

PROJECT DESCRIPTION:

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

SYSTEM SIZE: 8.96 kW DC STC
 ARRAY AREA: #1 - 507.92 SQ FT

APPLICABLE CODES & STANDARDS
 NCBC 2018
 NEC 2017

EQUIPMENT SUMMARY

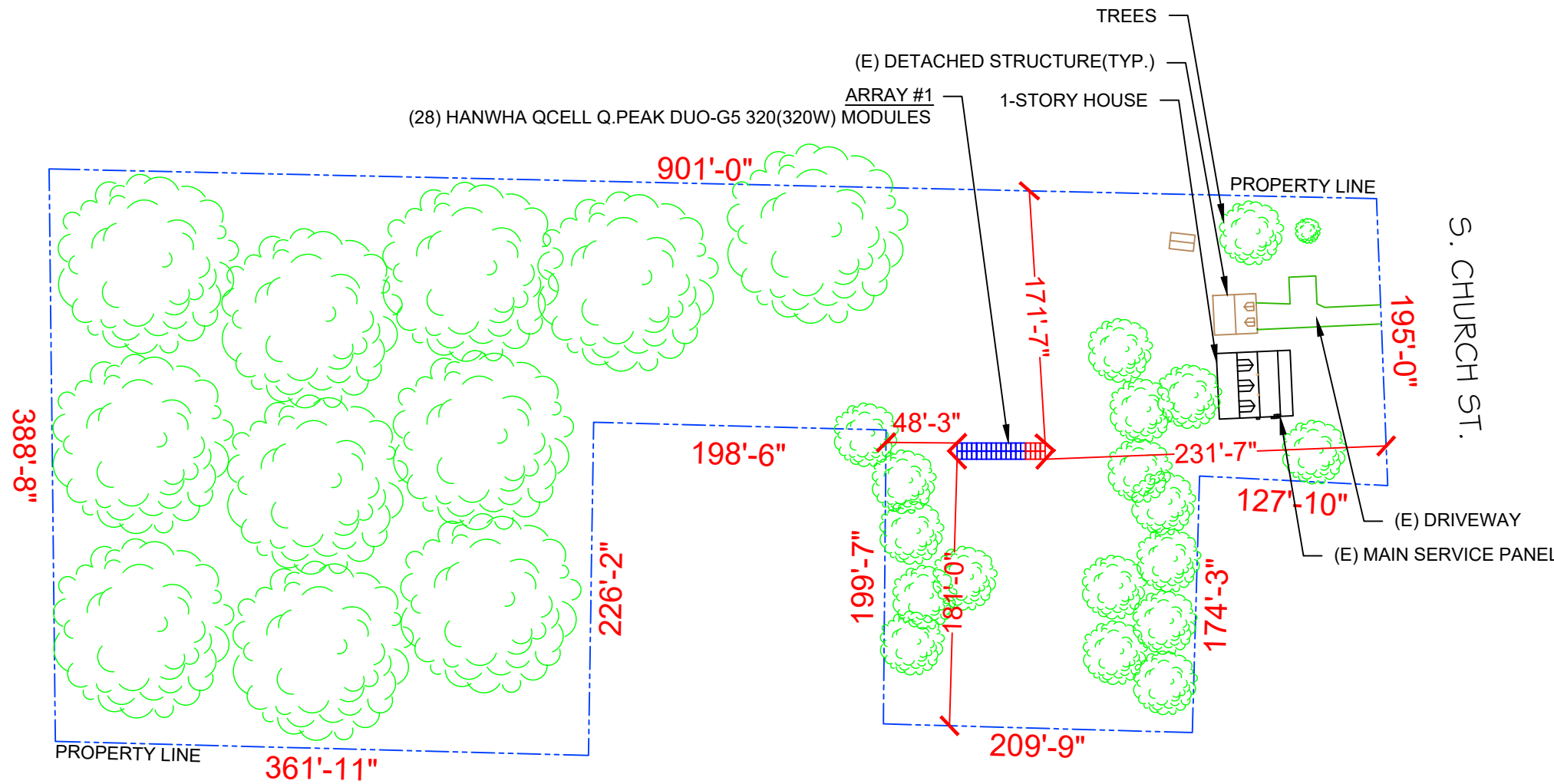
28 HANWHA QCELL Q.PEAK DUO-G5 320(320W) MODULES
 04 GENERAC PV LINK S2502 POWER OPTIMIZERS
 01 GENERAC PWRCELL X7602 7600W(7.6kW) INVERTER

AUTHORITIES HAVING JURISDICTION

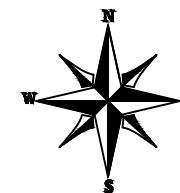
BUILDING : HARNETT COUNTY
 ZONING : HARNETT COUNTY
 UTILITY : DUKE ENERGY

DESIGN SPECIFICATIONS

OCCUPANCY : II
 CONSTRUCTION : SINGLE-FAMILY
 ZONING : RESIDENTIAL
 GROUND SNOW LOAD : 15 PSF
 WIND EXPOSURE : B
 WIND SPEED : 120 MPH



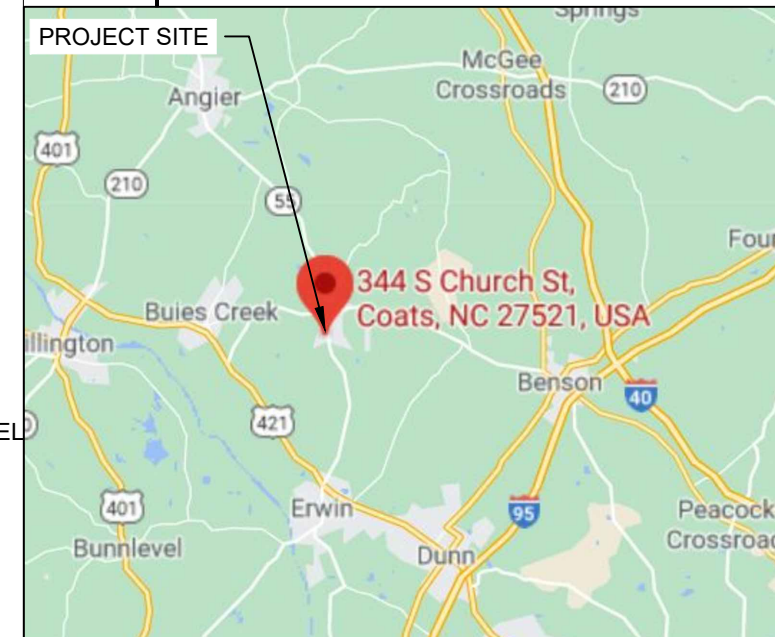
NOTE:
 THE PANELS IN RED ARE
 FOR THE GARAGE
 METER



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 RACKING DETAILS
 PV-3B RACKING DETAILS
 PV-3C RACKING DETAILS
 PV-4 ELECTRICAL LINE DIAGRAM
 PV-5 WIRING CALCULATIONS
 PV-6 to 11 EQUIPMENT SPECIFICATIONS



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REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE: 01-08-2021

PROJECT NAME & ADDRESS

LARRY M LUEDTKE
 RESIDENCE
 344 S. CHURCH ST.,
 COATS, NC 27521

SHEET NAME
 PLOT PLAN &
 VICINITY MAP

SHEET SIZE

ANSI B
 11" X 17"

SHEET NUMBER

PV-1

1 PLOT PLAN WITH ROOF PLAN

PV-1

SCALE: 1=100

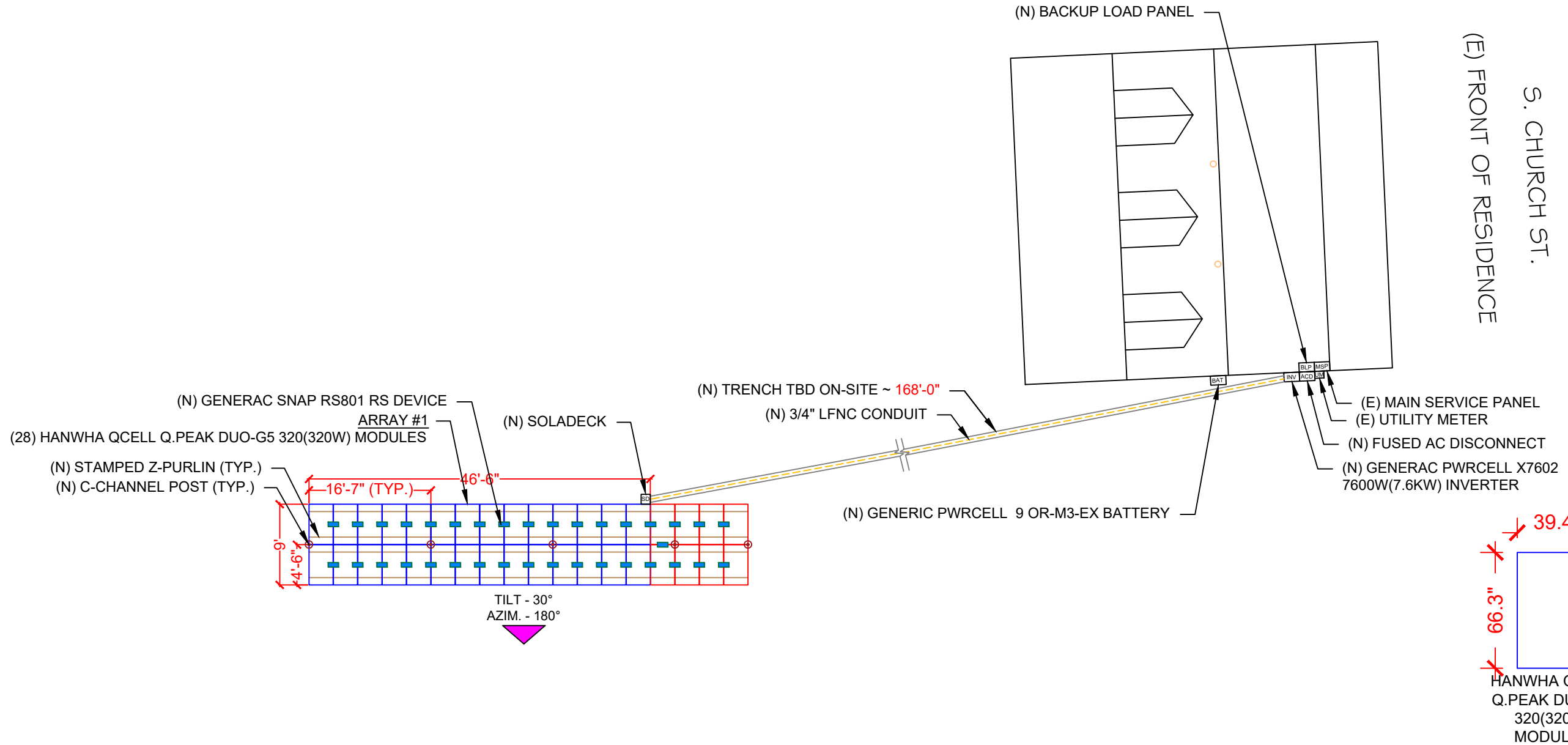
MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 28 MODULES
 MODULE TYPE = HANWHA QCELL Q.PEAK DUO-G5 320(320W) 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

(E) BACK OF RESIDENCE

(N) BACKUP LOAD PANEL

(E) FRONT OF RESIDENCE
 5. CHURCH ST.



REVISIONS

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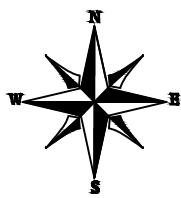
PROJECT NAME & ADDRESS

LARRY M LUEDTKE
 RESIDENCE
 344 S. CHURCH ST.,
 COATS, NC 27521

SHEET NAME
ROOF PLAN & MODULES

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

SHEET NUMBER
PV-2



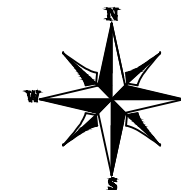
1 | **ROOF PLAN & MODULES**
 PV-2 | SCALE: 1/16" = 1'-0"

ON- SITE CUSTOMER APPROVAL: _____

LEGEND

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

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LARRY M LUEDTKE
 RESIDENCE
 344 S. CHURCH ST.,
 COATS, NC 27521

SHEET NAME

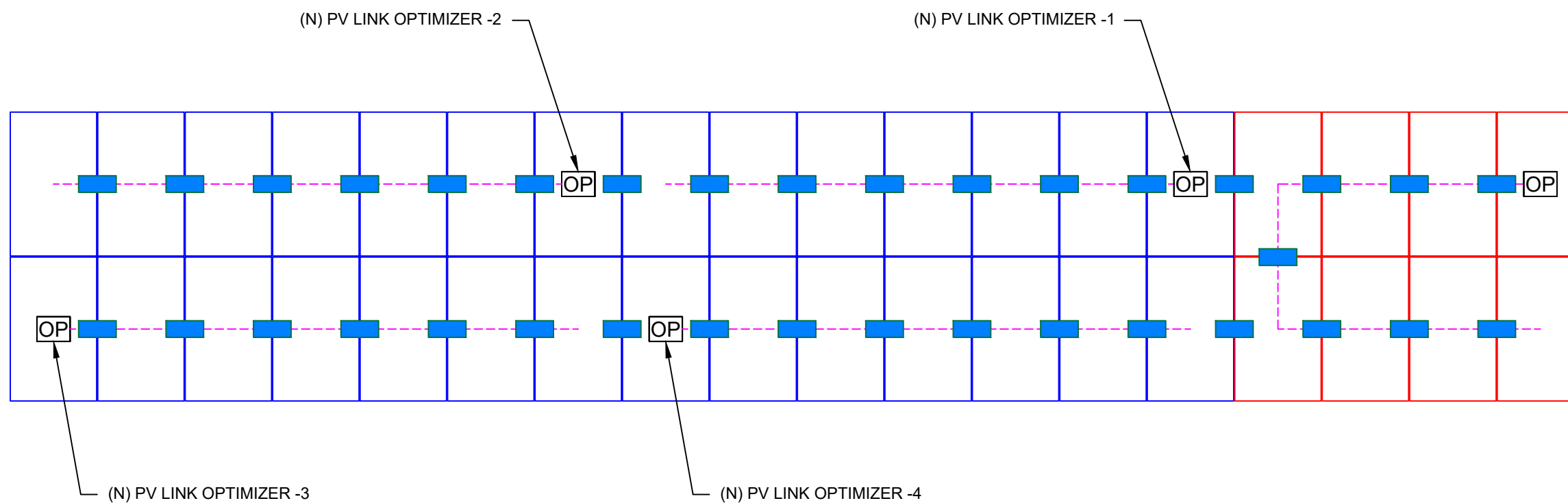
STRING
 LAYOUT

SHEET SIZE

ANSI B
 11" X 17"

SHEET NUMBER

PV-2A



REVISIONS		
DESCRIPTION	DATE	REV

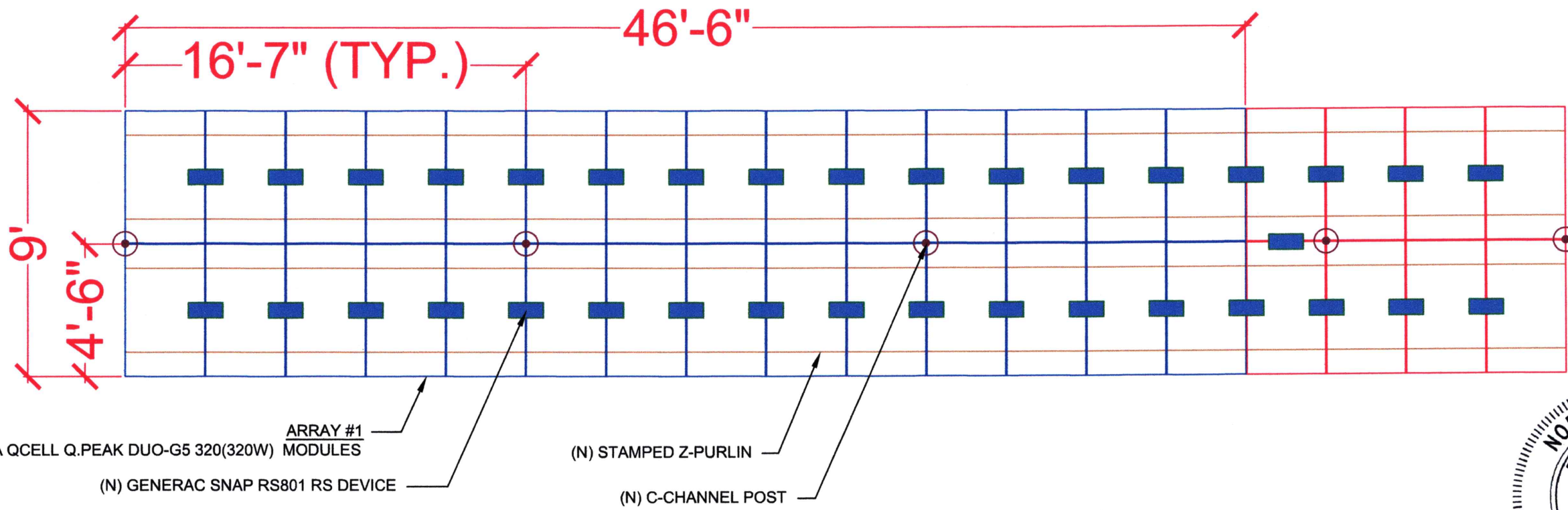
Signature with Seal
 DATE: 01-08-2021
 PROJECT NAME & ADDRESS

LARRY M LUEDTKE
RESIDENCE
 344 S. CHURCH ST.,
 COATS, NC 27521

SHEET NAME
RACKING DETAIL

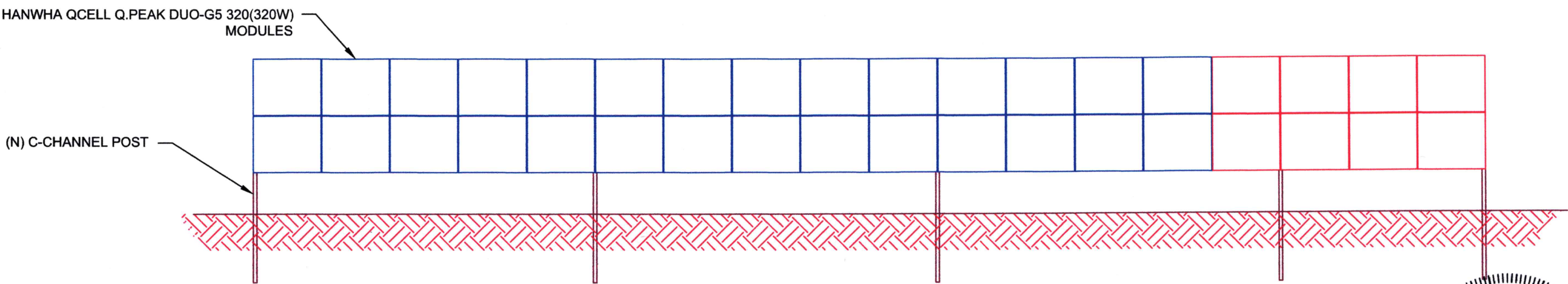
SHEET SIZE
**ANSI B
 11" X 17"**

SHEET NUMBER
PV-3A



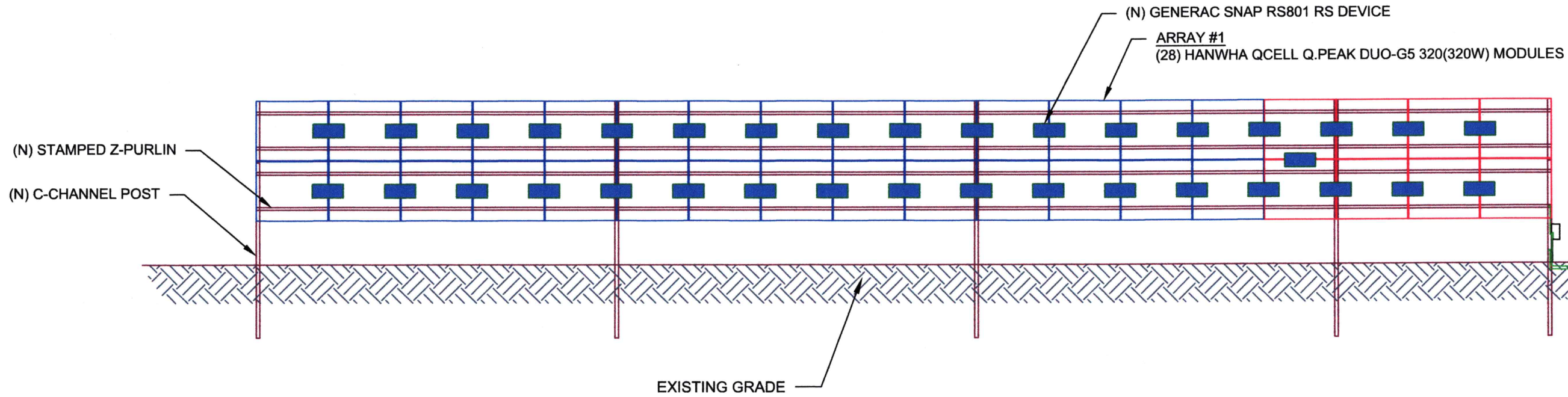
1 RACKING DETAIL (Top View)
 PV-3A SCALE: 3/16" = 1'-0"

NORTH CAROLINA
PROFESSIONAL
SEAL
 050201
 W. M. STULEZ
 ENGINEER
 DATE: 01/08/2021
 SEAL LIMITED TO
 STRUCTURAL
 COMPONENTS



2 RACKING DETAIL (Front View)
 PV-3A SCALE: 3/16" = 1'-0"

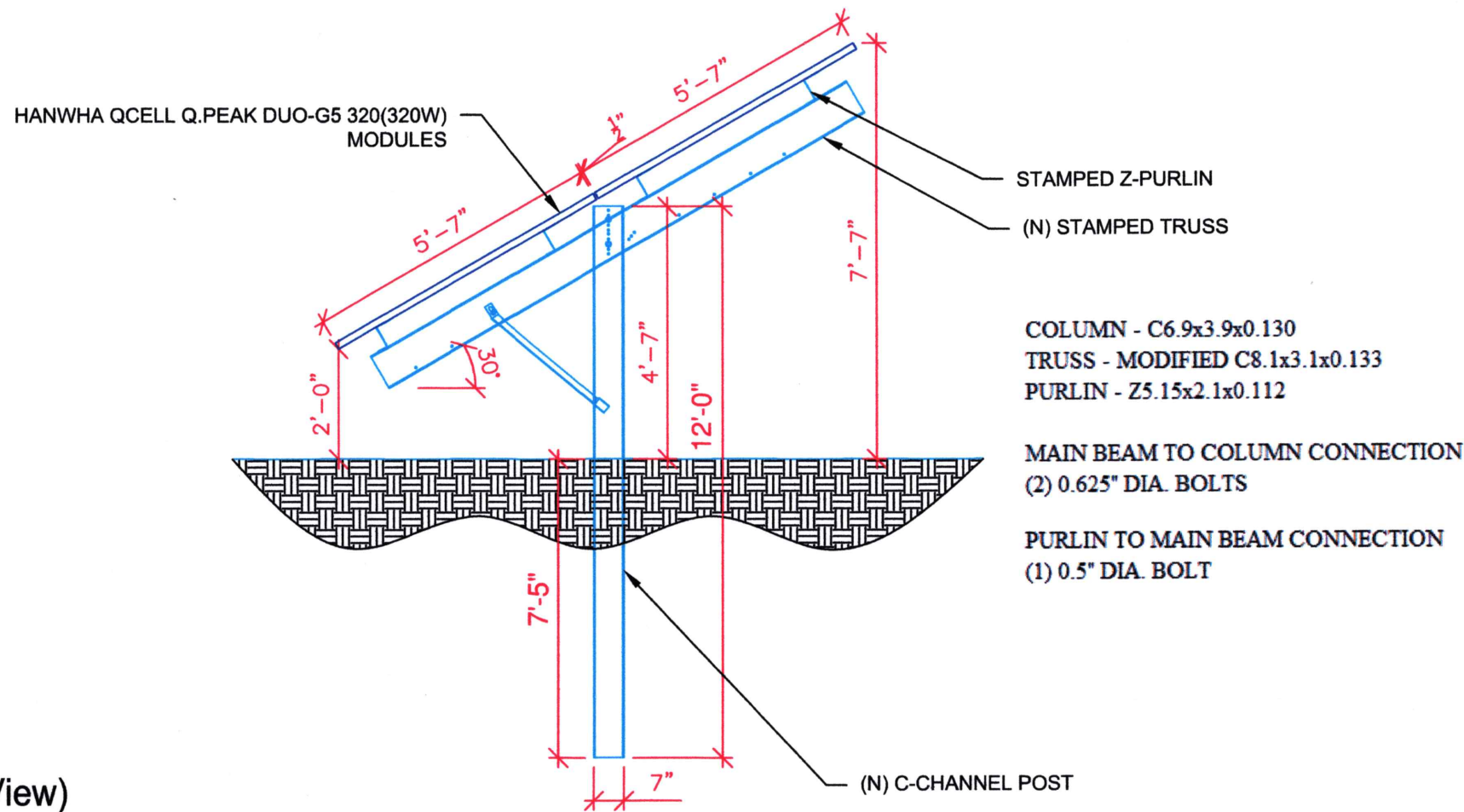
NORTH CAROLINA
GREAT LAKES
SOLAR &
ENGINEERING,
PLLC
 No. P-2216
CERTIFICATE OF AUTHORIZATION



1 RACKING DETAIL (Rear View)

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

IBC 2015	
1603.1.1 Floor Live Load	N/A
1603.1.2 Roof Live Load	20 psf (Reducible)
1603.1.3 Roof Snow Load	
$P_g =$	15 psf
$P_f =$	11.34 psf
$C_e =$	0.9
$I_s =$	1.00
$C_t =$	1.2
1603.1.4 Wind Load	
$V =$	120 MPH
$I_w =$	1.00
Exposure =	B
1603.1.5 Earthquake Design Data	
$S_{D_s} =$	0.189
$S_{D_1} =$	0.134
Site Class =	D
$I_e =$	1.00
SDC =	C
Base Shear $V =$	71.86 lb
Soil Assumed to be Stiff	



2 RACKING DETAIL (Side View)

PV-3B SCALE: NTS

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DESCRIPTION	DATE	REV

Signature with Seal

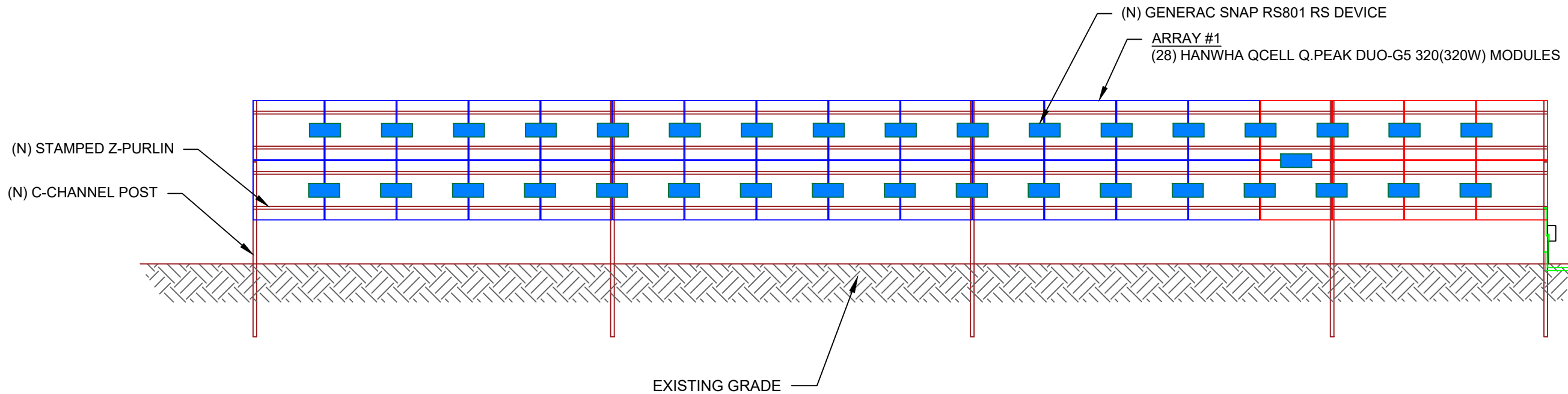
 DATE: 01-08-2021
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 PROFESSIONAL
 SEAL
 050201
 ENGINEER
 M. STUEBE
 01/08/2021
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 344 S. CHURCH ST.,
 COATS, NC 27521

NORTH CAROLINA
 GREAT LAKES
 SOLAR &
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 No. P-2216
 CERTIFICATE OF AUTHORIZATION

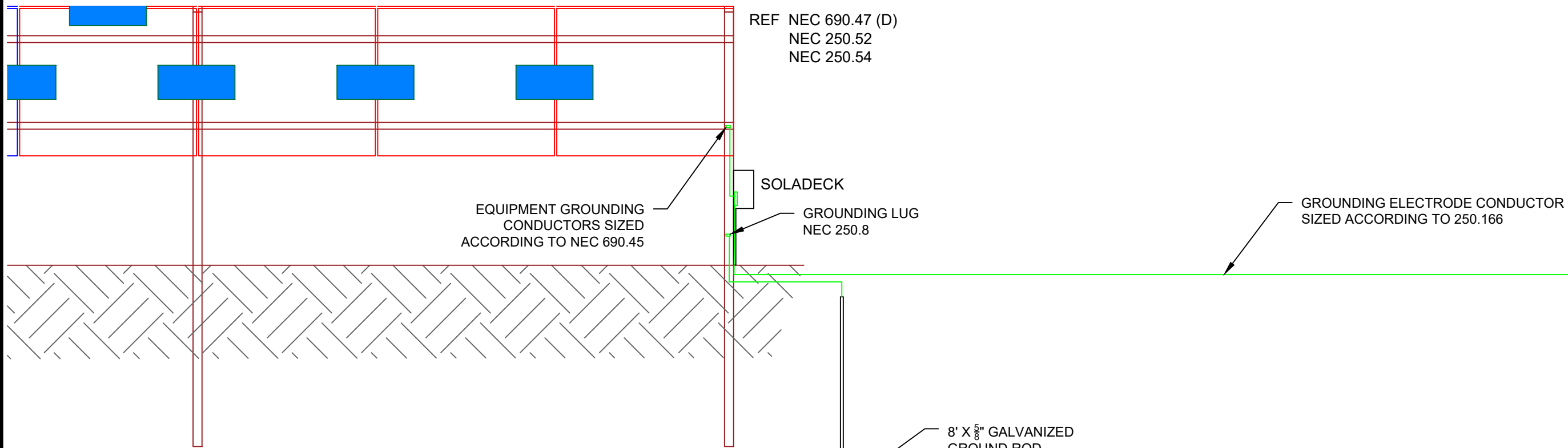
SHEET NAME	RACKING DETAIL
SHEET SIZE	ANSI B 11" X 17"
SHEET NUMBER	PV-3B



1 RACKING DETAIL (Rear View)

PV-3C

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



2 GROUNDING DETAIL (Side View)

PV-3C

SCALE: NTS



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DATE:01-08-2021

PROJECT NAME & ADDRESS

LARRY M LUEDTKE
RESIDENCE
344 S. CHURCH ST.,
COATS, NC 27521

SHEET NAME
RACKING
DETAIL

SHEET SIZE
ANSI B
11" X 17"

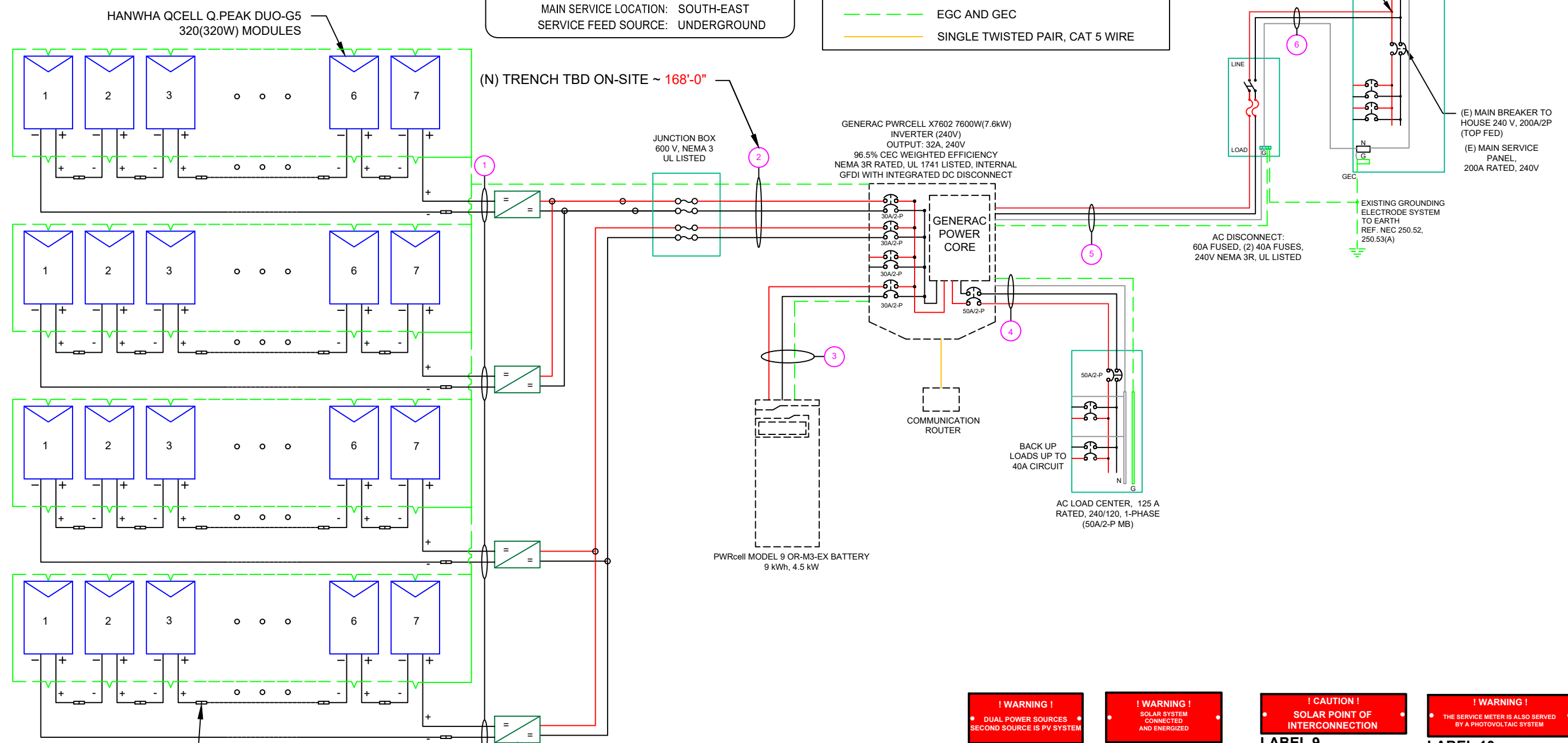
SHEET NUMBER
PV-3C

(28) HANWHA QCELL Q.PEAK DUO-G5 320(320W) MODULES
 (4) PV LINKS OF 7 MODULES CONNECTED IN SERIES

SERVICE INFO
 UTILITY PROVIDER: DUKE ENERGY
 MAIN SERVICE VOLTAGE: 240V
 MAIN PANEL BRAND: N/A
 MAIN SERVICE PANEL: 200A
 MAIN CIRCUIT BREAKER RATING: 200A
 MAIN SERVICE LOCATION: SOUTH-EAST
 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

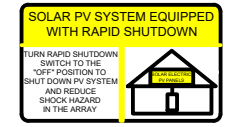


SNAP RS (RS801)
 MAX INPUT CURRENT - 13 A
 UL 1741 LISTED
 MODULE LEVEL RAPID
 SHUTDOWN (PVRSS)
 COMPLIANT
 NEMA 6P RATED

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 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

! WARNING ! DUAL POWER SOURCES SECOND SOURCE IS PV SYSTEM

LABEL 7
 AT MEP

! WARNING ! SOLAR SYSTEM CONNECTED AND ENERGIZED

LABEL 8
 AT MEP

! CAUTION ! SOLAR POINT OF INTERCONNECTION

LABEL 9
 AT UTILITY METER

! 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		
(4)	#10AWG - THWN-2	IMC OR PVC IN TRENCH / LFNC	3/4"
(1)	#6AWG - THWN-2 GND		
(2)	#10AWG - THWN-2	EMT OR FLEX	3/4"
(1)	#10AWG - THWN-2 GND		
(3)	#6AWG - THWN-2	EMT OR FLEX	3/4"
(1)	#6AWG - THWN-2 GND		
(3)	#6AWG - THWN-2	EMT OR FLEX	3/4"
(1)	#6AWG - THWN-2 GND		
(3)	#6AWG - THWN-2	EMT OR FLEX	3/4"

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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: 01-08-2021

PROJECT NAME & ADDRESS

LARRY M LUEDTKE
RESIDENCE
 344 S. CHURCH ST.,
 COATS, NC 27521

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(320W) 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 #	GENERIC PWRCELL 9 OR-M3-EX BATTERY
USABLE ENERGY	9kWH
AVG. AC POWER COMPLETE DISCHARGE CYCLE	3.4kW
MAX. CONT. AC POWER @40°C	4.5kW
PEAK MOTOR STARTING CURRENT (2 SEC)	25A
REBUS VOLTAGE: INPUT/ OUTPUT	360-420Vdc
NOMINAL VOLTAGE	43.20Vdc
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: ARRAY 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 _{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)	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 _{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)	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)	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:

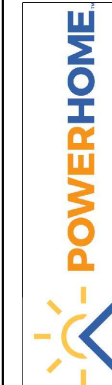
No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER NEC TABLE 310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC TABLE 310.15(B)(3)(a)	1
CIRCUIT CONDUCTOR SIZE	6 AWG
CIRCUIT CONDUCTOR AMPACITY PER NEC TABLE 310.15(B)(16)	75A

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	



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REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE:01-08-2021

PROJECT NAME & ADDRESS

LARRY M LUEDTKE
RESIDENCE
344 S. CHURCH ST.,
COATS, NC 27521

SHEET NAME

WIRING
CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-5



Q.PEAK DUO-65 315-330

Q.ANTUM SOLAR MODULE

The new Q.PEAK DUO-65 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.



Engineered in Germany

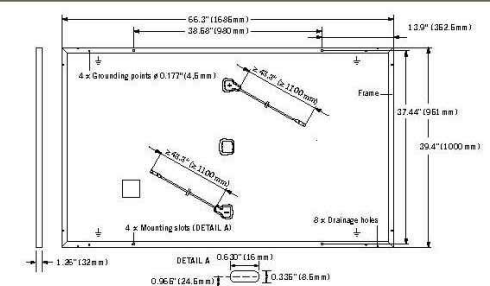


¹ APT test conditions according to IEC/TS 62804-1:2015, method B (-1500V, 168h)
² See data sheet on rear for further information.



MECHANICAL SPECIFICATION

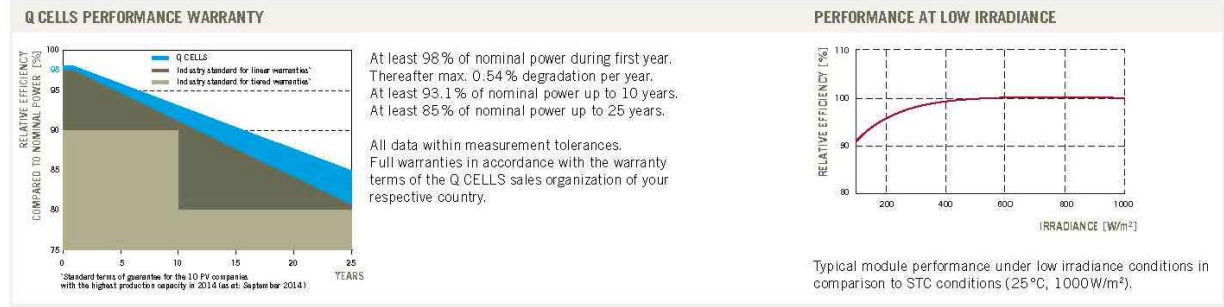
Format	66.3 in x 39.4 in x 1.26 in (including frame) (1685 mm x 1000 mm x 32 mm)
Weight	41.2 lbs (18.7 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 x 20 monocrystalline Q.ANTUM solar half-cells
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, STC ¹ (POWER TOLERANCE +5W / -0W)					
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 MPP	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, NMOT ²					
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

¹ Measurement 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 · ² 800 W/m², NMOT, spectrum AM 1.5 G



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, push¹	[lbs/ft²]	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/ft²]	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

PACKAGING INFORMATION

Number of Modules per Pallet	32
Number of Pallets per 53' Trailer	30
Number of Pallets per 40' High Cube Container	26
Pallet Dimensions (L x W x H)	69.3 in x 45.3 in x 46.9 in (1760 mm x 1150 mm x 1190 mm)
Pallet Weight	1415 lbs (642 kg)

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.

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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

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Web: www.powerhome.com

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE: 01-08-2021

PROJECT NAME & ADDRESS

**LARRY M LUEDTKE
RESIDENCE**
344 S. CHURCH ST.,
COATS, NC 27521

SHEET NAME
**EQUIPMENT
SPECIFICATION**

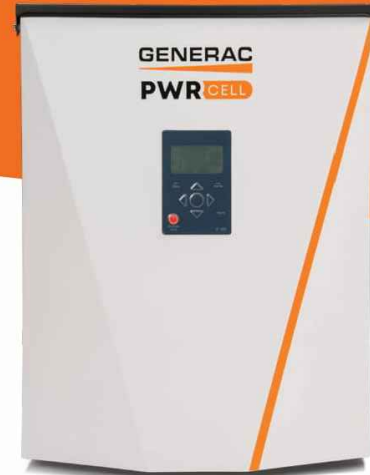
SHEET SIZE
**ANSI B
11" X 17"**

SHEET NUMBER
PV-6

GENERAC[®] PWRCELL

7.6kW 1Ø PWRcell Inverter with CTs
Model #: X7602 (Ordering SKU: APKE00014)

11.4 kW 3Ø PWRcell Inverter with CTs
Model #: X11402 (Ordering SKU: APKE00013)



Solar + 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.

FEATURES & BENEFITS

- 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, zero-import and export limiting
- Free system monitoring included via PWRview™ Web Portal and Mobile App

AC OUTPUT/GRID-TIE	MODEL X7602	MODEL X11402
MAX. CONT. GRID-TIED AC POWER @ 50°C (122°F):	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/ISLANDED	MODEL X7602	MODEL X11402
MAX. CONT. AC POWER @ 40°C (104°F) W/ SINGLE 6 MODULE BATTERY CABINET ¹ :	9,000 W	9,000 W
MAX. CONT. AC POWER @ 40°C (104°F) WITH 2 BATTERY CABINETS (8 MODULES MINIMUM):	11,000 W	9,600-11,000 W ²
MAX. CONT. AC POWER @ 50°C (122°F):	8,800 W	7,500-8,800 W ²
PEAK MOTOR STARTING CURRENT (2 SEC):		50 A, RMS
AC BACKUP OUTPUT VOLTAGE:	120/240, 1Ø VAC	120/208, 1Ø VAC
AC FREQUENCY:	60 Hz	60 Hz
THD (VOLTAGE):	< 2%	< 2%
AUTOMATIC SWITCHOVER TIME:	< 1 Seconds	< 1 Seconds

DC INPUT	MODEL X7602	MODEL X11402
DC INPUT VOLTAGE RANGE:	360-420 VDC	360-420 VDC
NOMINAL DC BUS VOLTAGE:	380 VDC	380 VDC
DC DISTRIBUTION INPUT BREAKERS:	4 x 2P30 A	4 x 2P30 A
MAX INPUT CURRENT PER DC INPUT:	30 A	30 A
REVERSE-POLARITY PROTECTION:	Yes	Yes
TRANSFORMERLESS, UNGROUNDED:	Yes	Yes
TYPICAL NIGHTTIME POWER CONSUMPTION:	< 7 W	< 7 W
DC BUS EXPORT FUSES (+/-):	40 A	40 A
2-POLE DISCONNECTION:	Yes	Yes

EFFICIENCY	MODEL X7602	MODEL X11402
PEAK EFFICIENCY:	97.3%	97.7%
CEC WEIGHTED EFFICIENCY:	96.5%	97.5%

¹Peak Performance

²In Island mode X11402 protected loads only supply 2 phases 120 VAC L-N, 208 L-L which results in lower power than in grid tied 3 phase mode. The low value of the range is for full L-L loading while high value of the range is full L-N loading

Specifications

FEATURES AND MODES

ISLANDING ³ :	Yes
GRID SELL:	Yes
SELF CONSUMPTION:	Yes
PRIORITIZED CHARGING FROM RENEWABLES:	Yes
GRID SUPPORT - ZERO EXPORT:	Yes
ESS PCS OPERATION MODES (IMPORT ONLY, EXPORT ONLY):	Yes

ADDITIONAL FEATURES

SUPPORTED COMMUNICATION INTERFACES:	REbus™, CANbus, Ethernet
SYSTEM MONITORING:	PWRview™ Web Portal and Mobile App
BACKUP LOADS DISCONNECT ³ :	Yes, 50 A Circuit Breaker
INVERTER BYPASS SWITCH:	Automatic
WARRANTY:	10 Years

STANDARDS COMPLIANCE

SAFETY:	UL 1741 SA, CSA 22.2, UL 1998
GRID CONNECTION STANDARDS:	IEEE 1547, Rule 21, Rule 14H, CSIP, UL 1741 PCS CRD (Import Only, Export Only)
EMISSIONS:	FCC Part 15 Class B

DIMENSIONS AND INSTALLATION SPECIFICATIONS

ENCLOSURE KNOCKOUTS - QTY, SIZE - IN (MM):	6 x Combo 3/4" x 1" (19 x 25.4) 7 x Combo 1/2" x 3/4" (12.7 x 19)
DIMENSIONS L x W x H - IN (MM):	24.5" x 19.25" x 8" (622.3 x 488.9 x 203.2)
WEIGHT - LB (KG):	62.7 (28.4)
COOLING:	Forced convection
AUDIBLE NOISE:	< 40 dBA
OPERATING TEMPERATURE - FAHRENHEIT (CELSIUS):	-4 to 122 °F (-20 to 50 °C) ⁴
PROTECTION RATING:	NEMA 3R

INSTALLATION GUIDELINES

BATTERY TYPES SUPPORTED:	PWRcell™ Battery
MODULE STRING SIZE PER PV LINK OPTIMIZER:	Varies, refer to PV Link Installation Manual
MAXIMUM RECOMMENDED DC POWER FROM PV:	15 kW

³3Ø inverters offer islanding for 1Ø loads.

⁴Includes ambient temperature rising from inverter operation. Reduced power at extreme temperatures.

Specifications listed in this document are achieved with firmware version 13310 or greater. Confirm inverter has latest firmware to ensure full performance.

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REVISIONS

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Signature with Seal

DATE:01-08-2021

PROJECT NAME & ADDRESS

LARRY M LUEDTKE
RESIDENCE
344 S. CHURCH ST.,
COATS, NC 27521

SHEET NAME
**EQUIPMENT
SPECIFICATION**

SHEET SIZE

**ANSI B
11" X 17"**

SHEET NUMBER

PV-7

GENERAC

SnapRS™

Inline Disconnect Switch
Model: APKE00011
Certification Model Reference: RS801



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.

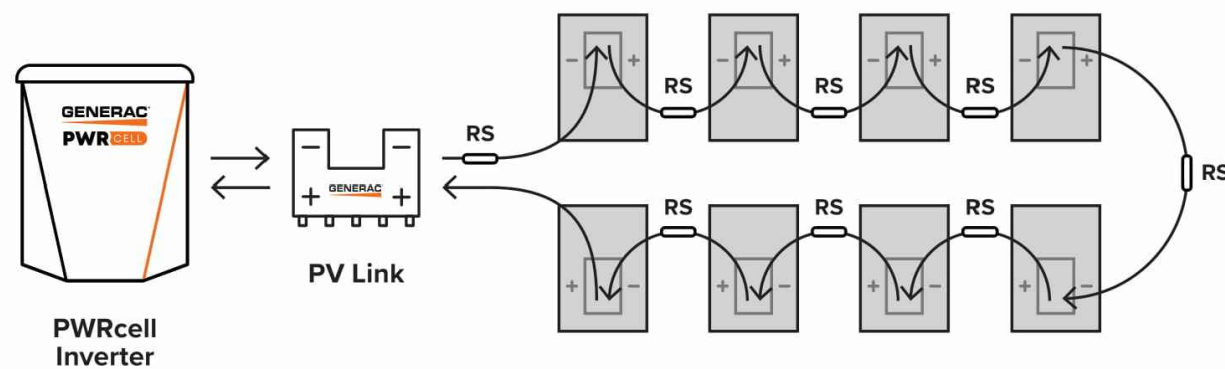


Diagram is applicable for most 60 cell PV modules. Modules with higher cell count may require a different arrangement. Contact Generac for more details.

Specifications

SnapRS™ (APKE00011)	
PV MODULE MAX VOC:	75 V
EFFICIENCY:	99.8%*
MAX INPUT CURRENT:	13 A
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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SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8

GENERAC

PWRCELL

OUTDOOR RATED BATTERY

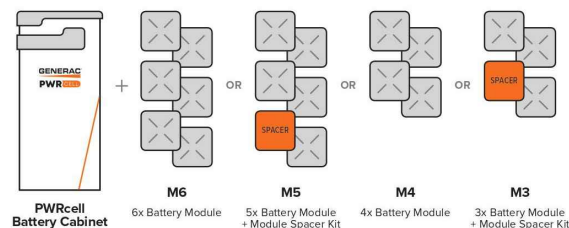
PWRcell Outdoor Rated Battery Cabinet (Ordering SKU: APKE00028)
 3.0kWh PWRcell EX Battery Module
 Model#/Ordering SKU: G0080000

The PWRcell™ Outdoor Rated (OR) Cabinet is a Type 3R smart battery platform 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. Whether for backup power or smart energy management, PWRcell has power and capacity options for every need, without sacrificing flexibility or function.

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. When needs change, 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.

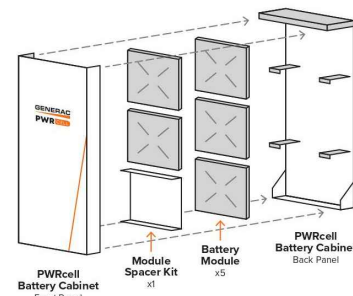
BATTERY CONFIGURATION GUIDE



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



Specifications

PWRcell™ BATTERY CONFIGURATIONS				
BATTERY MODULE SERIES:	EX			
BATTERY MODULES:	3	4	5	6
USABLE ENERGY:	9 kWh	12 kWh	15 kWh	18 kWh
AVG. AC POWER OVER COMPLETE DISCHARGE CYCLE:	3.4 kW	4.5 kW	5.6 kW	6.7 kW
MAX. CONT. AC POWER @ 40°C (104°F):	4.5 kW	6 kW	7.5 kW	9 kW
PEAK MOTOR STARTING CURRENT (2 SEC) - A, RMS	25	33	42	50
REbus™ VOLTAGE - INPUT/OUTPUT:	360-420 VDC			
NOMINAL VOLTAGE:	43.2 VDC			
DC-DC ROUND-TRIP EFFICIENCY:	96.5%			
MAX. AMBIENT OPERATING TEMPERATURE RANGE:	14 TO 122 °F (-10 TO 50 °C)			
RECOMMENDED AMBIENT OPERATING TEMPERATURE (FULL POWER)*:	32 to 104 °F (0 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 - LB (KG):	287 (130)	344 (156)	401 (182)	459 (208)
WEIGHT, ACCESSORY MOUNTING HARDWARE - LB (KG):	21 (10)			
WARRANTY - LI-ION MODULES:	10 Years, (7.56MWh)			
WARRANTY - ELECTRONICS AND ENCLOSURE:	10 Years			
COMMUNICATION PROTOCOL:	REbus™ DC Nanogrid™			
COMPLIANCE:	UL 9540, UL 1973, UL 1642, CSA 22.2 #107.1			

*Performance may be limited outside of recommended operating temperature range

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).

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PWRcell MODEL BUILDER



Sample Model Name: PWRcell OR M3 EX

*The PWRcell Outdoor Rated Battery Cabinet can be combined with PWRcell DCB Battery Modules, but this combination is only recommended for indoor installations.



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SHEET NAME
EQUIPMENT SPECIFICATION

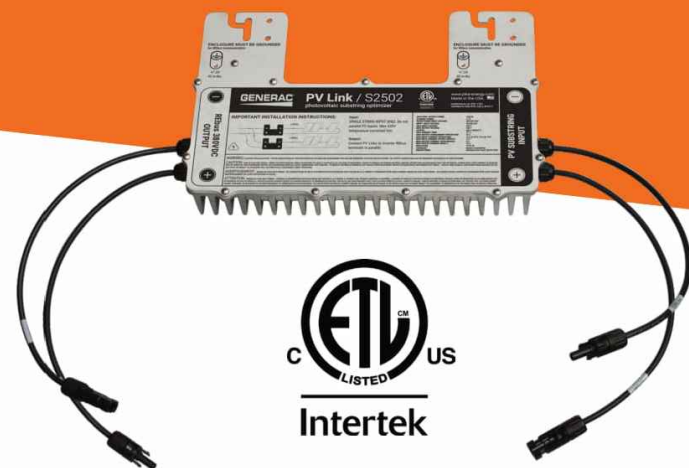
SHEET SIZE
**ANSI B
 11" X 17"**

SHEET NUMBER
PV-9

GENERAC

PV Link™

2500W MPPT Substring Optimizer
 Model: APKE00010
 Certification Model Reference: S2502



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.

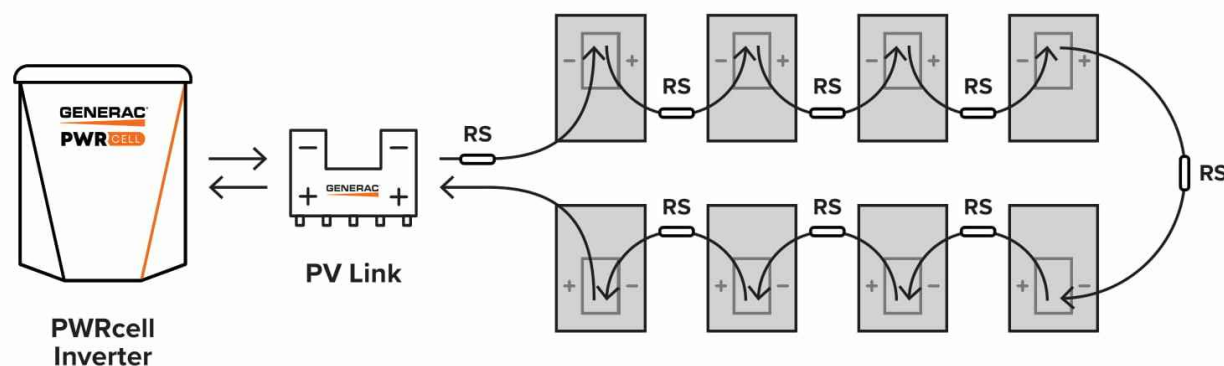


Diagram is applicable for most 60 cell PV modules. Modules with higher cell count may require a different arrangement. Contact Generac for more details.

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 3R
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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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

- 1. 4 x 7 IN C-CHANNEL POST**
Optional Lengths = 8 - 17 Feet
- 2. SLR-STRUT-50**
Reinforcement Brace
- 3. TRUSS - 120**
5-40 Degree Angle Adjustment
- 4. 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-DBLL 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.



POWER HOME SOLAR, LLC
"POWER YOUR FUTURE"
919 N. MAIN ST.
MOORESVILLE, NC 28115
Phone: 704-800-6591 (OFFICE)
Email: info@powerhome.com
Web: www.powerhome.com

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE:01-08-2021

PROJECT NAME & ADDRESS

LARRY M LUEDTKE
RESIDENCE
344 S. CHURCH ST.,
COATS, NC 27521

SHEET NAME
EQUIPMENT SPECIFICATION

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

SHEET NUMBER
PV-11