NEW PHOTOVOLTAIC SYSTEM 14.260kW DC / 11.500kW AC
NEW ENERGY STORAGE SYSTEM 13.500kWh
335 DEANNE LANE, 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

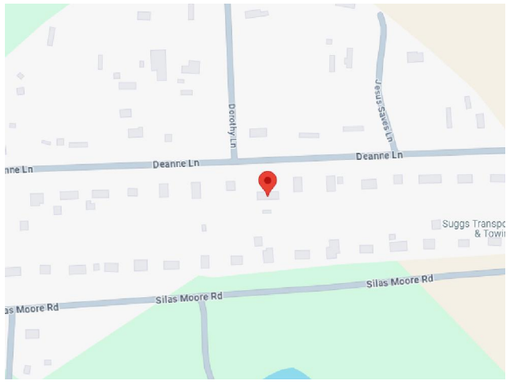
SOLAR LAYOUT MEETS 120 MPH DESIGN WIND SPEED REQUIREMENTS

HIGH TEMP: 36°C, LOW TEMP: -8.5°C

SCOPE OF WORK

(N) 14.260kW DC / 11.500kW AC ROOF MOUNT PV SYSTEM
(N) 13.500kWh ENERGY STORAGE SYSTEM
(31) CANADIAN SOLAR CS6.1-54TM-460H MODULE
(1) TESLA POWERWALL 3 INTEGRATED SOLAR BATTERY
1707000-XX-Y (240V) INVERTER
(18) TESLA SOLAR SHUTDOWN DEVICE (MCI-1)
(1) TESLA GATEWAY 3 (1841000-X1-Y)

VICINITY MAP



NOTICE TO CONTRACTOR
All construction must comply with current NC Building Codes and is subject to field inspection and verification.
APPROVED
Limited building only review
Permit holder responsible for full compliance with the code
06/17/2025
Harnett COUNTY NORTH CAROLINA

SHEET CATALOG

PV-1	COVER SHEET
PV-1.1	GENERAL NOTES
PV-2	SITE PLAN-1
PV-2.1	SITE PLAN-2
PV-3	MOUNTING DETAILS
PV-3.1	STRUCTURAL DETAILS
PV-4	SINGLE LINE DIAGRAM
PV-4.1	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: 2025.05.05 10:57:18 -04'00'

METER NUMBER: 349 487 519

CONTRACTOR INFORMATION

YES SOLAR SOLUTIONS

ADDRESS: 202 NORTH DIXON AVENUE, CARY, NC 27513

PHONE NUMBER: (919) 375-0757

LICENSE NUMBER: NC GC #67356; NC ELECTRIC #U.32326

LICENSE TYPE: NC GC/ELECTRIC

CUSTOMER INFORMATION

NAME: RIDDLE RESIDENCE

ADDRESS: 335 DEANNE LANE, COATS, NC 27521

COORDINATES: 35.437243, -78.620282

APN: 071611005847

14.260kW DC / 11.500kW AC ROOF MOUNT PV SYSTEM
13.500kWh ENERGY STORAGE SYSTEM

NORTH CAROLINA PROFESSIONAL SEAL 025611 ENGINEER RONALD P. BITTLER

STRUCTURAL
05.05.2025

STRUCTURAL REVIEW PROVIDED BY:
RONALD P. BITTLER, PE
RB ENGINEERING, INC. (C-2499)
168 QUADE DRIVE
CARY, NC 27513
919-677-9662
PROJECT #RB-25480

PROJECT ID	AUR-1012369
DATE	5/3/2025
CREATED BY	VK
SIGNATURE	

COVER SHEET
PV-1

NOTES:

1. MODULES ARE LISTED UNDER UL 1703 / UL 61730 AND CONFORM TO THE STANDARDS.
2. INVERTERS ARE LISTED UNDER UL 1741 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 ADDITION OF PHOTOVOLTAIC SYSTEM.

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GENERAL NOTES

PV-1.1

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(N) 13.500kWh ENERGY STORAGE SYSTEM
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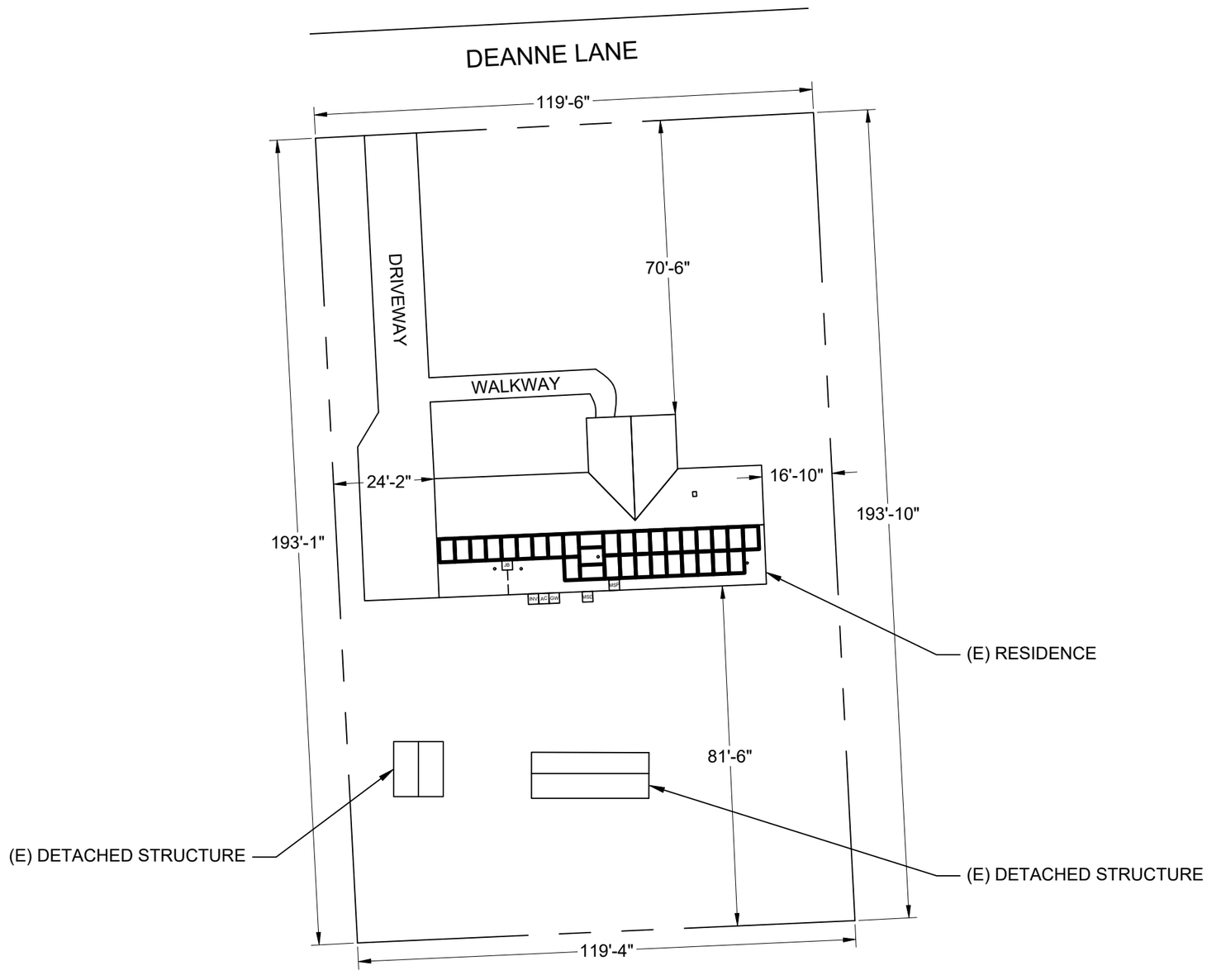
1707000-XX-Y (240V) INVERTER
(18) TESLA SOLAR SHUTDOWN DEVICE (MCI-1)
(1) TESLA GATEWAY 3 (1841000-X1-Y)

TOTAL ARRAY AREA = 680.73 SQ.FT
TOTAL ROOF AREA = 2684.34 SQ.FT
% ARRAY AREA IN ROOF = 25.35%

NOTE: NO GATE AND FENCE.



LEGEND

PROPERTY LINE

N

SCALE:1" = 30'-0"

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SITE PLAN-1
PV-2

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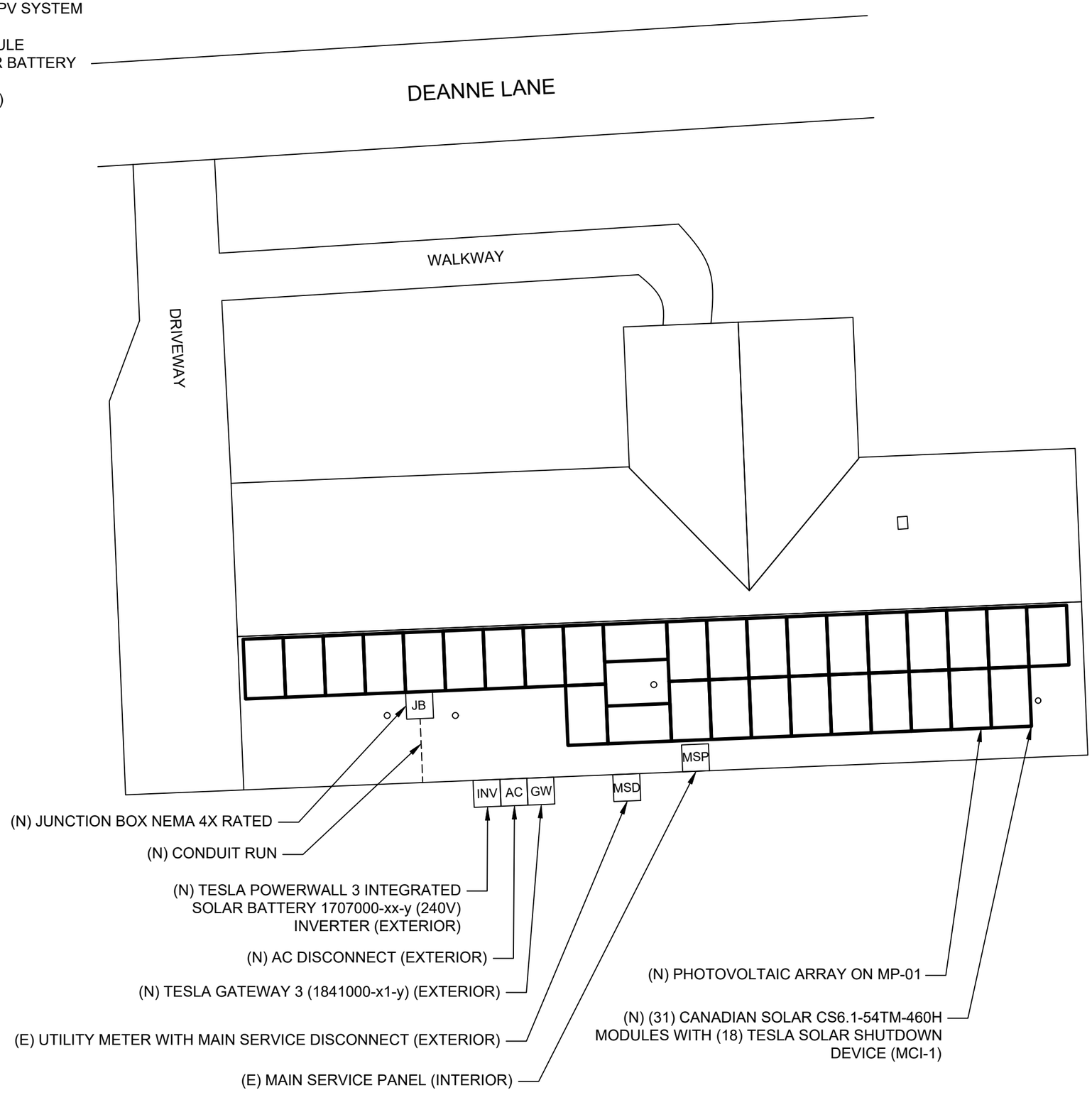

LEGEND

- VENT (ROOF OBSTRUCTION)
- MSD — UTILITY METER WITH MAIN SERVICE DISCONNECT
- MSP — MAIN SERVICE PANEL
- AC — AC DISCONNECT
- GW — TESLA BACKUP GATEWAY 3
- INV — INVERTER WITH INTEGRATED SOLAR BATTERY
- JB — JUNCTION BOX

N

SCALE: 1" = 10'-0"

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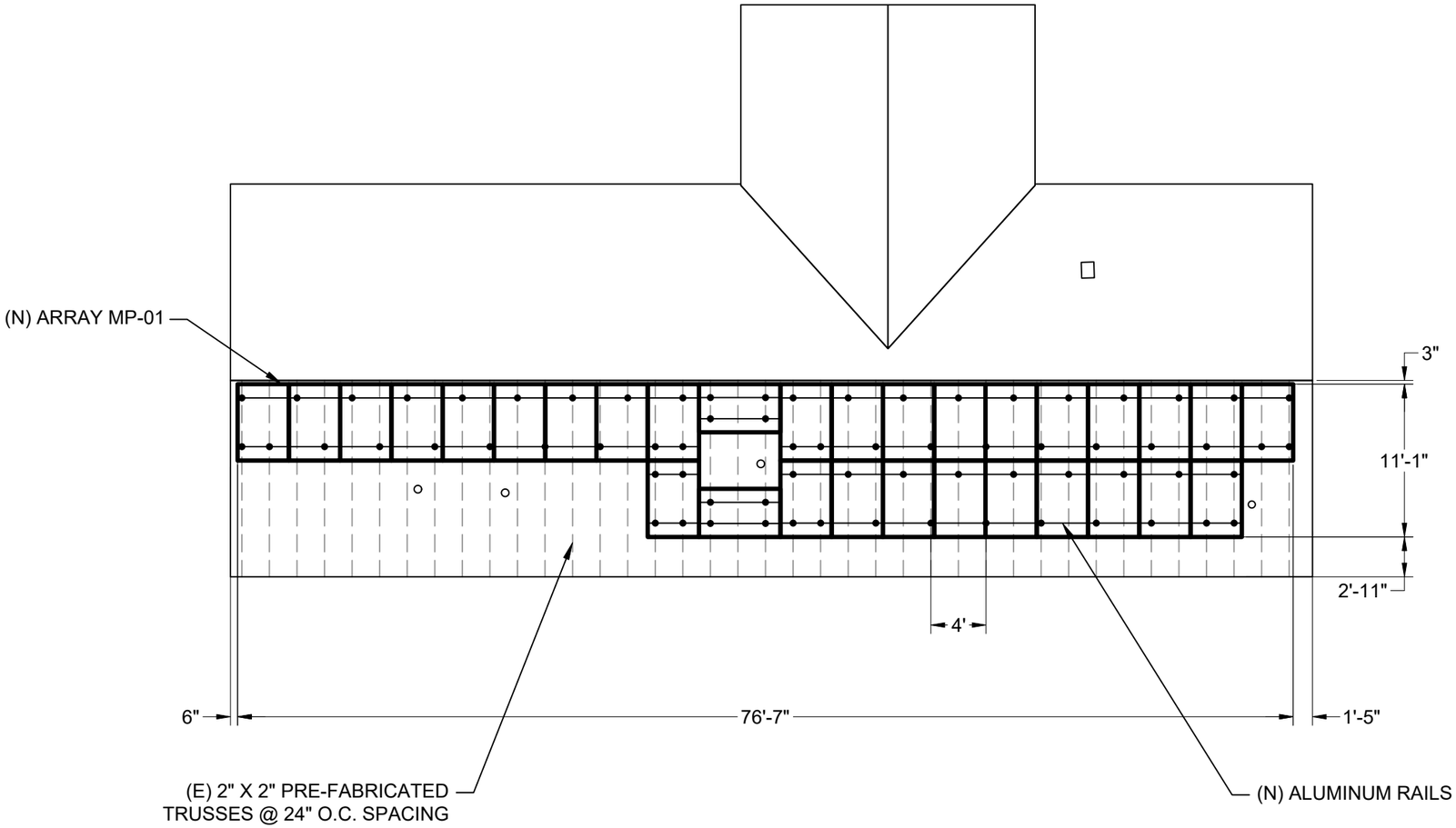
SITE PLAN-2
PV-2.1

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	178°	20°	31	680.73	COMPOSITION SHINGLE	SNAPNRACK ULTRA RAIL COMP KIT	71	ATTIC	PRE-FABRICATED TRUSSES	2" X 2"	24" O.C.	4'-0"	1'-6"

NOTE: PENETRATIONS ARE STAGGERED.



LEGEND

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

N

SCALE:1" = 10'-0"

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13.500kWh ENERGY STORAGE SYSTEM

NORTH CAROLINA PROFESSIONAL SEAL 025611 ENGINEER RONALD P. BITTLER

05.05.2025

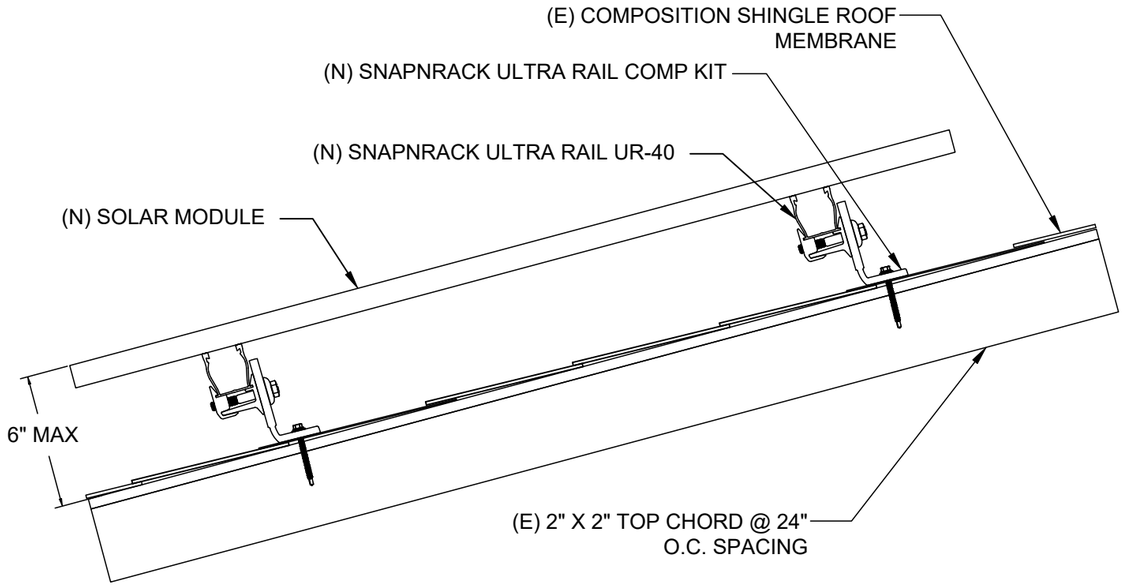
PROJECT ID	AUR-1012369
DATE	5/3/2025
CREATED BY	VK
SIGNATURE	

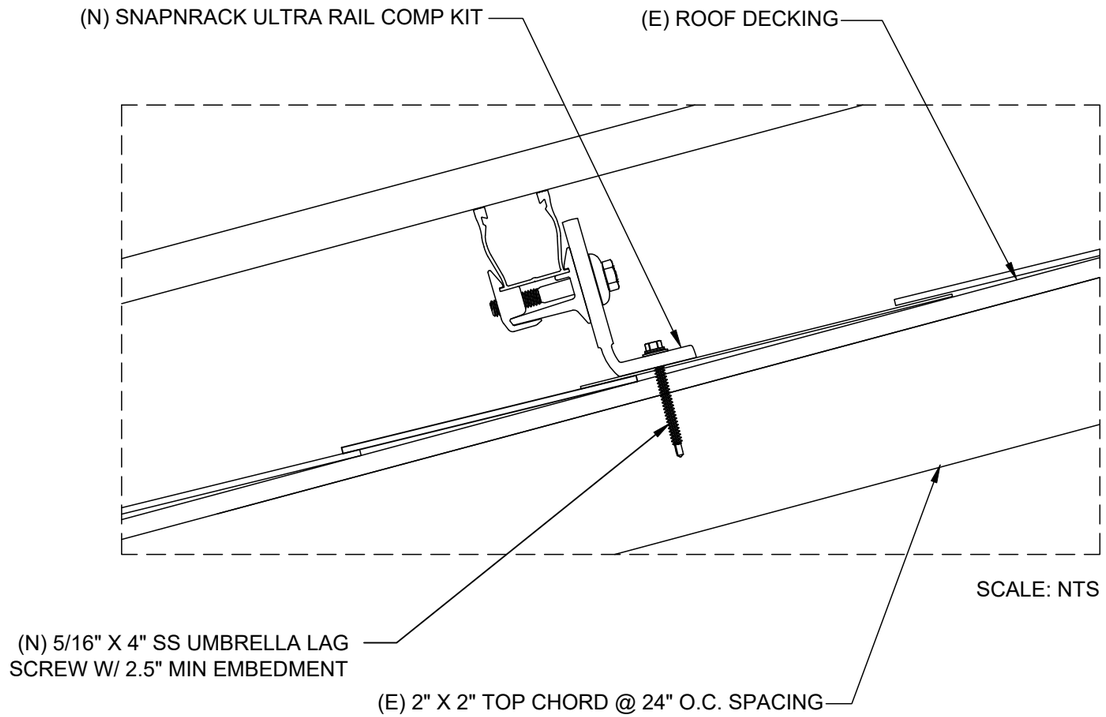
MOUNTING DETAILS

PV-3

STRUCTURAL NOTES

1. ALL SOLAR PANEL COMPONENTS SHALL BE INSTALLED PER THE MANUFACTURER'S APPROVED INSTALLATION SPECIFICATIONS.
2. THE EXISTING BUILDING'S STRUCTURE SHALL BE VERIFIED AS PROPERLY CONSTRUCTED AND MAINTAINED IN GOOD CONDITION. NO ALLOWANCE HAS BEEN MADE FOR ANY EXISTING DEFICIENCY IN DESIGN, MATERIAL, CONSTRUCTION, OR LACK OF MAINTENANCE FOR THE EXISTING STRUCTURE OR PROPOSED EQUIPMENT. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS, PROPER FIT, AND CLEARANCES IN THE FIELD.
3. IF ANY CONDITION THROUGHOUT THE ASSOCIATED REPORT OR PERMIT DRAWINGS IS NOT REPRESENTED ON-SITE, CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD (EOR) OF ANY DISCREPANCIES AND RECEIVE WRITTEN APPROVAL FROM THE EOR BEFORE PROCEEDING WITH INSTALLATION.
4. MISCELLANEOUS ITEMS NOT EXPLICITLY NAMED & SHOWN IN THESE DRAWINGS HAVE NOT BEEN DESIGNED. IT IS RECOMMENDED THAT MATERIAL OF SUITABLE SIZE & STRENGTH BE OBTAINED FROM A REPUTABLE MANUFACTURER FOR MISCELLANEOUS ITEMS.
5. CONTRACTOR SHALL BE RESPONSIBLE TO COMPLETE, SEAL, & WATERPROOF ROOFTOP PENETRATIONS FOR SOLAR RACKING.
6. CONTRACTOR TO PROVIDE MINIMUM 1/4" GAP BETWEEN ALL SOLAR PANELS.
7. PROJECT WINDSPEED IS BASIC WIND SPEED PER CODE UNLESS NOTED OTHERWISE.





DEAD LOAD CALCULATIONS

BOM	QUANTITY	LBS/UNIT	TOTAL WEIGHT (LBS)
MODULES	31	50.7	1571.7
MID-CLAMP	50	0.17	8.5
END-CLAMP	24	0.3	7.2
RAIL LENGTH	245	0.42	102.9
SPLICE BAR	12	0.52	6.24
SNAPNRACK ULTRA RAIL COMP KIT	71	1.03	73.13
MCI DEVICE	18	0.77	13.86
TOTAL WEIGHT OF THE SYSTEM (LBS)			1783.53
TOTAL ARRAY AREA ON THE ROOF (SQ. FT.)			680.73
WEIGHT PER SQ. FT.(LBS)			2.61
WEIGHT PER PENETRATION (LBS)			25.12

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NORTH CAROLINA PROFESSIONAL SEAL 025611 ENGINEER RONALD P. BITTLER

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STRUCTURAL DETAILS

PV-3.1

MODULE SPECIFICATIONS

MODEL	CANADIAN SOLAR CS6.1-54TM-460H
MODULE POWER @ STC	460W
OPEN CIRCUIT VOLTAGE:Voc	39.7V
MAX POWER VOLTAGE:Vmp	32.4V
SHORT CIRCUIT CURRENT:Isc	14.75A
MAX POWER CURRENT:Imp	14.20A
TEMPERATURE COEFFICIENT:Voc	-0.25%/°C
MODULE DIMENSIONS: L x W x H	70.9" x 44.6" x 1.18"
NUMBER OF MODULES	31

INVERTER-1 SPECIFICATIONS

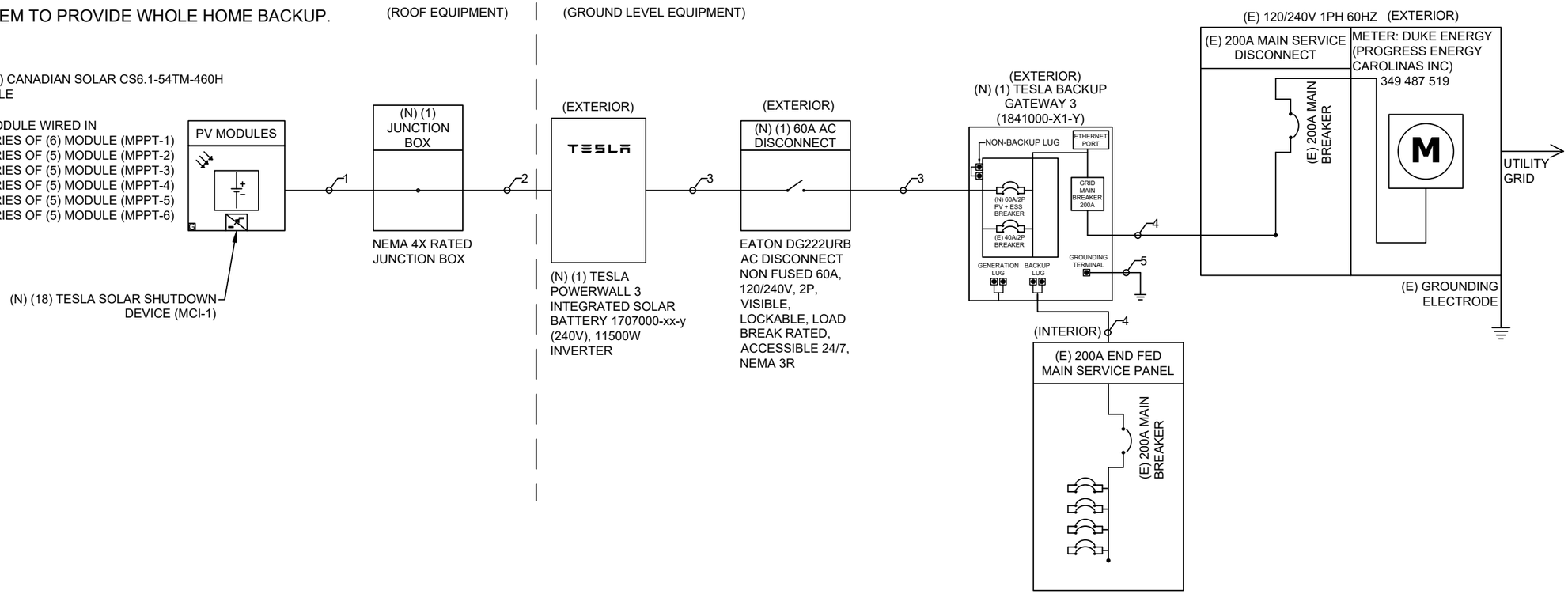
MODEL	TESLA POWERWALL 3 INTEGRATED SOLAR BATTERY 1707000-XX-Y (240V)
POWER RATING	11500W
MAX OUTPUT CURRENT	48A
CEC WEIGHTED EFFICIENCY	97.5%
MAX INPUT CURRENT	15A
MAX DC VOLTAGE	550V
NUMBER OF INVERTER	1

RSD CHARACTERISTICS

MODEL	TESLA SOLAR SHUTDOWN DEVICE (MCI-1)
NOMINAL INPUT DC CURRENT	13A
MAX SYSTEM VOLTAGE	600VDC
MAX INPUT SHORT CIRCUIT CURRENT	19A
NUMBER OF RSD	18

NOTE:

1. SYSTEM TO PROVIDE WHOLE HOME BACKUP.



CONDUCTOR SCHEDULE

TAG ID	CONDUIT SIZE	CONDUCTOR	NEUTRAL	GROUND
1	NONE	(12) 10 AWG PV WIRE	NONE	(1) 6 AWG BARE COPPER, EGC
2	1-1/4" PVC	(12) 8 AWG THHN/THWN-2, Cu	NONE	(1) 10 AWG THHN/THWN-2, EGC
3	1" EMT	(2) 4 AWG THHN/THWN-2, Cu	(1) 4 AWG THHN/THWN-2, Cu	(1) 10 AWG THHN/THWN-2, EGC
4	2" PVC	(2) 3/0 AWG THHN/THWN-2, Cu	(1) 3/0 AWG THHN/THWN-2, Cu	(1) 6 AWG THHN/THWN-2, EGC
5	NONE			(1) 4 AWG BARE COPPER, GEC

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13.500kWh ENERGY STORAGE SYSTEM

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SINGLE LINE DIAGRAM

PV-4

SYSTEM CHARACTERISTICS

DC SYSTEM SIZE	14260W
MAX OPEN CIRCUIT VOLTAGE	258.14V
OPERATING VOLTAGE	194.4V
MAX SHORT CIRCUIT CURRENT	110.62A
OPERATING CURRENT	85.2A

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.

DC WIRE SIZING CALCULATIONS BASED ON FOLLOWING EQUATIONS

REQUIRED CONDUCTOR AMPACITY:
Isc(A) * # OF PARALLEL STRINGS = MAX CURRENT PER 690.8(A)(1) * 125%
= MAX CURRENT PER 690.8(B)(1)

CORRECTED AMPACITY CALCULATIONS:
DERATED CONDUCTOR AMPACITY PER 690.8(B)(2) = AMPACITY * TEMPERATURE DERATE FACTOR * CONDUIT FILL DERATE
DERATED CONDUCTOR AMPACITY CHECK : MAX CURRENT PER 690.8(B)(1) < DERATED CONDUCTOR AMPACITY

AC WIRE SIZING CALCULATIONS BASED ON FOLLOWING EQUATIONS

REQUIRED CONDUCTOR AMPACITY:
INVERTER OUTPUT CURRENT * # OF INVERTERS = MAX CURRENT PER 690.8(A)(3) * 125%
= MAX CURRENT PER 690.8(B)(1)

CORRECTED AMPACITY CALCULATIONS:
DERATED CONDUCTOR AMPACITY PER 690.8(B)(2) = AMPACITY * TEMPERATURE DERATE FACTOR * CONDUIT FILL DERATE
DERATED CONDUCTOR AMPACITY CHECK : MAX CURRENT PER 690.8(B)(1) < DERATED CONDUCTOR AMPACITY

OCPD CALCULATION

ALLOWABLE BACKFEED:
MAIN PANEL RATING = 200A
MAIN BREAKER RATING = 200A

INVERTER OVERCURRENT PROTECTION:
INVERTER OVERCURRENT PROTECTION = INVERTER O/P CURRENT * CONTINUOUS LOAD (1.25)
= 48 * 1.25
= 60A
PV OVERCURRENT PROTECTION = 60A

WIRE SIZE CALCULATIONS

AMBIENT TEMPERATURE @ 36°C

TAG 1: (DC)
REQUIRED CONDUCTOR AMPACITY (14.75 * 1.25 * 1.25) = 23.04A
CORRECTED AMPACITY CALCULATION (0.91 * 1 * 40) = 36.4A
23.04A < 36.4A (#10 AWG PV WIRE)

TAG 2: (DC)
REQUIRED CONDUCTOR AMPACITY (14.75 * 1.25 * 1.25) = 23.04A
CORRECTED AMPACITY CALCULATION (0.91 * 0.5 * 55) = 25.02A
23.04A < 25.02A (1-1/4" PVC, #8 AWG THHN/THWN-2, Cu)

TAG 3: (AC)
REQUIRED CONDUCTOR AMPACITY (48 * 1 * 1.25) = 60A
CORRECTED AMPACITY CALCULATION (0.88 * 1 * 85) = 74.8A
60A < 74.8A (1" EMT, #4 AWG THHN/THWN-2, Cu)

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ELECTRICAL CALCULATIONS

PV-4.1

⚠ 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)

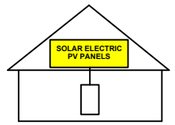
PHOTOVOLTAIC

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 **48.00** AMPS AC
AC NOMINAL OPERATING VOLTAGE **240** VAC

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

⚠ WARNING

TRI POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM THIRD SOURCE IS BATTERY BACKUP SYSTEM.

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

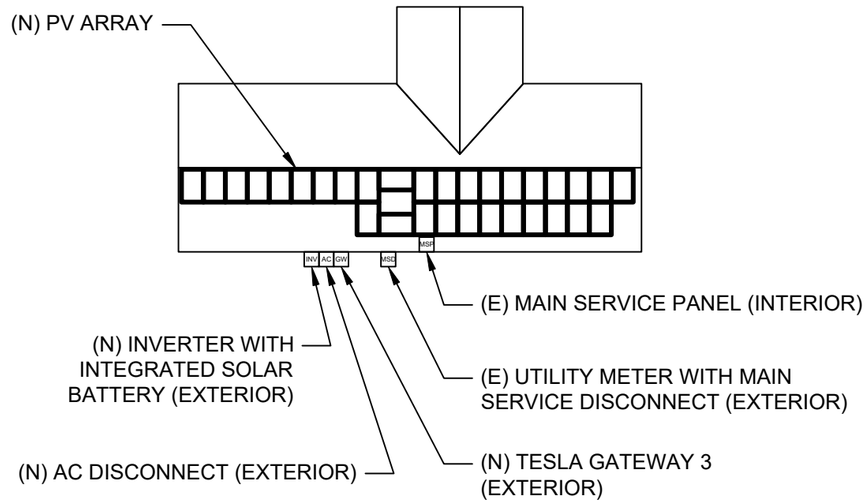
INVERTER-1

RATED MAXIMUM POWER-POINT CURRENT(Imp)	85.2	A
RATED MAXIMUM POWER-POINT VOLTAGE (Vmp)	194.4	V
MAXIMUM SYSTEM VOLTAGE (Voc)	258.14	V
MAXIMUM CIRCUIT CURRENT (Isc)	110.62	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



335 DEANNE LANE, 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 SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED AND SHALL NOT 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

CONTRACTOR INFORMATION

YES SOLAR SOLUTIONS

ADDRESS: 202 NORTH DIXON AVENUE, CARY, NC 27513

PHONE NUMBER: (919) 375-0757

LICENSE NUMBER: NC GC #67356; NC ELECTRIC #U.32326

LICENSE TYPE: NC GC/ELECTRIC

CUSTOMER INFORMATION

NAME: RIDDLE RESIDENCE

ADDRESS: 335 DEANNE LANE, COATS, NC 27521

COORDINATES: 35.437243, -78.620282

APN: 071611005847

14.260kW DC / 11.500kW AC ROOF MOUNT PV SYSTEM
13.500kWh ENERGY STORAGE SYSTEM

PROJECT ID	AUR-1012369
DATE	5/3/2025
CREATED BY	VK
SIGNATURE	

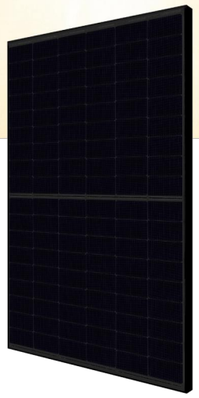
PLACARDS

PV-5

NEW

Preliminary Technical Information Sheet

CanadianSolar



TOPHiKu6 (All-Black)

N-type TOPCon Technology

440 W ~ 460 W

CS6.1-54TM-440|445|450|455|460H

MORE POWER

460 W — Module power up to 460 W
Module efficiency up to 22.5 %

Excellent anti-LeTID & anti-PID performance.
Low power degradation, high energy yield

Lower temperature coefficient (Pmax): -0.29%/°C, increases energy yield in hot climate

Lower LCOE & system cost

MORE RELIABLE

Minimizes micro-crack impacts

Heavy snow load up to 8100 Pa, wind load up to 5000 Pa*

25 Years — **Industry Leading Product Warranty on Materials and Workmanship***

30 Years — **Linear Power Performance Warranty***

1st year power degradation no more than 1%
Subsequent annual power degradation no more than 0.4%

*Subject to the terms and conditions contained in the applicable Canadian Solar Limited Warranty Statement. Also this 25-year limited product warranty is available only for products installed and operating on residential rooftops in certain regions.

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001:2015 / Quality management system
ISO 14001:2015 / Standards for environmental management system
ISO 45001: 2018 / International standards for occupational health & safety
IEC62941: 2019 / Photovoltaic module manufacturing quality system

PRODUCT CERTIFICATES*

* The specific certificates applicable to different module types and markets will vary, and therefore not all of the certifications listed herein will simultaneously apply to the products you order or use. Please contact your local Canadian Solar sales representative to confirm the specific certificates available for your Product and applicable in the regions in which the products will be used.

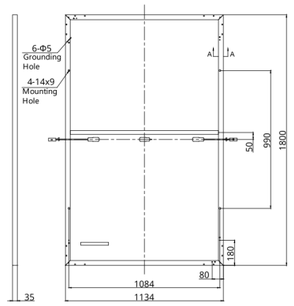
CSI Solar Co., Ltd. is committed to providing high quality solar photovoltaic modules, solar energy and battery storage solutions to customers. The company was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey. Over the past 22 years, it has successfully delivered around 100 GW of premium-quality solar modules across the world.

* For detailed information, please refer to the Installation Manual.

CSI Solar Co., Ltd.
199 Lushan Road, SND, Suzhou, Jiangsu, China, 215129, www.csisolar.com, support@csisolar.com

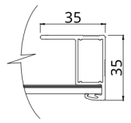
ENGINEERING DRAWING (mm)

Rear View



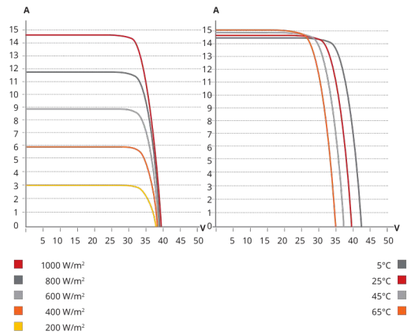
Frame Cross Section

A - A



Mounting Hole

CS6.1-54TM-455H / I-V CURVES



ELECTRICAL DATA | STC*

CS6.1-54TM	440H	445H	450H	455H	460H
Nominal Max. Power (Pmax)	440 W	445 W	450 W	455 W	460 W
Opt. Operating Voltage (Vmp)	31.6 V	31.8 V	32.0 V	32.2 V	32.4 V
Opt. Operating Current (Imp)	13.93 A	14.00 A	14.07 A	14.14 A	14.20 A
Open Circuit Voltage (Voc)	38.9 V	39.1 V	39.3 V	39.5 V	39.7 V
Short Circuit Current (Isc)	14.48 A	14.55 A	14.61 A	14.68 A	14.75 A
Module Efficiency	21.6%	21.8%	22.0%	22.3%	22.5%
Operating Temperature	-40°C ~ +85°C				
Max. System Voltage	1000V (IEC/UL)				
Module Fire Performance	TYPE 2 (UL 61730 1000V) or CLASS C (IEC 61730)				
Max. Series Fuse Rating	25 A				
Application Classification	Class A				
Power Tolerance	0 ~ + 10 W				

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m2, spectrum AM 1.5 and cell temperature of 25°C.

ELECTRICAL DATA | NMOT*

CS6.1-54TM	440H	445H	450H	455H	460H
Nominal Max. Power (Pmax)	333 W	337 W	340 W	344 W	348 W
Opt. Operating Voltage (Vmp)	29.9 V	30.1 V	30.3 V	30.4 V	30.6 V
Opt. Operating Current (Imp)	11.14 A	11.18 A	11.25 A	11.30 A	11.36 A
Open Circuit Voltage (Voc)	36.8 V	37.0 V	37.2 V	37.4 V	37.6 V
Short Circuit Current (Isc)	11.68 A	11.73 A	11.78 A	11.84 A	11.89 A

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m² spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

MECHANICAL DATA

Specification	Data
Cell Type	TOPCon cells
Cell Arrangement	108 [2 X (9 X 6)]
Dimensions	1800 × 1134 × 35 mm (70.9 × 44.6 × 1.38 in)
Weight	23 kg (50.7 lbs)
Front Cover	3.2 mm tempered glass with anti-reflective coating
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	4 mm² (IEC), 12 AWG (UL)
Connector	T6 or MC4 or MC4-EVO2 or MC4-EVO2A
Cable Length (Including Connector)	Portrait: 350 mm (13.8 in) (+) / 250 mm (9.8 in) (-); landscape: 1150 mm (45.3 in)*
Per Pallet	31 pieces
Per Container (40' HQ)	744 pieces

* For detailed information, please contact your local Canadian Solar sales and technical representatives.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.29 % / °C
Temperature Coefficient (Voc)	-0.25 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	41 ± 3°C

PARTNER SECTION

* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. CSI Solar Co., Ltd. reserves the right to make necessary adjustment to the information described herein at any time without further notice.
Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

CSI Solar Co., Ltd.
199 Lushan Road, SND, Suzhou, Jiangsu, China, 215129, www.csisolar.com, support@csisolar.com

CONTRACTOR INFORMATION

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PROJECT ID	AUR-1012369
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SIGNATURE	

MODULE SPEC SHEET

SS

Powerwall 3

Power Everything

—

Powerwall 3 is a fully integrated solar and battery system, designed to accelerate the transition to sustainable energy. Customers can receive whole home backup, cost savings, and energy independence by producing and consuming their own energy while participating in grid services. Once installed, customers can manage their system using the Tesla App to customize system behavior to meet their energy goals.

Powerwall 3 achieves this by supporting up to 20 kW DC of solar and providing up to 11.5 kW AC of continuous power per unit. It has the ability to start heavy loads rated up to 185 LRA, meaning a single unit can support the power needs of most homes. Powerwall 3 Expansions make it easier and more affordable to scale up customers' systems to meet their current or future needs. Powerwall 3 is designed for fast and efficient installations, modular system expansion, and simple connection to any electrical service.

Powerwall 3 Technical Specifications

System Technical Specifications					
Model Number	1707000-xx-y				
Nominal Grid Voltage (Input & Output)	120/240 VAC				
Grid Type	Split phase				
Frequency	60 Hz				
Nominal Battery Energy	13.5 kWh AC[1]				
Nominal Output Power (AC)	5.8 kW	7.6 kW	10 kW	11.5 kW	
Maximum Apparent Power	5,800 VA	7,600 VA	10,000 VA	11,500 VA	
Maximum Continuous Current	24 A	31.7 A	41.7 A	48 A	
Overcurrent Protection Device[2]	30 A	40 A	60 A	60 A	
Configurable Maximum Continuous Discharge Power Off-Grid (PV Only, -20°C to 25°C)	15.4 kW[3]				
Maximum Continuous Charge Current / Power (Powerwall 3 only)	20.8 A AC / 5 kW				
Maximum Continuous Charge Current / Power (Powerwall 3 with up to (3) Expansion units)	33.3 A AC / 8 kW				
Output Power Factor Rating	0 - 1 (Grid Code configurable)				
Maximum Output Fault Current (1 s)	160 A				
Maximum Short-Circuit Current Rating	10 kA				
Load Start Capability	185 LRA				
Solar to Battery to Home/Grid Efficiency	89%[1,4]				
Solar to Home/Grid Efficiency	97.5%[5]				
Power Scalability	Up to 4 Powerwall 3 units supported				
Energy Scalability	Up to 3 Expansion units (for a maximum total of 7 units)				
Supported Islanding Devices	Gateway 3, Backup Switch, Backup Gateway 2				
Connectivity	Wi-Fi (2.4 and 5 GHz), Ethernet, Cellular (LTE/4G[6])				
Hardware Interface	Dry contact relay, Rapid Shutdown (RSD) certified switch and 2-pin connector, RS-485 for meters				
AC Metering	Revenue Grade (+/- 0.5%, ANSI C12.20)				
Protections	Integrated arc fault circuit interrupter (AFCI), Isolation Monitor Interrupter (IMI), PV Rapid Shutdown (RSD) using Tesla Mid-Circuit Interrupters				
Customer Interface	Tesla Mobile App				
Warranty	10 years				

[1] Values provided for 25°C (77°F), at beginning of life. 3.3 kW charge/discharge power.

[2] See Powerwall 3 Installation Manual for fuse requirements if using fuse for overcurrent protection.

[3] 15.4kW off-grid maximum continuous discharge power is only available if on-grid rating is 11.5 kW. If enabled, Powerwall 3 must be installed with an 80 A breaker and appropriately sized conductors.

[4] Typical solar shifting use case.

[5] Tested using CEC weighted efficiency methodology.

[6] The customer is expected to provide internet connectivity for Powerwall 3; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

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INVERTER SPEC SHEET

SS

Powerwall 3 Technical Specifications

Solar Technical Specifications

Maximum Solar STC Input	20 kW
Withstand Voltage	600 V DC
PV DC Input Voltage Range	60 — 550 V DC
PV DC MPPT Voltage Range	60 — 480 V DC
MPPTs	6
Maximum Current per MPPT (I_{mp})	15 A [7,8]
Maximum Short Circuit Current per MPPT (I_{sc})	19 A [8]

[7] Only applicable to Powerwall 3 units with 15 A I_{MP} on the product label. Otherwise, Powerwall 3 has an I_{MP} of 13 A.

[8] When PV strings are combined on the roof and the DC input current exceeds the MPPT rating, a jumper can be used to combine two MPPTs into a single input to intake DC current up to 30 A I_{MP} / 38 A I_{SC} (or 26 A I_{MP} / 30 A I_{SC} if Powerwall 3 is labeled with 13 A I_{MP} / 15 A I_{SC}).

Environmental Specifications

Operating Temperature	–20°C to 50°C (–4°F to 122°F) [9]
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	–20°C to 30°C (–4°F to 86°F), up to 95% RH, non-condensing, State of Energy (SOE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Rating	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP55 (Wiring Compartment)
Pollution Rating	PD3
Operating Noise @ 1 m	< 50 db(A) typical < 62 db(A) maximum

[9] Performance may be de-rated at operating temperatures above 40°C (104°F).

Compliance Information

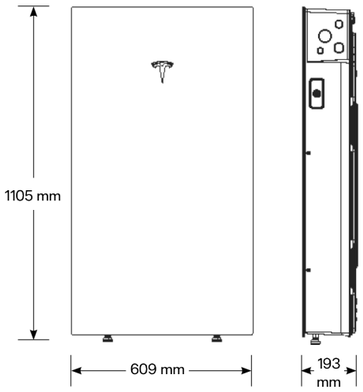
Certifications	UL 1741, UL 9540, UL 9540A, UL 3741, UL 1741 PCS, UL 1741 SA, UL 1741 SB, UL 1973, UL 1699B, UL 1998, CSA C22.2 No. 0.8, CSA C22.2 No. 107.1, CSA C22.2 No. 330, CSA 22.3 No. 9, IEEE 1547, IEEE 1547A, IEEE 1547.1, CA Rule No.21
Grid Connection	United States and Canada
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)
Fire Testing	Meets the unit level performance criteria of UL 9540A

Powerwall 3 Technical Specifications

Mechanical Specifications

Dimensions	1105 x 609 x 193 mm (43.5 x 24 x 7.6 in) [10]
Total Weight of Installed Unit	132 kg (291.2 lb)
Weight of Powerwall 3	124 kg (272.5 lb)
Weight of Glass Front Cover	6.5 kg (14.5 lb)
Weight of Wall Bracket	1.9 kg (4.2 lb)
Mounting Options	Floor or wall mount

[10] These dimensions include the glass front cover being installed on Powerwall 3.



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INVERTER SPEC SHEET

SS

Solar Shutdown Device Technical Specifications

—

The Solar Shutdown Device is a Mid-Circuit Interrupter (MCI) and is integral to the rapid shutdown (RSD) function required for rooftop PV systems in accordance with Article 690 of the NEC. When paired with Powerwall 3, solar array shutdown is initiated by an External System Shutdown Switch or the On/Off Enable switch located on Powerwall 3. Systems not subject to rapid shutdown requirements must still install one or more MCIs for functional purposes; see the Powerwall 3 installation manual for details.

	Model	MCI-1	MCI-2	MCI-2 High Current
Electrical Specifications	Nominal Input DC Current Rating (I_{MP})	13 A	13 A	15 A
	Maximum Input Short Circuit Current (I_{SC})	19 A	17 A	19 A
	Maximum System Voltage	600 V DC	1000 V DC [15]	1000 V DC [15]
	Maximum Disconnect Voltage [16]	600 V DC	165 V DC	165 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	
Environmental Specifications	Operating Temperature	-40°C to 50°C (-40°F to 122°F)	-45°C to 70°C (-49°F to 158°F)	
	Storage Temperature	–30°C to 70°C (–22°F to 158°F)	–30°C to 70°C (–22°F to 158°F)	
	Enclosure Rating		NEMA 4X / IP65	
Mechanical Specifications	Electrical Connections		MC4 Connector	
	Housing		Plastic	
	Dimensions	125 x 150 x 22 mm (5 x 6 x 1 in)	173 x 45 x 22 mm (6.8 x 1.8 x 1 in)	
	Weight	350 g (0.77 lb)	120 g (0.26 lb)	
	Mounting Options	ZEP Home Run Clip M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw	Wire Clip	
Compliance Information	Certifications		UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)	
	RSD Initiation Method		External System Shutdown Switch or Powerwall 3 Enable Switch	
UL 3741 PV Hazard Control (and PVRSA) Compatibility			See UL 3741 Application Addendum	

[15] Maximum System Voltage is limited by Powerwall to 600 V DC.

[16] Maximum Disconnect Voltage is the maximum voltage allowed across each MCI in the open position (Rapid Shutdown Initiated). An individual MCI-2 has a voltage rating of 165V but in combination (connected in the same string) their voltage ratings are additive.

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RAPID SHUTDOWN SPEC SHEET

SS

Gateway 3

Tesla Gateway 3 controls connection to the grid in a Powerwall system, automatically detecting outages and providing seamless transition to backup power. It provides energy monitoring that is used by Powerwall for solar self-consumption, time-based control, and backup operation.

Performance Specifications

Model Number	1841000-x1-y
Nominal Grid Voltage	120/240 V AC
Grid Configuration	Split phase
Grid Frequency	60 Hz
Continuous Current Rating	200 A
Maximum Supply Short Circuit Current	22 kA with Square D or Eaton main breaker 25 kA with Eaton main breaker [17]
IEC Protective Class	Class I
Overvoltage Category	Category IV

[17] Only Eaton CSR or BWH main breakers are 25 kA rated.

AC Meter	+/- 0.5%
Communication	CAN
User Interface	Tesla App
Backup Transition	Automatic disconnect for seamless backup
Overcurrent Protection Device	100–200 A Service entrance rated Eaton CSR, BWH, or BW, or Square D QOM breakers
Internal Panelboard	200 A 8-space/16 circuit breakers Eaton BR, Siemens QP, or Square D HOM breakers rated to 10–125A
Warranty	10 years

Environmental Specifications

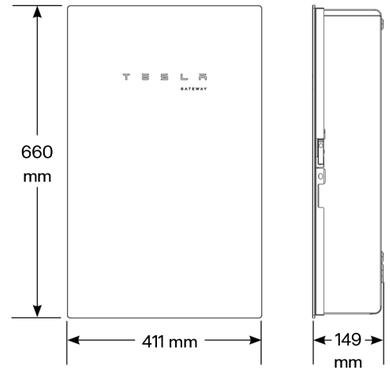
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

Compliance Information

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS, CSA 22.2 107.1, CSA 22.2 29
Emissions	FCC Part 15, Class B, ICES 003

Mechanical Specifications

Dimensions	660 x 411 x 149 mm (26 x 16 x 6 in)
Weight	16.3 kg (36 lb)
Mounting options	Wall mount



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SIGNATURE	

GATEWAY SPEC SHEET

SS

DESCRIPTION:

SNAPNRACK, ULTRA RAIL COMP KIT

PART NUMBER(S):

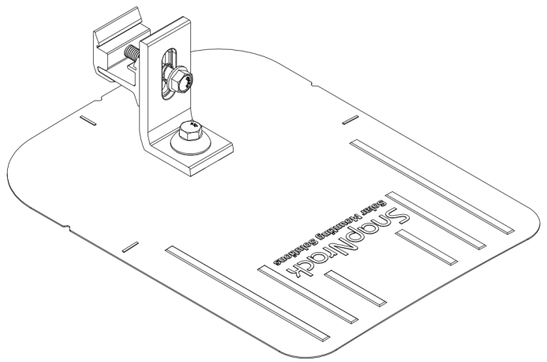
SEE BELOW

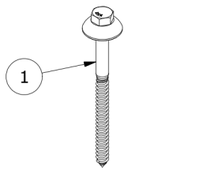
DRAWN BY: mwatkins

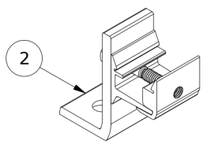
REVISION: C

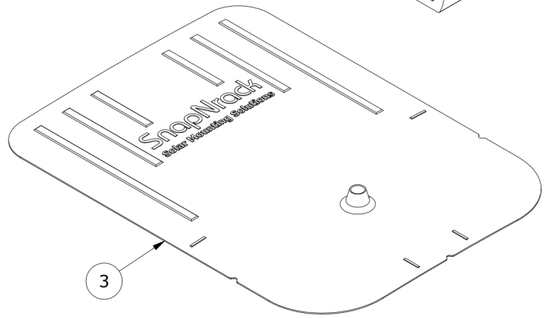
SnapNrack

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









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 RAIL UMBRELLA L FOOT, SILVER / BLACK
3	1	232-01375, 232-01376, 232-01377	SNAPNRACK, 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:

SNAPNRACK, ULTRA RAIL COMP KIT

PART NUMBER(S):

SEE BELOW

DRAWN BY: mwatkins

REVISION: C

SnapNrack

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

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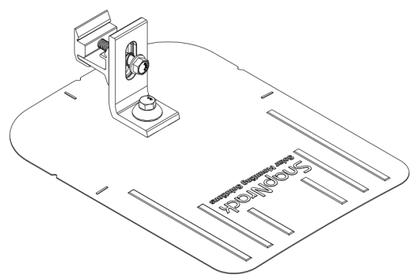
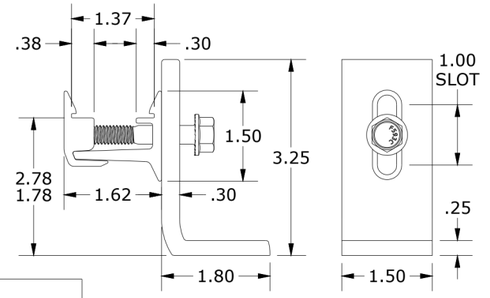
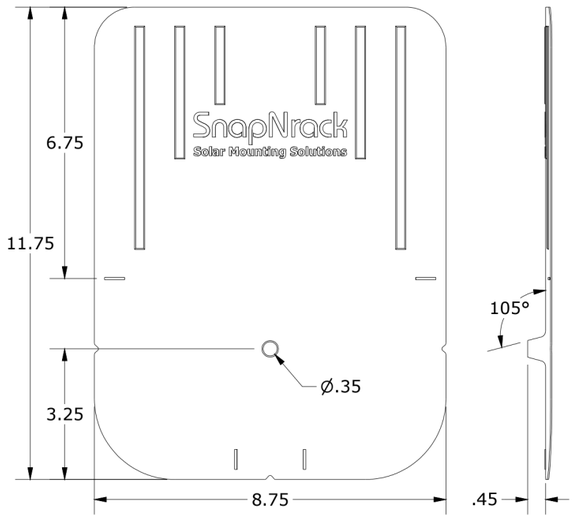
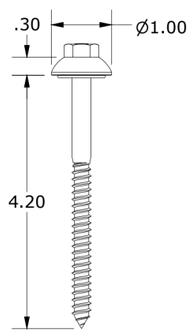


UMBRELLA L FOOT PROPERTIES	
SKU	DESCRIPTION
242-01219	ULTRA RAIL UMBRELLA L FOOT, SILVER
242-01220	ULTRA RAIL UMBRELLA L FOOT, BLACK



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





ALL DIMENSIONS IN INCHES

CONTRACTOR INFORMATION

YES SOLAR SOLUTIONS

ADDRESS: 202 NORTH DIXON AVENUE, CARY, NC 27513

PHONE NUMBER: (919) 375-0757

LICENSE NUMBER: NC GC #67356; NC ELECTRIC #U.32326

LICENSE TYPE: NC GC/ELECTRIC

CUSTOMER INFORMATION

NAME: RIDDLE RESIDENCE

ADDRESS: 335 DEANNE LANE, COATS, NC 27521

COORDINATES: 35.437243, -78.620282

APN: 071611005847

14.260kW DC / 11.500kW AC ROOF MOUNT PV SYSTEM
13.500kWh ENERGY STORAGE SYSTEM

PROJECT ID	AUR-1012369
DATE	5/3/2025
CREATED BY	VK
SIGNATURE	

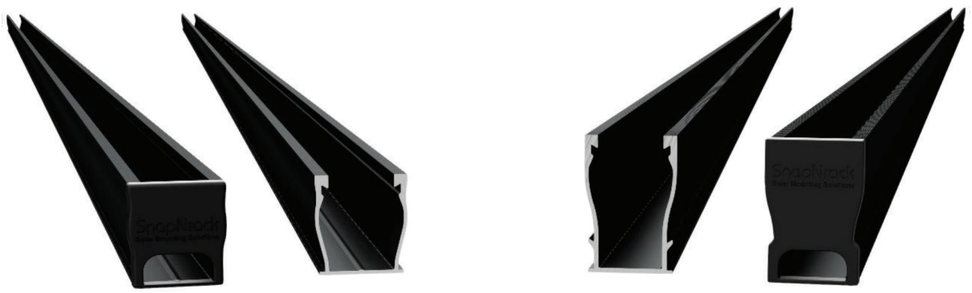
MOUNT SPEC SHEET

SS

SnapNrack™
Solar Mounting Solutions

UR-40
UR-60

Ultra Rail



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 raiil profiles

Start Installing Ultra Rail Today

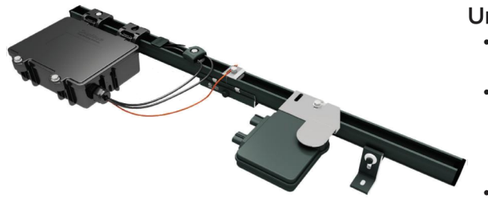
RESOURCES	snapnrack.com/resources
DESIGN	snapnrack.com/configurator
WHERE TO BUY	snapnrack.com/where-to-buy

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

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