

ROOF MOUNT PHOTOVOLTAIC SYSTEM

CODES:

THIS PROPOSED INSTALLATION COMPLIES WITH THE FOLLOWING:
 2018 INTERNATIONAL BUILDING CODE (IBC)
 2018 INTERNATIONAL RESIDENTIAL CODE (IRC)
 2018 INTERNATIONAL MECHANICAL CODE (IMC)
 2018 INTERNATIONAL PLUMBING CODE (IPC)
 2018 INTERNATIONAL FUEL GAS CODE (IFGC)
 2018 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)
 2018 INTERNATIONAL EXISTING BUILDING CODE (IEBC)
 2018 INTERNATIONAL SWIMMING POOL AND SPA CODE (ISPSA)
 2020 NATIONAL ELECTRICAL CODE (NEC)
 AS ADOPTED BY COUNTY OF HARNETT

CONSTRUCTION NOTES:

CONDUIT AND CONDUCTOR SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.

ALL SOLAR ENERGY SYSTEM EQUIPMENT SHALL BE SCREENED TO THE MAXIMUM EXTENT POSSIBLE AND SHALL BE PAINTED A COLOR SIMILAR TO THE SURFACE UPON WHICH THEY ARE MOUNTED.

MODULES SHALL BE TESTED, LISTED AND IDENTIFIED WITH FIRE CLASSIFICATION IN ACCORDANCE WITH UL 2703. SMOKE AND CARBON MONOXIDE ALARMS ARE REQUIRED PER SECTION R314 AND 315 TO BE VERIFIED AND INSPECTED BY INSPECTOR IN THE FIELD.

DIG ALERT (811) TO BE CONTACTED AND COMPLIANCE WITH EXCAVATION SAFETY PRIOR TO ANY EXCAVATION TAKING PLACE

PHOTOVOLTAIC SYSTEM GROUND WILL BE TIED INTO EXISTING GROUND AT MAIN SERVICE FROM DC DISCONNECT/INVERTER AS PER 2020 NEC SEC 250.166(A).

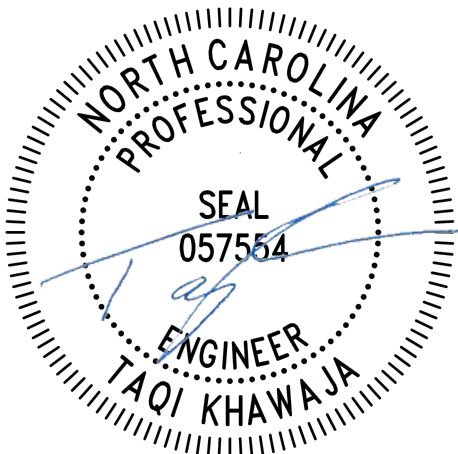
SOLAR PHOTOVOLTAIC SYSTEM EQUIPMENT WILL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF ART. 690 OF THE 2020 NEC

THE MAIN SERVICE PANEL WILL BE EQUIPPED WITH A GROUND ROD OR UFER

UTILITY COMPANY WILL BE NOTIFIED PRIOR TO ACTIVATION OF THE SOLAR PV SYSTEM

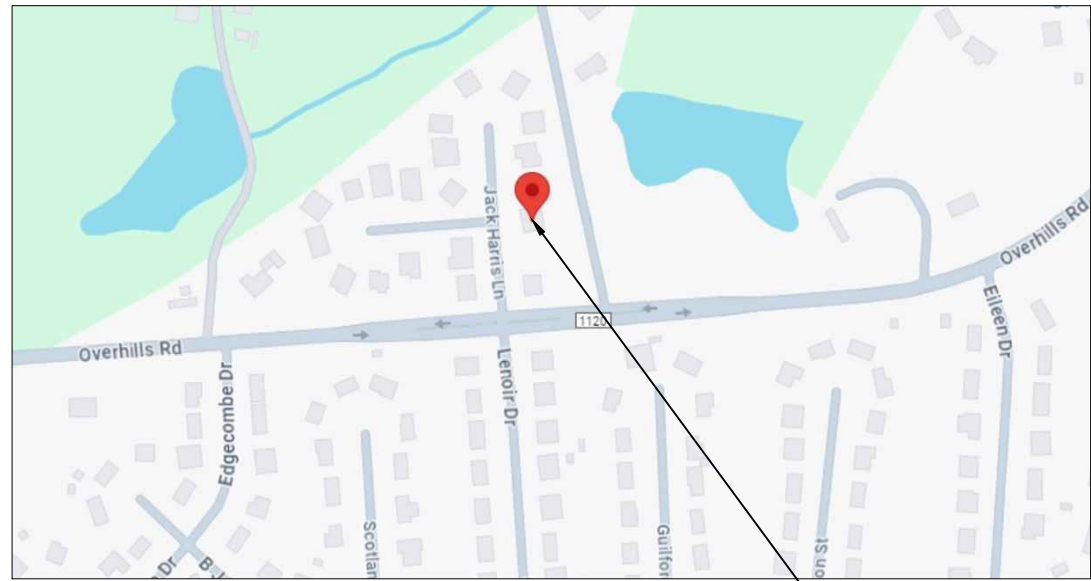
SOLAREGE OPTIMIZERS ARE LISTED TO IEC 62109-1 (CLASS II SAFETY) AND UL 1741 STANDARDS

INSTALL CREW TO VERIFY ROOF STRUCTURE PRIOR TO COMMENCING WORK. EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNT.



Signed by: Taqi Khawaja, PE
 Signed on: 10/23/2024

VICINITY MAP:



SITE LOCATION

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APPENDIX	MANUFACTURER SPECIFICATION SHEETS

THIS SYSTEM DESIGNED WITH:
 WIND SPEED: 130
 WIND EXPOSURE: C
 SNOW LOAD: 15

CLIENT:
 SPENCER RICHARD
 44 JACK HARRIS LN, SPRING LAKE, NC 28390
 AHJ: COUNTY OF HARNETT
 UTILITY: SOUTH RIVER EMC
 METER: 16964615
 APN: 010514 0002 03
 PHONE: (910) 587-4736
 EMAIL: SP.RICH03@GMAIL.COM










SYSTEM:
 SYSTEM SIZE (DC): 44 X 410 = 18.040 KW
 SYSTEM SIZE (AC): 12.000 KW @ 240V
 MODULES: 44 X HANWHA QCELL: Q.PEAK DUO BLK ML-G10+ 410
 OPTIMIZERS: 44 X SOLAREGE S440
 INVERTER 1: SOLAREGE SE6000H-USRGM [S1]
 INVERTER 2: SOLAREGE SE6000H-USRGM [S1]

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freedom
 FOREVER
FREEDOM FOREVER LLC
 415 INDUSTRIAL CT., GREER, SC 29651
 Tel: (800) 385-1075
GREG ALBRIGHT

CONTRACTOR LICENSE:
 ELECTRICAL CONTRACTOR U.34043

PROJECT DETAILS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-1

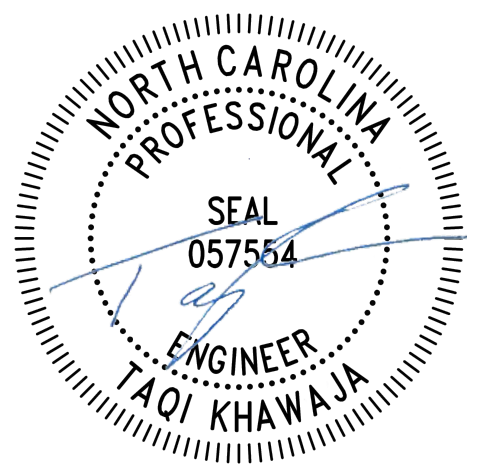
LEGEND:

-  CHIMNEY
-  PIPE VENT
-  MODULES
-  CONDUIT
-  SETBACK
-  AC DISCONNECT
-  JUNCTION BOX
-  SUBPANEL
-  ISOLATED LOAD PANEL

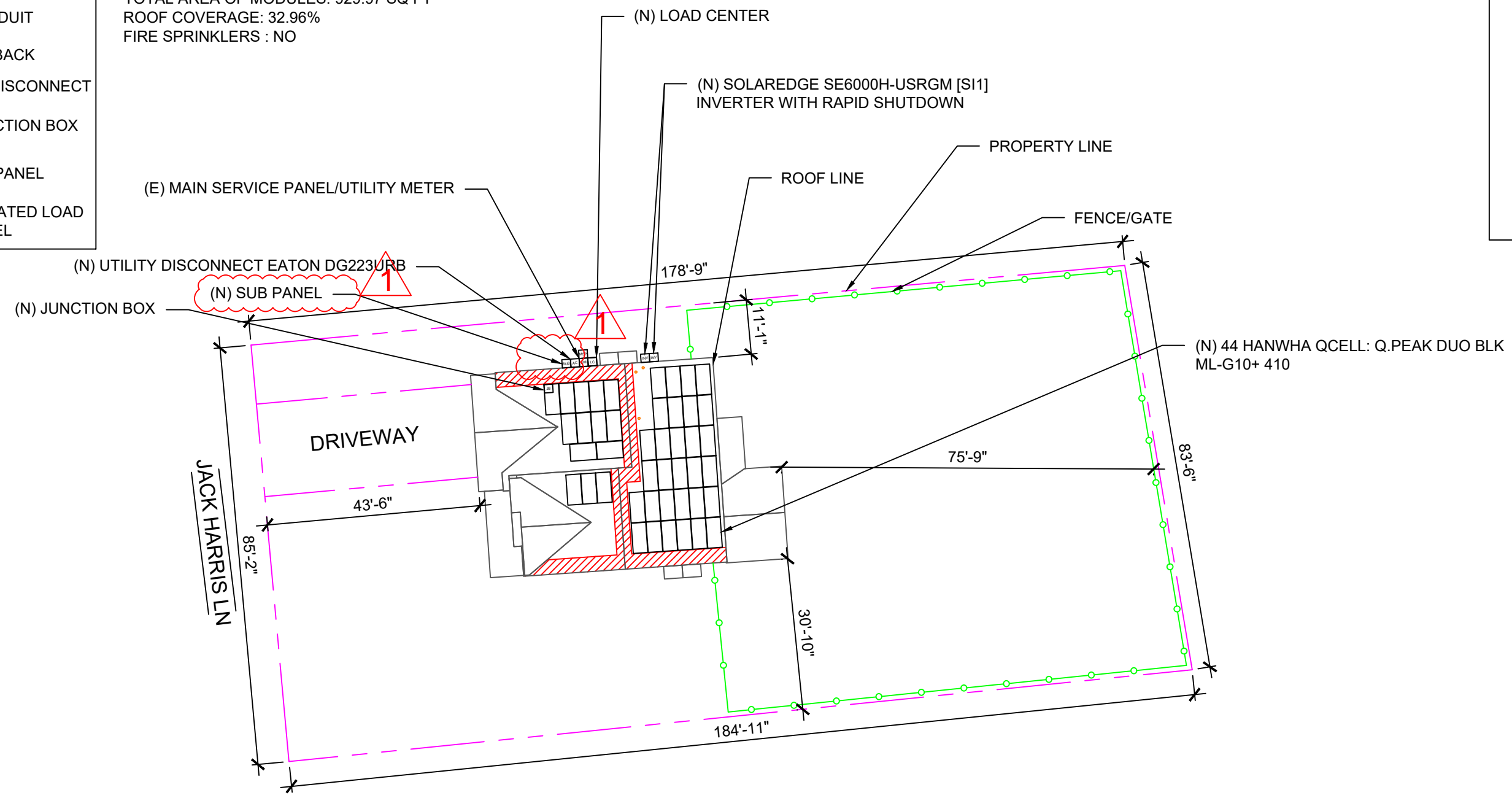
PV SYSTEM
18.040 kW-DC
 12.000 kW-AC

THIS SYSTEM DESIGNED WITH:
 WIND SPEED: 130
 WIND EXPOSURE: C
 SNOW LOAD: 15

TOTAL ROOF AREA RIDGE SETBACK CALCS:
 TOTAL ROOF AREA: 2821.93 SQ FT
 SINGLE MODULE AREA: 21.13570602 SQ FT
 TOTAL NUMBER OF MODULES: 44
 TOTAL AREA OF MODULES: 929.97 SQ FT
 ROOF COVERAGE: 32.96%
 FIRE SPRINKLERS : NO



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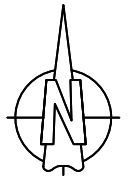
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





SITE PLAN
 SCALE: 1/24" = 1'-0"

1

SITE PLAN			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-2

LEGEND:

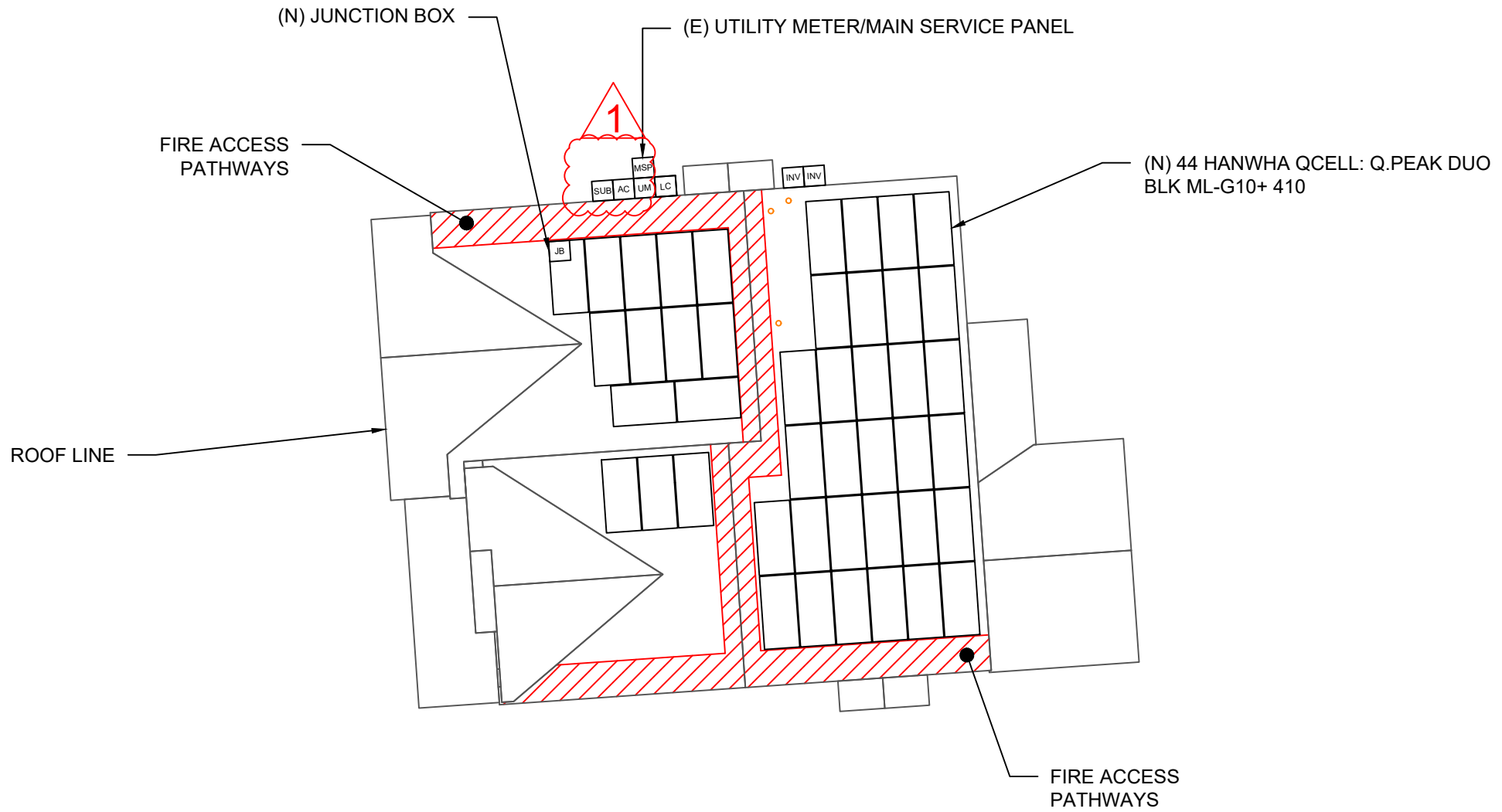
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-  CONDUIT
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PV SYSTEM
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 12.000 kW-AC

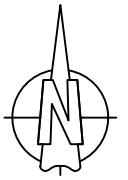
MODIFIED SETBACKS PROPOSED AT RIDGE:
 TOTAL ARRAY AREA = 929.97 SF
 TOTAL ROOF AREA = 2821.93 SF
 TOTAL ARRAY AREA AS A % TO ROOF AREA = 32.96%
 32.96% < 33%

BOS WILL BE AS CLOSE AS POSSIBLE TO MSP WITHIN 10'

THIS SYSTEM DESIGNED WITH:
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 WIND EXPOSURE: C
 SNOW LOAD: 15



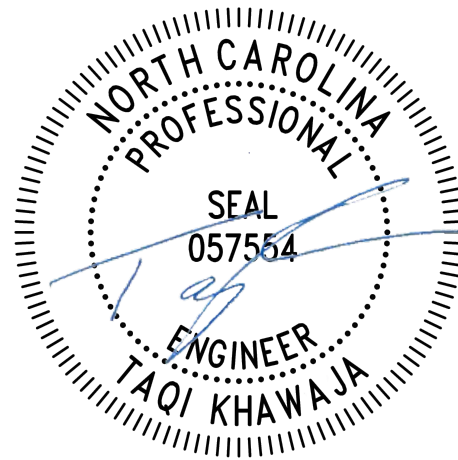
TOTAL ROOF AREA: 2821.93 SQ FT
 TOTAL ARRAY AREA: 929.97 SQ FT
 ARRAY COVERAGE: 32.96%
 SYSTEM DISTRIBUTED WEIGHT: 2.79 LBS
 ROCKIT SMART SLIDE POINT-LOAD: 27.72 LBS



ROOF PLAN
 SCALE: 2/25" = 1'-0"

1

- NOTES:**
1. EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNTS
 2. ATTACHED CLAMPS AT 25% FROM THE EDGE AND 50% FROM THE CENTER OF THE MODULES
 3. JUNCTION BOX IS MOUNTED TO THE RAIL.



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 Signed on: 10/23/2024

ROOF AREA: 2821.93 SQ FT

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 APN: 010514 0002 03
 PHONE: (910) 587-4736
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REVISIONS		
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FREEDOM FOREVER LLC
 415 INDUSTRIAL CT., GREER, SC 29651
 Tel: (800) 385-1075
GREG ALBRIGHT

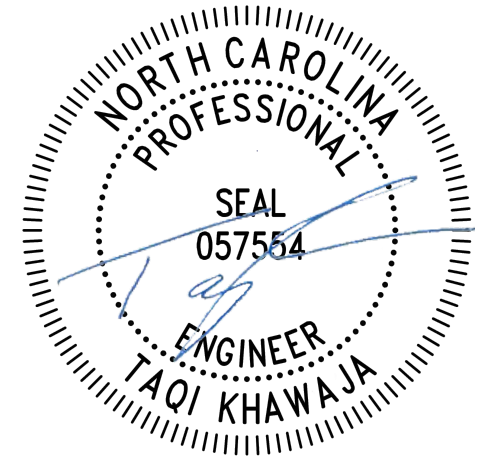
CONTRACTOR LICENSE:
 ELECTRICAL CONTRACTOR U.34043

ROOF PLAN WITH MODULES LAYOUT

JOB NO: 502646	DATE: 10/23/2024	DESIGNED BY: F.S.	SHEET: PV-2A
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ROOF DETAILS:

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ROOF AREA STATEMENT

ROOF	MODULE QUANTITY	ROOF PITCH	ARRAY PITCH	AZIMUTH	ROOF AREA	ARRAY AREA
ROOF 1	30	30	30	86	933.25 SQ FT	634.07 SQ FT
ROOF 2	11	30	30	266	532.53 SQ FT	232.49 SQ FT
ROOF 3	3	30	30	266	318.13 SQ FT	63.41 SQ FT
----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT
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----	----	----	----	----	SQ FT	SQ FT

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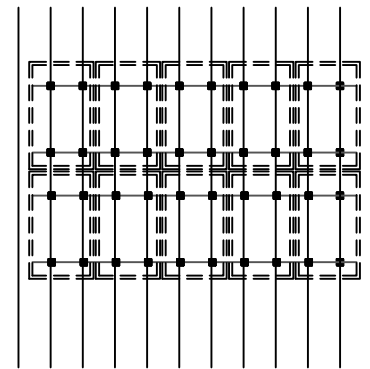
ARRAY DETAILS

JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-2B

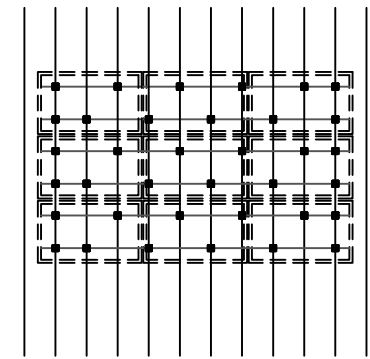
TABLE 1 – ARRAY INSTALLATION

	ROOF PITCH	ROOFING TYPE	ATTACHMENT TYPE	FRAMING TYPE	MAX UNBRACED LENGTH(FT.)	STRUCTURAL ANALYSIS RESULT	PENETRATION PATTERN	MAX ATTACHMENT SPACING (IN.)	MAX RAIL OVERHANG(IN.)
ROOF 1	30	Comp Shingle	Ecofasten RockIt Smart Slide	2x10 Truss @ 16" O.C.	5	PASS	STAGGERED	64. O.C	21.33333
ROOF 2	30	Comp Shingle	Ecofasten RockIt Smart Slide	2x10 Truss @ 16" O.C.	6	PASS	STAGGERED	64. O.C	16
ROOF 3	30	Comp Shingle	Ecofasten RockIt Smart Slide	2x10 Truss @ 16" O.C.	6	PASS	STAGGERED	64. O.C	21.33333

1. CONTRACTOR TO VERIFY FRAMING TYPE AND MAX UNBRACED LENGTH PRIOR TO INSTALLATION. IF THE ABOVE INFORMATION DOES NOT MATCH FIELD CONDITIONS, NOTIFY ENGINEER OF RECORD IMMEDIATELY.
2. WHERE COLLAR TIES OR RAFTER SUPPORTS EXIST, CONTRACTOR SHALL USE RAFTERS WITH COLLAR TIES AS ATTACHMENT POINTS.
3. MAX RAIL OVERHANG APPLICABLE FOR RAILED ATTACHMENT INSTALLATIONS.



STACKED DETAIL
For Illustration purposes only



STAGGERED DETAIL
For Illustration purposes only



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INVERTER 1: SOLAREEDGE SE6000H-USRGM [SI1]
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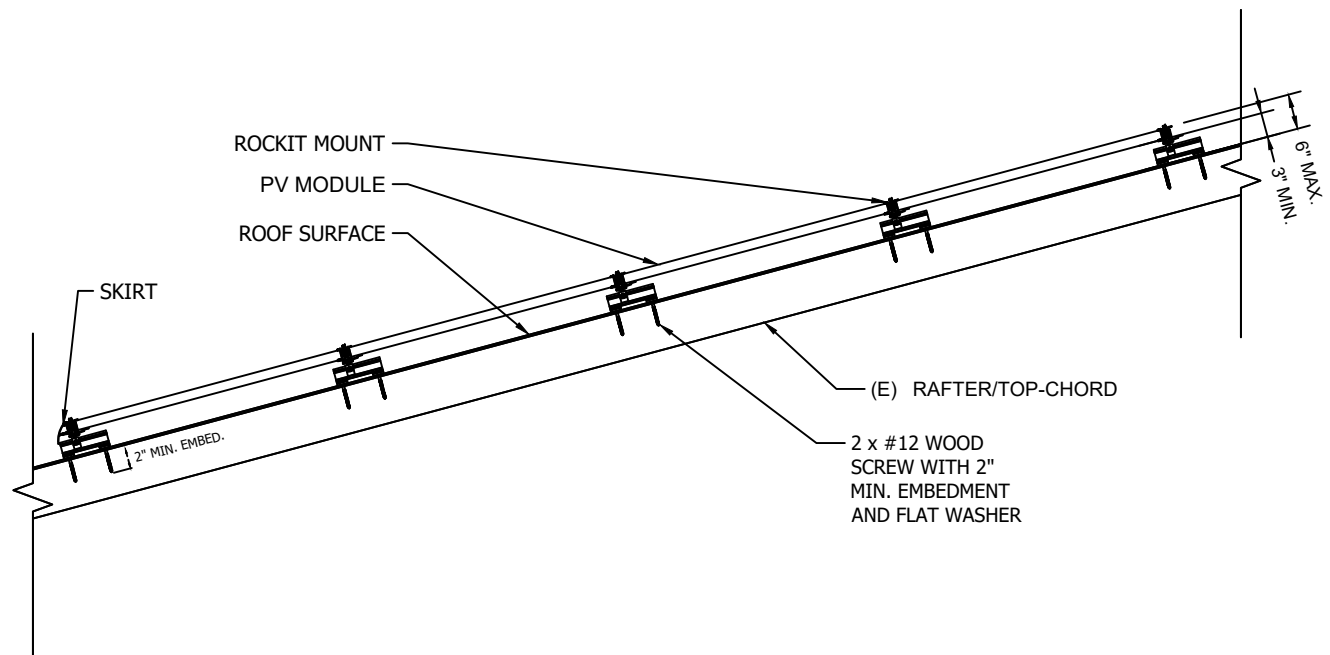


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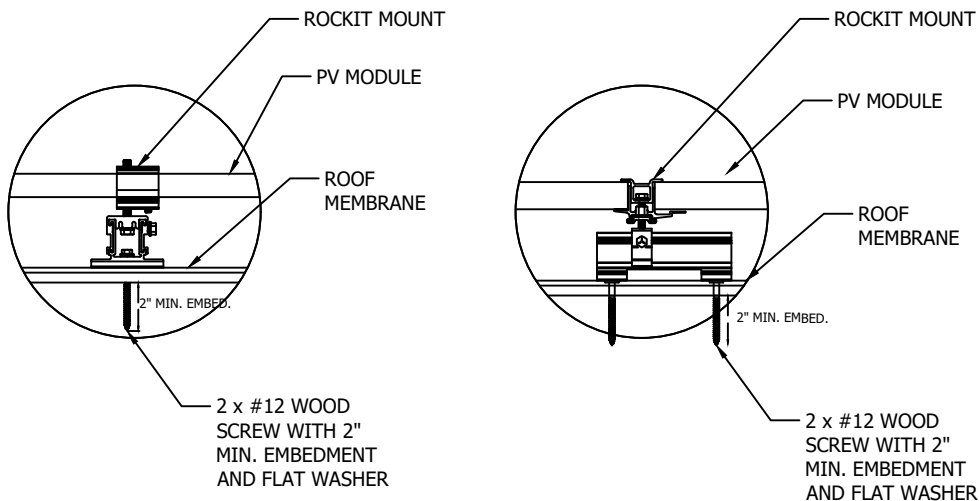
Greg Albright

CONTRACTOR LICENSE:
ELECTRICAL CONTRACTOR U.34043

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502646	10/23/2024	F.S.	PV-3



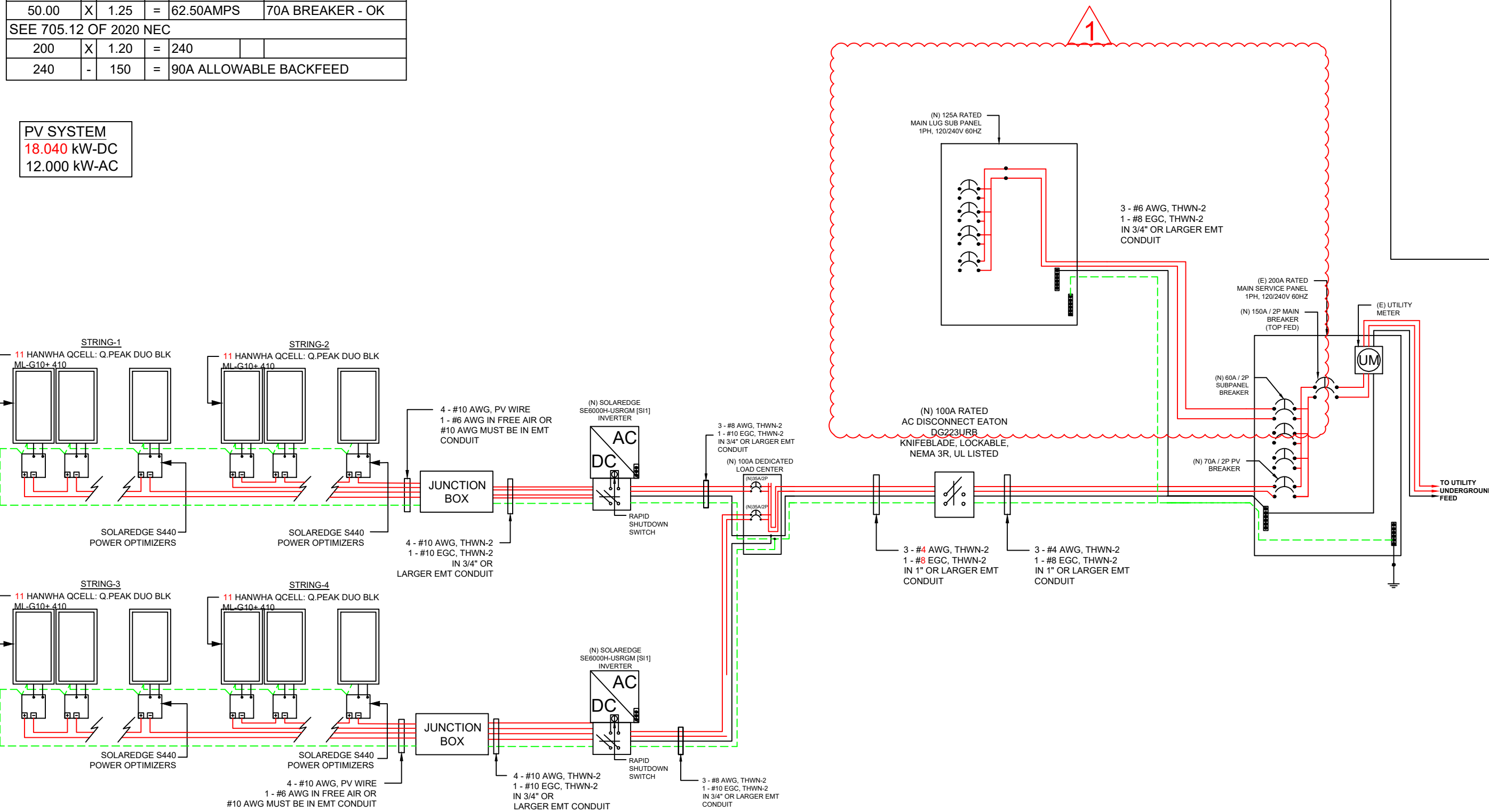
SOLAR PV ARRAY SECTION VIEW
Scale: NTS



ATTACHMENT DETAIL
Scale: NTS

BACKFEED BREAKER SIZING					
MAX. CONTINUOUS OUTPUT 50.00A @ 240V					
25	X	1.25	=	31.25AMPS	35A BREAKER - OK
25	X	1.25	=	31.25AMPS	35A BREAKER - OK
50.00	X	1.25	=	62.50AMPS	70A BREAKER - OK
SEE 705.12 OF 2020 NEC					
200	X	1.20	=	240	
240	-	150	=	90A ALLOWABLE BACKFEED	

PV SYSTEM
18.040 kW-DC
12.000 kW-AC



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THREE LINE DIAGRAM

JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-4

WIRE SCHEDULE												
RACEWAY #	EQUIPMENT				CONDUCTOR QTY.	AWG WIRE SIZE	STARTING ALLOWABLE AMPACITY @ 90°C 310.15(B)(16)	STARTING CURRENT APPLIED TO CONDUCTORS IN RACEWAY	TEMPERATURE CORRECTION FACTOR 310.15(B)(2)(a)	ADJUSTMENT FACTOR FOR MORE THAN 3 CONDUCTORS 310.15(B)(3)(a)	ADJUSTED CONDUCTOR AMPACITY @ 90°C	MAXIMUM CURRENT APPLIED TO CONDUCTORS IN RACEWAY
1	DC	MODULE	TO	OPTIMIZER	2	10	40	14.03	0.91	1	36.40	17.53
2	DC	OPTIMIZER	TO	JUNCTION BOX	2	10	40	15.00	0.91	1	36.40	18.75
3	DC	JUNCTION BOX	TO	INVERTER 1	4	10	40	15.00	0.91	0.8	29.12	18.75
4	DC	JUNCTION BOX	TO	INVERTER 2	4	10	40	15.00	0.91	0.8	29.12	18.75
5	AC	INVERTER 1	TO	DEDICATED LOAD CENTER	3	8	55	25.00	0.91	1	50.05	31.25
6	AC	INVERTER 2	TO	DEDICATED LOAD CENTER	3	8	55	25.00	0.91	1	50.05	31.25
7	AC	DEDICATED LOAD CENTER	TO	AC DISCONNECT	3	4	95	50.00	0.91	1	86.45	62.50
8	AC	AC DISCONNECT	TO	POI	3	4	95	50.00	0.91	1	86.45	62.50
9	AC	SUBPANEL	TO	MSP	3	10	40		0.91	1	36.40	0.00

CONDUCTOR AMPACITY CALCULATIONS IN ACCORDANCE WITH NEC 690.8.

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GREG ALBRIGHT
(Signature)

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CONDUCTOR CALCULATIONS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-5

Residential Optional Calculation 9/25/1997 Freedom Forever LLC

by John Sokalik Version 2014

STEP 1 Article 220.82 (B) (1),(2)

sq. ft. ▼ 2975	General Lighting load	8,925 VA	
	Small Appliance	VA	
	Laundry circuit	VA	
	Gen.Lgt, Sm App. & Laun. Load	8,925 VA	

Spencer Richard
44 Jack Harris Ln
Spring Lake, NC, 28390
(910) 587-4736
10/3/2024 16:37 502646

STEP 2 Article 220.82 (C)

A/C Condenser & Fixed Electric Space Heating		General lighting, Sm. Appl. & Laundry		8,925 VA
5 ton ▼	7,130 VA	AHU 1	Select ▼	VA
A/C #2 ▼	VA	AHU 2	Select ▼	VA
A/C #3 ▼	VA	AHU 3	Select ▼	VA
A/C #4 ▼	VA	AHU 4	Select ▼	VA
A/C #5 ▼	VA	AHU 5	Select ▼	VA

STEP 3 Article 220.82 (B) (3)

6,000 VA ▼	1	Water Heater	6,000 VA	
1,400 VA ▼	1	Refrigerator	1,400 VA	
800 VA ▼	1	Freezer	800 VA	
1,200 VA ▼	1	Dishwasher	1,200 VA	
1,127 VA ▼	1	Disposal	1,127 VA	
540 VA ▼		Range Hood	VA	
1,400 VA ▼	1	Microwave	1,400 VA	
<input type="checkbox"/> 1,440 VA ▼		Central Vac	VA	
<input type="checkbox"/> 288 VA ▼		Mini Refrig	VA	
<input type="checkbox"/> 400 VA ▼		Compactor	VA	
<input type="checkbox"/> 12,000 VA ▼		Tankless heater	VA	
1,500 VA ▼		Wine Cooler	VA	
<input type="checkbox"/> select ▼		Jacuzzi Tub	VA	
<input type="checkbox"/> select ▼		Sprinkler	VA	
<input type="checkbox"/> select ▼		Well Pump	VA	
<input type="checkbox"/> select ▼		Fountain Pump	VA	
<input type="checkbox"/> select ▼		Elevator	VA	
<input type="checkbox"/>		Pool Equip. Panel	VA Apply Demand	
<input checked="" type="checkbox"/> 17280		Other load	17,280 VA No Demand	
<input type="checkbox"/>		Other load	VA No Demand	

STEP 4 Article 220.82 (B) (3)
Electric Clothes Dryers **5,760 VA**

STEP 5 Article 220.82 (B) (3)
Electric Ranges **7,680 W** Col C demand **8000**

or Number of appliances

Check Box for Gas Range

Cooktop	Col B demand
Cooktop	Col B demand
Oven(s)	Col B demand
Oven(s)	Col B demand

Number of appliances **0** Dem. Factor

Cooktop & Oven Demand Load

Total Appliance Load 29,207 VA

Heating Load
CU Load

Electric Space Heat @ 65% <4, 40% >3, vs. A/C @ 100% **7,130 VA**

Appliance Demand Load 29,207 VA

Dryer Demand Load 5,760 VA

Range Demand Load 7,680 VA

Service Demand 33,759 VA

Demand Load @ 240V, 1ph **141 A**

Neutral Demand 134 A

Min.Service Req. 150 A

Total Appliance Load 29,207 VA

Use this area for your own notes

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FREEDOM FOREVER LLC
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Tel: (800) 385-1075

GREG ALBRIGHT

Greg Albright

CONTRACTOR LICENSE:
ELECTRICAL CONTRACTOR U.34043

ELECTRICAL CALCULATIONS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-5A

OCPD SIZES:

35A BREAKER
35A BREAKER
70A FUSES

SERVICE LIST:

NONE

MATERIAL LIST:

QTY.	PART	PART #	DESCRIPTION
44	110 - MODULES	PV-111-410	"MFG: Q-CELL, 410W MONO BOB, MFG SKU: Q.PEAK DUO BLK ML-G10+ 410"
1	120 - INVERTERS	INV-120-608	"MFG: SOLAREEDGE, 6.0 KW RGM SCREENLESS W/CONSUMPTION MONITORING, MFG SKU: SE6000H-US000BEI4"
1	120 - INVERTERS	INV-120-608	"MFG: SOLAREEDGE, 6.0 KW RGM SCREENLESS W/CONSUMPTION MONITORING, MFG SKU: SE6000H-US000BEI4"
2	180 - MONITORING EQUIPMENT	ME-180-502	"MFG: SOLAREEDGE, CELL MODEM W/5 YRS, MFG SKU: SE-CELL-B-R05-US-S-S2"
2	160 - EQUIPMENT ACCESSORIES	EA-163-304	"MFG: SOLAREEDGE, ENERGY NET PLUG-IN, MFG SKU: ENET-HBNP-01"
44	130 - OPTIMIZERS	OPT-130-440-2	"MFG: SOLAREEDGE, 440W 60V OPTIMIZER, MFG SKU: S440"
4	260 - FITTINGS/ANCHORS	RAC-260-049	"MFG: EZ SOLAR, JUNCTION BOX, PV, MFG SKU: JB-1.2"
1	320 - DISCONNECTS	EE-321-100	"MFG: EATON, DISCONNECT, GENERAL DUTY, 2P, 240V, 100A, NON FUSIBLE, NEMA 3R, MFG SKU: DG223URB"
1	150 - LOAD CENTERS / MAIN PANELS	EE-151-131	"MFG: EATON, LOAD CENTER, 8 SPACE, 16 CIRCUIT, MAIN LUG, 125A, NEMA 3R, 10KAIC, CURRENT DESIGN, COVER INCLUDED, MFG SKU: BR816L125RP"
500	260 - FITTINGS/ANCHORS	RAC-260-550	"MFG: BURNDY, PV WILEY CABLE CLIP THICKNESS RANGE: 1.3 TO 3MM MFG SKU: ACC-FPV180"
1	350 - ELECTRICAL ACCESSORIES	EA-350-585	"MFG: ILSCO, GROUND LUG, MFG SKU: SGB-4"
77	260 - FITTINGS/ANCHORS	RAC-265-034	"MFG: ECO FASTEN, ROCKIT SMART SLIDE BLK 6 - 75", MFG SKU: 2011024"
44	260 - FITTINGS/ANCHORS	RAC-265-004	"MFG: ECO FASTEN, ROCKIT COMP COUPLING AL BLK, MFG SKU: 2011021"
22	260 - FITTINGS/ANCHORS	RAC-265-028	"MFG: ECO FASTEN, SKIRT AL BLK 35MM & 40MM A80, MFG SKU: 2099012"
1	260 - FITTINGS/ANCHORS	RAC-265-031	"MFG: ECO FASTEN, SKIRT END CAP PLS 35MM&40MM-A, MFG SKU: 2099035"
44	260 - FITTINGS/ANCHORS	RAC-265-018	"MFG: ECO FASTEN, FRAME MLPE MOUNT SS, MFG SKU: 4011012"
1	260 - FITTINGS/ANCHORS	RAC-260-049	"MFG: EZ SOLAR, JUNCTION BOX, PV, MFG SKU: JB-1.2"
308	260 - FITTINGS/ANCHORS	RAC-265-035	"MFG: ECO FASTEN, ROCKIT SCREW #12X3"" W/BW, MFG SKU: 2011025"
77	260 - FITTINGS/ANCHORS	RAC-265-003	"MFG: ECO FASTEN, ROCKIT MOUNT AL BLK, MFG SKU: 2011020"
10	260 - FITTINGS/ANCHORS	RAC-265-040	"MFG: ECO FASTEN, SMART CONDUIT MOUNT W/HW, MFG SKU: 4011017"
10	"420 - 3/4"" FITTINGS"	FIT-420-082	"MFG: BRIDGEPORT, 3/4"" HANGER/COWBOY STRAPS, STEEL, MFG SKU: 2110"

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GREG ALBRIGHT

CONTRACTOR LICENSE:
 ELECTRICAL CONTRACTOR U.34043

EQUIPMENT & SERVICE LIST

JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-6

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT
690.13(B)

DO NOT DISCONNECT UNDER LOAD
NEC 690.15 (B) & NEC 690.33(D)(2)

WARNING
SINGLE 120-VOLT SUPPLY
DO NOT CONNECT
MULTIWIRE BRANCH CIRCUITS
NEC 710.15(C) & 692.9 (C)

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
NEC 705.12(D) & NEC 690.59

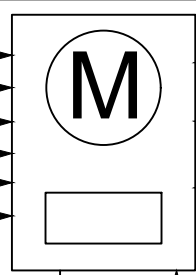
WARNING
TURN OFF PHOTOVOLTAIC
AC DISCONNECT PRIOR TO
WORKING INSIDE PANEL
NEC 110.27(C) & OSHA 1910.145(F)(7)

WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
706.15(C)(4) & 690.13(B)

WARNING
THIS EQUIPMENT FED BY
MULTIPLE SOURCES:
TOTAL RATING OF ALL OVERCURRENT
DEVICES EXCLUDING MAIN POWER
SUPPLY SHALL NOT EXCEED
AMPACITY OF BUSBAR
NEC 705.12(B)(3)(3)

WARNING
THE DISCONNECTION OF THE
GROUNDED CONDUCTOR(S)
MAY RESULT IN OVERVOLTAGE
ON THE EQUIPMENT
NEC 690.31(E)

**RAPID SHUTDOWN SWITCH FOR
SOLAR PV SYSTEM**
690.56(C)(3)



SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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

IFC 605.11.3.1(1) & 690.56(C)

CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED
NEC 705.12(D) & NEC 690.59

WARNING
POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.
NEC 705.12(C) & NEC 690.59

WARNING
ARC FLASH AND SHOCK HAZARD
APPROPRIATE PPE REQUIRED
24 INCH FLASH HAZARD BOUNDARY
3 CALORIM/2 FLASH HAZARD AT 18 INCHES
480 VAC SHOCK HAZARD WHEN COVER IS REMOVED
42 INCH LIMITED APPROACH
12 INCH RESTRICTED APPROACH - 500 V CLASS 00 GLOVES
1 INCH PROHIBITED APPROACH - 500 V CLASS 00 GLOVES
LOCATION: 44 JACK HARRIS LN SPRING LAKE, NC 28390

PHOTOVOLTAIC AC DISCONNECT
NEC 690.13(B)

PHOTOVOLTAIC AC DISCONNECT
RATED AC OUTPUT CURRENT: **50.00A**
NOMINAL OPERATING AC VOLTAGE: **240V**
NEC 690.54

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
NEC 705.12(D) & NEC 690.59

SOLAR PV DC CIRCUIT
EVERY 10' ON CONDUIT AND ENCLOSURES
NEC 690.31

PHOTOVOLTAIC POWER SOURCE
EVERY 10' ON CONDUIT AND ENCLOSURES
NEC 690.31(D)(2)

MAXIMUM VOLTAGE **480** V
MAXIMUM CIRCUIT CURRENT **16.5** A
MAX DC-DC CONVERTER OUTPUT CURRENT **15** A

NOTES:

- NEC ARTICLES 690 AND 705 AND IRC SECTION R324 MARKINGS SHOWN HEREON.
- ALL MARKING SHALL CONSIST OF THE FOLLOWING:
 - UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
 - RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
 - ARIAL FONT.
- ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED. SIGNAGE CANNOT BE HAND-WRITTEN.
- SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS

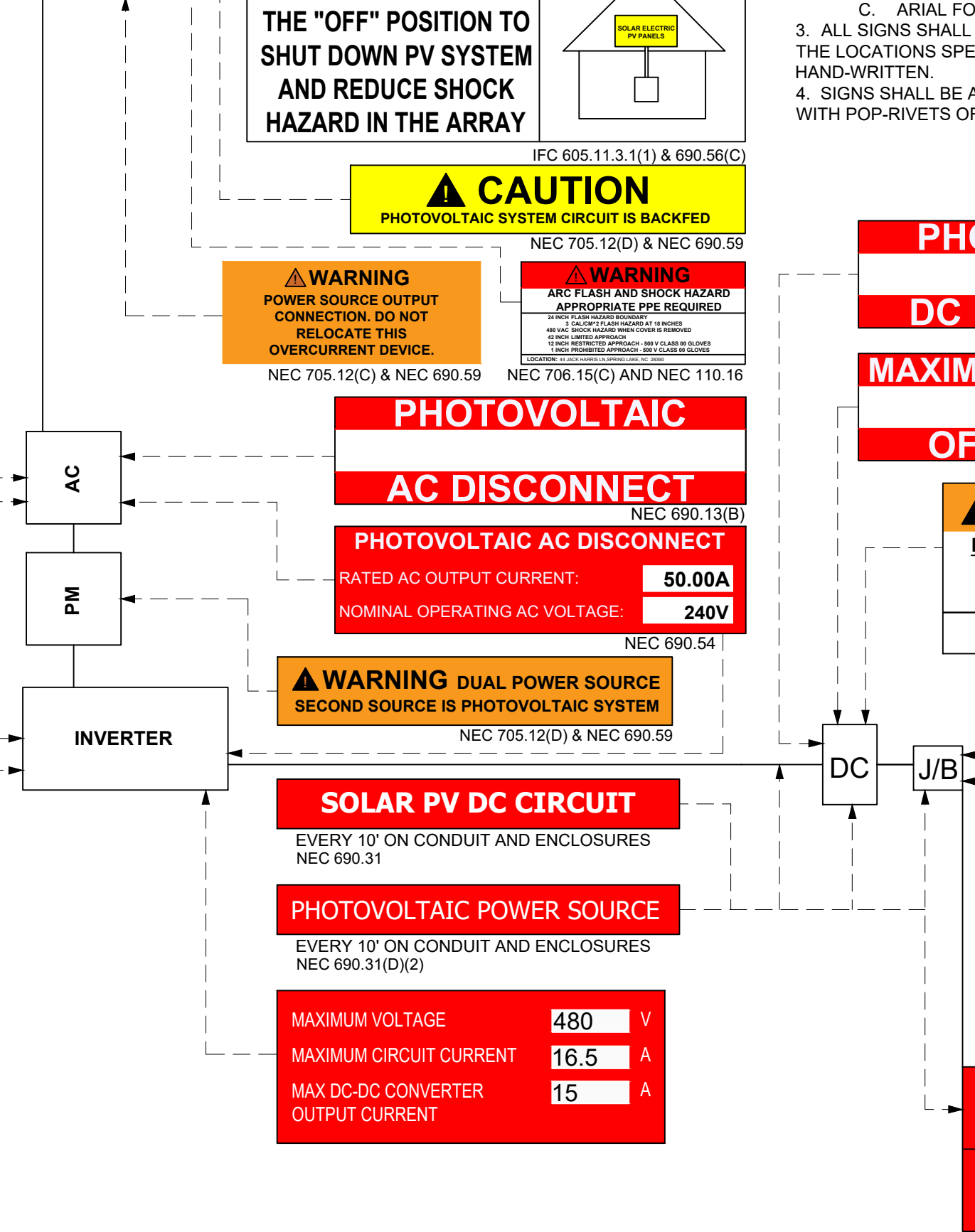
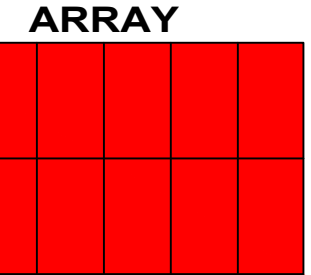
PHOTOVOLTAIC DC DISCONNECT
NEC 690.13(B)

MAXIMUM DC VOLTAGE OF PV SYSTEM
NEC 690.53

WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT
706.15(C)(4) & 690.13(B)

WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
706.15(C)(4) & 690.13(B)

WARNING
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL
NEC 110.27(C) & OSHA 1910.145(F)(7)



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PHONE: (910) 587-4736
EMAIL: SP.RICH03@GMAIL.COM

SYSTEM:
SYSTEM SIZE (DC): 44 X 410 = 18,040 kW
SYSTEM SIZE (AC): 12,000 kW @ 240V
MODULES: 44 X HANWHA QCELL: Q.PEAK DUO BLK ML-G10+ 410
OPTIMIZERS: 44 X SOLAREEDGE S440
INVERTER 1: SOLAREEDGE SE6000H-USRGM [S1]
INVERTER 2: SOLAREEDGE SE6000H-USRGM [S1]

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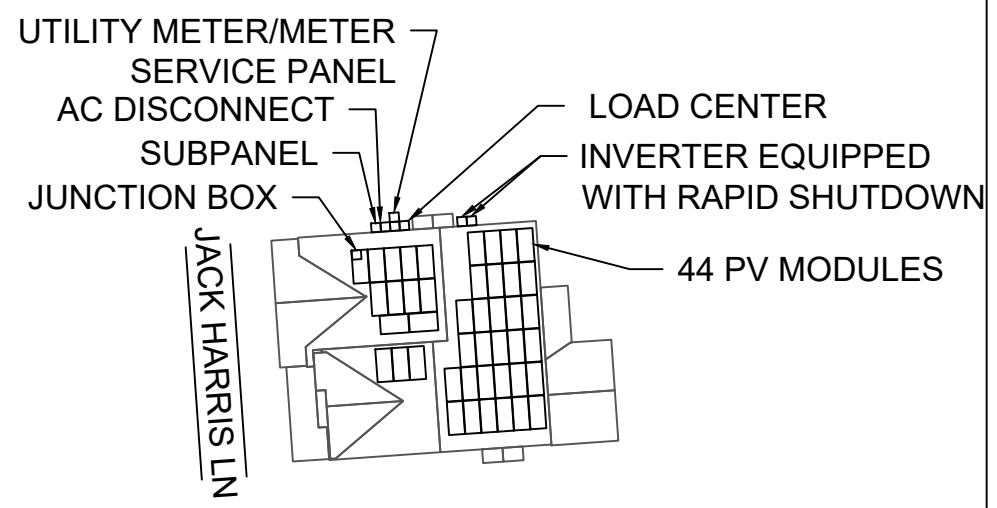
GREG ALBRIGHT
Greg Albright

CONTRACTOR LICENSE:
ELECTRICAL CONTRACTOR U.34043

LABELS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-7

CAUTION:

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS AS SHOWN



WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL



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GREG ALBRIGHT

CONTRACTOR LICENSE:
 ELECTRICAL CONTRACTOR U.34043

SITE PLACARD			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-7A

NOTES:

1. NEC ARTICLES 690 AND 705 AND IRC SECTION R324 MARKINGS SHOWN HEREON.
2. ALL MARKING SHALL CONSIST OF THE FOLLOWING:
 - A. UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
 - B. RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
 - C. AERIAL FONT.
3. ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED. SIGNAGE CANNOT BE HAND-WRITTEN.
4. SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS.

1-10 11-20 21-30 31-40 41-50 51-60

SOLAREEDGE OPTIMIZER CHART

1

2

3

4

5

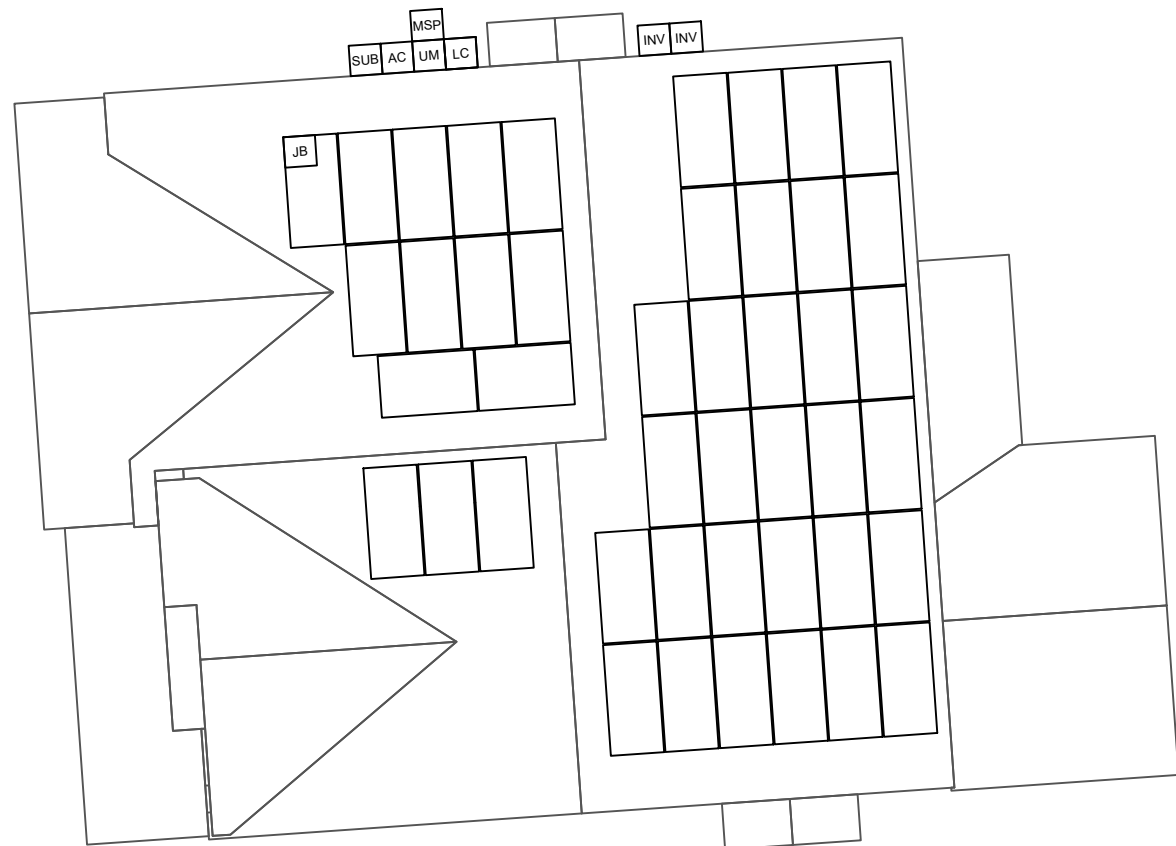
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7

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9

10



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OPTIMIZER CHART

JOB NO: 502646	DATE: 10/23/2024	DESIGNED BY: F.S.	SHEET: PV-8
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JOB HAZARD ANALYSIS

Crew leader to fill out all sections below, hold a pre-job safety meeting with all personnel, and upload this completed document and the Safety Plan to Site Capture

Ladder Access

- Ladders must be inspected before each use.
- Extension ladders must be set up on a firm and level surface at a 4-to-1 rise to run angle (or 75 degrees) and the top must be secured to the structure. Extension style ladders placed on uneven, loose or slippery surfaces must additionally have the base firmly anchored or lashed so the base will not slip out.
- Extension ladders must be used with walk-through devices or the ladder must extend 36" above the stepping off point.
- A-frame ladders must only be climbed with the ladder spreader bars locked in the open position; A-frame ladders shall not be climbed while in the closed position (ex, closed and used while leaned against a structure).

Additional notes:

Mobile Equipment

- Only Qualified operators will operate equipment; operators must maintain a certification on their person for the equipment being operated.
- Type(s) of mobile equipment (Type/Make/Model):
- Qualified operator(s):

Material Handling and Storage

- Materials will be staged/stored in a way that does not present a hazard to client, personnel or public. Materials stored on the roof will be physically protect from failing or sliding off.

Fall Protection

- A site-specific plan for fall prevention and protection is required prior to starting work and must remain onsite at all times until work is complete; a fall rescue plan must be outlined and discussed among the crew prior to work start.
- First-person-Up (FPU) must install their anchor and connect before any other task, including installing other anchors. The Last-Person-Down (LPD) must be the only person on a roof uninstalling fall protection.

FPCP (name and title):

FPU and LPD (name and title):

Electrical Safety

- The Electrical Qualified Person (EQP) is required onsite to perform electrical work.
- All electrical work will be performed with equipment in an electrically safe condition (de-energized) unless approval has been granted prior to work.
- Service drops and overhead electrical hazards will be identified and protected from contact, as necessary.

EQP (name and title):

Public Protection

- The safety of the Client and Public must be maintained at all times.
- The Client and the Public shall be prevented from entering the work zone through the use of barriers and/or signage, as required.
- Company, Client and Public property shall be protected from falling objects.
- Pets (including dogs) shall be secured by their owners prior to work start.
- The Client should not leave pets, family members, or others in charge or care of Employees, Contractors, or Temporary Workers.

Crew leader responsible for communication with the client:

Client and public is excluded from work area by barricades (N/A, Yes, No):

Training and Pre-Job Safety Briefing

- All employees onsite shall be made aware of the specific hazards of this project and review this HJA during a pre-job briefing, and their signature indicates awareness of site conditions and the plan to eliminate any hazards identified prior to and during the project.

Crew leader (name/title):

Crew member (name/title):

Crew member (name/title):

Crew member (name/title):

Crew member (name/title):

Crew member (name/title):

Airborne Contaminants:

- Asbestos-containing (Transite) piping (ACP) - Do not disturb (move, drill, cut fracture, etc.)
- Asbestos-containing thermal insulation (ACI) and Asbestos-containing duct wrapping (ACW) - do not disturb, no attic or crawlspace access is allowed if work to be performed could cause exposure to personnel, client or public.

If yes, list specific tasks and protection in place:

Weather and Environment

- The site supervisor shall forecast the weather conditions at the job site, prior to crew arrival, in order to mitigate any hazards associated with inclement weather (heat, cold, wind, rain, etc.)
- The site supervisor will utilized a portable wind meter (anemometer) to verify actual onsite wind conditions, by checking at the ground and on any elevated work surface (ex, rooftop) prior to work start, at midday and prior to solar panel staging on a roof.
- Elevated work involving the moving or maneuvering of solar panels shall cease at 25mph (sustained wind) until wind subsides.

Forecasted weather maximum temp (degrees f):

Heat Related Illness Prevention

- Employees shall have access to potable drinking water that is fresh, pure, and suitably cool. The water shall be located as close as practicable to the areas where employees are working. Water shall be supplied in sufficient quantity at the beginning of the work shift to provide at least one quart per employee per hour for drinking for the entire shift. Employees may begin the shift with smaller quantities of water if they identify the location and have effective means for replenishment during the shift to allow employees to drink on quart or more per hour. The frequent drinking of water shall be encouraged.
- Shade shall be present when temperature exceeds 80 degrees Fahrenheit. When the outdoor temperature in the work exceeds 80 degrees Fahrenheit, employees shall have and maintain one or more areas with shade at all times.
- New employees must be acclimatized. New employees will be monitored by their Crew Leader (site supervisor) for the first two (2) weeks of employment or longer when necessary.
- Employees will be allowed and encouraged to implement scheduled breaks during each shift. Employees must take cool-down breaks in the shade any time they feel the need to do so to protect them from overheating. Supervisors are REQUIRED to allow employees any break period they need during high heat conditions.
- Cool Vests are encouraged for all employees at all times during periods of high heat.
- Identify the location of the closet Occupational/Industrial Clinic or Hospital in case a crew member becomes ill.

What is the specific plan to provide and replenish sufficient water for all employees on site?

If offsite replenish is necessary, where will you go to replenish water (location/address):

Who will replenish the drinking water (name):

Restroom facilities

- Employees shall have access to restroom facilities with hand-washing stations. Use of onsite restroom is at the client's discretion (location is annotated below). If client does not give permission, location of suitable restroom facilities with hand-washing stations offsite will be provided. The onsite supervisor will identify location and make arrangements to ensure all employees have access at any point.

Restroom facilities will be (circle one): Onsite - Offsite

If Offsite, add location name and address:

Incident Reporting Procedure

Contact your Site Supervisor
Name:

Phone:

Contact your Manager
Name:

Phone:

Contact your Site Supervisor
Name:

Phone:

With: Your full name, phone number, office location, brief description of what happen and when.

NOTE ADDITIONAL HAZARDS NOT ADDRESSED ABOVE

(add as many as necessary by using additional sheets)

Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:

CLIENT:
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Greg Albright

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SAFETY PLAN			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
502646	10/23/2024	F.S.	PV-10

FOR INSTALLATION REFERENCE ONLY

SCAN QR CODE TO ACCESS REFERENCE LINK

FREEDOM REFERENCES



INSTALL HOTLINE

PV INSTALLATION REFERENCES



ENPHASE



SOLAREEDGE



TESLA

BATTERY INSTALLATION REFERENCES



Enphase Storage Systems



SOLAREEDGE Storage Systems



TESLA Storage Systems



NON-BACKUP Battery Systems



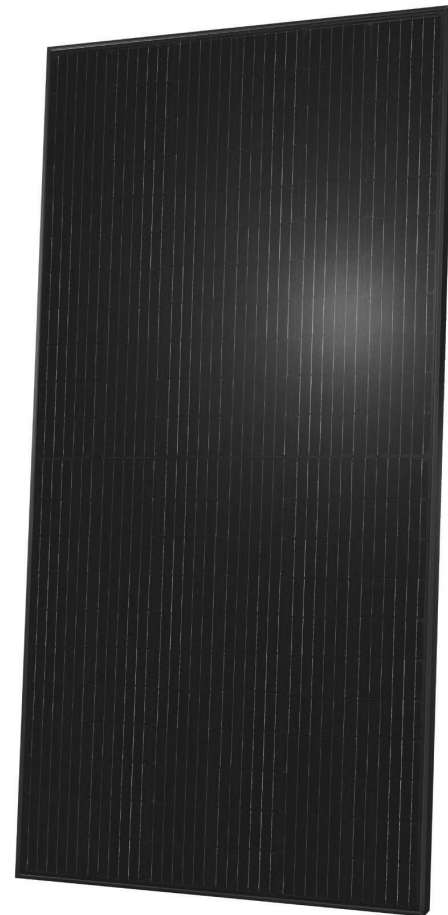
Misc. Quick Guide

Q.PEAK DUO BLK ML-G10+ SERIES



385-415 Wp | 132 Cells
21.0% Maximum Module Efficiency

MODEL Q.PEAK DUO BLK ML-G10+/TS



Breaking the 21% efficiency barrier

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 21.0%.



25 YEARS WARRANTY

A reliable investment

Inclusive 25-year product warranty and 25-year linear performance warranty¹.



Enduring high performance

Long-term yield security with Anti LeTID Technology, Anti PID Technology² and Hot-Spot Protect.



Innovative all-weather technology

Optimal yields, whatever the weather with excellent low-light and temperature behaviour.



The most thorough testing programme in the industry

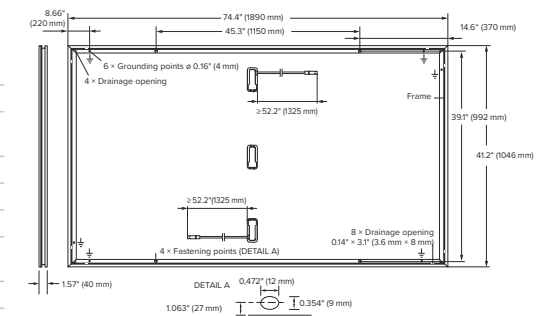
Qcells is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

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

Q.PEAK DUO BLK ML-G10+ SERIES

Mechanical Specification

Format	74.4 in × 41.2 in × 1.57 in (including frame) (1890 mm × 1046 mm × 40 mm)
Weight	51.8 lbs (23.5 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodised aluminium
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 mm ² Solar cable; (+) ≥ 52.2 in (1325 mm), (-) ≥ 52.2 in (1325 mm)
Connector	Stäubli MC4; IP68

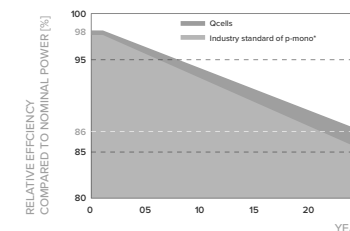


Electrical Characteristics

POWER CLASS		385	390	395	400	405	410	415	
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	410	415
	Short Circuit Current ¹	I _{SC} [A]	11.04	11.07	11.10	11.14	11.17	11.20	11.23
	Open Circuit Voltage ¹	V _{OC} [V]	45.19	45.23	45.27	45.3	45.34	45.37	45.41
	Current at MPP	I _{MPP} [A]	10.59	10.65	10.71	10.77	10.83	10.89	10.95
	Voltage at MPP	V _{MPP} [V]	36.36	36.62	36.88	37.13	37.39	37.64	37.89
	Efficiency ¹	η [%]	≥ 19.5	≥ 19.7	≥ 20.0	≥ 20.2	≥ 20.5	≥ 20.7	≥ 21.0
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	307.6	311.3
	Short Circuit Current	I _{SC} [A]	8.90	8.92	8.95	8.97	9.00	9.03	9.05
	Open Circuit Voltage	V _{OC} [V]	42.62	42.65	42.69	42.72	42.76	42.79	42.83
	Current at MPP	I _{MPP} [A]	8.35	8.41	8.46	8.51	8.57	8.62	8.68
Voltage at MPP	V _{MPP} [V]	34.59	34.81	35.03	35.25	35.46	35.68	35.89	

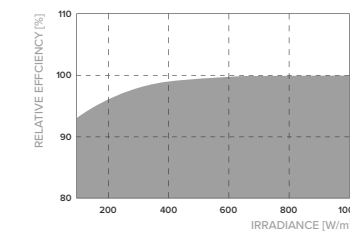
¹ Measurement tolerances P_{MPP} ± 3%; I_{SC}; V_{OC} ± 5% at STC: 1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3. ² 800 W/m², NMOT, spectrum AM 1.5

Qcells PERFORMANCE WARRANTY PERFORMANCE AT LOW IRRADIANCE



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 Qcells sales organisation of your respective country.



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

^{*} Standard terms of guarantee for the 5 PV companies with the highest production capacity in 2021 (February 2021)

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/ft ²]	75 (3600 Pa)/75 (3600 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/ft ²]	112 (5400 Pa)/112 (5400 Pa)		

³ See Installation Manual

Qualifications and Certificates

UL61730-1 & UL61730-2, CE-compliant, Quality Controlled PV - TÜV Rheinland, IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (solar cells),



The ideal solution for:



Rooftop arrays on residential buildings



Rooftop arrays on commercial/industrial buildings



^{*} Contact your Qcells Sales Representative for details regarding the module's eligibility to be Buy American Act (BAA) compliant.

Qcells pursues minimizing paper output in consideration of the global environment.

Note: Installation instructions must be followed. Contact our technical service for further information on approved installation of this product. Hanwha Q CELLS America Inc. 400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL hqc-inquiry@qcells.com | WEB www.qcells.com



SolarEdge Home Wave Inverter For North America

SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US



INVERTERS

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014-2023 per articles 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

/ SolarEdge Home Wave Inverter For North America

SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US

Applicable to inverters with part number	SEXXXXH-XXXXBXX4					SE11400H-XXXXBXX5	Units
	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
OUTPUT							
Rated AC Power Output	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5 ⁽¹⁾						Hz
Maximum Continuous Output Current @240V	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85						
GFDI Threshold	1						A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes						
INPUT							
Maximum DC Power @240V	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes						
Maximum Input Voltage	480						Vdc
Nominal DC Input Voltage	380						Vdc
Maximum Input Current @240V ⁽²⁾	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V ⁽²⁾	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45						Adc
Reverse-Polarity Protection	Yes						
Ground-Fault Isolation Detection	600k Sensitivity						
Maximum Inverter Efficiency	99.2						%
CEC Weighted Efficiency	99					99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5						W

(1) For other regional settings please contact SolarEdge support.
(2) A higher current source may be used; the inverter will limit its input current to the values stated.

/ SolarEdge Home Wave Inverter

For North America

SE3800H-US / SE5000H-US / SE6000H-US/

SE7600H-US / SE10000H-US / SE11400H-US

Applicable to inverters with part number	SEXXXXH-XXXXXBXX4					SE11400H-XXXXXBXX5	
	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
ADDITIONAL FEATURES							
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), wireless SolarEdge Home Network (optional) ⁽³⁾ , Wi-Fi (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional ⁽⁴⁾						
Consumption Metering							
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection						
Rapid Shutdown - NEC 2014-2023 per articles 690.11 and 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect						
STANDARD COMPLIANCE							
Safety	UL1741, UL1741 SA, UL1741 SB, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07						
Grid Connection Standards	IEEE1547-2018, Rule 21, Rule 14 (H1), CSA C22.3 No. 9						
Emissions	FCC Part 15 Class B						
INSTALLATION SPECIFICATIONS							
AC Output Conduit Size / AWG Range	1" Maximum / 14 – 6 AWG			1" Maximum / 14 – 4 AWG			
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1 – 2 strings / 14 – 6 AWG			1" Maximum / 1 – 3 strings / 14 – 6 AWG			
Dimensions with Safety Switch (H x W x D)	17.7 x 14.6 x 6.8 / 450 x 370 x 174			21.06 x 14.6 x 7.3 / 535 x 370 x 185	21.06 x 14.6 x 8.2 / 535 x 370 x 208 ⁽⁵⁾	in / mm	
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6	44.9 / 20.4 ⁽⁵⁾	lb / kg	
Noise	< 25			< 50			dBA
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁶⁾						
Protection Rating	NEMA 4X (Inverter with Safety Switch)						

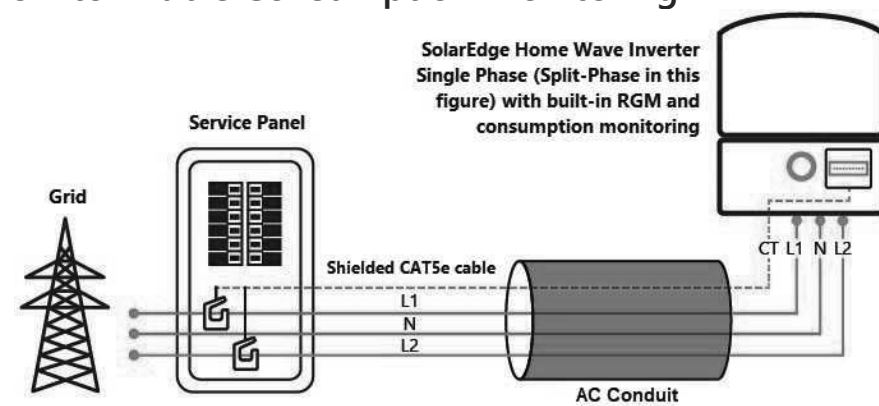
(3) For more information, refer to the [SolarEdge Home Network](#) datasheet

(4) Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BEI4. For consumption metering, current transformers should be ordered separately: SEACT0750-400NA-20 or SEACT0750-400NA-20. 20 units per box.

(5) SE11400H-USxxxBox5 is the updated PN, though SE11400H-USxxxBox4 will still be available. All specifications are similar for both models, **EXCLUDING** the weight and dimensions [HxWxD]. The weight and dimensions of SE11400H-USxxxBox4 are 17.6 [kg] and 21.06-14.6-7.3 / 535-370-185 [in/mm], accordingly.

(6) Full power up to at least 50°C / 122°F; for power de-rating information refer to the [Temperature De-rating Technical Note for North America](#).

How to Enable Consumption Monitoring



By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills.

Power Optimizer

For North America

S440, S500



POWER OPTIMIZER

PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- Detects abnormal PV connector behavior, preventing potential safety issues*
- Module-level voltage shutdown for installer and firefighter safety
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- Faster installations with simplified cable management and easy assembly using a single bolt
- Flexible system design for maximum space utilization
- Compatible with bifacial PV modules
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

* Expected availability in 2022

solaredge.com



/ Power Optimizer

For North America

S440, S500

	S440	S500	Unit
INPUT			
Rated Input DC Power ⁽¹⁾	440	500	W
Absolute Maximum Input Voltage (Voc)	60		Vdc
MPPT Operating Range	8 - 60		Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15	Adc
Maximum Efficiency	99.5		%
Weighted Efficiency	98.6		%
Ovenvoltage Category	II		
OUTPUT DURING OPERATION			
Maximum Output Current	15		Adc
Maximum Output Voltage	60		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)			
Safety Output Voltage per Power Optimizer	1+/-0.1		Vdc
STANDARD COMPLIANCE			
Photovoltaic Rapid Shutdown System	NEC 2014, 2017 & 2020		
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3		
Safety	IEC62109-1 (class II safety), UL1741		
Material	UL94 V-0, UV Resistant		
RoHS	Yes		
Fire Safety	VDE-AR-E 2100-712:2013-05		
INSTALLATION SPECIFICATIONS			
Maximum Allowed System Voltage	1000		Vdc
Dimensions (W x L x H)	129 x 153 x 30 / 5.07 x 6.02 x 1.18		mm / in
Weight (including cables)	655 / 1.5		gr / lb
Input Connector	MC4 ⁽²⁾		
Input Wire Length	0.1 / 0.32		m / ft
Output Connector	MC4		
Output Wire Length	(+) 2.3, (-) 0.10 / (+) 7.54, (-) 0.32		m / ft
Operating Temperature Range ⁽³⁾	-40 to +85		°C
Protection Rating	IP68 / Type6B		
Relative Humidity	0 - 100		%

(1) Rated power of the module at STC will not exceed the power optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed

(2) For other connector types please contact SolarEdge

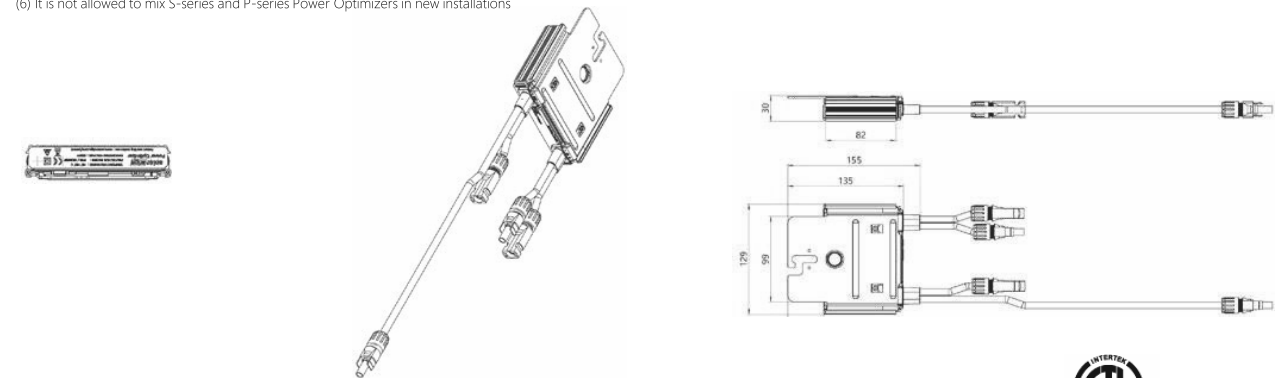
(3) For ambient temperature above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Using a SolarEdge Inverter	Single Phase HD-Wave	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	S440, S500	8	14	18
Maximum String Length (Power Optimizers)	25		50 ⁽⁴⁾	
Maximum Nominal Power per String	5700 (6000 with SE7600-US-SE11400-U)	6000	12750	W
Maximum Allowed Connected Power per String ⁽⁵⁾ (Permitted only when the difference in connected power between strings is 1,000W or less)	Refer to Footnote 5	One String 7200W Two strings or more 7800W	15,000W	
Parallel Strings of Different Lengths or Orientations	Y			

(4) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement

(5) If the inverters rated AC power < maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power. Refer to: <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>

(6) It is not allowed to mix S-series and P-series Power Optimizers in new installations



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Product specifications

Eaton DG223URB

Catalog Number: DG223URB

Eaton General duty non-fusible safety switch, single-throw, 100 A, NEMA 3R, Rainproof, Painted galvanized steel, Two-pole, Two-wire, 240 V

General specifications

Product Name	Catalog Number
Eaton general duty non-fusible safety switch	DG223URB
	UPC
	782114731154
Product Length/Depth	Product Height
7.38 in	19.25 in
Product Width	Product Weight
9.13 in	12 lb
Warranty	Certifications
Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.	UL Listed
	Catalog Notes
	WARNING! Switch is not approved for service entrance unless a neutral kit is installed.



Product specifications

Product Category
General duty safety switch
Enclosure material
Painted galvanized steel
Type
Non-fusible, single-throw
Fuse configuration
Non-fusible
Number of wires
2
Enclosure
NEMA 3R
Voltage rating
240V
Amperage Rating
100A
Number Of Poles
Two-pole

Resources

Catalogs
Eaton's Volume 2—Commercial Distribution
Multimedia
Switching Devices Flex Center
Double Up on Safety
Specifications and datasheets
Eaton Specification Sheet - DG223URB



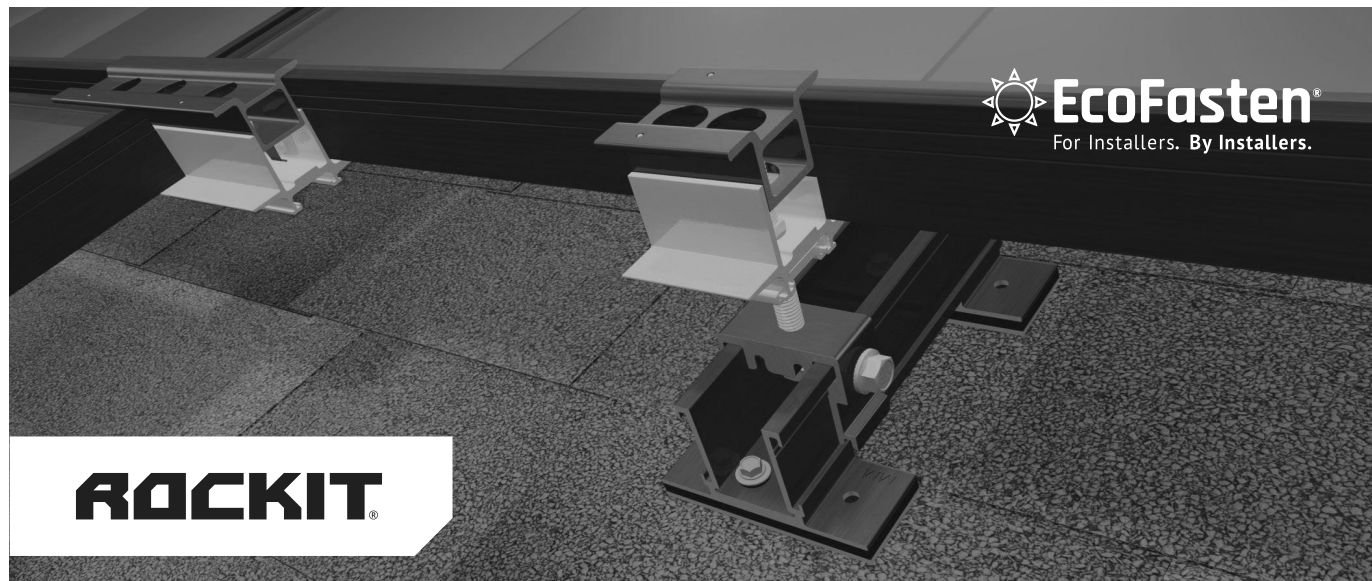
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Eaton House
30 Pembroke Road
Dublin 4, Ireland
Eaton.com
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ROCKIT SMART SLIDE

Integrated UltraGrip Technology™

Pre-installed sealing pads are compatible with all composition shingle roofs. The compression achieved when fastened to the roof creates a super strong watertight seal. In most cases, the slide can be mounted to the deck without the need for sealant. A layer of flexible foam provides cushioning, which allows the waterproofing sealant to embed deep into the granules of the shingle as well as to flexibly conform over the steps found on architectural-style shingles.



ROCKIT

INTRODUCING ROCKIT SMART SLIDE!

Introducing EcoFasten's patent pending RockIt Smart Slide, our simple solution for quickly installing the popular RockIt rail-less racking system to composition shingle roofs.

Features & Benefits

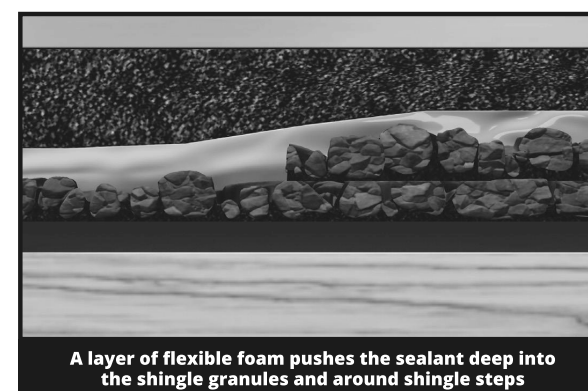
- Eliminates the need to pry up shingle courses and install a metal flashing
- Multiple opportunities to find the rafter
- No need for additional material when architectural shingles are not level
- Longer 6.75" slide avoids overlaps in shingle courses
- Integrated flashing utilizes UltraGrip Technology™ to create a watertight seal



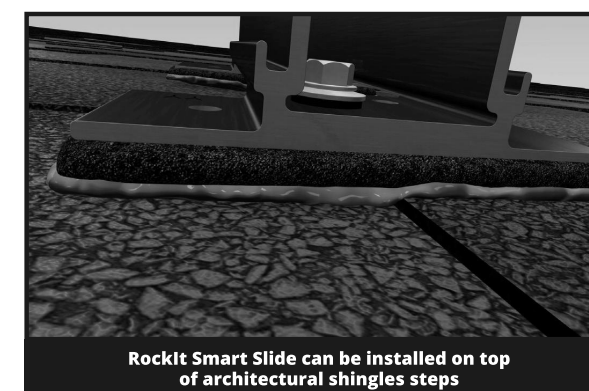
ROCKIT SMART SLIDE

Required Components:

Part Number:	Description:
2011024	RI SMART SLIDE BLK 6.75"
2011025	RI SMART SCRW #12X3" W/BW



A layer of flexible foam pushes the sealant deep into the shingle granules and around shingle steps



RockIt Smart Slide can be installed on top of architectural shingles steps

Testing & Documentation

- [UL441 Rain Report](#)
- [TAS 100 \(A\)-95 Wind and Wind Driven Rain Resistance](#)
- [Mechanical Load Test/Structural Capacity Certification](#)
- [Florida Product Approval](#)
- [RockIt Installation Manual](#)
- [RockIt CutSheets](#)



RI SMART SLIDE BLK 6.75"

PART NUMBER	DESCRIPTION
2011024	RI SMART SLIDE BLK 6.75"

ITEM NO.	DESCRIPTION
1	ROCKIT SMART SLIDE ASSEMBLY

1) ROCKIT FLASHLESS SLIDE ASSEMBLY

MATERIAL	ALUMINUM, EPDM, ADHESIVE, TREATED PAPER
FINISH	BLACK

Rev: CS-3

RI SMART SCREW #12X3" W/BW

PART NUMBER	DESCRIPTION
2011025	RI SMART SCREW #12X3" W/BW

ITEM NO.	DESCRIPTION
1	SELF TAPPING SCREW #12 WITH SEALING WASHER ASSEMBLY

MATERIAL	STAINLESS STEEL, EPDM RUBBER
FINISH	MILL, BLACK

Rev: CS-2



ROCKIT®

COMPLETE RAIL-LESS RACKING SYSTEM

The RockIt system is the industry's premier rail-less PV racking system for composition shingle, tile, and metal roofs. Designed in conjunction with the needs of installers, RockIt quickly & easily installs with a single tool. Featuring an easy-to-position alignment slide and a top-down leveling system, RockIt is logistically intelligent with no need to ship or transport long rails. Components are available in a black finish that complements both commercial and residential applications. Conforms to UL 2703.

FEATURES & BENEFITS

- Patented watertight technology
- Fully integrated bonding
- Top-down leveling system
- North-South adjustability
- Single tool install
- Florida Product Approved for composition shingle roofs

STREAMLINED INSTALLATION WITH MINIMAL ROOF PENETRATIONS



ROCKIT

ROCKIT COUPLING

The fast installing RockIt Coupling easily attaches to the module frame to bridge the gaps between modules.

SKIRT

The sleek black Skirt installs first and acts as an alignment guide for the entire array. The Skirt End Cap does double duty as a skirt coupling device and an aesthetically-pleasing finishing touch.

ROCKIT MOUNT

Featuring integrated bonding pins, the RockIt Mount connects to the Slide and can easily be positioned for fast installation. Features top-down leveling.

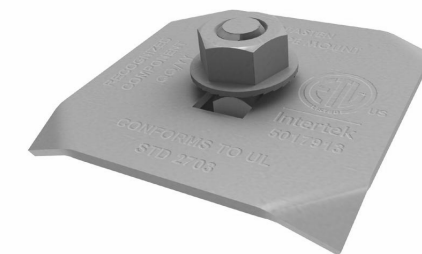


ROCKIT COMP SLIDE

Available in four variations, the RockIt Slide allows installation on composition shingle, tile, and metal roofs.

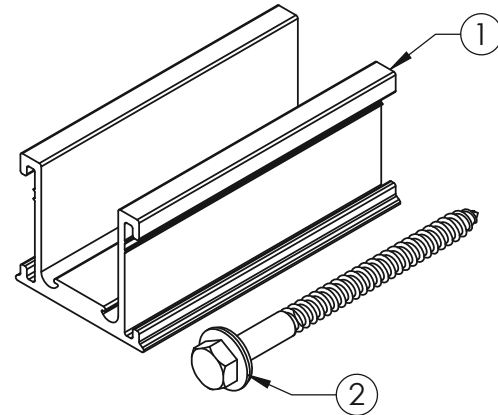
FRAME MLPE MOUNT

Attaches and fully bonds MLPE's (Module Level Power Electronics) to the module frame with a single bolt clip.



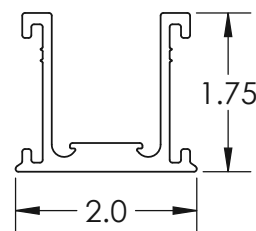
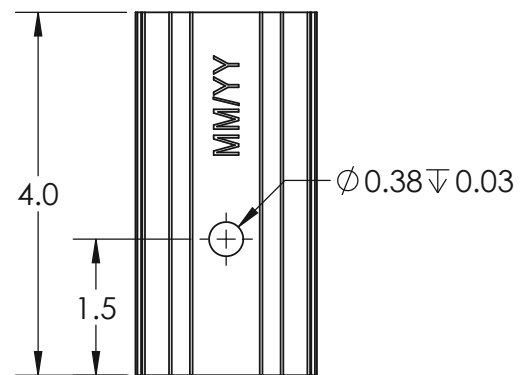
RI COMP SLIDE AL BLK

PART NUMBER	DESCRIPTION
2011013	RI COMP SLIDE AL BLK



ITEM NO.	DESCRIPTION
1	ROCKIT V3 SLIDECOMP
2	LAG SCREW, 5/16-4", THREAD 3", EPDM BACKED WASHER

1) ROCKIT V3 SLIDECOMP

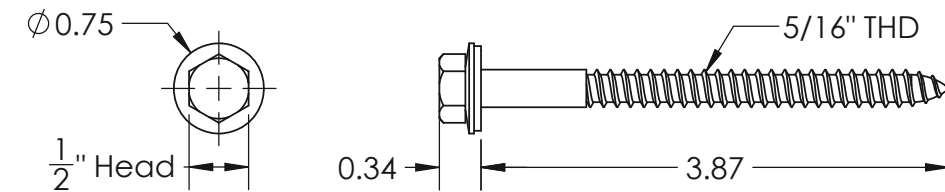


Material	Aluminum
Finish	Black

REV.- CS1

RI COMP SLIDE AL BLK

2) LAG SCREW, 5/16-4", THREAD 3", EPDM BACKED WASHER

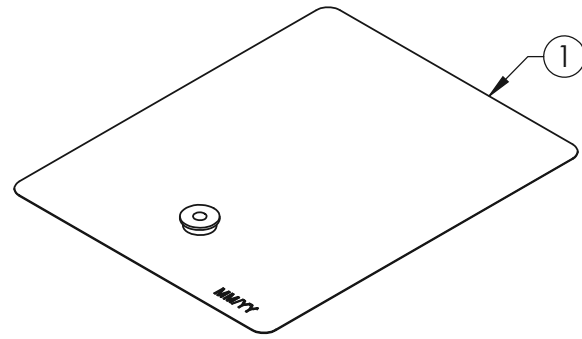


Material	Stainless Steel
Finish	Mill

REV.- CS1

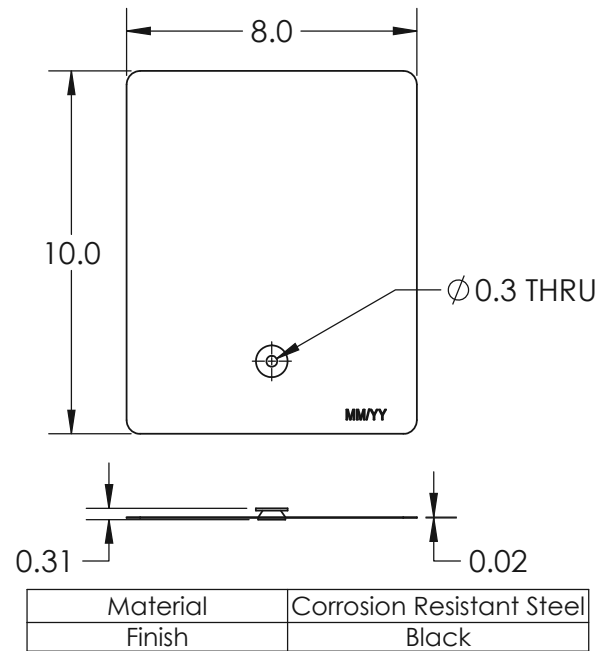
GF-1 FLASHING GLV BLK 8X10"

PART NUMBER	DESCRIPTION
3012020	GF-1 FLASHING GLV BLK 8X10"



ITEM NO.	DESCRIPTION
1	GF1M-GAL-BLK-810 W/O WASHER ASSEMBLY

1) GF1M-GAL-BLK-810 W/O WASHER ASSEMBLY



REV.- CS1





ECOFASTEN SOLAR LLC
4141 W. VAN BUREN ST., SUITE 2
PHOENIX, AZ 85009

877-859-3947
INFO@ECOFASTENSOLAR.COM

April 8th, 2024

EcoFasten
4141 West Van Buren St.
Phoenix, AZ 85009

Attn.: EcoFasten Solar Engineering Department

Re: Report # 7.16-RockIt_CS-SS EcoFasten RockIt System, with Comp Slide or Smart Slide,
Certification for Gable and Hip roofs.

This letter certifies the loading criteria and design basis used for the structural analysis of the EcoFasten - RockIt System as shown in Report # 7.16-RockIt_CS-SS "Engineering Certification for the EcoFasten - RockIt System with Comp or Smart Slide for Gable and Hip Roofs". All information, data, and analysis therein are based on, and comply with, the following building codes and typical specifications. The Span Tables provided in the referenced report may be used when all assumptions listed therein are met.

Building Codes:

1. ASCE/SEI 7-16, Minimum Design Loads for Buildings and Other Structures, by American Society of Civil Engineers
2. 2021 International Building Code (IBC)
3. 2021 International Residential Code (IRC)
4. SEAOC (Structural Engineer Association of California) report PV2-2017 Wind Design for Solar Arrays
5. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES
6. Aluminum Design Manual 2020, by The Aluminum Association, Inc.
7. ANSI/AWC NDS-2018, National Design Specification for Wood Construction, by the American Wood Council

Please note our evaluation only applies to EcoFasten products and excludes the structural adequacy of the chosen roof attachments, PV modules, or underlying roof supporting members. It shall be the responsibility of the installer or system designer to verify the structural capacity and adequacy of the referenced system components with respect to the applied or resultant loads of the chosen array configuration.

Sincerely,



Matthew S Kuzila, P.E.

Sealed 04.08.2024
Expires 12.31.2024