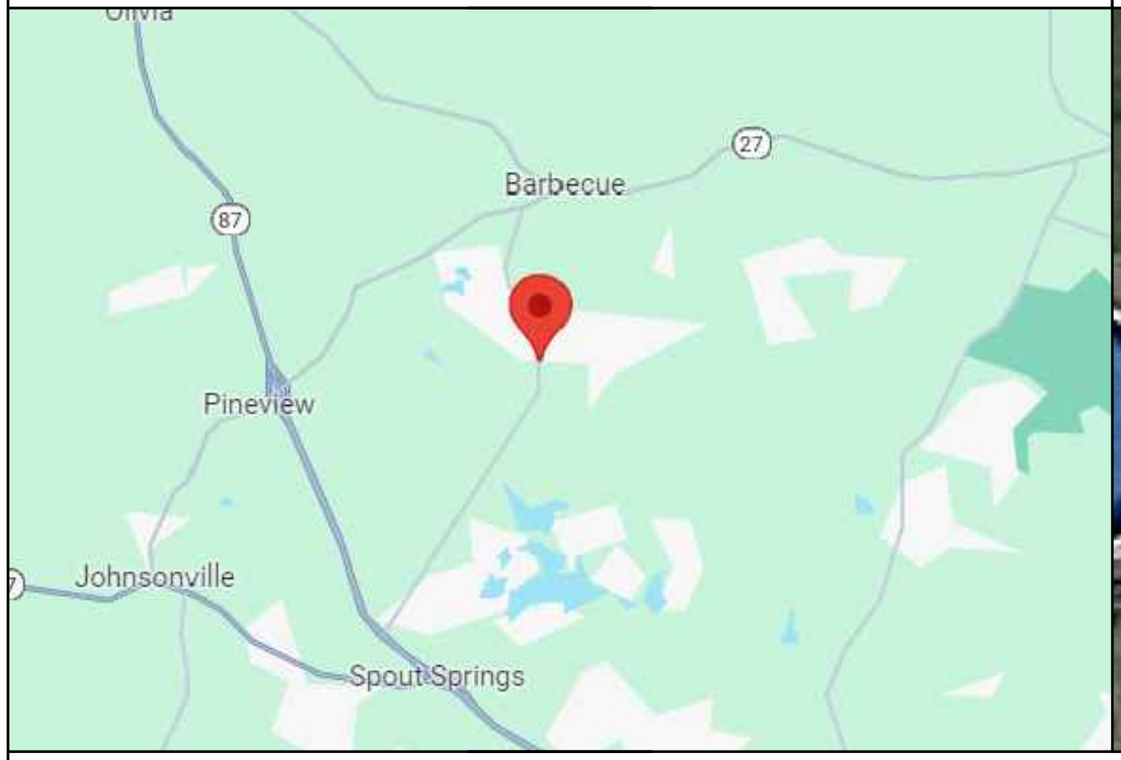
VICINITY MAP



PROPERTY MAP

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)

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
10/19/2023
Harnett COUNTY NORTH CAROLINA

ABBREVIATIONS

A	AMPERE
AC	ALTERNATING CURRENT
DC	DIRECT CURRENT
EGC	EQUIPMENT GROUNDING CONDUCTOR
EMT	ELECTRICAL METAL TUBING
GALV	GALVANIZED
GEC	GROUNDING ELECTRODE CONDUCTOR
GND	GROUND
I	CURRENT
IMP	CURRENT AT MAXIMUM POWER
ISC	SHORT-CIRCUIT CURRENT
KVA	KILOVOLT AMPERE
KW	KILOWATT
MAX	MAXIMUM
MIN	MINIMUM
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUG ONLY
NOM	NOMINAL
NTS	NOT TO SCALE
PNOM	NOMINAL POWER
PV	PHOTOVOLTAIC
PVC	POLYVINYL CHLORIDE
SN	SOLAR NOON
STC	STANDARD TEST CONDITIONS
TYP	TYPICAL
V	VOLT
VMP	VOLTAGE AT MAXIMUM POWER
VOC	OPEN-CIRCUIT VOLTAGE
W	WATT

CODE REFERENCES

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

SHEET INDEX

SITE CONDITIONS

ASCE 7-10 WIND SPEED - 115 MPH
EXPOSURE CATEGORY - B
RISK CATEGORY - II

LEGEND

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

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING
10/13/23

ENGINEER:

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

JOB TITLE:

NEW SOLAR PV SYSTEM
11.745 kW DC INPUT
7.600 kW AC EXPORT

ABDO ZACHEUS
55 VAIL COURT
SANFORD, NC 27332

CLIENT:

SOUTHERN ENERGY MANAGEMENT
ENERGY EFFICIENCY & SOLAR POWER

ISSUED FOR:	DATE:
CONSTRUCTION	10/11/23

PROJECT INFORMATION

PV1.1

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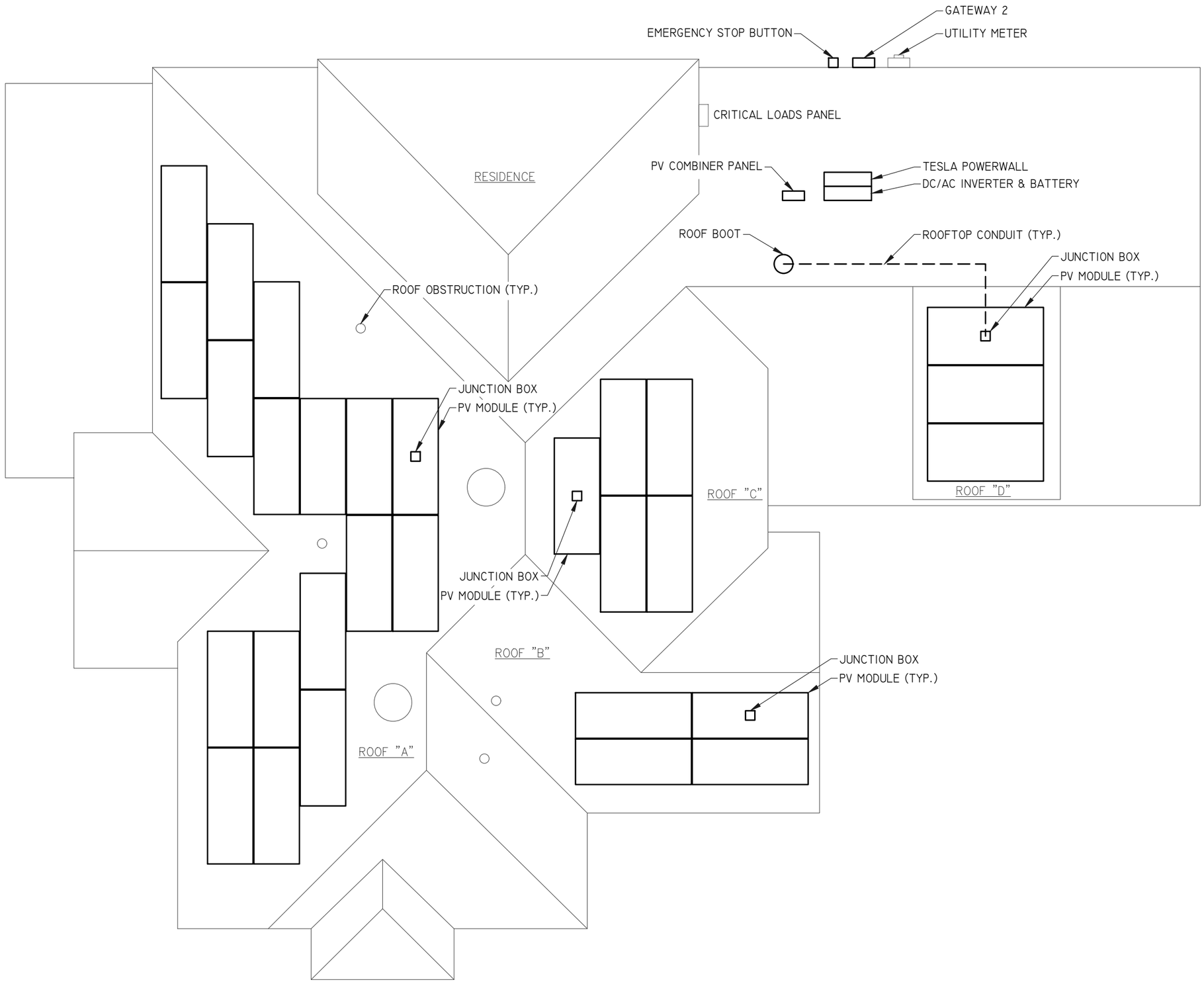

1 SITE PLAN

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

N

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/13/23

ENGINEER:

MODEL ENERGY
300 FAYETTEVILLE ST.
#1430
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ENERGY EFFICIENCY & SOLAR POWER

ISSUED FOR:	DATE:
CONSTRUCTION	10/11/23

SITE INFORMATION

PV2.1

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ROOF LOADING	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	2.7 LBS./SQFT.
TOTAL	6.4 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-26.9 LBS./SQFT.
UPLIFT ZONE 2	-32.4 LBS./SQFT.
UPLIFT ZONE 3	-32.4 LBS./SQFT.
DOWNWARD	24.7 LBS./SQFT.
FASTENER LOAD:	
UPLIFT ZONE 1	-246 LBS.
UPLIFT ZONE 2	-222 LBS.
UPLIFT ZONE 3	-74 LBS.
DOWNWARD	226 LBS.

MOUNTING RAILS	
MAKE	IRONRIDGE
MODEL	XR10
MATERIAL	ALUMINUM
WEIGHT	0.42 LBS./FT.
SPACING	21 IN.

NOTES:

- PROVIDE 1/8" TO 1/4" GAP BETWEEN FULL RAIL LENGTHS FOR THERMAL EXPANSION

ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	IRONRIDGE
MODEL	HALO ULTRA GRIP
MATERIAL	ALUMINUM
FASTENER	
MAKE	IRONRIDGE
MODEL	RD-1430-01-MI
MATERIAL	SS,#14 EPDM WASHER
SIZE	#14
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	2 PER MOUNT
MAX. PULL-OUT FORCE	960 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	480 LBS.

- LAG BOLT EMBEDDED WITH 2" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER

ARRAY SUMMARY	
# MODULES	17
# ROOF MOUNTS	70
RAIL LENGTH	211 FEET
ARRAY AREA	359 SQFT.
ARRAY WEIGHT	984 LBS.
AZIMUTH @ SN	263°
TILT ANGLE	45°

PV MODULES	
MAKE	QCELLS
MODEL	ML-G10+-405
WIDTH	41.1"
LENGTH	74.0"
THICKNESS	1.26"
WEIGHT	48.5 LBS

ROOF SUMMARY	
STRUCTURE:	
TYPE	TRUSSES
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 4"
SPACING	24" O.C.
EFF. SPAN	11'-6"
PITCH	12 / 12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	3/8"
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

STATEMENT OF STRUCTURAL COMPLIANCE

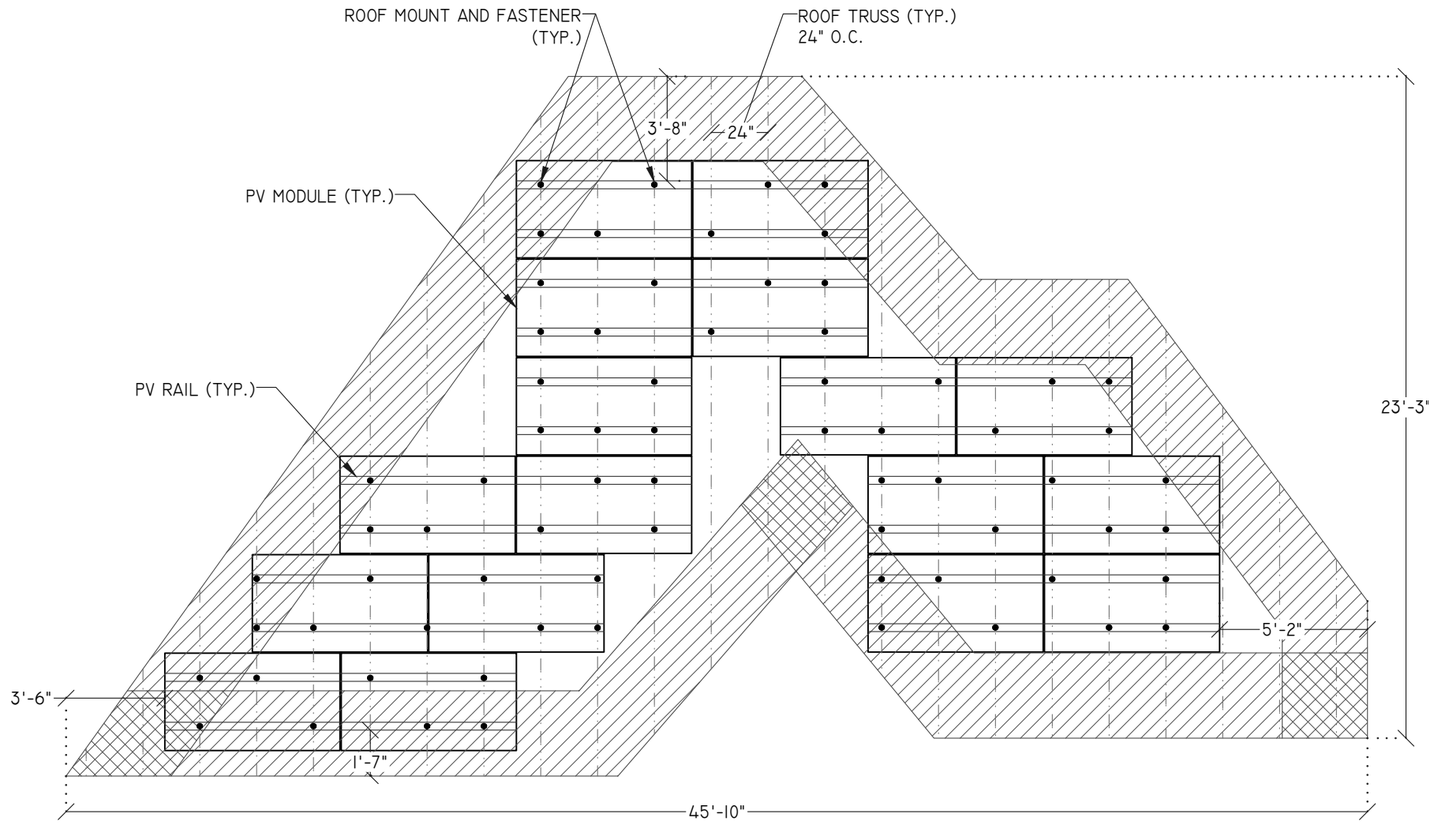
THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PROPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING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

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF ZONES:

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



1 MODULE, RACKING, AND FASTENER LAYOUT - ROOF "A" PLANAR VIEW

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

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/13/23

ENGINEER:

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

JOB TITLE:

NEW SOLAR PV SYSTEM
11.745 kW DC INPUT
7.600 kW AC EXPORT

ABDO ZACHEUS
55 VAIL COURT
SANFORD, NC 27332

CLIENT:

SOUTHERN ENERGY MANAGEMENT
ENERGY EFFICIENCY & SOLAR POWER

ISSUED FOR:	DATE:
CONSTRUCTION	10/11/23

STRUCTURAL INFORMATION

PV3.1

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ROOF LOADING	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	2.8 LBS./SQFT.
TOTAL	6.7 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-26.9 LBS./SQFT.
UPLIFT ZONE 2	-32.4 LBS./SQFT.
UPLIFT ZONE 3	-32.4 LBS./SQFT.
DOWNWARD	24.7 LBS./SQFT.
FASTENER LOAD:	
UPLIFT ZONE 1	-276 LBS.
UPLIFT ZONE 2	-222 LBS.
UPLIFT ZONE 3	-111 LBS.
DOWNWARD	254 LBS.

MOUNTING RAILS	
MAKE	IRONRIDGE
MODEL	XR10
MATERIAL	ALUMINUM
WEIGHT	0.42 LBS./FT.
SPACING	21 IN.

NOTES:

- PROVIDE 1/8" TO 1/4" GAP BETWEEN FULL RAIL LENGTHS FOR THERMAL EXPANSION

ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	IRONRIDGE
MODEL	HALO ULTRA GRIP
MATERIAL	ALUMINUM
FASTENER	
MAKE	IRONRIDGE
MODEL	RD-1430-01-MI
MATERIAL	SS,#14 EPDM WASHER
SIZE	#14
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	2 PER MOUNT
MAX. PULL-OUT FORCE	960 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	480 LBS.

- LAG BOLT EMBEDDED WITH 2" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER

ARRAY SUMMARY	
# MODULES	4
# ROOF MOUNTS	20
RAIL LENGTH	50 FEET
ARRAY AREA	84 SQFT.
ARRAY WEIGHT	235 LBS.
AZIMUTH @ SN	173°
TILT ANGLE	45°

PV MODULES	
MAKE	QCELLS
MODEL	ML-G10+-405
WIDTH	41.1"
LENGTH	74.0"
THICKNESS	1.26"
WEIGHT	48.5 LBS

ROOF SUMMARY	
STRUCTURE:	
TYPE	TRUSSES
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 4"
SPACING	24" O.C.
EFF. SPAN	6'-0"
PITCH	12 / 12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	3/8"
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

STATEMENT OF STRUCTURAL COMPLIANCE

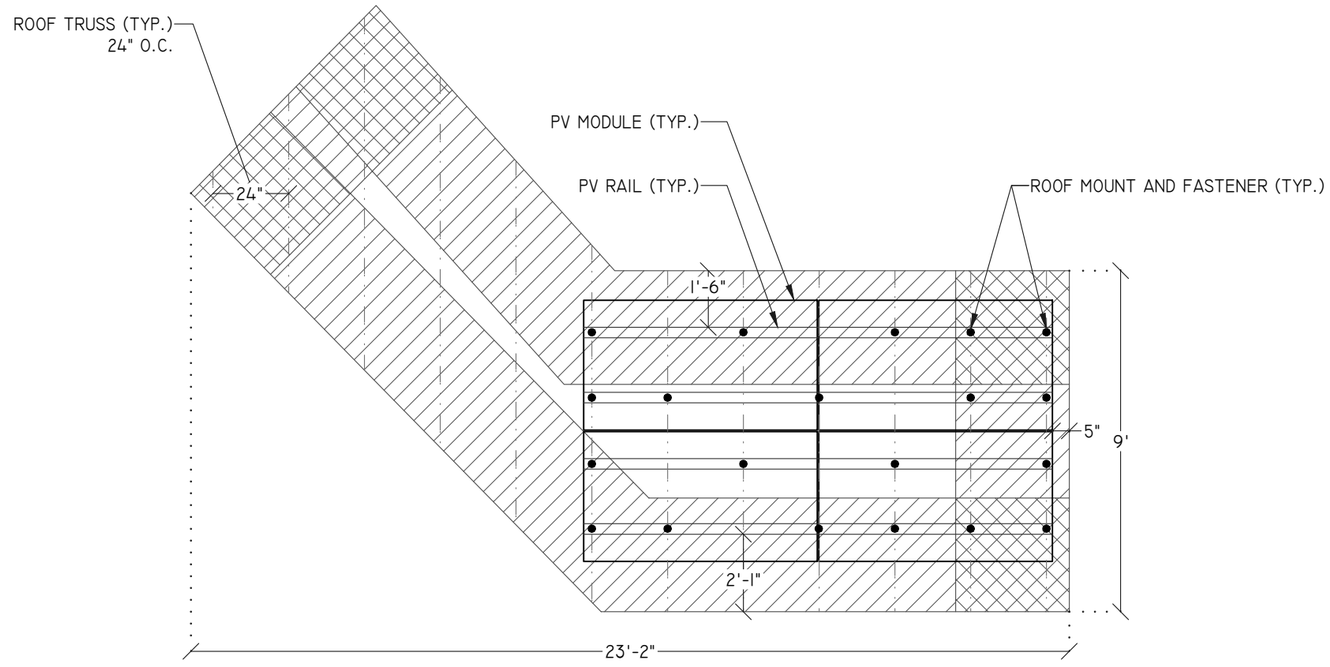
THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PROPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING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

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF ZONES:

ALL ZONES	MAX. RAIL OVERHANG = 16"
ZONE 1	MAX. FASTENER SPAN ZONE 1 = 48"
ZONE 2	MAX. FASTENER SPAN ZONE 2 = 48"
ZONE 3	MAX. FASTENER SPAN ZONE 3 = 24"



1 MODULE, RACKING, AND FASTENER LAYOUT - ROOF "B" PLANAR VIEW

SCALE: 1/4" = 1'-0"

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/13/23

ENGINEER:

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

JOB TITLE:

NEW SOLAR PV SYSTEM
11.745 kW DC INPUT
7.600 kW AC EXPORT

ABDO ZACHEUS
55 VAIL COURT
SANFORD, NC 27332

CLIENT:

SOUTHERN ENERGY MANAGEMENT
ENERGY EFFICIENCY & SOLAR POWER

ISSUED FOR:	DATE:
CONSTRUCTION	10/11/23

STRUCTURAL INFORMATION

PV3.2

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ROOF LOADING	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	2.8 LBS./SQFT.
TOTAL	6.7 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-26.9 LBS./SQFT.
UPLIFT ZONE 2	-32.4 LBS./SQFT.
UPLIFT ZONE 3	-32.4 LBS./SQFT.
DOWNWARD	24.7 LBS./SQFT.
FASTENER LOAD:	
UPLIFT ZONE 1	-276 LBS.
UPLIFT ZONE 2	-222 LBS.
UPLIFT ZONE 3	-111 LBS.
DOWNWARD	254 LBS.

MOUNTING RAILS	
MAKE	IRONRIDGE
MODEL	XR10
MATERIAL	ALUMINUM
WEIGHT	0.42 LBS./FT.
SPACING	21 IN.

NOTES:

- PROVIDE 1/8" TO 1/4" GAP BETWEEN FULL RAIL LENGTHS FOR THERMAL EXPANSION

ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	IRONRIDGE
MODEL	HALO ULTRA GRIP
MATERIAL	ALUMINUM
FASTENER	
MAKE	IRONRIDGE
MODEL	RD-1430-01-MI
MATERIAL	SS,#14 EPDM WASHER
SIZE	#14
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	2 PER MOUNT
MAX. PULL-OUT FORCE	960 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	480 LBS.

- LAG BOLT EMBEDDED WITH 2" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER

ARRAY SUMMARY	
# MODULES	5
# ROOF MOUNTS	22
RAIL LENGTH	62 FEET
ARRAY AREA	106 SQFT.
ARRAY WEIGHT	291 LBS.
AZIMUTH @ SN	83°
TILT ANGLE	45°

PV MODULES	
MAKE	QCELLS
MODEL	ML-G10+-405
WIDTH	41.1"
LENGTH	74.0"
THICKNESS	1.26"
WEIGHT	48.5 LBS

ROOF SUMMARY	
STRUCTURE:	
TYPE	TRUSSES
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 4"
SPACING	24" O.C.
EFF. SPAN	11'-6"
PITCH	12 / 12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	3/8"
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

STATEMENT OF STRUCTURAL COMPLIANCE

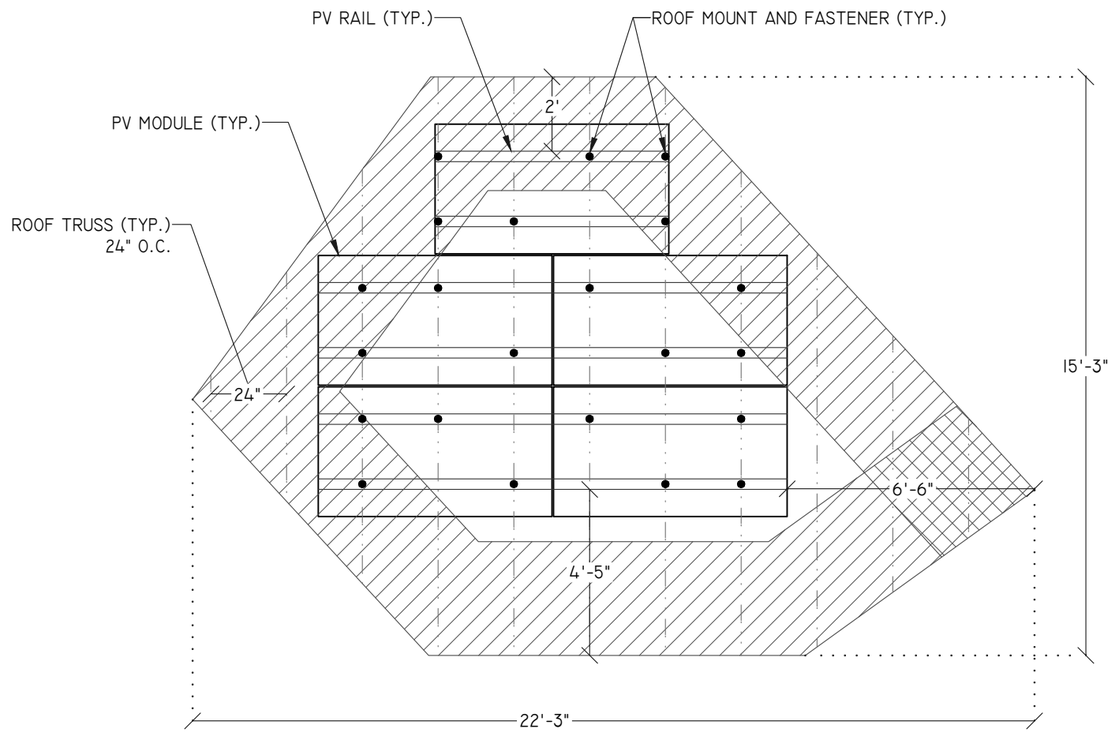
THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PROPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING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

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF ZONES:

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



1 MODULE, RACKING, AND FASTENER LAYOUT - ROOF "C" PLANAR VIEW

SCALE: 1/4" = 1'-0"

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/13/23

ENGINEER:

MODEL ENERGY
300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
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SANFORD, NC 27332

CLIENT:

SOUTHERN ENERGY MANAGEMENT
ENERGY EFFICIENCY & SOLAR POWER

ISSUED FOR:	DATE:
CONSTRUCTION	10/11/23

STRUCTURAL INFORMATION

PV3.3

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ROOF LOADING	
GROUND SNOW LOAD:	15 LBS./SQFT.
LIVE LOAD:	20 LBS./SQFT.
DEAD LOAD:	
ROOFING	3.9 LBS./SQFT.
PV ARRAY	2.8 LBS./SQFT.
TOTAL	6.7 LBS./SQFT.
WIND LOAD:	
UPLIFT ZONE 1	-24.6 LBS./SQFT.
UPLIFT ZONE 2	-29.0 LBS./SQFT.
UPLIFT ZONE 3	-29.0 LBS./SQFT.
DOWNWARD	23.0 LBS./SQFT.
FASTENER LOAD:	
UPLIFT ZONE 1	-253 LBS.
UPLIFT ZONE 2	-199 LBS.
UPLIFT ZONE 3	-99 LBS.
DOWNWARD	236 LBS.

MOUNTING RAILS	
MAKE	IRONRIDGE
MODEL	XR10
MATERIAL	ALUMINUM
WEIGHT	0.42 LBS./FT.
SPACING	21 IN.

NOTES:

- PROVIDE 1/8" TO 1/4" GAP BETWEEN FULL RAIL LENGTHS FOR THERMAL EXPANSION

ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	IRONRIDGE
MODEL	HALO ULTRA GRIP
MATERIAL	ALUMINUM
FASTENER	
MAKE	IRONRIDGE
MODEL	RD-1430-01-MI
MATERIAL	SS,#14 EPDM WASHER
SIZE	#14
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	2 PER MOUNT
MAX. PULL-OUT FORCE	960 LBS.
SAFETY FACTOR	2
DESIGN PULL-OUT FORCE	480 LBS.

- LAG BOLT EMBEDDED WITH 2" OF THREAD IN WOOD RAFTER OR TRUSSES MEMBER

ARRAY SUMMARY	
# MODULES	3
# ROOF MOUNTS	18
RAIL LENGTH	37 FEET
ARRAY AREA	63 SQFT.
ARRAY WEIGHT	180 LBS.
AZIMUTH @ SN	173°
TILT ANGLE	27°

PV MODULES	
MAKE	QCELLS
MODEL	ML-G10+-405
WIDTH	41.1"
LENGTH	74.0"
THICKNESS	1.26"
WEIGHT	48.5 LBS

ROOF SUMMARY	
STRUCTURE:	
TYPE	TRUSSES
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 4"
SPACING	24" O.C.
EFF. SPAN	11'-6"
PITCH	6 / 12
DENSITY	30 LBS./CU.FT.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	3/8"
WEIGHT	1.6 LBS./SQFT.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./SQFT.

STATEMENT OF STRUCTURAL COMPLIANCE

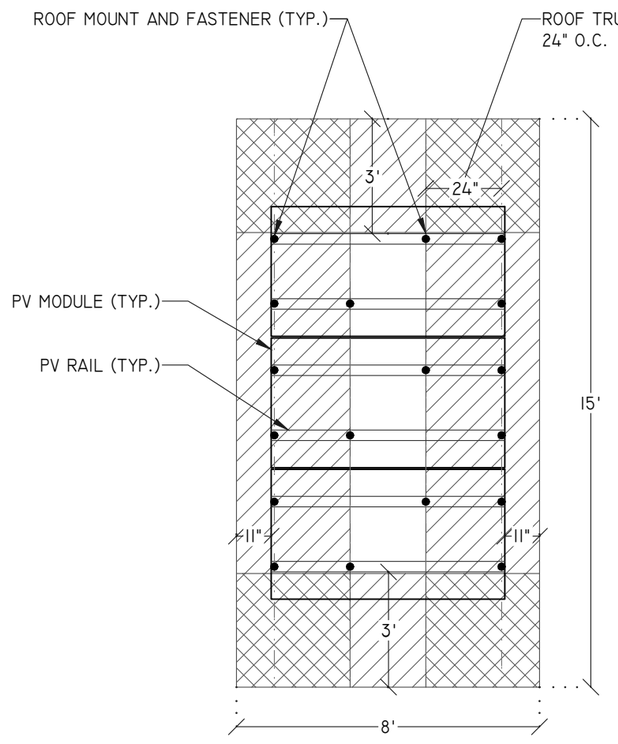
THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PROPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING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

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ROOF ZONES:

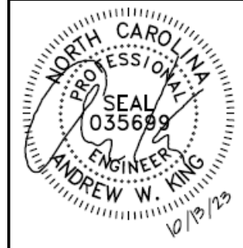
ALL ZONES	MAX. RAIL OVERHANG = 16"
☐ ZONE 1	MAX. FASTENER SPAN ZONE 1 = 48"
▨ ZONE 2	MAX. FASTENER SPAN ZONE 2 = 48"
⊠ ZONE 3	MAX. FASTENER SPAN ZONE 3 = 24"



1 MODULE, RACKING, AND FASTENER LAYOUT - ROOF "D" PLANAR VIEW

SCALE: 1/4" = 1'-0"

SEAL:



ENGINEER:

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

JOB TITLE:

NEW SOLAR PV SYSTEM
11.745 kW DC INPUT
7.600 kW AC EXPORT

ABDO ZACHEUS
55 VAIL COURT
SANFORD, NC 27332

CLIENT:

SOUTHERN ENERGY MANAGEMENT
ENERGY EFFICIENCY & SOLAR POWER

ISSUED FOR:	DATE:
CONSTRUCTION	10/11/23

STRUCTURAL INFORMATION

PV3.4

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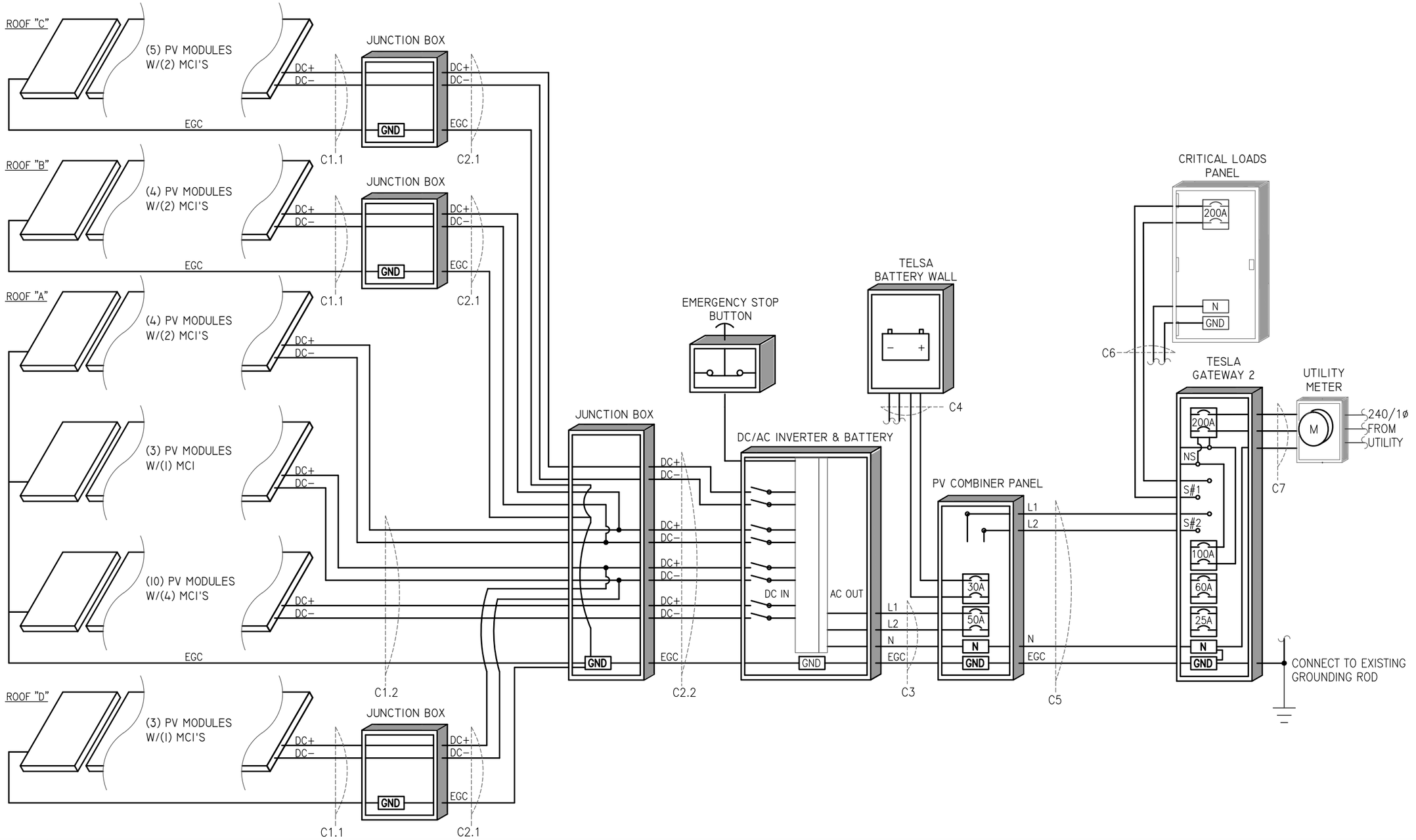

1 PV SYSTEM ELECTRICAL WIRING SCHEMATIC

SCALE : NTS

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/13/23

ENGINEER:

MODEL ENERGY
300 FAYETTEVILLE ST.
#1430
RALEIGH, NC 27602
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ELECTRICAL INFORMATION

PV4.1

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PV MODULES	
MAKE	QCELLS
MODEL	ML-G10+-405
TECHNOLOGY	MONO-CRYST.
NOM. POWER (Pnom)	405 WATTS
NOM. VOLT. (Vmp)	37.39 VOLTS
O.C. VOLT. (Voc)	45.34 VOLTS
MAX. SYS. VOLT.	1000 V (UL)
TEMP. COEF. (Vtc)	-0.27 %/°C
NOM. CURR. (Imp)	10.83 Amps
S.C. CURR. (Isc)	11.17 Amps
MAX. SERIES FUSE	20 Amps

MID-CIRCUIT INTERUPTER (NEW)	
MAKE	TESLA
MODEL	MCI-2
NOMINAL DC INPUT CURRENT	13 AMPS
MAX DC INPUT Isc	17 AMPS
MAX DC VOLTAGE	1000 VOLTS
MAX DEVICES PER STRING	5
CONNECTOR	MC4
ENCLOSURE RATING	NEMA 4

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

DC/AC INVERTER & BATTERY	
MAKE	POWERWALL+
MODEL #	1850000-XX-Y
TECHNOLOGY	TRANS-LESS
NOMINAL BATTERY ENERGY	13.4 kWh
DC INPUT:	
MAX. POWER	9600 watts
MAX. VOLT	600 vdc
NOM. VOLT.	60-550 vdc
MAX. CURRENT	13 amps
MAX. SCC	17 amps
STRINGS INPUTS	4 STRINGS
AC OUTPUT:	
MAX CONT. POWER ON-GRID	7600 watts
MAX CONT. POWER OFF-GRID	9600 watts
PEAK OFF-GRID POWER (10s)	22000 watts
NOM. VOLT.	240 volts
MAX. CURR.	40 amps
GFP (Y/N)	YES
RPP (Y/N)	YES
GFCI (Y/N)	YES
AFCI (Y/N)	YES
DC DISC. (Y/N)	YES
RAPID SHUTDOWN	AUTOMATIC
PROTECT. RATING	NEMA 4X

BATTERY STORAGE SYSTEM (NEW)	
MAKE	TESLA
MODEL	POWERWALL
TOTAL ENERGY	14 kWh
USABLE ENERGY	13.5 kWh
REAL PWR. (cont.)	5 kW
REAL PWR. (10s)	7 kW
APPR. PWR. (cont.)	5.8 kW
APPR. PWR. (10s)	7.2 kW
OCP	30 AMPS

NOTES:

- QUANTITY: (1)
- PCS IN GATEWAY SET TO NO EXPORT OF BATTERY POWER

CONDUCTOR SCHEDULE

TAG	CURRENT CARRYING CONDUCTORS				GROUNDING CONDUCTORS				CONDUIT/RACEWAY				NOTES
	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL	INSULATION	QTY.	SIZE	MATERIAL	LOCATION	
C1.1	2	10 AWG	COPPER	PV WIRE	1	6 AWG	COPPER	PV WIRE	-	-	-	FREE AIR	1
C1.2	6	10 AWG	COPPER	PV WIRE	1	6 AWG	COPPER	PV WIRE	-	-	-	FREE AIR	1
C2.1	2	10 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	3/4"	FMC/EMT/MC	EXT/INT	2,4
C2.2	8	8 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	1"	FMC/EMT/MC	EXT/INT	2,4
C3	3	8 AWG	COPPER	THWN	1	10 AWG	COPPER	THWN	1	3/4"	NOTE 5	INTERIOR	2,4,5
C4	3	10 AWG	COPPER	THWN	1	10 AWG	COPPER	THWN	1	1/2"	NOTE 5	INTERIOR	2,4,5
C5	3	4 AWG	COPPER	THWN	1	8 AWG	COPPER	THWN	1	1"	NOTE 5	EXT/INT	2,4,5
C6	3	3/0	COPPER	THWN	1	6 AWG	COPPER	THWN	1	2"	NOTE 5	EXT/INT	2,4,5
C7	3	3/0	COPPER	THWN	-	-	-	-	1	1-1/2"	NOTE 5	EXTERIOR	2,4,5
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

PV COMBINER PANEL (NEW)	
MAKE	N/A
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
BUS RATING	125 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	NO
BREAKER RATING	N/A

NOTES:

- BACK-FEED DC/AC INVERTER & BATTERY OUTPUT VIA (1) 50 AMP BREAKERS AT THE OPPOSITE END OF THE BUS BAR FROM THE INCOMING FEEDERS
- BACK-FEED POWERWALL OUTPUT VIA (1) 30A BREAKER.
- PROVIDE WITH PERMANENT LABEL THAT READS, "PV COMBINER PANEL. DO NOT ADD ADDITIONAL LOADS."
- PROVIDE WITH PERMANENT LABEL THAT READS, "FED BY MULTIPLE POWER SOURCES".

POWER MANAGEMENT SYSTEM (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	200 AMPS

NOTES:

- MAIN BREAKER SERVES AS SERVICE DISCONNECT SWITCH.
- CONNECT CRITICAL LOADS PANEL VIA GATEWAY OUTPUTS.
- GATEWAY INTERNAL PANEL (NON-GENERATION OPTION) INSTALLED.
- RELOCATE 60 AMP & 25 AMP BREAKER IN GATEWAY INTERNAL PANEL.
- PROVIDE 100 AMP BREAKER IN GATEWAY INTERNAL PANEL FOR NON SECURE MAIN BREAKER.
- BACKFEED PV COMBINER PANEL OUTPUT VIA SECURE LUGS.
- PCS IN GATEWAY SET TO NO EXPORT OF BATTERY POWER.
- SERVICE DISCONNECT LABEL
- PROVIDE N/G BOND
- PROVIDE GEC

CRITICAL LOADS PANEL (EXISTING)	
MAKE	SQUARE D
MODEL	HOMC40UC
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:

- REMOVE SERVICE DISCONNECT LABEL
- REMOVE N/G BOND
- REMOVE GEC

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 10/13/23

ENGINEER:

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SANFORD, NC 27332

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ENERGY EFFICIENCY & SOLAR POWER

ISSUED FOR:	DATE:
CONSTRUCTION	10/11/23

ELECTRICAL INFORMATION

PV4.2

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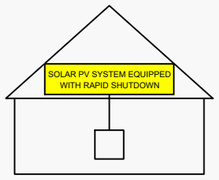
SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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

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.

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

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

WARNING
MULTIPLE POWER SOURCES ONSITE
UTILITY SERVICE DISCONNECT LOCATED

NEC 705.10
PLACE AT SERVICE EQUIPMENT AND PV SYSTEM DISCONNECT MEANS

PV SYSTEM DISCONNECT

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

WARNING
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

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

PCS CONTROLLED
CURRENT SETTING: 200 AMPS
THE MAXIMUM OUTPUT CURRENT FROM THIS SYSTEM TOWARDS THE MAIN PANEL IS CONTROLLED ELECTRICALLY. REFER TO THE MANUFACTURER'S INSTRUCTIONS FOR MORE INFORMATION.

NEC 705.13
PLACE ON PANELS CONNECTED TO GATEWAY

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

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.

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

DIRECT CURRENT
PHOTOVOLTAIC POWER SOURCE

MAXIMUM VOLTAGE	600 VDC
MAX CIR. CURRENT	52.0 AMPS

NEC 690.53
PLACE ON ALL DC DISCONNECTING MEANS

PHOTOVOLTAIC POWER SOURCE

OPERATING AC VOLT.	240 VAC
MAXIMUM OPERATING AC OUTPUT CURRENT	40.0 AMPS

NEC 690.54
PLACE ON INTERCONNECTION DISCONNECTING MEANS

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING
10/13/23

ENGINEER:

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EQUIPMENT LABELS

PV5.1

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POWERWALL
Backup Gateway 2

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

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

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

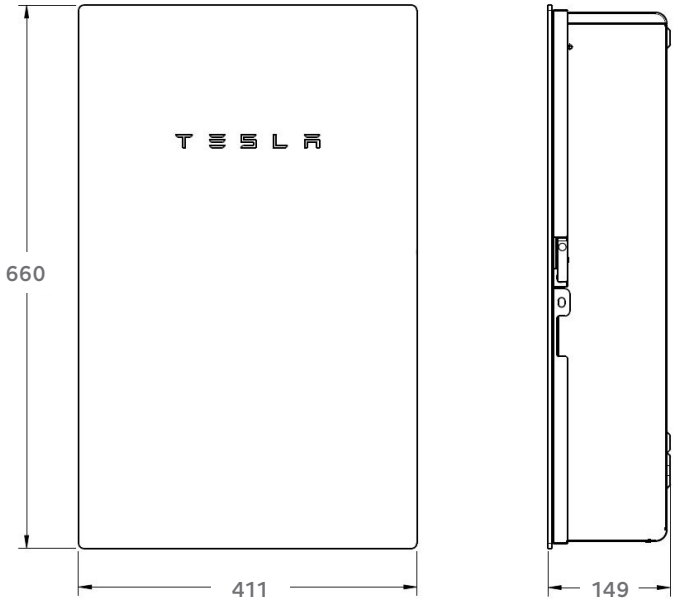
PERFORMANCE SPECIFICATIONS

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

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

MECHANICAL SPECIFICATIONS

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



COMPLIANCE INFORMATION

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

ENVIRONMENTAL SPECIFICATIONS

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

POWERWALL

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

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

PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240 V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Total Energy[1]	14 kWh
Usable Energy[1]	13.5 kWh
Real Power, max continuous	5 kW (charge and discharge)
Real Power, peak (10 s)	7 kW (discharge only)
Apparent Power, max continuous	5.8 kVA (charge and discharge)
Apparent Power, peak (10 s)	7.2 kVA (discharge only)
Maximum Supply Fault Current	10 kA
Maximum Output Fault Current	32 A
Overcurrent Protection Device	30 A
Imbalance for Split-Phase Loads	100%
Power Factor Output Range	+/– 1.0 adjustable
Power Factor Range (full-rated power)	+/– 0.85
Internal Battery DC Voltage	50 V
Round Trip Efficiency[1,2]	90%
Warranty	10 years

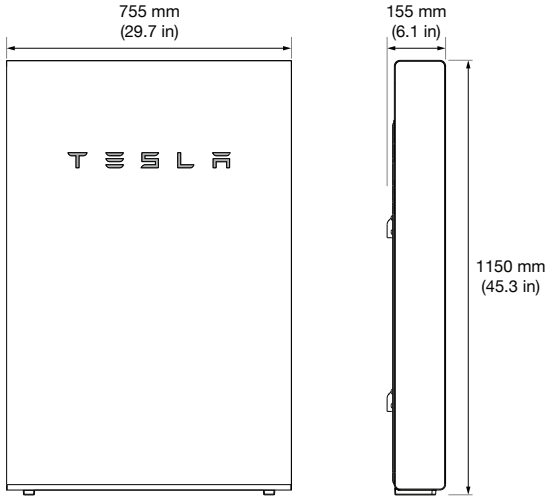
[1] Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
[2] AC to battery to AC, at beginning of life.

COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 1973, UL 9540, UN 38.3
Grid Connection	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)

MECHANICAL SPECIFICATIONS

Dimensions	1150 mm x 755 mm x 155 mm (45.3 in x 29.7 in x 6.1 in)
Weight	125 kg (276 lbs)
Mounting options	Floor or wall mount

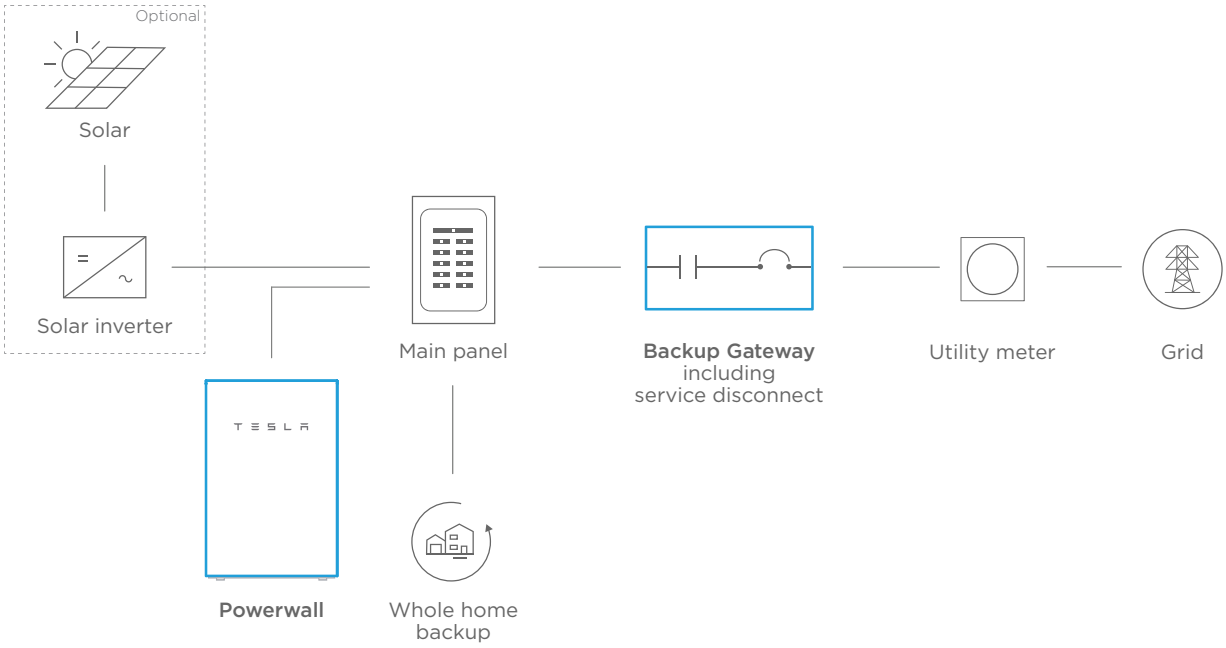


ENVIRONMENTAL SPECIFICATIONS

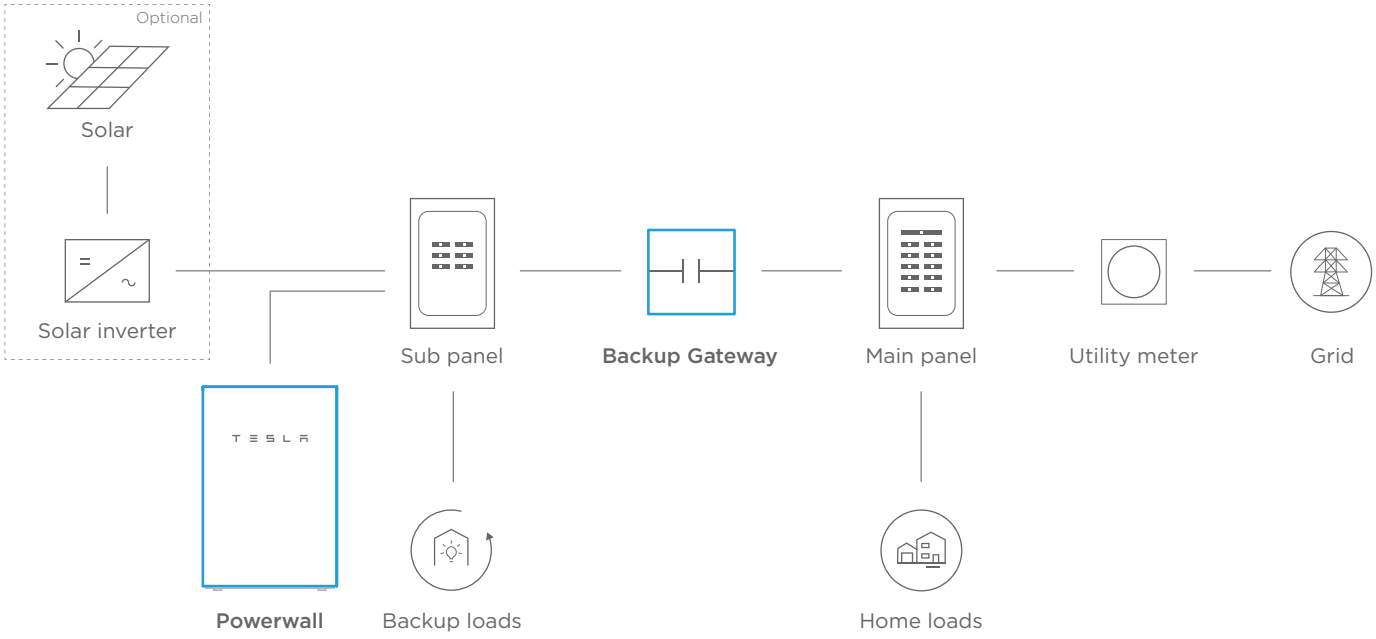
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	–20°C to 30°C (–4°F to 86°F) Up to 95% RH, non-condensing State of Energy (SoE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring Compartment)
Wet Location Rating	Yes
Noise Level @ 1m	< 40 dBA at 30°C (86°F)

TYPICAL SYSTEM LAYOUTS

WHOLE HOME BACKUP



PARTIAL HOME BACKUP



powered by Q.ANTUM DUO Z

Q.PEAK DUO BLK ML-G10+

385-405

ENDURING HIGH PERFORMANCE

25 YR Warranty
Product & Performance

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2021

Q CELLS Yield Security

BREAKING THE 20% EFFICIENCY BARRIER
Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.

THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY
Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather with excellent low-light and temperature behavior.

ENDURING HIGH PERFORMANCE
Long-term yield security with Anti LID Technology, Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING
High-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

A RELIABLE INVESTMENT
Inclusive 25-year product warranty and 25-year linear performance warranty[2].

[1] APT test conditions according to IEC / TS 62804-1:2015, method A (–1500 V, 96 h)
[2] See data sheet on rear for further information.

THE IDEAL SOLUTION FOR:

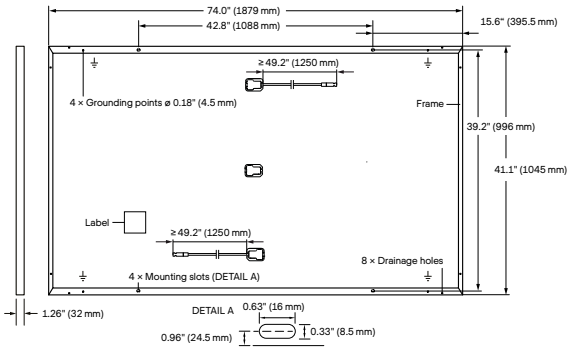
Rooftop arrays on residential buildings

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥49.2 in (1250 mm), (–) ≥49.2 in (1250 mm)
Connector	Stäubli MC4; IP68

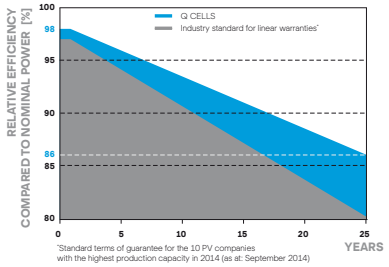


ELECTRICAL CHARACTERISTICS

POWER CLASS				385	390	395	400	405
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / –0 W)								
Minimum	Power at MPP[1]	P_{MPP}	[W]	385	390	395	400	405
Minimum	Short Circuit Current[1]	I_{SC}	[A]	11.04	11.07	11.10	11.14	11.17
Minimum	Open Circuit Voltage[1]	V_{OC}	[V]	45.19	45.23	45.27	45.30	45.34
Minimum	Current at MPP	I_{MPP}	[A]	10.59	10.65	10.71	10.77	10.83
Minimum	Voltage at MPP	V_{MPP}	[V]	36.36	36.62	36.88	37.13	37.39
Minimum	Efficiency[1]	η	[%]	≥19.6	≥19.9	≥20.1	≥20.4	≥20.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]								
Minimum	Power at MPP	P_{MPP}	[W]	288.8	292.6	296.3	300.1	303.8
Minimum	Short Circuit Current	I_{SC}	[A]	8.90	8.92	8.95	8.97	9.00
Minimum	Open Circuit Voltage	V_{OC}	[V]	42.62	42.65	42.69	42.72	42.76
Minimum	Current at MPP	I_{MPP}	[A]	8.35	8.41	8.46	8.51	8.57
Minimum	Voltage at MPP	V_{MPP}	[V]	34.59	34.81	35.03	35.25	35.46

[1]Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25±2 °C, AM 1.5 according to IEC 60904-3 • [2]800 W/m², NMOT, spectrum AM 1.5

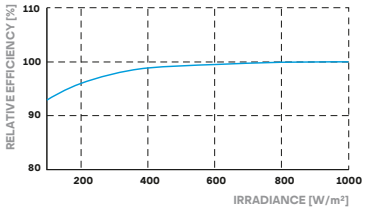
Q CELLS PERFORMANCE WARRANTY



At least 98 % of nominal power during first year. Thereafter max. 0.5 % degradation per year. At least 93.5 % of nominal power up to 10 years. At least 86 % of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²)

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	–0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	–0.34	Nominal Module Operating Temperature	NMOT	[°F]	109±5.4 (43±3 °C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V_{SYS}	[V]	1000 (IEC) / 1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push / Pull[3]	[lbs/ft²]	75 (3600 Pa) / 55 (2660 Pa)	Permitted Module Temperature on Continuous Duty	–40 °F up to +185 °F (–40 °C up to +85 °C)
Max. Test Load, Push / Pull[3]	[lbs/ft²]	113 (5400 Pa) / 84 (4000 Pa)		

[3] See Installation Manual

QUALIFICATIONS AND CERTIFICATES

UL 61730, CE-compliant,
Quality Controlled PV - TÜV Rheinland,
IEC 61215:2016, IEC 61730:2016,
U.S. Patent No. 9,893,215 (solar cells),
QCPV Certification ongoing.

C Certified US
UL 61730

TÜVRheinland CERTIFIED
www.tuv.com
ID 1111220277

PACKAGING INFORMATION

Horizontal packaging	76.4 in 1940 mm	43.3 in 1100 mm	48.0 in 1220 mm	1656 lbs 751 kg	24 pallets	24 pallets	32 modules

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

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Specifications subject to technical changes © **Q CELLS** Q.PEAK DUO BLK ML-G10+_385-405_2021-05_Rev01_NA

POWERWALL+

Powerwall+ is an integrated solar battery system that stores energy from solar production. Powerwall+ has two separate inverters, one for battery and one for solar, that are optimized to work together. Its integrated design and streamlined installation allow for simple connection to any home, and improved surge power capability brings whole home backup in a smaller package. Smart system controls enable owners to customize system behavior to suit their renewable energy needs.

KEY FEATURES

- Integrated battery, inverter, and system controller for a more compact install
- A suite of application modes, including self-powered, time-based control, and backup modes
- Wi-Fi, Ethernet, and LTE connectivity with easy over-the-air updates

PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) SPECIFICATIONS

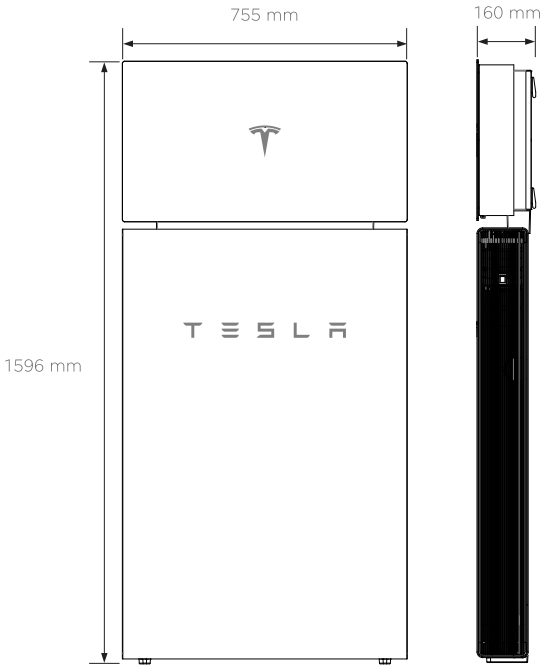
Powerwall+ Model Number	1850000-xx-y
Solar Assembly Model Number	1538000-xx-y
Nominal Battery Energy	13.5 kWh
Nominal Grid Voltage (Input / Output)	120/240 VAC
Grid Voltage Range	211.2 - 264 VAC
Frequency	60 Hz
Phase	240 VAC: 2W+N+GND
Maximum Continuous Power On-Grid	7.6 kVA full sun / 5.8 kVA no sun[1]
Maximum Continuous Power Off-Grid	9.6 kW full sun / 7 kW no sun[1]
Peak Off-Grid Power (10 s)	22 kW full sun / 10 kW no sun[1]
Maximum Continuous Current On-Grid	32 A output
Maximum Continuous Current Off-Grid	40 A output
Load Start Capability	98 - 118 A LRA[2]
PV Maximum Input Voltage	600 VDC
PV DC Input Voltage Range	60 - 550 VDC
PV DC MPPT Voltage Range	60 - 480 VDC
MPPTs	4
Input Connectors per MPPT	1-2-1-2
Maximum Current per MPPT (I_{mp})	13 A[3]
Maximum Short Circuit Current per MPPT (I_{sc})	17 A[3]
Allowable DC/AC Ratio	1.7
Overcurrent Protection Device	50 A breaker
Maximum Supply Fault Current	10 kA
Output Power Factor Rating	+/– 0.9 to 1[4]
Round Trip Efficiency	90%[5]
Solar Generation CEC Efficiency	97.5% at 208 V 98.0% at 240 V
Customer Interface	Tesla Mobile App
Internet Connectivity	Wi-Fi, Ethernet, Cellular LTE/4G)[6]
PV AC Metering	Revenue grade (+/-0.5%)
Protections	Integrated arc fault circuit interrupter (AFCI), PV Rapid Shutdown
Warranty	10 years

COMPLIANCE INFORMATION

PV Certifications	UL 1699B, UL 1741, UL 3741, UL 1741 SA, UL 1998 (US), IEEE 1547, IEEE 1547.1
Battery Energy Storage System Certifications	UL 1642, UL 1741, UL 1741 PCS, UL 1741 SA, UL 1973, UL 9540, IEEE 1547, 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)

MECHANICAL SPECIFICATIONS

Dimensions	1596 x 755 x 160 mm (62.8 x 29.7 x 6.3 in)
Total Weight	140 kg (310 lb)[7]
Battery Assembly	118 kg (261 lb)
Solar Assembly	22 kg (49 lb)
Mounting options	Floor or wall mount



ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	–20°C to 50°C (–4°F to 122°F)[8]
Recommended Temperature	0°C to 30°C (32°F to 86°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	–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 Type	Type 3R
Solar Assembly Ingress Rating	IP55 (Wiring Compartment)
Battery Assembly Ingress Rating	IP56 (Wiring Compartment) IP67 (Battery & Power Electronics)
Noise Level @ 1 m	< 40 db(A) optimal, < 50 db(A) maximum

[1]Values provided for 25°C (77°F).

[2]Load start capability may vary.

[3]Where the DC input current exceeds an MPPT rating, jumpers can be used to allow a single MPPT to intake additional DC current up to 26 A I_{mp} / 34 A I_{sc}.

[4]Power factor rating at max real power.

[5]AC to battery to AC, at beginning of life.

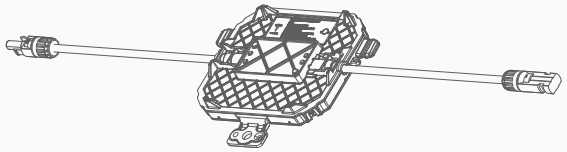
[6]Cellular connectivity subject to network service coverage and signal strength.

[7]The total weight does not include the Powerwall+ bracket, which weighs an additional 9 kg (20 lb).

[8]Performance may be de-rated at operating temperatures below 10°C (50°F) or greater than 43°C (109°F).

SOLAR SHUTDOWN DEVICE

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



ELECTRICAL SPECIFICATIONS

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

RSD MODULE PERFORMANCE

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

COMPLIANCE INFORMATION

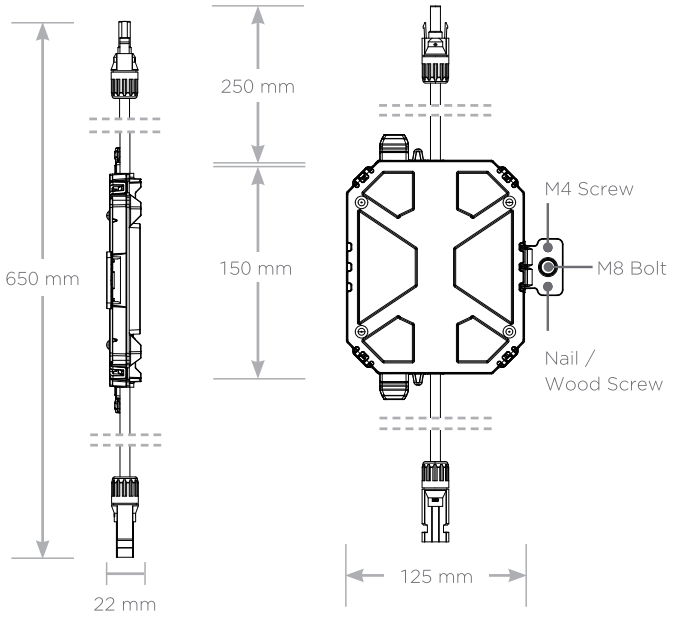
Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)
RSD Initiation Method	External System Shutdown Switch
Compatible Equipment	*See Compatibility Table below*

ENVIRONMENTAL SPECIFICATIONS

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

MECHANICAL SPECIFICATIONS

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



UL 3741 PV HAZARD CONTROL (AND PVRSA) COMPATIBILITY

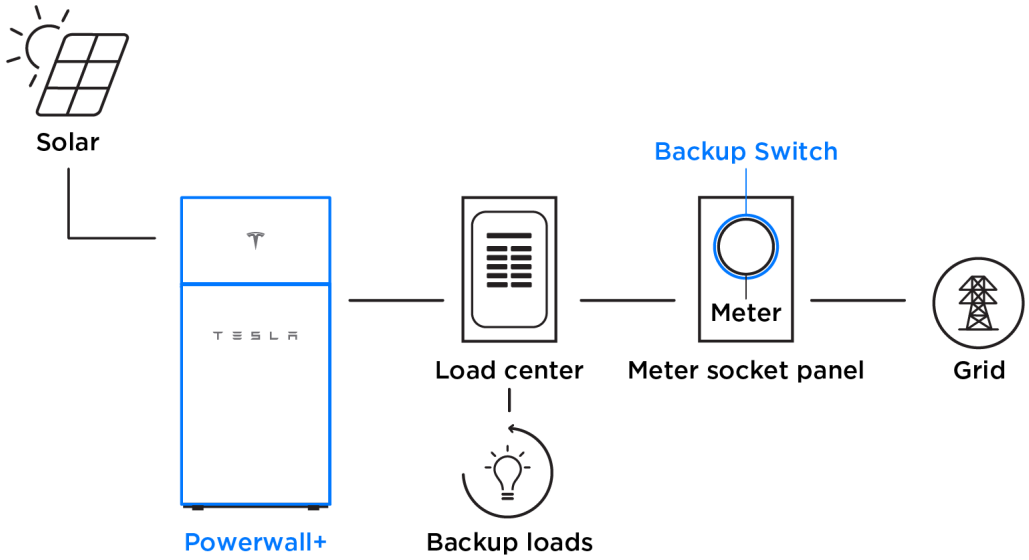
Tesla Solar Roof and Tesla/Zep ZS Arrays using the following modules are certified to UL 3741 and UL 1741 PVRSA when installed with the Powerwall+ and Solar Shutdown Devices. See the Powerwall+ Installation Manual for detailed instructions and for guidance on installing Powerwall+ and Solar Shutdown Devices with other modules.

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

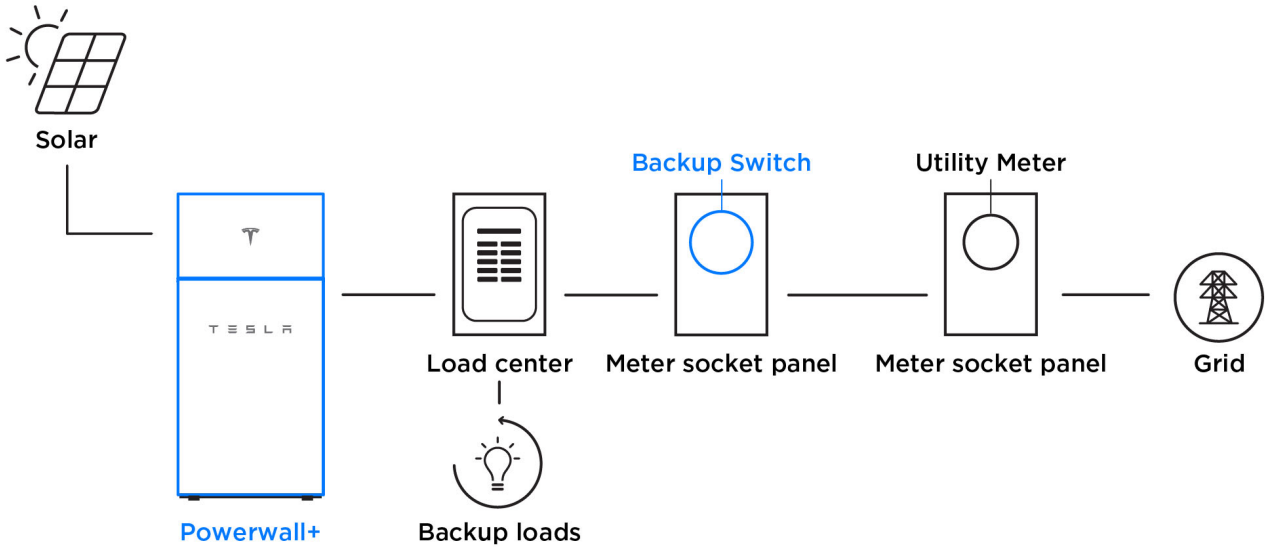
[1]**Exception**: Tesla solar modules installed in locations where the max Voc for three modules at low design temperatures exceeds 165 V shall be limited to two modules between Solar Shutdown Devices.

SYSTEM LAYOUTS

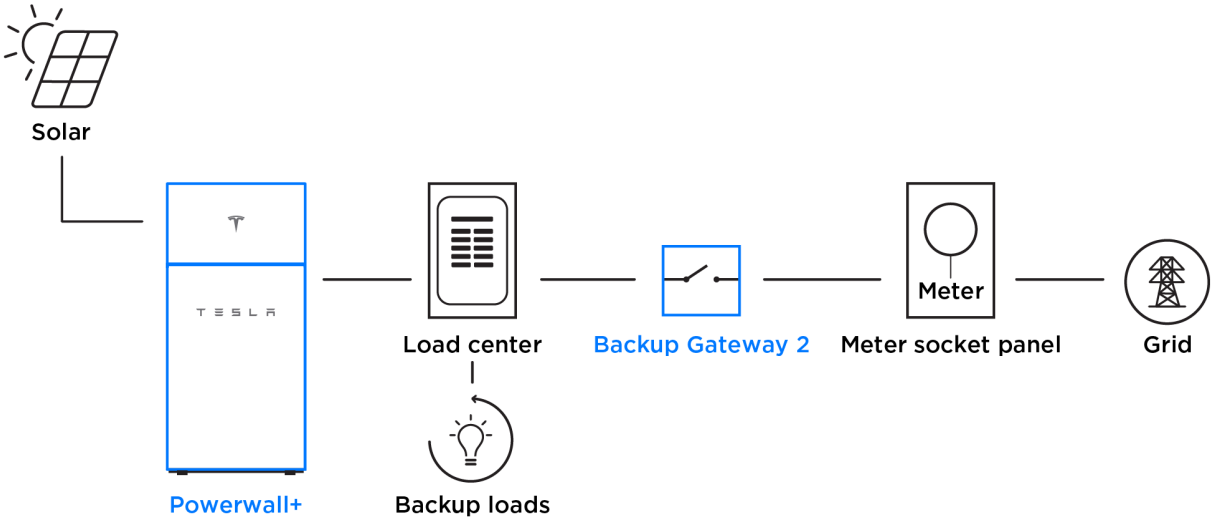
Powerwall+ with Backup Switch Installed Behind Utility Meter



Powerwall+ with Backup Switch Installed Downstream of Utility Meter



Powerwall+ with Backup Gateway 2 for Whole Home Backup



Powerwall+ with Backup Gateway 2 for Partial Home Backup