

PROJECT DESCRIPTION:

12 X 320 HANWHA QCELL Q.PEAK DUO-G5 320 (320 W) MODULES
GROUND MOUNTED SOLAR PHOTOVOLTAIC MODULES

SYSTEM SIZE: 3.84 kW DC STC
ARRAY AREA: #1 - 217.68 SQ FT

AUTHORITIES HAVING JURISDICTION

BUILDING : HARNETT COUNTY
ZONING : HARNETT COUNTY
UTILITY : DUKE ENERGY

APPLICABLE CODES & STANDARDS

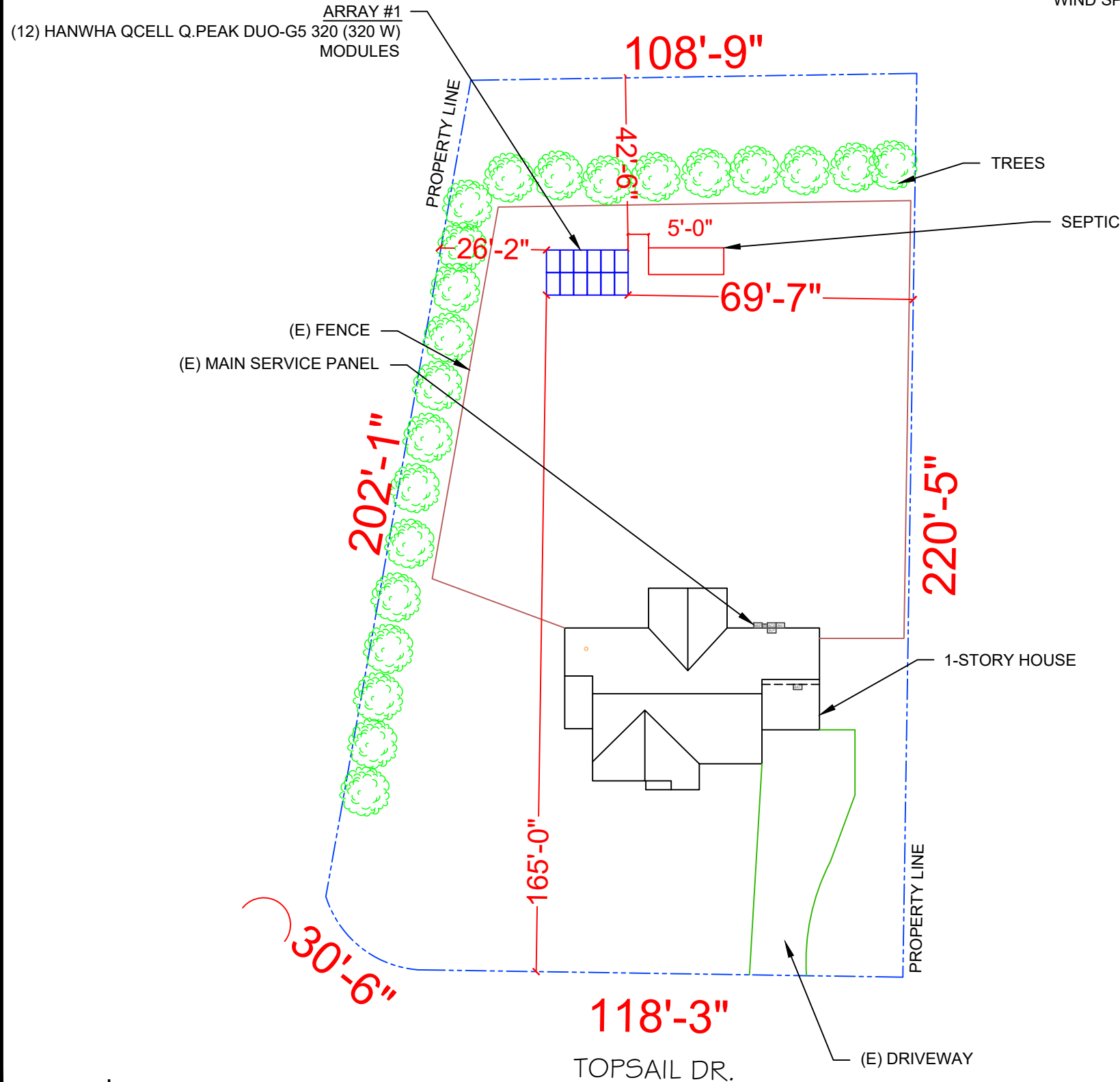
NCBC 2018
NEC 2017

DESIGN SPECIFICATION

OCCUPANCY: II
CONSTRUCTION: SINGLE-FAMILY
FIRE: RESIDENTIAL
GROUND SNOW LOAD: 15 PSF
WIND EXPOSURE: B
WIND SPEED: 116 MPH

EQUIPMENT SUMMARY

12 HANWHA QCELL Q.PEAK DUO-G5 320 (320 W) MODULES
02 GENERAC PV LINK S2502 POWER OPTIMIZERS
01 GENERAC PWRCELL X7602 (7600 W) INVERTER



1 PLOT PLAN WITH ROOF PLAN

PV-1 SCALE: 1/20"=1'-0"

NOTE: GROUND MOUNT LOCATION TBD ON-SITE



2 HOUSE PHOTO

PV-1 SCALE: NTS



3 VICINITY MAP

PV-1 SCALE: NTS

SHEET INDEX

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

POWERHOME
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REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal
DATE: 07/16/2020

PROJECT NAME & ADDRESS

JODI WITT
RESIDENCE
15 TOPSAIL DR.,
ANGIER, NC 27501

SHEET NAME
PLOT PLAN & VICINITY MAP

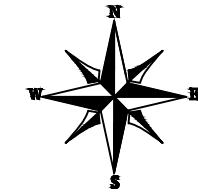
SHEET SIZE
**ANSI B
11" X 17"**

SHEET NUMBER
PV-1

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 12 MODULES
 MODULE TYPE = HANWHA QCELL Q.PEAK DUO-G5 320 (320 W) MODULES
 MODULE WEIGHT = 41.2 LBS / 18.7 KG.
 MODULE DIMENSIONS = 66.3"x 39.4" = 18.14 SF
 UNIT WEIGHT OF ARRAY = 2.27 PSF

TILT - 30°
 AZIM. - 180°



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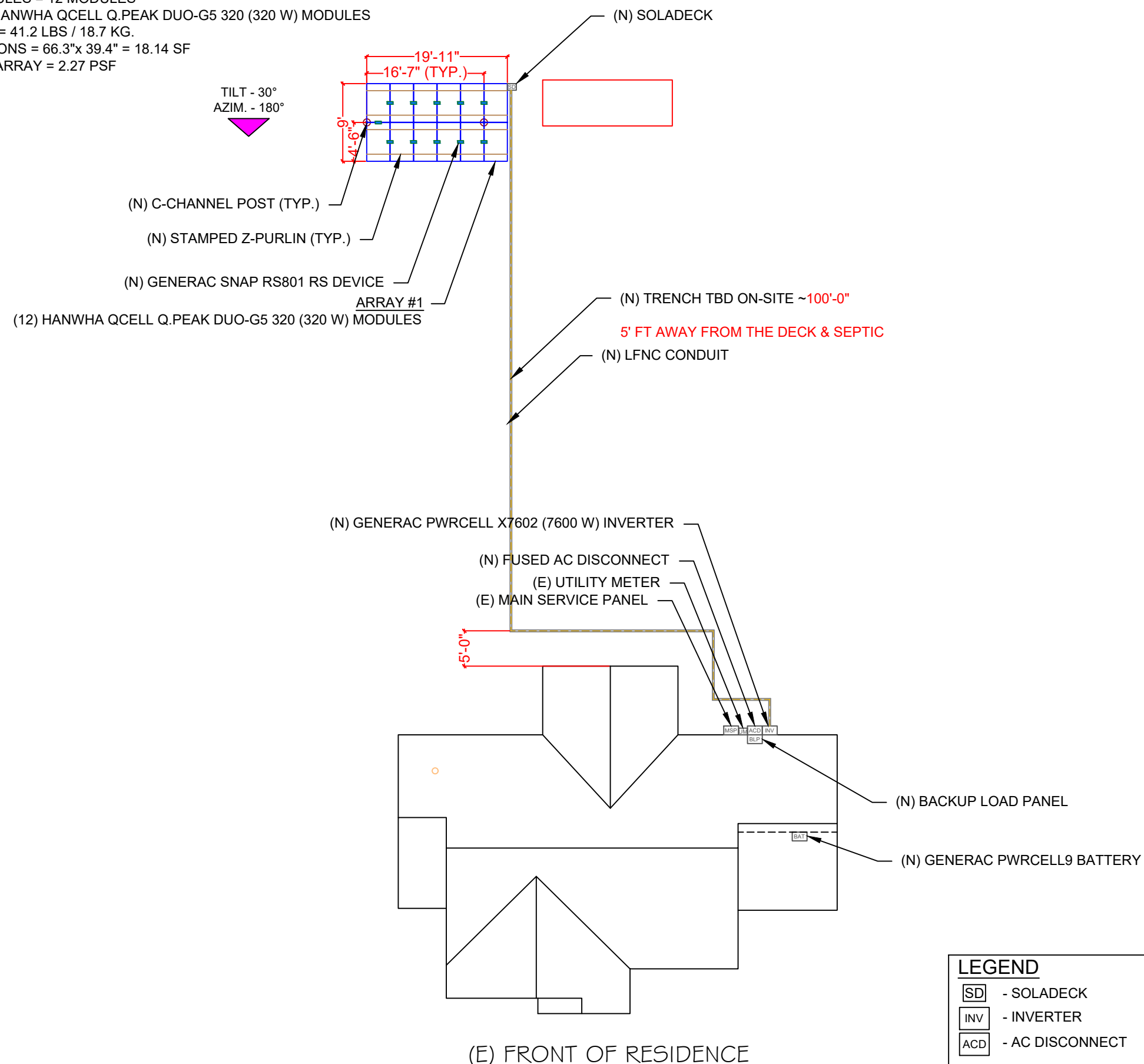
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**JODI WITT
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 ANGIER, NC 27501

SHEET NAME
ROOF PLAN & MODULES

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

SHEET NUMBER
PV-2

(E) BACK OF RESIDENCE

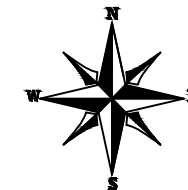


(E) FRONT OF RESIDENCE

TOPSAIL DR.

LEGEND

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



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SHEET NAME

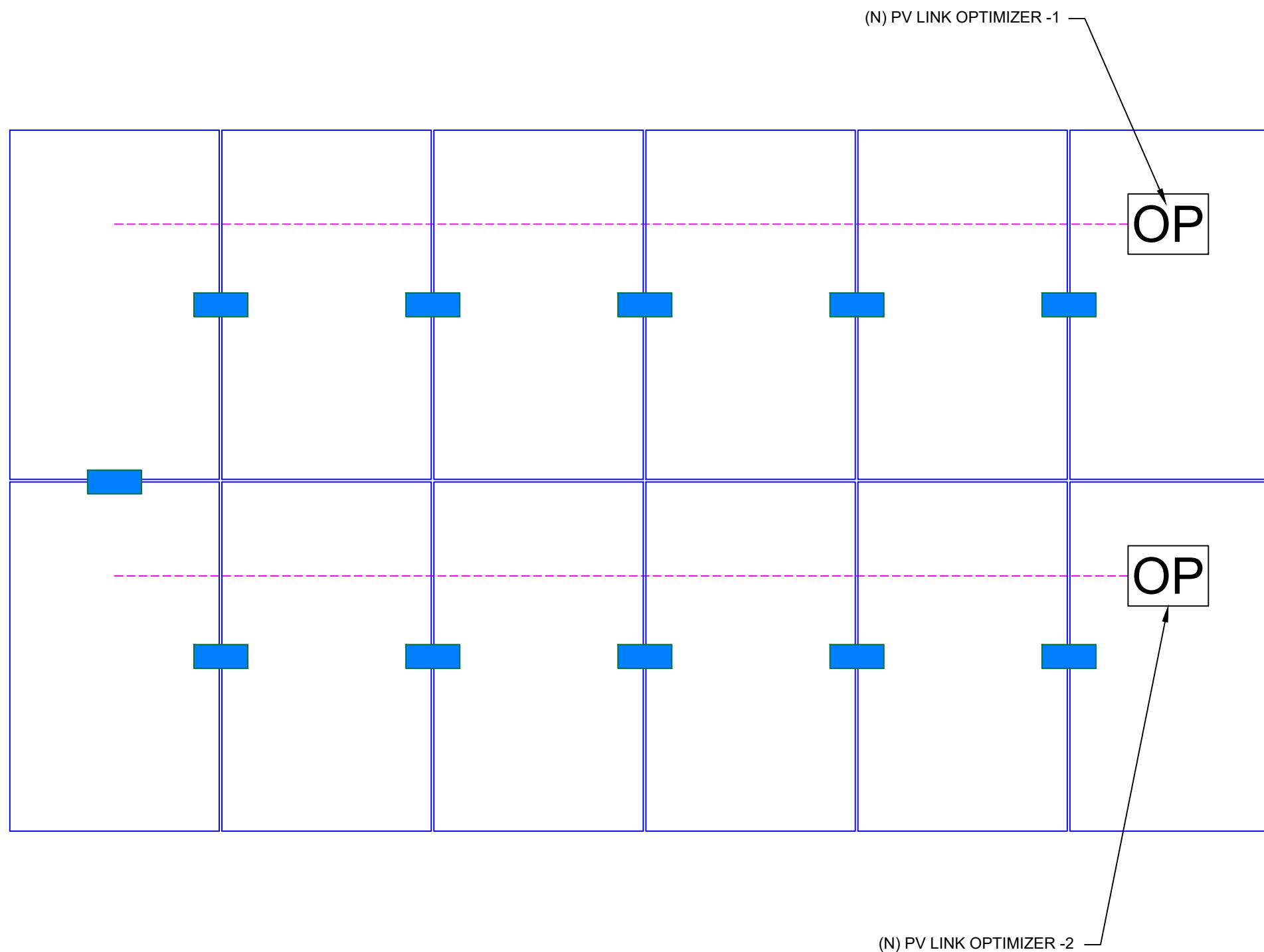
STRING
 LAYOUT

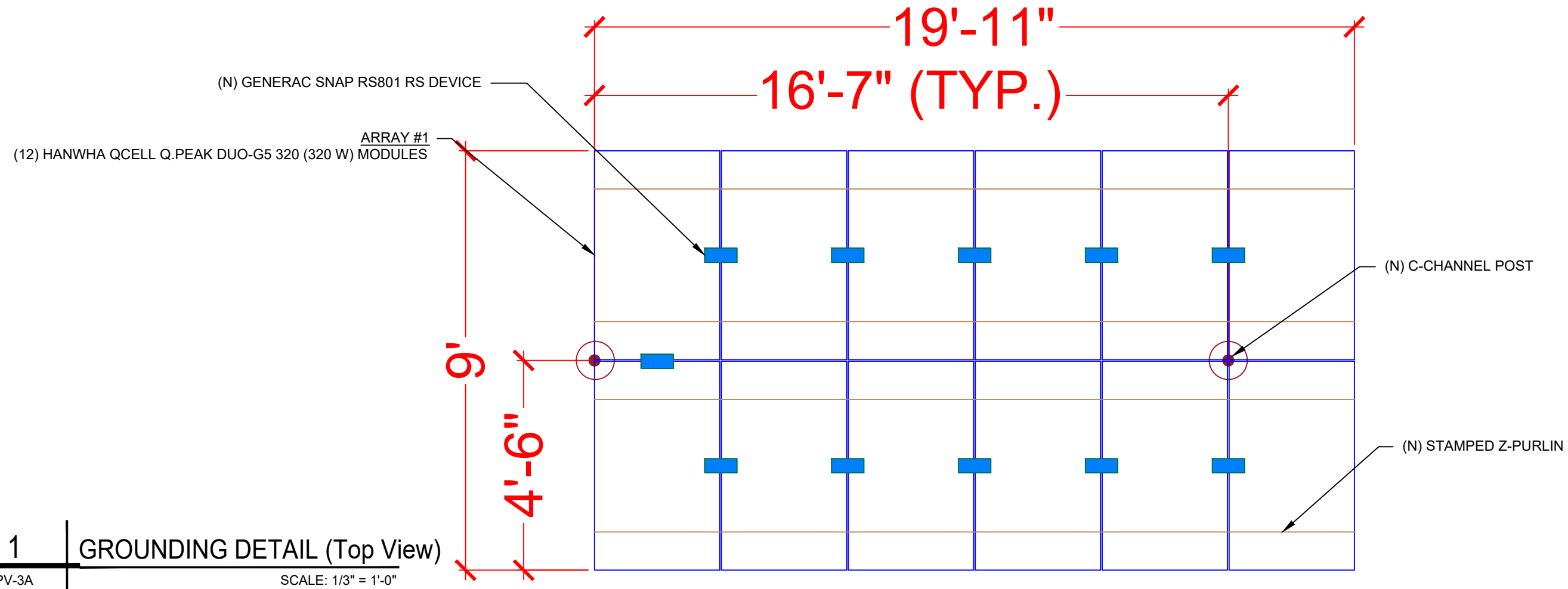
SHEET SIZE

ANSI B
 11" X 17"

SHEET NUMBER

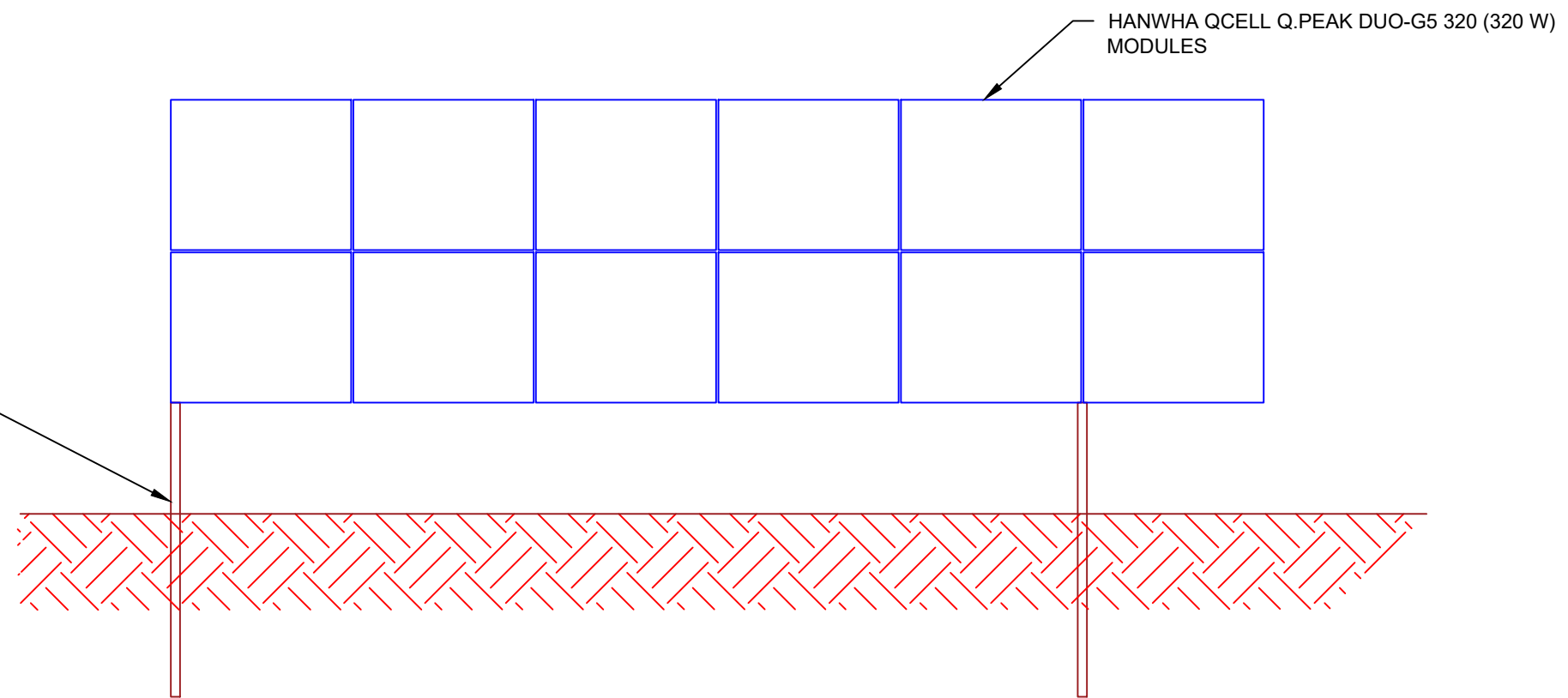
PV-2A





1 | GROUNDING DETAIL (Top View)

PV-3A | SCALE: 1/3" = 1'-0"



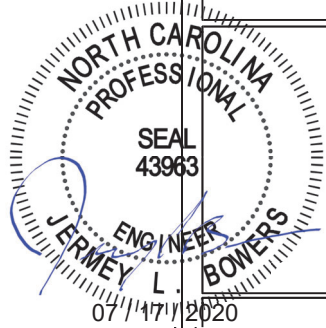
2 | GROUNDING DETAIL (Front View)

PV-3A | SCALE: 1/3" = 1'-0"

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DESCRIPTION	DATE	REV



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E & ADDRESS

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 ANGIER, NC 27501

SHEET NAME	GROUNDING DETAIL
SHEET SIZE	ANSI B 11" X 17"
SHEET NUMBER	PV-3A

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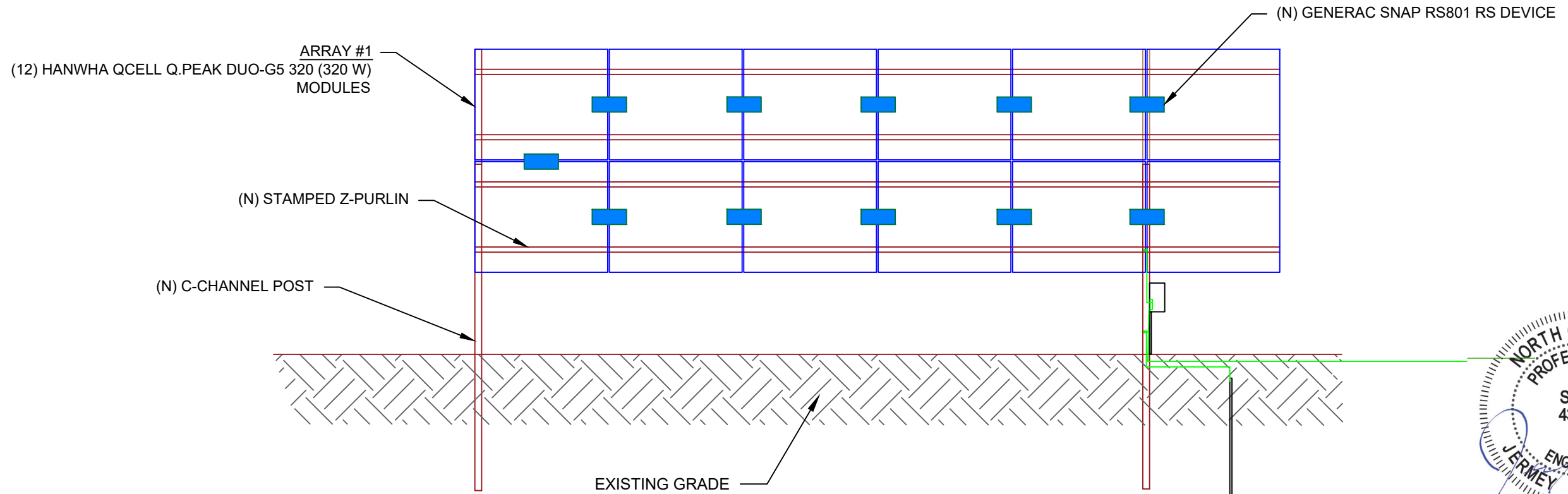
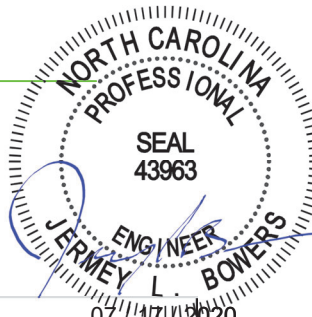
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**JODI WITT
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SHEET NAME
**GROUNDING
 DETAIL**

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

SHEET NUMBER
PV-3B



1 GROUNDING DETAIL (Rear View)

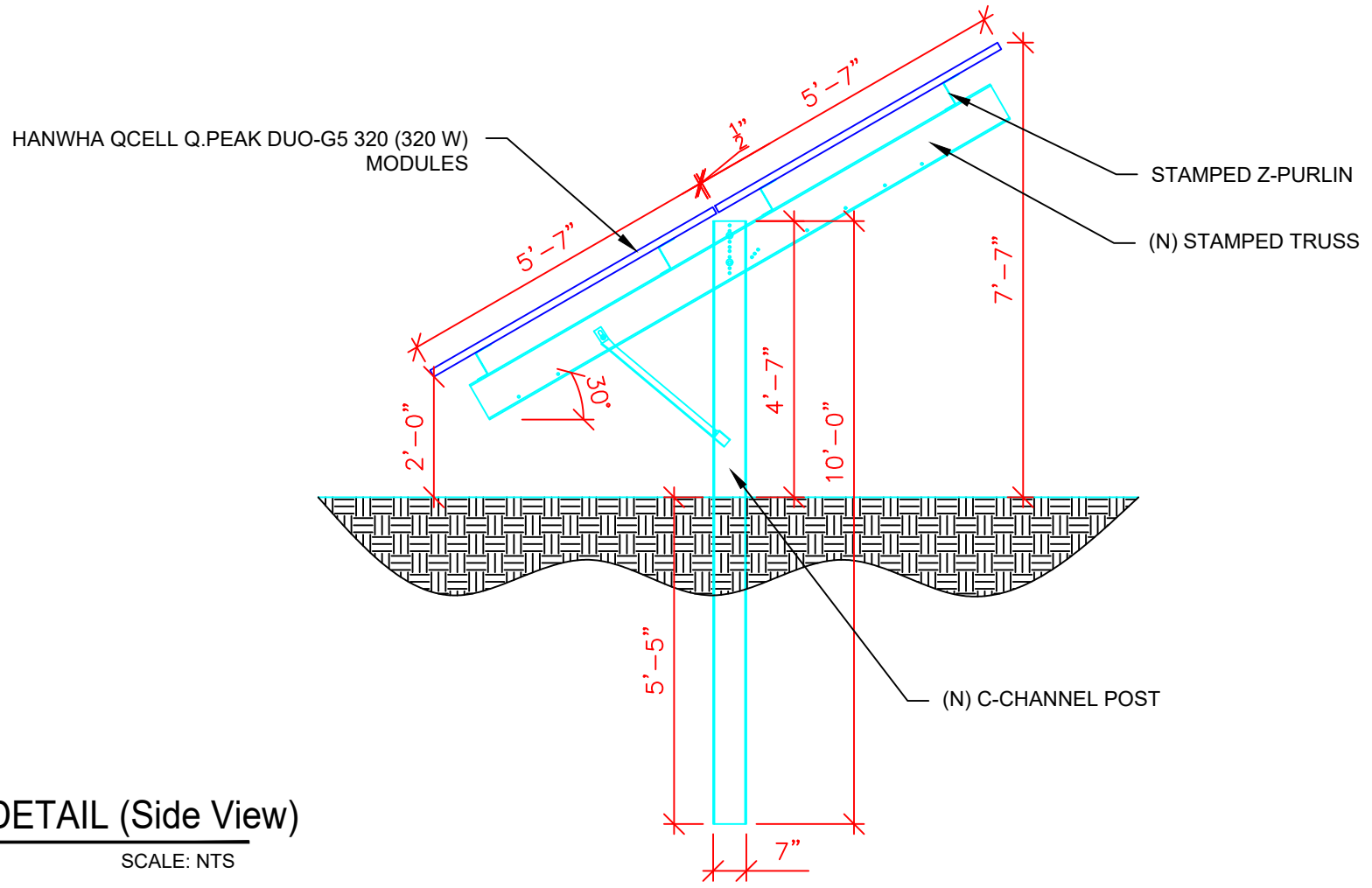
PV-3B SCALE: 1/3" = 1' - 0"

IBC 2015 07/17/2020

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	
	$S_{D_s} = 0.184$
	$S_{D_1} = 0.132$
	Site Class = D
	$I_e = 1.00$
	SDC = B
	Base Shear V = 18.55 lb

Soil Assumed to be Stiff

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



2 GROUNDING DETAIL (Side View)

PV-3B SCALE: NTS

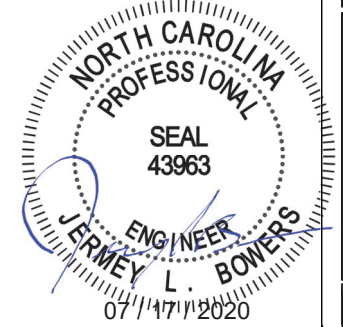
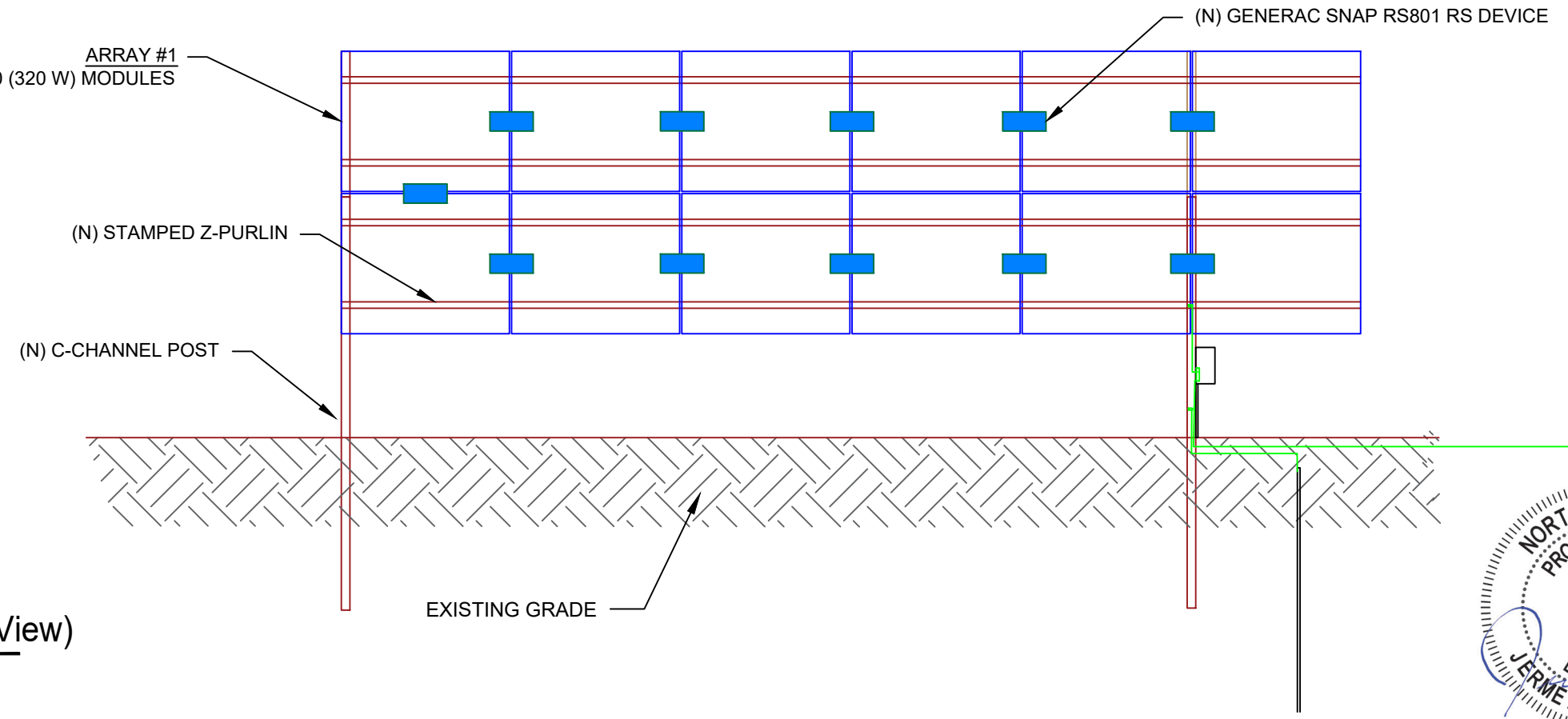
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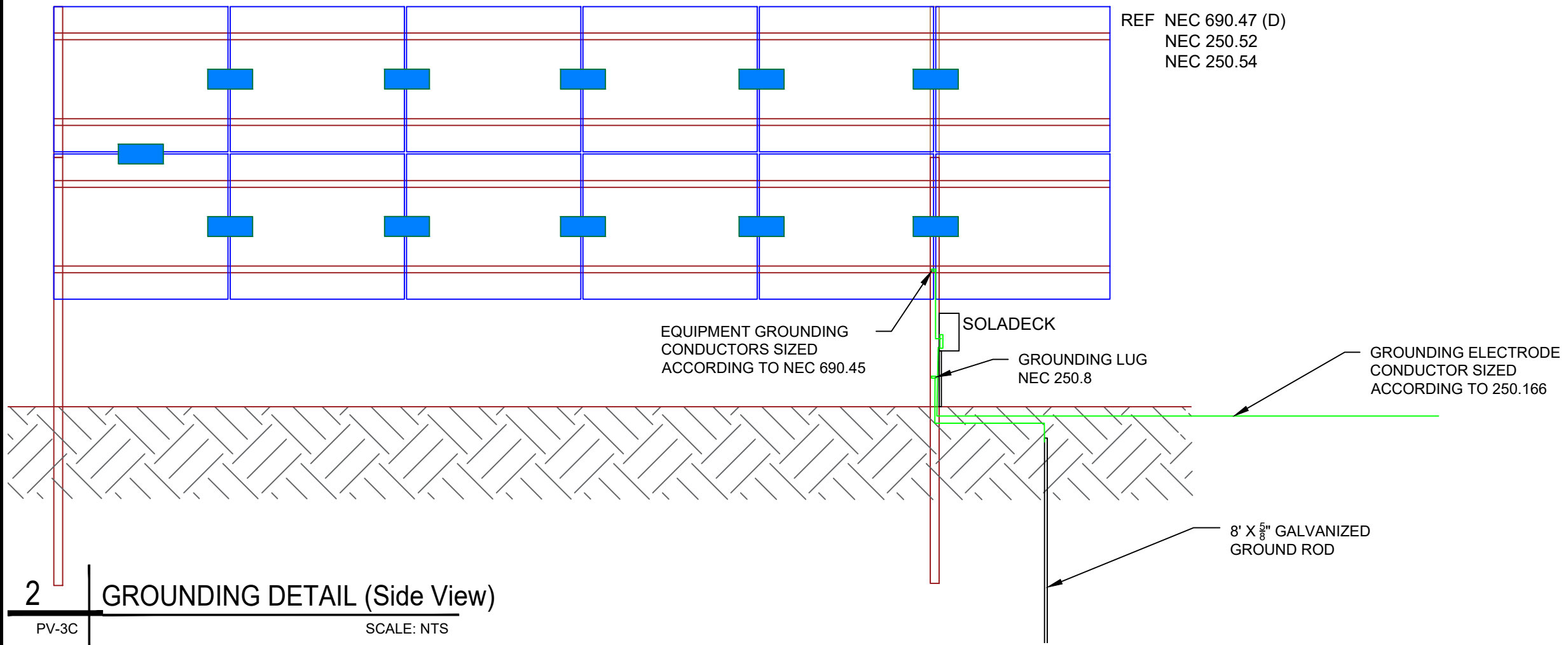
PROJECT NAME & ADDRESS
**JODI WITT
 RESIDENCE**
 15 TOPSAIL DR.,
 ANGIER, NC 27501

SHEET NAME GROUNDING DETAIL
SHEET SIZE ANSI B 11" X 17"
SHEET NUMBER PV-3C

1 | **GROUNDING DETAIL (Rear View)**
 PV-3C | SCALE: 1/4" = 1'-0"



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

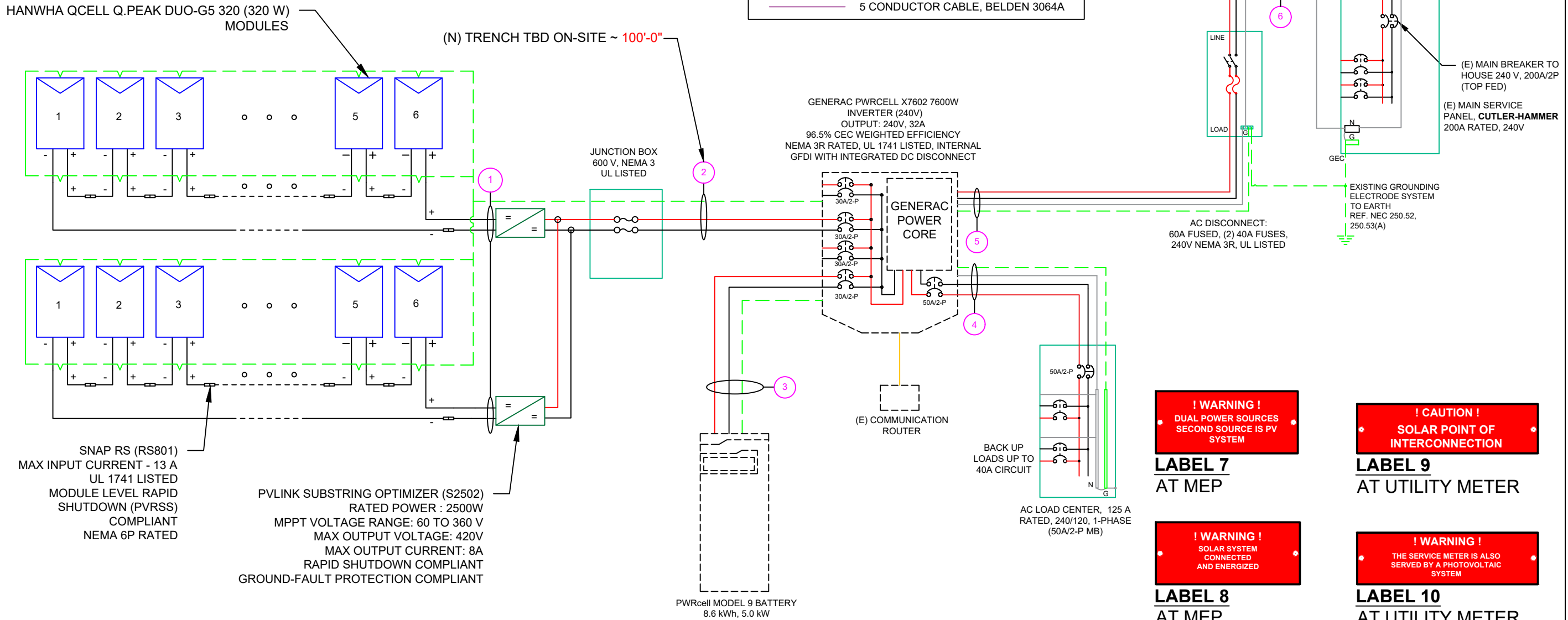


(12) HANWHA QCELL Q.PEAK DUO-G5 320 (320 W) MODULES
 (2) PV LINKS OF 06 MODULES CONNECTED IN SERIES

SERVICE INFO
 UTILITY PROVIDER: DUKE ENERGY
 MAIN SERVICE VOLTAGE: 240V
 MAIN PANEL BRAND: CUTLER-HAMMER
 MAIN SERVICE PANEL: 200A
 MAIN CIRCUIT BREAKER RATING: 200A
 MAIN SERVICE LOCATION: NORTH
 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, BELDEN 3106A
- SINGLE TWISTED PAIR, BELDEN 3088A
- 5 CONDUCTOR CABLE, BELDEN 3064A



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

PVLINK 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

GENERAC PWRCELL X7602 7600W
 INVERTER (240V)
 OUTPUT: 240V, 32A
 96.5% CEC WEIGHTED EFFICIENCY
 NEMA 3R RATED, UL 1741 LISTED, INTERNAL
 GFDI WITH INTEGRATED DC DISCONNECT

! WARNING !
 DUAL POWER SOURCES
 SECOND SOURCE IS PV
 SYSTEM

LABEL 7
 AT MEP

! CAUTION !
 SOLAR POINT OF
 INTERCONNECTION

LABEL 9
 AT UTILITY METER

! WARNING !
 SOLAR SYSTEM
 CONNECTED
 AND ENERGIZED

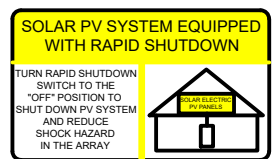
LABEL 8
 AT MEP

! WARNING !
 THE SERVICE METER IS ALSO
 SERVED BY A PHOTOVOLTAIC
 SYSTEM

LABEL 10
 AT UTILITY METER

! WARNING !
 PHOTOVOLTAIC
 POWER
 SOURCE

LABEL 1
 ON ALL CONDUITS SPACED AT
 MAX 10FT



LABEL 2
 AT INVERTER

! CAUTION !
 SOLAR ELECTRIC
 SYSTEM
 CONNECTED AND
 ENERGIZED

LABEL 3
 AT INVERTER

**PHOTOVOLTAIC
 DC DISCONNECT**

LABEL 4
 AT EACH DC
 DISCONNECT

! WARNING !
 ELECTRIC SHOCK HAZARD
 DO NOT TOUCH TERMINALS
 TERMINALS ON BOTH LINE AND LOAD SIDES
 MAY BE ENERGIZED IN THE OPEN POSITION

LABEL 5
 AT EACH AC
 DISCONNECT

**PHOTOVOLTAIC
 AC DISCONNECT**

LABEL 6
 AT EACH AC
 DISCONNECT

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

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**JODI WITT
 RESIDENCE**
 15 TOPSAIL DR.,
 ANGIER, NC 27501

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-G5 320 (320 W) MODULES
VMP	33.32V
IMP	9.60A
VOC	40.13V
ISC	10.09A
TEMP. COEFF. VOC	-0.28%/°C
PTC RATING	297W
MODULE DIMENSION	66.3"L x 39.4"W x 1.26"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	GENERAC PWRCELL X7602
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 BATTERY
USABLE ENERGY	8.6kW
RATED CONTINUOUS POWER	3.4Kw
POWER: 60 MINUTES	4.2kW
POWER: 2 MINUTES	5.0kW
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	-20°
AMBIENT TEMP (HIGH TEMP 2%)	32°
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	54°

DC CONDUCTOR AMPACITY CALCULATIONS: ARRAY TO JUNCTION BOX:

EXPECTED WIRE TEMP (In Celsius)	54°
TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a)	0.76
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)	10A
1.25 X I _{max}	
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)	24.32A
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)	54°
TEMP. CORRECTION PER NEC TABLE 310.15 (B)(2)(a)	0.76
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)	20A
1.25 X I _{max} 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)	30.4A
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)	32°
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	10 AWG
CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16)	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	26.25A
1.25 X I _{max}	
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 (26.25A) otherwise less the entry for circuit conductor size and ampacity	

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

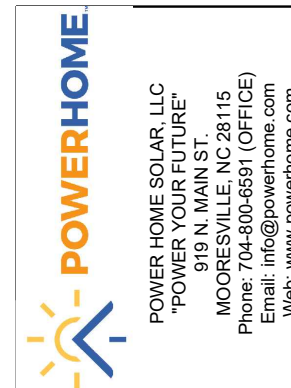
No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	32°
TEMP. CORRECTION PER NEC TABLE 310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)	1
CIRCUIT CONDUCTOR SIZE	6 AWG
CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16)	75A

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)	32°
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	



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SHEET NAME
**WIRING
CALCULATIONS**

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

SHEET NUMBER
PV-5



Q.ANTUM SOLAR MODULE

The new Q.PEAK DUO-G5 solar module from Q CELLS impresses thanks to innovative Q.ANTUM DUO Technology, which enables particularly high performance on a small surface. Q.ANTUM's world-record-holding cell concept has now been combined with state-of-the-art circuitry half cells and a six-busbar design, thus achieving outstanding performance under real conditions - both with low-intensity solar radiation as well as on hot, clear summer days.



Q.ANTUM TECHNOLOGY: LOW LEVELIZED COST OF ELECTRICITY
Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 19.9%.



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 and Anti PID Technology¹, Hot-Spot Protect and Traceable Quality Tra.Q™.



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



A RELIABLE INVESTMENT
Inclusive 12-year product warranty and 25-year linear performance guarantee².



STATE OF THE ART MODULE TECHNOLOGY
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.

THE IDEAL SOLUTION FOR:

- Rooftop arrays on residential buildings
- Rooftop arrays on commercial and industrial buildings

Engineered in Germany

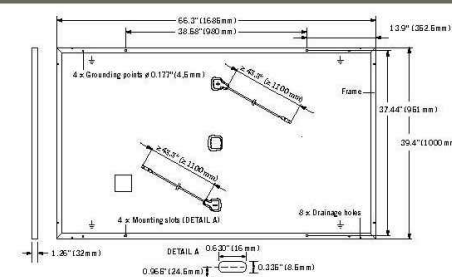


¹ APT test conditions according to IEC/TS 62804-1:2015, method B (~1500V, 168h)
² See data sheet on rear for further information.



MECHANICAL SPECIFICATION

Format	66.3 in x 39.4 in x 1.26 in (including frame) (1685 mm x 1000 mm x 32 mm)
Weight	41.2 lbs (18.7 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 x 20 monocrystalline Q.ANTUM solar half-cells
Junction box	2.76-3.35 in x 1.97-2.76 in x 0.51-0.83 in (70-85 mm x 50-70 mm x 13-21 mm), decentralized, IP67
Cable	4 mm ² Solar cable; (+) ≥ 43.3 in (1100 mm), (-) ≥ 43.3 in (1100 mm)
Connector	Multi-Contact MC4, IP68

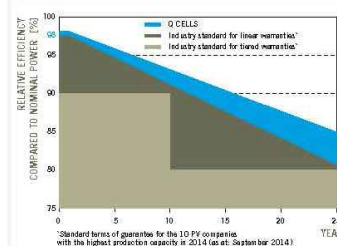


ELECTRICAL CHARACTERISTICS

POWER CLASS		315	320	325	330	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC¹ (POWER TOLERANCE +5W / -0W)						
Minimum	Power at MPP¹	P_{MPP} [W]	315	320	325	330
	Short Circuit Current¹	I_{SC} [A]	10.04	10.09	10.14	10.20
	Open Circuit Voltage¹	V_{OC} [V]	39.87	40.13	40.40	40.66
	Current at MPP¹	I_{MPP} [A]	9.55	9.60	9.66	9.71
	Voltage at MPP¹	V_{MPP} [V]	32.98	33.32	33.65	33.98
	Efficiency¹	η [%]	≥ 18.7	≥ 19.0	≥ 19.3	≥ 19.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT²						
Minimum	Power at MPP	P_{MPP} [W]	235.3	239.0	242.8	246.5
	Short Circuit Current	I_{SC} [A]	8.09	8.13	8.17	8.22
	Open Circuit Voltage	V_{OC} [V]	37.52	37.77	38.02	38.27
	Current at MPP	I_{MPP} [A]	7.52	7.56	7.60	7.64
	Voltage at MPP	V_{MPP} [V]	31.30	31.62	31.94	32.25

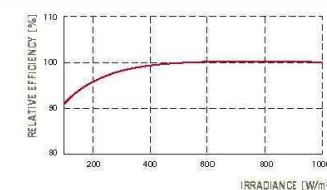
¹Measurement tolerances P_{MPP} ± 3%; I_{SC}, V_{OC} ± 5% at STC: 1000 W/m², 25 ± 2°C, AM 1.5 G according to IEC 60904-3 - 2800 W/m², NMOT, spectrum AM 1.5 G

Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.54% degradation per year. At least 93.1% of nominal power up to 10 years. At least 85% of nominal power up to 25 years.
All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organization of your respective country.

PERFORMANCE AT LOW IRRADIANCE



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

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I_{SC}	α [%/K]	+0.04	Temperature Coefficient of V_{OC}	β [%/K]	-0.28
Temperature Coefficient of P_{MPP}	γ [%/K]	-0.37	Normal Module Operating Temperature	NMOT [°F]	109 ± 5.4 (43 ± 3°C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V_{STS}	[V]	1000 (IEC) / 1000 (UL)	Safety Class	II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating	C (IEC) / TYPE 1 (UL)
Max. Design Load, push²	[lbs/ft ²]	75 (3600 Pa) / 55 (2667 Pa)	Permitted module temperature on continuous duty	-40°F up to +185°F (-40°C up to +85°C)
Max. Test Load, Push / Pull²	[lbs/ft ²]	113 (5400 Pa) / 84 (4000 Pa)		² see installation manual

QUALIFICATIONS AND CERTIFICATES

UL 1703; VDE Quality Tested; CE-compliant; IEC 61215:2016; IEC 61730:2011, application class A



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. 300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

Specifications subject to technical changes © Hanwha Q CELLS Q.PEAK DUO-G5.315-330.2018-03_Rev03_INA



REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE: 07/16/2020

PROJECT NAME & ADDRESS

JODI WITT
RESIDENCE
15 TOPSAIL DR.,
ANGIER, NC 27501

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-6

FEATURES:

No autotransformer or battery inverter needed

User-selectable modes

Free system monitoring



GENERAC

PWRCELL

Inverter
Model: X7602, X11402

Solar-plus-storage is simple with the Generac PWRcell Inverter. This bi-directional, REbus™-powered inverter offers a simple, efficient design for integrating smart batteries with solar. Ideal for self-supply, backup power, zero-export and energy cost management, the PWRcell inverter is the industry's most feature-rich line of inverters, available in single-phase and three-phase models.

ADDITIONAL FEATURES

- Single inverter for grid-tied solar with smart battery integration
- Simplified system design: No autotransformer or battery inverter needed
- User-selectable modes for backup power, self-supply, time-of-use and zero-export
- Free system monitoring included via PWRview Web Portal and Mobile App

AC OUTPUT/ GRID-TIE	MODEL X7602	MODEL X11402
RATED AC POWER OUTPUT	7600 W	11400 W
AC OUTPUT VOLTAGE	120/240, 1Ø VAC	120/208, 3Ø VAC
AC FREQUENCY	60 Hz	60 Hz
MAXIMUM CONTINUOUS OUTPUT CURRENT	32 A, RMS	32 A, RMS
GROUND-FAULT ISOLATION DETECTION	Included	Included
CHARGE BATTERY FROM AC	Yes	Yes
THD (CURRENT)	< 2 %	< 2 %
TYPICAL NIGHTTIME POWER CONSUMPTION	<7 W	<7 W

AC OUTPUT/ BACKUP	MODEL X7602	MODEL X11402
RATED AC BACKUP POWER OUTPUT	8000 W	8000 W
MAXIMUM AC BACKUP POWER OUTPUT	12000 W	12000 W
AC BACKUP OUTPUT VOLTAGE	120/240, 1Ø VAC	120/240, 1Ø VAC
AC FREQUENCY	60 HZ	60 HZ
AC CIRCUIT BREAKER	50 A	50 A
THD (VOLTAGE)	< 2 %	< 2 %
AUTOMATIC SWITCHOVER TIME	< 1 Seconds	< 1 Seconds
TYPICAL NIGHTTIME POWER CONSUMPTION	30 W	30 W

DC INPUT	MODEL X7602	MODEL X11402
DC INPUT VOLTAGE RANGE	360-420 VDC	360-420 VDC
NOMINAL DC BUS VOLTAGE	380 VDC	380 VDC
MAX INPUT CURRENT	20 A	30 A
REVERSE-POLARITY PROTECTION	YES	YES
GROUND-FAULT ISOLATION DETECTION	YES	YES
TRANSFORMERLESS, UNGROUNDED	YES	YES

DC INPUT/ BATTERY	MODEL X7602	MODEL X11402
MAXIMUM CONTINUOUS POWER	8000 W	8000 W
INTERNAL DC DISTRIBUTION BREAKERS	4X 2P30A	4X 2P30A
DC FUSES ON PLUS AND MINUS	40 A	40 A
2-POLE DISCONNECTION	YES	YES

EFFICIENCY	MODEL X7602	MODEL X11402
PEAK EFFICIENCY	97 %	98 %
CEC WEIGHTED EFFICIENCY	96.5 %	97.5 %

Specifications



FEATURES AND MODES	
ISLANDING ³	Yes
GRID SELL	Yes
SELF CONSUMPTION	Yes
PRIORITIZED CHARGING FROM RENEWABLES	Yes
GRID SUPPORT - ZERO EXPORT	Yes

ADDITIONAL FEATURES	
SUPPORTED COMMUNICATION INTERFACES	CANbus, RS4854, Ethernet
SYSTEM MONITORING	PWRview Web Portal and Mobile App
CRITICAL LOADS DISCONNECT ¹	Yes
MANUAL INVERTER BYPASS SWITCH	Automatic
WARRANTY	10 Years

STANDARDS COMPLIANCE	
SAFETY	UL1741 SA, CSA 22.2
GRID CONNECTION STANDARDS	IEEE1547, Rule 21, Rule 14H
EMISSIONS	FCC part15 class B

DIMENSIONS AND INSTALLATION SPECIFICATIONS	
WIRE GAUGE RANGE	10 - 8 AWG
TOTAL AC KNOCKOUTS X SIZE	2" x 0.75", 2 x 1"
TOTAL DC KNOCKOUTS X SIZE	5" x 1"
DIMENSIONS (L, W, H)	24.5" x 19.25" x 8"
WEIGHT	62.7 lb
COOLING	Forced convection
NOISE	< 40 dBA
OPERATING TEMPERATURE	-20 to 50 °C*
PROTECTION RATING	NEMA 3R

INSTALLATION GUIDELINES	
BATTERY TYPES SUPPORTED	PWRcell battery module
MODULE STRING SIZE PER PV LINK OPTIMIZER	2-9 PV modules
MAXIMUM RECOMMENDED DC POWER FROM PV	10kW (1Ø), 15kW (3Ø)
BATTERIES PER INVERTER	Up to 2

³3Ø inverters offer islanding for 1Ø loads, ⁴Modbus, *Reduced power at extreme temperatures

Specifications subject to change without notice.

GENERAC

Generac Power Systems, Inc.
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REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

DATE:07/16/2020

PROJECT NAME & ADDRESS

JODI WITT
RESIDENCE
15 TOPSAIL DR.,
ANGIER, NC 27501

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-7



FEATURES:

Easy installation

Low cost, high efficiency solution

NEC 2017 and 2020 PVRSS compliant

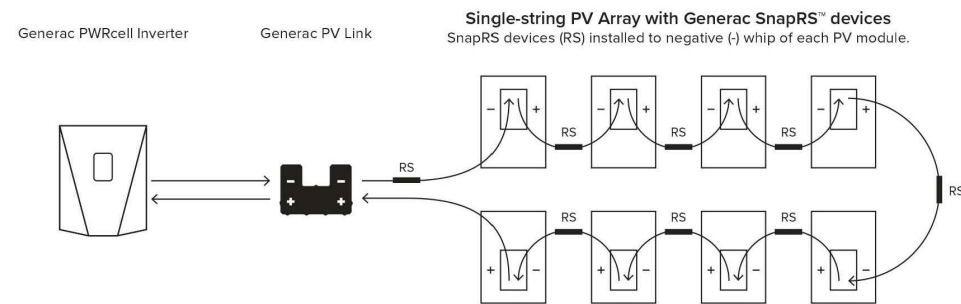
SnapRS™

Instant Rapid Shutdown Compliance
Model: RS801

The Generac SnapRS is NEC 2017 compliant, and doesn't require any extra hardware to mount, no pairing and no fussy digital communications. Just snap a Generac SnapRS disconnect device to each PV module for total rapid shutdown performance. When signaled by the inverter, SnapRS units break the PV circuit, reducing array voltage to <80V in seconds.

SYSTEM DESIGN

Snap a Generac SnapRS disconnect device to the negative (-) whip (-) of each module in the solar array for simple NEC-2017 module-level rapid shutdown compliance. SnapRS devices isolate array voltage when a rapid shutdown command is given by a connected Islanding Inverter



ADDITIONAL FEATURES

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

Specifications



SNAPRS (RS801)

PV MODULE MAX VOC	75 V	OPERATING TEMPERATURE	-40 to 70 °C
EFFICIENCY	99.9 %	CERTIFICATIONS	UL1741
MAX INPUT CURRENT	13 A	WEIGHT	100 g
SHUTDOWN TIME	< 10 Seconds	DIMENSIONS (L,W,H)	1" x 1" x 7"
ENCLOSURE RATING	NEMA 6P	WARRANTY	25 Years

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DATE:07/16/2020

PROJECT NAME & ADDRESS

**JODI WITT
RESIDENCE
15 TOPSAIL DR.,
ANGIER, NC 27501**

SHEET NAME
**EQUIPMENT
SPECIFICATION**

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

SHEET NUMBER
PV-8

Specifications subject to change without notice.



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FEATURES:

Connect up to 2 PWRcells to a single PWRcell Inverter

Plug-and-play with PWRcell Inverters and PV Links

Residential and commercial application ready



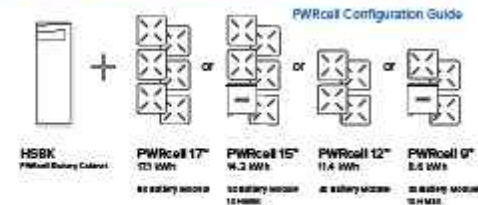
GENERAC
PWRCELL

Battery
Model: 9, 12, 15, 17

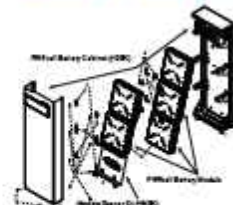
No other smart battery offers the flexibility of PWRcell. Whether for backup power or smart energy management, the PWRcell battery has power and capacity options for every need, without sacrificing flexibility or function.

The PWRcell battery series allows system owners the flexibility to scale from the economical 8.6kWh PWRcell 9™ to the massive 17.1 kWh PWRcell 17™ by adding additional PWRcell battery modules, the gold standard in storage.

PWRCELL CONFIGURATION GUIDE



PWRCELL ASSEMBLY



PWRCELL BATTERY DESIGN

PWRcell is a modular smart battery platform that allows for a range of configurations to suit any need, small or large. PWRcell can be built in capacities ranging from 8.6-17.1kWh. When needs change, PWRcell can be upgraded with additional modules. Use the chart above to understand what components you need for your chosen PWRcell configuration.

ADDITIONAL FEATURES

- Connect as many as two 2 PWRcells to a single PWRcell Inverter™ for up to 34.2kWh of storage
- Best-in-class battery backup power
- Plug-and-play with PWRcell Inverters™ and PV Links™
- Time-of-use (TOU) and zero-export ready
- Residential and commercial application ready

Specifications

PWRCELL MODEL	9	12	15	17
BATTERY MODULES	3	4	5	6
USABLE ENERGY	8.6 kWh	11.4 kWh	14.3 kWh	17.1 kWh
POWER: RATED CONTINUOUS	3.4 kW	4.5 kW	5.6 kW	6.7 kW
POWER: 60 MINUTES	4.2 kW	5.6 kW	7.0 kW	8.4 kW
POWER: 2 MINUTES	5.0 kW	6.7 kW	8.4 kW	10.0 kW
REBUS VOLTAGE: INPUT/OUTPUT	360-420 VDC			
MODULE VOLTAGE	46.8 VDC			
ROUND-TRIP EFFICIENCY	96.5 %			
OPERATING TEMPERATURE	-10 to 45 °C*			
RECOMMENDED TEMPERATURE	13 to 30 °C			
MAXIMUM INSTALLATION ALTITUDE	9834 ft. (3000 m)			
DIMENSIONS (L,W,H)	68" x 22" x 10"			
WEIGHT (ENCLOSURE)	115 lb. (52 kg)			
WEIGHT (INSTALLED)	280 lb. (127 kg)	335 lb. (152 kg)	390 lb. (178 kg)	445 lb. (202 kg)
WARRANTY: LI-ION MODULES	10 Years, (22.6 MWh)	10 Years, (30.2 MWh)	10 Years, (37.8 MWh)	10 Years, (45.3 MWh)
WARRANTY: ELECTRONICS AND ENCLOSURE	10 Years			
COMMUNICATION PROTOCOL	REbus DC Nanogrid™			
COMPLIANCE	UL 9540, UL 1973, UL 1642, CSA 22.2			

*Reduced power at extreme temperatures

Specifications subject to change without notice.

UPGRADING PWRCELL

Inside of the PWRcell battery, the PWRcell battery modules are stacked 2-deep on three levels, allowing for up to six modules to be connected in series. Upgrade an existing PWRcell battery by adding modules and a module spacer (HMSK) if required. PWRcell 9 and PWRcell 15 require a module spacer.

Generac offers a convenient PWRcell Battery Upgrade Kit (HMUK) to help replace lost or misplaced hardware. A PWRcell Battery Upgrade Kit may be purchased from your Generac distributor.

Refer to the table to the right for material requirements related to upgrading PWRcell.

UPGRADE MATERIAL REQUIREMENTS

Starting Configuration	Ending Configuration		
	PWRCELL 17	PWRCELL 15	PWRCELL 12
PWRCELL 9	+ 3 x PWRCell Mod + 2 x HMUK*	+ 2 x PWRCell Mod + 1 x HMUK*	+ 1 x PWRCell Mod + 1 x HMUK*
PWRCELL 12	+ 2 x PWRCell Mod + 1 x HMUK*	+ 1 x PWRCell Mod + 1 x HMSK	
PWRCELL 15	+ 1 x PWRCell Mod + 1 x HMUK*		

*HMUK (Upgrade kit) only required if original hardware is unavailable

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REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE: 07/16/2020

PROJECT NAME & ADDRESS

JODI WITT
RESIDENCE
15 TOPSAIL DR.,
ANGIER, NC 27501

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-9



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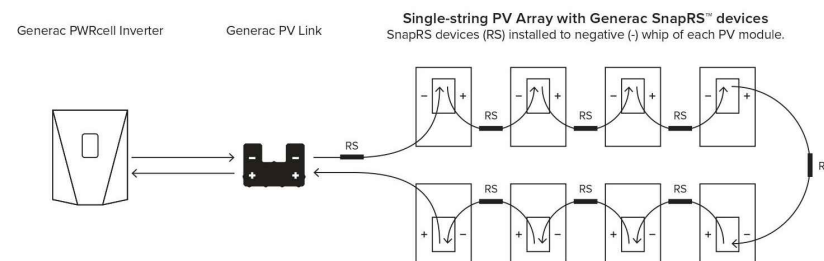
PV Link™

S2500 Series sub-string optimizer
Model: S2502

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

ADDITIONAL FEATURES

- Quick connections with MC4 connectors
- 2500W capacity
- Compatible with high-voltage smart batteries
- Cost-effective solution for high-performance PV
- Ground-fault protection



FEATURES:

Fast, simple installation

Lower failure risk than module-level optimizers

NEC 2017 rapid shutdown compliant with SnapRS™

Specifications



PWRCELL PV LINK (S2502)

RATED POWER	2500 W	PROTECTIONS	Ground-fault, Arc-fault (Arc-fault Type 1 AFCI, Integrated)
PEAK EFFICIENCY	99%	MAX OPERATING TEMP	70 °C
MPPT VOLTAGE RANGE	60-360 VMP	SYSTEM MONITORING	PWRview Web Portal and Mobile App
MAX INPUT VOLTAGE	420 VOC; max when cold	ENCLOSURE	Type 3R
MAX OUTPUT	420 VOC	WEIGHT	7.3 lb
NOMINAL OUTPUT (REBUS™)	380 VDC	DIMENSIONS (L,W,H)	2" x 15.4" x 9.6"
MAX OUTPUT CURRENT	8 A	COMPLIANCE	UL 1741, CSA 22.2
MAX SHORT CIRCUIT CURRENT (ISC)	18 A	WARRANTY	25 Years
STANDBY POWER	<1 W		

Specifications subject to change without notice.

GENERAC

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15 TOPSAIL DR.,
ANGIER, NC 27501

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

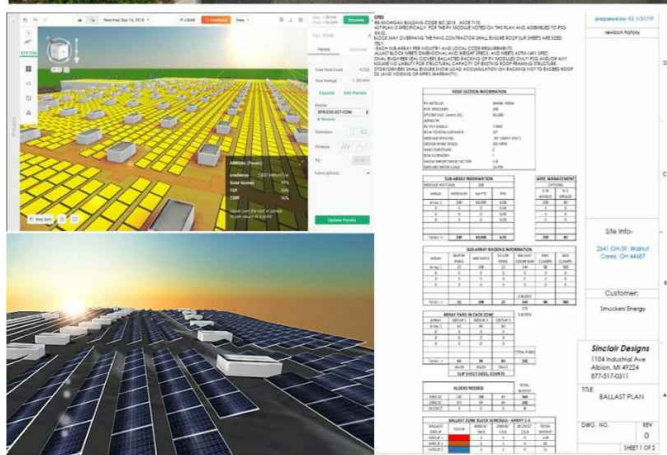
SDE: Project Development Support (Using Aurora PV Software & Solid-Works)

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.

Sinclair Designs & Engineering

Integrated Project Development & System Manufacturing

Sky Rack 2.0 Ground Mount System



Introducing the New Sky Rack 2.0 Ground Mount
The new design increases the overall structural integrity of the assembly and provides more efficient installation techniques.

Based on your module choice and the size of the project, this system can offer a direct hardware to module solution; eliminating the need to purchase expensive panel clamp kits (10% Savings).

APPLICATION	OPEN FIELD		
Tilt Angle	5-45 Degrees	Terrain	5 Degree E/W
Module Orientation	2 High Portrait	Wire Management	Included
Wind Load	115 MPH	Warranty	25 Years
Snow Load	60 PSF	Material	11GA G90 CHEM TREAT Steel
Ground Clearance	24in Standard (Customer Req)	Manufacturing	Made in Michigan, USA

4 Main Components For Efficient Installation

- 4 x 7 IN C-CHANNEL POST**
Optional Lengths = 8 - 17 Feet
- SLR-STRUT-50**
Reinforcement Brace
- TRUSS - 120**
5-40 Degree Angle Adjustment
- Z-PURLIN-(2-5 Panel Lengths Available)**
Wire Tie Management Holes
Additional Slots for direct module tie-in

Additional Components Available to Increase Spec Requirements

- Z-PURLIN BRACE**
For high wind/heavy snow areas
- SLR-DBL L STRUT- 50**
For high wind/heavy snow areas
- SLR-STRONGBACK**
For high wind/heavy snow areas
- Z-PURLIN CANTILEVER-44**
Allows additional modules to be installed at the beginning and end of each array.

Minimal Hardware Requirements For Efficient Installation

- ALL HDW & CLAMP KITS ARE STORED IN HIGH VOLUMES**
- 2x 5/8-11 x 1 3/4 Serrated Flanged Heads
 - 7x 1/2-13 x 1 1/2 Serrated Flanged Heads
 - AK Solar UL-467 SS MID CLAMP KITS
 - AK Solar UL-467 SS END CLAMP KITS
-

PRODUCT AVAILABILITY: All racking systems are manufactured "IN HOUSE" from "Prime" 11 Gage Grade 50 USA Steel. This allows us to control 100% of the production schedule and deploy your system ahead of the installation date. We inventory 1-2 Megawatts of racking product to maintain an average lead time of 7-10 days.



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SHEET NAME
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SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-11