

# PROJECT DESCRIPTION:

24 X 400 HANWHA QCELL Q.PEAK DUO BLK ML-G10+ 400 MODULES  
GROUND MOUNTED SOLAR PHOTOVOLTAIC MODULES

SYSTEM SIZE: 9.60 kW DC STC  
ARRAY AREA: #1 - 506.88 SQ FT

AUTHORITIES HAVING JURISDICTION

BUILDING : HARNETT COUNTY

ZONING : HARNETT COUNTY

UTILITY : CENTRAL ELECTRIC MEMBERSHIP CORP.

## DESIGN SPECIFICATION

OCCUPANCY: II

CONSTRUCTION: SINGLE-FAMILY

FIRE: RESIDENTIAL

GROUND SNOW LOAD: 10 LB/S

WIND EXPOSURE: B

WIND SPEED: 117 MPH

## EQUIPMENT SUMMARY

24 HANWHA QCELL Q.PEAK DUO BLK ML-G10+ 400 MODULES

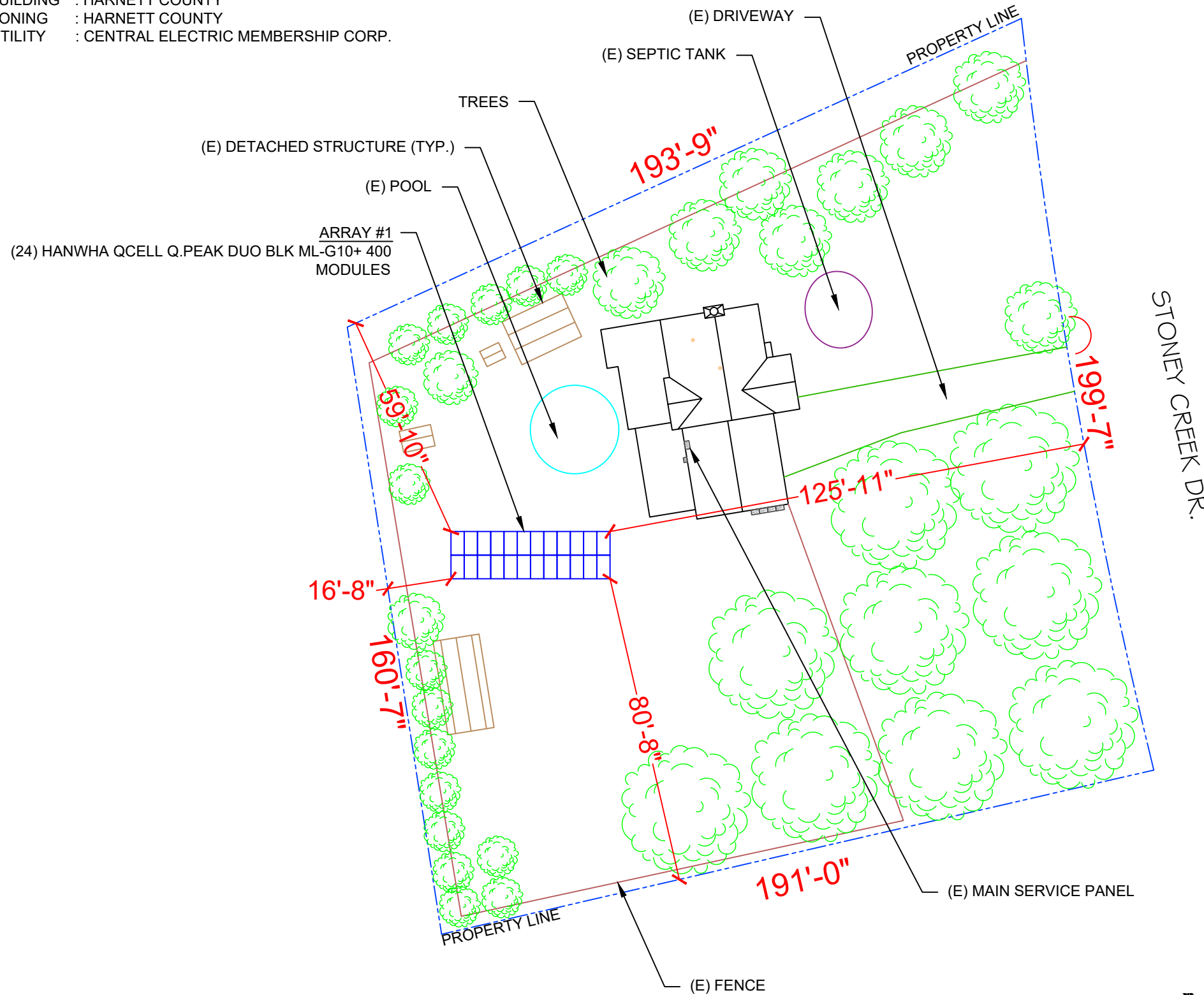
04 GENERAC PV LINK S2502 POWER OPTIMIZERS

01 GENERAC PWRCELL XVT076A03 (7.6KW) INVERTER

## APPLICABLE CODES & STANDARDS

NORTH CAROLINA RESIDENTIAL CODE 2018

NEC 2017



2

HOUSE PHOTO

PV-1

SCALE: NTS



3

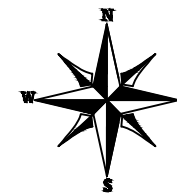
VICINITY MAP

PV-1

SCALE: NTS

## SHEET INDEX

PV-1	PLOT PLAN & VICINITY MAP
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PV-2A	STRING LAYOUT
PV-3	RACKING DETAILS
PV-3A	RACKING DETAILS
PV-3B	RACKING DETAILS
PV-4	ELECTRICAL LINE DIAGRAM
PV-5	WIRING CALCULATIONS
PV-6 to 11	EQUIPMENT SPECIFICATIONS



NOTE: GROUND MOUNT LOCATION TBD ON-SITE

1

PLOT PLAN & VICINITY MAP

PV-1

SCALE: 1/32" = 1'-0"

## REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE: 02/03/2022

PROJECT NAME & ADDRESS

RIVERA FRANCISCO JR.  
RESIDENCE  
480 STONEY CREEK DR.,  
SANFORD, NC 27332

SHEET NAME  
PLOT PLAN &  
VICINITY MAP

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

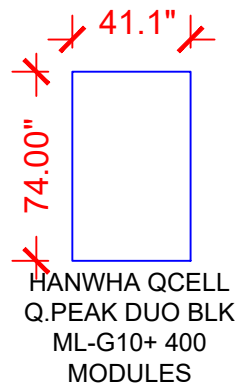
PV-1



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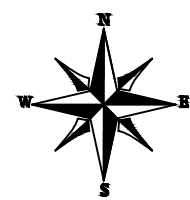
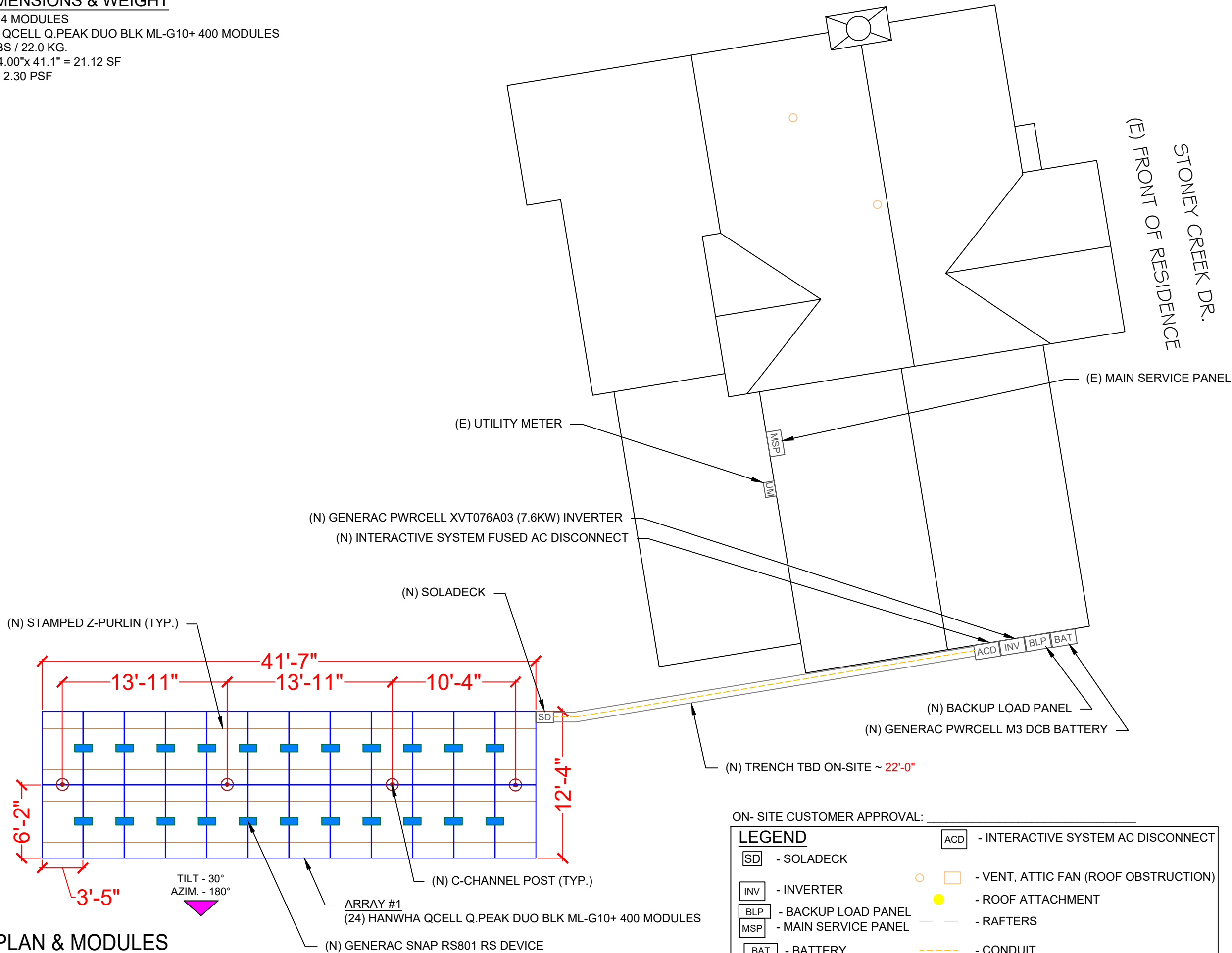
**MODULE TYPE, DIMENSIONS & WEIGHT**

NUMBER OF MODULES = 24 MODULES  
 MODULE TYPE = HANWHA QCELL Q.PEAK DUO BLK ML-G10+ 400 MODULES  
 MODULE WEIGHT = 48.5 LBS / 22.0 KG.  
 MODULE DIMENSIONS = 74.00"x 41.1" = 21.12 SF  
 UNIT WEIGHT OF ARRAY = 2.30 PSF



(E) BACK OF RESIDENCE

STONEY CREEK DR.  
 (E) FRONT OF RESIDENCE



**1 ROOF PLAN & MODULES**  
 PV-2 SCALE: 1/8" = 1'-0"

ON-SITE CUSTOMER APPROVAL: \_\_\_\_\_

LEGEND	
[SD]	- SOLADECK
[INV]	- INVERTER
[BLP]	- BACKUP LOAD PANEL
[MSP]	- MAIN SERVICE PANEL
[BAT]	- BATTERY
[OP]	- PV LINK OPTIMIZER
[ACD]	- INTERACTIVE SYSTEM AC DISCONNECT
○	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
●	- ROOF ATTACHMENT
---	- RAFTERS
- - -	- CONDUIT
■	- RAPID SHUTDOWN

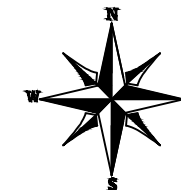
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REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal  
 DATE: 02/03/2022

PROJECT NAME & ADDRESS  
**RIVERA FRANCISCO JR.**  
**RESIDENCE**  
 480 STONEY CREEK DR.,  
 SANFORD, NC 27332

SHEET NAME  
**ROOF PLAN & MODULES**  
 SHEET SIZE  
**ANSI B**  
**11" X 17"**  
 SHEET NUMBER  
**PV-2**



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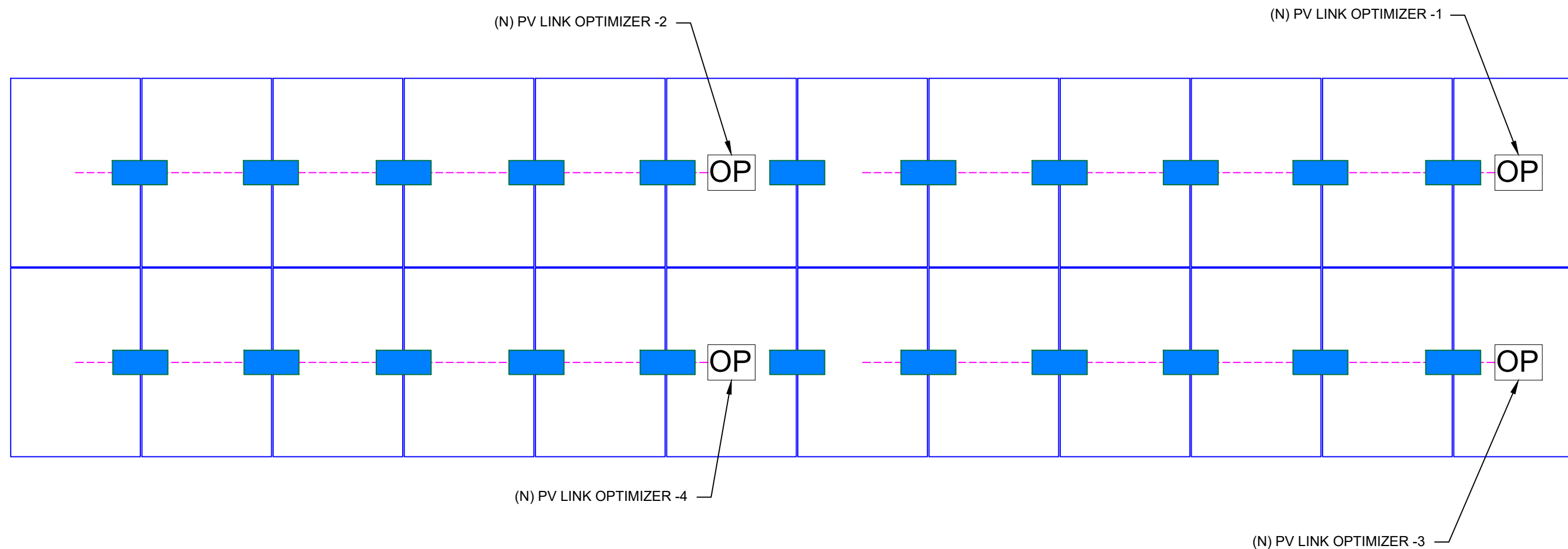
PROJECT NAME & ADDRESS

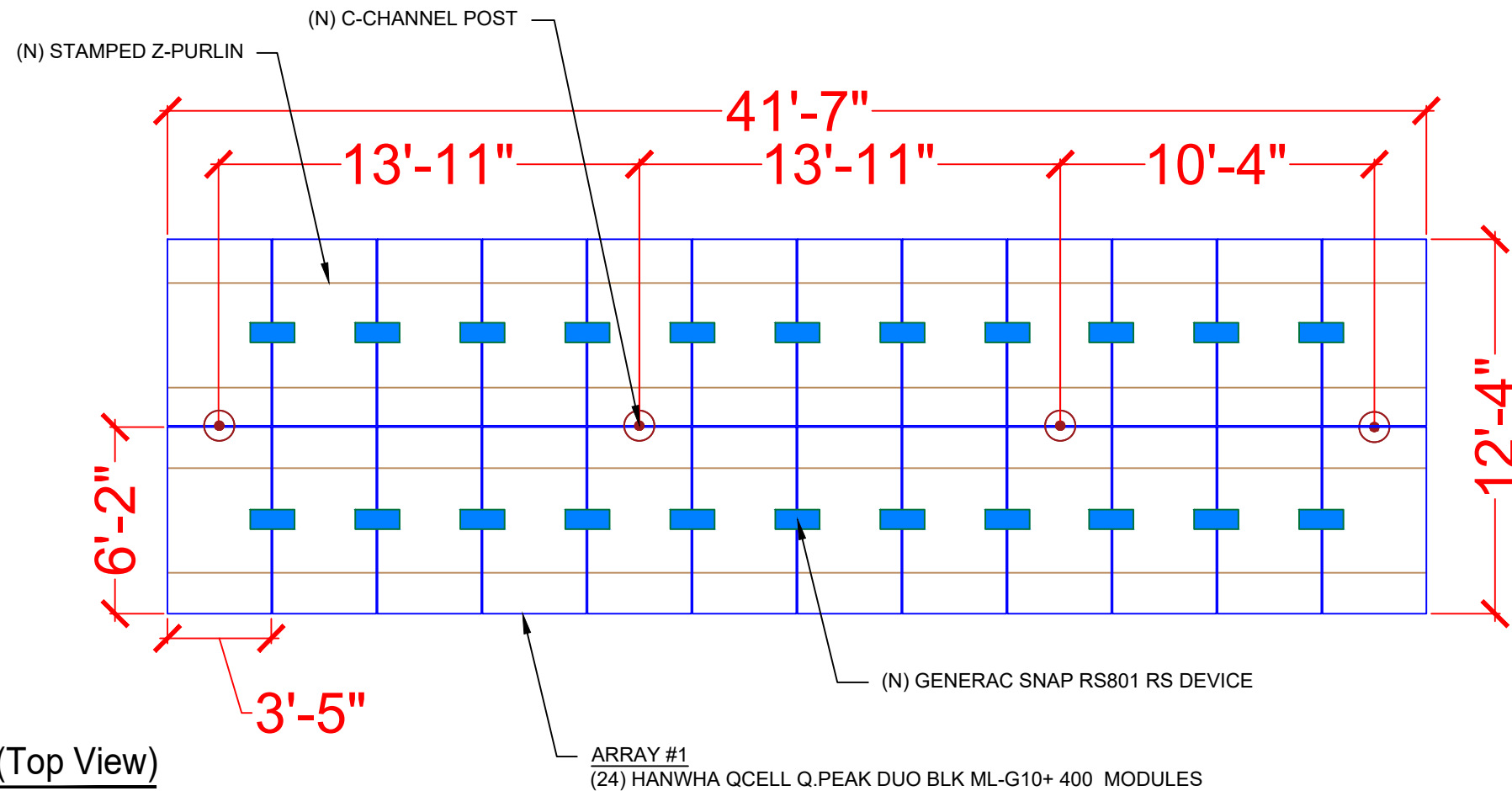
RIVERA FRANCISCO JR.  
 RESIDENCE  
 480 STONEY CREEK DR.,  
 SANFORD, NC 27332

SHEET NAME  
**STRING LAYOUT**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-2A**





**1 RACKING DETAIL (Top View)**

PV-3

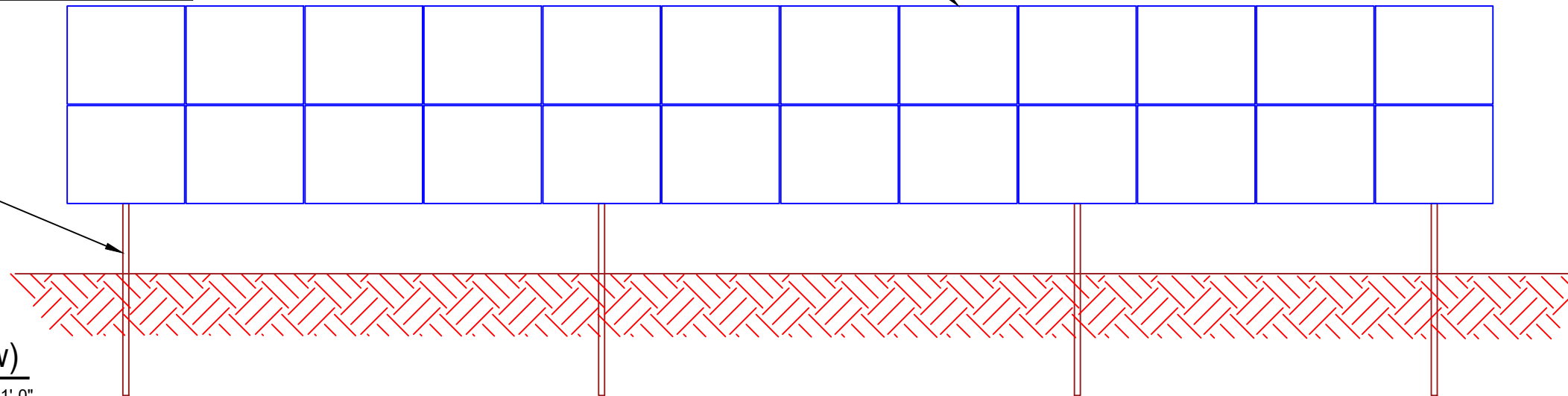
SCALE: 3/16" = 1'-0"

**BILL OF MATERIALS**

EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	24	HANWHA QCELL Q.PEAK DUO BLK ML-G10+ 400 MODULES
OPTIMIZER	4	GENERAC PV LINK S2502 POWER OPTIMIZERS
GENERAC SNAP RS	24	GENERAC SNAPRS MODEL RS801
INVERTER	01	GENERAC PWRCELL XVT076A03 (7.6KW) INVERTER
INTERACTIVE SYSTEM AC DISCONNECT	1	60A FUSED, (2) 40A FUSES, 240V, NEMA 3R, UL LISTED
SOLADECK	1	SOLADECK 600 V, NEMA 3R, UL LISTED
BATTERY	1	GENERAC PWRCELL OR M3 DCB BATTERY
BACKUP PANEL	1	125A, BACKUP PANEL, 240V

HANWHA QCELL Q.PEAK DUO BLK ML-G10+ 400 MODULES

(N) C-CHANNEL POST



**2 RACKING DETAIL (Front View)**

PV-3

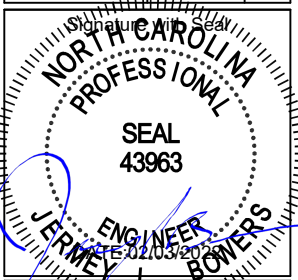
SCALE: 1/4" = 1'-0"



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**REVISIONS**

DESCRIPTION	DATE	REV



PROJECT NAME & ADDRESS  
 04/12/2022

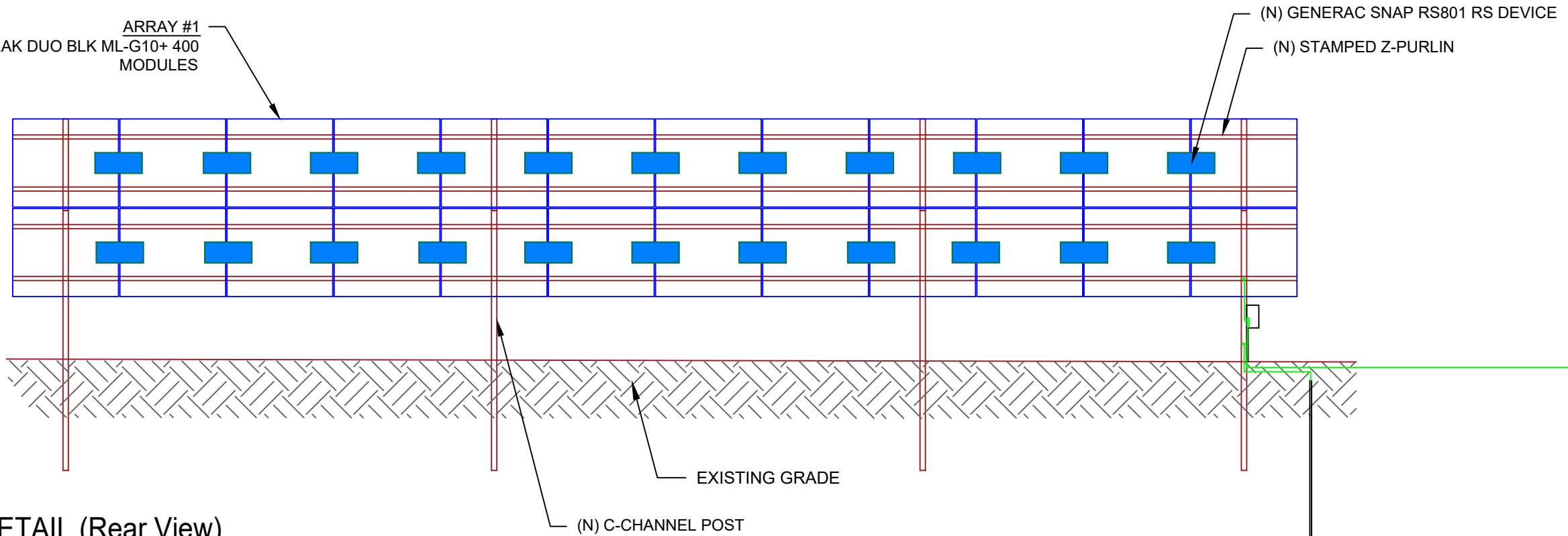
**RIVERA FRANCISCO JR.  
 RESIDENCE**  
 480 STONEY CREEK DR.,  
 SANFORD, NC 27332

SHEET NAME  
**RACKING  
 DETAIL**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-3**

ARRAY #1  
(24) HANWHA QCELL Q.PEAK DUO BLK ML-G10+ 400  
MODULES

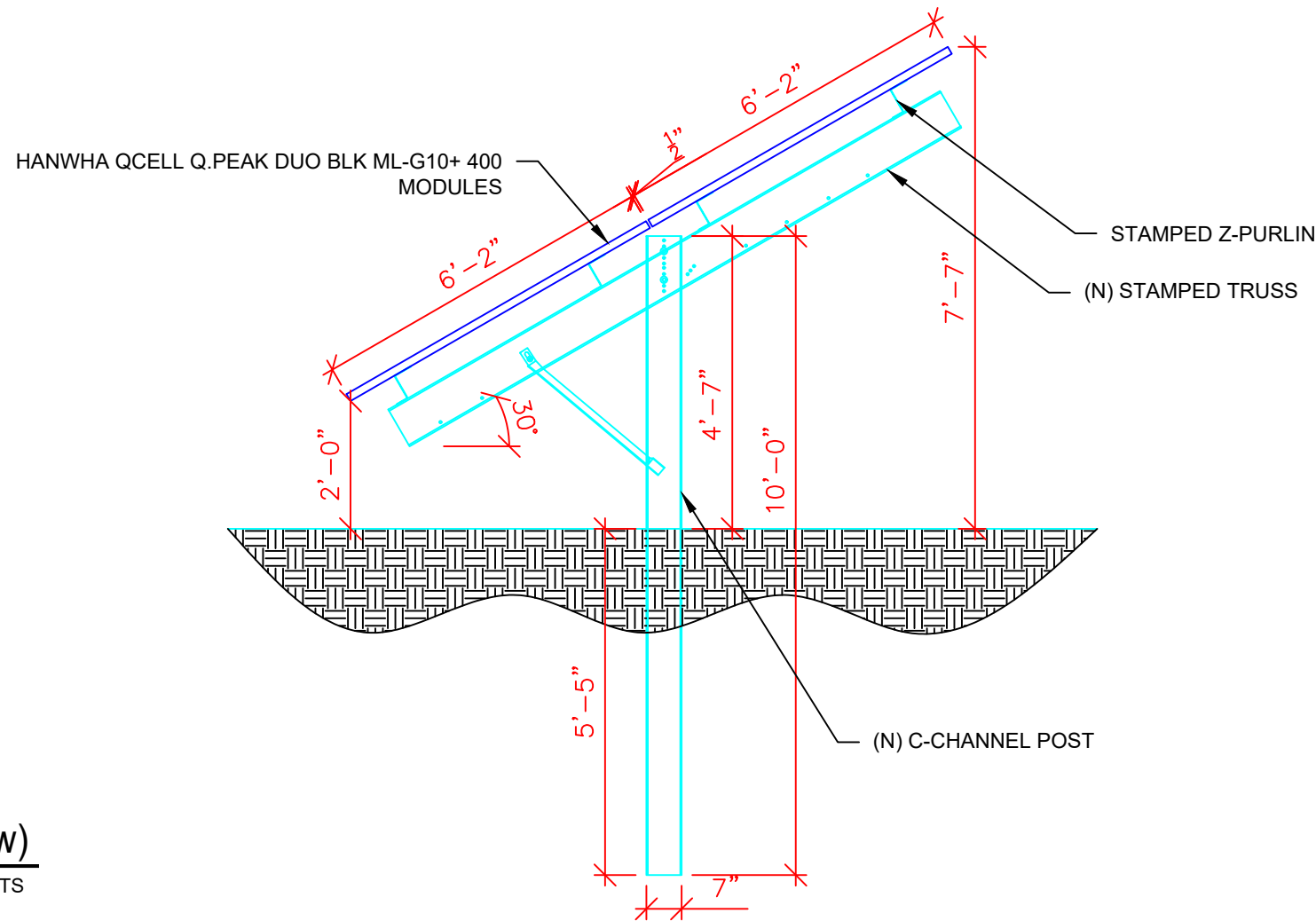


**1 RACKING DETAIL (Rear View)**

PV-3A

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

IBC 2015	
1603.1.1 Floor Live Load	N/A
1603.1.2 Roof Live Load	20 psf
1603.1.3 Roof Snow Load	
$P_g =$	15 psf
$P_f =$	9.07 psf
$C_e =$	0.9
$I_s =$	0.80
$C_t =$	1.2
1603.1.4 Wind Load	
$V =$	105 MPH
$I_w =$	1.00
Exposure =	C
1603.1.5 Earthquake Design Data	
$S_{Ds} =$	0.204
$S_{D1} =$	0.142
Site Class =	D
$I_e =$	1.00
SDC =	C
Base Shear $V =$	20.57 lb
Soil Assumed to be Stiff	



**2 RACKING DETAIL (Side View)**

PV-3A

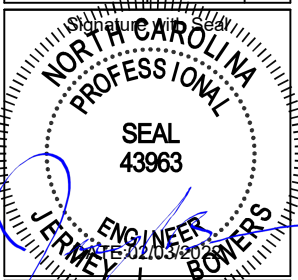
SCALE: NTS

Column -	C3.9x6.9x.14
Main -	C3.9x6.9x.12
Purlin -	Z5.15x2.1x0.12
Main Beam Column Connection	
(2) Diameter 3/4 Bolts	
Purlin to Main Beam Connection	
(1) Diameter 3/4 Bolts	



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REVISIONS		
DESCRIPTION	DATE	REV



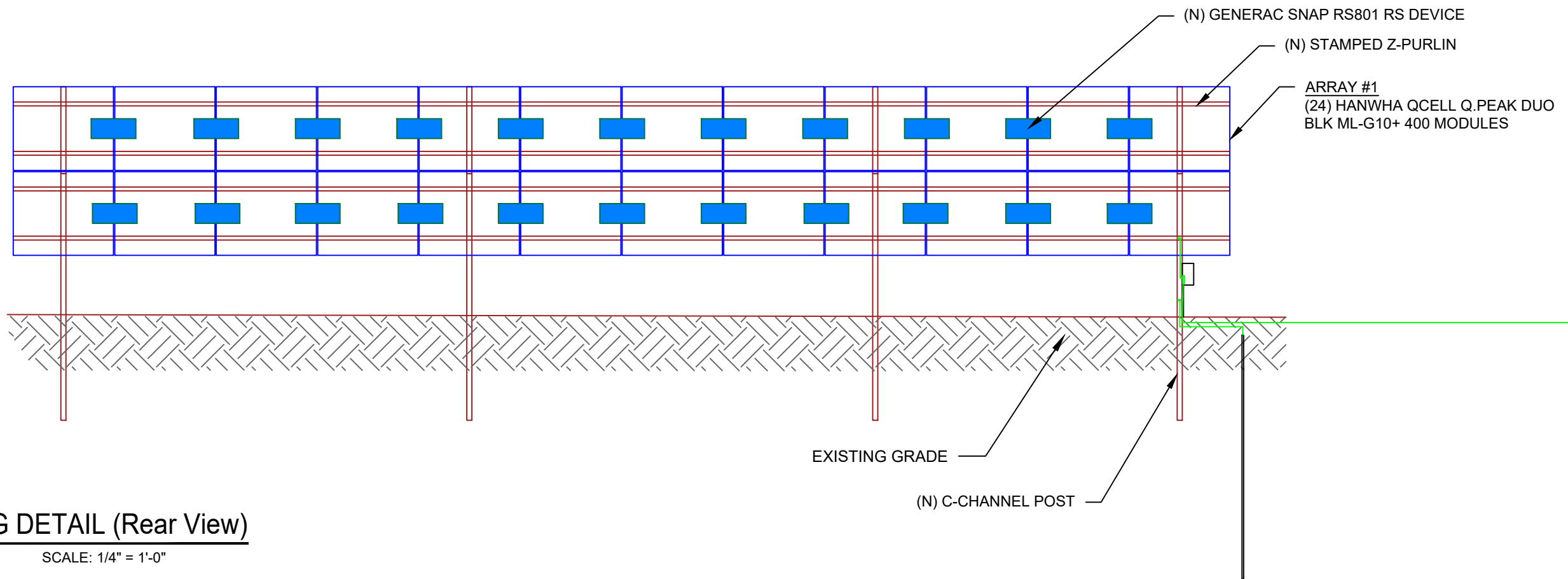
PROJECT NAME & ADDRESS  
04/12/2022

RIVERA FRANCISCO JR.  
RESIDENCE  
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SANFORD, NC 27332

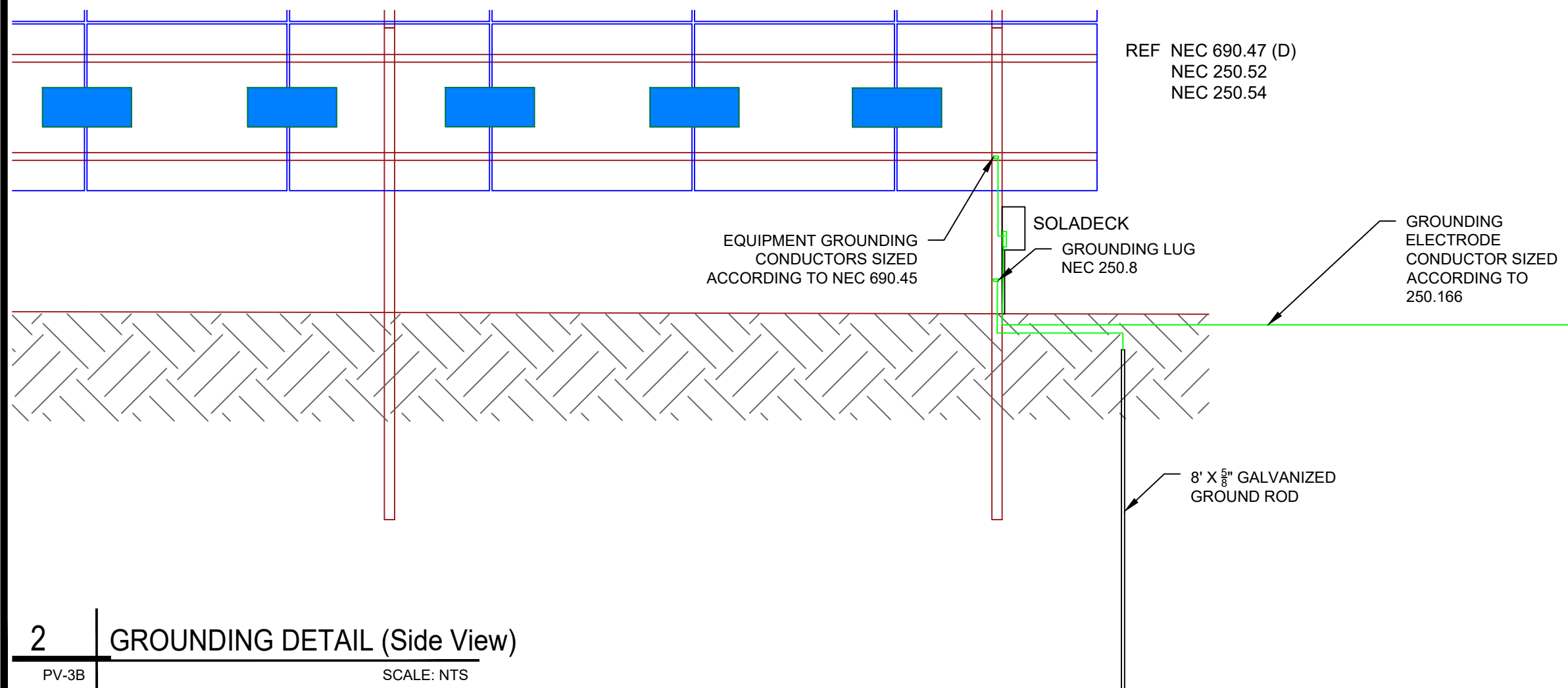
SHEET NAME  
**RACKING  
DETAIL**

SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PV-3A**



**1** RACKING DETAIL (Rear View)  
PV-3B SCALE: 1/4" = 1'-0"



**2** GROUNDING DETAIL (Side View)  
PV-3B SCALE: NTS

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REVISIONS

DESCRIPTION	DATE	REV

NORTH CAROLINA PROFESSIONAL SEAL  
43963  
JEREMY BOWERS  
ENGINEER  
02/03/2022

PROJECT NAME & ADDRESS  
04/12/2022

RIVERA FRANCISCO JR.  
RESIDENCE  
480 STONEY CREEK DR.,  
SANFORD, NC 27332

SHEET NAME  
RACKING  
DETAIL

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-3B

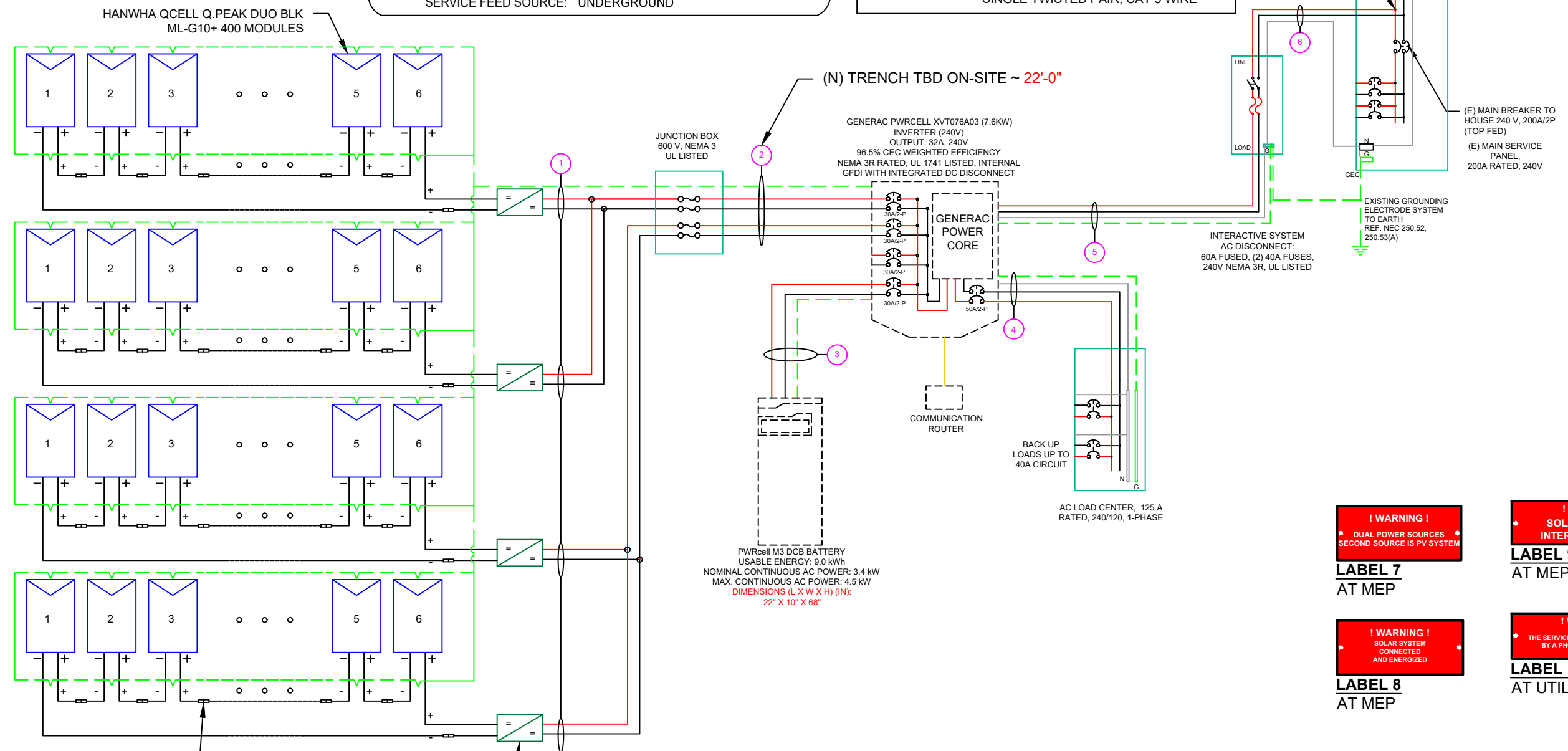
(24) HANWHA QCELL Q.PEAK DUO BLK ML-G10+ 400 MODULES  
 (4) PV LINKS OF 6 MODULES CONNECTED IN SERIES  
 TOTAL AC SYSTEM SIZE: 7.6kW  
 TOTAL DC SYSTEM SIZE: 9.6kW

**SERVICE INFO**

UTILITY PROVIDER: CENTRAL ELECTRIC MEMBERSHIP CORP.  
 MAIN SERVICE VOLTAGE: 240V  
 MAIN PANEL BRAND: N/A  
 MAIN SERVICE PANEL: 200A  
 MAIN CIRCUIT BREAKER RATING: 200A  
 MAIN SERVICE LOCATION: SOUTH-WEST  
 SERVICE FEED SOURCE: UNDERGROUND

**WIRE LEGEND**

- PV ARRAY +VE CONDUCTOR AND L1
- PV ARRAY -VE CONDUCTOR AND L2
- NEUTRAL CONDUCTOR
- EGC AND GEC
- SINGLE TWISTED PAIR, CAT 5 WIRE



SNAP RS (RS801)  
 MAX INPUT CURRENT - 13 A  
 UL 1741 LISTED  
 MODULE LEVEL RAPID SHUTDOWN (PVRSS) COMPLIANT  
 NEMA 6P RATED

PV LINK SUBSTRING OPTIMIZER (S2502)  
 RATED POWER : 2500W  
 MPPT VOLTAGE RANGE: 60 TO 360 V  
 MAX OUTPUT VOLTAGE: 420V  
 MAX OUTPUT CURRENT: 8A  
 RAPID SHUTDOWN COMPLIANT  
 GROUND-FAULT PROTECTION COMPLIANT

- WARNING: PHOTOVOLTAIC POWER SOURCE**  
**LABEL 1**  
 ON ALL PV CONDUITS SPACED AT MAX 10FT
- ! CAUTION ! SOLAR ELECTRIC SYSTEM CONNECTED AND ENERGIZED**  
**LABEL 3**  
 AT INVERTER
- ! WARNING ! ELECTRIC SHOCK HAZARD DO NOT TOUCH TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION**  
**LABEL 5**  
 AT EACH AC DISCONNECT
- 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  
**LABEL 2**  
 AT INVERTER
- PHOTOVOLTAIC DC DISCONNECT**  
**LABEL 4**  
 AT EACH DC DISCONNECT
- PHOTOVOLTAIC AC DISCONNECT**  
**LABEL 6**  
 AT EACH AC DISCONNECT

- ! WARNING ! DUAL POWER SOURCES SECOND SOURCE IS PV SYSTEM**  
**LABEL 7**  
 AT MEP
- ! CAUTION ! SOLAR POINT OF INTERCONNECTION**  
**LABEL 9**  
 AT MEP
- ! WARNING ! SOLAR SYSTEM CONNECTED AND ENERGIZED**  
**LABEL 8**  
 AT MEP
- ! WARNING ! THE SERVICE METER IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM**  
**LABEL 10**  
 AT UTILITY METER

QTY	CONDUCTOR INFORMATION	CONDUIT TYPE	CONDUIT SIZE
(8)	#10AWG - PV WIRE/USE-2	N/A	N/A
(1)	#6AWG - BARE COPPER IN FREE AIR	N/A	N/A
(4)	#10AWG - THWN-2	IMC OR PVC IN TRENCH/ LFNC	3/4"
(1)	#6AWG - THWN-2 GND	EMT OR FLEX	3/4"
(2)	#10AWG - THWN-2	EMT OR FLEX	3/4"
(1)	#10AWG - THWN-2 GND	EMT OR FLEX	3/4"
(3)	#6AWG - THWN-2	EMT OR FLEX	3/4"
(1)	#6AWG - THWN-2 GND	EMT OR FLEX	3/4"
(3)	#6AWG - THWN-2	EMT OR FLEX	3/4"
(1)	#6AWG - THWN-2 GND	EMT OR FLEX	3/4"
(3)	#6AWG - THWN-2	EMT OR FLEX	3/4"



**REVISIONS**

DESCRIPTION	DATE	REV
(E) MAIN BREAKER TO HOUSE 240 V, 200A/2P (TOP FED)		
(E) MAIN SERVICE PANEL, 200A RATED, 240V		

Signature with Seal

DATE: 02/03/2022

PROJECT NAME & ADDRESS

**RIVERA FRANCISCO JR.**  
**RESIDENCE**  
 480 STONEY CREEK DR.,  
 SANFORD, NC 27332

SHEET NAME  
**ELECTRICAL LINE DIAGRAM**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-4**

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	HANWHA QCELL Q.PEAK DUO BLK ML-G10+ 400
VMP	37.13V
IMP	10.77A
VOC	45.30V
ISC	11.14A
TEMP. COEFF. VOC	-0.27%/°C
PTC RATING	376.56W
MODULE DIMENSION	74.00"L x 41.1"W x 1.26"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	GENERAC PWRCELL XVT076A03 (7.6KW)
AC POWER OUTPUT (LOADS/GRID)	7600VA
AC POWER OUTPUT (BACKUP)	8000VA
NOMINAL OUTPUT VOLTAGE	240 VAC
MAX OUTPUT CURRENT @240V (LOADS/GRID)	32A
MAX OUTPUT CURRENT @240V (BACKUP)	50A
NOMINAL DC INPUT VOLTAGE	380Vdc
MAX DC INPUT VOLTAGE	420Vdc
CEC WEIGHTED EFFICIENCY	96.5%
MAX DC POWER (PV)	10000W
MAX INPUT CURRENT (PV)	20Adc
CONT. PEAK POWER (BATTERY)	8000W

SERIES SUB STRING OPTIMIZER SPECIFICATIONS	
MANUFACTURER / MODEL #	PV LINK S2502
RATED POWER	2500W
MPPT VOLTAGE RANGE	60-360 Vmp
MAXIMUM INPUT VOLTAGE	420Voc
MAXIMUM OUTPUT	420 Adc
NOMINAL OUTPUT	380 Vdc
MAXIMUM OUTPUT CURRENT	8 A
MAXIMUM SHORT CIRCUIT CURRENT	18 A

BATTERY SPECIFICATIONS	
MANUFACTURER / MODEL #	GENERAC PWRCELL M3 DCB BATTERY
USABLE ENERGY	9.0KWH
NOMINAL CONTINUOUS AC POWER	3.4kW
MAX. CONTINUOUS AC POWER	4.5kW
PEAK MOTOR STARTING CURRENT (2 SEC)	25A
REBUS VOLTAGE: INPUT/ OUTPUT	360-420Vdc
MODULE VOLTAGE	46.8Vdc
ROUND-TRIP EFFICIENCY	96.5%

**ELECTRICAL NOTES**

- 1.) ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- 2.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- 3.) WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- 4.) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- 5.) DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- 6.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- 7.) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- 8.) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- 9.) MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- 10.) THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-19°
AMBIENT TEMP (HIGH TEMP 2%)	34°
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	56°

**DC CONDUCTOR AMPACITY CALCULATIONS:  
PV LINK OPTIMIZER TO JUNCTION BOX:**

EXPECTED WIRE TEMP (In Celsius)	56°
TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a)	0.71
NO. OF CURRENT CARRYING CONDUCTORS	8
CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)	0.7
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16)	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	10A
1.25 X I <sub>max</sub>	
DERATED AMPACITY OF CIRCUIT CONDUCTOR	
TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16)	19.88A
Result should be greater than (10A) otherwise less the entry for circuit conductor size and ampacity	

**FROM JUNCTION BOX TO INVERTER:**

EXPECTED WIRE TEMP (In Celsius)	56°
TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a)	0.71
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)	0.8
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16)	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	20A
1.25 X I <sub>max</sub> X # of PV LINKS	
DERATED AMPACITY OF CIRCUIT CONDUCTOR	
TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16)	22.72A
Result should be greater than (20A) otherwise less the entry for circuit conductor size and ampacity	

**FROM BATTERY TO INVERTER:**

EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	2
CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)	1
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16)	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	31.25A
1.25 X I <sub>max</sub> (= 25A)	
DERATED AMPACITY OF CIRCUIT CONDUCTOR	
TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16)	38.40A
Result should be greater than (31.25A) otherwise less the entry for circuit conductor size and ampacity	

**AC CONDUCTOR AMPACITY CALCULATIONS:  
FROM INVERTER TO BACK-UP PANEL:**

No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER NEC TABLE 310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)	1
CIRCUIT CONDUCTOR SIZE	6 AWG
CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16)	75A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	42.5A
1.25 X INVERTER OUTPUT CURRENT (BACKUP POWER)	
DERATED AMPACITY OF CIRCUIT CONDUCTOR	
TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16)	72A
Result should be greater than (42.5A) otherwise less the entry for circuit conductor size and ampacity	

**AC CONDUCTOR AMPACITY CALCULATIONS:  
FROM INVERTER TO MEP:**

No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER NEC TABLE 310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)	1
CIRCUIT CONDUCTOR SIZE	6 AWG
CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16)	75A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	40A
1.25 X MAX INVERTER OUTPUT CURRENT (LOADS/GRID)	
DERATED AMPACITY OF CIRCUIT CONDUCTOR	
TEMP. CORRECTION PER TABLE 310.15 (B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY 310.15 (B)(16)	72A
Result should be greater than (40A) otherwise less the entry for circuit conductor size and ampacity	



REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

DATE:02/03/2022

**PROJECT NAME & ADDRESS**

**RIVERA FRANCISCO JR.  
RESIDENCE**  
480 STONEY CREEK DR.,  
SANFORD, NC 27332

SHEET NAME  
**WIRING  
CALCULATIONS**

SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PV-5**



powered by  
**Q.ANTUM DUO Z**

# Q.PEAK DUO BLK ML-G10+

## 385-405

ENDURING HIGH PERFORMANCE



### BREAKING THE 20% EFFICIENCY BARRIER

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.



### THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

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



### INNOVATIVE ALL-WEATHER TECHNOLOGY

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



### ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID Technology, Anti PID Technology<sup>1</sup>, Hot-Spot Protect and Traceable Quality Tra.Q™.



### EXTREME WEATHER RATING

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



### A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty<sup>2</sup>.

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

### THE IDEAL SOLUTION FOR:

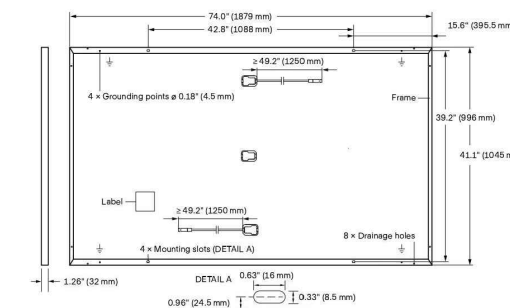


Engineered in Germany



### MECHANICAL SPECIFICATION

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm <sup>2</sup> Solar cable; (+) ≥ 49.2 in (1250 mm), (-) ≥ 49.2 in (1250 mm)
Connector	Stäubli MC4; IP68

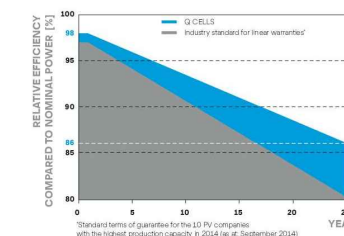


### ELECTRICAL CHARACTERISTICS

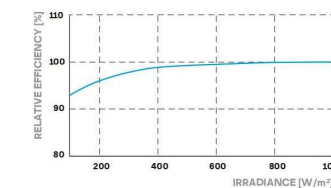
POWER CLASS		385	390	395	400	405
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC <sup>1</sup> (POWER TOLERANCE +5 W / -0 W)						
Power at MPP <sup>1</sup>	P <sub>MPP</sub> [W]	385	390	395	400	405
Short Circuit Current <sup>1</sup>	I <sub>SC</sub> [A]	11.04	11.07	11.10	11.14	11.17
Open Circuit Voltage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

<sup>1</sup> Measurement tolerances P<sub>MPP</sub> ± 3%; I<sub>SC</sub>; V<sub>OC</sub> ± 5% at STC: 1000 W/m<sup>2</sup>, 25 ± 2 °C, AM 1.5 according to IEC 60904-3 • <sup>2</sup> 800 W/m<sup>2</sup>, NMOT, spectrum AM 1.5

### Q CELLS PERFORMANCE WARRANTY



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



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m<sup>2</sup>)

### TEMPERATURE COEFFICIENTS

Temperature Coefficient of I <sub>SC</sub>	α [%/K]	+0.04	Temperature Coefficient of V <sub>OC</sub>	β [%/K]	-0.27
Temperature Coefficient of P <sub>MPP</sub>	γ [%/K]	-0.34	Nominal Module Operating Temperature	NMOT [°F]	109 ± 5.4 (43 ± 3 °C)

### PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V <sub>SYS</sub>	[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 <sup>3</sup>	[lbs/ft <sup>2</sup> ]	75 (3600 Pa) / 55 (2660 Pa)	Permitted Module Temperature on Continuous Duty	-40 °F up to +185 °F (-40 °C up to +85 °C)
Max. Test Load, Push / Pull <sup>3</sup>	[lbs/ft <sup>2</sup> ]	113 (5400 Pa) / 84 (4000 Pa)		

<sup>3</sup> See Installation Manual

### QUALIFICATIONS AND CERTIFICATES

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



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

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

### Hanwha Q CELLS America Inc.

400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us



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Web: www.powerhome.com

### REVISIONS

DESCRIPTION	DATE	REV

### Signature with Seal

DATE:02/03/2022

### PROJECT NAME & ADDRESS

RIVERA FRANCISCO JR.  
RESIDENCE  
480 STONEY CREEK DR.,  
SANFORD, NC 27332

SHEET NAME  
EQUIPMENT SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-6

Specifications subject to technical changes © Q CELLS Q.PEAK DUO BLK ML-G10+ -385-405-2021-05\_Rev01\_NA

.\generac inverter xvt076a03 ( rev d)-1.jpg

.\generac inverter xvt076a03 ( rev d)-2.jpg



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SANFORD, NC 27332

SHEET NAME

EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-7

**GENERAC**

# SnapRS™

Inline Disconnect Switch  
Model #: RS801 (Ordering SKU: APKE00011)



Generac SnapRS are a simple way to satisfy rapid shutdown compliance for solar + storage systems. Generac SnapRS are 2017/2020 NEC 690.12 compliant, don't require any extra hardware to mount, and need no pairing or fussy digital communications.

## FEATURES & BENEFITS

- Fast, easy, and simple to install
- One SnapRS device per PV module
- Achieves PVRSS Compliance
- Low cost, high efficiency solution

## SYSTEM DESIGN

Snap a Generac SnapRS disconnect device (RS) to the negative lead (-) of each module in the solar array for simple module-level rapid shutdown compliance. SnapRS devices isolate array voltage when a rapid shutdown is initiated at a PWRcell™ Inverter. When rapid shutdown is initiated, SnapRS units isolate each PV module in the array, reducing array voltage to <80V in seconds.

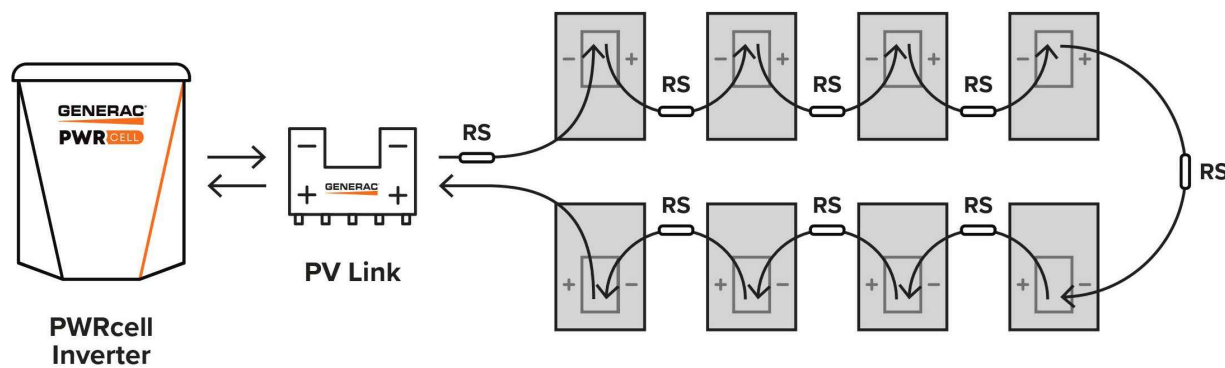


Diagram is applicable for most 60 cell PV modules. Modules with higher cell count may require a different arrangement. Contact Generac for more details.

## Specifications

SnapRS™ (APKE00011)	
PV MODULE MAX VOC:	75 V
EFFICIENCY:	99.8%*
MAX INPUT CURRENT:	13 A
MAX TOTAL QTY IN SUBSTRING:	10
SHUTDOWN TIME:	< 10 Seconds
ENCLOSURE RATING:	NEMA 6P
OPERATING TEMPERATURE - FAHRENHEIT (CELSIUS):	-40 to 158 °F (-40 to 70 °C)
CERTIFICATIONS:	UL1741
PROTECTIONS:	PVRSE
WEIGHT - LB (KG):	0.17 (0.08)
DIMENSIONS, L x W x H - IN (MM):	7" x 1" x 1" (177.8 x 25.4 x 25.4)
WARRANTY:	25 Years

\*When used with a 50V panel

Connect one SnapRS device to the negative lead of each PV module in the PV Link controlled array for complete PV Rapid shutdown performance



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545 W29290 Hwy. 59, Waukesha, WI 53189  
[www.Generac.com](http://www.Generac.com) | 888-GENERAC (436-3722)  
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**GENERAC**



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### REVISIONS

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DATE:02/03/2022

PROJECT NAME & ADDRESS

RIVERA FRANCISCO JR.  
RESIDENCE  
480 STONEY CREEK DR.,  
SANFORD, NC 27332

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-8

.\new battery spec sheet\_page-0001.jpg

## Specifications

### PWRcell™ BATTERY CONFIGURATIONS

BATTERY MODULE SERIES:	3.0 kWh DCB / 3.0 kWh EX			
BATTERY MODULES:	3	4	5	6
USABLE ENERGY:	9 kWh	12 kWh	15 kWh	18 kWh
NOMINAL CONT. AC POWER <sup>1</sup> :	3.4 kW	4.5 kW	5.6 kW	6.7 kW
MAX. CONT. AC POWER <sup>2</sup> :	4.5 kW	6 kW	7.5 kW	9 kW
NOMINAL CONT. DC (CHARGE/DISCHARGE) - A:	11.6	15.5	19.4	23.3
PEAK MOTOR STARTING CURRENT (2 SEC) - A, RMS:	25	33	42	50
REbus™ VOLTAGE - INPUT/OUTPUT:	360-420 VDC			
NOMINAL VOLTAGE:	380 VDC			
DC-DC ROUND-TRIP EFFICIENCY:	96.5%			
MAXIMUM AMBIENT OPERATING TEMPERATURE:	14 TO 122 °F (-10 TO 50 °C)			
OPTIMAL AMBIENT OPERATING TEMPERATURE:	41 to 104 °F (5 to 40 °C)			
MAXIMUM INSTALLATION ALTITUDE - FT (M):	9834 (3000)			
DIMENSIONS, L x W x H - IN (MM):	22" x 10" x 68" (559 x 254 x 1727)			
WEIGHT, ENCLOSURE - LB (KG):	115 (52)			
WEIGHT, INSTALLED W/ DCB MODULES - LB (KG):	280 (127)	335 (152)	390 (177)	445 (202)
WEIGHT, INSTALLED W/ EX MODULES - LB (KG):	287 (130)	344 (156)	401 (182)	459 (208)
WEIGHT, ACCESSORY MOUNTING HARDWARE - LB (KG):	21 (10)			
ENCLOSURE TYPE:	Type 3R			
WARRANTY - LI-ION MODULES:	10 Years, (7.56MWh)			
WARRANTY - ELECTRONICS AND ENCLOSURE:	10 Years			
COMMUNICATION PROTOCOL:	REbus™ DC Nanogrid™			
SEISMIC RATING:	IEEE 693-2018 (HIGH)			
COMPLIANCE:	UL 9540, UL 1973, UL 1642, CSA 22.2 #107.1			

<sup>1</sup>Average AC power over a complete discharge cycle. <sup>2</sup>Peak Performance, values provided for 40°C (104°F).  
Note: Charge/discharge rate may be reduced at temperature extremes

### PWRcell ACCESSORIES

Inside of the PWRcell Battery Cabinet, battery modules are stacked two deep on three levels, allowing for up to six modules to be connected in series. You can upgrade an existing PWRcell Battery Cabinet by adding Battery Modules and a Module Spacer (APKE00008). A Module Spacer is only required for battery configurations with an odd number of modules (i.e. 3 or 5).

Generac offers a convenient PWRcell Battery Upgrade Kit (APKE00009) to help replace lost or misplaced hardware.

Note: When adding modules, be sure all modules within an individual cabinet are of the same series type (i.e., EX or DCB).

### PWRcell MODEL BUILDER



Sample Model Name: PWRcell OR M3 DCB

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S45 W29290 Hwy. 59, Waukesha, WI 53189  
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**GENERAC**®



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Phone: 704-800-6591 (OFFICE)  
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Web: [www.powerhome.com](http://www.powerhome.com)

### REVISIONS

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DATE:02/03/2022

### PROJECT NAME & ADDRESS

RIVERA FRANCISCO JR.  
RESIDENCE  
480 STONEY CREEK DR.,  
SANFORD, NC 27332

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
PV-9

# GENERAC<sup>®</sup>

# PWRCELL

## OUTDOOR RATED BATTERY

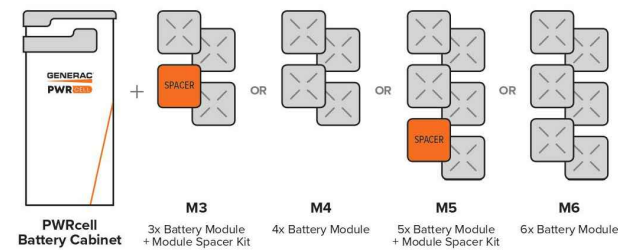
PWRcell Outdoor Rated Battery Cabinet (Ordering SKU: APKE00028)  
 3.0kWh PWRcell DCB Battery Module  
 Model #: BJ-DCB05ZKBG (Ordering SKU: G0080040)  
 3.0kWh PWRcell EX Battery Module  
 Model #: G0080001

The PWRcell™ Outdoor Rated (OR) Battery Cabinet is a Type 3R smart battery enclosure that allows for a range of configurations to suit any need, small or large, indoor or outdoor. No other smart battery offers the power and flexibility of PWRcell.

### PWRcell BATTERY CABINET DESIGN

The PWRcell Battery Cabinet allows system owners the flexibility to scale from an economical 9kWh to a massive 18kWh by installing additional battery modules to the PWRcell Battery Cabinet. An existing PWRcell Battery Cabinet can be upgraded with additional modules. Use the graphic below and the chart on the back of this sheet to understand what components you need for your chosen PWRcell configuration.

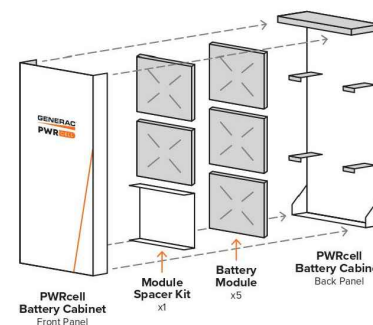
### BATTERY CONFIGURATION GUIDE



### FEATURES & BENEFITS

- Connect 2 PWRcell Battery Cabinets to a single PWRcell Inverter for up to 36kWh of storage
- Best-in-class battery backup power
- Plug-and-play with PWRcell Inverter and PV Link™
- Time-of-use (TOU) and zero-export ready
- Residential and commercial application ready.
- 3R-rated cabinet allows for outdoor or indoor installation
- Additional mounting hardware for outdoor installations comes standard to provide additional ground clearance and support

### BATTERY CABINET ASSEMBLY



POWER HOME SOLAR, LLC  
 "POWER YOUR FUTURE"  
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 MOORESVILLE, NC 28115  
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 Email: info@powerhome.com  
 Web: www.powerhome.com

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#### PROJECT NAME & ADDRESS

RIVERA FRANCISCO JR.  
 RESIDENCE  
 480 STONEY CREEK DR.,  
 SANFORD, NC 27332

SHEET NAME  
**EQUIPMENT SPECIFICATION**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-9A**

**GENERAC**

# PV Link™

2500W MPPT Substring Optimizer  
Model #: S2502 (Ordering SKU: APKE00010)

PV Link is the simple solar optimizer for quick installation and long-lasting performance. Connect PV modules to each PV Link to overcome shading and challenging roof lines.

## FEATURES & BENEFITS

- Fast, simple installation
- Lower failure risk than module-level optimizers
- 2017/2020 NEC rapid shutdown compliant with SnapRS™
- Quick connections with MC4 connectors
- Exports up to 2500W
- Compatible with PWRcell™ Inverters
- Cost-effective solution for high-performance PV
- Ground-fault protection

## SINGLE-STRING PV ARRAY WITH SnapRS DEVICES

Where PV module-level rapid shutdown is required (NEC 690.12), a SnapRS device (RS) is installed to negative (-) lead of each PV module.

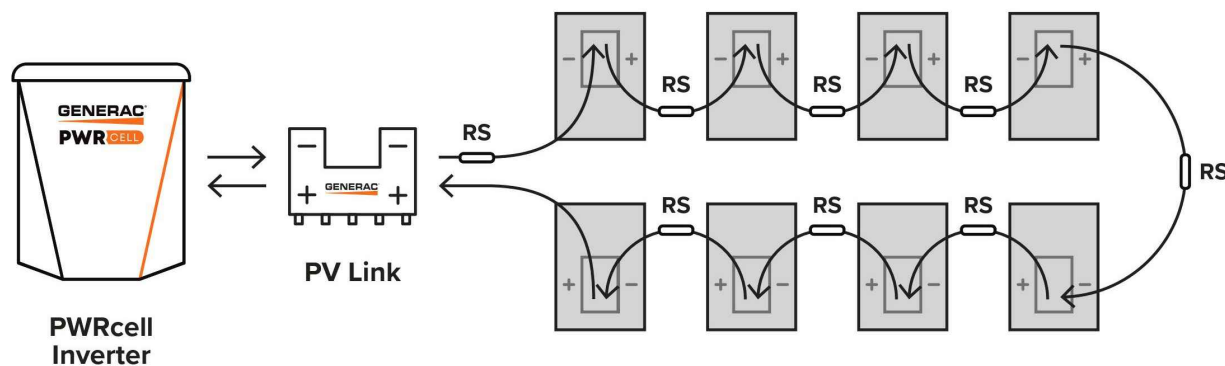


Diagram is applicable for most 60 cell PV modules. Modules with higher cell count may require a different arrangement. Contact Generac for more details.



## Specifications

PV Link™ (APKE00010)	
RATED POWER*:	2500W
PEAK EFFICIENCY:	99%
MPPT VOLTAGE RANGE:	60-360 VMP
MAX INPUT VOLTAGE:	420 VOC; max when cold
MAX OUTPUT:	420 VOC
NOMINAL OUTPUT (REbus™):	380 VDC
MAX OUTPUT CURRENT (CONTINUOUS):	8 A
MAX OUTPUT CURRENT (FAULT):	10 A
MAX INPUT CURRENT (CONTINUOUS):	13 A @ 50°C, 10 A @ 70°C
MAX INPUT SHORT CIRCUIT CURRENT (ISC):	18 A
STANDBY POWER:	< 1 W
PROTECTIONS:	Ground-fault, Arc-fault (Arc-fault Type 1 AFCI, Integrated), PVRSE
MAX OPERATING TEMP: FAHRENHEIT (CELSIUS)	158 °F (70 °C)
SYSTEM MONITORING:	PWRview™ Web Portal and Mobile App
ENCLOSURE:	Type 4X
WEIGHT - LB (KG):	7.3 lb (3.3 kg)
DIMENSIONS, L x W x H - IN (MM):	15.4" x 2" x 9.6" (391.2 x 50.8 x 243.8)
COMPLIANCE:	UL 1741, CSA 22.2
WARRANTY:	25 Years

\*PV Link can tolerate higher than rated power at its input if Max Input Voltage and Short Circuit Current specifications are not exceeded



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PROJECT NAME & ADDRESS

RIVERA FRANCISCO JR.  
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480 STONEY CREEK DR.,  
SANFORD, NC 27332

SHEET NAME  
EQUIPMENT  
SPECIFICATION

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-10



# Sinclair Designs & Engineering

## Your One-Stop-Shop for Solar Racking Solutions

Carport Systems   Pole Mount Trackers   Ground Mount Systems   Commercial Roof Mount Systems



T - Y - L - A Carports   Fixed, Single, Dual Axis Sun Trackers   5 - 45 Degree GroPost/Ballastund Mount Systems   5 - 7 - 10 Degree Roof Mounts

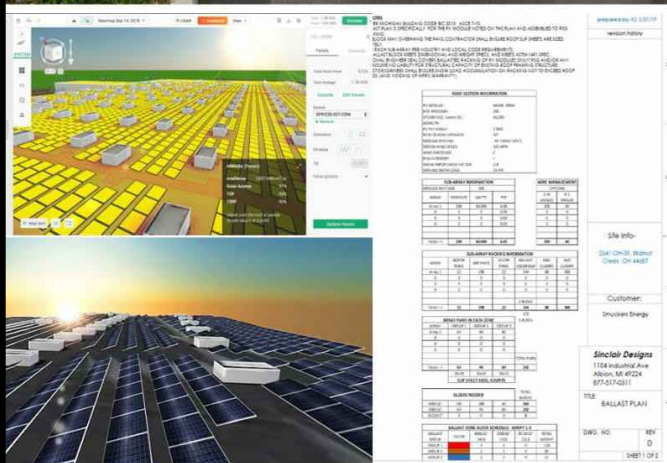
SDE: Project Development Support (Using Aurora PV Software & Solid-Works)

Our NABCEP certified PV designers and Engineers can support you through every phase of your project.

Preliminary Designs for Quick Proposals: 3D Modeling, PV Production, Shade Analysis, & Site Drawings

Ballast Calculations with PSF Analysis

Accurate Component Pricing & Project Bill of Materials



**Need Installation Support?** Our new business partners can provide geotechnical support and offer installation pricing for all of our racking systems. Together, we are on track to install over 80 Megawatts of power throughout the USA in 2019.

# PRODUCT SPEC SHEET

Fixed Tilt System - Module Clamp Kits or Direct to Frame   Season Adjust - Manual



TILT ANGLE	5 - 40 DEGREES	TERRAIN	+/- 5 DEG E/W
MODULE ORIENTATION	2 HIGH PORTRAIT	WIRE MANAGEMENT	ZIP TIE HOLES AVAILABLE
WIND LOAD	125 MPH	WARRANTY	20 - 25 YEAR OPTIONS
SNOW LOAD	60 PSF	MATERIAL	GRADE 50 - 60 HSLA STEEL
GROUND CLEARANCE	24 - 36 IN	COATING	GALVANIZED
MODULE CLAMPS OR DIRECT TO FRAME	OPTIONAL	MANUFACTURING	USA - MICHIGAN MADE

**Note: Higher wind load/snow load options are available. Formal site specific structural calculations available upon request.**

4X MAIN COMPONENTS	ADDITIONAL COMPONENTS	MINIMAL HARDWARE
1. C-CHANNEL-POST	HIGH WIND/SNOW	2 X 5/8-11 X 1 3/4 BOLTS
2. STRUT-40	STRONG-BACKS	2 X 5/8-11 SERRATED NUTS
3. TRUSS/GIRDER	CANTILEVERS	14 X 1/2-13 X 1 3/4 BOLTS
4. Z-PURLIN (2-5 PANEL LENGTHS)	STRUT-50	14 X 1/2-13 SERRATED NUTS



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PV-11