

La Luz Engineering, PLLC

May 20, 2021

SolarTyme

6710 Jefferson Davis Hwy
Richmond, VA 23237

**Re: Structural Review of Existing Roof for New Photovoltaic Panel Installation
David Dunlap Residence – 168 Swain St, Spring Lake, NC 28390**

Per your request, we have reviewed the existing roof framing which will receive new solar panel arrays for this project. This review was performed in accordance with the provisions of the 2018 North Carolina Residential Code, 2018 North Carolina Existing Building Code and American Wood Council National Design Specification (NDS) for Wood Construction 2015 Edition. Moreover, the review evaluates the ability of the existing structure to handle gravitational loads and wind uplift loads from the addition of the proposed PV system. The calculations on the following pages detail the modifications to gravitational loading and wind uplift respectively.

The existing roof framing members are 2" x 4" wood trusses at 24" on center. The roofing material is composite shingle. There are twenty-three 400W photovoltaic modules which will be installed on the roof of this residence. Ironridge railing and attachments will be used for this project.

Per the ASD load calculations section of the calculations below, the PV system installation results in a decrease in loading to the existing roof structure. Based on this analysis the roof framing was found to adequately support the proposed PV system.

The proposed PV system roof attachments are 4.75" x 5/16" Diameter lag bolts at a 48" maximum attachment spacing. The calculations in the *Uplift Capacity* section of the calculations demonstrate the lag bolts will provide adequate resistance to uplift based on a 2.5-inch embedment depth. This analysis is based on the American Wood Council National Design Specification (NDS) for Wood Construction 2015 Edition.

Structural analysis of the entire structure was not completed, and we are not the original Engineer of Record for this residence. We did not inspect the residence and all roof framing dimensions are based on the contractor's site analysis and plan drawings. Our structural review was limited to analyzing the existing structural roof members for the addition of the photovoltaic panels, based on our understanding of the existing residence, as described above. The truss connections have not been reviewed and the type and quality of wood used for construction is unknown. We are also not the Engineer of Record for the solar hardware, connections or layout. La Luz Engineering does not assume responsibility for improper installation of any solar hardware.

Regards,
La Luz Engineering, PLLC



Ben Brokaw, P.E.
Principal



5/20/2021

Site Information

Wind	130 mph
Exposure	B
Lumber	Southern Pine
Grade	No. 2
Modulus of Elasticity	1,400,000

Panel Information

Panel Type	CertainTeed400W
Panel Length	78.74 in
Panel Width	39.06 in
Panel Weight	50.7 lbs
Roof Material	Composite Shingle
Roof Dead Load	$Q_D = 10$ psf
PV System Dead Load	$Q_{PV} = 3$ psf
Framing Spacing	$s_{roof} = 24$ in
Linear Dead Load	$W_D = (Q_D + Q_{PV}) * s_{roof} = 26.00$ plf

Gravitational Loading (VEBC Section 603.7.3)

*R324.4.1 - 2015 VRC

Existing Live Load	$LL_E = 20$ psf	Table 1607.1
Existing Snow Load	$SL_E = 10$ psf	
Existing Roof Dead Load	$DL_E = 10$ psf	
Installed PV System Live Load	$LL_{PV} = 0$ psf	
Installed PV System Snow Load	$SL_{PV} = 9$ psf	Reduced due to slope
Installed PV System Total Dead Load	$DL_{PV} = 13$ psf	& unobstructed slippery surface

ASD Load Combinations	Existing	Installed PV
DL	10 psf	13 psf
DL + LL	30 psf	13 psf
DL + SL	20 psf	22 psf
DL + .75LL + .75SL	32.5 psf	19.75 psf
Maximum Existing Load M_{el}	32.5 psf	
Maximum Installed PV System Load M_{pv}	22 psf	
	$M_{el} > M_{pv}$	{OK}

Uplift Demand / Lag Screw Check

Mean Roof Height	<	30
Exposure		B
Height & Exposure Adjustment Coefficient		1.00 Table R301.2(3)
Effective Wind Area		10 ft ²
Design Wind Pressure (*Zone 3 most conservative value)	$p =$	-71.60 Table R301.2(2)
Trib. Depth for Each Rail	$d_{pv} = L/2 =$	3.28 ft
Trib. Depth for Each Rail	$b_{pv} = W/2 =$	1.63 ft
Screw Anchor Spacing	$s_{pv} =$	4 ft (max)
Uplift Force on Each Screw, Portrait	$U_L = (p + Q_{pv}) * d_{pv} * s_{pv} =$	-900.261 lbs (Upwards)
Uplift Force on Each Screw, Landscape	$U_w = (p + Q_{pv}) * b_{pv} * s_{pv} =$	-446.586 lbs (Upwards)
Design Uplift Force	$P_{uplift} = 0.6 * [\text{Max} (U_L , U_w)] =$	-540.156 lbs (Upwards)

Uplift Capacity

NDS 2015 Adjustment Factors

$$C_D = 1.6$$

$$C_M = 1$$

$$C_t = 1$$

$$SG = 0.55$$

Lumber Specific Gravity	SG =	0.55 NDS Supplement Table 4a
Lag Screw Diameter	D =	5/16 in
Withdraw Design /in	$1800 * SG^{3/2} * D^{3/4} =$	307 lbs/in NDS 2015 12.1-1
Embedment Depth	$l_p =$	2.5 in
Total Nominal Withdrawal Value	$W = W * l_p =$	767 lbs
Withdrawal Design Value	$W' = W * C_D * C_M * C_t =$	1227 lbs NDS 2015 Table 11.3.1
Demand-Capacity Ratio	$P_{uplift} / W' =$	0.44 < 1 {OK}

MODULE : (23) CT SERIES 144 HALF-CELL: CT400HC11-04
INVERTER : (1) GENERAC POWERCELL: MODEL X7602
DC SYSTEM SIZE: 9.2 kW

BATTERY: (1) PWRCELL BATTERY MODULE

Notes:

1. THIS PROJECT SHALL COMPLY WITH THE 2018 NORTH CAROLINA RESIDENTIAL CODE AND WHICH INCLUDES THE 2018 NCEBC AND THE 2018 NCMC
2. STATEWIDE UNIFORM REQUIREMENTS OF INSPECTION PROCEDURES FOR SOLAR PHOTOVOLTAIC SYSTEMS INSTALLED ON RESIDENTIAL ROOFTOPS
3. ALL ELECTRICAL WORK SHALL BE DESIGNED PER LATEST NATIONAL, STATE AND LOCAL ELECTRICAL CODE.
4. 110.2 APPROVAL : ALL ELECTRICAL EQUIPMENT SHALL BE LABELED, LISTED OR CERTIFIED BY A NATIONALLY RECOGNIZED TESTING LABORATORY ACCREDITED BY THE UNITED STATES OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION.PV EQUIPMENT, SYSTEMS AND ALL ASSOCIATED WIRING AND INTERCONNECTIONS SHALL ONLY BE INSTALLED BY QUALIFIED PERSONS.
 THIS IS A (23) MODULE SOLAR ELECTRIC PROJECT USING CT SERIES 144 HALF-CELL: CT400HC11-04 400(WATT)
5. THIS SYSTEM USES (1) GENERAC POWERCELL: MODEL X7602 INVERTER
6. THIS SYSTEM IS A 9.2 kW USING IRONRIDGE XR-100 RAILS AT A 23° PITCH.
7. NO ALTERATIONS TO EXISTING DWELLING, THIS BUILDING IS A 2 STORY HOUSE.
8. LOCAL UTILITY PROVIDED SHALL BE NOTIFIED PRIOR TO USE AND ACTIVATION OF ANY SOLAR PV INSTALLATION.
9. NO SHEET METAL OR TECH SCREWS SHALL BE USED TO GROUND DISCONNECT ENCLOSURE WITH TIN-PLATED ALUMINUM LUGS; PROPER GROUNDING/GROUND BAR KITS SHOULD BE USED.
10. ALL ELECTRICAL EQUIPMENT SHALL BE 3 FEET FROM GAS METER.

SHEET NO	DRAWING INFO
PV-1	COVER SHEET
PV-2	LAYOUT
PV-3	STRUCTURE
PV-4A	WIRING
PV-4B	WIRING NOTES
PV-5	SIGNAGE

LEGEND

- ROOF OUTLINE
- ⊗ ○ ROOF VENT/MECHANICAL
- SOLAR MODULE (67"X40")
- ⊕ PV STAND-OFF/PENETRATION
- - CONDUIT RUN
- ▬ DIE LADDER/ACCESS POINT

VICINITY MAP



NOTICE TO CONTRACTOR
 All construction shall comply with current NC Building Codes and all applicable local ordinances and regulations.

APPROVED

Sealed Building Plans herein
 Project Author/Responsible Party
 Not for Construction without Review

06/07/2021

SATELLITE MAP



SOLAR Tyme
 6710 JEFFERSON HWY
 RICHMOND VA 23237
 License #: 2705036452

DAVID DUNLAP
 168 SWAIN ST
 SPRING LAKE, NC 28390

REV 1

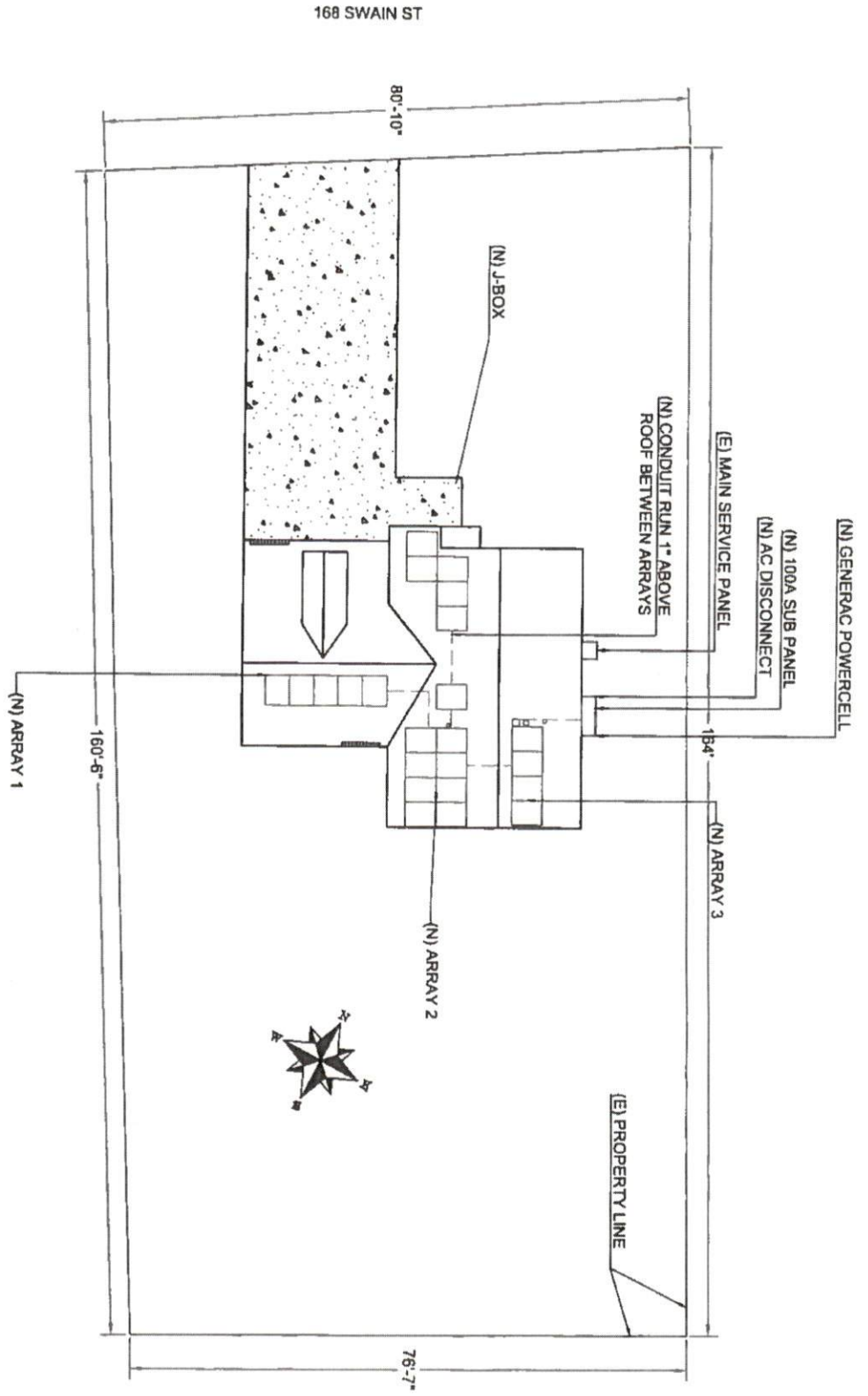
Designed by
 BB

Issue Date
 5/20/2021

Drawing
 Cover Sheet

Drawing
 PV-1

SCALE: 1/8" = 1'-0"

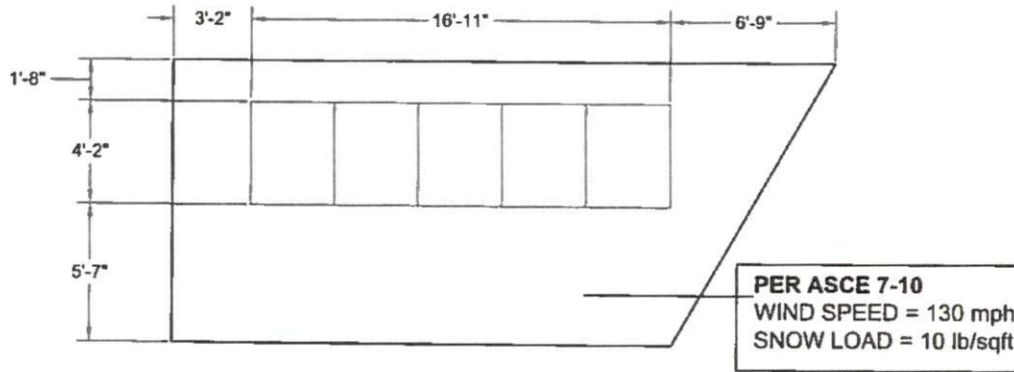


	SOLAR TYME 6710 JEFFERSON HWY RICHMOND VA 23237 License #: 2705036452
	DAVID DUNLAP 168 SWAIN ST SPRING LAKE, NC 28390
REV 1	Designed by BB
Issue Date 5/20/2021	Drawing Layout
Drawing PV-2	

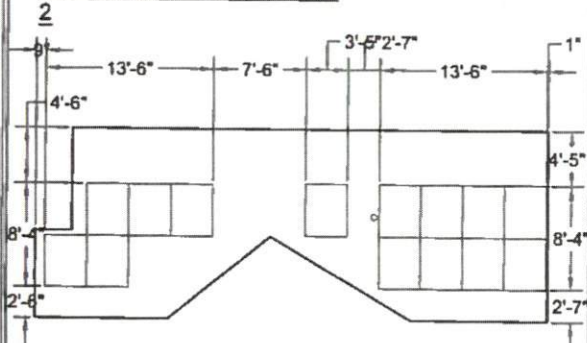
ROOF NOTES:

1. THE ROOF MODULES WILL NOT COVER ANY PLUMBING OR MECHANICAL VENTS
2. THIS SYSTEM IS ON COMP SHINGLE ROOF AT A 23° PITCH WITH 2X4 TRUSSED AT 24" O.C.
3. THIS ROOF HAS 1 LAYERS OF COMP SHINGLES.
4. THESE BUILDINGS ARE 2 STORY HOUSES AND GARAGE.
5. NO ATTACHMENTS SHALL BE MADE WITHIN 6 INCHES OF ALL NAILING PLATES.
6. ALL WIRING SETBACK ON THE ROOF IS IN 3/4" EMT AND 4" ABOVE THE ROOF.
7. ALL LAG SCREWS SHALL HAVE A MINIMUM EMBEDMENT OF 2.5"
8. MAX CANTILEVER SHALL BE 18" OR AS SPECIFIED ON PLANS.
9. ALL RAILS TO BE LEVELED.
10. ALL CONNECTIONS SHALL BE SEALED WITH WATERPROOF SEALANT.
11. PROVIDE 3/16" PILOT HOLE PRIOR TO INSTALLATION OF 5/16 LAG SCREW

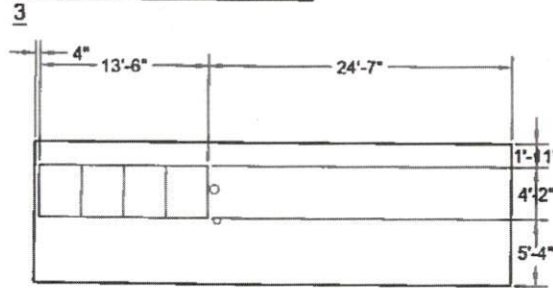
SCALE: 3/8" = 1'-0":ARRAY 1



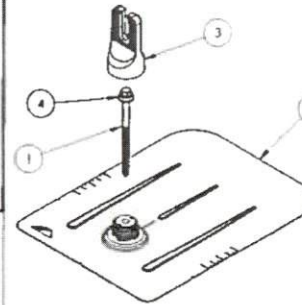
SCALE: 3/16" = 1'-0":ARRAY 2



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

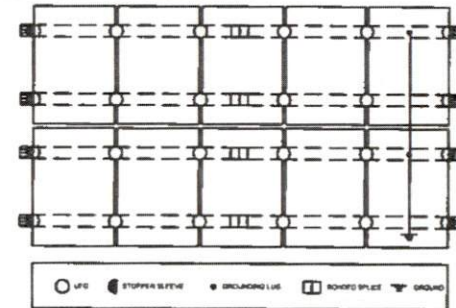


MODULE ATTACHMENT



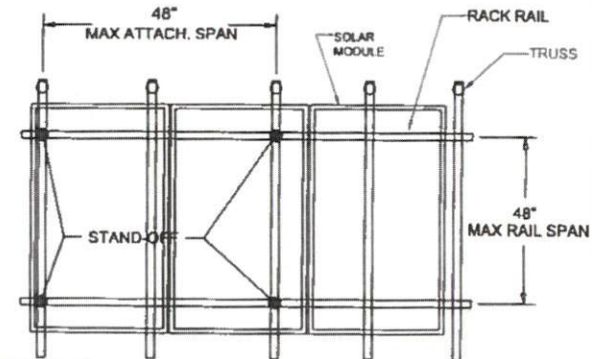
ITEM NO.	DESCRIPTION
1	BOLT LAG 5/16 X 4.75"
2	ASSY, FLASHING
3	ASSY, CAP
4	WASHER, EPDM BACKED

RAIL GROUNDING INFO



APPROVED SHIPING WELDER/WITNESS CAN PROVIDE EQUIPMENT GROUNDING OF RAILMOUNT SYSTEMS ELIMINATING THE NEED FOR GROUNDING LUGS AND FIELD PAID CALLED EQUIPMENT GROUND CONDUCTORS (EGC).

ROOF ATTACHMENT



SOLAR TYME
6710 JEFFERSON HWY
RICHMOND VA 23237
License #: 2705036452

DAVID DUNLAP
168 SWAIN ST
SPRING LAKE, NC 28390

REV 1

Designed by
BB

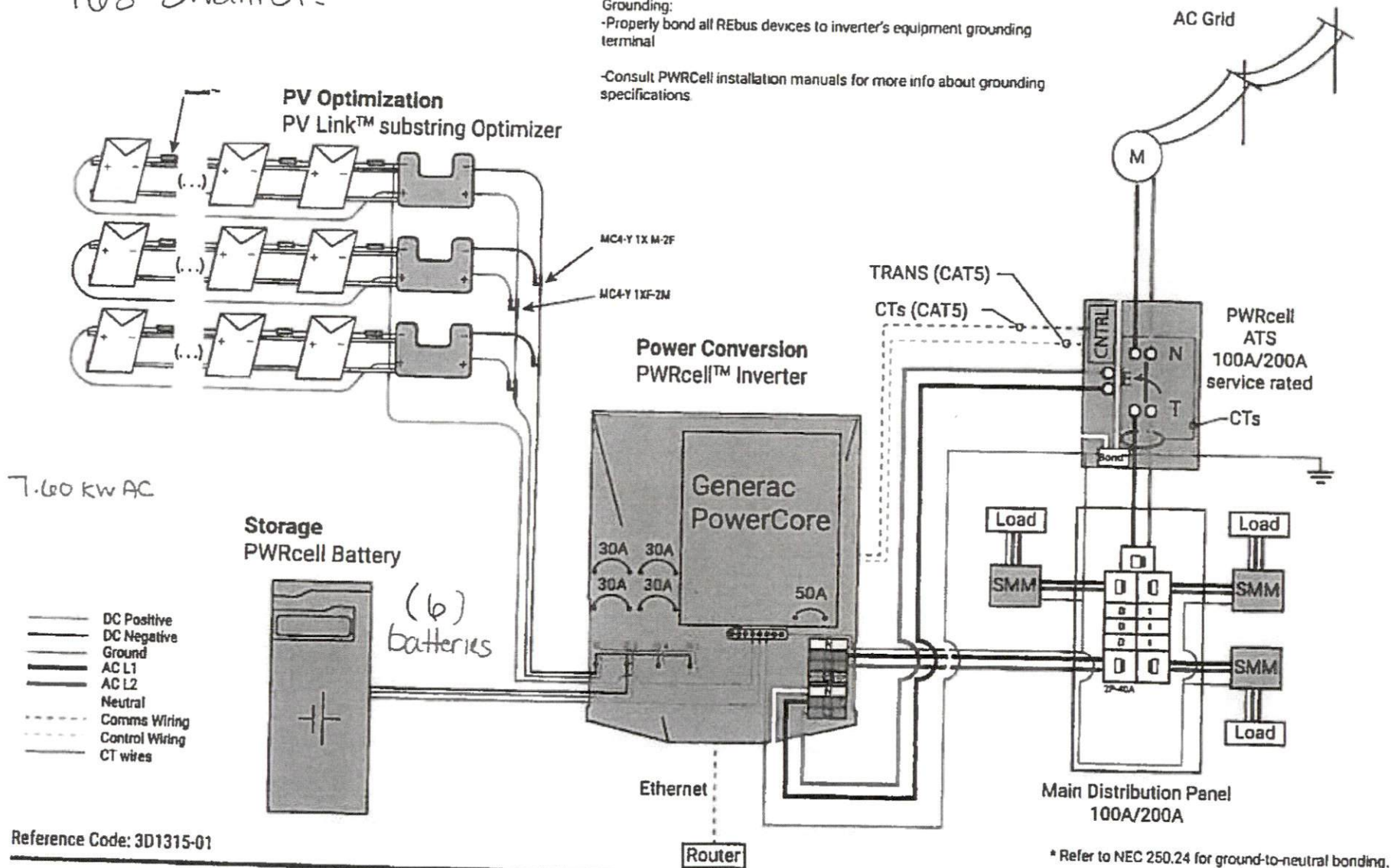
Issue Date
5/20/2021

Drawing
Structure

Drawing
PV-3

Dunlap
168 Swain St.

Grounding:
- Properly bond all REbus devices to inverter's equipment grounding terminal
- Consult PWRcell installation manuals for more info about grounding specifications



Reference Code: 3D1315-01

This design shows Generac PWRcell Whole-Home-Backup configuration. This configuration provides load shedding capability to provide power to essential circuits. The inverter backup output supports a loads panel using Generac SMM devices for load management for larger 240V loads. This configuration is acceptable with most 100A and 200A residential services.

- Whole-Home-Backup (X7602)**
- 1 PWRcell Inverter (X7602)
 - N SnapRS™
 - PV Links
 - 1 PWRcell Batteries
 - 1 CT Kit (Incl.)
 - N PV Modules
 - 1 PWRcell ATS
 - SMMs

* Refer to NEC 250.24 for ground-to-neutral bonding.



NOTES:

1. ALL PV SYSTEM COMPONENT SHALL BE LISTED BY A RECOGNIZED TESTING AGENCY (i.e., UL 1741, ETC)
2. WIRING MATERIAL SHALL BE SUITABLE FOR THE SUN EXPOSURE AND WET LOCATIONS. FIELD APPLIED PROTECTIVE COATINGS ARE NOT ACCEPTABLE
3. WHERE THE TERMINAL OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION, A WARNING SIGN SHALL BE MOUNTED ON OR ADJACENT TO THE DISCONNECTING MEANS HAVING THE FOLLOWING WORDS: "WARNING-ELECTRIC SHOCK HAZARD, DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION"
4. SIGNS SHALL BE POSTED ADJACENT TO EACH PV DISCONNECT AND INVERTER TO INDICATE "PHOTOVOLTAIC SYSTEM"
5. ALL PV MODULES AND ASSOCIATED EQUIPMENT AND WIRING MATERIAL SHALL BE PROTECTED FROM PHYSICAL DAMAGE
6. ALL FIELD INSTALLED JUNCTION, PULL AND OUTLET BOXES LOCATED BEHIND MODULES OR PANEL SHALL BE ACCESSIBLE DIRECTLY OR BY DISPLACEMENT OF A MODULE(S) OR PANEL(S) SECURED BY REMOVABLE FASTENERS
7. EACH SIDE OF A POWER TRANSFORMER SHALL BE CONSIDERED AS PRIMARY AND PROTECTED IN ACCORDANCE WITH NEC 2017
8. REMOVAL OF INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BONDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR AND THE PHOTOVOLTAIC SOURCE AND/OR OUTPUT CIRCUIT GROUNDING CONDUCTOR
9. THE OVER-CURRENT PROTECTION OF OUTPUT CIRCUITS WITH INTERNAL CURRENT LIMITING DEVICES SHALL BE NOT LESS THAN 125% OF THE MAXIMUM LIMITED CURRENT OF THE OUTPUT CIRCUIT. THE CONDUCTORS IN SUCH AN OUTPUT CIRCUIT SHALL BE SIZED IN ACCORDANCE WITH NEC 2017.
10. PHOTOVOLTAIC SOURCE CIRCUITS, OUTPUT CIRCUITS, INVERTER OUTPUT CIRCUITS AND EQUIPMENT SHALL BE PROTECTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NEC 2017.
11. MODULES FRAMES AND RACKING SYSTEMS SHALL BE GROUNDED AT UL-LISTED LOCATIONS PROVIDED BY THE MANUFACTURER USING UL LISTED GROUNDING LUGS. THE REMOVAL OF THE ONE PANEL SHALL NOT INTERRUPT THE CONTINUITY OF THE GROUNDING SYSTEM FOR THE REST OF THE PANELS OR RACKING SYSTEM. NEC 2017 690.64(B)(2)
12. ALL NEC REQUIRED PV SIGNAGE (690.17, 690.53, 690.56, 705.10) WILL BE POSTED.
13. IF AN EXISTING GROUND ROD IS PRESENT, AN ADDITIONAL GROUND ROD WILL BE PLACED LESS THAN 6 FEET AWAY.
14. IF THE EXISTING MAIN SERVICE PANEL DOES NOT HAVE A VIABLE GROUNDING ELECTRODE, IT IS THE PV CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
15. ALL ELECTRICAL EQUIPMENT SHALL BE LABELED, LISTED OR CERTIFIED BY A NATIONALLY RECOGNIZED TESTING LABORATORY ACCREDITED BY THE UNITED STATES OCCUPATIONAL SAFETY HEALTH ADMINISTRATION.

SYSTEM OUTPUT:

DC (STC) RATING: 9.2 kW
 (23) CT SERIES 144 HALF-CELL: CT400HC11-04,
 400 WATT MODULES
 (1) GENERAC POWERCELL: MODEL X760Z
 INVERTER

PV SYSTEM CALCULATIONS:

DC SIDE

MAXIMUM DC SYSTEM VOLTAGE:
 $40.8 \times 1.12 = 45.696V$
 MAXIMUM PER DC SOURCE CIRCUIT CURRENT:
 $10.6 \times 1.25 \times 1.25 = 16.5625A$

AC SIDE

MAXIMUM AC SYSTEM VOLTAGE: 240V
 MAXIMUM AC CURRENT FOR OVER-CURRENT PROTECTION:
 $32 \times 1.25 = 40A, 40A$

LOAD CALCULATION:

BUS RATING = 200A
 120% OF 200A = 240A
 PV INPUT BREAKER = 40A
 MAIN BREAKER UTILITY = 200A
 TOTAL SUPPLY AMPS = 40A + 200A = 240A
 EQUAL TO 120% OF BUS RATING

MODULE INFORMATION

CT SERIES 144 HALF-CELL: CT400HC11-04
 PEAK POWER: 400 WATTS
 V_{oc}: 40.8Vdc I_{sc}: 10.6A
 V_{mp}: 40.8Vdc I_{mp}: 9.8A
 TYPE 1 (UL 1703) OR CLASS C (IEC 61730)
 MAX SERIES FUSE RATING 20A

INVERTER INFORMATION

GENERAC POWERCELL: MODEL X760Z
 24.5" x 19.25" x 8" 62.7 LBS.
 COMPLIANCE: IEEE-1547, UL 1741, CA Rule 21 (UL 1741-SA)
 RATED AC POWER OUTPUT: 7600 W
 AC OUTPUT VOLTAGE: 120/208, 3Ø VAC
 MAXIMUM CONTINUOUS OUTPUT CURRENT: 32 A, RMS
 AC FREQUENCY: 60 Hz
 CHARGE BATTERY FROM AC: YES
 GROUND-FAULT ISOLATION DETECTION: INCLUDED
 TYPICAL NIGHTTIME POWER CONSUMPTION: < 7 W

BATTERY: PWRCELL BATTERY MODULE
 MODULE STRING SIZE PER PV LINK OPTIMIZER-2-9 PV
 modules



SOLAR TYME
 6710 JEFFERSON HWY
 RICHMOND VA 23237
 License #: 2705036452

DAVID DUNLAP
 168 SWAIN ST
 SPRING LAKE, NC 28390

REV 1

Designed by
 BB

Issue Date
 5/20/2021

Drawing
 Wiring Notes

Drawing
 PV-4B

SIGNAGE

CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED

TO BE PLACED ON ALL INTERIOR & EXTERIOR PV CONDUITS, RACEWAYS, ENCLOSURE, CABLE ASSEMBLES, EVERY 10 FEET, 1' FROM TURNS AND ABOVE AND BELOW PENETRATIONS AND ALL DC COMBINER AND JUNCTION BOXES

PHOTOVOLTAIC POWER SOURCE

OPERATING AC VOLTAGE: 240 V
MAXIMUM OPERATING AC OUTPUT CURRENT: 40 A

TO BE PLACED ON MAIN SERVICE PANEL

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TO BE PLACED ON MAIN SERVICE PANEL

PHOTOVOLTAIC SYSTEM COMBINER PANEL DO NOT ADD LOADS

TO BE PLACED ON SOLAR SUB PANEL

RAPID SHUT DOWN SWITCH FOR SOLAR PV SYSTEM

TO BE PLACED ON AC DISCONNECT

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



LABEL FOR PV SYSTEMS THAT SHUT DOWN

NOTES: THE ARRAY AND THE CONDUCTORS LEAVING THE ARRAY
ALL LABELS WILL BE ON RESISTANT MATERIAL
SUITABLE FOR THE ENVIRONMENT
ALL LABELS SHALL HAVE A RED BACKGROUND
WITH MIN. 3/8" WHITE LETTERING

WARNING

ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS.
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION.

TO BE PLACED ON DISCONNECT

WARNING

DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND
PV SOLAR ELECTRIC SYSTEM

TO BE PLACED ON MAIN SERVICE PANEL

WARNING: PHOTOVOLTAIC POWER SOURCE

TO BE PLACED ON MAIN SERVICE PANEL

PHOTOVOLTAIC SYSTEM
AC DISCONNECT

WARNING

DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE AND LOAD SIDES
MAY BE ENERGIZED IN THE OPEN POSITION.

OPERATING VOLTAGE: 240 VOLTS
OPERATING CURRENT: 40 AMPS

TO BE PLACED ON DISCONNECT

**SOLAR PV BREAKER
BREAKER IS BACKFED
DO NOT RELOCATE**

TO BE PLACED INSIDE MAIN SERVICE PANEL
NEXT TO SOLAR BREAKER



SOLAR TYME
6710 JEFFERSON HWY
RICHMOND VA 23237
License #: 2705036452

DAVID DUNLAP
168 SWAIN ST
SPRING LAKE, NC 28390

REV 1

Designed by
BB

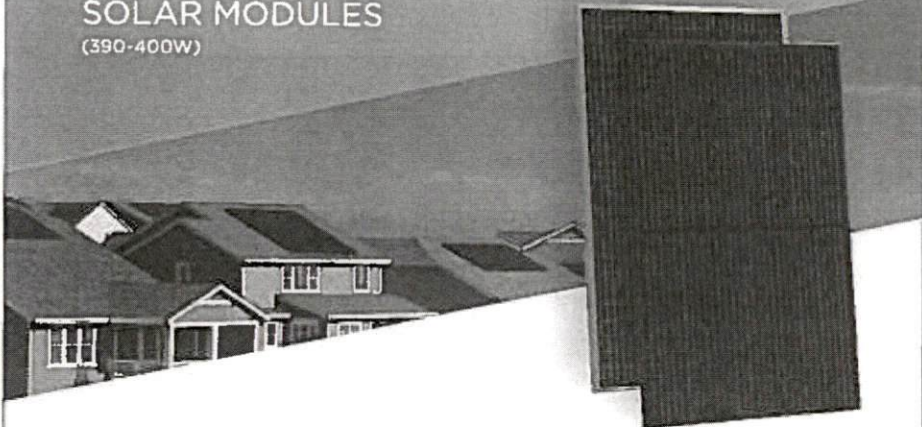
Issue Date
5/20/2021

Drawing
Signage

Drawing
PV-5

CertainTeed Solar

CT SERIES 144 HALF-CELL SOLAR MODULES (390-400W)



Half-Cell Monocrystalline Type

- CT390HC11-04
- CT380HC00-04
- CT395HC11-04
- CT395HC00-04
- CT400HC11-04
- CT400HC00-04

Features and Benefits

- High Quality / High Power
- Up to 390W black backsheet / 400W white backsheet
- UL listed (UL 1703)
- Positive power output tolerance

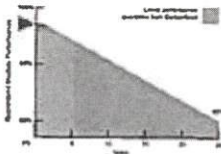
Limited Warranty*

- 25-year linear power output warranty

*See CertainTeed's limited warranty for details



Power Output Warranty



Electrical Characteristics

	390W	385W	400W	
Nominal Output (P _{mpp})	W	390	395	400
Voltage at P _{mpp} (V _{mpp})	V	40.4	40.6	40.8
Current at P _{mpp} (I _{mpp})	A	9.7	9.7	9.8
Open Circuit Voltage (V _{oc})	V	48.2	48.4	48.6
Short Circuit Current (I _{sc})	A	10.5	10.6	10.8
Output Tolerance	W	-	-0 / + 5	-
No. of Cells & Connections	144 half-cells in series / 3 bypass diodes			-
Maximum Series Fuse Rating	20A			-
Cell Type	6" half-cut monocrystalline			-
Module Efficiency	%	19.4	19.6	19.9
Temperature Coefficient of P _{mpp}	%/C	-	-0.42	-
Temperature Coefficient of V _{oc}	%/C	-	-0.31	-
Temperature Coefficient of I _{sc}	%/C	-	0.05	-



Mechanical Characteristics

Laminate	Glass: 3.2 high transmission, tempered, anti-reflective Encapsulant: EVA Backsheet: Weatherproof film (Black or White)
Frame	Anodized aluminum (Black or Silver)
Junction Box	IP67/IP68
Output Cables	4 mm ² (12AWG) PV Wire, Length 1.2m (47.2")
Connectors	Polarized MC4 compatible
Weight	23.0kg (50.7 lbs)

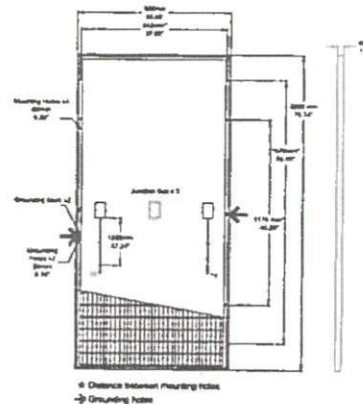


Operating Conditions

Nominal Operating Cell Temp.	45+/-2° C
Operating Temperature	-40 to 85° C
Maximum System Voltage	1,000V
Fire Performance	Class C / Type 1
Maximum Wind Load	113 psf / 210 mph (5400 Pa)
Maximum Snow Load	113 psf (5400 Pa)



Dimensions



CertainTeed
CEILING • DECKING • FENCE • GYPSUM • INSULATION • BAILING • ROOFING • SIDING • TRIM
20 Hobart Road, Hazlet, PA 16830 Professional: 800-331-6990 Consumer: 800-782-8777 certainteed.com

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
BATTERY AC POWER OUTPUT	3000 W	3000 W
AC OUTPUT VOLTAGE	120/240, 60 VAC	277/240, 60 VAC
AC FREQUENCY	60 Hz	60 Hz
MAXIMUM CONTINUOUS OUTPUT CURRENT	32 A, RMS	32 A, RMS
GROUND-FAULT ISOLATION DETECTION	Include	Include
CHARGE BATTERY FROM AC	Yes	Yes
THD RECURRENT	< 2%	< 2%
TYPICAL NIGHTTIME POWER CONSUMPTION	1 W	1 W

AC OUTPUT/BACKUP	MODEL X7602	MODEL X11402
BATTERY AC BACKUP POWER OUTPUT	8000 W	8000 W
MAXIMUM AC BACKUP POWER OUTPUT	12000 W	12000 W
AC BACKUP OUTPUT VOLTAGE	120/240, 60 VAC	120/240, 60 VAC
AC FREQUENCY	60 Hz	60 Hz
AC CIRCUIT BREAKER	50 A	50 A
THD RFLYBACK	< 2%	< 2%
AUTOMATIC SWITCHOVER TIME	< 1 Sec/40s	< 1 Sec/40s
TYPICAL NIGHTTIME POWER CONSUMPTION	30 W	30 W

DC INPUT	MODEL X7602	MODEL X11402
DC INPUT VOLTAGE RANGE	36-470 VDC	36-470 VDC
NOMINAL DC BUS VOLTAGE	384 VDC	384 VDC
MAX INPUT CURRENT	20 A	20 A
REVERSE POLARITY PROTECTION	Yes	Yes
GROUND-FAULT ISOLATION DETECTION	Yes	Yes
TRANSFORMERLESS, UNGROUNDING	Yes	Yes

DC INPUT/BATTERY	MODEL X7602	MODEL X11402
MAXIMUM CONTINUOUS POWER	6000 W	2000 W
INTERNAL DC DISTRIBUTION BREAKERS	6x 2P30A	6x 2P30A
DC FUSES ON PLUS AND MINUS	40 A	40 A
2-POLE DISCONNECTION	Yes	Yes

EFFICIENCY	MODEL X7602	MODEL X11402
PEAK EFFICIENCY	98%	99%
CEC WEIGHTED EFFICIENCY	96.5%	97.5%

Specifications



FEATURES AND MODES

UL LISTED	Yes
UL 1741	Yes
UL 1548	Yes
PROTECTED OVERCURRENT PROTECTION	Yes
OVERTEMPERATURE PROTECTION	Yes

ADDITIONAL FEATURES

BATTERY CHARGE WISEMETER DISPLAY	Yes (Web Portal)
APP MONITORING	Yes (Web Portal and Mobile App)
APP CONTROL	Yes
PARALLEL OPERATION SUPPORT	Available
WARRANTY	5 Years

STANDARDS COMPLIANCE

IEEE 1547	IEEE 1547-2018
IEEE 1547-2018 (S1)	IEEE 1547-2018 (S1)
IEEE 1547-2018 (S2)	IEEE 1547-2018 (S2)

DIMENSIONS AND INSTALLATION SPECIFICATIONS

HEIGHT (MAX)	12.5 IN
WIDTH (MAX)	17.5 IN
DEPTH (MAX)	17.5 IN
WEIGHT (MAX)	13.5 LBS
WARRANTY	5 Years
INSTALLATION	Indoor/Outdoor
ENVIRONMENT	Indoor/Outdoor
TEMPERATURE RANGE	32°F to 104°F
RELATIVE HUMIDITY	5% to 95%

INSTALLATION GUIDELINES

BATTERY TYPE/CONFIGURATION	LiFePO4/12V
MAXIMUM BATTERY VOLTAGE (MAX)	470 VDC
MAXIMUM BATTERY CURRENT (MAX)	20 A
BATTERY CONNECTION	Terminal

© 2023 Generac Power Systems, Inc. All rights reserved. PWRCELL is a registered trademark of Generac Power Systems, Inc.

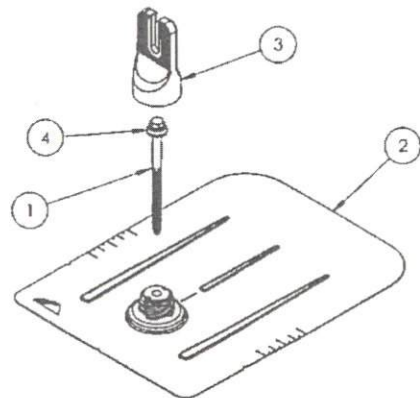
Specifications subject to change without notice.

GENERAC

Generac Power Systems, Inc.
545 W. 232nd Hwy. St. Wausau, WI 54989
www.Generac.com | 888.GENERAC | 888.415.3722

GENERAC

Generac Power Systems, Inc.
545 W. 232nd Hwy. St. Wausau, WI 54989
www.Generac.com | 888.GENERAC | 888.415.3722

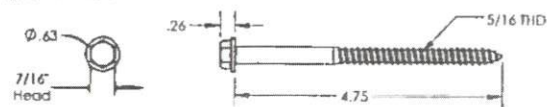


ITEM NO.	DESCRIPTION
1	BOLT LAG 5/16 X 4.75"
2	ASSY, FLASHING
3	ASSY, CAP
4	WASHER, EPDM BACKED

FLASHFOOT 2

Part Number	Description
FF2-01-A1	FLASHFOOT2, MLL
FF2-01-B1	FLASHFOOT2, BLACK

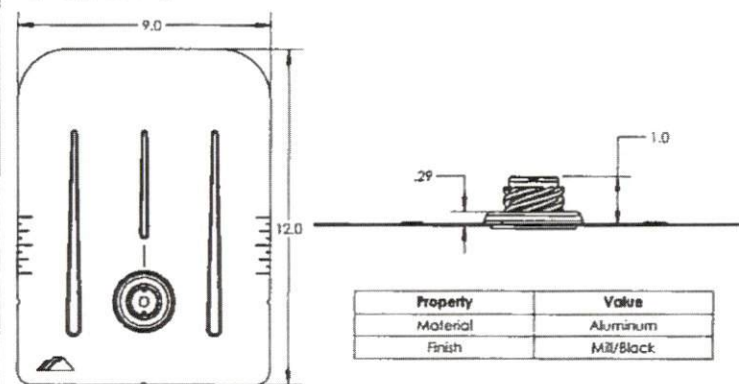
1) Bolt, Lag 5/16 x 4.75



Property	Value
Material	300 Series Stainless Steel
Finish	Clear

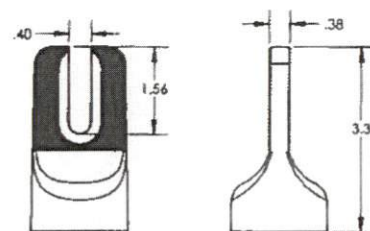
v1.21

2) Assy, Flashing



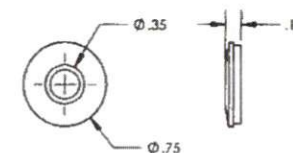
Property	Value
Material	Aluminum
Finish	Mill/Black

3) Assy, Cap



Property	Value
Material	Aluminum
Finish	Mill/Black

4) Washer, EPDM Backed

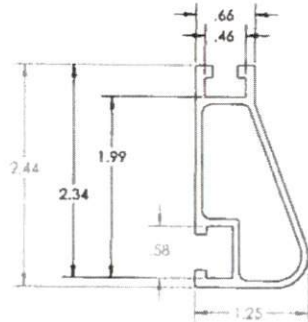
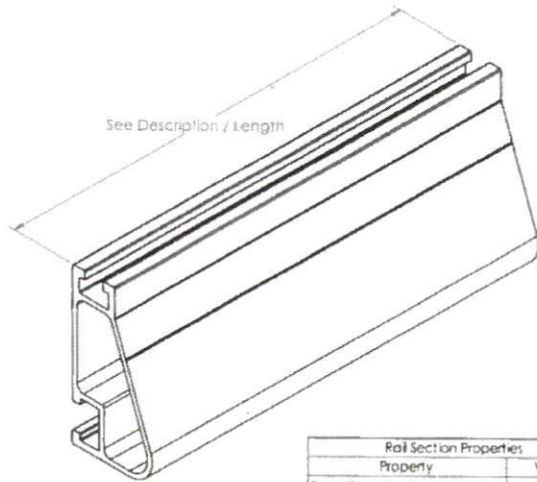


Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v1.21



XR100 Rail



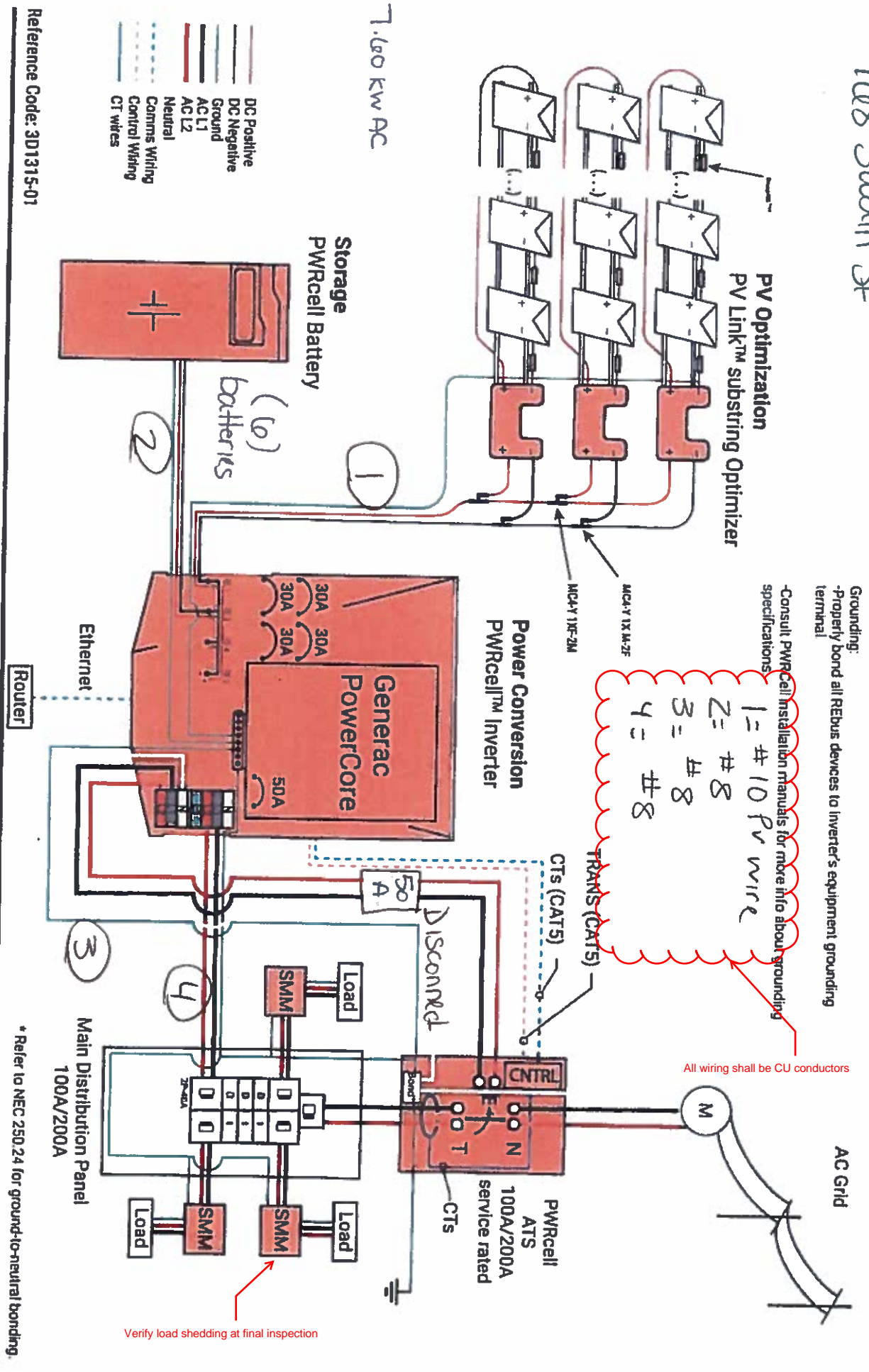
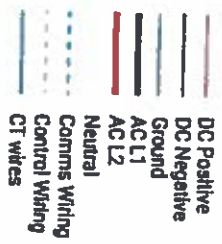
Rail Section Properties	
Property	Value
Total Cross Sectional Area	0.582 in ²
Section Modulus (X-axis)	0.297 in ³
Moment of Inertia (X-axis)	0.390 in ⁴
Moment of Inertia (Y-axis)	0.085 in ⁴
Torsional Constant	0.214 in ⁴
Polar Moment of Inertia	0.126 in ⁴

APPROVED MATERIALS:
6005-T6, 6005A-T61, 6105-T5, 6N01-T6
(34,000 PSI YIELD STRENGTH MINIMUM)

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-100-132A	XR-100-132B	XR100 Rail 132' (11 Feet)	6000-Series Aluminum	7.50 lbs.
XR-100-168A	XR-100-168B	XR100 Rail 168' (14 Feet)		9.55 lbs.
XR-100-204A	XR-100-204B	XR100 Rail 204' (17 Feet)		11.60 lbs.

Dunlap
168 Swan St

7.650 KW AC



Reference Code: 3D1315-01

This design shows Generac PWRcell Whole-Home-Backup configuration. This configuration provides load shedding capability to provide power to essential circuits. The inverter backup output supports a loads panel using Generac SMM devices for load management for larger 240V loads. This configuration is acceptable with most 100A and 200A residential services.

Whole-Home-Backup (X7602)

- 1 PWRcell Inverter (X7602)
- N SnapRS™
- PV Links
- 1 PWRcell Batteries
- 1 CT Kit (Incl.)
- N PV Modules
- 1 PWRcell ATS
- SMMs

Part No. A0001216061 | Rev. A | 07 OCT 2020

© 2020 Generac Power System, Inc. All rights reserved

Generac Power Systems, Inc. • 5415 W29290 Hwy. 59 • Waukesha, WI 53189



* Refer to NEC 250.24 for ground-to-neutral bonding.