SCOPE OF WORK

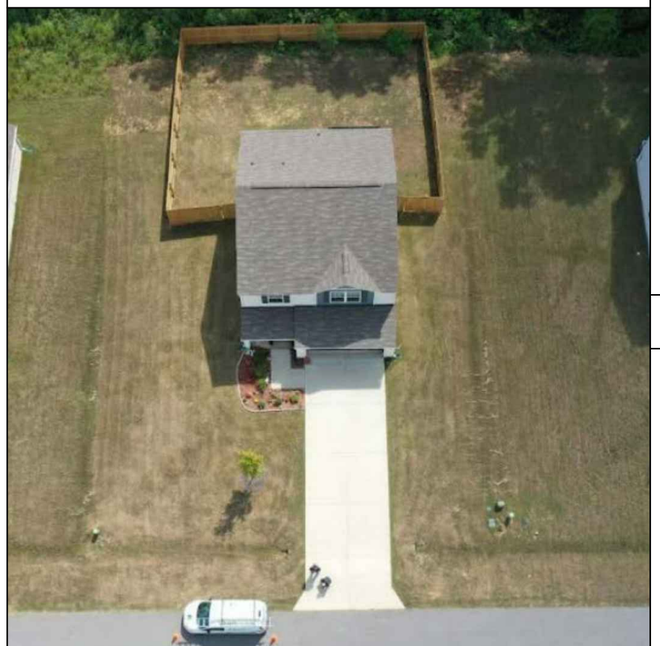
INSTALL A ROOF-MOUNTED PV SYSTEM &
ENERGY STORAGE SYSTEM:

- (16) CERTAINTEED CT370HC11-06 MODULES
- (06) TESLA SOLAR SHUTDOWN DEVICE MCI-2
- (01) TESLA POWERWALL 3 (11.5KW, 13.5KWH)
- (01) TESLA GATEWAY 3
- (01) NON-FUSED AC DISCONNECT

TOTAL PV SIZE: 5.920 KW DC, 5.366 KW CEC AC

TABLE OF CONTENTS

AERIAL PHOTO



GOVERNING CODES

ALL WORK TO COMPLY WITH:
- 2018 INTERNATIONAL BUILDING CODE
- 2018 INTERNATIONAL RESIDENTIAL CODE
- 2017 NATIONAL ELECTRICAL CODE
- 2013 INTERNATIONAL FIRE CODE

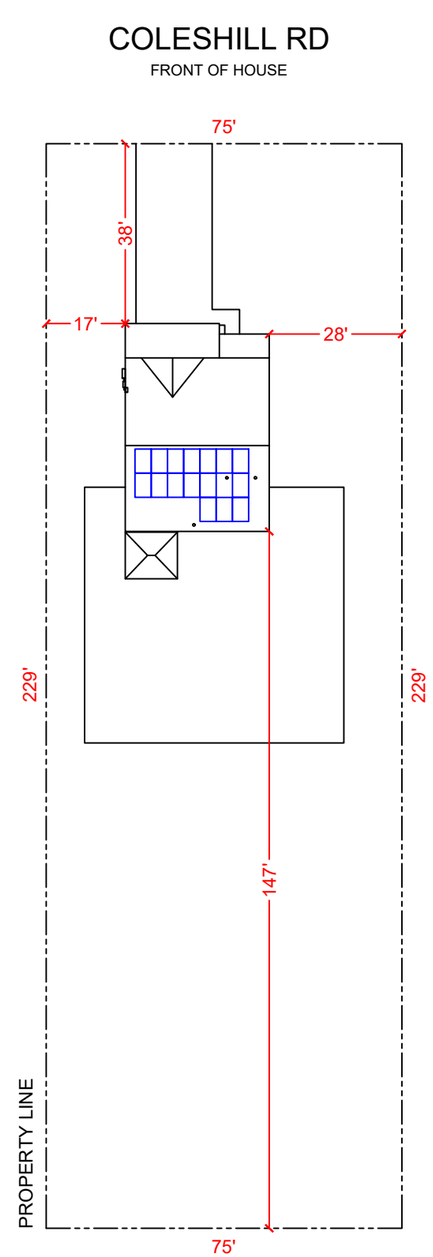
GENERAL NOTES

- ALL WORK SHALL CONFORM TO APPLICABLE BUILDING, ELECTRICAL CODE AND ANY LOCALLY ADOPTED ORDINANCES.
- DRAWINGS ARE DIAGRAMMATIC, SITE CONDITIONS SHALL PREVAIL. IF NO SCALE IS GIVEN, DRAWINGS ARE NOT TO SCALE. ALL DIMENSIONS SHALL BE VERIFIED BY THE CONTRACTOR IN THE FIELD UPON COMMENCEMENT OF CONSTRUCTION.
- ALL CONDUIT AND WIRE RUNS ARE DIAGRAMMATIC, SUBJECT TO FIELD CONDITIONS ROUTING OF RACEWAYS SHALL BE FINALIZED BY THE CONTRACTOR. IF THE DISTANCES FOR WIRE RUNS ARE DIFFERENT THAN AS SHOWN, THE CONTRACTOR SHALL NOTIFY THE DESIGN TEAM TO VALIDATE THE WIRE SIZE.
- ALL EQUIPMENT SHALL BE LISTED AND LABELED BY A RECOGNIZED TESTING LABORATORY AND INSTALLED PER THE LISTING AND MANUFACTURER'S REQUIREMENTS.
- ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH REQUIRED ACCESS AND WORKING CLEARANCES PER CEC ARTICLE 110.
- ALL NEW MAIN SERVICE PANELS AND SUBPANELS WILL HAVE APPROPRIATE FIELD IDENTIFICATION PER CEC 408.4.
- ALL EQUIPMENT WILL BE INSTALLED WHERE IT IS NOT EXPOSED TO PHYSICAL DAMAGE PER CEC110.27(B).

SITE DETAILS

ASHRAE MIN TEMP	-12°C
ASHRAE 2% HIGH TEMP	34°C
BUILDING OCCUPANCY	R-3
TYPE OF CONSTRUCTION	V-B
SPRINKLERS SYSTEM PER NFPA 13D	NO
# OF STORIES	2
WIND SPEED (ASCE 7-10)	120 MPH
WIND EXPOSURE	B
RISK CATEGORY	II
GROUND SNOW LOAD	15 PSF
SQUARE FOOTAGE	1800 SQ FT
UTILITY PROVIDER	DUKE ENERGY

SITE PLAN



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CHARLOTTE, NORTH CAROLINA, 28217
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NC GC #76615
NC ELE #U.34519

PREPARED BY:
HIGH LINE DESIGNS
SCOTT TOYAMA

SCALE: 1/32" = 1'-0"
SHEET SIZE: 11" x 17"
TEMPLATE V2.0

AHJ: HARNETT COUNTY
APN: 0662371163.000
DATE: 10/17/2024

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358 COLESHILL RD
ANGIER, NC 27501

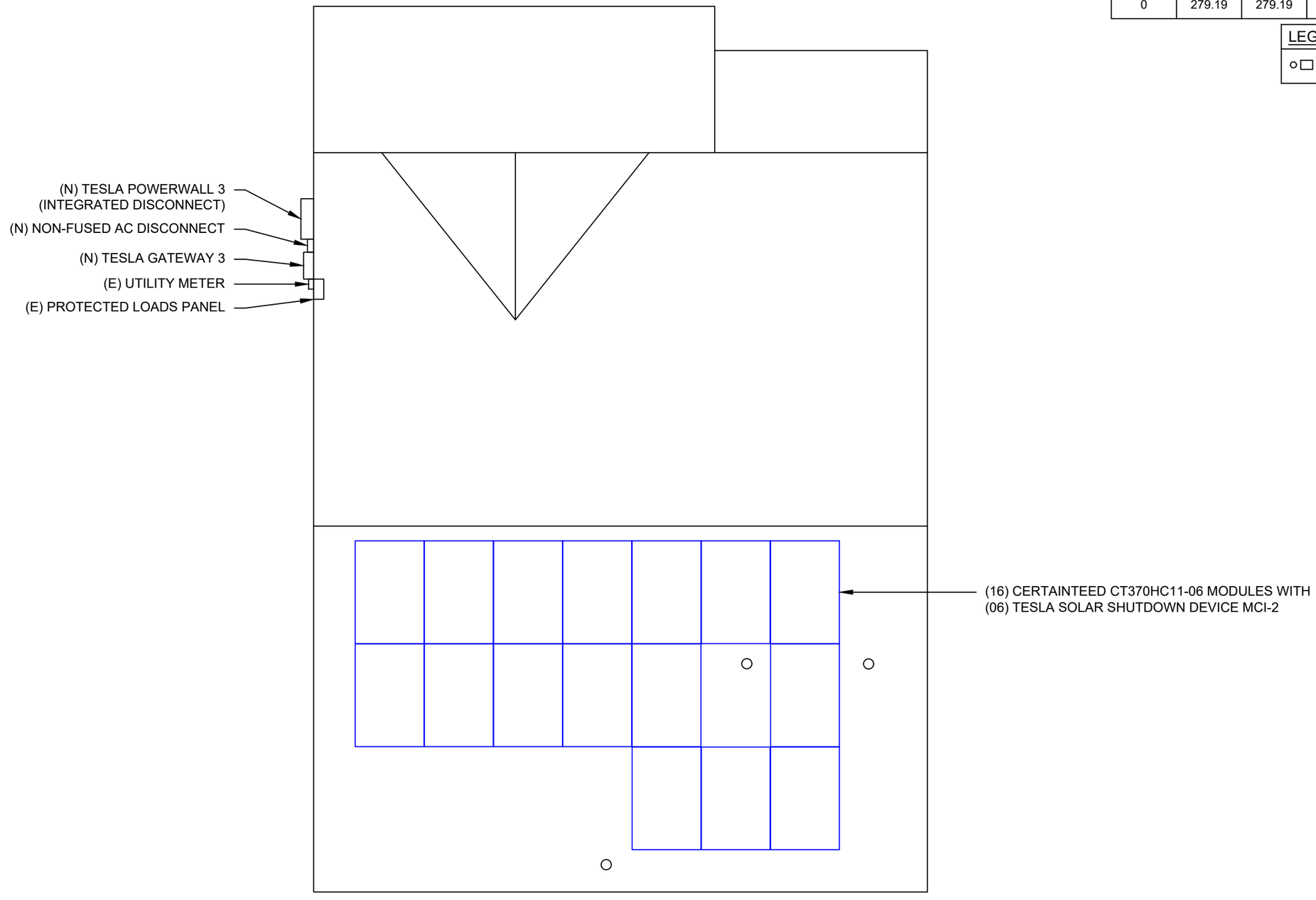
PV-1
COVER SHEET

COLESHILL RD

PV ROOF COVERAGE				
(E) PV AREA [SQ FT]	(N) PV AREA [SQ FT]	TOTAL PV AREA [SQ FT]	TOTAL ROOF AREA [SQ FT]	PERCENTAGE COVERED BY PV
0	279.19	279.19	1310.88	21%

LEGEND

○□ - ROOF OBSTRUCTION



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NC GC #76615
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PREPARED BY:
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SCOTT TOYAMA

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SHEET SIZE: 11" x 17"	APN: 0662371163.000
TEMPLATE V2.0	DATE: 10/17/2024

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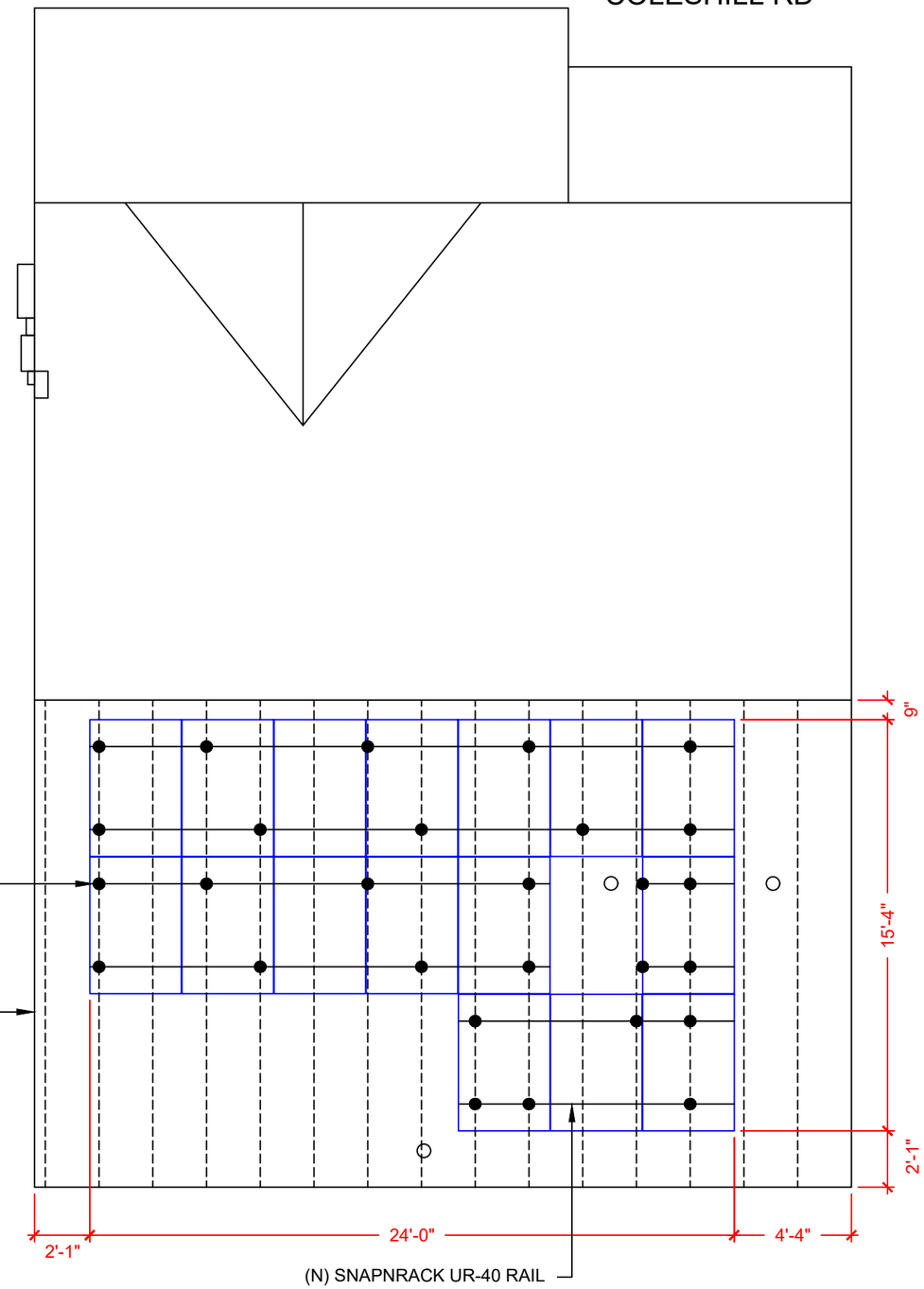
ANGIER, NC 27501

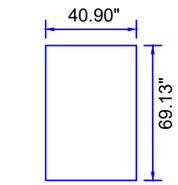
PV-2
ROOF PLAN
& MODULES

LEGEND

- - - - RAFTER OR TRUSS
● - ROOF ATTACHMENT
○ □ - ROOF OBSTRUCTION

COLESHILL RD





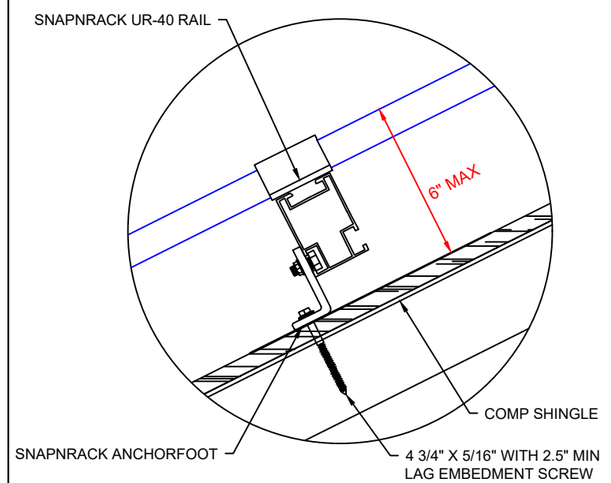
ROOF DESCRIPTION

ROOF	ROOF TILT	AZIMUTH	ROOF MATERIAL	TRUSS SIZE	TRUSS SPACING	MAX SPAN
#1	28°	135°	COMP SHINGLE	2" X 4"	24" O.C.	5'-9"

STRUCTURAL INFORMATION

NUMBER OF MODULES	16	--
MODULE WEIGHT	45.19	LBS
TOTAL MODULE (ARRAY) WEIGHT	723.04	LBS
NUMBER OF ATTACHMENT POINT	28	--
MOUNTING SYSTEM WEIGHT (PER MODULE)	0.55	LBS
MOUNTING SYSTEM WEIGHT	15.40	LBS
TOTAL SYSTEM WEIGHT	738.44	LBS
WEIGHT AT EACH ATTACHMENT POINT	25.82	LBS
MODULE AREA (69.13"X40.90")	19.63	SQFT
TOTAL ARRAY AREA	279.19	SQFT
DISTRIBUTED LOAD	2.64	PER SQFT

ROOF ATTACHMENT DETAIL



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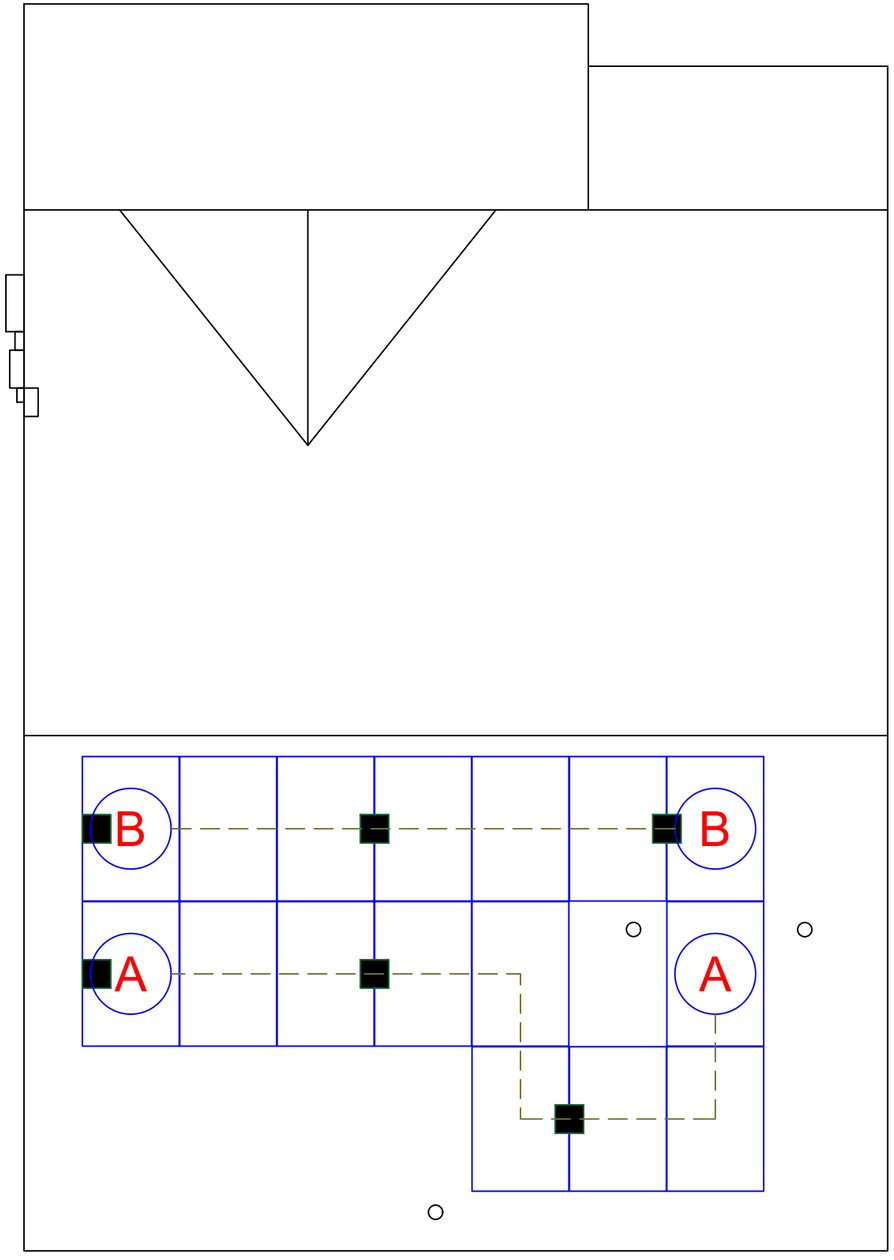
PV-2A
ROOF, MODULES & ATTACHMENT DETAILS

LEGEND

■ - TESLA SOLAR SHUTDOWN DEVICE MCI-2

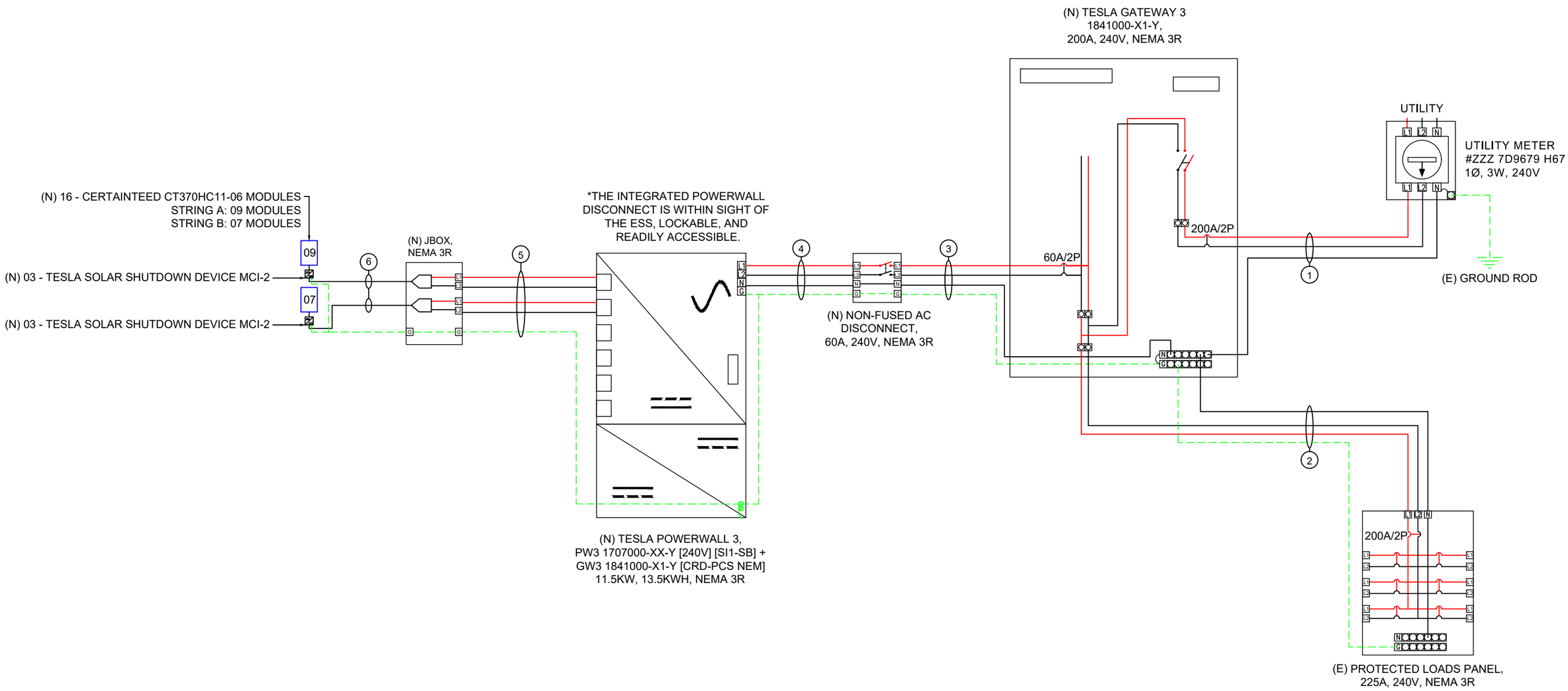
COLESHILL RD



RENU ENERGY SOLUTIONS, LLC 801 PRESSLEY ROAD, SUITE 100 CHARLOTTE, NORTH CAROLINA, 28217 704-525-6767 | RENUENERGYSOLUTIONS.COM	NC GC #76615 NC ELE #U.34519	PREPARED BY: HIGH LINE DESIGNS SCOTT TOYAMA	SCALE: 3/16" = 1'-0" SHEET SIZE: 11" x 17" TEMPLATE V2.0	AHJ: HARNETT COUNTY APN: 0662371163.000 DATE: 10/17/2024	**SANDRA HALLER** 358 COLESHILL RD ANGIER, NC 27501	PV-3 STRINGING PAGE

ID	TYPICAL	CONDUCTOR	NEUTRAL	EGC	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM TEMP. RATING	AMP. @ TERMINAL
1	1	4/0 AWG XHHW, ALUMINUM	4/0 AWG XHHW, ALUMINUM	N/A	2" DIA	2	200A	0.96 (34°C)	1	160.0A	200.0A	205A	196.8A	75°C	180A
2	1	4/0 AWG XHHW, ALUMINUM	4/0 AWG XHHW, ALUMINUM	4 AWG XHHW, ALUMINUM	2" DIA	2	200A	0.96 (34°C)	1	160.0A	200.0A	205A	196.8A	75°C	180A
3	1	6 AWG THHN, COPPER	6 AWG THHN, COPPER	10 AWG THHN, COPPER	1" DIA	2	60A	0.96 (34°C)	1	48.0A	60.0A	75A	72.0A	75°C	65A
4	1	6 AWG THHN, COPPER	6 AWG THHN, COPPER	10 AWG THHN, COPPER	1" DIA	2	60A	0.96 (34°C)	1	48.0A	60.0A	75A	72.0A	75°C	65A
5	1	10 AWG THHN, COPPER	N/A	10 AWG THHN, COPPER	0.75" DIA	4	N/A	0.96 (34°C)	0.8	10.9A	13.6A	40A	30.7A	75°C	35A
6	2	10 AWG PV WIRE, COPPER	N/A	6 AWG SOLID BARE COPPER	FREE AIR	2	N/A	0.96 (34°C)	1	10.9A	13.6A	N/A	N/A	75°C	30A

NEW SOLAR PROJECT
5.92 KW DC, 11.50 KW AC



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ANGIER, NC 27501

PV-4
THREE-LINE DIAGRAM

MODULES										
REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COFF. OF VOC	FUSE RATING
(N) PV MODULES	16	CERTAINTEED CT370HC11-06	370W	345.72W	11.51A	10.87A	40.8V	34.06V	-0.29%/°C	20A

DISCONNECTS					
REF.	QTY.	MAKE AND MODEL	FUSES	RATED CURRENT	MAX RATED VOLTAGE
(N) DISCONNECT	1	EATON OR EQUIVALENT	N/A	60A	240V

OCPDS				
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX VOLTAGE
GATEWAY 3	1	EATON 200A	200A	240V
GATEWAY 3	1	EATON BR260	60A	240V

DESIGN TEMPERATURES	
ASHRAE EXTREME LOW	-12°C (10.4°F), SOURCE: RALEIGH DURHAM INTERNATIONAL
ASHRAE 2% HIGH	34°C (93.2°F), SOURCE: RALEIGH DURHAM INTERNATIONAL

INVERTER OUTPUT CALCULATIONS & 705.12 COMPLIANCE

INVERTER OUTPUT CIRCUIT	INVERTER OR ESS	# OF INVERTERS / ESS	CONTINUOUS OUTPUT	125% SAFETY FACTOR	TOTAL BACKFEED	MINIMUM BREAKER SIZE
#1	PW3	1	48.00A	125%	60.00A	60A

VOC CALCULATION PER NEC 690.7(A)(1)

MODULE	CT370HC11-06
# OF MODULES LARGEST STRING	9
ASHRAE MIN TEMP [°C]	-12
VOC [V]	40.8
TEMP COEF VOC [%/°C]	-0.29
TEMP ADJ VOC [V]	45.18
VOLTAGE OF LARGEST STRING [V]	406.60

ELECTRICAL NOTES (APPLICABILITY BASED ON SCOPE OF WORK)

AS-BUILT CHANGES TO THE ABOVE WIRING ARE PERMISSIBLE AS LONG AS SUBSITUTIONS ARE CODE COMPLIANT. FOR EXAMPLE, APPROPRIATELY SIZED NM-B MAY BE USED FOR MICROINVERTER OUTPUT CIRCUITS IF INSTALLED IN ACCORDANCE WITH NEC ARTICLE 334, OR MC CABLE MAY BE USED FOR DC SOLAR STRINGS IF INSTALLED IN ACCORDANCE WITH NEC ARTICLE 330.

ALL OUTDOOR EQUIPMENT SHALL BE RAINTIGHT & HOLD A MINIMUM NEMA 3R RATING, INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES. CONDUCTORS EXPOSED TO WET CONDITIONS SHALL BE SUITABLE FOR USE IN WET CONDITIONS PER NEC 310.10(C).

ALL TERMINAL TEMPERATURES OF EQUIPMENT WILL BE VERIFIED TO BE RATED FOR 75°C, OR THE WIRE WILL NEED TO BE RESIZED USING THE 60°C TERMINAL TEMPERATURE RATINGS FOR 100A OR LESS.

ALL NM-B SHALL BE INSTALLED AND PROTECTED PER NEC 334, AND ALL SER CABLE SHALL BE INSTALLED AND PROTECTED PER NEC 338.

ALL ROOFTOP RACEWAYS AND CABLES EXPOSED TO DIRECT SUNLIGHT WILL BE INSTALLED >7/8" ABOVE THE ROOF.

ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250. A SUPPLEMENTAL GROUND ROD WILL BE DRIVEN IN ACCORDANCE WITH NEC 250.53(A)(3) IF THE EXISTING GROUND ROD HAS A RESISTANCE TO EARTH THAT IS GREATER THAN 25 OHMS.

IF ANY EXISTING LOAD CONDUCTORS ARE EXTENDED BY MORE THAN 6', AFCI PROTECTION WILL BE PROVIDED PER NEC 210.12(D).

PER NEC 690.47(A) PV SYSTEMS THAT ARE NOT SOLIDLY GROUNDED, THE EQUIPMENT GROUNDING CONDUCTOR FOR THE OUTPUT OF THE PV SYSTEMS SHALL BE PERMITTED TO BE THE CONNECTION TO GROUND FOR GROUND-FAULT PROTECTION AND EQUIPMENT GROUNDING OF THE PV ARRAY.

THE ESS CIRCUIT BREAKER SHALL BE SECURED IN PLACE BY AN ADDITIONAL FASTENER PER NEC 408.36(D).

NO SINGLE BACK-UP LOAD WILL BE LARGER THAN THE MAXIMUM CONTINUOUS OUTPUT OF THE ESS PER NEC 710.15(A).

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NC ELE #U.34519

PREPARED BY:
HIGH LINE DESIGNS
SCOTT TOYAMA

SCALE: NTS	AHJ: HARNETT COUNTY
SHEET SIZE: 11" x 17"	APN: 0662371163.000
TEMPLATE V2.0	DATE: 10/17/2024

SANDRA HALLER
358 COLESHILL RD
ANGIER, NC 27501

PV-4A
DESIGN TABLES

⚠ 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(B)].

⚠ WARNING

POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

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

PHOTOVOLTAIC SYSTEM
⚠ AC DISCONNECT ⚠

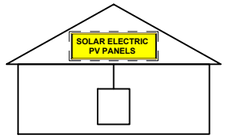
RATED AC OUTPUT CURRENT	48.00	A
NOMINAL OPERATING AC VOLTAGE	240	V

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

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

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

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN



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

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

⚠ WARNING

TRI POWER SUPPLY

SOURCES: UTILITY GRID, PV SOLAR & BATTERY ELECTRIC SYSTEM

LABEL 6
AT POINT OF INTERCONNECTION (2 3/4" X 1 5/8").

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL 7
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]

MAIN BATTERY SYSTEM DISCONNECT

LABEL 8
LOCATED AT MAIN BATTERY DISCONNECT

LABELING NOTES
1.1 LABELING REQUIREMENTS BASED ON THE 2020 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]

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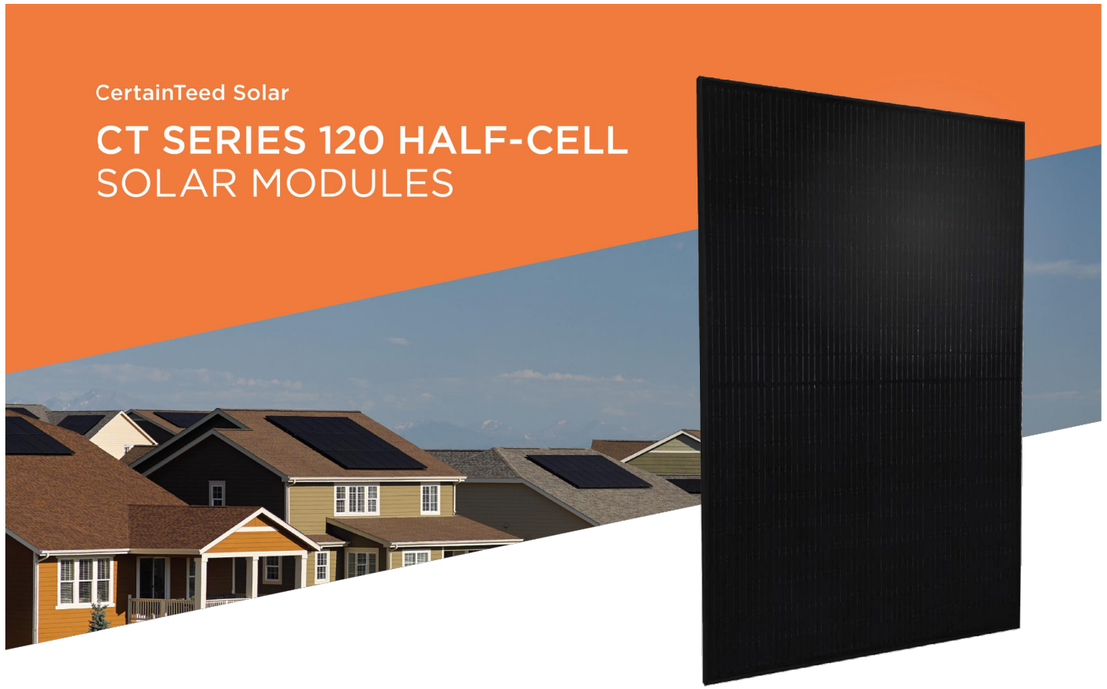
PV-5
LABELS & PLACARDS

CertainTeed Solar

CT SERIES 120 HALF-CELL SOLAR MODULES



Half-Cell Monocrystalline Type

CT360HC11-06
CT365HC11-06
CT370HC11-06

Features and Benefits

High Quality / High Power

- Up to 370W with black backsheet
- UL listed (UL 61730)
- Positive power output tolerance

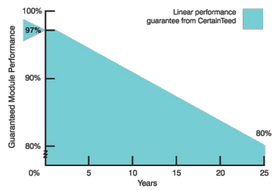
Limited Warranty*

- 25-year linear power output warranty

*See CertainTeed's limited warranty for details

See reverse for product specifications

Power Output Warranty



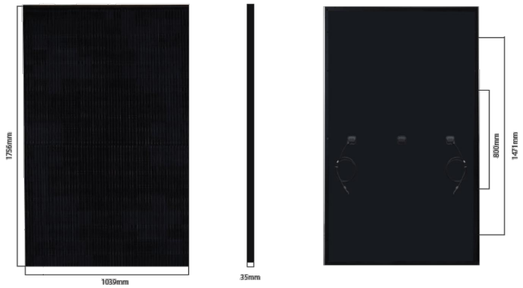
Electrical Characteristics

		360W	365W	370W
Nominal Output (Pmpp)	W	360	365	370
Voltage at Pmax (Vmpp)	V	33.8	33.96	34.06
Current at Pmax (Impp)	A	10.66	10.75	10.87
Open Circuit Voltage (Voc)	V	40.6	40.7	40.8
Short Circuit Current (Isc)	A	11.24	11.36	11.51
Output Tolerance	W	-0 / + 5		
No. of Cells & Connections		120 half-cells with 3 bypass diodes		
Maximum Series Fuse Rating		20A		
Cell Type		Monocrystalline		
Module Efficiency	%	19.73	20.01	20.29
Temperature Coefficient of Pmpp	%/C	-0.36		
Temperature Coefficient of Voc	%/C	-0.29		
Temperature Coefficient of Isc	%/C	0.05		

Mechanical Characteristics

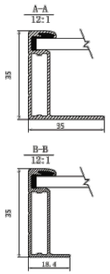
Laminate	Glass: 3.2 high transmission, tempered, anti-reflective Encapsulant: POE Backsheet: Weatherproof film (Black)
Frame	Anodized aluminum (Black)
Junction Box	IP68
Output Cables	4 mm² (12AWG) PV Wire, Length 1.2m (47.2")
Connectors	Polarized MC compatible
Weight	20.5 kg (45.19 lbs)

Dimensions



Operating Conditions

Nominal Operating Cell Temp.	44+/-2° C
Operating Temperature	-40 to 85° C
Maximum System Voltage	1,500V
Fire Performance	Class C / Type 1
Maximum Wind Load	210mph wind speed (5400 Pa)
Maximum Snow Load	112 lbs/ft² (5400 Pa)



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358 COLESHILL RD
ANGIER, NC 27501

PV-6
EQUIPMENT DATASHEET

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
Maximum Continuous Charge Current / Power	20.8 A AC / 5 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%[1,3]			
Solar to Home/Grid Efficiency	97.5%[4]			
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[5])			
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			

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})	13 A[6]
Maximum Short Circuit Current per MPPT (I_{sc})	15 A[6]

[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] Typical solar shifting use case.

[4] Tested using CEC weighted efficiency methodology.

[5] 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.

[6] Where 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 26 A I_{MP} / 30 A I_{SC}.

Powerwall 3 Technical Specifications

Environmental Specifications

Operating Temperature	–20°C to 50°C (–4°F to 122°F)[7]
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

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

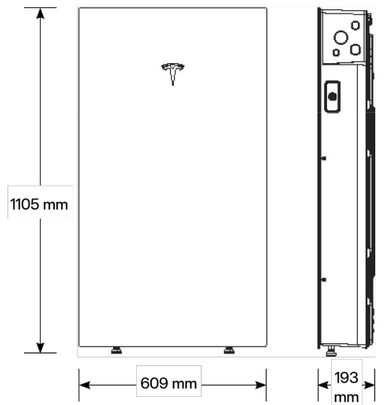
Compliance Information

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

Mechanical Specifications

Dimensions	1105 x 609 x 193 mm (43.5 x 24 x 7.6 in)[8]
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

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



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CHARLOTTE, NORTH CAROLINA, 28217
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NC GC #76615
NC ELE #U.34519

PREPARED BY:
HIGH LINE DESIGNS
SCOTT TOYAMA

SCALE: NTS	AHJ: HARNETT COUNTY
SHEET SIZE: 11" x 17"	APN: 0662371163.000
TEMPLATE V2.0	DATE: 10/17/2024

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EQUIPMENT DATASHEET

Solar Shutdown Device Technical Specifications

—

The 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 3, solar array shutdown is initiated by any loss of AC power.

Electrical Specifications

Model	MCI-1	MCI-2
Nominal Input DC Current Rating (I_{MP})	13 A	13 A
Maximum Input Short Circuit Current (I_{SC})	19 A	17 A
Maximum System Voltage (PVHCS)	600 V DC	1000 V DC [13]
Maximum Disconnect Voltage [14]	600 V DC	165 V DC

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

[14] 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.

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

PV HAZARD CONTROL SYSTEM | GENERIC PV ARRAY

UL 3741 REPORT DATE 4-06-22 Tesla Inverter Based PVHCS, Consisting of Tesla Inverters, Tesla MCI and other
PV RAPID SHUTDOWN ARRAY listed components to create the system

WARNING: To reduce the risk of injury, read all instructions.

PV HAZARD CONTROL EQUIPMENT AND COMPONENTS

Function	Manufacturer	Model No.	Firmware Versions	Certification Standard
Inverter or Powerwall+	Tesla	7.6 kW: 1538000[1] 3.8 kW: 1534000[1] 7.6 kW: 1850000[1]	V4, CEA4F802 V4, FF7BE4E1 V4, CEA4F802	UL 1741, UL 1998, PVRSS/PVRSE
Mid Circuit Interrupter (MCI)	Tesla	MCI-1, MCI-2	N/A	UL 1741 PVRSE
PV Modules	The PVHC PV modules must be listed by a NRTL to UL 1703 and/or UL 61730-1 and UL 61730-2 (excluding Class 0 and Class I).			
PV Mounting System	The PV mounting system must comply with one of the following: • Listed by NRTL to UL 2703 and rated for use with the specific PV modules noted above. • The non-certified combinations of mounting and PV modules shall be evaluated for loading, mounting and grounding per the NEC and other applicable installation codes.			
PV Connectors	The following PV connectors may be used to connect to the Tesla MCIs: • Staubli type PV-KST4/6II-UR or type PV-KST4-EVO2 (male), • Staubli type PV-KBT4/6II-UR or PV-KBT4-EVO2 (female), • Staubli Branch Socket PV-AZB4 and Branch Plug PV-AZS4, • Connectors evaluated by an NRTL for intermatability with the connectors above.			
PVHCS Initiator: (PV Inverter)	Dedicated PV system AC circuit breaker or AC disconnect switch, labeled per NEC 690.12 requirements.			N/A
PVHCS Initiator: (Powerwall+)	Emergency stop device (NISD)- Listed "Emergency Stop Button" or "Emergency Stop Device" or "Emergency Stop Unit".			UL 508 or UL 60947 Parts 1, 5-1 and 5-5.

[1] Applies to variations of this part number with suffix of two numbers and one letter.

Note: PVHCS installation requirements may reduce the effective equipment and component ratings below the individual equipment and component PVRSE ratings in order to achieve PVHCS shock hazard reduction requirements.

PVHCS INSTALLATION REQUIREMENTS

Max System Voltage	600 Vdc
PVHCS Maximum Circuit Voltage (Array Internal Voltage After Actuation)	165 Vdc (cold weather open circuit)

OTHER INSTALLATION INSTRUCTIONS

1. An MCI must be connected to one end of each series string or mounting plane sub-array string.

2. MCIs shall be installed between series connected module combinations such that the PVHC Maximum Circuit Voltage after actuation is no greater than 165V under any circumstances. The installation location coldest anticipated operating ambient temperature shall be used to calculate the PV maximum voltage in accordance with NEC 690.7.

3. Verification that the MCIs are installed in accordance with 1) and 2) shall be documented for inspection, by voltage measurement logs and/or as-built string layout diagrams.

4. For PV Inverter: The PVHCS initiator (AC breaker or switch) shall be sized and installed in accordance with NEC requirements. The specific part shall be identified on the as-built system drawings.

5. For Powerwall+: The PVHCS emergency stop initiator shall have the following minimum ratings: Outdoor (Type 3R or higher), 12V, 1A, and shall be installed in accordance with NEC requirements. The specific part shall be identified on the as-built system drawings. Refer to the Powerwall+ installation manual for further details.

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SCOTT TOYAMA

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SHEET SIZE: 11" x 17"	APN: 0662371163.000
TEMPLATE V2.0	DATE: 10/17/2024

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PV-8
EQUIPMENT DATASHEET

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[15]
IEC Protective Class	Class I
Overvoltage Category	Category IV

[15] 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

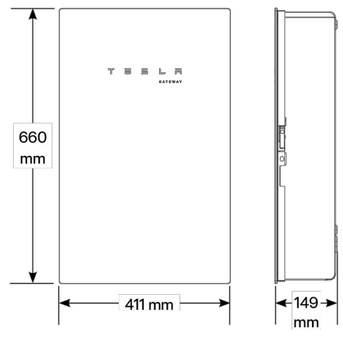
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

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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PV-9
EQUIPMENT DATASHEET

Product	Powerwall
Last Revised	November 30, 2023
Revision	1.2

DISCONNECTING MEANS FOR POWERWALL 2, POWERWALL+, AND POWERWALL 3

Overview

Disconnecting means requirements for ESS and PV systems are addressed in NEC 705.20 (interconnected power systems), 706.15.B.1 (ESS) and 690.15 (PV).

In the 2023 edition of the NEC, there is uniform agreement between these articles that the disconnecting means should:

- Disconnect all poles
- Be capable of interrupting current
- Be either within line of sight or else lockable in the open position if not within sight
- Indicate the off/on position
- Be allowed as integral to the system/unit

The traditional disconnecting means for equipment and systems is the circuit breaker supplying the equipment. In the majority of installations, the circuit breaker resides in a readily accessible, lockable panel enclosure. Tesla recommends this to be considered the primary disconnecting means, regardless of the edition of code enforced.

Enable Switch as Secondary Disconnecting Means

Tesla also makes available an Enable switch located on the Powerwall 2, Powerwall+, or Powerwall 3 unit, certified to UL 1741 to interrupt current and disconnect all poles from the connected AC circuits, with redundant series-connected contactors. (The same contactors controlled by a remote E-stop button are certified as suitable for rapid shutdown per article 690.12, a life-safety function required for first responders.)

As of November 2022, Tesla is producing Powerwall 2 and Powerwall+ with a locking mechanism that can be used to keep the Enable switch locked in the OFF position. Powerwall 3 is also produced with an equivalent locking mechanism. While the circuit breaker remains the primary disconnecting means (preferred because it de-energizes all circuits connected to the unit, not just on the open side terminals within the unit), the Enable switch on the unit itself also provides a local lockable means that meets within-sight requirements for disconnects when the breaker is not within sight.

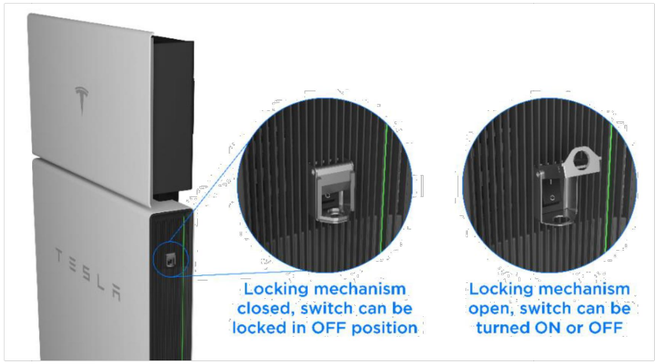

Figure 1: Locking Enable Switch on Powerwall+

Looking into future code, requirements within article 706.15.B.1 of the 2023 NEC have been further amended to allow disconnecting means to be either within line of sight or else lockable if not within sight. These changes are in alignment with ESS and PV requirements to ensure safe working conditions when disconnecting means are not visible from the equipment. To reiterate, this requirement was removed from the same article of the 2023 edition to align with the similar Article 690 and 705 requirements, for two key reasons: 1) the need for lockable means is most important when the switch isn't within sight, so that a worker can be assured the switch remains open, and 2) the subjective nature of what is practical and impractical in locating additional disconnects in residential spaces.

Therefore, Tesla's position on 2020 compliance is that the panel circuit breaker be the primary disconnecting means and that the lockable Enable switch on the unit itself be used as supplemental to meet the additional "within sight" 706.15 requirement specific to the 2020 NEC.

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801 PRESSLEY ROAD, SUITE 100
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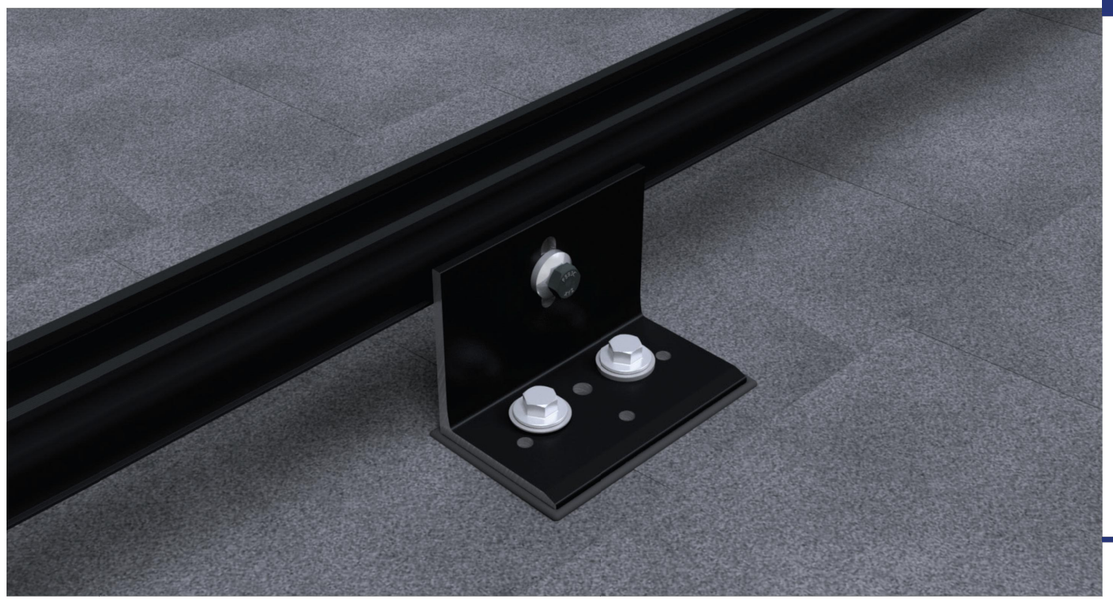
PV-10
EQUIPMENT DATASHEET

SnapNrack®

Ultra Rail

AnchorFoot™



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- Pre-installed butyl for easy worry-free sealing
- Compatible with proprietary DeckAnchor™ fasteners cutting the number of deck fasteners in half, from 4 to 2
- Single Tool installation & snap-in features as with all SnapNrack products

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are the latest innovation designed to reduce the number of roof fasteners when mounting direct to deck and provide maximum flexibility to mount anywhere on the roof. Engineered with butyl, now installers do not have to add sealant to the bottom of the mount, simplifying the installation process and further protecting the roof.

AnchorFoot™

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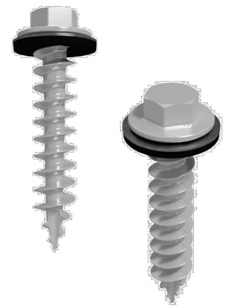
- Industry-leading .200” thick butyl allows installation over shingles without cutting pieces
- Flexible direct to deck mounting options with (2) DeckAnchors or (4) #14 wood screws
- Flexible rafter mounting options with (1) 5/16” lag or (2) #14 wood screws
- Ships pre-assembled with Ultra Rail Mounting Clamp for easy rail attachment
- Rated for UL2703 Bonding & Grounding with TAS 100A Wind Driven Rain Testing for waterproof certification



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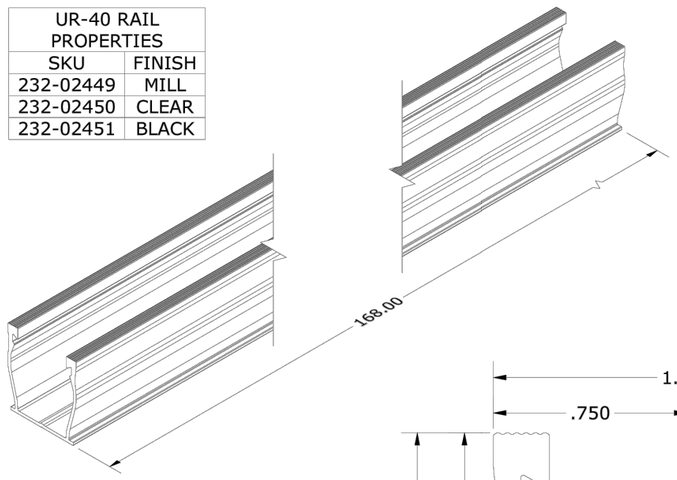
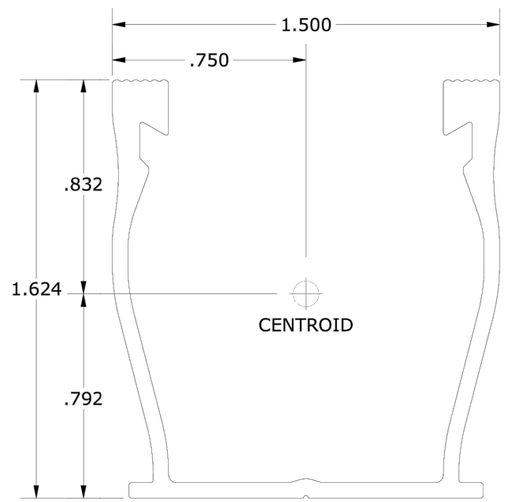
PV-11
EQUIPMENT DATASHEET

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

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	

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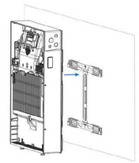
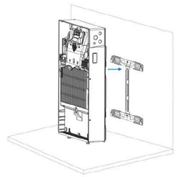
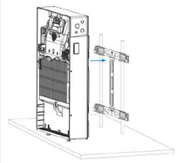
PV-12
EQUIPMENT DATASHEET

APPENDIX A: POWERWALL 3 ANCHORING DETAILS

A1

Table 5. Mounting Design Guidelines Based on Seismic and Wind Speed Conditions

	Ground- or Wall-mount Powerwall 3 with Wall Bracket	**Ground-mount Powerwall 3 on Poured Concrete**	**Ground-mount Powerwall 3 on Poured Concrete with Steel Posts**
			
Wall and Foundation	Existing structural wall and existing approved foundation	Existing structural wall and poured concrete foundation	Poured concrete with steel posts
Seismic Design Category	A, B, C, or D	A, B, C, or D	A, B, C, or D
Max Wind Speed	180 mph Exposure Category C	180 mph Exposure Category C	180 mph Exposure Category C
Installation Information	*Installation instructions on page 37* *Anchoring details on page 93* (A6 - A9)	*Installation instructions on page 96* (A10 - A11) *Anchoring details on page 93* (A6 - A9)	*Installation instructions and anchoring details on page 98* (A12 - A15)

NOTE: There is no wind speed limitation on Powerwall and anchoring equipment when mounting in interior locations.

The following conditions will require additional site-specific evaluation by the installing company's structural engineering team:

- Wind Exposure Category D
- Wind speeds greater than 180 mph
- Poured concrete pad and steel post construction in regions with seismic above S_S = 2.37 will require site-specific calculations
- If needed, reference the linked third party resource for Seismic Categories, Wind Speeds and Exposure Categories: *https://asce7hazardtool.online/*

Anchoring Details for Ground- or Wall-mounting Powerwall 3 with Wall Bracket on Existing Approved Foundation

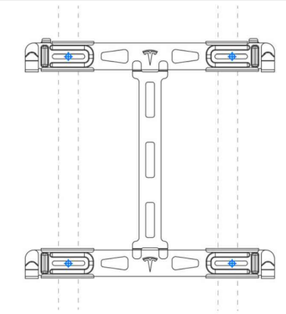
A6

Reference these anchoring details when mounting Powerwall 3 to the provided mounting bracket.

Wood Studs (spaced at 12 to 17 inches)

If anchoring directly into wood studs, use at least four (one in each corner) ¼ inch wood screws with washers, of sufficient length for at least 2-½ inch embedment into the studs.

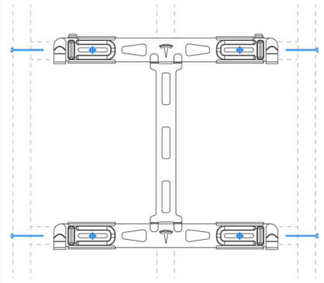
NOTE: See *Channel Strut (Unistrut) on page 95* for stud spacing greater than 17 inches, up to 24 inches.



Wood Studs (spaced at 12 to 17 inches)

If anchoring to blocking between wood studs, use minimum 2 x 4 in blocks, end-nailed into studs with two 16d (89 x 4 mm) nails or toe-nailed into studs with four 8d (64 x 3 mm) nails. Use at least four (one in each corner) ¼ inch wood screws with washers, of sufficient length for at least 2-½ inch embedment into the blocking.

NOTE: See *Channel Strut (Unistrut) on page 95* for stud spacing greater than 17 inches, up to 24 inches.

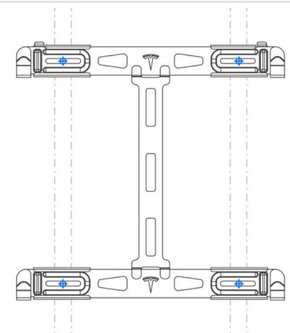


Metal Studs (spaced at 12 to 17 inches)

If anchoring directly to metal studs, studs must be minimum 18 gauge. Use at least four (one in each corner) #14 (¼ inch) sheet metal screws with washers, of sufficient length to penetrate at least 3 threads beyond the stud.

If backing is needed between the studs, the backing must be minimum 18 gauge. Attach backing to metal studs with 12 gauge 3x3 inch angle clip or Simpson SFC2.25 clips with two #10 sheet metal screws in each leg.

NOTE: See *Channel Strut (Unistrut) on page 95* for stud spacing greater than 17 inches, up to 24 inches.



RENU ENERGY SOLUTIONS, LLC
801 PRESSLEY ROAD, SUITE 100
CHARLOTTE, NORTH CAROLINA, 28217
704-525-6767 | RENUENERGYSOLUTIONS.COM

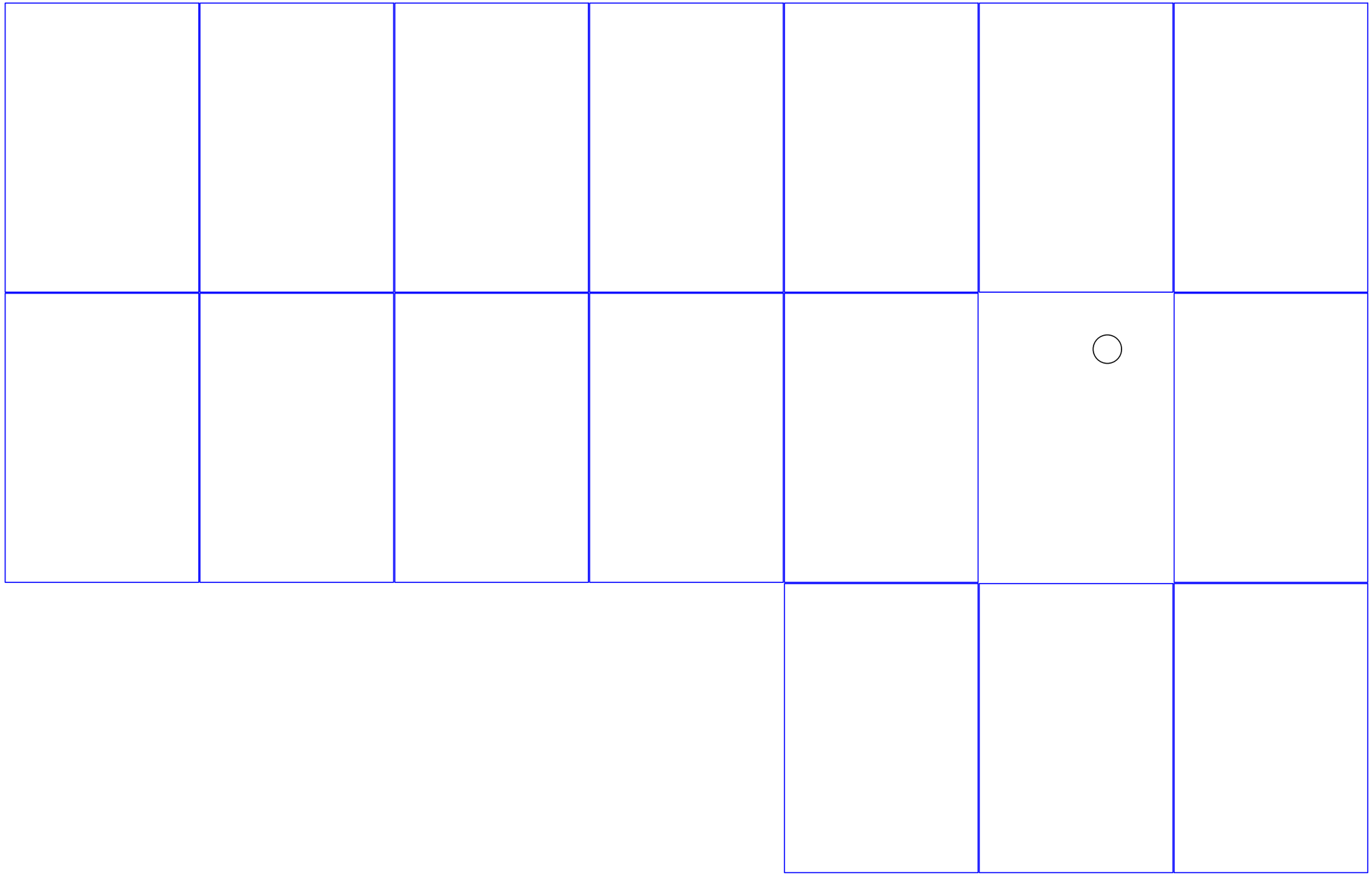
NC GC #76615
NC ELE #U.34519

PREPARED BY:
HIGH LINE DESIGNS
SCOTT TOYAMA

SCALE: NTS	AHJ: HARNETT COUNTY
SHEET SIZE: 11" x 17"	APN: 0662371163.000
TEMPLATE V2.0	DATE: 10/17/2024

SANDRA HALLER
358 COLESHILL RD
ANGIER, NC 27501

PV-13
ANCHORAGE DETAILS



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SANDRA HALLER
358 COLESHILL RD
ANGIER, NC 27501

PV-14
MAPPING SHEET