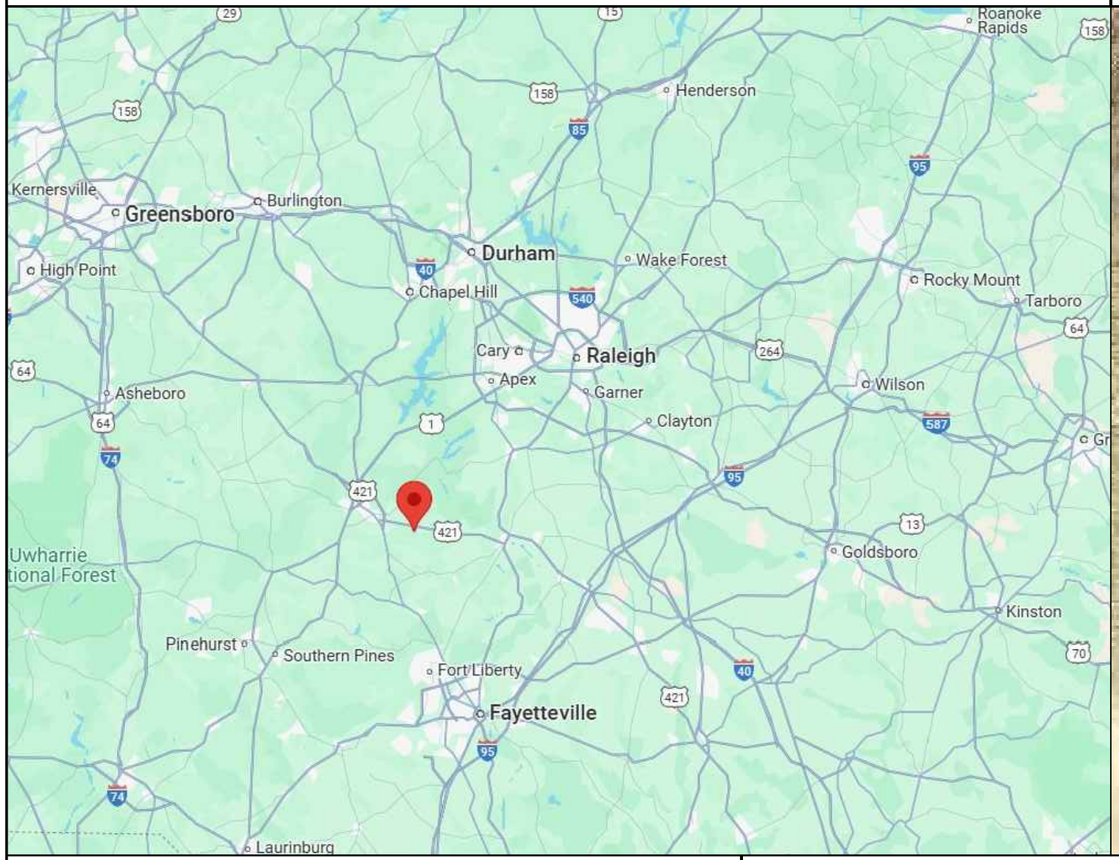
VICINITY MAP



PROPERTY MAP

SCOPE OF WORK

(32) CERTAINTEED CTMI0400HCII-06
(I) TESLA POWERWALL 3
(I2) TESLA MCI- I
(I) TESLA GATEWAY 2
ROOF MOUNT: IRONRIDGE FLASHVUE
MOUNTING RAILS: IRONRIDGE XRI0

SITE CONDITION

ASCE 7-I0 WIND SPEED - I20 MPH
EXPOSURE CATEGORY - B
RISK CATEGORY - II
SNOW LOAD - I5 LBS/SQFT

SHEET INDEX

INTERCONNECTIONS TYPE

LINE SIDE TAP

CODE REFERENCES

2017 NATIONAL ELECTRIC CODE
2018 NORTH CAROLINA FIRE CODE
2018 NORTH CAROLINA BUILDING CODE
2018 NORTH CAROLINA RESIDENTIAL CODE

UTILITY COMPANY

DUKE ENERGY PROGRESS

LEGEND

- DISCONNECT SWITCH
- FUSE
- CIRCUIT BREAKER
- GND — EQUIP. GROUND

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035609 ENGINEER ANDREW W. KING 10/21/24

MODEL ENERGY
300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
919-274-9905
MODELENERGY.COM
P-1194

JOB TITLE:

NEW SOLAR PV SYSTEM
12.800 kW DC INPUT
11.500 kW AC EXPORT

James Smith
358 Liam Drive,
Broadway, NC 27505

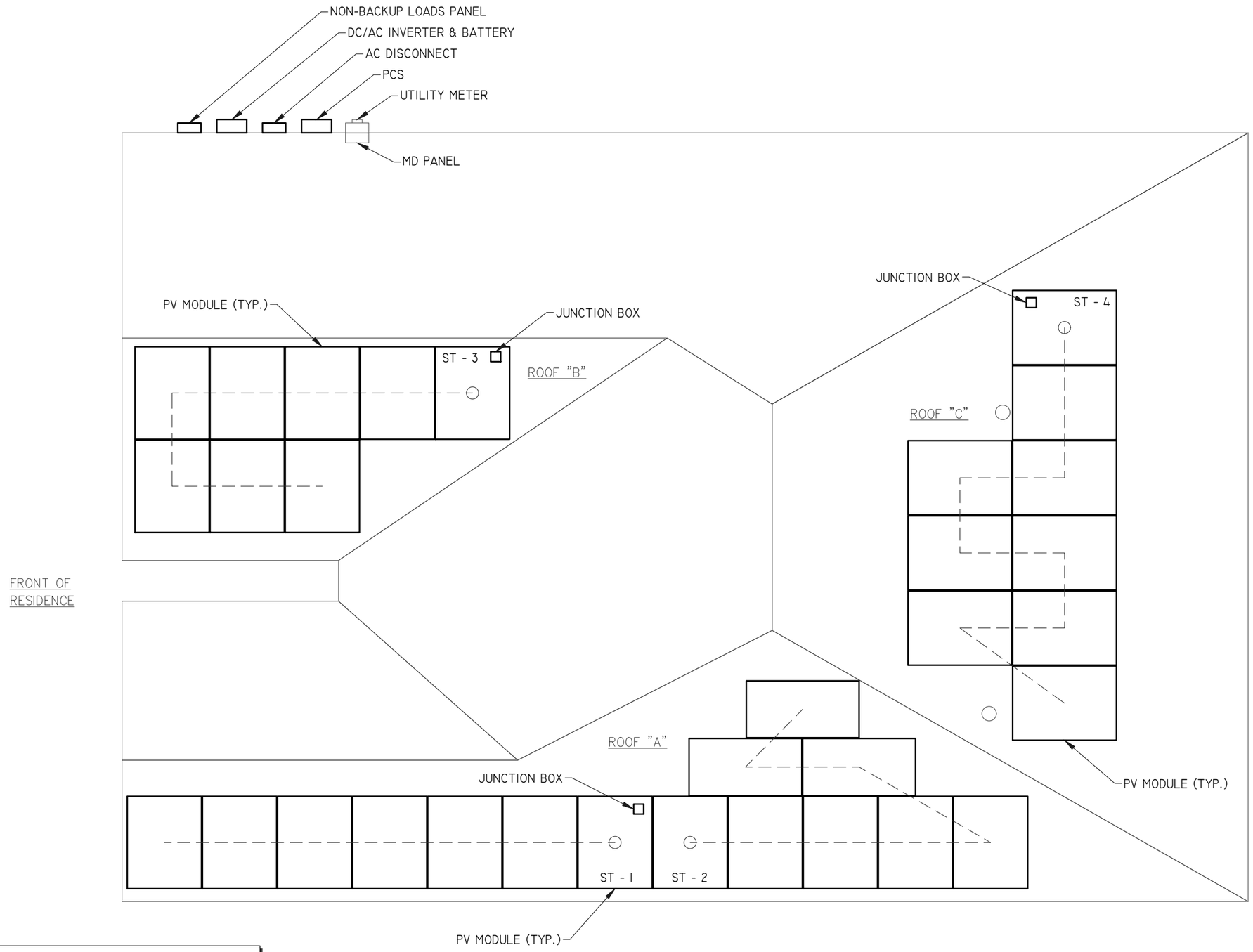
CLIENT:

EMERALDENERGY
North Carolina Renewable Energy Specialists

ISSUED FOR:	DATE:
PERMIT	10/21/24

PROJECT INFORMATION

PV1.1



NOTE: PROVIDE ADDITIONAL JUNCTION BOXED AS REQUIRED TO COMBINE MODULES ON DIFFERENT ARRAYS INTO A SINGLE STRING

1 SITE PLAN
SCALE: 3/16" = 1' -0"

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/21/24

MODEL ENERGY
300 FAYETTEVILLE ST.
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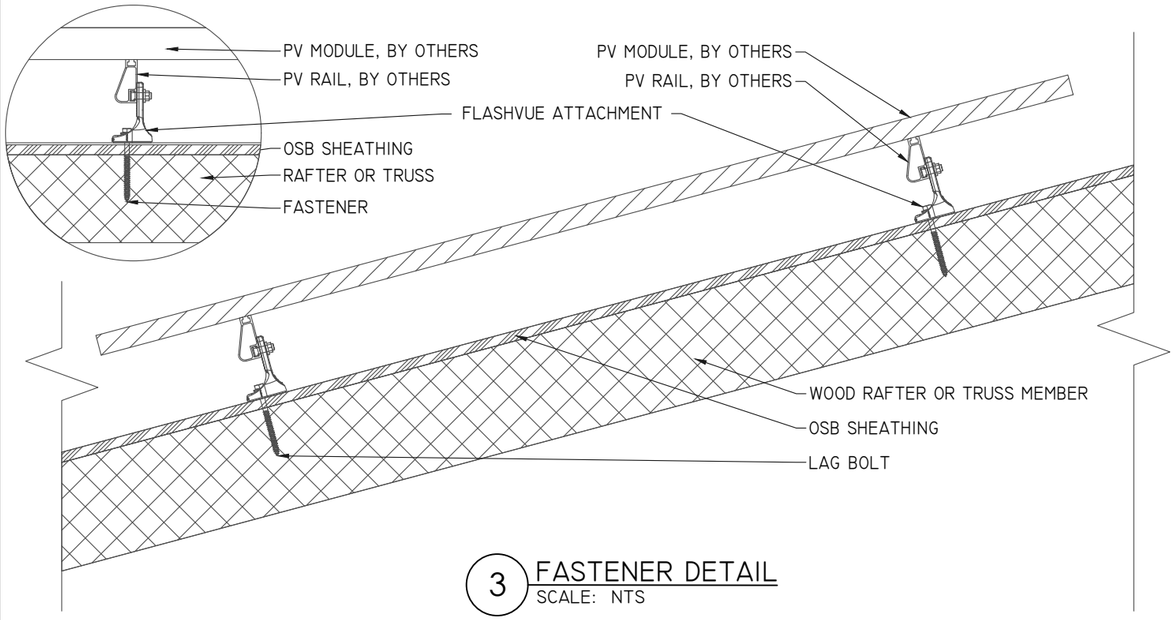
SITE INFORMATION

PV2.1



3 FASTENER DETAIL
SCALE: NTS

ARRAY "B" SUMMARY	
# MODULES	8
# ROOF MOUNTS	24
RAIL LENGTH	98 FT.
ARRAY AREA	168 SQFT.
ARRAY WEIGHT	511 LBS.
AZIMUTH @ SN	154°
TILT ANGLE	40°

ARRAY "A" SUMMARY	
# MODULES	15
# ROOF MOUNTS	50
RAIL LENGTH	120 FT.
ARRAY AREA	315 SQFT.
ARRAY WEIGHT	877 LBS.
AZIMUTH @ SN	154°
TILT ANGLE	40°

MOUNTING RAILS	
MAKE	IRONRIDGE
MODEL	XRI0
MATERIAL	ALUMINUM
WEIGHT	1.25 LBS/SQFT
SPACING	34''

STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

SIGNED:

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF SUMMARY	
STRUCTURE:	
TYPE	TRUSS
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 4"
SPACING	24''
EFF. SPAN	
ROOF "A"	13'-7"
ROOF "B"	11'-2"
PITCH	
ROOF "A"	10/12
ROOF "B"	10/12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	IRONRIDGE
MODEL	FLASHVUE
MATERIAL	ALUMINUM
FASTENER	
MAKE	GENERIC
MODEL	LAG BOLT
MATERIAL	300 SERIES SS
SIZE	5/16" X 4.5"
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	1 PER MOUNT
MAX. PULL-OUT FORCE	800 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	400 LBS.

- LAG BOLT EMBEDDED WITH 2.5" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER

ROOF LOADING "LANDSCAPE"	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	3.0 LBS./SQFT.
TOTAL	6.9 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-28.9 LBS/SQFT
UPLIFT ZONE 2	-34.0 LBS/SQFT
UPLIFT ZONE 3	-34.0 LBS/SQFT
DOWNWARD	27.0 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-323 LBS
UPLIFT ZONE 2	-253 LBS
UPLIFT ZONE 3	-126 LBS
DOWNWARD	301 LBS

ROOF LOADING "PORTRAIT"	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	2.5 LBS./SQFT.
TOTAL	6.4 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-28.9 LBS/SQFT
UPLIFT ZONE 2	-34.0 LBS/SQFT
UPLIFT ZONE 3	-34.0 LBS/SQFT
DOWNWARD	27.0 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-327 LBS
UPLIFT ZONE 2	-192 LBS
UPLIFT ZONE 3	-192 LBS
DOWNWARD	305 LBS

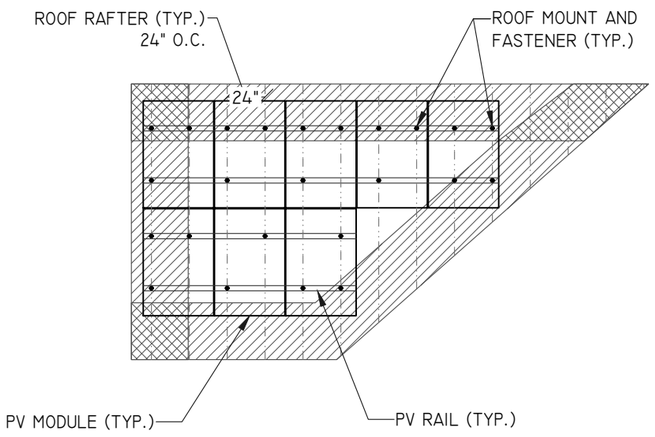
PV MODULES	
MAKE	CERTAINTEED
MODEL	CTMI0400HCII-06
WIDTH	44.6''
LENGTH	67.8''
THICKNESS	1.4''
WEIGHT	49 LBS

ROOF ZONES "LANDSCAPE":

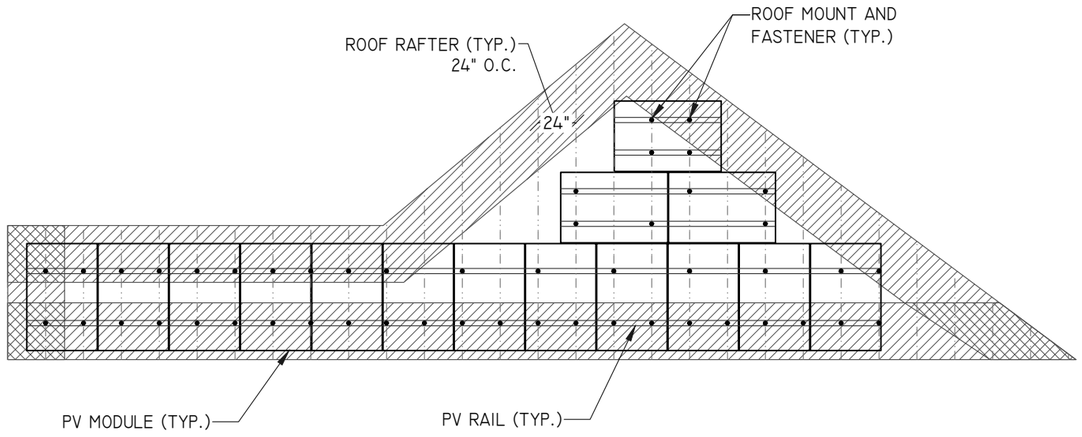
ALL ZONES	MAX. RAIL OVERHANG =	16''
☐ ZONE 1	MAX. FASTENER SPAN ZONE 1 =	72''
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =	48''
⊠ ZONE 3	MAX. FASTENER SPAN ZONE 3 =	24''

ROOF ZONES "PORTRAIT":

ALL ZONES	MAX. RAIL OVERHANG =	16''
☐ ZONE 1	MAX. FASTENER SPAN ZONE 1 =	48''
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 =	24''
⊠ ZONE 3	MAX. FASTENER SPAN ZONE 3 =	24''



2 ROOF "B" PLANAR VIEW
SCALE: 1/8" = 1' -0"



1 ROOF "A" PLANAR VIEW
SCALE: 1/8" = 1' -0"

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/21/24

MODEL ENERGY
300 FAYETTEVILLE ST.
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CLIENT:

EMERALDENERGY
North Carolina Renewable Energy Specialists

ISSUED FOR:	DATE:
PERMIT	10/21/24

STRUCTURAL INFORMATION

PV3.1

ROOF "C" SUMMARY	
STRUCTURE:	
TYPE	TRUSS
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 4"
SPACING	24''
EFF. SPAN	23'-10"
PITCH	5/12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

ROOF "C" LOADING	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	2.5 LBS./SQFT.
TOTAL	6.4 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-27.0 LBS/SQFT
UPLIFT ZONE 2	-44.6 LBS/SQFT
UPLIFT ZONE 3	-67.0 LBS/SQFT
DOWNWARD	16.0 LBS/SQFT
FASTENER LOAD:	
UPLIFT ZONE 1	-305 LBS
UPLIFT ZONE 2	-252 LBS
UPLIFT ZONE 3	N/A
DOWNWARD	181 LBS

ARRAY "C" SUMMARY	
# MODULES	9
# ROOF MOUNTS	22
RAIL LENGTH	75 FT.
ARRAY AREA	189 SQFT.
ARRAY WEIGHT	530 LBS.
AZIMUTH @ SN	64°
TILT ANGLE	23°

MOUNTING RAILS	
MAKE	IRONRIDGE
MODEL	XR10
MATERIAL	ALUMINUM
WEIGHT	1.25 LBS/SQFT
SPACING	34''

PV MODULES	
MAKE	CERTAINTEED
MODEL	CTM10400HC11-06
WIDTH	44.6''
LENGTH	67.8''
THICKNESS	1.4''
WEIGHT	49 LBS

ROOF "C" ZONES:

ALL ZONES	MAX. RAIL OVERHANG =	16''
ZONE 1	MAX. FASTENER SPAN ZONE 1 =	48''
ZONE 2	MAX. FASTENER SPAN ZONE 2 =	24''
ZONE 3	DO NOT INSTALL MODULES IN ZONE 3	N/A

STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

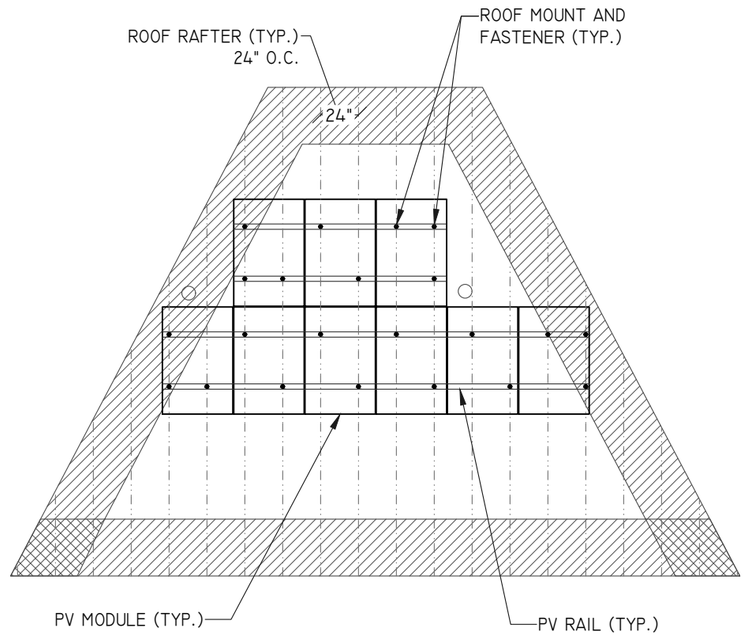
SIGNED:

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	IRONRIDGE
MODEL	FLASHVUE
MATERIAL	ALUMINUM
FASTENER	
MAKE	GENERIC
MODEL	LAG BOLT
MATERIAL	300 SERIES SS
SIZE	5/16" X 4.5"
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	1 PER MOUNT
MAX. PULL-OUT FORCE	800 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	400 LBS.

- LAG BOLT EMBEDDED WITH 2.5" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER



1 ROOF "C" PLANAR VIEW
SCALE: 1/8" = 1' -0"

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/21/24

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North Carolina Renewable Energy Specialists

ISSUED FOR:	DATE:
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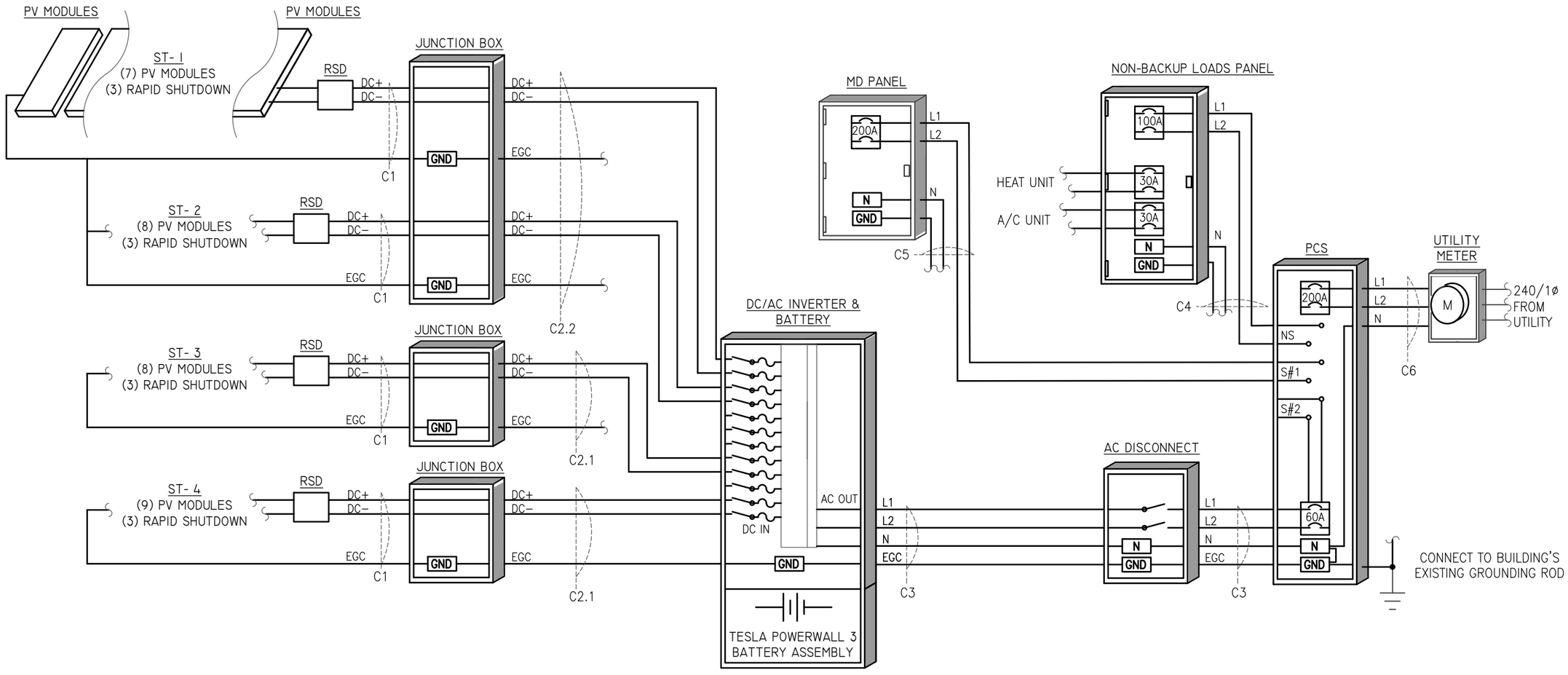
STRUCTURAL INFORMATION

PV3.2



1 PV SYSTEM ELECTRICAL WIRING SCHEMATIC
SCALE: NTS

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/21/24

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ELECTRICAL INFORMATION

PV4.1

PV MODULES	
MAKE	CERTAINTEED
MODEL	CTMI0400HCII-06
TECHNOLOGY	MONO-CRYST.
NOM. POWER (Pnom)	400 WATTS
NOM. VOLT. (Vmp)	31.01 VOLTS
O.C. VOLT. (Voc)	37.04 VOLTS
MAX. SYS. VOLT.	1500 V (UL)
TEMP. COEF. (Vtc)	-0.27 %/°C
NOM. CURR. (Imp)	12.90 Amps
S.C. CURR. (Isc)	13.79 Amps
MAX. SERIES FUSE	25 Amps

RAPID SHUT DOWN SYSTEM	
MAKE	TESLA
MODEL	MCI -1
PV DC INPUT:	
MAX. NUM. DEVICES PER STRING	5
MAX. CURRENT	19A
NOM. CURRENT	13A
DC OUTPUT:	
MAX. VOLT.	MODULE Voc
MAX. SYSTEM VOLT.	1000 VOLTS

JUNCTION BOX	
MAKE	SOLADECK
MODEL	0783-3R
PRO. RATING	NEMA 3R
VOLT. RATING	600 VOLTS
AMP RATING	120 AMPS
UL LISTING	UL 50

NOTES:

- PROVIDE ADDITIONAL JUNCTION BOXED AS REQUIRED TO COMBINE MODULES ON DIFFERENT ARRAYS INTO A SINGLE STRING

MAXIMUM DC VOLTAGE CALCULATION:

VocMAX= Voc*[1+(Tmin-Tstc)*(TKvoc/100)]
VocMAX=37.04*[1+((-12.1)-25)*(-0.27/100)] = 40.75 V
VocMAX/STRING= VocMAX*# OF MODULES IN STRING
VocMAX/STRING= 40.75*9 = 366.75 V
366.75 V < 600 V

MAXIMUM DC CURRENT CALCULATION:

Isc MAX= Isc*Tcx
Isc MAX= 13.79*1.25
Isc MAX= 17.24 AMPS

DC/AC INVERTER & BATTERY	
MAKE	TESLA POWERWALL 3
MODEL	1707000-XX-Y
TECHNOLOGY	TRANS-LESS
DC INPUT:	
MAX. VOLT	600 volts
NOM. VOLT.	60-550 volts
MAX. CURRENT	13 amps
MAX. SCC	15 amps
STRINGS INPUTS	6 STRINGS
AC OUTPUT:	
MAX. POWER	11500 watts
NOM. VOLT.	240 volts
MAX. CURR.	48 amps
RAPID SHUTDOWN (Y/N)	YES
PROTECT. RATING	NEMA 3R
BATTERY INFO:	
USABLE ENERGY	13.5 kWh
NOM. VOLT	240 VOLTS
MAX. CONT. CHARGE	5000 WATTS
UL LIST. (Y/N)	YES

CONDUCTOR SCHEDULE

TAG	CURRENT CARRYING CONDUCTORS				GROUNDING CONDUCTORS				CONDUIT/RACEWAY				NOTES
	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL	LOCATION	
C1	2	10 AWG	COPPER	PV WIRE	1	6 AWG	COPPER	BARE WIRE	-	-	-	FREE AIR	1
C2.1	2	10 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	1/2"	FMC/EMT/MC	FREE AIR	1
C2.2	4	10 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	3/4"	FMC/EMT/MC	EXT/INT	2,4
C3	3	6 AWG	COPPER	THHN-2	1	10 AWG	COPPER	THHN-2	1	1"	NOTE 5	EXTERIOR	2,4,5
C4	3	3 AWG	COPPER	THHN-2	1	8 AWG	COPPER	THHN-2	1	1 1/4"	NOTE 5	EXTERIOR	2,4,5
C5	3	4/0 AWG	ALUMINUM	XHHW	1	2 AWG	ALUMINUM	XHHW	1	2"	NOTE 5	EXTERIOR	2,4,5
C6	3	4/0 AWG	ALUMINUM	XHHW	-	-	-	-	1	2"	NOTE 5	EXTERIOR	2,4,5,6
XC	-	-	-	-	-	-	-	-	-	-	-	-	3

NOTES:

1. MANUFACTURER PROVIDED, UL LISTED WIRING HARNESS FOR USE ON EXPOSED ROOFS
2. CONDUIT SIZE SHOWN IS CODE MINIMUM. LARGER SIZES ARE ALLOWED.
3. EXISTING CONDUCTORS, FIELD VERIFY
4. EQUIPMENT TERMINAL RATING SHALL BE A MINIMUM OF 75°C AT BOTH END OF CONDUCTOR
5. PVC, EMT, ROMEX, LFNMC & FMC ARE ACCEPTABLE WHEN USED IN ACCORDANCE WITH ARTICLES 330, 334, 348, 350, 352, 356, & 358 OF THE 2017 NEC

PCS (NEW)	
MAKE	TESLA
MODEL	BACKUP GATEWAY
AC VOLTAGE	240 volts
MAX. AC CURR.	200 amps
PROTECT. RATING	NEMA 3R
FUSED (Y/N)	YES
FUSE RATING	200A

NOTES:

- INSTALL 200A EATON MAIN BREAKER.
- MAIN BREAKER SERVES AS SERVICE DISCONNECT SWITCH.
- TROUGH MAY BE USED IF NECESSARY.
- CONNECT NON-BACKUP LOADS PANEL VIA NON-BACKUP SECURE LUGS GATEWAY OUTPUTS.
- CONNECT MD PANEL VIA SECURE LUGS #1 GATEWAY OUTPUTS.
- GATEWAY INTERNAL PANEL (GENERATION OPTION) INSTALLED.
- BACK-FEED DC/AC INVERTER & BATTERY OUTPUT VIA (1) 60A BREAKER IN GATEWAY PANEL.
- SERVICE DISCONNECT LABEL
- PROVIDE N/G BOND
- PROVIDE GEC

AC DISCONNECT (NEW)	
MAKE	GENERIC
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
AMP RATING	60 AMPS
UL LIST. (Y/N)	YES
FUSED (Y/N)	NO
FUSE RATING	N/A

NOTES:

- LOAD-BREAK RATED
- VISIBLE OPEN
- LOCKABLE IN OPEN POSITION
- INSTALL ADJACENT TO METER
- DISCONNECT TO BE READILY ACCESSIBLE TO UTILITY COMPANY PERSONNEL AT ALL TIMES

NON-BACKUP LOADS PANEL (NEW)	
MAKE	N/A
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	100 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	YES
BREAKER RATING	100 AMPS

NOTES:

- MOVE A/C UNIT INTO NON-BACKUP LOADS PANEL.
- MOVE HEAR UNIT INTO NON-BACKUP LOADS PANEL.

MD PANEL (EXISTING)	
MAKE	N/A
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	200 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	YES
BREAKER RATING	200 AMPS

NOTES:

- FEED MD PANEL VIA GATEWAY OUTPUTS.
- REMOVE N/G BONG IN MD PANEL.
- REMOVE SERVICE DISCONNECT STICKER.
- REMOVE CONNECTION TO GROUNDING ELECTRODE SYSTEM .

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/21/24

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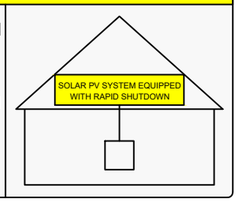
ELECTRICAL INFORMATION

PV4.2

EQUIPMENT LABELS

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



NEC 690.56 (C)(1)(a)
PLACE WITHIN 3FT OF SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATIONS OF RAPID SHUTDOWN SWITCHES

PV SYSTEM DISCONNECT

NEC 690.13 (B)
PLACE ON PV SYSTEM DISCONNECTING MEANS.

⚠WARNING

TRIPLE POWER SUPPLY SOURCES: UTILITY GRID, PV SOLAR AND BESS ELECTRIC SYSTEM

NEC 705.12 (B)(3)
PLACE ON ALL EQUIPMENT THAT IS SUPPLIED BY ALL POWER SOURCES

⚠WARNING

ELECTRIC SHOCK HAZARD

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

NEC 690.13 (B)
PLACE ON PV SYSTEM DISCONNECTING MEANS.

⚠WARNING

POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

NEC 705.12 (B)(2)(3)(b)
PLACE ADJACENT TO BACK-FED BREAKER

WARNING: PHOTOVOLTAIC POWER SOURCE

NEC 690.31 (G)(3)&(4)
PLACE ON ALL JUNCTION BOXES, EXPOSED RACEWAYS, AND OTHER WIRING METHODS EVERY 10' AND ON EVERY SECTION SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.

⚠WARNING

FED BY MULTIPLE POWER SOURCES

TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING UTILITY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR

NEC 705.12 (B)(2)(3)(c)
PLACE ADJACENT TO BACK-FED BREAKER

PHOTOVOLTAIC POWER SOURCE

OPERATING AC VOLT.	240 VAC
MAXIMUM OPERATING AC OUTPUT CURRENT	48 AMPS

NEC 690.54
PLACE ON INTERCONNECTION DISCONNECTING MEANS

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

NEC 690.56 (C)(3)
PLACE ON RAPID SHUTDOWN SWITCH OR EQUIPMENT WITH INTEGRATED RAPID SHUTDOWN *REFLECTIVE*

EQUIPMENT LABEL NOTES

1. LABELS SHOWN ARE 1/2 THEIR ACTUAL REQUIRED SIZE.
2. LABEL MATERIAL SHALL BE SUITABLE FOR THE EQUIPMENT ENVIRONMENT.
3. CONDUIT SHALL BE MARKED WITH REQUIRED LABEL EVERY 10 FEET.

DIRECT CURRENT PHOTOVOLTAIC POWER SOURCE

MAXIMUM VOLTAGE	600 VDC
MAX CIR. CURRENT	76 AMPS

NEC 690.53
PLACE ON ALL DC DISCONNECTING MEANS

CONSTRUCTION NOTES

1. ALL WORK AND EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST NATIONAL, STATE, AND LOCAL CODES AND ORDINANCES
2. FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS, BEST PRACTICES, AND SPECIFICATIONS
3. WIRES SHALL BE RATED AND LABELED "SUNLIGHT RESISTANT" WHERE EXPOSED TO AMBIENT CONDITIONS
4. THE PHOTOVOLTAIC SYSTEM SHALL NOT EXCEED 600 VOLTS OR 800 AMPS
5. EACH ELECTRICAL APPLIANCE SHALL BE PROVIDED WITH A NAMEPLATE GIVING THE IDENTIFYING NAME AND THE RATING IN VOLTS AND AMPERES, OR VOLTS AND WATTS. IF THE APPLIANCE IS TO BE USED ON A SPECIFIC FREQUENCY OR FREQUENCIES, IT SHALL BE SO MARKED. WHERE MOTOR OVERLOAD PROTECTION EXTERNAL TO THE APPLIANCES IS REQUIRED, THE APPLIANCE SHALL BE SO MARKED
6. WHERE APPLICABLE, GROUNDING ELECTRODE CONDUCTOR TO BE CONTINUOUS. GROUNDING CRIMPS TO BE IRREVERSIBLE
7. IN ONE- AND TWO-FAMILY DWELLINGS, LIVE PARTS IN PHOTOVOLTAIC SOURCE CIRCUITS AND PHOTOVOLTAIC OUTPUT CIRCUITS OVER 150 VOLTS TO GROUND, SHALL ONLY BE ACCESSIBLE TO QUALIFIED PERSONS WHILE ENERGIZED.
8. PHOTOVOLTAIC SYSTEMS SHALL BE PERMANENTLY MARKED AT VARIOUS EQUIPMENT LOCATIONS TO IDENTIFY THAT A PHOTOVOLTAIC SYSTEM IS INSTALLED AND THAT VARIOUS DANGERS ARE PRESENT.
9. EACH PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS SHALL BE PERMANENTLY MARKED TO IDENTIFY IT AS A PHOTOVOLTAIC SYSTEM DISCONNECT
10. WHERE ALL TERMINALS OF A DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION, A WARNING SIGN SHALL BE MOUNTED ON OR ADJACENT TO THE DISCONNECT
11. A PERMANENT LABEL FOR THE DIRECT-CURRENT PHOTOVOLTAIC POWER SOURCE SHALL BE PROVIDED BY THE INSTALLED AT THE DC DISCONNECT MEANS
12. A PERMANENT PLAQUE OR DIRECTORY, DENOTING ALL ELECTRIC POWER SOURCES SERVING THE PREMISES, SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT LOCATIONS OF ALL POWER PRODUCTION SOURCES.
13. A PERMANENT PLAQUE OR DIRECTORY SHALL BE PROVIDED DENOTING THE LOCATIONS OF THE SERVICE DISCONNECT MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECT MEANS IF THEY ARE NOT LOCATED AT THE SAME LOCATION.
14. ALL MODULE GROUND CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH NEC SECTION 690.4 (C)

ENGINEER:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/21/24

MODEL ENERGY
300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
919-274-9905
MODELENERGY.COM
P-1194

JOB TITLE:

NEW SOLAR PV SYSTEM

12.800 kW DC INPUT
11.500 kW AC EXPORT

James Smith
358 Liam Drive,
Broadway, NC 27505

CLIENT:

EMERALDENERGY
North Carolina Renewable Energy Specialists

ISSUED FOR:	DATE:
PERMIT	10/21/24

ELECTRICAL INFORMATION

PV4.3

Solstice® Panel

HALF-CELL 400W
SOLAR MODULE

EMERALDENERGY
North Carolina Renewable Energy Specialists

High performance, half-cell mono-crystalline 10BB 400W all-black modules produced using state of the art automated production lines and made using the highest quality materials and quality control standards.

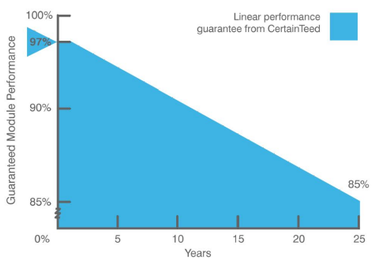
HALF-CELL MONOCRYSTALLINE TYPE
- CTM10400HC11-06

FEATURES AND BENEFITS
High Quality / High Power
- 400W with black grid backsheet
- UL listed (61730-1, UL 61730-2)
- Positive power output tolerance

Limited Warranty*
- 25-year linear power output warranty

*See CertainTeed's limited warranty for details

POWER OUTPUT WARRANTY



OPERATING CONDITIONS

Dimensions	1722 x 1134 x 35 mm
Nominal Operating Cell Temperature	45 +/-2 ° C
Operating Temperature	-40 to 85° C
Maximum System Voltage	1,500V
Fire Performance	Class C / Type 1
Maximum Wind Load	112 lbs/ft² (5400 Pa)
Maximum Snow Load	112 lbs/ft² (5400 Pa)

certainteed
SAINT-GOBAIN

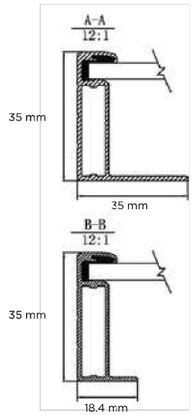
ELECTRICAL CHARACTERISTICS

Nominal Output (Pmpp)	W	400
Voltage at Pmax (Vmpp)	V	31.01
Current at Pmax (Impp)	A	12.90
Open Circuit Voltage (Voc)	V	37.04
Short Circuit Current (Isc)	A	13.79
Output Tolerance	W	-0 / + 5
No. of Cells & Connections		108 half-cells with 3 bypass diodes
Maximum Series Fuse Rating		25A
Cell Type		Monocrystalline
Module Efficiency	%	20.5
Temperature Coefficient of Pmpp	%/C	-0.35
Temperature Coefficient of Voc	%/C	-0.27
Temperature Coefficient of Isc	%/C	+0.05

MECHANICAL CHARACTERISTICS

Glass	Glass: 3.2 high transmission, tempered
Frame	Anodized aluminum (Black)
Junction Box	IP68
Output Cables	4 mm2 (12AWG) PV Wire, Length 1.2m (47.2")
Connectors	Polarized MC compatible
Weight	48.5 lbs (22 kg)

DIMENSIONS



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CEILINGS • DECKING • FENCE • GYPSUM • INSULATION • RAILING • ROOFING • SIDING • TRIM
20 Moores Road, Malvern, PA 19355 Professional: 800-233-8990 Consumer: 800-782-8777 certainteed.com

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LABELS,
DETAILS & SPECS

PV5.1

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 [7]

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

RSD Module Performance

Maximum Number of Devices per String	5	5
Control	Power Line Excitation	Power Line Excitation
Passive State	Normally Open	Normally Open
Maximum Power Consumption	7 W	7 W
Warranty	25 years	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	NEMA 4X / IP65

Mechanical Specifications

Electrical Connections	MC4 Connector	MC4 Connector
Housing	Plastic	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 Powerwall 3 Installation Manual

Backup Gateway 2

—

Backup Gateway 2 controls connection to the grid when paired with Powerwall 3, automatically detecting outages and providing seamless transition to backup power. Backup Gateway 2 also provides energy metering for solar self-consumption, time-based control, and backup operation.

In this system configuration, Powerwall 3 acts as the Site Controller, with the Backup Gateway 2 Site Controller disabled.

Performance Specifications

Model Number	1232100-xx-y
AC Voltage (Nominal)	120/240 V
Feed-in Type	Split phase
Grid Frequency	60 Hz
Current Rating	200 A
Maximum Supply Short Circuit Current	10 kA [8]
Overcurrent Protection Device	100 - 200 A, Service entrance rated [9]
Overvoltage Category	Category IV
Internal Primary AC Meter	Revenue accurate (+/- 0.2%)
Internal Auxiliary AC Meter	Revenue accurate (+/- 2%)
Primary Connectivity	Ethernet, Wi-Fi
Secondary Connectivity	Cellular (3G, LTE/4G) [10]
User Interface	Tesla App
Operating Modes	Support for solar self-consumption, time-based control, and backup
Backup Transition	Automatic disconnect for seamless backup
Modularity	Supports up to 10 AC-coupled Powerwalls
Optional Internal Panelboard	200 A 6-space / 12 circuit breakers Siemens QP or Square D HOM breakers rated 10 - 80A or Eaton BR breakers rated 10 - 125A
Warranty	10 years

[10] When protected by Class J fuses, Backup Gateway 2 is suitable for use in circuits capable of delivering not more than 22kA symmetrical amperes.

[11] The customer is expected to provide internet connectivity for Backup Gateway 2; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

Environmental Specifications

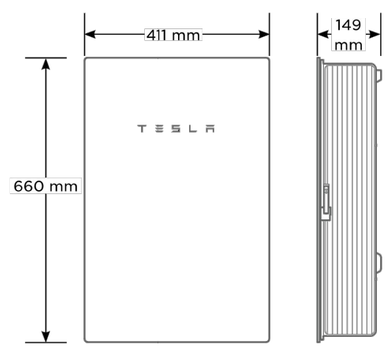
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

Compliance Information

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

Mechanical Specifications

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



ENGINEER:

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CLIENT:

EMERALDENERGY
North Carolina Renewable Energy Specialists

ISSUED FOR:	DATE:
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EQUIPMENT SPEC SHEETS

PV5.2

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
Overcurrent Protection Device	Configurable up to 60 A
Solar to Battery to Home/Grid Efficiency	89% [1,2]
Solar to Home/Grid Efficiency	97.5% [3]
Supported Islanding Devices	Backup Gateway 2, Backup Switch
Connectivity	Wi-Fi (2.4 and 5 GHz), Dual-port switched Ethernet, Cellular (LTE/4G [4])
Hardware Interface	Dry contact relay, Rapid Shutdown (RSD) certified switch and 2-pin connector, RS-485 for meters
AC Metering	Revenue Grade (+/- 0.5%)
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	150 — 480 V DC
MPPTs	6
Maximum Current per MPPT (I_{mp})	13 A [5]
Maximum Short Circuit Current per MPPT (I_{sc})	15 A [5]

Battery Technical Specifications

Nominal Battery Energy	13.5 kWh AC [2]
Maximum Continuous Discharge Power	11.5 kW AC
Maximum Continuous Charge Power	5 kW AC
Output Power Factor Rating	0 - 1 (Grid Code configurable)
Maximum Continuous Current	48 A
Maximum Output Fault Current	10 kA
Load Start Capability (1 s)	185 A LRA
Power Scalability	Up to 4 Powerwall 3 units supported

[1] Typical solar shifting use case.

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

[3] Tested using CEC weighted efficiency methodology.

[4] Cellular connectivity subject to network service coverage and signal strength.

[5] 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) [6]
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) IP45 (Wiring Compartment)
Pollution Rating	PD3
Operating Noise @ 1 m	< 50 db(A) typical <62 db(A) maximum

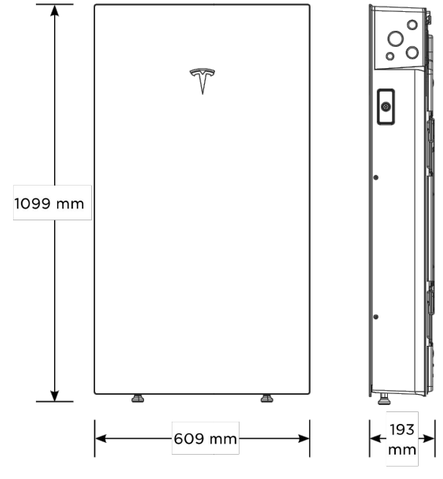
[6] Performance may be de-rated at operating temperatures above 40°C (104°F).

Compliance Information

Certifications	UL 1642, UL 1699B, UL 1741, UL 1741 SA, UL 1741 SB, UL 1741 PCS, UL 3741, UL 1973, UL 1998, UL 9540, IEEE 1547-2018, IEEE 1547.1, UN 38.3
Grid Connection	United States
Emissions	FCC Part 15 Class B
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	1099 x 609 x 193 mm (43.25 x 24 x 7.6 in)
Weight	130 kg (287 lb)
Mounting Options	Floor or wall mount



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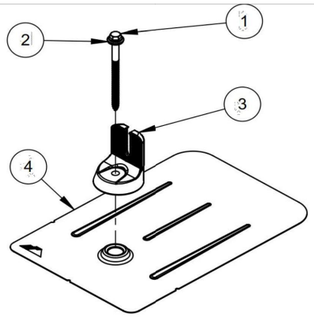
EQUIPMENT SPEC SHEETS

PV5.3

Cut Sheet

IRONRIDGE

FlashVue

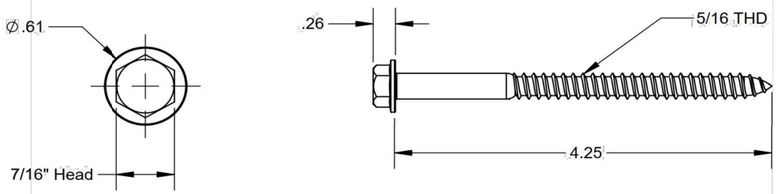


ITEM NO	DESCRIPTION	QTY IN KIT
1	BOLT, LAG 5/16 X 4.25"	1
2	WASHER, EPDM BACKED	1
3	FM FLASHING, MILL OR BLACK	1
4	GRIP CAP, MILL OR BLACK	1

FLASHVUE

PART NUMBER	DESCRIPTION
FV-01-M1	FLASHING, FLASHFOOT, MILL
FV-01-B1	FLASHING, FLASHFOOT, BLACK

1) BOLT, LAG 5/16 x 4.25"

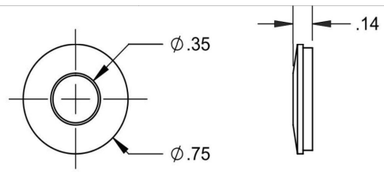


Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v1.0

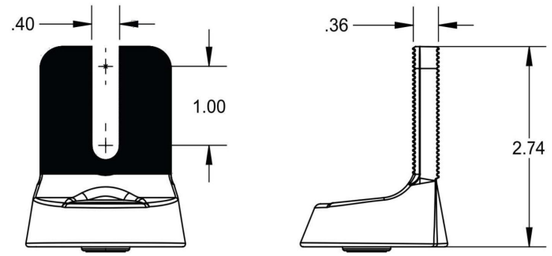
Cut Sheet

2) Washer, EPDM Backed



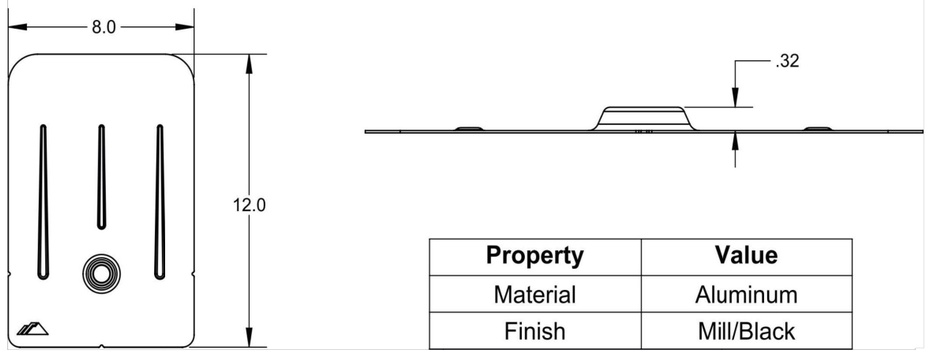
Property	Value
Material	300 Series Stainless Steel
Finish	Clear

3) Grip Cap



Property	Value
Material	Aluminum
Finish	Mill/Black

4) FM Flashing



Property	Value
Material	Aluminum
Finish	Mill/Black

v1.0

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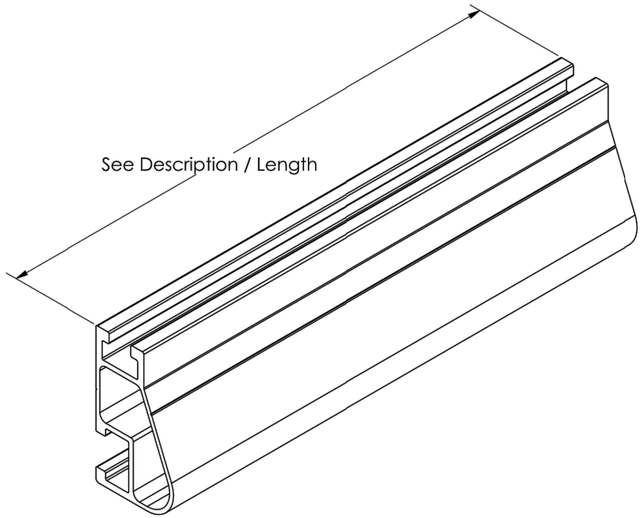
EQUIPMENT SPEC SHEETS

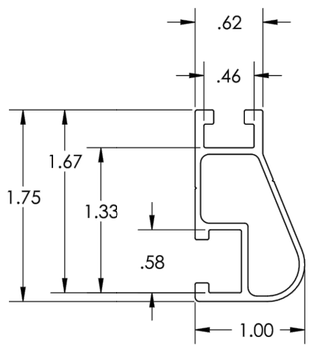
PV5.4

Cut Sheet

IRONRIDGE

XR10 Rail





Rail Section Properties	
Property	Value
Total Cross-Sectional Area	0.363 in^2
Section Modulus (X-axis)	0.136 in^3
Moment of Inertia (X-axis)	0.124 in^4
Moment of Inertia (Y-axis)	0.032 in^4
Torsional Constant	0.076 in^3
Polar Moment of Inertia	0.033 in^4

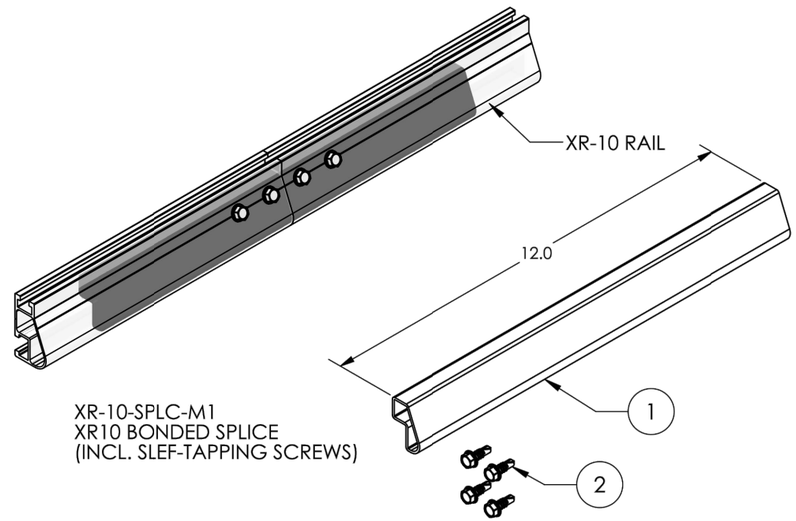
Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-10-132A	XR-10-132B	XR10, Rail 132" (11 Feet)	6000-Series Aluminum	4.67 lbs.
XR-10-168A	XR-10-168B	XR10, Rail 168" (14 Feet)		5.95 lbs.
XR-10-204A	XR-10-204B	XR10, Rail 204" (17 Feet)		7.22 lbs.

v1.0

Cut Sheet

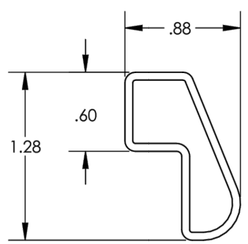
IRONRIDGE

XR10 Bonded Splice



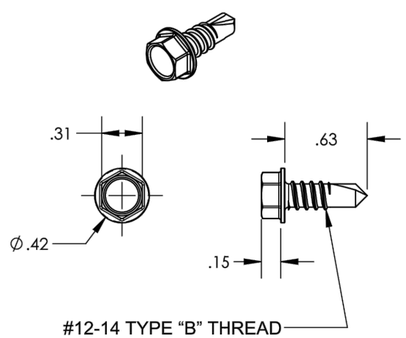
XR-10-SPLC-M1
XR10 BONDED SPLICE
(INCL. SLEF-TAPPING SCREWS)

1) Splice, XR10, Mill 12" long



Property	Value
Material	6000 Series Aluminum
Finish	Mill

2) Screw, Self Drilling



Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v1.10

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EQUIPMENT SPEC SHEETS

PV5.5

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Customer: James Smith
Installer: Emerald Energy
Subject: PV System Structural Compliance
Date: 10/21/24
Wind Speed: ASCE 7-10 - 120 MPH

To whom it may concern:

Model Energy, PLLC has reviewed the installation details of the proposed PV system that is to be installed by Emerald Energy at 358 Liam Drive, Broadway, NC 27505. The conditions of the existing structure have been reviewed and validated by Model Energy, PLLC. The existing roof structure has been designed to support the additional loads of the proposed PV system. In addition, the racking and fastening system shall be capable of securing the system to the structure under design conditions when installed properly and in accordance with the racking and fastening arrangement detailed within the accompanying permit set. The installation design is compliant with current 2018 North Carolina state and national building codes.

Thank you,

Andrew King, PE