

**PHOTOVOLTAIC ROOF MOUNT SYSTEM**

**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 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.

**SR.#**

**PROJECT INFORMATION**

1	PV MODULES	76 X Q.PEAK DUO XL-G10.3 / BFG 480W
2	OPTIMIZER	40 X P1101
3	INVERTER	02 X SE17.3KUS
4	ROOF TYPE	ASPHALT SHINGLES
5	RACKING	PSR-B84 RAILS (BLACK)
6	MOUNTING TYPE	COMP MOUNT FLASHING (BLACK)
7	DC SIZE	36.480 KW
8	AC SIZE	34.6 KVA

**SR.#**

**PROJECT INFORMATION**

1	PV1	DRAWING INDEX
2	PV2	SITE LAYOUT
3	PV3	STRING MAPPING
4	PV4	ELECTRICAL ONE LINE DIAGRAM
5	PV5	DETAILED ELECTRICAL WIRING SCHEMATIC
6	PV6	PV LABELS
7	PV7	BILL OF MATERIALS
8	PV8	RACKING DETAILS



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**Customer Information:**

**LifeLink Medical Group**

901 Denim Dr.  
Erwin, NC 28339

**Customer Signature:**

**Sheet Name:**

Drawing Index

**JOB NUMBER:**

23-439-LLM

**Date:**

10/31/2024

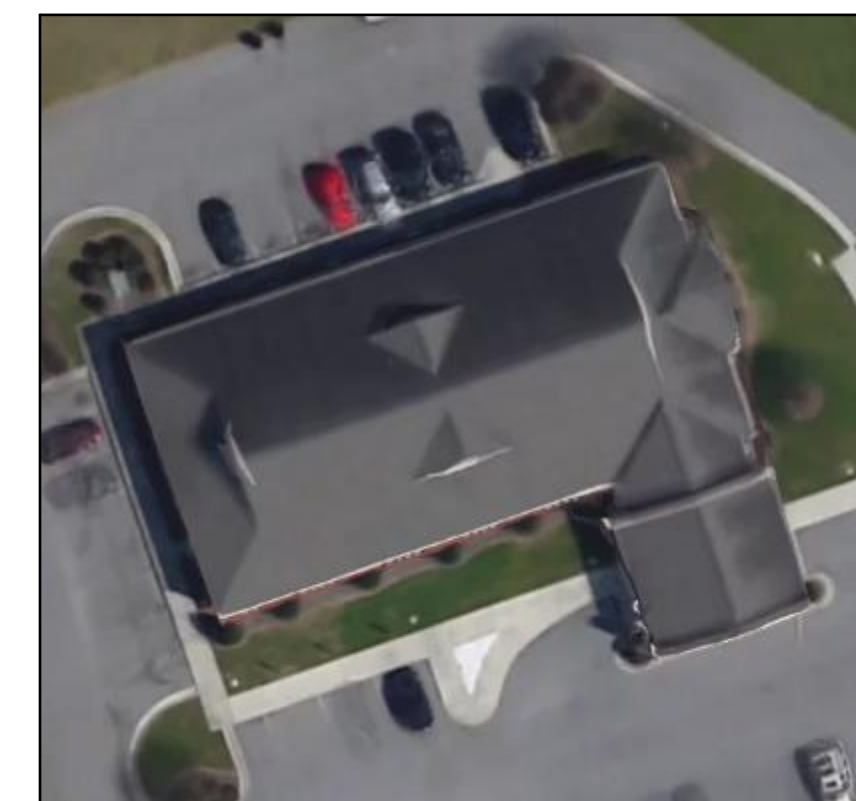
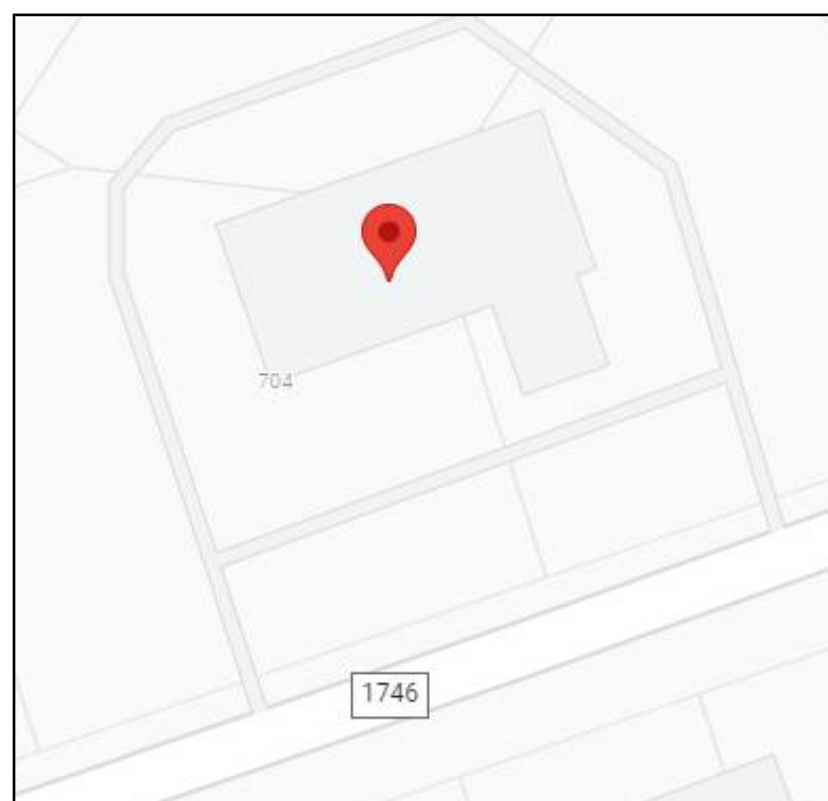
**Revision A:**

**Sheet Size:**

22" X 28.7"

**Sheet Number:**

PV1



**VICINITY MAP**

**TOP VIEW OF THE BUILDING**

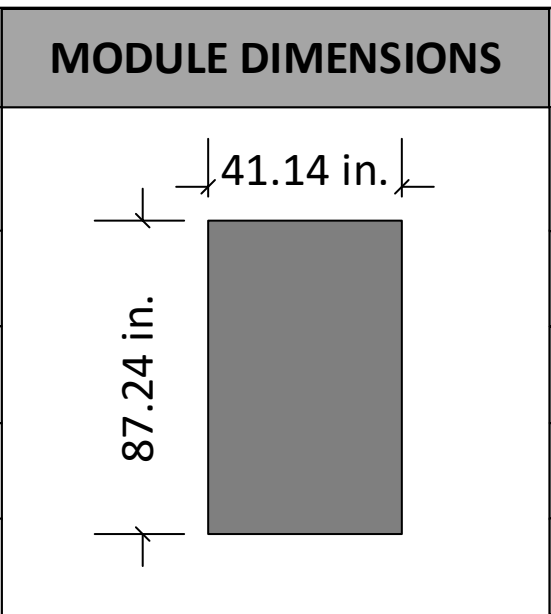


**DESIGN CRITERIA**  
WIND SPEED: 115 MPH  
GROUND SNOW LOAD: 15 LB/FT<sup>2</sup>  
WIND EXPOSURE FACTOR: B

**UTILITY COMPANY:**  
DUKE ENERGY PROGRESS  
**PERMIT ISSUER (AHJ):**  
HARNETT COUNTY

**SCOPE OF WORK**  
INSTALLATION OF UTILITY  
INTERACTIVE PHOTOVOLTAIC  
SOLAR SYSTEM.

ROOF DESCRIPTION			
ROOF	PITCH	AZIMUTH	NO. OF MODULES
A	23°	250°	11
B	23°	160°	59
C	23°	340°	06



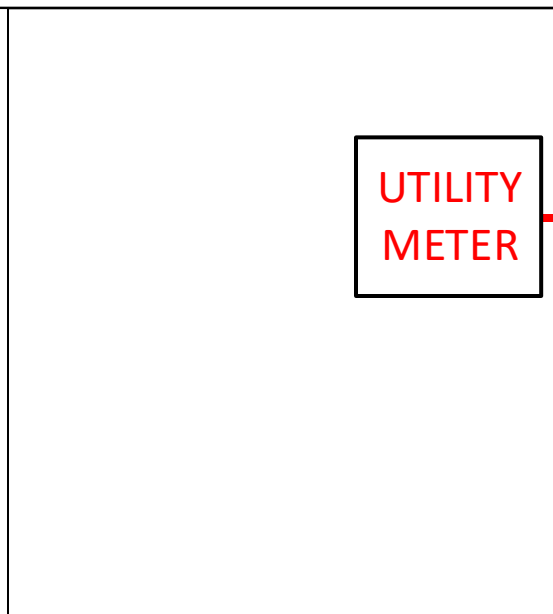
LEGENDS	
SYMBOLS	DESCRIPTION
■	Roof Vent

**SYSTEM DETAILS**

**Modules:**  
76 x Q.PEAK DUO XL-G10.3 / BFG 480W

**Optimizer:**  
30 x SOLAREEDGE P1101 OPTIMIZER

RAPID SHUTDOWN EQUIPPED



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Site Layout

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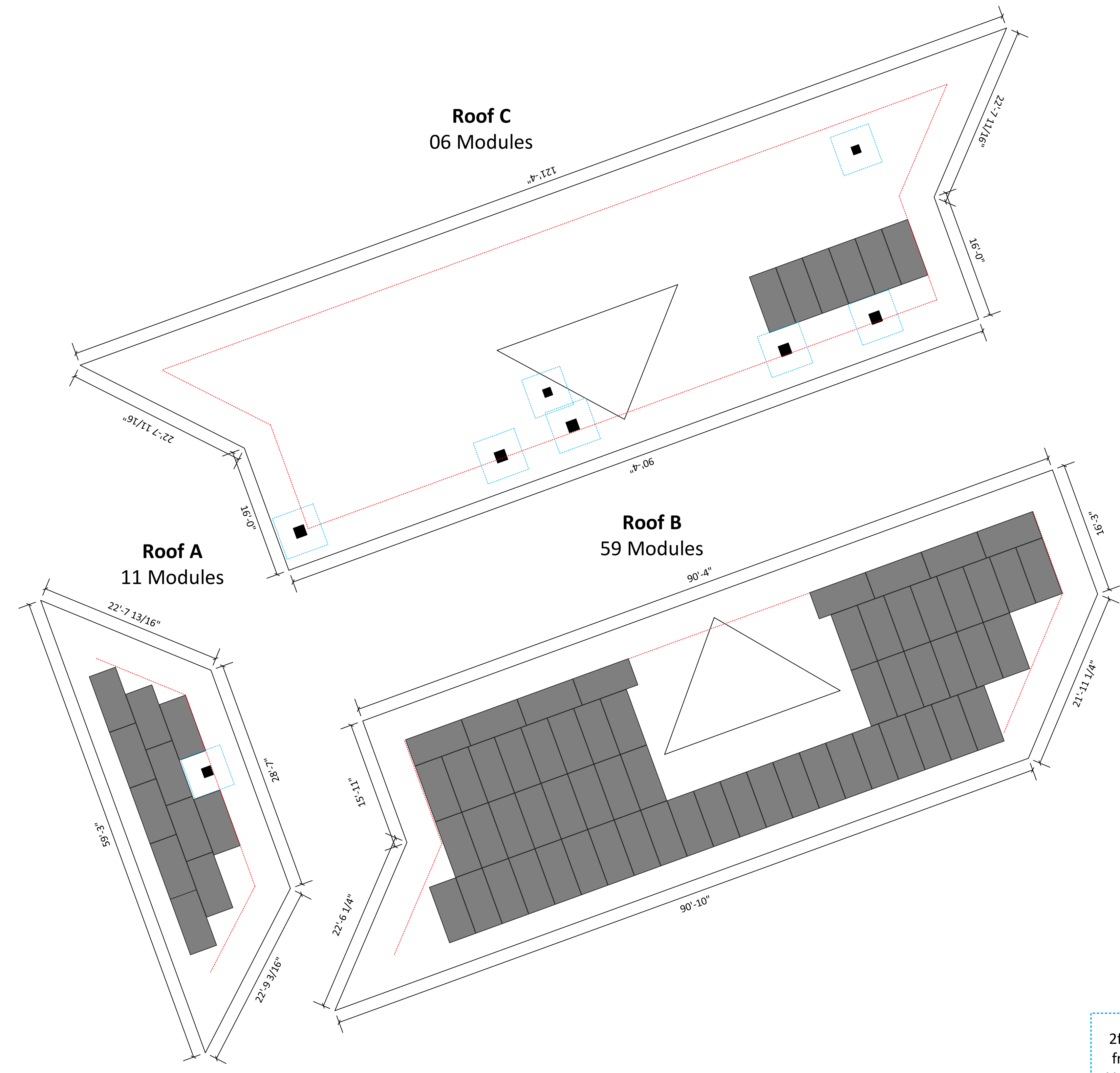
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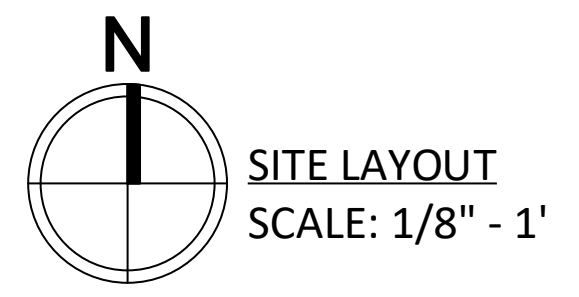
**Sheet Number:**

PV2



2ft setback from each Vent on the roof

4ft setback from sides of the roof



String Layout – Inverter: SE17.3KUS

Inverter 1				Inverter 2			
Strings #	No. of Modules	No. of Optimizer	Color	Strings #	No. of Modules	No. of Optimizer	Color
String 1	19	10	Blue	String 3	19	10	Green
String 2	19	10	Orange	String 4	19	10	Yellow

UTILITY METER



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String Mapping

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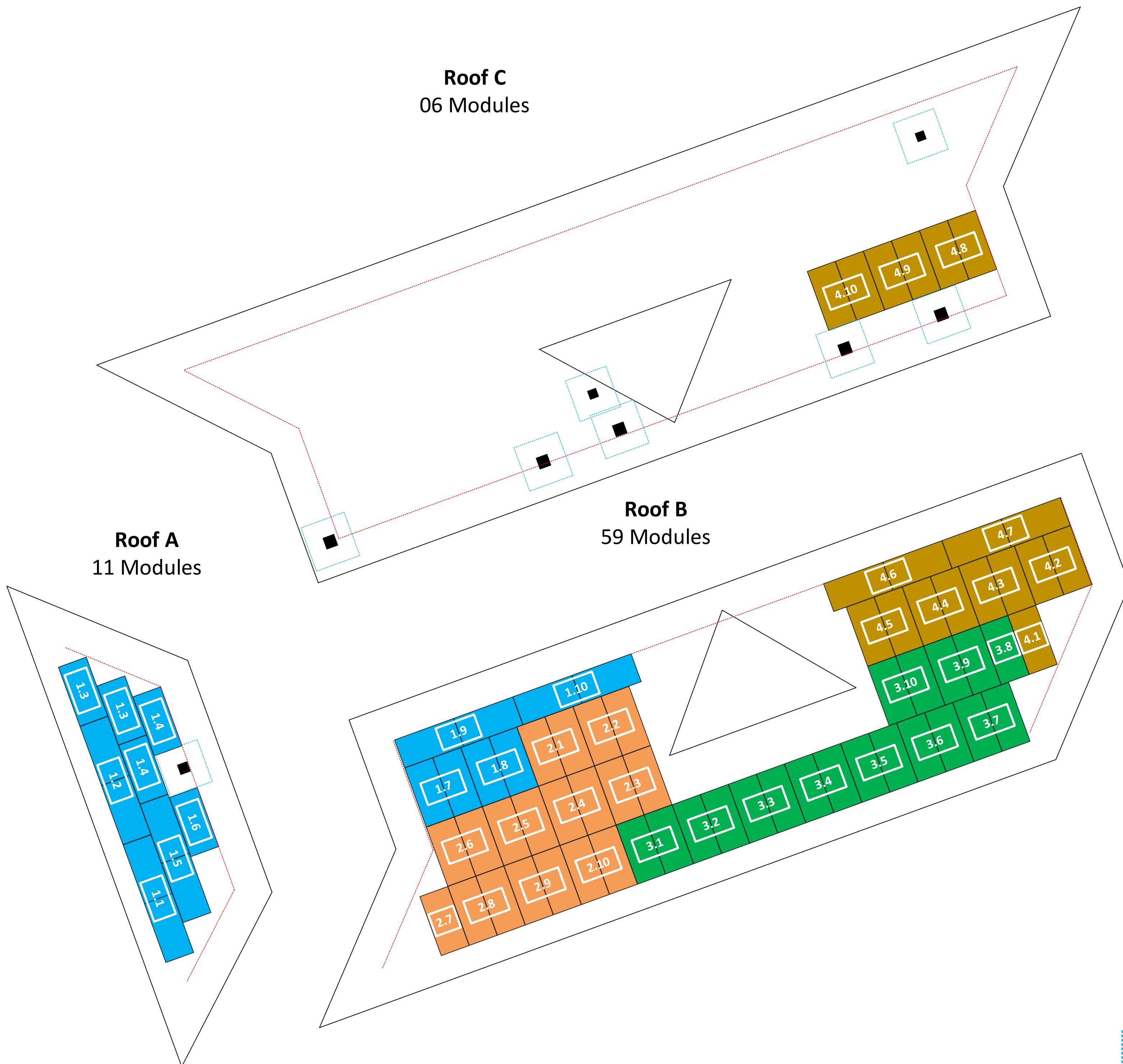
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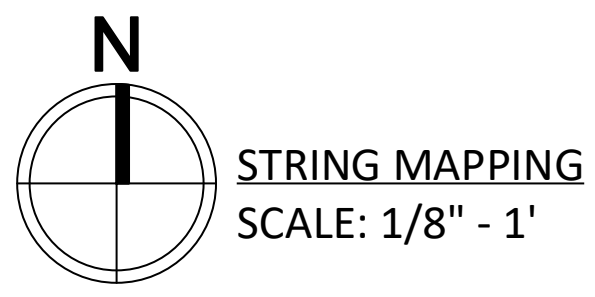
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PV3



2ft setback from each Vent on the roof

4ft setback from sides of the roof



## STRING CALCULATION

String #	No of Modules	Estimated Power	Imp	I <sub>max</sub>	Voc	V <sub>mpp</sub>
1	19	9,120W	15.2A	28.08A	10	600V DC
2	19	9,120W	15.2A	28.08A	10	600V DC
3	19	9,120W	15.2A	28.08A	10	600V DC
4	19	9,120W	15.2A	28.08A	10	600V DC

**Modules:**  
76 x Q.PEAK DUO XL-G10.3 / BFG 480W  
**Optimizer:**  
40 x SOLAREEDGE P1101 OPTIMIZER  
RAPID SHUTDOWN EQUIPPED

## NEC Code and UL Standard References

Rapid Shut Down	NEC 690.12 (A-D), UL1741	Grounding	NEC Article 250.30(A)
Grid Connection Standards	IEEE 1547, Rule 21, 14(HI)	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	Disconnecting Means	NEC 690.13



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Electrical One Line Diagram

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23-439-LLM

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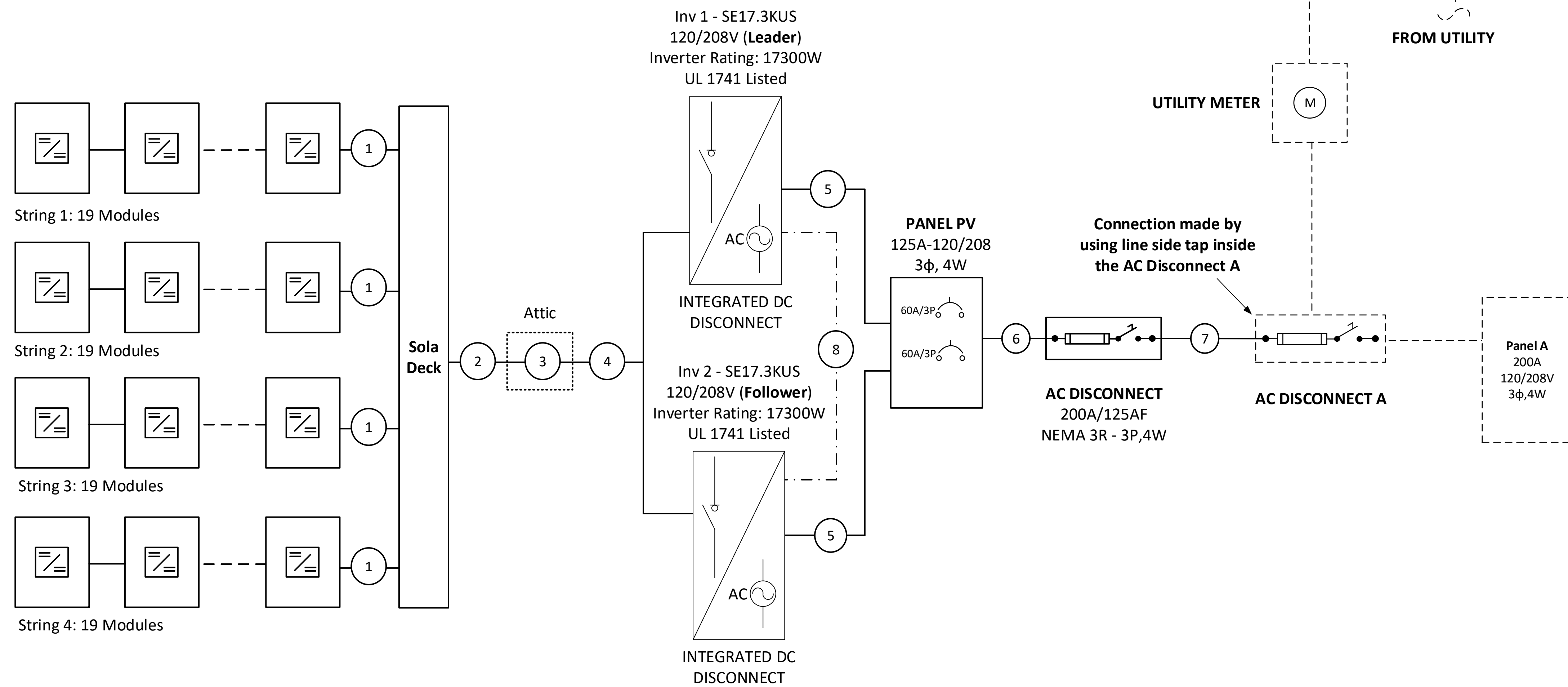
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PV4



- **System Size:** 36,480W DC
- (76) Q.PEAK DUO XL-G10.3 / BFG 480W
- (40) SOLAREEDGE P1101 OPTIMIZERS
- (02) SOLAREEDGE SE17.3KUS Inverter
- SE17.3KUS Inverter Output: 48.25A max (per phase)
- Combined AC output max: 34.6 kVA

- Grounding will be done via grounding lugs and mid-clamps to ensure the rail and panels are continuously grounded.
- Rapid Shutdown is included in the Inverters, refer to Inverter & Optimizer 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 Wire		#10 Bare CU	28.08
2	4 x #10 MC Cable		#10 Green	
3	8 x #8 XHHW-2	1.25" LFMC	#8 Green	
4	8 x #8 XHHW-2	1.25" EMT	#8 Green	
5	4 x #6 THHN	1" LFNC / EMT	#8 Green	60A
6	4 x #1 THHN	1.5" EMT	#6 Green	120A
7	4 x #1 THHN	1.5" EMT		120A
8	CAT 5e Shielded	1" LFNC		



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Detailed Electrical Diagram

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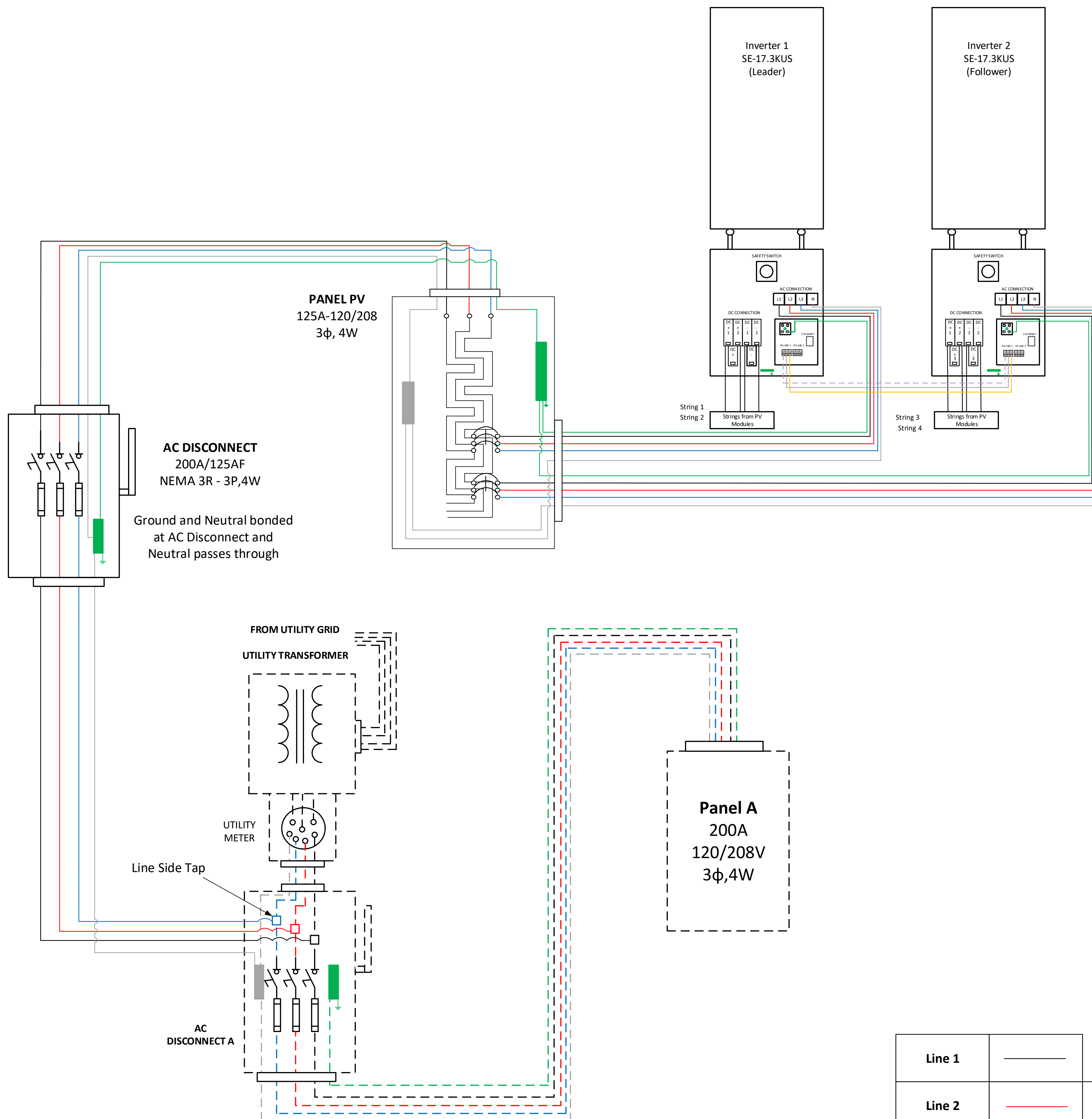
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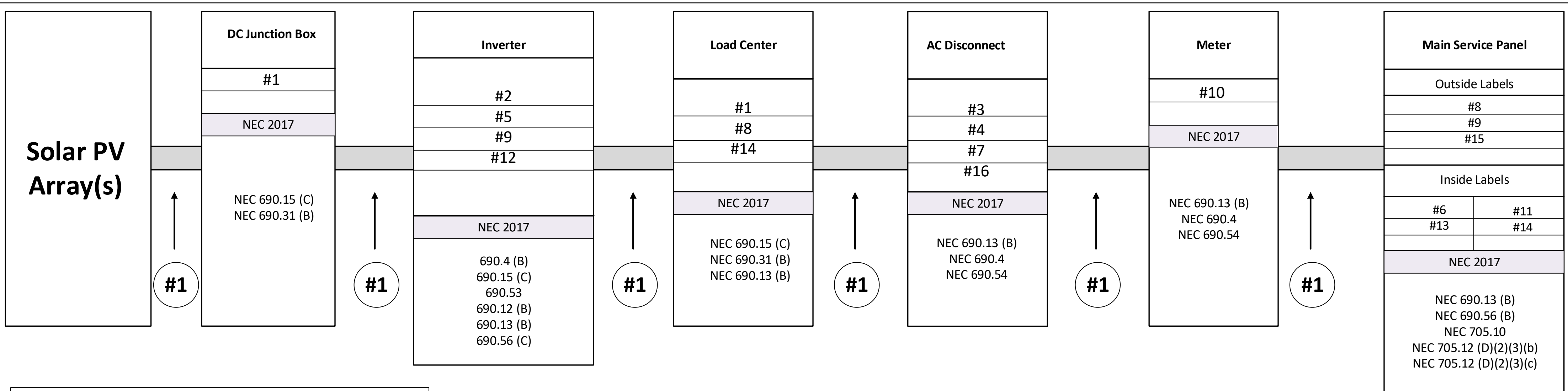
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PV5



**Note:** LifeLink Medical Group will provide an ethernet port within the 10 feet of inverter for the communication.

Line 1	_____		
Line 2	_____	Neutral	_____
Line 3	_____	Ground	_____



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PV Labels

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PV6



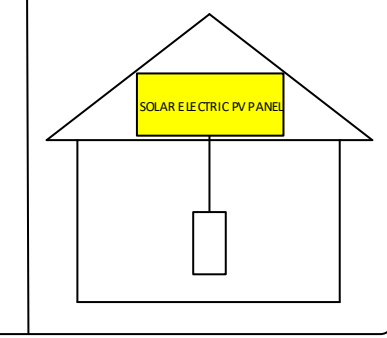
**LABELING AND WARNING SIGNS**

**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.

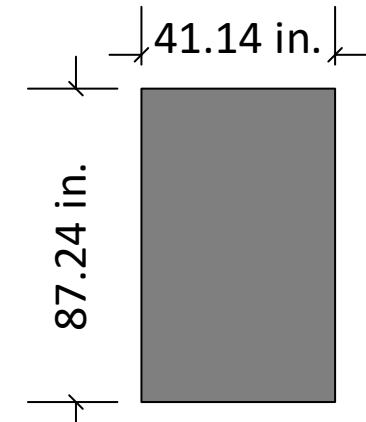
**B. MAIN SERVICE DISCONNECT:**  
1. RESIDENTIAL BUILDINGS- THE MARKING MAY BE PLACED WITHIN THE MAIN SERVICE DISCONNECT. THE MARKING SHALL BE PLACED ON THE OUTSIDE COVER IF THE MAIN SERVICE DISCONNECT IS OPERABLE WITH THE SERVICE PANEL CLOSED.  
2. COMMERCIAL BUILDINGS- THE MARKINGS SHALL BE PLACED 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**

<b>#1</b>	<b>WARNING : PHOTOVOLATIC POWER SOURCE</b>	<b>#8</b>	<b>WARNING</b> <b>ELECTRIC SHOCK HAZARD</b> TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION	<b>#13</b>	<b>WARNING</b> <b>THIS EQUIPMENT FED BY MULTIPLE SOURCES.TOTAL RARTING OF ALL OVERCURRENT DEVICES,EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE,SHALL NOT EXCEED AMPACITY OF BUSBAR</b>
<b>#2</b>	PHOTOVOLATIC DC DISCONNECT	<b>#9</b>	<b>WARNING</b> <b>DUAL POWER SUPPLY</b> SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM	<b>#14</b>	<b>SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN</b>  TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY 
<b>#3</b>	PHOTOVOLATIC AC DISCONNECT	<b>#10</b>	<b>WARNING</b> <b>THIS SERVICE METER IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM</b>	<b>#15</b>	<b>SOLAR AC DISCONNECT LOCATED AT SOUTH-EAST SIDE WALL OF THE HOUSE BESIDE THE UTILITY METER</b>
<b>#4</b>	<b>RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM</b>	<b>#11</b>	<b>WARNING</b> <b>TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL</b>	<b>#16</b>	<b>SERVICE DISCONNECT LOCATED IN MAIN LOAD PANEL INSIDE THE HOUSE</b>
<b>#5</b>	MAXIMUM VOLTAGE <b>600V</b> MAXIMUM CIRCUIT CURRENT <b>28.08A</b> MAX. RATED OUTPUT CURRENT OFF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED)	<b>#12</b>	<b>WARNING</b> <b>BIPOLAR PHOTOVOLTAIC ARRAY DISCONNECTION OF NEUTRAL GROUND CONDUCTORS MAY RESULT IN OVERVOLTAGE ON ARRAY OR INVERTER</b>		
<b>#6</b>	PHOTOVOLTVIC POWER SOURCE OPERATING AC VOLTAGE <b>120/208</b> V MAXIMUM OPERATING AC OUTPUT CURRENT <b>96.5</b> A				
<b>#7</b>	AC DISCONNECT PHOTOVOLTAIC SYSTEM POWER SOURCE RATED AC OUTPUT CURRENT <b>96.5</b> AMPS NOMINAL OPERATING AC VOLTAGE <b>120/208</b> VOLTS				

**MODULE DIMENSIONS**



**SYSTEM DETAILS**

**Modules:**  
76 x Q.PEAK DUO XL-G10.3 / BFG 480W  
**Optimizer:**  
40 x SOLAREEDGE P1101 OPTIMIZER  
RAPID SHUTDOWN EQUIPPED

UTILITY METER



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BILL OF MATERIAL

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PV7



**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	05-215	02
09	05-211	03
10	07-359	01
11	05-372	01
12	05-103	02
13	05-108	02
14	07-111	02
15	8M-001	01
16	8M-002	01

**RAILS AND MOUNTING SYSTEM**

- 108 x PSR-B84: Pegasus Rail, Black, 84" (7 Feet)
- 84 x PSR-SPL: Pegasus - Bonded, Structural Splice
- 128 x PSR-MCB: Pegasus - Multiclamp, Mid/End, 30 to 40 mm, Black
- 48 x PSR-HEC: Pegasus - Hidden End Clamp
- 40 x PSR-MLP: Pegasus - MLPE Mount
- 15 x PSR-LUG: Pegasus - Grounding Lug
- 115 x PSR-WMC: Pegasus - Wire Management Clip
- 13 x PSR-CBG: Pegasus - Cable Grip
- 48 x PSR-CAP: Pegasus - End Cap
- 180 x PSCR-UBBDT: Pegasus Comp Mount - Open Slot, Black L Foot, Black Flashing, Dovetail 3/8" T-Bolt
- 228 x Heyco S6405: Wire Clips
- 228 x BUR CT50175CO: 7" ZIP TIES BLACK

**IronRidge CONTOUR TRIM**

- 56 x CTR-TR84-01-B1: Contour Trim
- 110 X CTR-CL-01-B1: Contour Clamp
- 29 X CTR-SPLC-01-M1: Contour Splice
- 10 X CTR-OUT-01-B1: Contour Corner Cap, Outer
- 04 X CTR-IN-01-B1: Contour Corner Cap, Inside
- 24 x CTR-CAP-01-B1: CONTOUR END CAPS (L-R PAIR)

**SOLAR MODULES**

- 76 x Q.PEAK DUO XL-G10.3 / BFG 480W

**INVERTER & SUPPORTING ITEMS**

- 02 x SOLED SE17.3K-USR2IBN24: SolarEdge SE17.3kUS
- 40 x SOLED P1101: SolarEdge Power Optimizer P1101

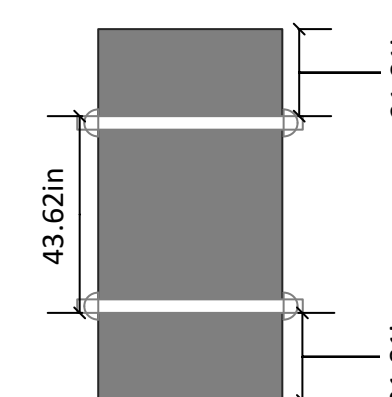
**WIRE & DISCONNECTS**

- 02 x WIRPV 2KVPV10STRBLK500: PV #10 BLK 2000V CU 500

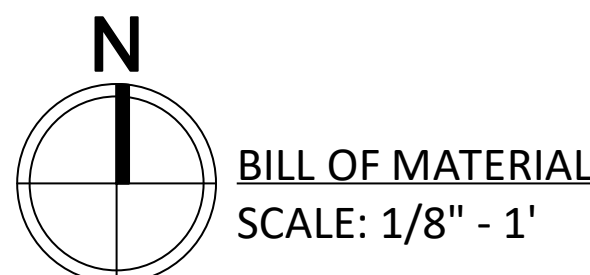
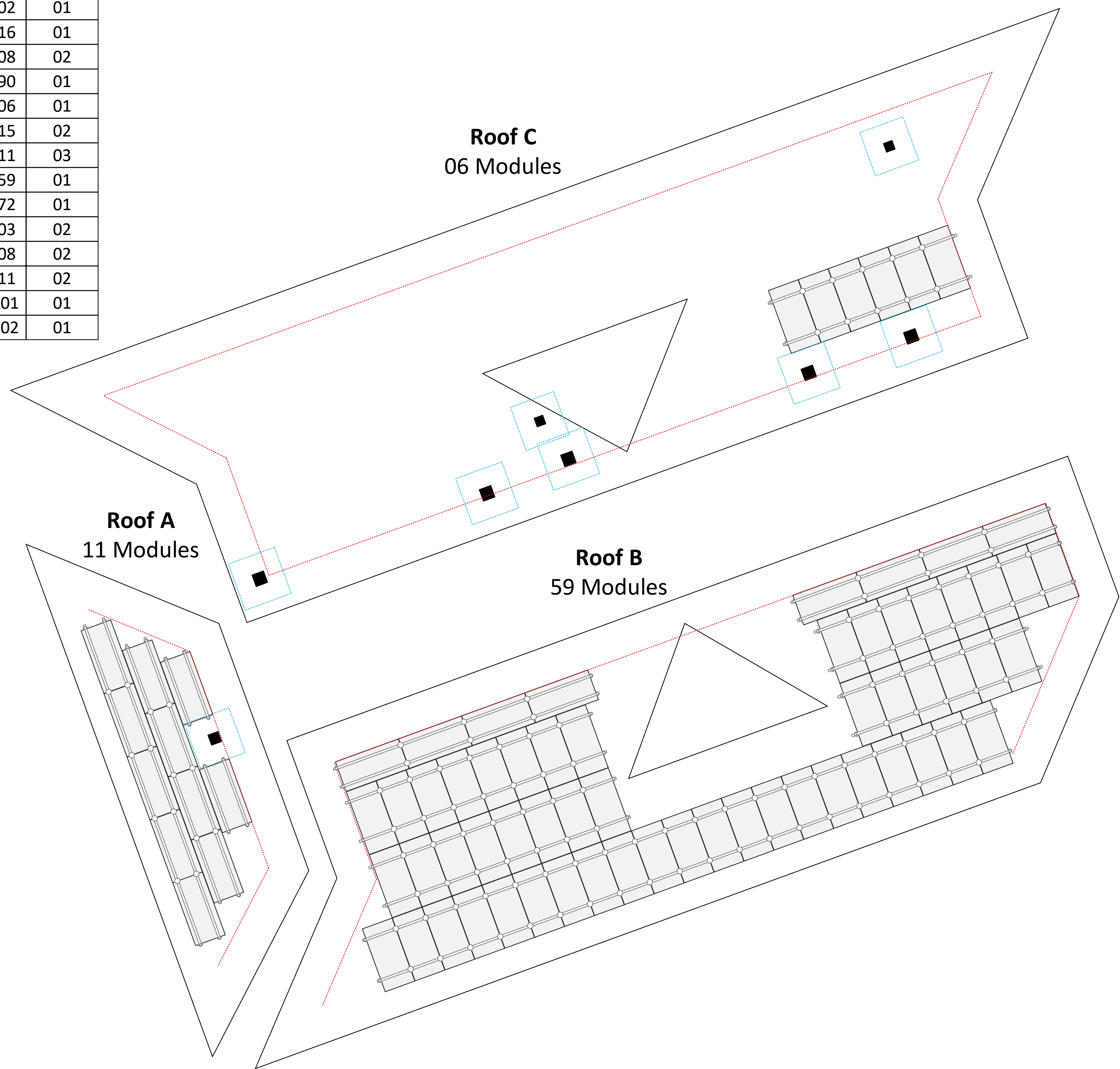
**ELECTRICAL ITEM**

- 01 x NQ430L2C: SQ D 225A PV Panel
- 02 x QOB360VH: SQ D 60A breaker
- 01 x D324NRB: 200A Ac disconnect, NEMA 3R, 240V
- 03 x FRZ TR125R: Fuses 125A
- 04 x IPCS 4002: Line/Load Side Hot Taps (#4/0 main - #2-10 tap) Medium types

**Panel Cantilever (Top & Bottom)**

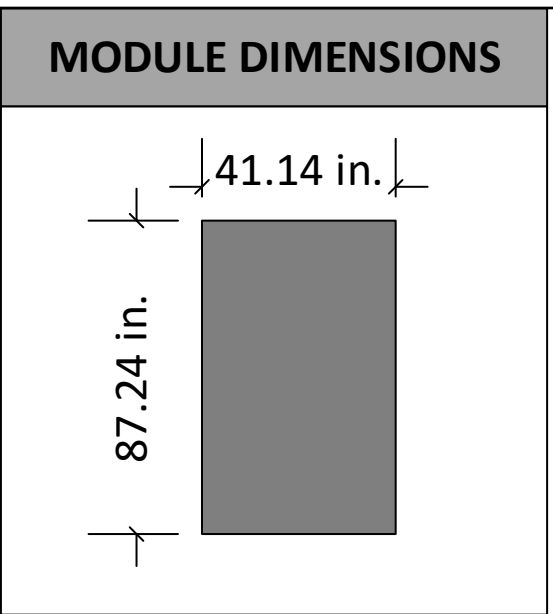


4ft setback from sides of the roof



**SYSTEM DETAILS**  
 Number of Panels: 76  
 Panels Module: Q,PEAK DUO XL-G10.3 / BFG 480W  
 DC Size: 36.480 kW  
 AC Size: 34.6 kVA

**RACKIGN DETAILS**  
 Pegasus Rails  
 Pegasus Comp Mounts



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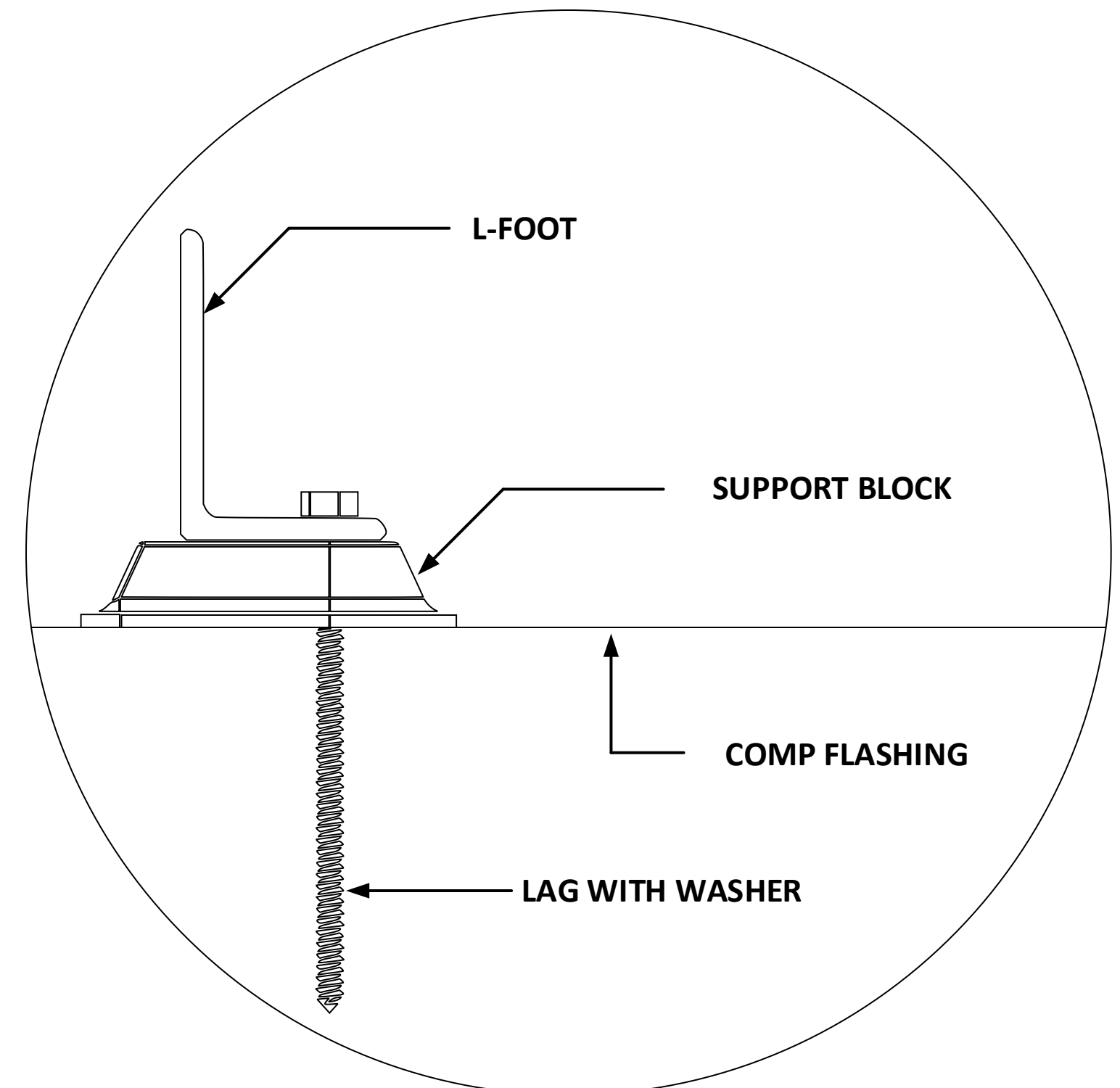
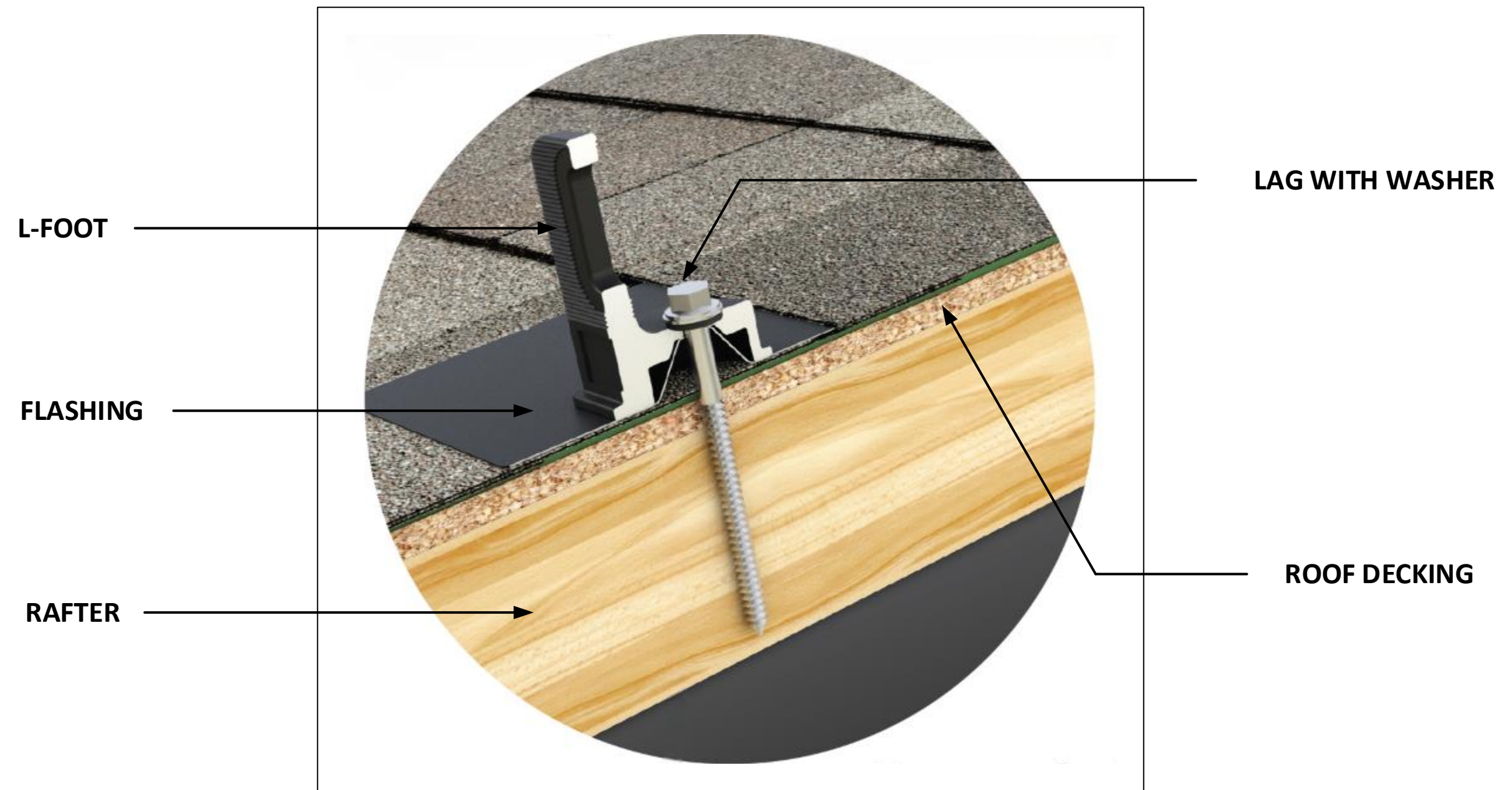
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PV8



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.

