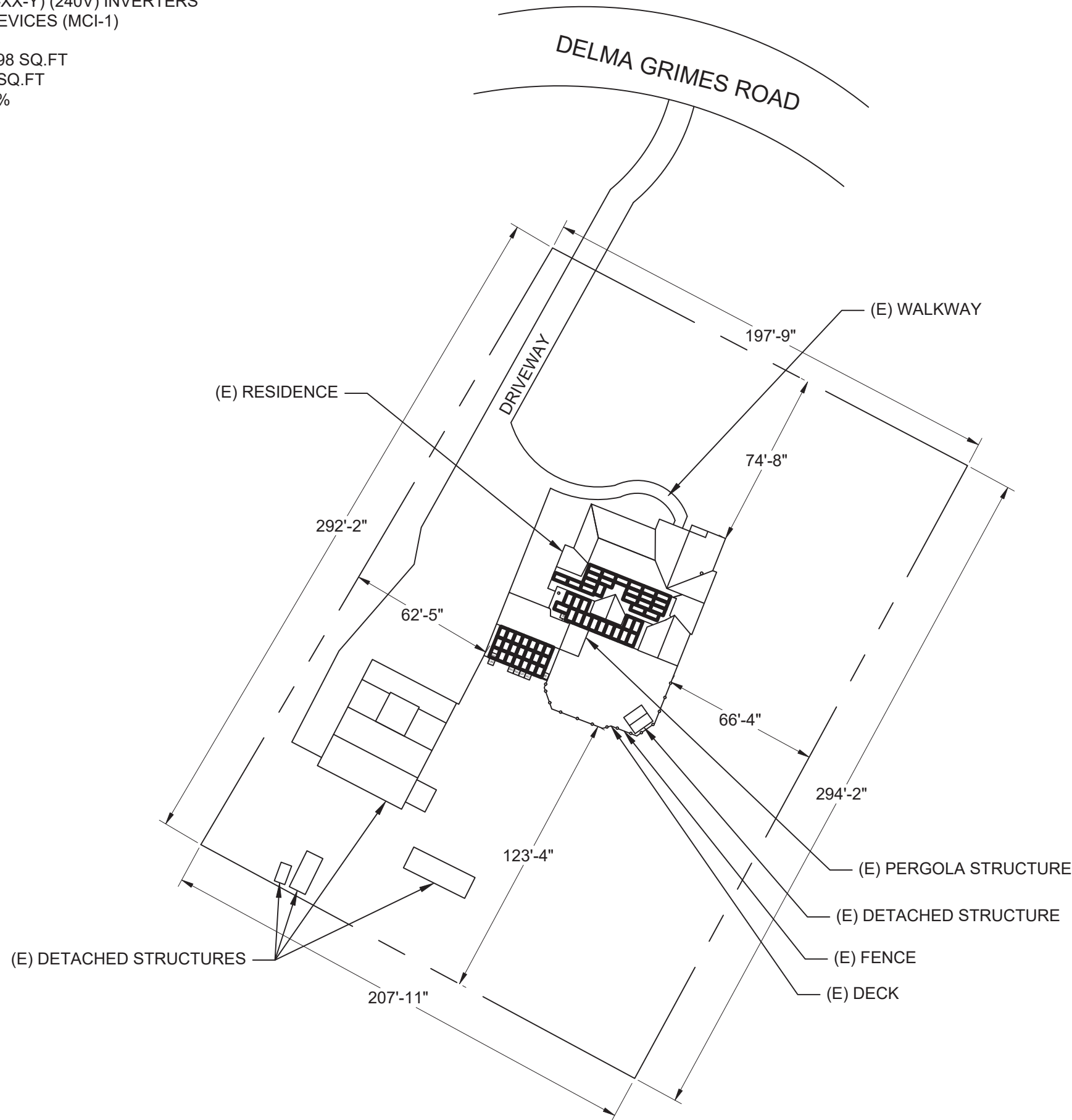
COVER SHEET
PV-1

SCOPE OF WORK

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TOTAL ARRAY AREA = 1210.98 SQ.FT
 TOTAL ROOF AREA = 4014 SQ.FT
 % ARRAY AREA IN ROOF = 30.16%

NOTE: NO GATE.



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SITE PLAN-1
 PV-2

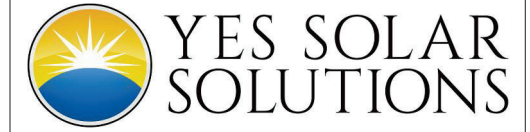
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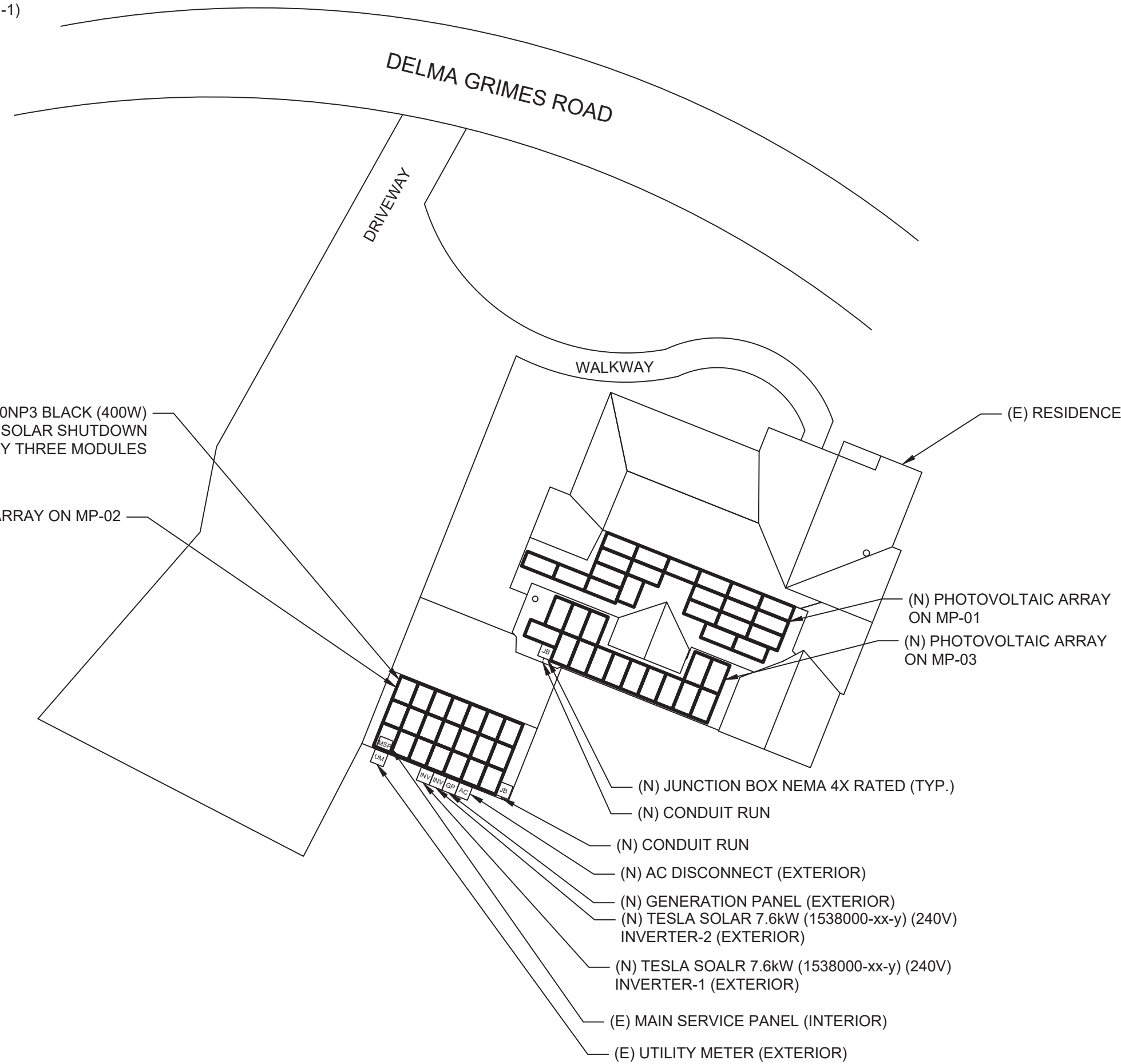
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LEGEND

- VENT (ROOF OBSTRUCTION)
- UM UTILITY METER
- MSP MAIN SERVICE PANEL
- AC AC DISCONNECT
- GP GENERATION PANEL
- JB JUNCTION BOX
- INV INVERTER



SCALE: 1" = 20'-0"



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**SITE PLAN-2
 PV-2.1**

WIND SPEED: 118 MPH AND SNOW LOAD: 15 PSF

S.NO	AZIMUTH	PITCH	NO. OF MODULES	ARRAY AREA (SQ.FT)	ROOF TYPE	ATTACHMENT	ATTACHMENT QUANTITY	ROOF EXPOSURE	FRAME TYPE	FRAME SIZE	FRAME SPACING	MAX ATTACHMENT SPACING	MAX OVER HANG
MP-01	204°	45°	21	446.15	COMPOSITION SHINGLE	SNAPNRACK ULTRA RAIL COMP KIT	84	ATTIC	RAFTERS	2" X 6"	16" O.C.	4'-0"	1'-6"
MP-02	203°	45°	21	446.15	COMPOSITION SHINGLE	SNAPNRACK ULTRA RAIL COMP KIT	42	ATTIC	RAFTERS	2" X 6"	16" O.C.	4'-0"	1'-6"
MP-03	203°	24°	15	318.67	COMPOSITION SHINGLE	SNAPNRACK ULTRA RAIL COMP KIT	41	ATTIC	RAFTERS	2" X 6"	14" O.C.	3'-6"	1'-6"

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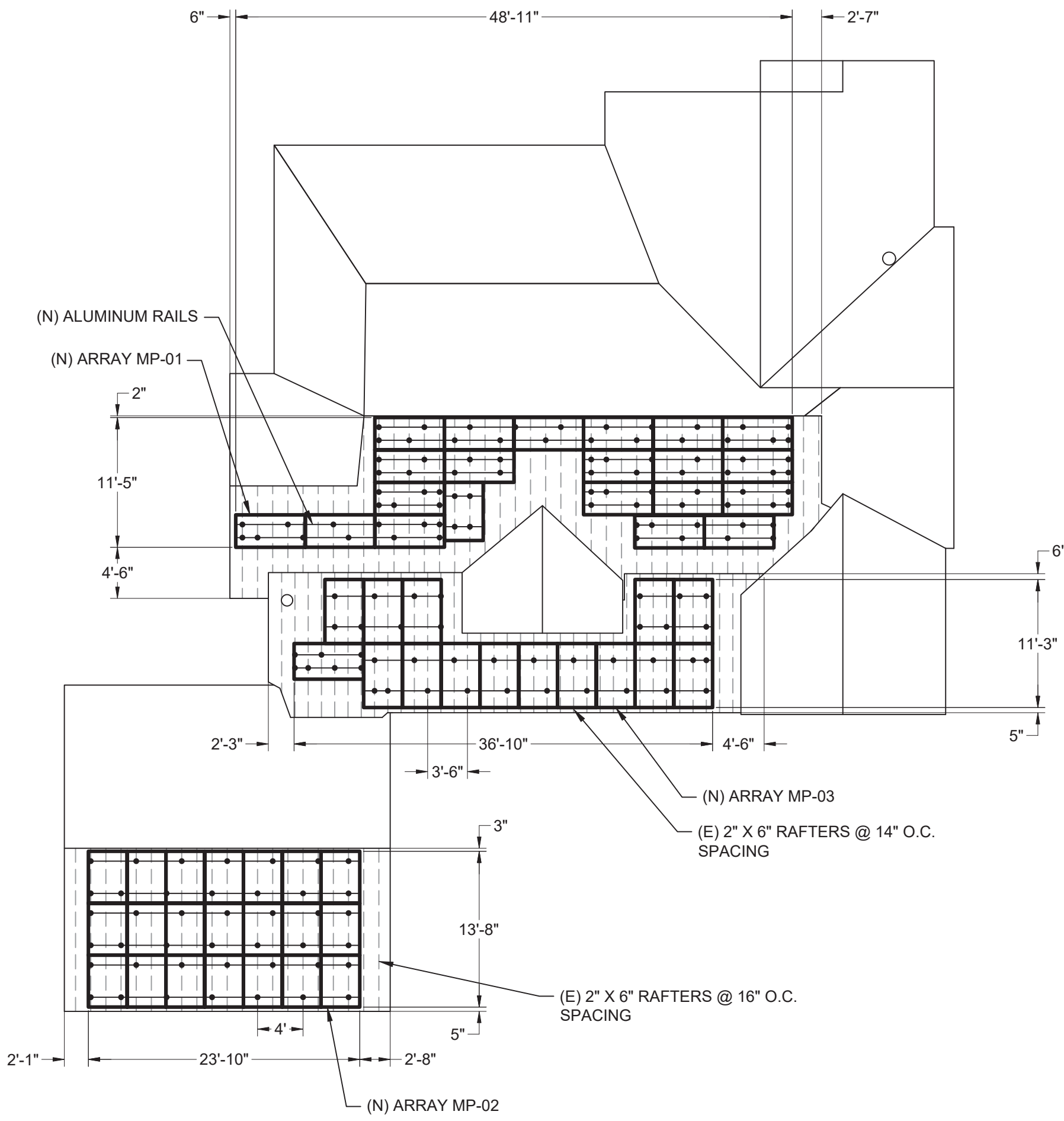
DATE 2/14/2024






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SIGNATURE

**MOUNTING DETAILS-1
PV-3**

NOTE: PENETRATIONS ARE STAGGERED.



- LEGEND**
-  MODULE
 -  RAIL
 -  ATTACHMENT
 -  ROOF FRAME
 -  VENT (ROOF OBSTRUCTION)



SCALE: 1" = 10'-0"

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**MOUNTING DETAILS-2
 PV-3.1**

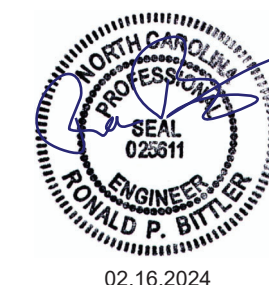
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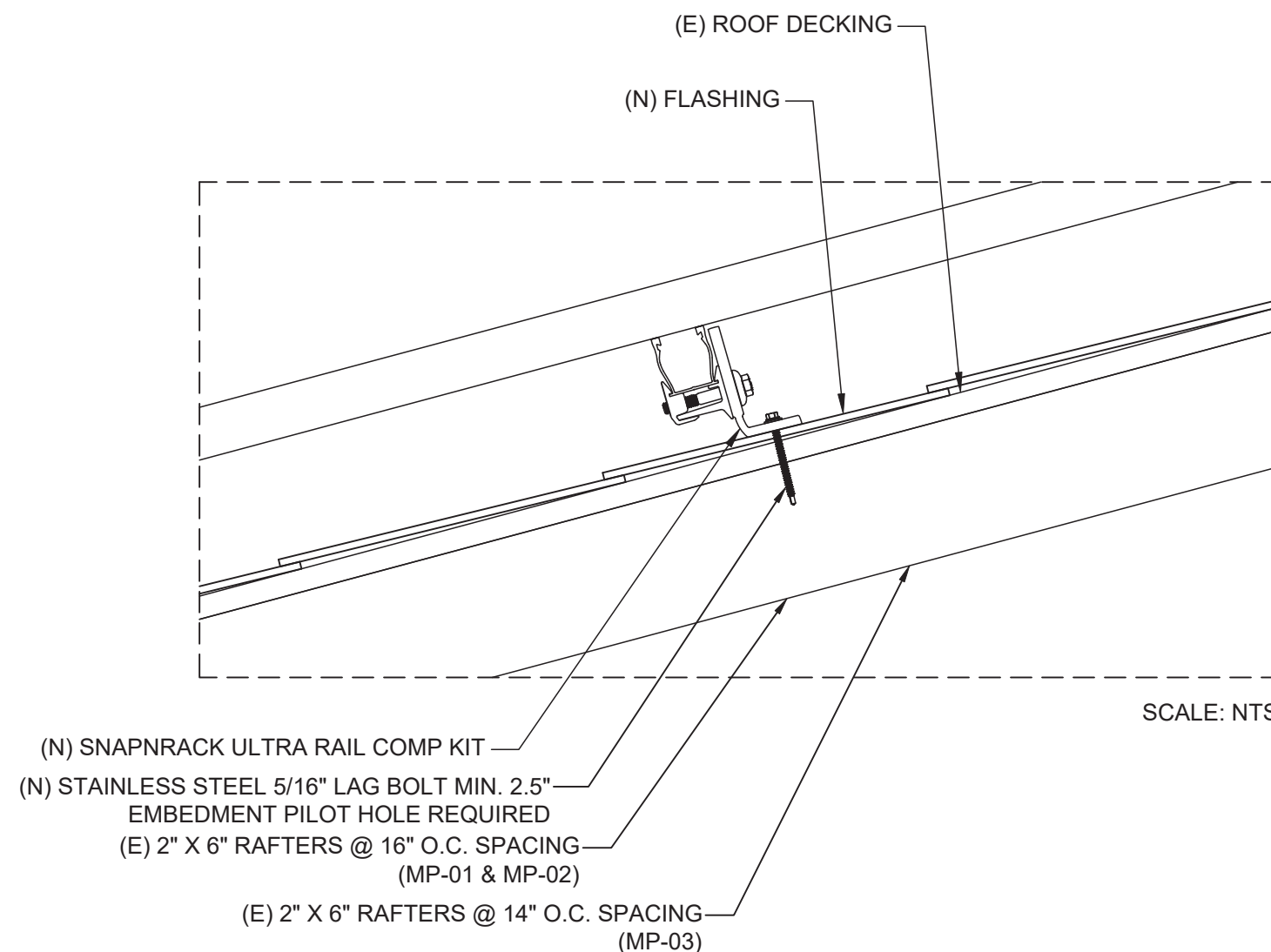
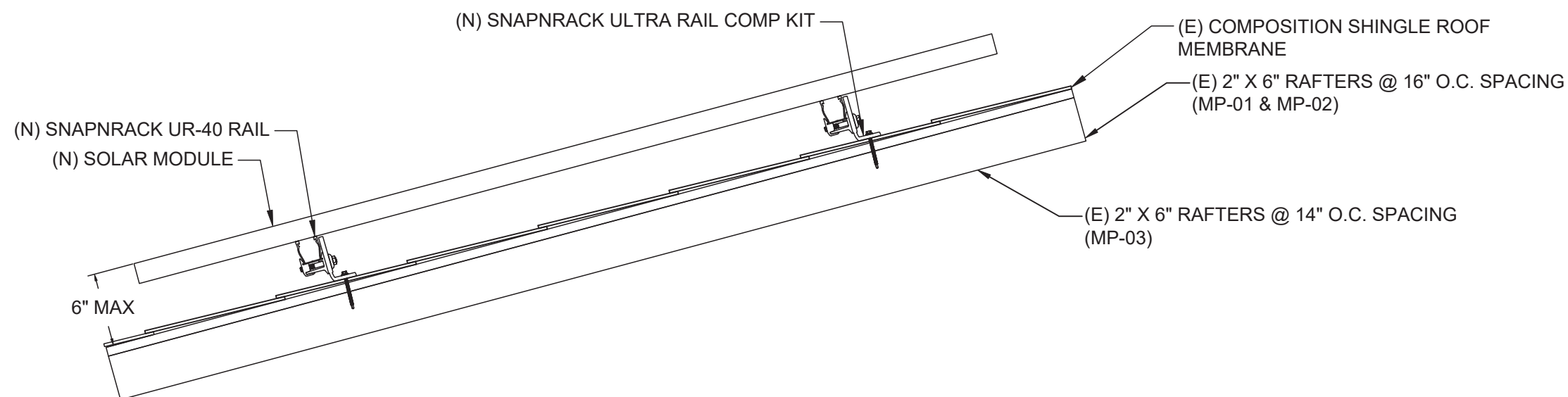
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**STRUCTURAL DETAILS
 PV-3.2**



DEAD LOAD CALCULATIONS

BOM	QUANTITY	LBS/UNIT	TOTAL WEIGHT (LBS)
MODULES	57	48	2736
MID-CLAMP	84	0.17	14.28
END-CLAMP	60	0.3	18
RAIL LENGTH	519	0.42	217.98
SPLICE BAR	20	0.52	10.4
SNAPNRACK ULTRA RAIL COMP KIT	167	1.03	172.01
TESLA MCI	19	0.77	14.63
TOTAL WEIGHT OF THE SYSTEM (LBS)			3183.30
TOTAL ARRAY AREA ON THE ROOF (SQ. FT.)			1210.98
WEIGHT PER SQ. FT.(LBS)			2.63
WEIGHT PER PENETRATION (LBS)			19.06

MODULE SPECIFICATIONS	
MODEL	REC SOLAR REC400NP3 BLACK (400W)
MODULE POWER @ STC	400W
OPEN CIRCUIT VOLTAGE:Voc	45V
MAX POWER VOLTAGE:Vmp	37.6V
SHORT CIRCUIT CURRENT:Isc	11.39A
MAX POWER CURRENT:Imp	10.64A
TEMPERATURE COEFFICIENT:Voc	-0.26%/°C
MODULE DIMENSIONS: L x W x H	74.8" x 40.9" x 1.2"
NUMBER OF MODULES	57

SPECIFICATIONS	
MODEL	TESLA SOLAR 7.6kW (1538000-xx-y) (240V)
POWER RATING	7600W
MAX OUTPUT CURRENT	32A
CEC WEIGHTED EFFICIENCY	98%
MAX INPUT CURRENT	13A
MAX DC VOLTAGE	600V
NUMBER OF INVERTERS	2

INVERTER-1 & 2	
MODEL	TESLA SOLAR 7.6kW (1538000-xx-y) (240V)
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MAX OUTPUT CURRENT	32A
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MAX INPUT CURRENT	13A
MAX DC VOLTAGE	600V
NUMBER OF INVERTERS	2

OPTIMIZER CHARACTERISTICS	
MODEL	TESLA SOLAR SHUTDOWN DEVICES (MCI-1)
MIN INPUT VOLTAGE	12VDC
MAX INPUT VOLTAGE	600VDC
MAX OUTPUT CURRENT	15ADC
NUMBER OF OPTIMIZERS	19

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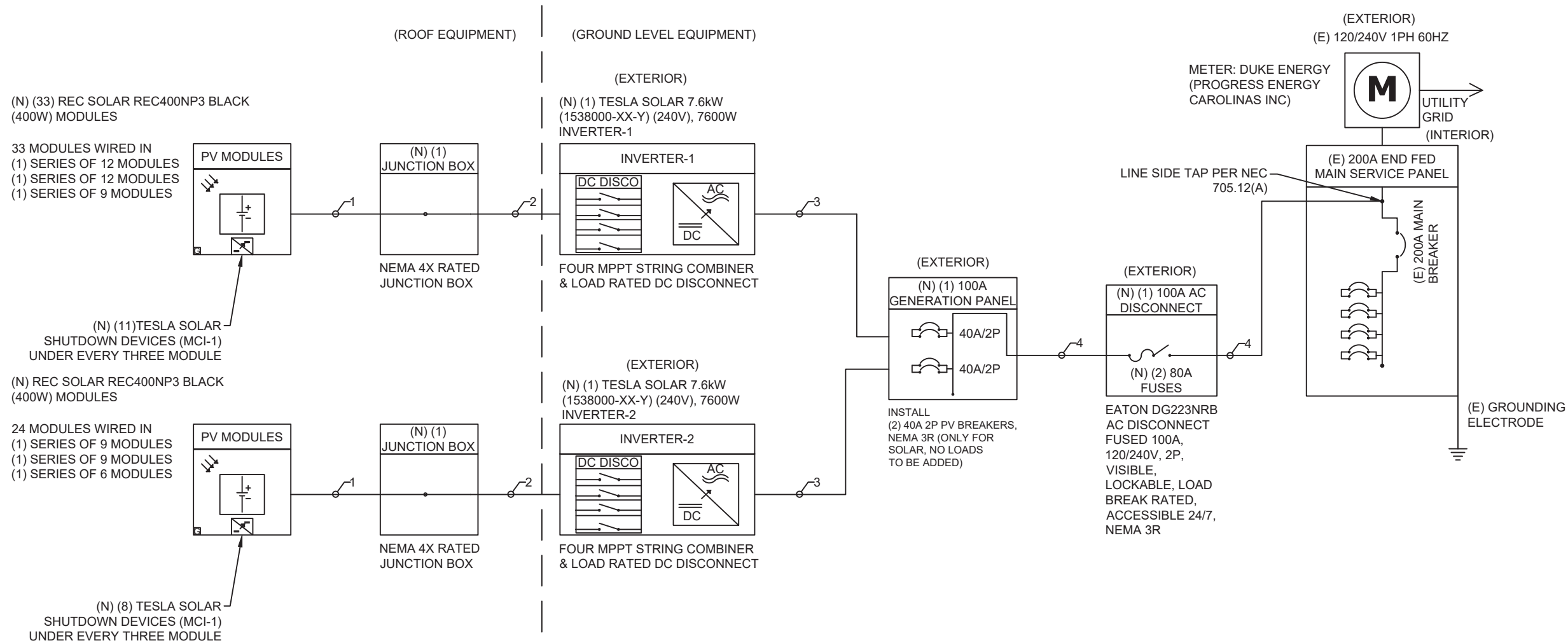


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- NOTE:
 1. INSULATED PIERCING TAPS USED FOR THE LINE SIDE TAP SHALL BE LISTED AND MARKED SUITABLE FOR USE ON THE LINE SIDE OF THE SERVICE DISCONNECT IN ACCORDANCE WITH NEC 230.46
 2. SEE CONDUCTOR SCHEDULE AT PV-4.1.



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SINGLE LINE DIAGRAM PV-4

CONDUCTOR SCHEDULE				
TAG ID	CONDUIT SIZE	CONDUCTOR	NEUTRAL	GROUND
1	NONE	(6) 10 AWG PV WIRE	NONE	(1) 6 AWG BARE COPPER, EGC
2	3/4" EMT	(6) 10 AWG THHN/THWN-2, Cu	NONE	(1) 10 AWG THHN/THWN-2, EGC
3	3/4" EMT	(2) 8 AWG THHN/THWN-2, Cu	(1) 8 AWG THHN/THWN-2, Cu	(1) 10 AWG THHN/THWN-2, EGC
4	1" EMT	(2) 3 AWG THHN/THWN-2, Cu	(1) 3 AWG THHN/THWN-2, Cu	(1) 8 AWG THHN/THWN-2, EGC

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**CONDUCTOR SCHEDULE
 PV-4.1**

SYSTEM CHARACTERISTICS		
DESCRIPTION	INVERTER 1	INVERTER 2
DC SYSTEM SIZE	13200W	9600W
MAX OPEN CIRCUIT VOLTAGE	587.03V	440.27V
OPERATING VOLTAGE	451.2V	338.4V
MAX SHORT CIRCUIT CURRENT	42.71A	42.71A
OPERATING CURRENT	31.92A	31.92A

OCPD CALCULATION	
ALLOWBLE BACKFEED:	
MAIN PANEL RATING	= 200A
MAIN BREAKER RATING	= 200A
LINE SIDE TAP 100% OF ALLOWABLE BACKFEED	= 200A
INVERTER OVERCURRENT PROTECTION:	
INVERTER OVERCURRENT PROTECTION	= COMBINED INVERTER O/P CURRENT * CONTINUOUS LOAD (1.25)
	= (32 + 32) * 1.25
	= 64.00 * 1.25
	= 80A
PV OVERCURRENT PROTECTION	= 80A ≥ 80A
PV BACKFEED	≤ 80A PV OVERCURRENT PROTECTION

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ELECTRICAL NOTES
1. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC 310.10(D).
2. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC 310.10(C).
3. MAXIMUM DC/AC VOLTAGE DROP SHALL BE NO MORE THAN 2%.
4. ALL CONDUCTORS SHALL BE IN CONDUIT UNLESS OTHERWISE NOTED.
5. BREAKER/FUSE SIZES PER NEC 240.
6. AC EQUIPMENT GROUNDING CONDUCTOR SIZED PER NEC 250.122.
7. AMBIENT TEMPERATURE CORRECTION FACTOR IS BASED ON NEC 310.15(B)(2)(a).
8. MAX. SYSTEM VOLTAGE COEFFICIENT IS FROM MODULE MANUFACTURER OR NEC 690.7 WHEN MANUFACTURER COEFFICIENT UNAVAILABLE.
9. CONDUCTORS ARE SIZED PER NEC TABLE 310.15(B)(16).
10. CONDUIT SHALL BE INSTALLED MINIMUM 7/8" FROM ROOF SURFACE.

WIRE SIZE CALCULATIONS	
AMBIENT TEMPERATURE @ 36°C	
TAG 1: (DC)	
REQUIRED CONDUCTOR AMPACITY (1.25 * 11.39 * 1.25)	= 17.79A
CORRECTED AMPACITY CALCULATION (0.91 * 1 * 40)	= 36.40A
17.79A < 36.40A (#10 AWG PV WIRE)	
TAG 2: (DC)	
REQUIRED CONDUCTOR AMPACITY (1.25 * 11.39 * 1.25)	= 17.79A
CORRECTED AMPACITY CALCULATION (0.91 * 0.8 * 40)	= 29.12A
17.79A < 29.12A (3/4" EMT, #10 AWG THHN/THWN-2, Cu)	
TAG 3: (AC)	
REQUIRED CONDUCTOR AMPACITY (32 * 1 * 1.25)	= 40.00A
CORRECTED AMPACITY CALCULATION (0.88 * 1 * 50)	= 44.00A
40.00A < 44.00A (3/4" EMT, #8 AWG THHN/THWN-2, Cu)	
TAG 4: (AC)	
REQUIRED CONDUCTOR AMPACITY (64 * 1 * 1.25)	= 40.00A
CORRECTED AMPACITY CALCULATION (0.88 * 1 * 100)	= 88.00A
80.00A < 88.00A (1" EMT, #3 AWG THHN/THWN-2, Cu)	

DC WIRE SIZING CALCULATIONS BASED ON FOLLOWING EQUATIONS
REQUIRED CONDUCTOR AMPACITY: $125\% * I_{sc}(A) * \# \text{ OF PARALLEL STRINGS} = \text{MAX CURRENT PER } 690.8(A)(1) * 125\%$ $= \text{MAX CURRENT PER } 690.8(B)(1)$
CORRECTED AMPACITY CALCULATIONS: $\text{DERATED CONDUCTOR AMPACITY PER } 690.8(B)(2) = \text{AMPACITY} * \text{TEMPERATURE DERATE FACTOR} * \text{CONDUIT FILL DERATE}$ $\text{DERATED CONDUCTOR AMPACITY CHECK : MAX CURRENT PER } 690.8(B)(1) < \text{DERATED CONDUCTOR AMPACITY}$
AC WIRE SIZING CALCULATIONS BASED ON FOLLOWING EQUATIONS
REQUIRED CONDUCTOR AMPACITY: $\text{INVERTER OUTPUT CURRENT} * \# \text{ OF INVERTERS} = \text{MAX CURRENT PER } 690.8(A)(3) * 125\%$ $= \text{MAX CURRENT PER } 690.8(B)(1)$
CORRECTED AMPACITY CALCULATIONS: $\text{DERATED CONDUCTOR AMPACITY PER } 690.8(B)(2) = \text{AMPACITY} * \text{TEMPERATURE DERATE FACTOR} * \text{CONDUIT FILL DERATE}$ $\text{DERATED CONDUCTOR AMPACITY CHECK : MAX CURRENT PER } 690.8(B)(1) < \text{DERATED CONDUCTOR AMPACITY}$

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ELECTRICAL CALCULATIONS PV-4.2

WARNING

ELECTRIC SHOCK HAZARD

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

DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

LABEL LOCATION
AC DISCONNECT, POINT OF INTERCONNECTION
PER CODE: NEC 690.13

WARNING:PHOTOVOLTAIC POWER SOURCE

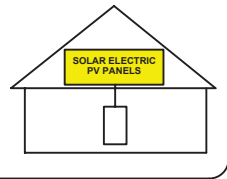
LABEL LOCATION
CONDUIT, INVERTER DC DISCONNECT
PER CODE: NEC 690.31(G)(3)

PHOTOVOLTAIC AC DISCONNECT

LABEL LOCATION
AC DISCONNECT, POINT OF INTERCONNECTION
PER CODE: NEC 690.13(B)

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 THE ARRAY



LABEL LOCATION
AC DISCONNECT, INVERTER DC DISCONNECT, POINT OF INTERCONNECTION
PER CODE: NEC 690.56(C)(1)(a)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION
INVERTER DC DISCONNECT
PER CODE: NEC 690.56(C)(3)

PHOTOVOLTAIC SYSTEM AC DISCONNECT SWITCH

RATED AC OPERATING CURRENT **64.00** AMPS AC
AC NOMINAL OPERATING VOLTAGE **240** VAC

LABEL LOCATION
AC DISCONNECT, POINT OF INTERCONNECTION
PER CODE: NEC 690.54

WARNING

DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION
POINT OF INTERCONNECTION
PER CODE: NEC 705.12(B)(3)

INVERTER-1

RATED MAXIMUM POWER-POINT CURRENT (Imp)	31.92	A
RATED MAXIMUM POWER-POINT VOLTAGE (Vmp)	451.2	V
MAXIMUM SYSTEM VOLTAGE (Voc)	587.03	V
MAXIMUM CIRCUIT CURRENT (Isc)	42.71	A

LABEL LOCATION
INVERTER DC DISCONNECT
PER CODE: NEC 690.53

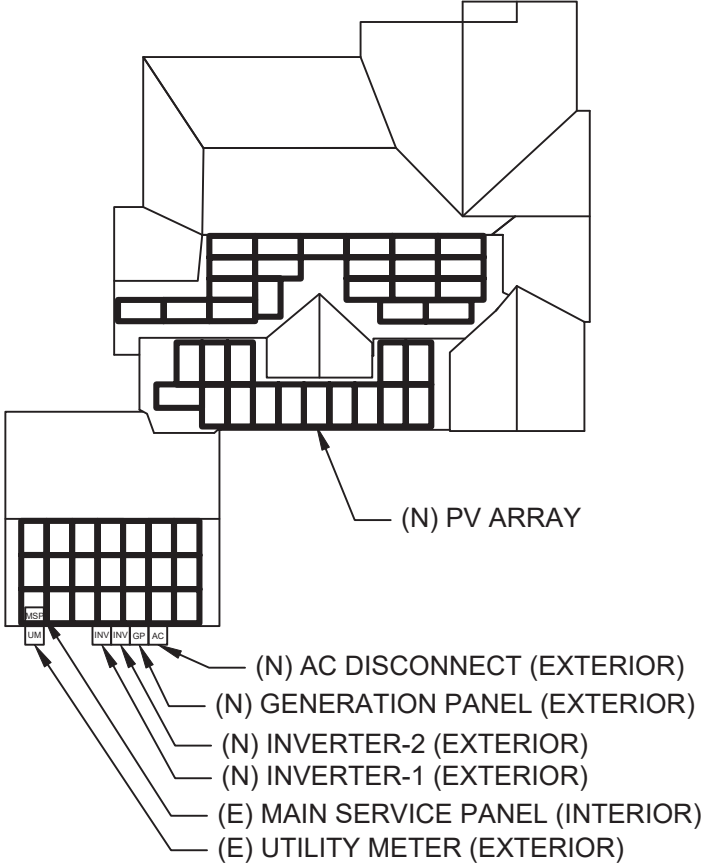
INVERTER-2

RATED MAXIMUM POWER-POINT CURRENT (Imp)	31.92	A
RATED MAXIMUM POWER-POINT VOLTAGE (Vmp)	338.4	V
MAXIMUM SYSTEM VOLTAGE (Voc)	440.27	V
MAXIMUM CIRCUIT CURRENT (Isc)	42.71	A

LABEL LOCATION
INVERTER DC DISCONNECT
PER CODE: NEC 690.53

CAUTION: MULTIPLE SOURCES OF POWER

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN




1039 DELMA GRIMES ROAD, COATS, NC 27521

- NOTES**
1. PLACARDS SHALL MEET THE REQUIREMENTS OF ARTICLES 690 AND 705, UNLESS OTHERWISE SPECIFIED PER LOCAL AHJ REQUIREMENTS.
 2. PLACARDS SHALL MEET THE REQUIREMENTS OF SECTION 110.21(B) AS REQUIRED AND SHALL COMPLY WITH ANSI Z535.4-2011, PRODUCT SAFETY SIGNS AND LABELS.
 3. PLACARDS SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD.
 4. PLACARDS SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED AND SHALL BE HANDWRITTEN.
 5. PLACARDS SHALL NOT COVER EXISTING MANUFACTURER LABELS.
 6. WARNING SIGNAGE TEXT SHALL BE MINIMUM 3/8" TALL.

LABEL LOCATION
SERVICE PANEL
PER CODE: NEC 705.10

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PLACARDS PV-5	

SOLAR'S MOST TRUSTED



REC N-PEAK 3 BLACK SERIES

PREMIUM FULL BLACK MONO N-TYPE SOLAR PANELS



MONO N-TYPE: THE MOST EFFICIENT C-SI TECHNOLOGY



NO LIGHT INDUCED DEGRADATION



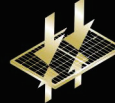
SUPER-STRONG FRAME UP TO 7000 PA SNOW LOAD



FLEXIBLE INSTALLATION OPTIONS

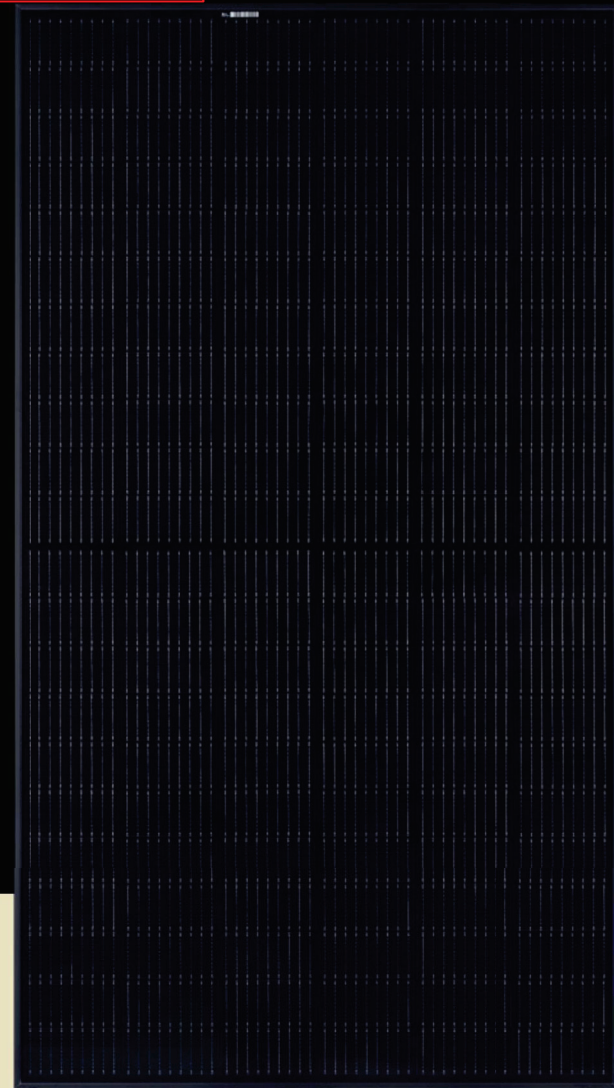


FEATURING REC'S PIONEERING TWIN DESIGN



BIFACIAL CELLS CAN PRODUCE ENERGY FROM BOTH SIDES

400 WP POWER

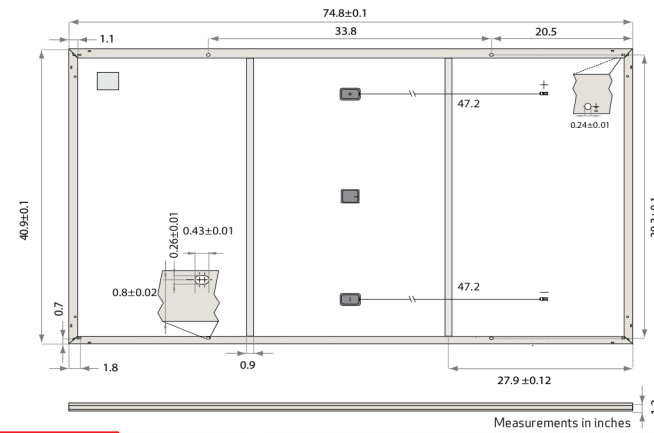


SOLAR'S MOST TRUSTED

REC N-PEAK 3 BLACK SERIES PRODUCT SPECIFICATIONS

GENERAL DATA

Cell type:	132 half-cut mono c-Si n-type cells 6 strings of 22 cells in series
Glass:	0.13 in solar glass with anti-reflective surface treatment in accordance with EN 12150
Backsheet:	Highly resistant polymer (black) with silver support bars
Frame:	Anodized aluminum (black) with silver support bars
Junction box:	3-part, 3 bypass diodes, lead-free IP68 rated, in accordance with IEC 62790
Connectors:	Stäubli MC4 PV-KBT4/KST4 (12 AWG) in accordance with IEC 62852, IP68 only when connected
Cable:	12 AWG PV wire, 47.2 + 47.2 in accordance with EN 50618
Dimensions:	74.8 x 40.9 x 1.2 in (19.7 sq-ft)
Weight:	48.0 lbs
Origin:	Made in Singapore



ELECTRICAL DATA

Product Code: RECxxNP3 Black

STC

Power Output - P _{MAX} (Wp)	390	400
Watt Class Sorting - (W)	0/+10	0/+10
Nominal Power Voltage - V _{MPP} (V)	36.8	37.6
Nominal Power Current - I _{MPP} (A)	10.60	10.64
Open Circuit Voltage - V _{OC} (V)	44.8	45.0
Short Circuit Current - I _{SC} (A)	11.31	11.39
Panel Efficiency (%)	19.5	20.3

NMOT

Power Output - P _{MAX} (Wp)	295	302
Nominal Power Voltage - V _{MPP} (V)	34.4	35.2
Nominal Power Current - I _{MPP} (A)	8.56	8.59
Open Circuit Voltage - V _{OC} (V)	41.9	42.1
Short Circuit Current - I _{SC} (A)	9.13	9.20

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. Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m², temperature 20°C, wind speed 1 m/s). *Where xxx indicates the nominal power class (P_{MAX}) at STC above.

MAXIMUM RATINGS

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

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

WARRANTY

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

The REC ProTrust Warranty is only available on panels purchased through an REC Certified Solar Professional installer. Warranty conditions apply. See www.recgroup.com for more details.

CERTIFICATIONS

IEC 61215:2016, IEC 61730:2016, UL 61730
IEC 62804 PID
IEC 61701 Salt Mist
IEC 62716 Ammonia Resistance
UL 61730 Fire Type Class 2
UL 790 Fire Class Type C
IEC 62782 Dynamic Mechanical Load
IEC 61215-2:2016 Hailstone (1.37in)
ISO 14001, ISO 9001, IEC 45001, IEC 62941



TEMPERATURE RATINGS*

Nominal Module Operating Temperature:	44.3°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

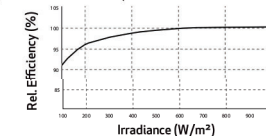
*The temperature coefficients stated are linear values

DELIVERY INFORMATION

Panels per pallet:	33
Panels per 40 ft GP/high cube container:	792 (24 pallets)
Panels per 53 ft truck:	TBD

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



Available from:

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 Solar PTE. LTD.
20 Tuas South Ave. 14
Singapore 637312
post@recgroup.com



Ref: Rev 1.1 - 11.22 Specifications subject to change without notice.

CONTRACTOR INFORMATION



YES SOLAR SOLUTIONS

ADDRESS: 202 NORTH DIXON AVENUE, CARY, NC 27513

PHONE NUMBER: (919) 375-0757

CUSTOMER INFORMATION

NAME: GRIMES JR RESIDENCE

ADDRESS: 1039 DELMA GRIMES ROAD, COATS, NC 27521

COORDINATES: 35.405154, -78.658851

APN: 071600014601

22.800kW DC / 15.200kW AC ROOF MOUNT PV SYSTEM

PROJECT ID AUR-92437

DATE 2/14/2024

CREATED BY AS

SIGNATURE

MODULE SPEC SHEET SS



TESLA

SOLAR INVERTER

3.8 kW | 7.6 kW

Tesla Solar Inverter completes the Tesla home solar system, converting DC power from solar to AC power for home consumption. Tesla's renowned expertise in power electronics has been combined with robust safety features and a simple installation process to produce an outstanding solar inverter that is compatible with both Solar Roof and traditional solar panels. Once installed, homeowners use the Tesla mobile app to manage their solar system and monitor energy consumption, resulting in a truly unique ecosystem experience.

KEY FEATURES

- Built on Powerwall 2 technology for exceptional efficiency and reliability
- Designed to integrate with Tesla Powerwall and Tesla App
- Wi-Fi, Ethernet, and cellular connectivity with easy over-the-air updates
- 3.8 kW and 7.6 kW models available

SOLAR INVERTER

Tesla Solar Inverter provides DC to AC conversion and integrates with the Tesla ecosystem, including Solar Panels, Solar Roof, Powerwall, and vehicle charging, to provide a seamless sustainable energy experience.

KEY FEATURES

- Integrated rapid shutdown, arc fault, and ground fault protection
- 2x the standard number of MPPTs for high production on complex roofs
- No neutral wire simplifies installation



ELECTRICAL SPECIFICATIONS

MODEL NUMBER	1534000-xx-y	1538000-xx-y
OUTPUT (AC)	3.8 kW	7.6 kW
Nominal Power	3,800 W	7,600 W
Maximum Apparent Power	3,328 VA at 208 V 3,840 VA at 240 V	6,656 VA at 208 V 7,680 VA at 240 V
Maximum Continuous Current	16 A	32 A
Breaker (Overcurrent Protection)	20 A	40 A
Nominal Power Factor	1 - 0.9 (leading / lagging)	
THD (at Nominal Power)	<5%	
INPUT (DC)		
MPPT	2	4
Input Connectors per MPPT	1-2	1-2-1-2
Maximum Input Voltage	600 VDC	
DC Input Voltage Range	60 - 550 VDC	
DC MPPT Voltage Range	60 - 480 VDC ¹	
Maximum Current per MPPT (I _{mp})	13 A	
Maximum Short Circuit Current per MPPT (I _{sc})	15 A	

PERFORMANCE SPECIFICATIONS

Peak Efficiency	98% at 208 V 98.1% at 240 V	98.4% at 208 V 98.6% at 240 V
CEC Efficiency	97.5% at 208 V 97.5% at 240 V	97.5% at 208 V 98.0% at 240 V
Allowable DC/AC Ratio	1.7	
Customer Interface	Tesla Mobile App	
Internet Connectivity	Wi-Fi (2.4 GHz, 802.11 b/g/n), Ethernet, Cellular (LTE/4G) ²	
AC Remote Metering Support	Wi-Fi (2.4 GHz, 802.11 b/g/n), RS-485	
Protections	Integrated arc fault circuit interrupter (AFCI), Rapid Shutdown	
Supported Grid Types	60 Hz, 240 V Split Phase 60 Hz, 208 V Wye	

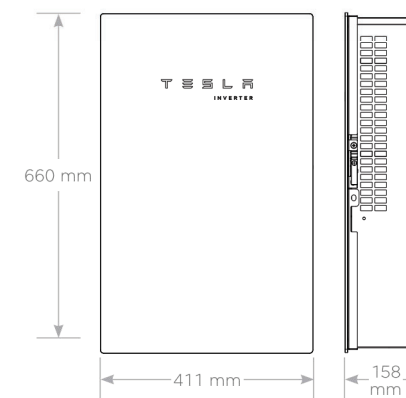
¹ Maximum current.

² Cellular connectivity subject to network operator service coverage and signal strength.

MECHANICAL SPECIFICATIONS

Dimensions	660 mm x 411 mm x 158 mm (26 in x 16 in x 6 in)
Weight	52 lb ³
Mounting options	Wall mount (bracket)

³ Door and bracket can be removed for a mounting weight of 37 lb.



ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-30°C to 45°C (-22°F to 113°F) ⁴
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Rating	Type 3R
Ingress Rating	IP55 (Wiring compartment)
Pollution Rating	PD2 for power electronics and terminal wiring compartment, PD3 for all other components
Operating Noise @ 1 m	< 40 db(A) nominal, < 50 db(A) maximum

⁴ For the 7.6 kW Solar Inverter, performance may be de-rated to 6.2 kW at 240 V or 5.37 kW at 208 V when operating at temperatures greater than 45°C.

COMPLIANCE INFORMATION

Grid Certifications	UL 1741, UL 1741 SA, IEEE 1547, IEEE 1547.1
Safety Certifications	UL 1741 PVRSS, UL 1699B, UL 1998 (US), UL 3741
Emissions	EN 61000-6-3 (Residential), FCC 47CFR15.109 (a)

TESLA

NA 2022-02-02

TESLA.COM/ENERGY

CONTRACTOR INFORMATION



YES SOLAR SOLUTIONS

ADDRESS: 202 NORTH DIXON AVENUE, CARY, NC 27513

PHONE NUMBER: (919) 375-0757

CUSTOMER INFORMATION

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APN: 071600014601

22.800kW DC / 15.200kW AC ROOF MOUNT PV SYSTEM

PROJECT ID AUR-92437

DATE 2/14/2024

CREATED BY AS

SIGNATURE

INVERTER SPEC SHEET
SS

SOLAR SHUTDOWN DEVICE

The Tesla Solar Shutdown Device is a Mid-Circuit Interrupter (MCI) and is part of the PV system rapid shutdown (RSD) function in accordance with Article 690 of the applicable NEC. When paired with Powerwall+, solar array shutdown is initiated by pushing the System Shutdown Switch if one is present.



ELECTRICAL SPECIFICATIONS

Model Number	MCI-1
Nominal Input DC Current Rating (I_{HP})	12 A
Maximum Input Short Circuit Current (I_{SC})	15 A
Maximum System Voltage	600 V DC

RSD MODULE PERFORMANCE

Maximum Number of Devices per String	5
Control	Power Line Excitation
Passive State	Normally open
Maximum Power Consumption	7 W
Warranty	25 years

COMPLIANCE INFORMATION

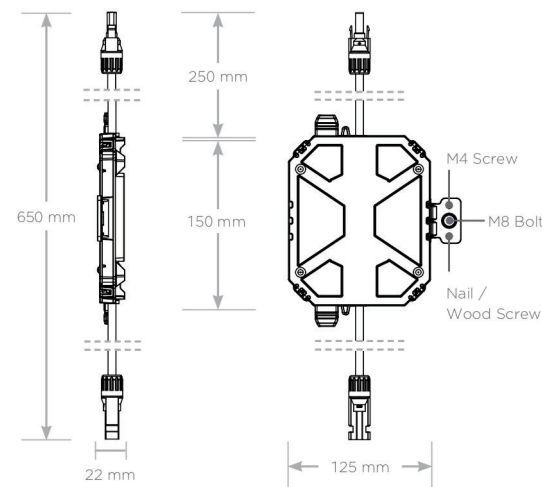
Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)
RSD Initiation Method	External System Shutdown Switch
Compatible Equipment	See <i>Compatibility Table</i> below

ENVIRONMENTAL SPECIFICATIONS

Ambient Temperature	-40°C to 50°C (-40°F to 122°F)
Storage Temperature	-30°C to 60°C (-22°F to 140°F)
Enclosure Rating	NEMA 4 / IP65

MECHANICAL SPECIFICATIONS

Electrical Connections	MC4 Connector
Housing	Plastic
Dimensions	125 mm x 150 mm x 22 mm (5 in x 6 in x 1 in)
Weight	350 g (0.77 lb)
Mounting Options	ZEP Home Run Clip M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw



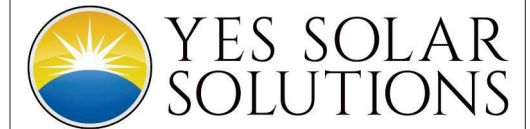
UL 3741 PV HAZARD CONTROL (AND PVRSA) COMPATIBILITY

Tesla Solar Roof and Tesla/Zep ZS Arrays using the following modules are certified to UL 3741 and UL 1741 PVRSA when installed with the Powerwall+ and Solar Shutdown Devices. See [Powerwall+ Rapid Shutdown: Module Selection Based on PV Hazard Control System Listing](#) for guidance on installing Powerwall+ and Solar Shutdown Devices with other modules.

Brand	Model	Required Solar Shutdown Devices
Tesla	Solar Roof V3	1 Solar Shutdown Device per 10 modules
Tesla	Tesla TxxxS (where xxx = 405 to 450 W, increments of 5) or Tesla TxxxH (where xxx = 395 to 415 W, increments of 5)	1 Solar Shutdown Device per 3 modules ¹
Hanwha	Q.PEAK DUO BLK-G5 or Q.PEAK DUO BLK-G6+	1 Solar Shutdown Device per 3 modules

¹**Exception:** Tesla solar modules installed in locations where the max Voc for three modules at low design temperatures exceeds 165 V shall be limited to two modules between Solar Shutdown Devices.

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RAPID SHUTDOWN DEVICE SPEC SHEET

SS

DESCRIPTION:
SNAPRACK, ULTRA RAIL COMP KIT

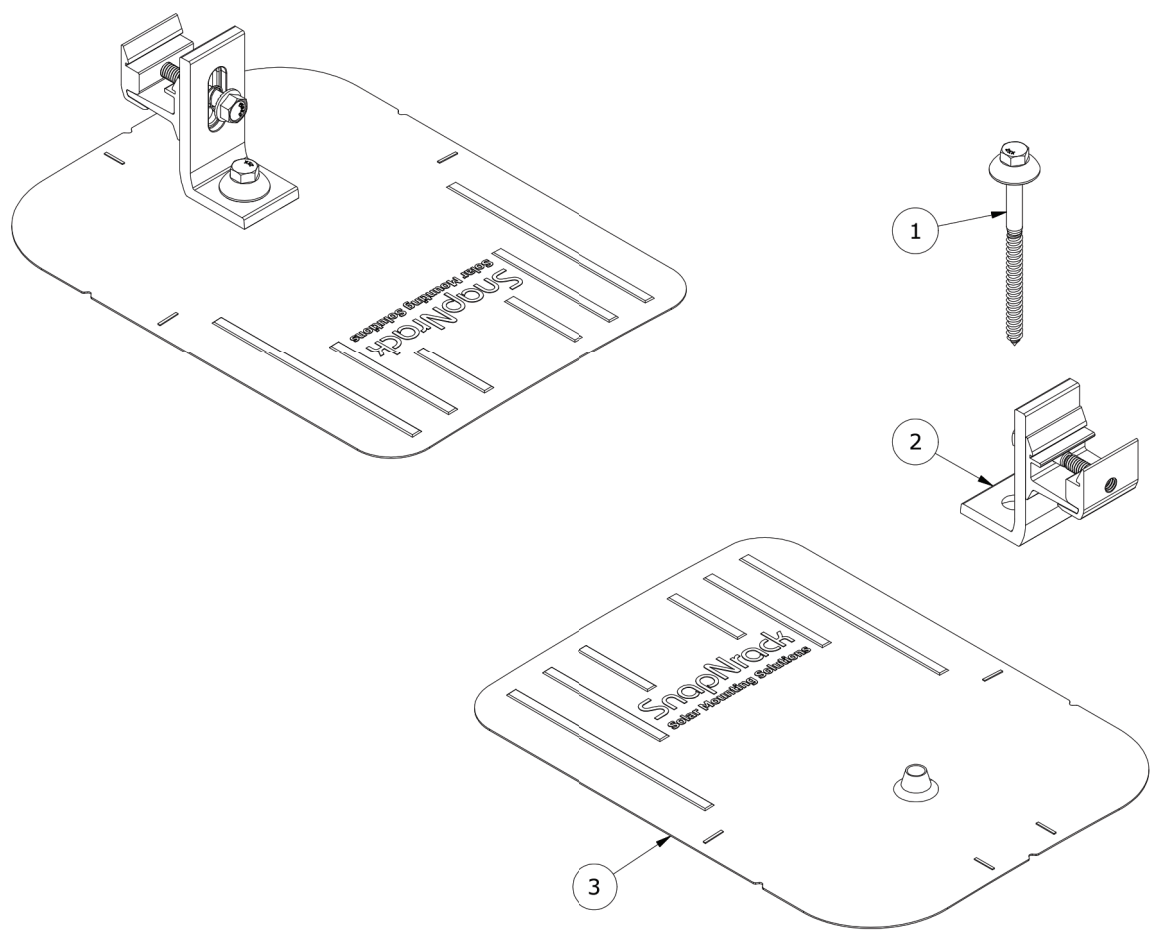
DRAWN BY:
 mwatkins

SnapNrack®

PART NUMBER(S):
 SEE BELOW

REVISION:
C

595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA
 PHONE (415) 580-8900 • FAX (415) 580-8902
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PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	242-92266	SNAPRACK, UMBRELLA LAG, TYPE 3, 4IN, SS
2	1	242-01219, 242-01220	SNAPRACK, ULTRA RAIL UMBRELLA L FOOT, SILVER / BLACK
3	1	232-01375, 232-01376, 232-01377	SNAPRACK, COMP FLASHING, 9IN X 12IN, SILVER / BLACK

MATERIALS:	6000 SERIES ALUMINUM, STAINLESS STEEL, RUBBER
DESIGN LOAD (LBS):	802 UP, 1333 DOWN, 356 SIDE
ULTIMATE LOAD (LBS):	2005 UP, 4000 DOWN, 1070 SIDE
TORQUE SPECIFICATION:	12 LB-FT
CERTIFICATION:	UL 2703, FILE E359313; WIND-DRIVEN RAIN TEST FROM UL SUBJECT 2582
WEIGHT (LBS):	0.79 - 1.03

DESCRIPTION:
SNAPRACK, ULTRA RAIL COMP KIT

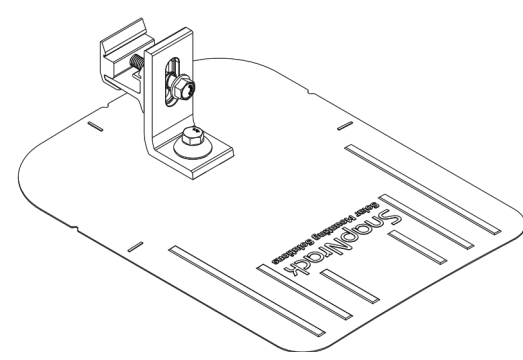
DRAWN BY:
 mwatkins

SnapNrack®

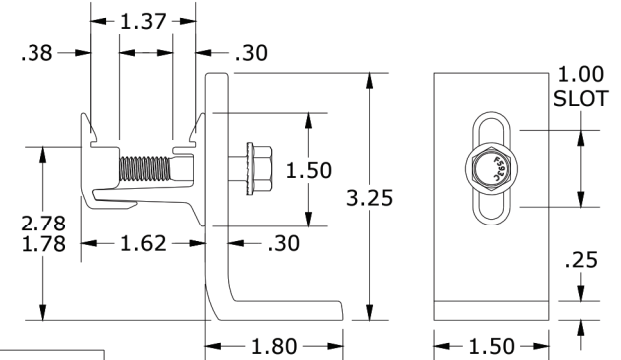
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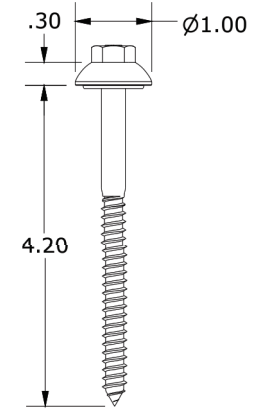
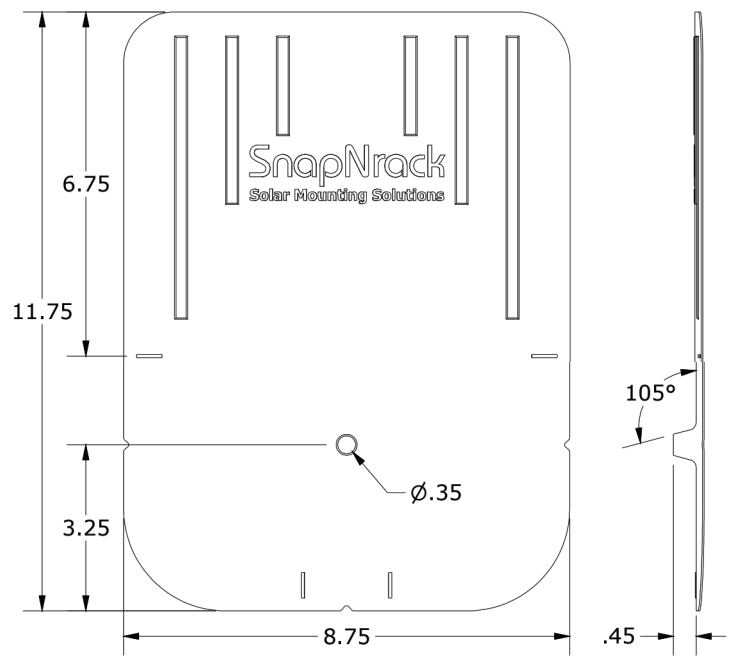
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UMBRELLA L FOOT PROPERTIES	
SKU	DESCRIPTION
242-01219	ULTRA RAIL UMBRELLA L FOOT, SILVER
242-01220	ULTRA RAIL UMBRELLA L FOOT, BLACK



COMP FLASHING PROPERTIES	
SKU	DESCRIPTION
232-01375	COMP FLASHING, 9" X 12", BLACK ALUM
232-01376	COMP FLASHING, 9" X 12", SILVER ALUM
232-01377	COMP FLASHING, 9" X 12", BLACK GALVALUME



ALL DIMENSIONS IN INCHES

CONTRACTOR INFORMATION



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 PHONE NUMBER: (919) 375-0757

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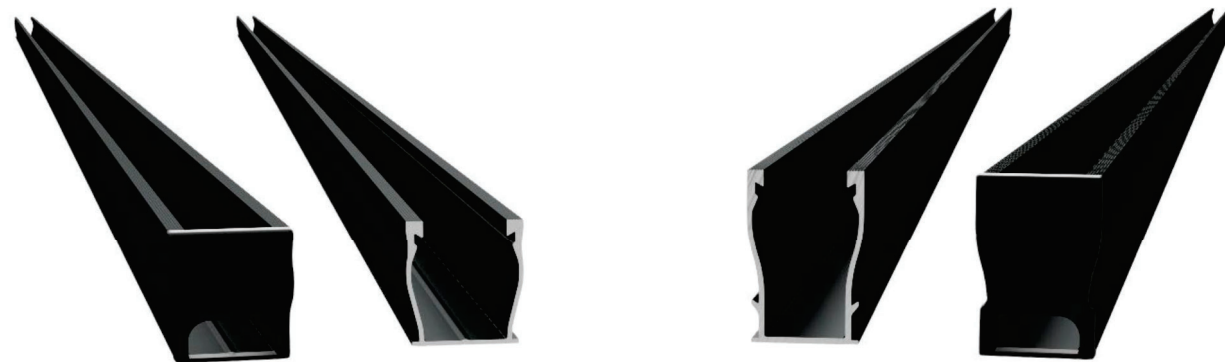
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PROJECT ID	AUR-92437
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CREATED BY	AS
SIGNATURE	

MOUNT SPEC SHEET
 SS

Ultra Rail

UR-40
UR-60




The Ultimate Value in Rooftop Solar

 Industry leading Wire Management Solutions

 Mounts available for all roof types

 Single Tool Installation

 All SnapNrack Module Clamps & Accessories are compatible with both rail profiles

Start Installing Ultra Rail Today

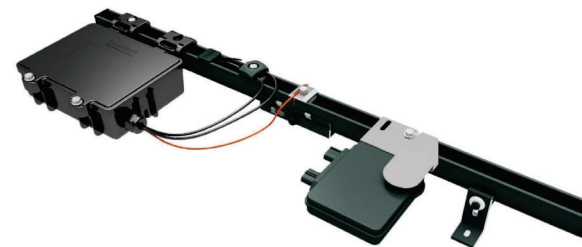
RESOURCES snapnrack.com/resources
DESIGN snapnrack.com/configurator
WHERE TO BUY snapnrack.com/where-to-buy

SnapNrack Ultra Rail System

A sleek, straightforward rail solution for mounting solar modules on all roof types. Ultra Rail features two rail profiles; UR-40 is a lightweight rail profile that is suitable for most geographic regions and maintains all the great features of SnapNrack rail, while UR-60 is a heavier duty rail profile that provides a larger rail channel and increased span capabilities. Both are compatible with all existing mounts, module clamps, and accessories for ease of install.

The Entire System is a Snap to Install

- New Ultra Rail Mounts include snap-in brackets for attaching rail
- Compatible with all the SnapNrack Mid Clamps and End Clamps customers love
- Universal End Clamps and snap-in End Caps provide a clean look to the array edge



Unparalleled Wire Management

- Open rail channel provides room for running wires resulting in a long-lasting quality install
- Industry best wire management offering includes Junction Boxes, Universal Wire Clamps, MLPE Attachment Kits, and Conduit Clamps
- System is fully bonded and listed to UL 2703 Standard

Heavy Duty UR-60 Rail

- UR-60 rail profile provides increased span capabilities for high wind speeds and snow loads
- Taller, stronger rail profile includes profile-specific rail splice and end cap
- All existing mounts, module clamps, and accessories are retained for the same great install experience



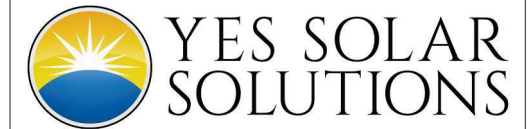
Quality. Innovative. Superior.

SnapNrack Solar Mounting Solutions are engineered to optimize material use and labor resources and improve overall installation quality and safety.

877-732-2860 www.snapnrack.com contact@snapnrack.com

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RAIL SPEC SHEET
SS