

PHOTOVOLTAIC ROOF MOUNT SYSTEM

SR.#

PROJECT INFORMATION

CODE AND STANDARDS

THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL COMPLY WITH THE FOLLOWING CODES:

- 2020 NATIONAL ELECTRICAL CODE
- 2018 NORTH CAROLINA RESIDENTIAL CODE
- 2018 NORTH CAROLINA BUILDING CODE
- ALL OTHER ORDINANCE ADOPTED BY THE LOCAL GOVERNING AGENCIES

SITE NOTES / OSHA REGULATION

1. A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
2. THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
3. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED AND IDENTIFIED BY RECOGNIZED ELECTRICAL TESTING LABORATORY.
4. MODULES AND SUPPORT STRUCTURES SHALL BE GROUNDED
5. SOLAR INVERTER SHALL BE LISTED TO UL1741
6. ALL CONDUCTORS SHALL BE COPPER AND SHOULD BE 75 AND 90 DEG RATED
7. REMOVAL OF AN INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BONDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR, THE PHOTOVOLTAIC SOURCE AND OUTPUT CIRCUIT GROUNDED CONDUCTORS.
8. LIVE PARTS OF PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS OVER 150V TO GROUND SHALL NOT BE ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS WHILE ENERGIZED.
9. ALL PV MODULES AND ASSOCIATED EQUIPMENT AND WIRING SHALL BE PROTECTED FROM PHYSICAL DAMAGE.

SOLAR CONTRACTOR

1. MODULE CERTIFICATIONS INCLUDE UL1703, IEC61646, IEC61370.
2. IF APPLICABLE, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE MARKED GROUNDING LUG HOLES PER THE MANUFACTURERS INSTALLATION REQUIREMENTS.
3. AS INDICATED BY DESIGN, OTHER NRTL LISTED MODULE GROUNDING DEVICES MAY BE USED IN PLACE OF STANDARD GROUNDING LUGS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ.
4. ALL MICROINVERTERS, PHOTOVOLTAIC MODULES, AC COMBINERS, DC-AC CONVERTERS AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER NEC690.4(B).
5. ALL SIGNAGE TO BE INSTALLED IN ACCORDANCE WITH LOCAL BUILDING CODE.
6. TERMINALS AND LUGS WILL BE TIGHTENED TO MANUFACTURER TORQUE SPECIFICATIONS (WHEN PROVIDED) IN ACCORDANCE WITH NEC CODE 110.14(D) ON ALL ELECTRICAL CONNECTIONS.
7. MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC UNLESS NOT AVAILABLE.

1	PV MODULES	33 x SOLARIA POWERX-390R
2	INVERTER	02 x Tesla Inverter 7.6 kW
3	ROOF TYPE	ASPHALT SHINGLES
4	RACKING	PSR-B84 RAILS (BLACK)
5	MOUNTING TYPE	COMP MOUNT FLASHING (BLACK)
6	DC SIZE	12.87 KW
7	AC SIZE	15.2 KVA



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PROJECT INFORMATION

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2	PV2	SITE LAYOUT
3	PV3	STRING MAPPING
4	PV4	ELECTRICAL ONE LINE DIAGRAM
5	PV5	DETAILED ELECTRICAL WIRING SCHEMATIC
6	PV6	PV LABELS
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8	PV8	ATTACHMENT DETAILS

Customer Information:

Kathryn Elizabeth Lassek
3185 Raynor McLamb Road
Linden NC 28356

Customer Signature:

Sheet Name:

Drawing Index

JOB NUMBER:

23-201-RL

Date:

05/01/2023

Revision:

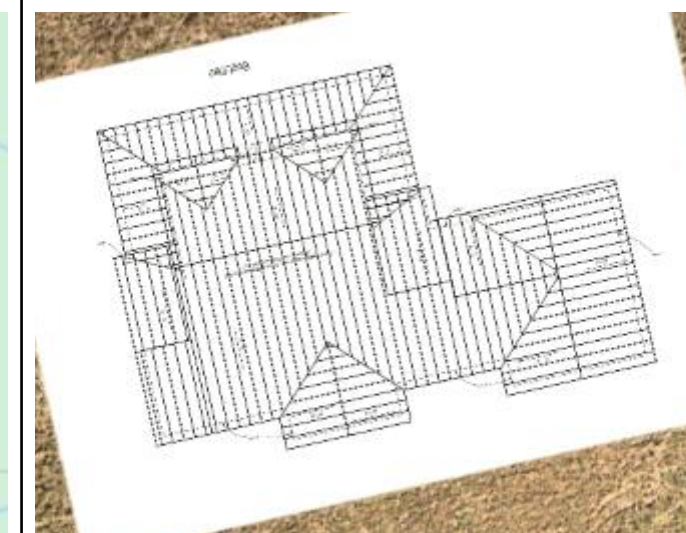
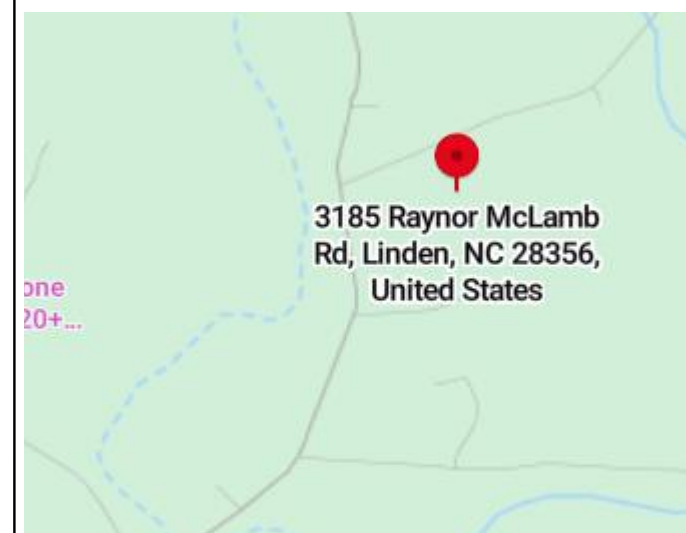
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17" X 22"

Sheet Number:

PV1



DESIGN CRITERIA
WIND SPEED: 135 MPH
GROUND SNOW LOAD: 10 PSF
WIND EXPOSURE FACTOR: B

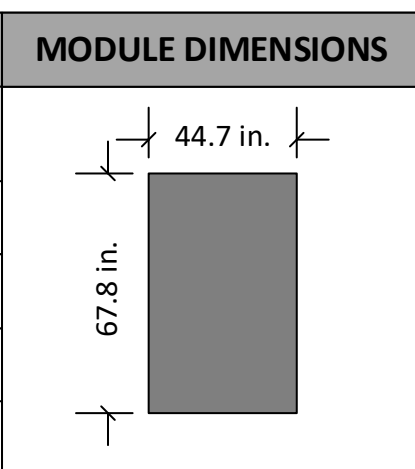
UTILITY COMPANY:
SOUTH RIVER EMC
PERMIT ISSUER (AHJ):
HARNETT COUNTY

SCOPE OF WORK
INSTALLATION OF UTILITY
INTERACTIVE PHOTOVOLTAIC
SOLAR SYSTEM.

VICINITY MAP

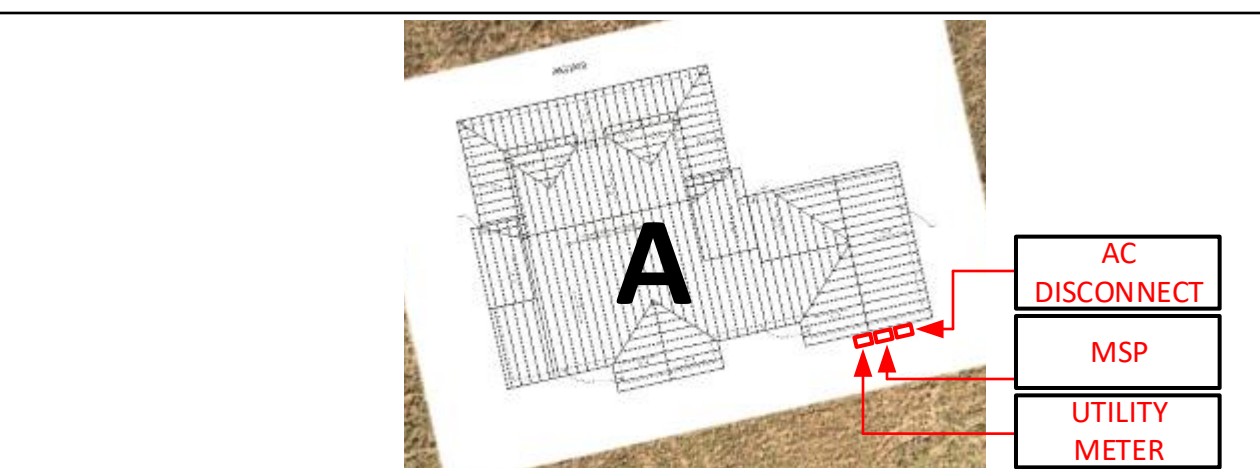
TOP VIEW OF THE BUILDING

ROOF DESCRIPTION			
ROOF	PITCH	AZIMUTH	NO. OF MODULES
A	34°	167°	33



Vent

- No vents will be covered by PV modules during the installation.



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SYSTEM DETAILS

NUMBER OF PANELS : 33
 PANELS MODEL : SOLARIA POWERX-390R
 DC SIZE : 12.87 kW
 AC SIZE : 15.2 kVA

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 Linden NC 28356

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Site Layout

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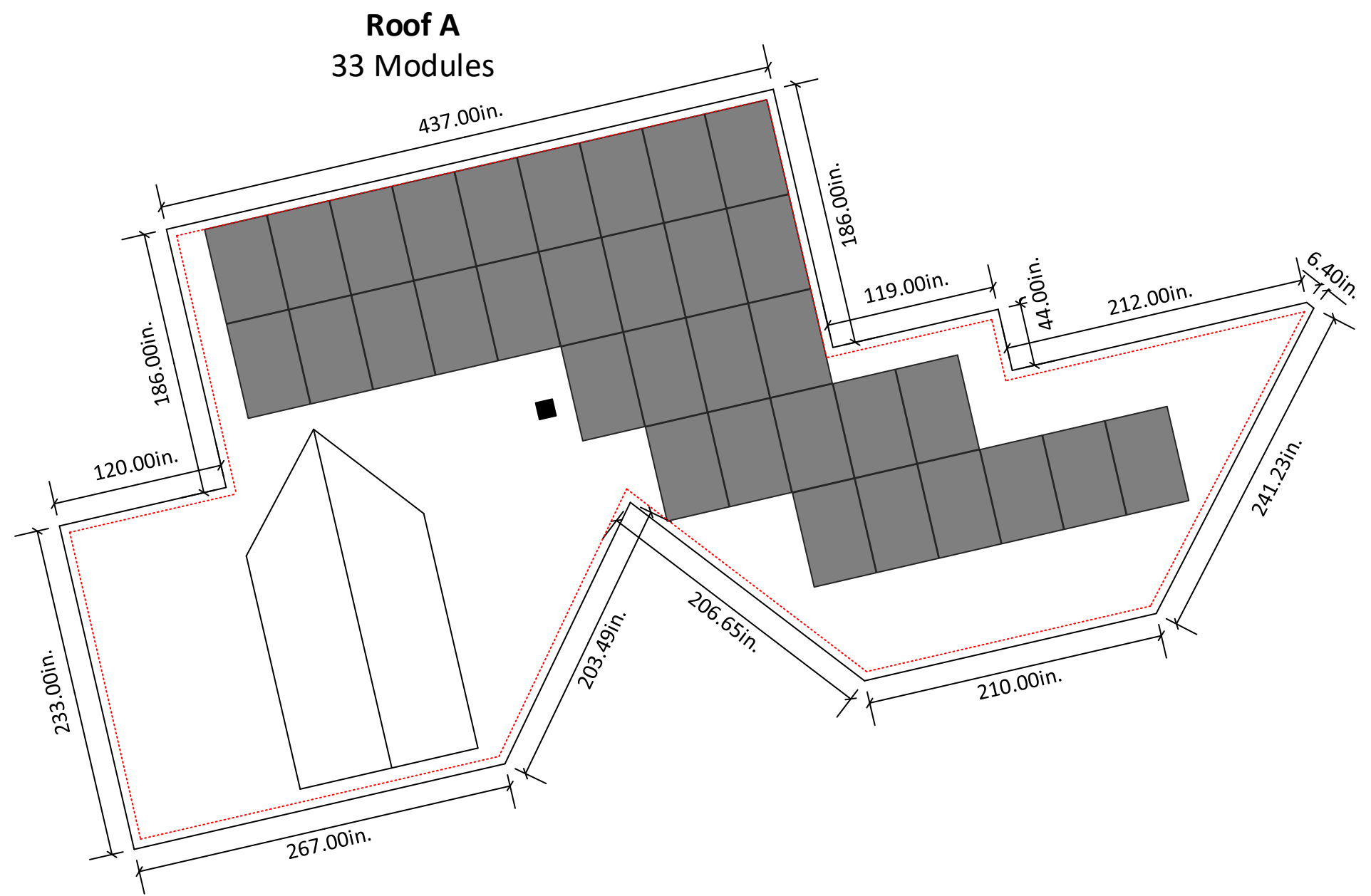
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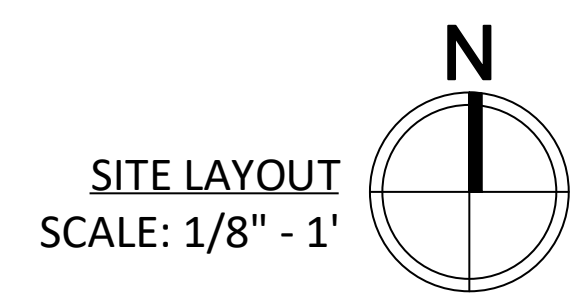
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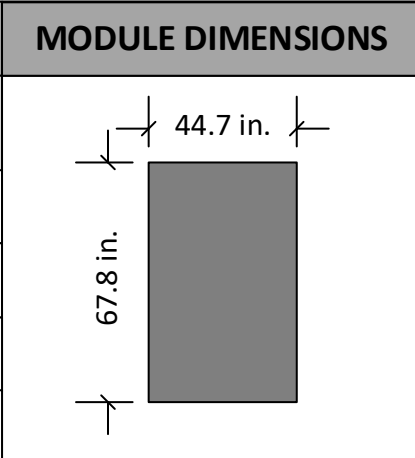
PV2



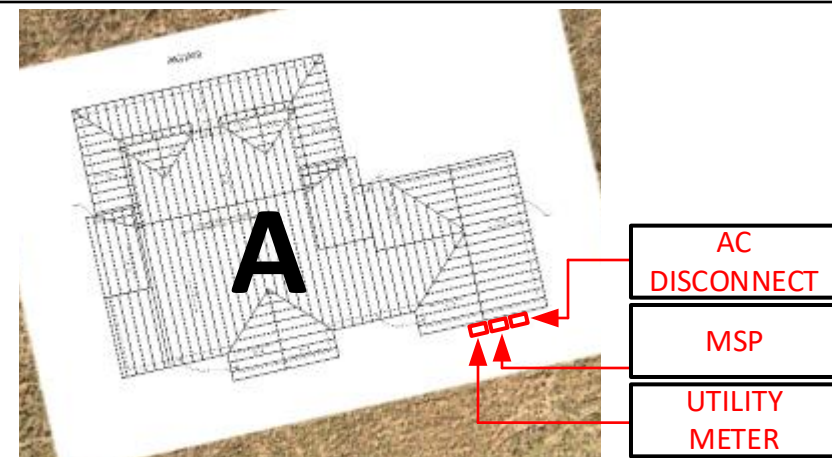
6in setback from sides of the roof



ROOF DESCRIPTION			
ROOF	PITCH	AZIMUTH	NO. OF MODULES
A	34°	167°	33



STRING LAYOUT					
TESLA 7.6KW - A			TESLA 7.6KW - B		
Strings #	No. of Modules	Color	Strings #	No. of Modules	Color
String 1	09	Blue	String 3	09	Green
String 2	09	Orange	String 4	06	Purple



Tesla MCI (Mid Circuit Interrupter)



SYSTEM DETAILS

NUMBER OF PANELS : 33
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String Mapping

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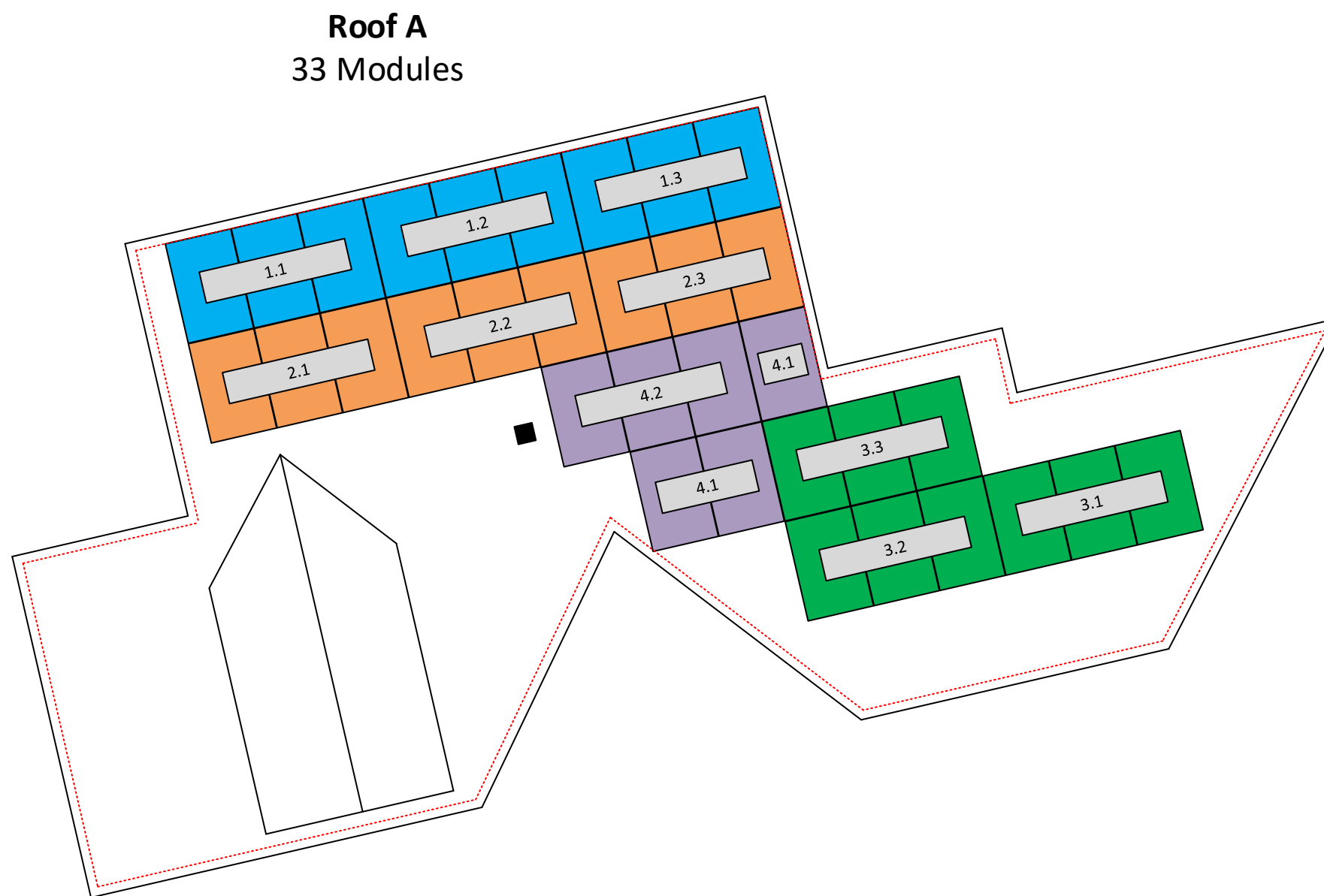
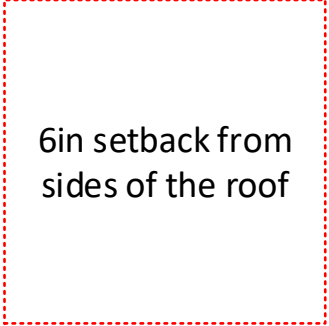
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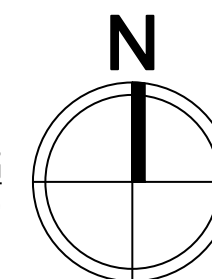
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Sheet Number:

PV3



STRING MAPPING
 SCALE: 1/8" - 1'



STRING CALCULATION

String #	No of Modules	Estimated Power	I _{max}	I _{mpp}	V _{oc}	V _{mpp}
1	09	3,510 W	19.85 Adc	12.73 Adc	332.1Vdc	550 Vdc
2	09	3,510 W	19.85 Adc	12.73 Adc	332.1Vdc	550 Vdc
3	09	3,510 W	19.85 Adc	12.73 Adc	332.1Vdc	550 Vdc
4	06	2,340 W	19.85 Adc	12.73 Adc	221.4Vdc	550 Vdc

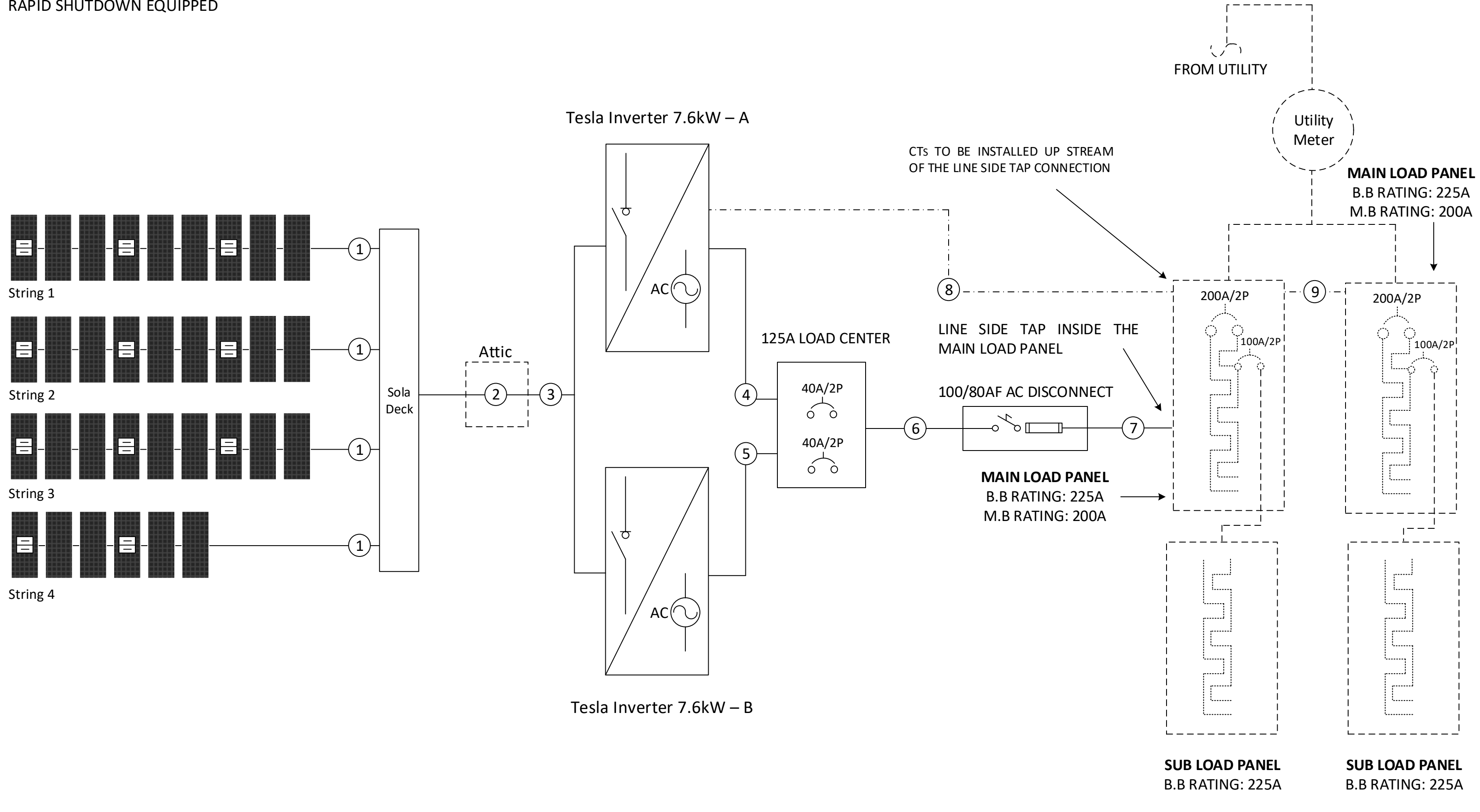
NEC Code (2020) and UL Standard References

Rapid Shut Down	NEC 690.12 (A-D), UL1741	Grounding	NEC Article 250.30(A)
Disconnecting Means	NEC 690.13	Conduit Fill	NEC Table C.9, 310.15(B)(3)(a)
Feeder Sizing	NEC Table 310, 15(B)(16, 17)	Interconnection	NEC 705.12
Over current Protection	NEC 690.9		



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33 X SOLARIA POWERX-390R
390W
TESLA MCI-2
RAPID SHUTDOWN EQUIPPED



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Electrical One Line Diagram

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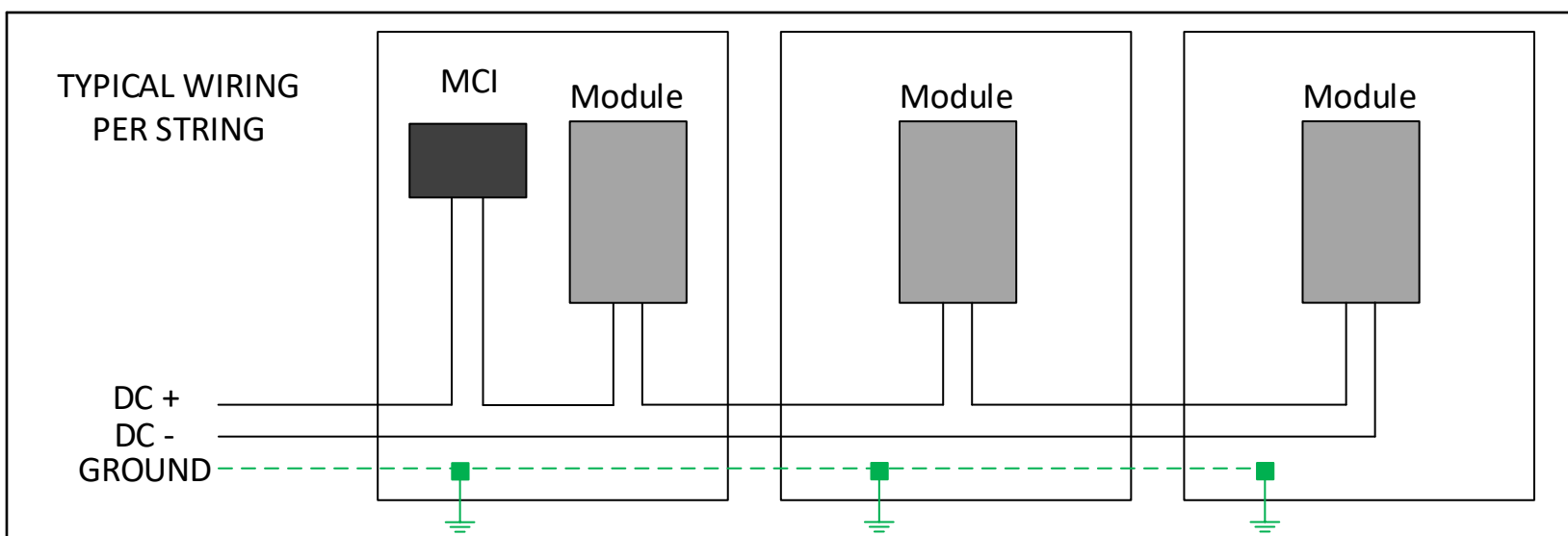
PV4

- System Size: 12,870W DC
- (33) SOLARIA POWERX-390R
- (11) 1879359-00-X: Tesla MCI-2
- (02) 1538000-45-y: Tesla Solar Inverter 7.6kW
- Inverter Output: 32A max @ 240 VAC (each)
- 15.2 kVA AC output max

- Grounding will be done via Pegasus grounding lugs and mid-clamps to ensure the rail and panels are continuously grounded.
- Rapid Shutdown is included in the Mid Circuit Interrupter, refer to Mid Circuit Interrupter and Inverter attached datasheets.
- The load center / disconnect will be visible, lockable accessible to utility linesmen and will be properly labelled as per NEC requirements. It will be located on the exterior wall of the building, next to the utility meter.

Sr.No	#Wire	Conduit Size	Ground Wire	Amperage
1	2 x #10 PV		#10 Bare CU	19.85
2	8 x #10 THHN Cu	3/4" LFMC	#10 Green	19.85
3	8 x #10 THHN Cu	3/4" EMT	#10 Green	19.85
4	3 x #8 THHN Cu	3/4" LFNC	#10 Green	40
5	3 x #8 THHN Cu	3/4" EMT	#10 Green	40
6	3 x #4 THHN Cu	1.25" PVC	#8 Green	80
7	3 x #4 THHN Cu	1.25" PVC		80
8	Shielded, twisted pair with drain wire	3/4" EMT		
9	Shielded, twisted pair with drain wire	3/4" LFNC		





Line 1		Note: Label on consumption CTs should face the grid
Line 2		Note: Tesla MCI should be at the start or end of every string
Neutral		Note: Tesla MCI should be placed after every three panels
Ground		Note: Tesla MCI should be placed after every three panels
CT Wire		Note: L1 on CT4 and L2 on CT3 (CTs Wire)



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Detailed Electrical Diagram

JOB NUMBER:

23-201-RL

Date:

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Revision:

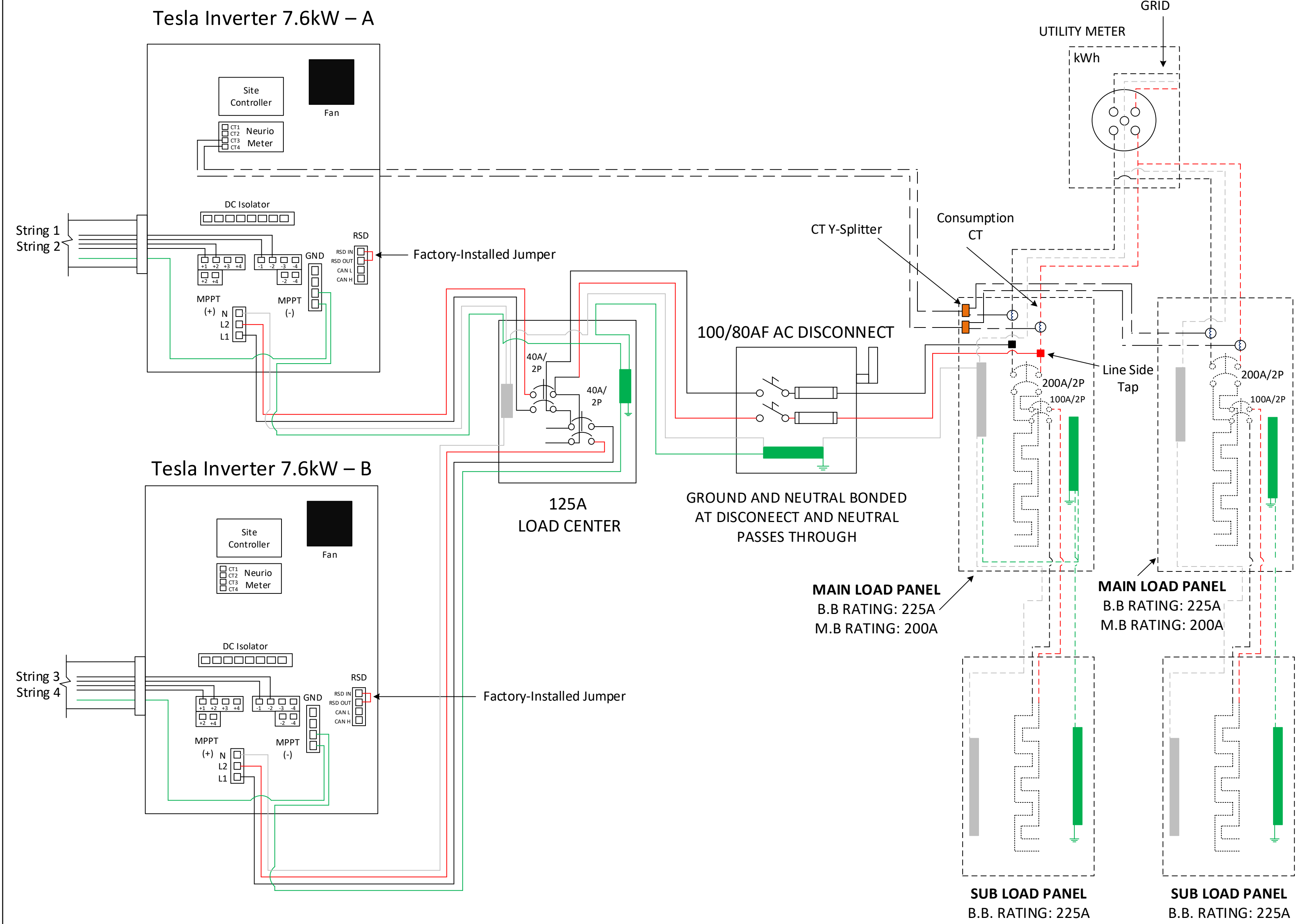
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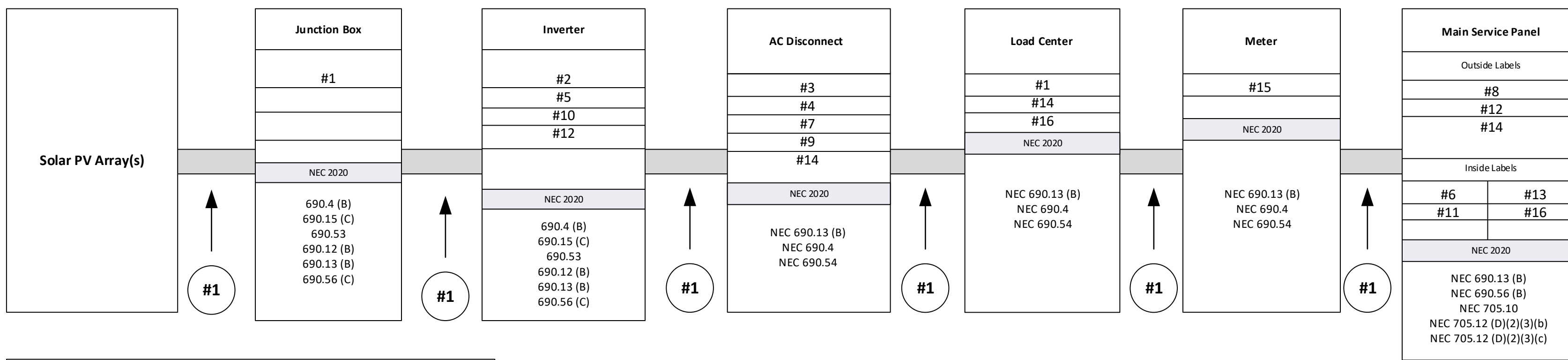
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Sheet Number:

PV5





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LABELING AND WARNING SIGNS: NEC 2020

A. PURPOSE
PROVIDE EMERGENCY RESPONDERS WITH APPROPRIATE WARNING AND GUIDANCE WITH RESPECT TO ISOLATING THE SOLAR ELECTRIC SYSTEM. THIS CAN FACILITATE IDENTIFYING ENERGIZED ELECTRICAL LINES THAT CONNECT THE SOLAR PANELS TO THE INVERTER, AS SHOULD NOT BE CUT WHEN VENTING FOR SMOKE REMOVAL.

B. MAIN SERVICE DISCONNECT:
1. RESIDENTIAL BUILDINGS- THE MARKING MAY BE PLACED WITHIN THE MAIN SERVICE DISCONNECT. THE MARKING SHALL BE PLACED ON THE OUTSIDE COVER IF THE MAIN SERVICE DISCONNECT IS OPERABLE WITH THE SERVICE PANEL CLOSED.
2. COMMERCIAL BUILDINGS- THE MARKINGS SHALL BE PLACED ADJACENT TO THE MAIN SERVICE DISCONNECT CLEARLY VISIBLE FROM THE LOCATION WHERE THE LEVER IS OPERATED

3. MARKINGS, VERBIAGE, FORMAT AND TYPE OF MATERIAL

a. VERBIAGE: CAUTION; SOLAR ELECTRIC SYSTEM CONNECTED
b. FORMAT:

- (1) WHITE LETTERING ON A RED BACKGROUND
- (2) MINIMUM 3/8 INCH LETTER HEIGHT
- (3) ALL LETTERS SHALL BE CAPITALIZED
- (4) ARIAL OR SIMILAR FONT, NON-BOLD

c. MATERIAL:

(1) REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT (USE UL-969) AS STANDARD FOR WEATHER RATING); DURABLE ADHESIVE MATERIALS MEET THIS REQUIREMENT.

C. MARKING REQUIREMENTS ON DC CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, DC COMBINERS AND JUNCTION BOXES;

1. MARKING: PLACEMENT, VERBIAGE, FORMAT AND TYPE OF MATERIAL.

a. PLACEMENT: MARKINGS SHALL BE PLACED EVERY 10 (TEN) FEET ON ALL INTERIOR AND EXTERIOR DC CONDUITS, RACEWAYS, ENCLOSURES AND CABLE ASSEMBLIES, AT TURNS ABOVE AND/OR BELOW PENETRATIONS, ALL DC COMBINERS AND JUNCTION

BOXES.

b. VERBIAGE: CAUTION SOLAR CIRCUIT

c. THE FORMAT AND TYPE OF MATERIAL SHALL ADHERE TO SECTION B-3.B & C ABOVE

D. INVERTERS ARE NOT REQUIRED TO HAVE CAUTION MARKINGS

#1 WARNING: PHOTOVOLTAIC POWER SOURCE

#2 PHOTOVOLTAIC
DC DISCONNECT

#3 PHOTOVOLTAIC
AC DISCONNECT

#4 RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

#5 MAXIMUM VOLTAGE 550Vdc
MAXIMUM CIRCUIT CURRENT 19.85Adc
MAX. RATED OUTPUT CURRENT OF THE CHARGE CONTOLLER OR DC-TO-DC CONVERTER IF INSTALLED

#6 PHOTOVOLTVIC POWER SOURCE
OPERATING AC VOLTAGE 240 V
MAXIMUN OPERATING AC OUTPUT CURRENT 80 A

#7 AC DISCONNECT PHOTOVOLTAIC SYSTEM POWER SOURCE
RATED AC OUTPUT CURRENT 80
NOMINAL OPERATING AC VOLTAGE 240

#8 SOLAR AC DISCONNECT LOCATED AT SOUTH-EAST SIDE WALL OF THE HOUSE BESIDE THE UTILITY METER

#9 SERVICE DISCONNECT LOCATED INSIDE THE MAIN LOAD PANEL

#10 WARNING
BIPOLAR PHOTOVOLTAIC ARRAY
DISCONNECT OF NUETRAL GROUNDED CONDUCTOR MAT RESULT IN OVERVOLTAGE ON ARRAY OR INVERTER

#11 WARNING
THIS EQUIPMENT FED BY MULTIPLE SOURCES.TOTAL RARTING OF ALL OVERCURRENT DEVICES,EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE,SHALL NOT EXCEED AMPACITY OF BUSBAR

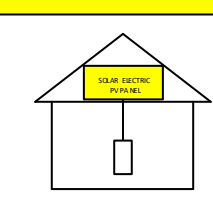
#12 WARNING
DUAL POWER SUPPLY SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

#13 WARNING
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKIN INSIDRE PANEL

#14 WARNING
ELECTRIC SHOCK HAZARD
TERMIONAL OM THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

#15 WARNING
THIS SERVICE METER IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM

#16 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



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3185 Raynor McLamb Road
Linden NC 28356

Customer Signature:

Sheet Name:

PV Labels

JOB NUMBER:

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Date:

05/01/2023

Revision:

A

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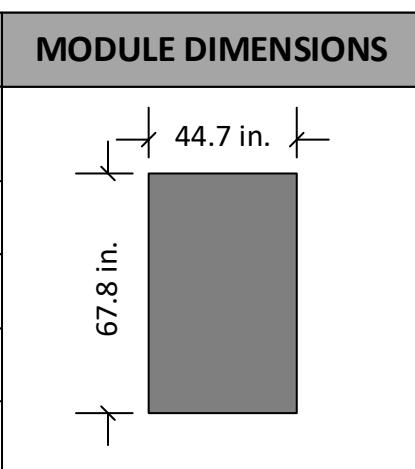
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17" X 22"

Sheet Number:

PV6



ROOF DESCRIPTION			
ROOF	PITCH	AZIMUTH	NO. OF MODULES
A	34°	167°	33



Rails and Splices : PSR-B84 (BLACK)

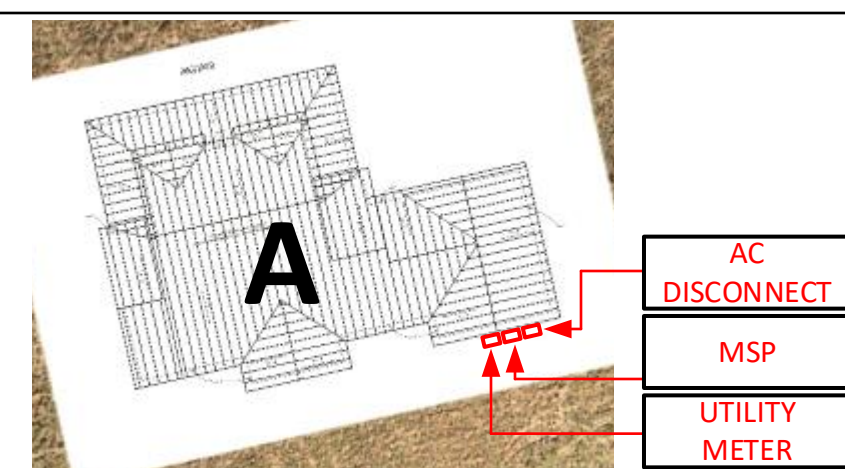
Rafter Spacing : 24 in

Attachment Span: 4ft

Roof Attachment : Pegasus Comp Mount

There is one layer of shingles
Roofing material is asphalt shingles

The roof is located in 135mph wind zone

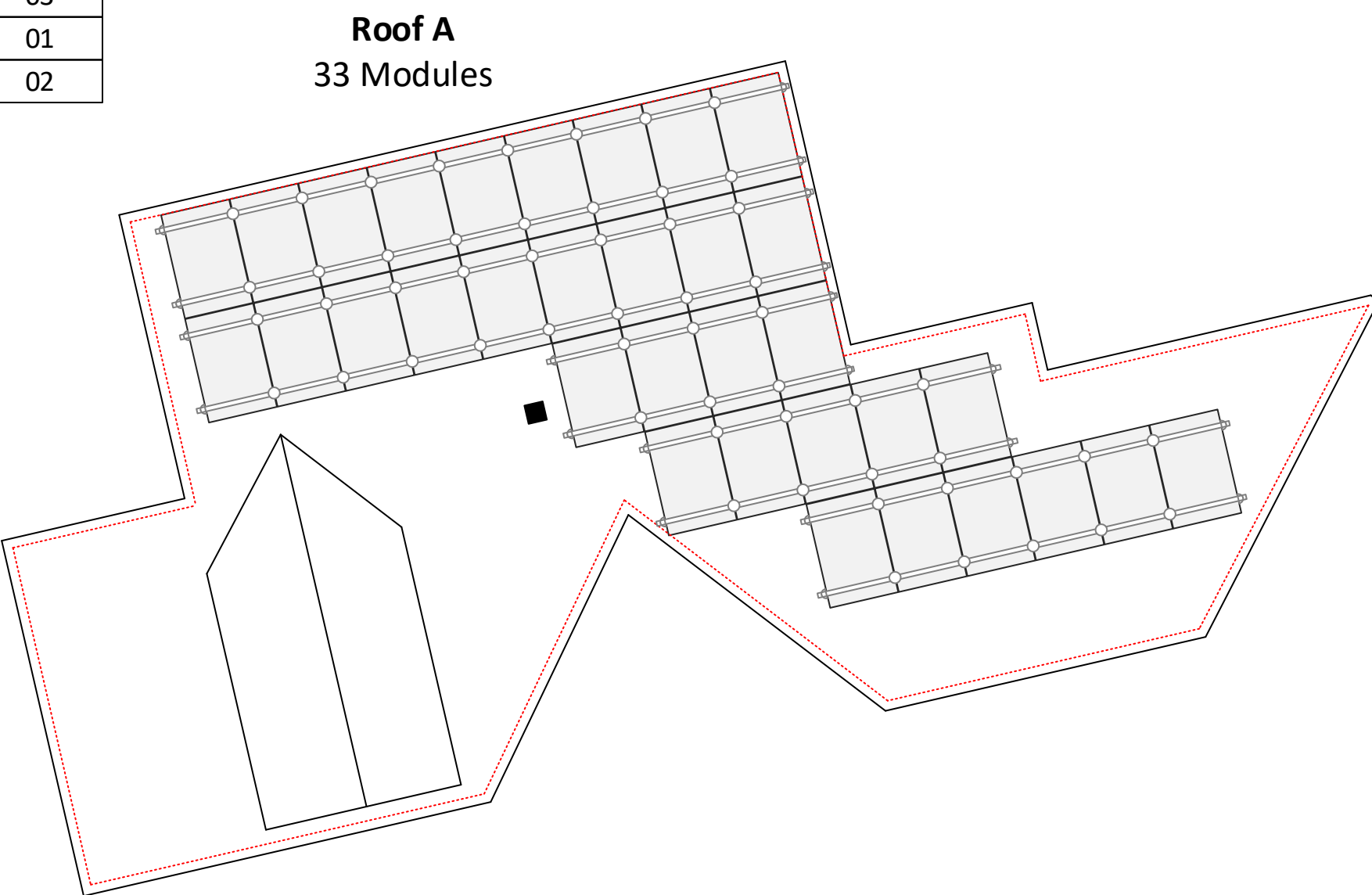


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PV LABELS		
Sr No	Code	Qty
01	02-314	11
02	03-301	02
03	03-302	01
04	02-316	01
05	03-308	02
06	03-390	01
07	03-306	01
08	8M-001	01
09	8M-002	01
10	05-103	02
11	05-108	01
12	05-211	03
13	05-372	01
14	05-215	03
15	07-359	01
16	07-111	02

- RAILS AND MOUNTING SYSTEM**
- 40 x PSR-B84: Pegasus Rail, Black, 84" (7 Feet)
 - 30 x PSR-SPL: Pegasus - Bonded, Structural Splice
 - 56 x PSR-MCB: Pegasus - Multiclamp, Mid/End, 30 to 40 mm, Black
 - 20 x PSR-HEC: Pegasus - Hidden End Clamp
 - 09 x PSR-LUG: Pegasus - Grounding Lug
 - 50 x PSR-WMC: Pegasus - Wire Management Clip
 - 06 x PSR-CBG: Pegasus - Cable Grip
 - 20 x PSR-CAP: Pegasus - End Cap
 - 66 x PSCR-UBBDT: Pegasus Comp Mount - Open Slot, Black L Foot, Black Flashing, Dovetail 3/8" T-Bolt
 - 88 x Heyco Wire Clips

- SOLAR MODULES**
- 33 x SOLARIA POWERX-390R
- INVERTER & SUPPORTING ITEMS**
- 02 x 1538000-45-y: Tesla Solar Inverter 7.6kW
 - 11 x 1879359-00-X: Tesla MCI-2
 - 02 x 1622277-xx-y: (2) Neurio W2 CTs
 - 01 x 1622289-xx-y: Neurio W2 CT extension wires (11ft)
 - 02 x 1622286-xx-y: Neurio W2 CT Y-Splitter
- ELECTRICAL ITEMS**
- 02 x IPCS 4002: Line/Load Side Hot Taps (#4/0 main - #2-10 tap)
 - 01 x HOM816L125PRB: Combiner Sub Panel (Sq D HOMELINE) 125A MLO/4-8 space minimum (NEMA 3R)
 - 02 x HOM240: SQ D HOM 40/2
 - 01 x D223NRB: 250volt/100amp/2pole fusible disconnect (NEMA 3R)
 - 02 x SQUARE D FRNR80: 250volt/80amp fuses
 - 500 ft x #10 PV WIRE BLK (Cu)
 - 01 x EZSLR JB-1.2: SolaDeck



6in setback from sides of the roof

BILL OF MATERIAL
SCALE: 1/8" - 1'

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Bill of Material

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PV7



Customer Information:

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Customer Signature:

Sheet Name:

Attachment Details

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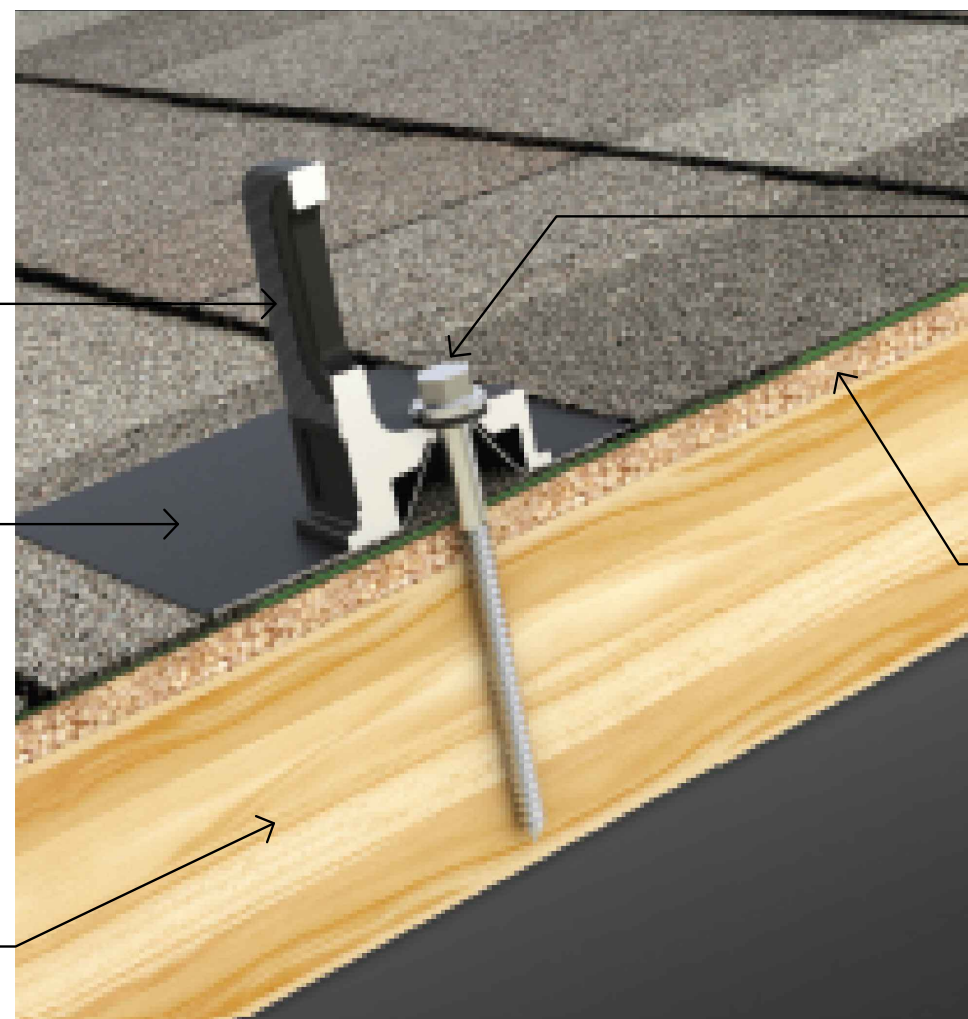
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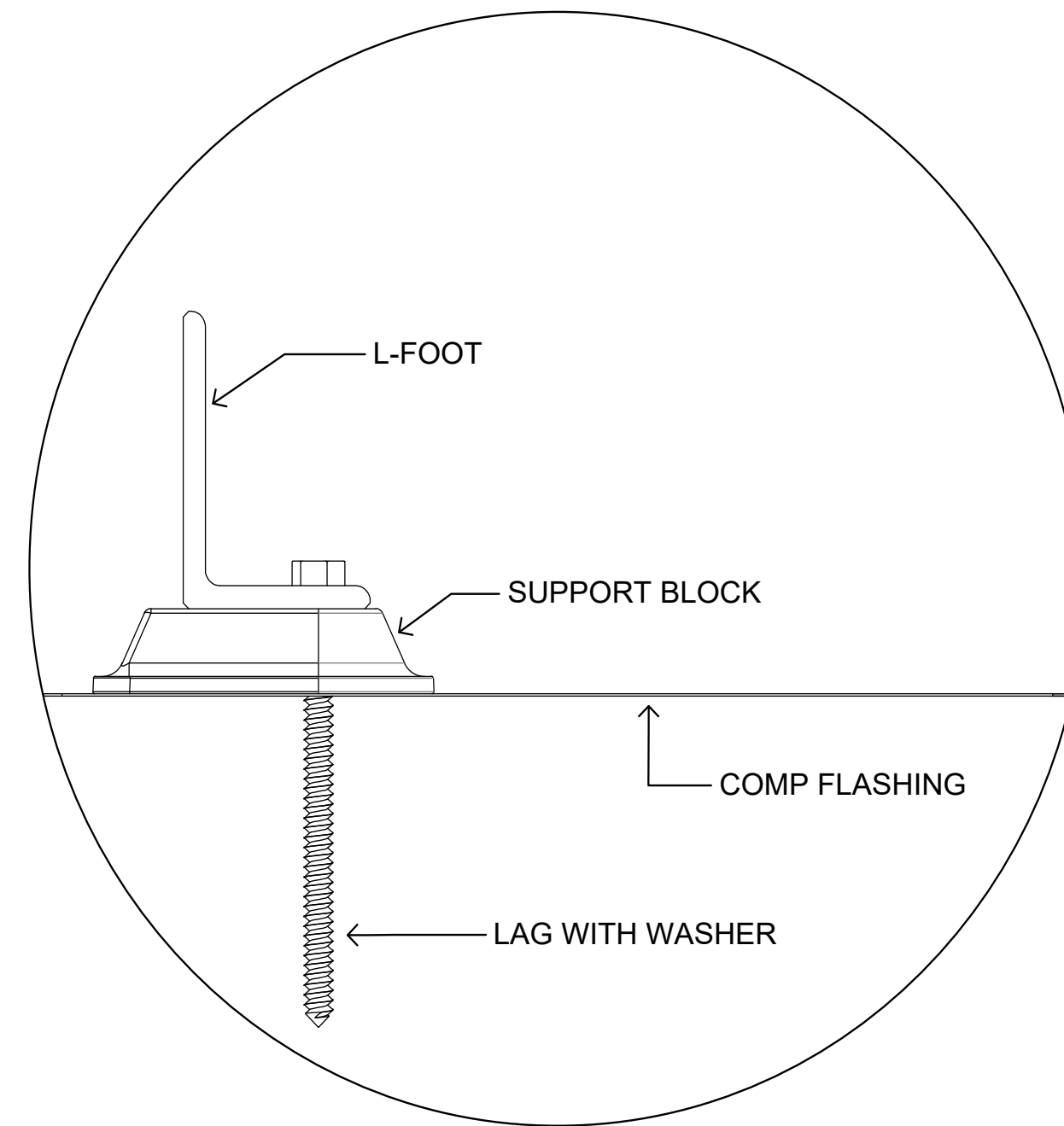
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PV8









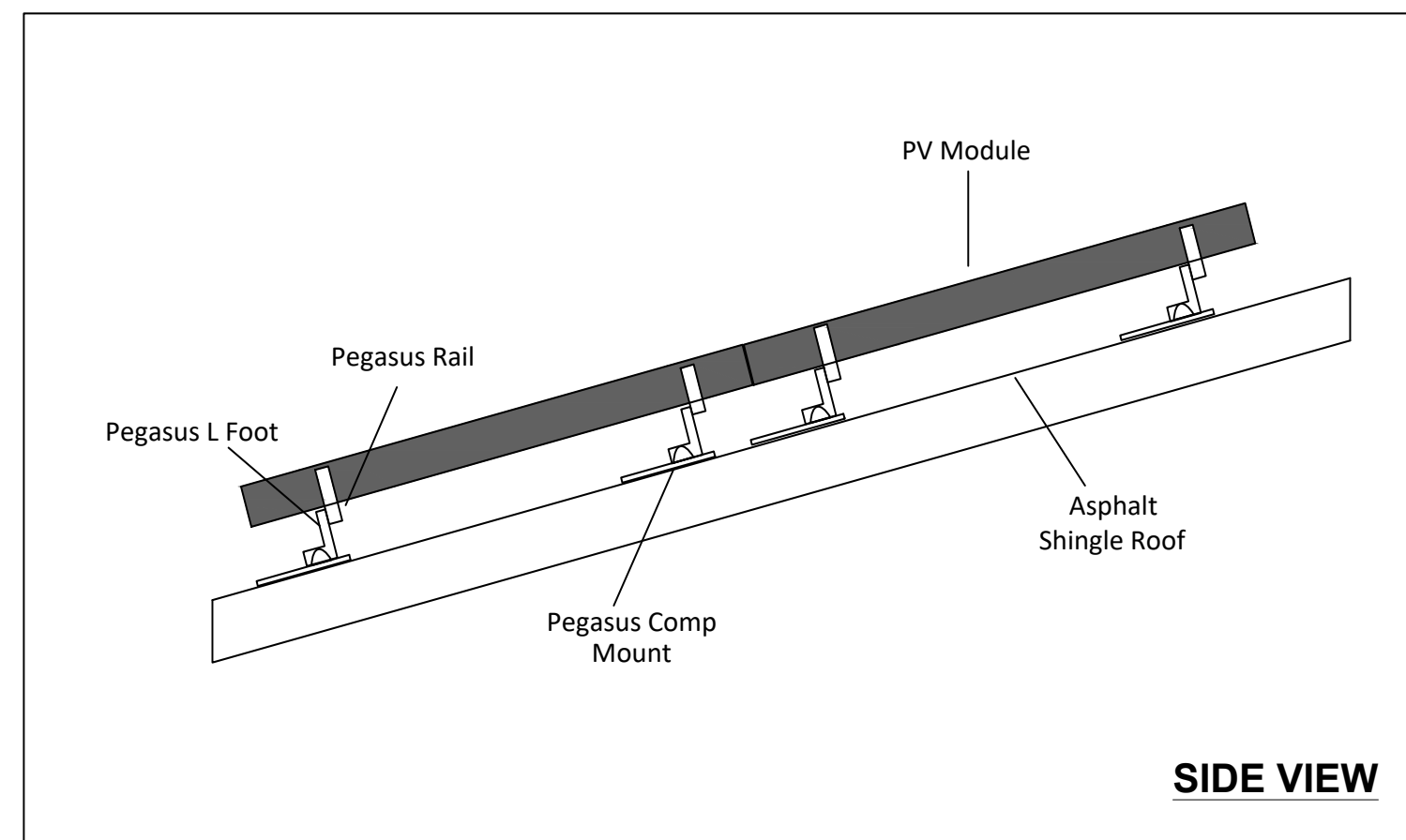
L-FOOT
FLASHING
RAFTER

LAG WITH WASHER
ROOF DECKING



L-FOOT
SUPPORT BLOCK
COMP FLASHING
LAG WITH WASHER

					
Multi-Clamp	Hidden End Clamp	MLPE Mount	Dovetail T-Bolt	Ground Lug	Cable Grip
Torque Value 100 in-lbs.	Torque Value 135 in-lbs.	Torque Value 135 in-lbs.	Torque Value 300 in-lbs.	Torque Value 135 in-lbs.	Torque Value 135 in-lbs.



PV Dead Load	
Roof A	<p>PV System Dead Load (Panel + Racking weight) / PV System Area (33 panels x 48.7 lbs./panel + 15 ft. of racking x 1.17 lb.ft.) / (33 panels x 5.65' x 3.72') = 2.73 psf</p>