



1011 N Causeway Blvd, Suite 19 ♦ Mandeville, Louisiana 70471 ♦ Phone: 985.624.5001 ♦ Fax: 985.624.5303

March 2022

Property Owner: Christopher Baird

Property Address: 330 Sierra Trail, Spring Lake, NC 28390

RE: Photovoltaic System Roof Installations

I have reviewed the existing structure referenced above to determine the adequacy of the existing structure support the proposed installation of an array of solar panels on the roof.

Based on my review, the existing structure is adequate to support the proposed solar panel installation. This assessment is based on recent on-site inspection by solar inspectors and photographs of the existing structure. The photovoltaic system is designed to withstand uplift and downward forces; our assessment is regarding the structure's support of the array. Stresses induced by the introduction of individual mount loads on the rafters or truss top chord are within acceptable limits as shown on the attached calculations. The structural considerations used in our review and assessment include the following:

Evaluation Criteria:

Applied Codes: ASCE 7-10 PEBC 2018 ""NETC 2018 """"PGE 2017
Risk Category: II
Design Wind Speed (3-second gust): 118 MPH
Wind Exposure Category: B
Ground Snow Load: 10 PSF
Seismic Design Category: D

Existing Structure:

Roof Material: Shingle
Roofing Structure: 2x6 rafters @ 24" O.C.
Roof Slope: 5/12

Connection of Array to Structure:

Manufacturer: UNIRAC
Mount: Flashloc Comp Kit
Mounting Connection: Flashloc Comp Kit 5/16" lag screw w/min 2.5" embedment into framing
Zone 1: 2 rails 4'-0" o.c. mounts
Zone 2: 2 rails 4'-0" o.c. mounts
Zone 3: 2 rails 4'-0" o.c. mounts

PRINCIPAL ENGINEERING, INC.
1011 N. CAUSEWAY BLVD. STE 19
MANDEVILLE, LA 70471
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NORTH CAROLINA FIRM NO. C4113

This item has been digitally signed and sealed by Henry I. DiFranco, Jr., P.E. on March 22, 2022. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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Effect of the Solar Array on Structure Loading:

Gravity Loads:

Per IBC Section 1607.12.5.1, the areas of the roof where solar panels are located are considered inaccessible, and therefore not subject to roof live loading. Live load in these areas is replaced by the dead load of the solar array, 3 psf. The total gravity load on the structure is therefore reduced and the structure may remain unaltered. Connections of the mounts to the underlying structure are to be installed in a staggered pattern, except at the array ends, to distribute the loading evenly to the roof structure. The stresses within the rafters or truss top chord due to the introduction of discrete mount loads are within acceptable limits, as shown on the attached calculations.

Wind Load:

The solar panel array will be flush mounted (no more than 6" above the surrounding roof surface, and parallel to the roof surface. Any additional wind loading on the structure due to the presence of the array is negligible. The array structure is designed by the manufacturer to withstand uplift and downward forces resulting from wind and snow loads. The attached calculations verify the capacity of the connection of the solar array to the roof to resist uplift due to wind loads, the governing load case.

Snow Load:

The reduced friction of the glass surface of the solar panels allows for the lower slope factor (C_s) per Section 7.4 of ASCE 7-10 resulting in a reduced design snow load for the structure. This analysis conservatively considered the snow load to be unchanged.

Seismic Load:

Analysis shows that additional seismic loads due to the array installation will be small. Even conservatively neglecting the wall materials, the solar panel installation represents an increase in the total weight of the roof and corresponding seismic load of less than 10%. This magnitude of additional forces meets the requirements of the exception in Section 11B.4 of ASCE 7-10. The existing lateral force resisting system of the structure is therefore allowed to remain unaltered.

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Conclusion:

To the best of my professional knowledge and belief, the subject construction and photovoltaic system installation will be in compliance with all state and local building codes and guidelines in effect at the time of our review.

Limitations:

Engineer's assessment of the existing structure is based on recent field reports and current photographs of the elements of the structure that were readily accessible at the time of inspection. The design of the solar panel racking (mounts, rails, connectors, etc.), connections between the racking and panels, and electrical engineering related to the installation are the responsibility of others. The photovoltaic system installation must be by competent personnel in accordance with manufacturer recommendations and specifications and should meet or exceed industry standards for quality. The contractor is responsible for ensuring that the solar array is installed according to the approved plans and must notify the engineer of any undocumented damage or deterioration of the structure, or of discrepancies between the conditions depicted in the approved plans and those discovered on site so that the project may be reevaluated and altered as required. Engineer does not assume any responsibility for improper installation of the proposed photovoltaic system.

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**Uplift and Wind Downforce Calculation Summary (ASCE 7-10)
Mount, Rack, & Panel Proportioning**

Property Owner:	Christopher Baird	Individual Panel Dimensions		
Project Address:	330 Sierra Trail	Length (in)	Width (in)	Area (sf)
City, State:	Spring Lake, NC 28390	77	39	20.85

Wind Load Calculation Summary (ASCE 7-10 C&C Provisions)				
Building Characteristics, Design Input, and Adjustment Factors				
Roof Dimensions:	Length (b):	57 ft.	Least Dimension:	38 ft.
	Width (w):	38 ft.		
Roof Height (h):		15 ft.	Must be less than 60	✓
Pitch:	5 on 12 =	22.6°	Must be less than 45°	✓
Roof Configuration		Gable		
Roof Structure:		2x Rafters		
Roof material:		Plywood		
Ultimate Wind Speed (mph):		118	From ASCE 7-10, Fig. 26.5	
Exposure Category:		B	Para 26.7.3	
Directionality Factor, K_d		0.85	Table 26.6-1	
Risk Category:		2	Table 1.5-2	
Exposure Coefficient, K_z		0.7	Table 30.3-1	
Topographic Adj., K_{zt}		1	Fig. 26.8-1	
Effective Wind Area (sf):		21	(Area per individual panel)	
Velocity Pressure (psf), q_h :		21.21	psf, Eq. 30.3-1	
Internal Pressure Coeff, GC_{pi}		0.18	Table 26.11-1	

Roof Zone Strip (a), in ft, Fig. 30.5-1, Note 5	
1 - Least Roof Horizontal Dimension (L or W) x 0.10	3.8
2 - Roof Height x 0.4	6
3 - Least Roof Horizontal Dimension (L or W) x 0.04	1.52
4 - Lesser of (1) and (2)	3.8
5 - Greater of (3) and (4)	3.8
6 - Greater of (5) and 3 feet	a= 3.8 ft.

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Net Design Wind Pressures					
(ASCE 7, Eq. 30.4.1; Load Factor for ASD = 0.6, per ASCE 7, 2.4.1)					
	Uplift (-psf)		Down (psf)		Description of Zone
	GC _p	Pressure	GC _p	Pressure	
Zone 1	-0.88	16.0	0.40	16.0	Interior Roof Area, >(a) ft from edge
Zone 2	-1.53	-21.7	0.40	16.0	Strip of (a) ft wide at roof edge
Zone 3	-2.40	-32.8	0.39	16.0	Corner intersection of Zone 2 strips

Snow Load		
Ground Snow Load, p _g	10.0	From ASCE 7 or AHJ
Terrain Category:	B	Para 6.5.6.3
Exposure	Fully	
Exposure Factor C _e	0.8	Table 7-2
Thermal Factor, C _t	1.0	Table 7-3
Importance Factor, I _s	1.0	Table 1.5.2
Roof Configuration	Gable	
Roof Slope	22.6°	
Distance from Eave to Ridge	19.0	
p _m , Minimum required Snow Load	N/A	Para. 7.3.4
p _f , Calculated Snow Load	5.60	Eq. 7.3-1
p _f , Design Snow Load	5.60 psf	

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Mount Selection and Spacing		
Manufacturer:	Unirac	Perpendicular Panel Orientation
Mount:	Flashloc Comp Kit	Allowable Arrangement by Uplift Pressure
Substrate:	Wood Rafters/Truss Top Chord	< 37 psf : 2 rails, mounts @ 4'-0" o.c. 37 to 75 psf : 2 rails, mounts @ 2'-0" o.c. 75 to 112 psf : 3 rails, mounts @ 2'-0" o.c. 112 to 150 psf : 4 rails, mounts @ 2'-0" o.c. > 150 psf : Mount capacity exceeded
Connector:	5/16" x 4" Lag Screw	
Allowable Uplift:	480 max.	
Required Mount Layout		
Zone 1	2 rails, mounts @ 4'-0" o.c.	
Zone 2	2 rails, mounts @ 4'-0" o.c.	
Zone 3	2 rails, mounts @ 4'-0" o.c.	
<i>(Allowable loads are based on individual mount failure before rail failure)</i>		

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PHOTOVOLTAIC ROOF MOUNT SYSTEM

26 MODULES-ROOF MOUNTED - 9.880 KW DC STC, 9.155 KW DC PTC, 7.540 KW AC

330 SIERRA TRAIL, SPRING LAKE, NC 28390



22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

PROJECT DATA

PROJECT ADDRESS: 330 SIERRA TRAIL, SPRING LAKE, NC 28390
OWNER: CHRISTOPHER BAIRD
CONTRACTOR: MARC JONES CONSTRUCTION, LLC DBA SUNPRO SOLAR
PHONE: 5052180838
DESIGNER: ESR
SCOPE: 9.880 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 26 LG ELECTRONICS : LG380N1C-A6 380W PV MODULES WITH 26 ENPHASE IQ7PLUS-72-2-US MICROINVERTERS

AUTHORITIES HAVING JURISDICTION:
BUILDING: HARNETT COUNTY
ZONING: HARNETT COUNTY
UTILITY: SOUTH RIVER ELECTRIC

SHEET INDEX

PV-1 COVER SHEET
PV-2 SITE PLAN
PV-3 ROOF PLAN & MODULES
PV-4 ELECTRICAL PLAN
PV-5 STRUCTURAL DETAIL
PV-6 ELECTRICAL LINE DIAGRAM
PV-7 WIRING CALCULATIONS
PV-8 LABELS
PV-9 PLACARD
PV-10 MICRO INVERTER CHART
PV-11+ EQUIPMENT SPECIFICATIONS

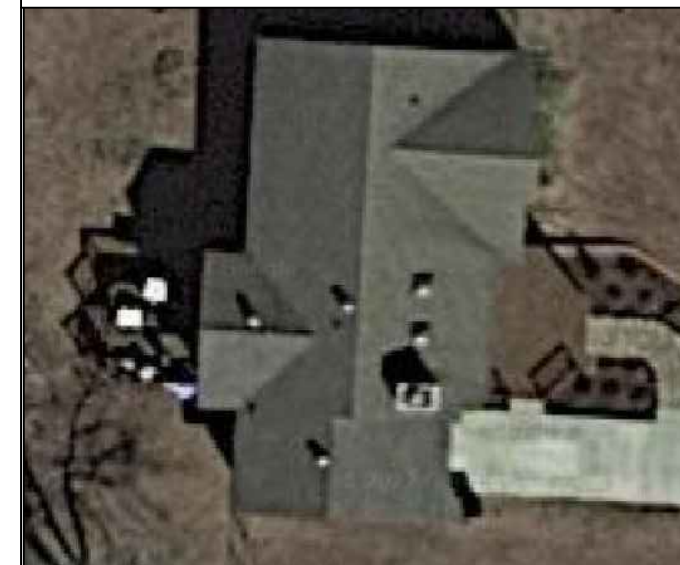
GENERAL NOTES

- ALL COMPONENTS ARE UL LISTED AND CEC CERTIFIED, WHERE WARRANTED.
- THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2017.
- THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
- ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
- WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
- HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
- A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH CEC 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
- PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
- PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
- ALL SINAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SINAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
- INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
- THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
- ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
- ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
- SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
- PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
- DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
- ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
- WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
- ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
- ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.

VICINITY MAP



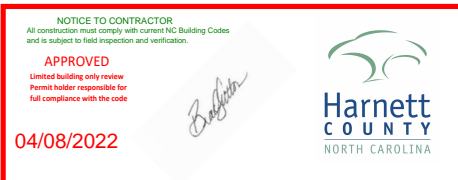
HOUSE PHOTO



CODE REFERENCES

PROJECT TO COMPLY WITH THE FOLLOWING:

2018 NORTH CAROLINA BUILDING CODE
2018 NORTH CAROLINA RESIDENTIAL CODE
2018 NORTH CAROLINA FIRE CODE
2017 NATIONAL ELECTRICAL CODE



REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	03/19/2022	

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NORTH CAROLINA FIRM NO. C4113

PROJECT NAME & ADDRESS
CHRISTOPHER BAIRD RESIDENCE
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
COVER SHEET

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

SHEET NUMBER
PV-1

PROJECT DESCRIPTION:

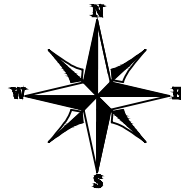
26 X LG ELECTRONICS : LG380N1C-A6 380W PV MODULES
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
 DC SYSTEM SIZE: 26 x 380 = 9.880KW DC
 AC SYSTEM SIZE: 26 x 290 = 7.540KW AC

EQUIPMENT SUMMARY

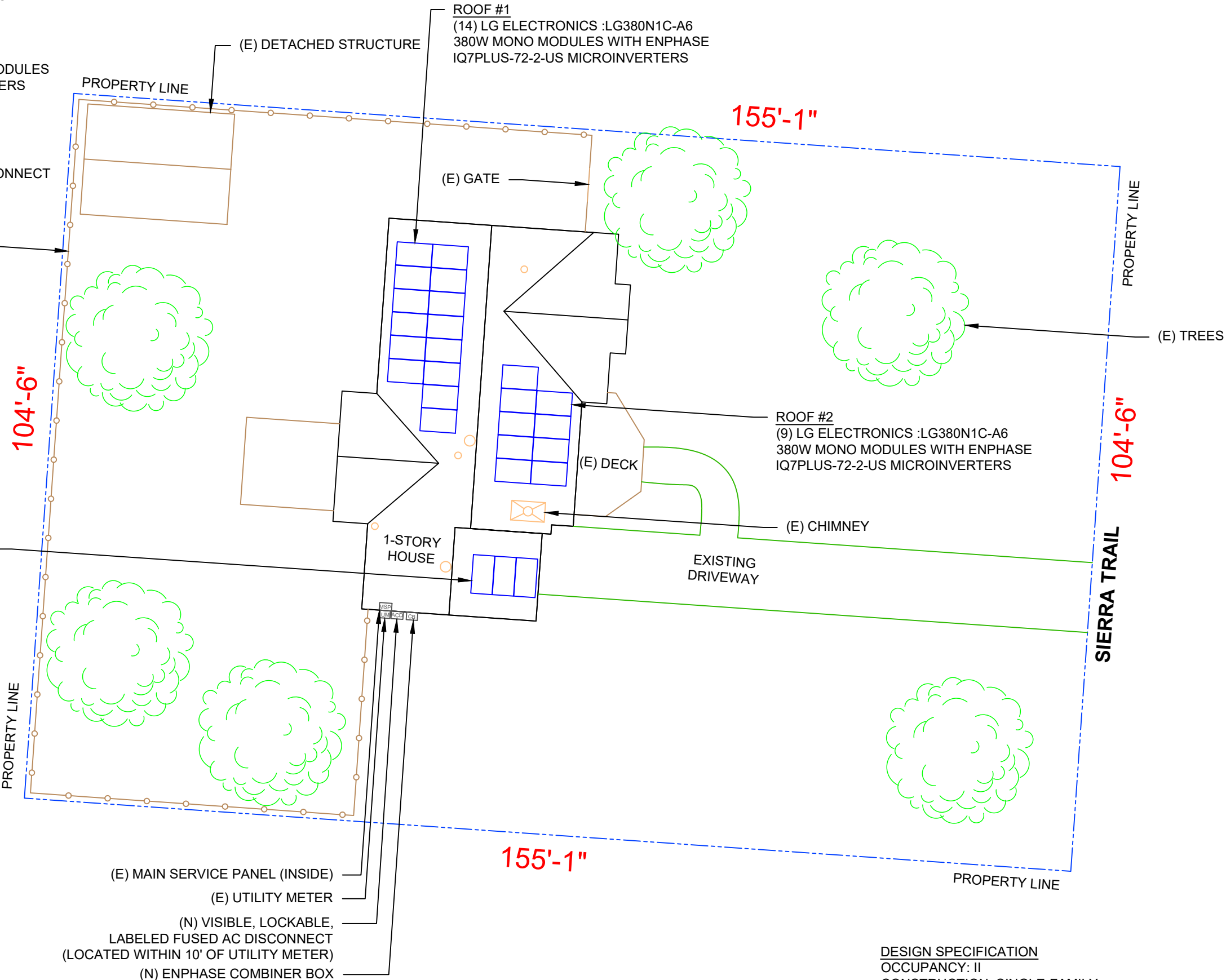
26 LG ELECTRONICS :LG380N1C-A6 MONO MODULES
 26 ENPHASE IQ7PLUS-72-2-US MICROINVERTERS

ROOF ARRAY AREA #1:- 273.14 SQ FT.
 ROOF ARRAY AREA #2:- 175.59 SQ FT.
 ROOF ARRAY AREA #3:- 58.53 SQ FT.

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT
 LOCATED WITHIN 10' OF UTILITY METER



(E) FENCE



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PROJECT NAME & ADDRESS

CHRISTOPHER
 BAIRD
 RESIDENCE
 330 SIERRA TRAIL,
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SHEET NAME
 SITE PLAN

SHEET SIZE
 ANSI B
 11" X 17"

SHEET NUMBER
 PV-2

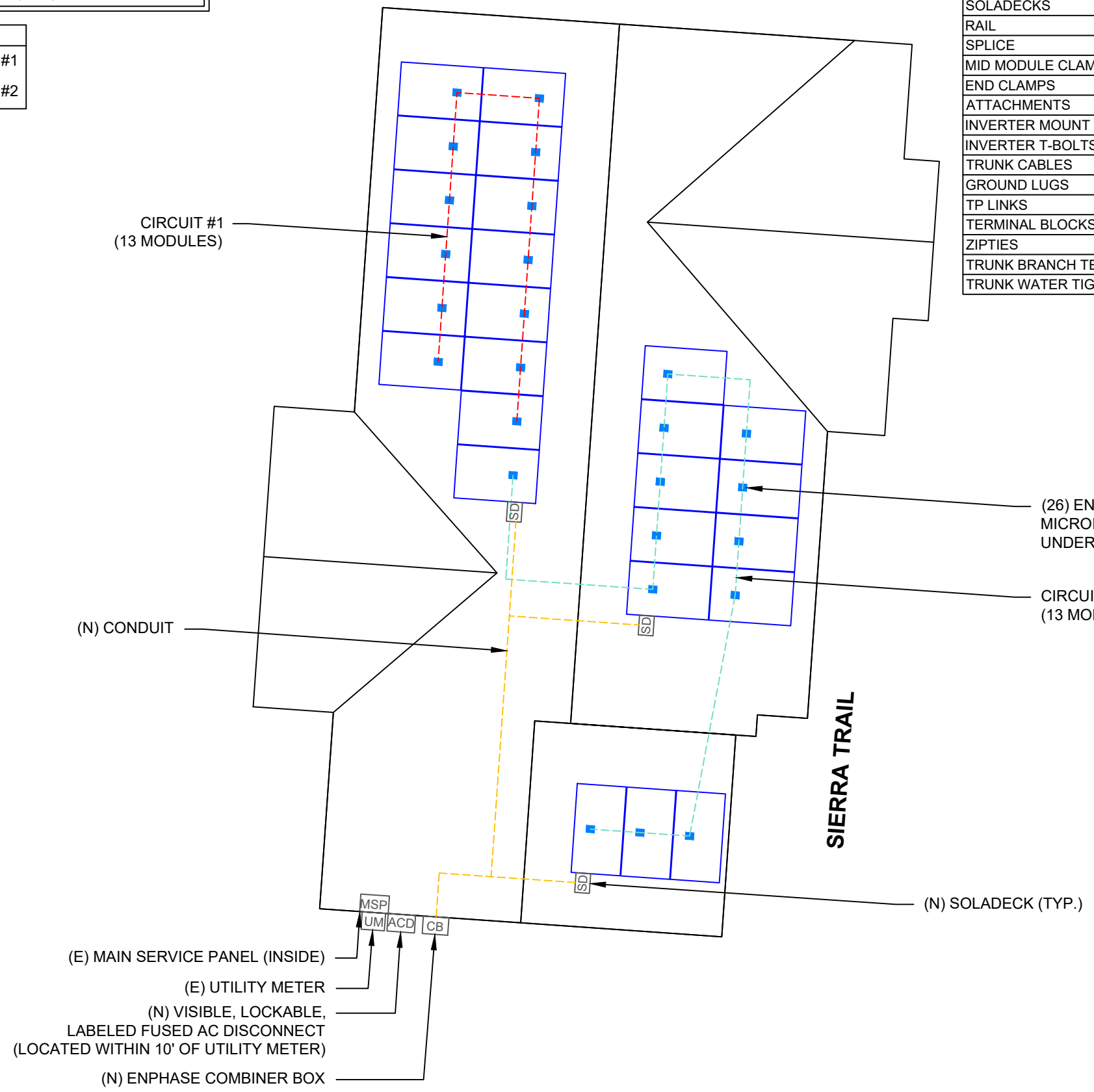
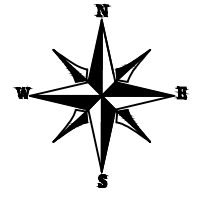
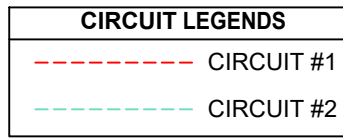
DESIGN SPECIFICATION

OCCUPANCY: II
 CONSTRUCTION: SINGLE-FAMILY
 ZONING: RESIDENTIAL
 GROUND SNOW LOAD: REFER STRUCTURAL LETTER
 WIND EXPOSURE: REFER STRUCTURAL LETTER
 WIND SPEED: REFER STRUCTURAL LETTER

1 | SITE PLAN

PV-2 | SCALE: 1/16" = 1'-0"

DC SYSTEM SIZE: 26 x 380 = 9.880KW DC
 AC SYSTEM SIZE: 26 x 290 = 7.540KW AC
 (26) LG ELECTRONICS : LG380N1C-A6 380W MONO MODULES
 WITH (26) ENPHASE IQ7PLUS-72-2-US MICROINVERTERS
 LOCATED UNDER EACH PANEL (240V)



BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	26	LG ELECTRONICS : LG380N1C-A6 380W MODULE
MICRO INVERTERS	26	ENPHASE IQ7PLUS-72-2-US MICROINVERTERS
SOLADECKS	3	SOLADECKS
RAIL	14	UNIRAC SM STANDARD RAIL, 168" SILVER
SPLICE	6	SPLICE KIT
MID MODULE CLAMPS	38	MID MODULE CLAMPS
END CLAMPS	28	END CLAMPS / STOPPER SLEEVE
ATTACHMENTS	60	UNIRAC FLASHLOC ATTACHMENT
INVERTER MOUNT CLIP	26	INVERTER MOUNT CLIP
INVERTER T-BOLTS	26	INVERTER T-BOLTS
TRUNK CABLES	31	TRUNK CABLES
GROUND LUGS	2	GROUND LUGS
TP LINKS	1	TP LINKS
TERMINAL BLOCKS	15	TERMINAL BLOCKS
ZIPTIES	100	ZIPTIES
TRUNK BRANCH TERMINAL	6	TRUNK BRANCH TERMINAL
TRUNK WATER TIGHT COVER	6	TRUNK WATER TIGHT COVER



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REVISIONS		
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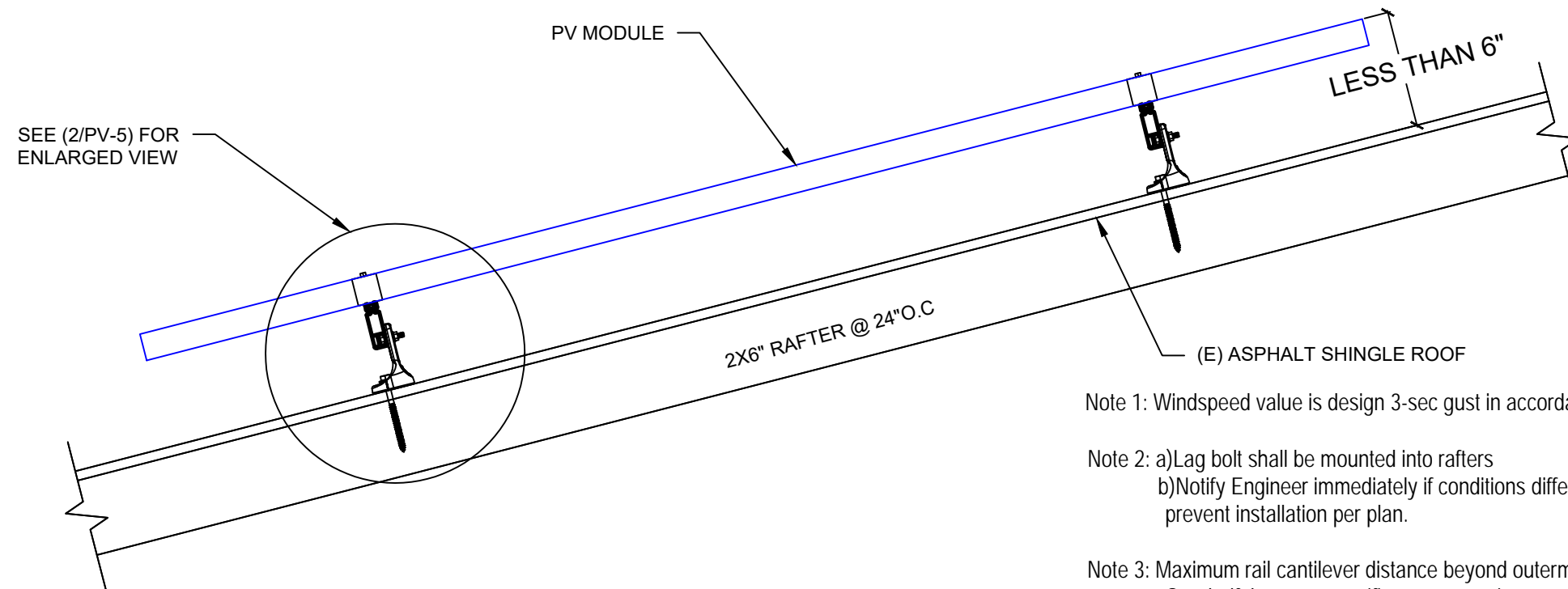
SHEET NAME
ELECTRICAL PLAN

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

SHEET NUMBER
PV-4

LEGEND

	- JUNCTION BOX
	- SOLADECK
	- INVERTER
	- COMBINER BOX
	- AC DISCONNECT
	- UTILITY METER
	- MAIN SERVICE PANEL
	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
	- ROOF ATTACHMENT
	- RAFTER
	- CONDUIT



1 ATTACHMENT DETAIL

PV-5

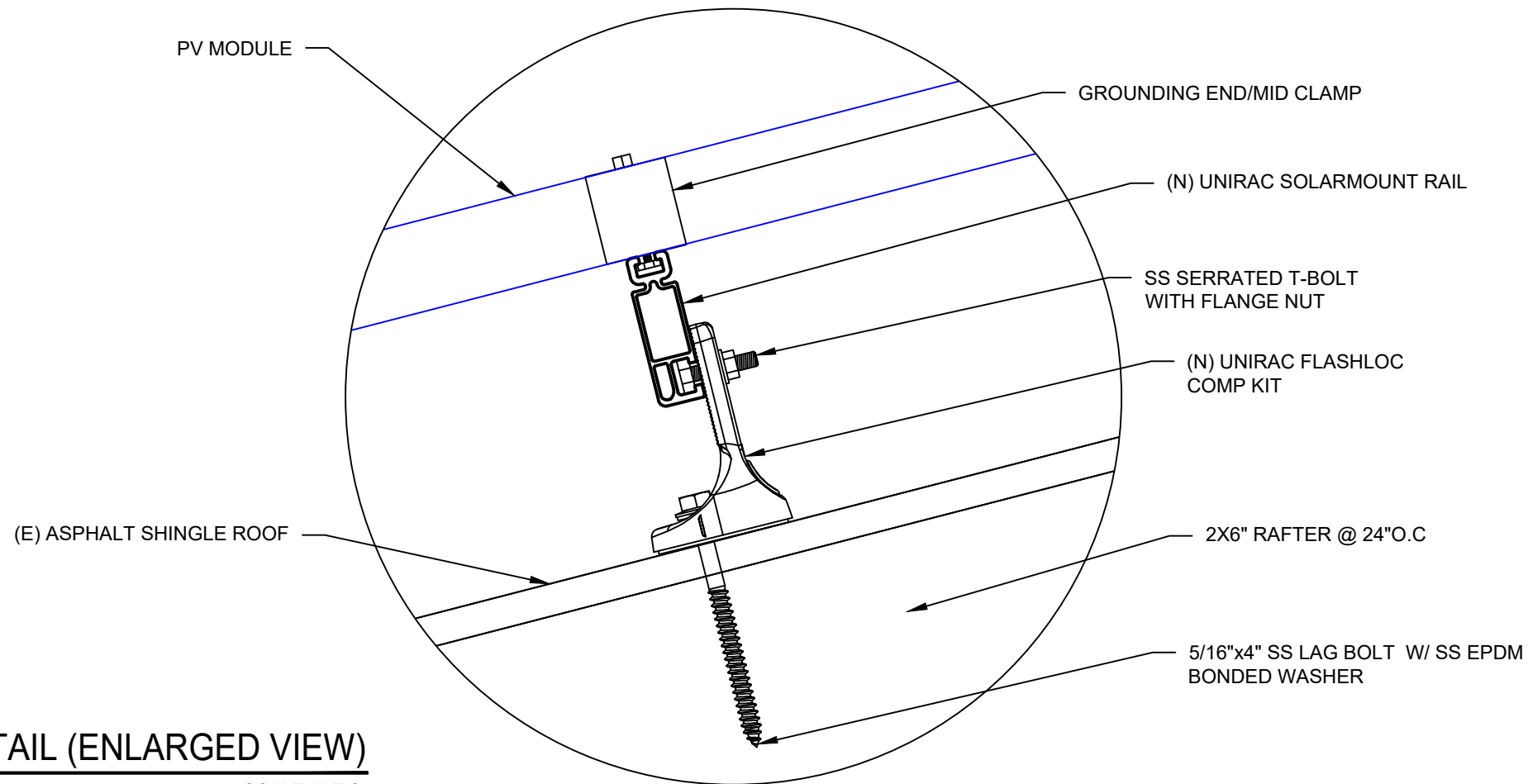
SCALE: N.T.S.

Note 1: Windspeed value is design 3-sec gust in accordance with ASCE 7-10, Risk Cat II

Note 2: a) Lag bolt shall be mounted into rafters
b) Notify Engineer immediately if conditions differ or prevent installation per plan.

Note 3: Maximum rail cantilever distance beyond outermost mount is One-half the zone-specific mount spacing.

Note 4: Installer shall adjust mount spacing by zone to match prescribed values on engineer's calculation letter



2 ATTACHMENT DETAIL (ENLARGED VIEW)

PV-5

SCALE: N.T.S.

SUNPRO

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PROJECT NAME & ADDRESS
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330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
STRUCTURAL DETAIL

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

SHEET NUMBER
PV-5

DC SYSTEM SIZE: 26 x 380 = 9.880KW DC
 AC SYSTEM SIZE: 26 x 290 = 7.540KW AC

(26) LG ELECTRONICS : LG380N1C-A6 380W MONO MODULES
 WITH (26) ENPHASE IQ7PLUS-72-2-US MICROINVERTERS
 LOCATED UNDER EACH PANEL (240V)
 (2) BRANCH CIRCUITS OF 13 MODULES CONNECTED IN PARALLEL

INTERCONNECTION NOTES:

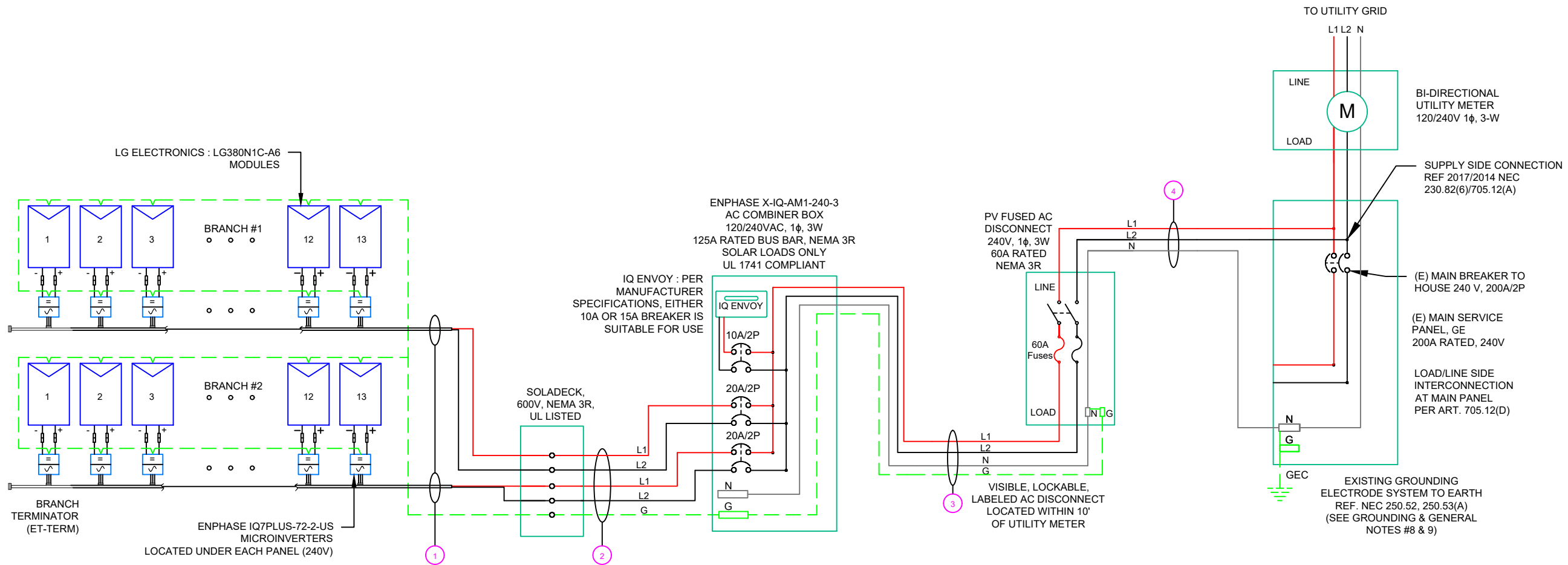
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95].
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

DISCONNECT NOTES:

1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3. DISCONNECT MEANS AND THEIR LOCATION SHALL BE IN ACCORDANCE WITH [NEC 225.31] AND [NEC 225.32].

GROUNDING & GENERAL NOTES:

1. PV GROUNDING ELECTRODE SYSTEM NEEDS TO BE INSTALLED IN ACCORDANCE WITH [NEC 690.43]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. SOLADECK QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - SOLADECK DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.
8. VERIFY UFER/EXISTING ROD OR ADD TWO GROUNDING RODS(5/8" X 8' EMBEDMENT) SPACED 6 FEET MINIMUM APART.
9. BOND COLD WATER AND GAS LINES(IF PRESENT) TO GROUNDING ELECTRODE CONDUCTOR



22171 MCH RD
 MANDEVILLE, LA 70471
 PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
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PRINCIPAL ENGINEERING, INC.
 1011 N. CAUSEWAY BLVD. STE 19
 MANDEVILLE, LA 70471
 985.624.5001
 INFO@PI-AEC.COM
 NORTH CAROLINA FIRM NO. C4113

PROJECT NAME & ADDRESS
CHRISTOPHER BAIRD RESIDENCE
 330 SIERRA TRAIL,
 SPRING LAKE, NC 28390

SHEET NAME
ELECTRICAL LINE DIAGRAM

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

SHEET NUMBER
PV-6

1 | ELECTRICAL LINE DIAGRAM

PV-6

SCALE: NTS

(GN) GENERAL NOTES :

1. CONDUIT TO BE UL LISTED FOR WET LOCATION AND UV PROTECTED (EX. -EMT, SCH 80 PVC OR RMC).
2. FMC MAYBE USED IN INDOOR APPLICATIONS WHERE PERMITTED BY NEC ART. 348

QTY	CONDUCTOR INFORMATION	CONDUIT TYPE	CONDUIT SIZE
① (4)	#12AWG - Q CABLE (L1 & L2 NO NEUTRAL)	N/A	N/A
(1)	#6AWG - BARE COPPER IN FREE AIR		
② (4)	#12AWG - THWN-2 (L1,L2) (EXTERIOR) / #12/2 ROMEX IN ATTIC	EMT, LFMC OR PVC	1"
(1)	#6AWG - THWN-2 GND		
(2)	#6AWG - THWN-2 (L1,L2)		
③ (1)	#6AWG - THWN-2 N	EMT, LFMC OR PVC	1"
(1)	#6AWG - THWN-2 GND		
(2)	#6AWG - THWN-2 (L1,L2)		
④ (1)	#6AWG - THWN-2 N	EMT, LFMC OR PVC	1"

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ7PLUS-72-2-US MICROINVERTERS
MIN/MAX DC VOLT RATING	22V MIN/ 60V MAX
MAX INPUT POWER	235W-440W
NOMINAL AC VOLTAGE RATING	240V/ 211-264V
MAX AC CURRENT	1.21A
MAX MODULES PER CIRCUIT	13 (SINGLE PHASE)
MAX OUTPUT POWER	290 VA

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	LG ELECTRONICS : LG380N1C-A6 380W MODULE
VMP	35.7V
IMP	10.65A
VOC	41.9V
ISC	11.39A
TEMP. COEFF. VOC	-0.26%/°C
MODULE DIMENSION	68.50"L x 41.02"W x 1.57"D (In Inch)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-10°
AMBIENT TEMP (HIGH TEMP 2%)	35°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.26%/°C

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20



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AC CALCULATIONS																						
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OC PD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
CIRCUIT 1	SOLADECK	240	15.73	19.6625	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	35	2	30	0.96	1	28.8	PASS			0.77	N/A	#N/A
CIRCUIT 2	SOLADECK	240	15.73	19.6625	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	35	2	30	0.96	1	28.8	PASS			0.55	N/A	#N/A
SOLADECK	COMBINER PANEL 1	240	15.73	19.6625	20	N/A	CU #6 AWG	CU #12 AWG	25	PASS	35	4	30	0.96	0.8	23.04	PASS	20	1.98	0.519	1" PVC	12.48798
COMBINER PANEL 1	AC DISCONNECT	240	31.46	39.325	40	CU #6 AWG	CU #6 AWG	CU #6 AWG	65	PASS	35	2	75	0.96	1	72	PASS	5	0.491	0.064	1" PVC	24.375
AC DISCONNECT	POI	240	31.46	39.325	40	CU #6 AWG	N/A	CU #6 AWG	65	PASS	35	2	75	0.96	1	72	PASS	5	0.491	0.064	1" PVC	18.28125

Circuit 1 Voltage Drop	1.418
Circuit 2 Voltage Drop	1.198

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 NORTH CAROLINA FIRM NO. C4113

PROJECT NAME & ADDRESS
 CHRISTOPHER BAIRD RESIDENCE
 330 SIERRA TRAIL,
 SPRING LAKE, NC 28390

SHEET NAME
 WIRING CALCULATIONS

SHEET SIZE
 ANSI B
 11" X 17"

SHEET NUMBER
 PV-7

ELECTRICAL NOTES

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- 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.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF SOLADECK, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.

**CAUTION:
AUTHORIZED SOLAR
PERSONNEL ONLY!**

LABEL-1:
LABEL LOCATION:
AC DISCONNECT

WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY
BE ENERGIZED IN THE OPEN POSITION

LABEL- 2:
LABEL LOCATION:
AC DISCONNECT
COMBINER
MAIN SERVICE PANEL
SUBPANEL
MAIN SERVICE DISCONNECT
CODE REF: NEC 690.13(B)

**WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM**

LABEL- 3:
LABEL LOCATION:
PRODUCTION METER
UTILITY METER
MAIN SERVICE PANEL
SUBPANEL
CODE REF: NEC 705.12(C) & NEC 690.59

WARNING
**TURN OFF PHOTOVOLTAIC AC
DISCONNECT PRIOR TO
WORKING INSIDE PANEL**

LABEL- 4:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
MAIN SERVICE DISCONNECT
COMBINER
CODE REF: NEC 110.27(C) & OSHA 1910.145 (f) (7)

CAUTION
**PHOTOVOLTAIC SYSTEM CIRCUIT IS
BACKFEED**

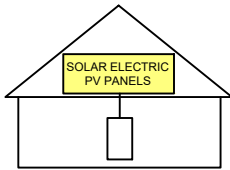
LABEL- 5:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(D) & NEC 690.59

WARNING
**POWER SOURCE OUTPUT
CONNECTION. DO NOT
RELOCATE THIS
OVERCURRENT DEVICE**

LABEL- 6:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3)(2)

**SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN**

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



LABEL- 7:
LABEL LOCATION:
AC DISCONNECT
CODE REF: IFC 605.11.3.1(1) & NEC 690.56(C)

**RAPID SHUTDOWN SWITCH
FOR SOLAR PV SYSTEM**

LABEL- 8:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.56(C)(2)

**PHOTOVOLTAIC
AC DISCONNECT**

LABEL- 9:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.13(B)

**PHOTOVOLTAIC
AC DISCONNECT**

NOMINAL OPERATING AC VOLATGE **240 V**
RATED AC OUTPUT CURRENT **31.46 A**

LABEL- 10:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
AC DISCONNECT
CODE REF: NEC 690.54

**MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT**

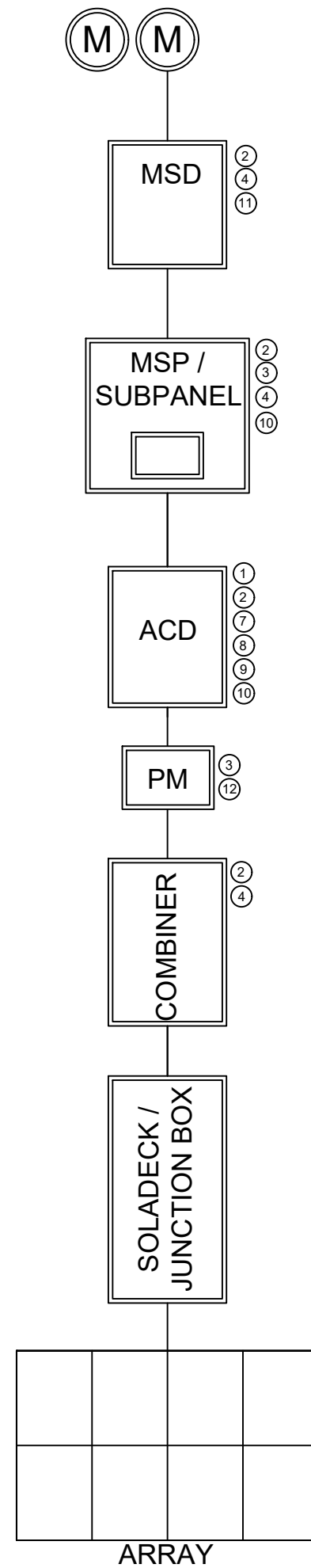
LABEL- 11:
LABEL LOCATION:
MAIN SERVICE DISCONNECT (ONLY IF MAIN SERVICE DISCONNECT IS PRESENT)
CODE REF: NEC 690.13(B)

PRODUCTION METER

LABEL- 12:
LABEL LOCATION:
PRODUCTION METER (ONLY IF PRODUCTION METER IS USED)

NOTE:

** ELECTRICAL DIAGRAM SHOWN IS FOR LABELING PURPOSES ONLY. NOT AN ACTUAL REPRESENTATION OF EQUIPMENT AND CONNECTIONS TO BE INSTALLED. LABEL LOCATIONS PRESENTED MAY VARY DEPENDING ON TYPE OF INTERCONNECTION METHOD AND LOCATION PRESENTED ELECTRICAL DIAGRAM PAGE. **



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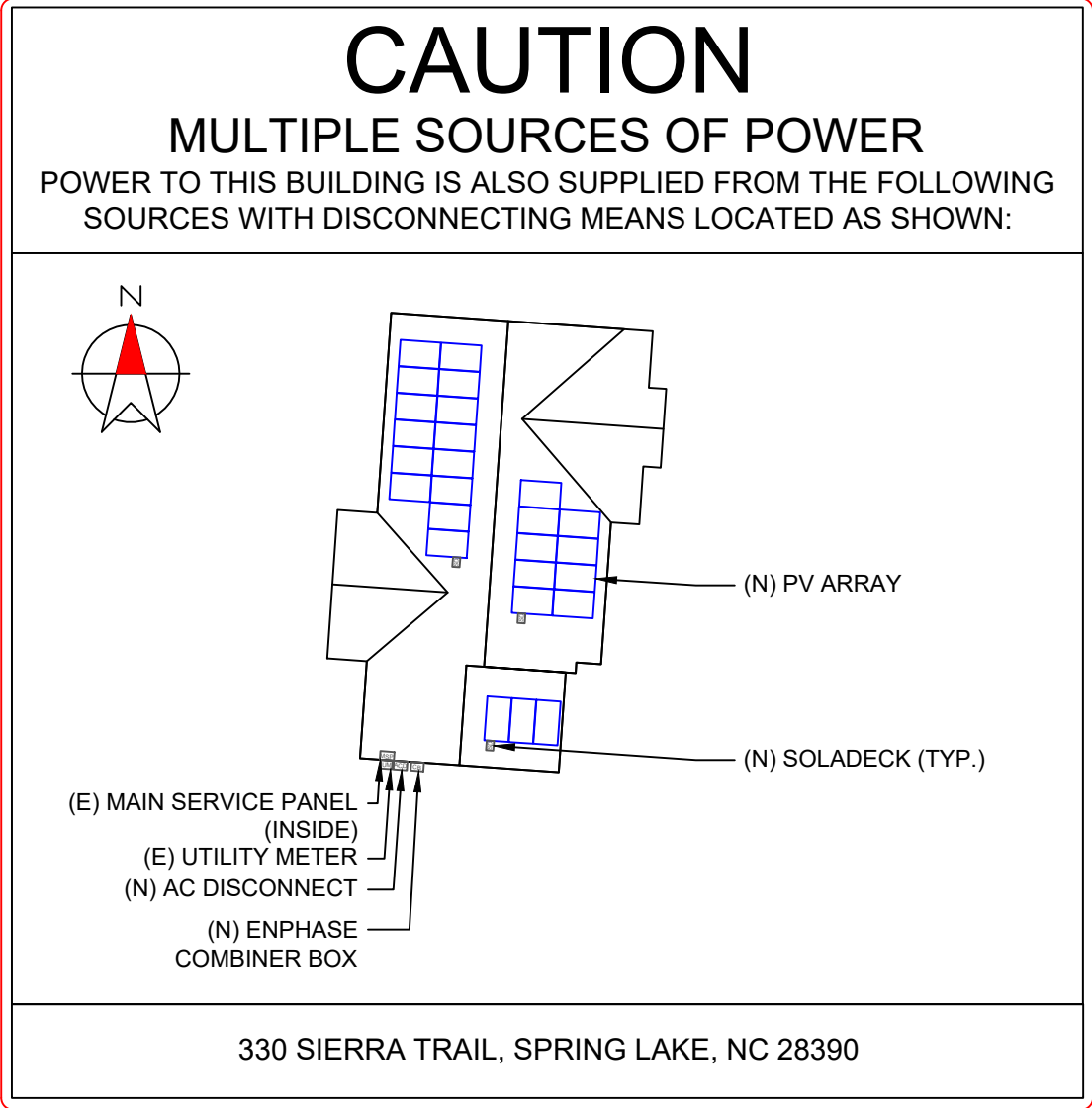
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985.624.5001
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NORTH CAROLINA FIRM NO. C4113

PROJECT NAME & ADDRESS
**CHRISTOPHER
BAIRD
RESIDENCE**
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
LABELS

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

SHEET NUMBER
PV-8



DIRECTORY
 PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN:
 NEC 690.56(B)&(C), [NEC 705.10])

LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]



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 MANDEVILLE, LA 70471
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 NORTH CAROLINA FIRM NO. C4113

PROJECT NAME & ADDRESS
CHRISTOPHER BAIRD RESIDENCE
 330 SIERRA TRAIL,
 SPRING LAKE, NC 28390

SHEET NAME
PLACARD

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

SHEET NUMBER
PV-9

LG NeON[®]2

LG370N1C-A6 | LG375N1C-A6 | LG380N1C-A6 Preliminary

370W | 375W | 380W

The LG NeON[®] 2 is LG's best selling solar module and one of the most powerful and versatile modules on the market today. The cells are designed to appear all-black at a distance, and the performance warranty guarantees 90.6% of labeled power output at 25 years.



Features



Enhanced Performance Warranty

LG NeON[®] 2 has an enhanced performance warranty. After 25 years, LG NeON[®] 2 is guaranteed at least 90.6% of initial performance.



25-Year Limited Product Warranty

The NeON[®] 2 is covered by a 25-year limited product warranty. In addition, up to \$450 of labor costs will be covered in the rare case that a module needs to be repaired or replaced.



Solid Performance on Hot Days

LG NeON[®] 2 performs well on hot days due to its low temperature coefficient.



Roof Aesthetics

LG NeON[®] 2 has been designed with aesthetics in mind using thinner wires that appear all black at a distance.

When you go solar, ask for the brand you can trust: LG Solar

About LG Electronics USA, Inc.

LG Electronics is a global leader in electronic products in the clean energy markets by offering solar PV panels and energy storage systems. The company first embarked on a solar energy source research program in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry and materials industries. In 2010, LG Solar successfully released its first Mono[®] series to the market, which is now available in 32 countries. The NeON[®] (previous Mono[®] NeON), NeON[®]2, NeON[®]2 BiFacial won the "Intersolar AWARD" in 2013, 2015 and 2016, which demonstrates LG's leadership and innovation in the solar industry.



LG NeON[®]2

LG370N1C-A6 | LG375N1C-A6 | LG380N1C-A6



Preliminary

General Data

Cell Properties (Material/Type)	Monocrystalline/N-type
Cell Maker	LG
Cell Configuration	60 Cells (6 x 10)
Module Dimensions (L x W x H)	1,740mm x 1,042mm x 40mm
Weight	18.6 kg
Glass (Material)	Tempered Glass with AR Coating
Backsheet (Color)	White
Frame (Material)	Anodized Aluminium
Junction Box (Protection Degree)	IP 68 with 3 Bypass Diodes
Cables (Length)	1,100mm x 2EA
Connector (Type/Maker)	MC 4/MC

Certifications and Warranty

Certifications**	IEC 61215-1/-1-1/2 - 2016, IEC 61730-1/2 - 2016, UL 61730-1 - 2017, UL 61730-2 - 2017 ISO 9001, ISO 14001, ISO 50001 OHSAS 18001
Salt Mist Corrosion Test	IEC 61701 2012 Seventy 6
Ammonia Corrosion Test	IEC 62716 - 2013
Module Fire Performance	Type 1 (UL 61730)
Fire Rating	Class C (UL 790, UL/CORD C 1703)
Solar Module Product Warranty	25 Year Limited
Solar Module Output Warranty	Linear Warranty*

*Improved: 1st year 98.5%, from 2-24th year: 0.33%/year down, 90.6% at year 25
**In Progress

Temperature Characteristics

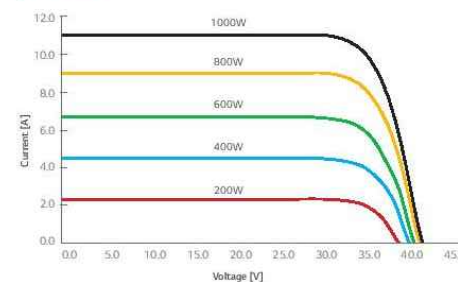
NMOT*	[°C]	42 ± 3
P _{max}	[%/°C]	-0.34
V _{oc}	[%/°C]	-0.26
I _{sc}	[%/°C]	0.03

*NMOT (Nominal Module Operating Temperature) Irradiance 800 W/m², Ambient temperature 20°C, Wind speed 1 m/s, Spectrum AM 1.5

Electrical Properties (NMOT)

Model	LG370N1C-A6	LG375N1C-A6	LG380N1C-A6	
Maximum Power (P _{max})	[W]	277	291	285
MPP Voltage (V _{mpp})	[V]	32.8	33.2	33.5
MPP Current (I _{mpp})	[A]	8.46	8.48	8.49
Open Circuit Voltage (V _{oc})	[V]	39.3	39.4	39.4
Short Circuit Current (I _{sc})	[A]	9.09	9.13	9.16

I-V Curves



Electrical Properties (STC*)

Model	LG370N1C-A6	LG375N1C-A6	LG380N1C-A6	
Maximum Power (P _{max})	[W]	370	375	380
MPP Voltage (V _{mpp})	[V]	34.9	35.3	35.7
MPP Current (I _{mpp})	[A]	10.61	10.63	10.65
Open Circuit Voltage (V _{oc} ± 5%)	[V]	41.7	41.8	41.9
Short Circuit Current (I _{sc} ± 5%)	[A]	11.31	11.35	11.39
Module Efficiency	[%]	20.4	20.7	21.0
Bi-faciality Coefficient of Power	[%]	10		
Power Tolerance	[%]	0 - +3		

*STC (Standard Test Condition): Irradiance 1000 W/m², cell temperature 25°C, AM 1.5

Operating Conditions

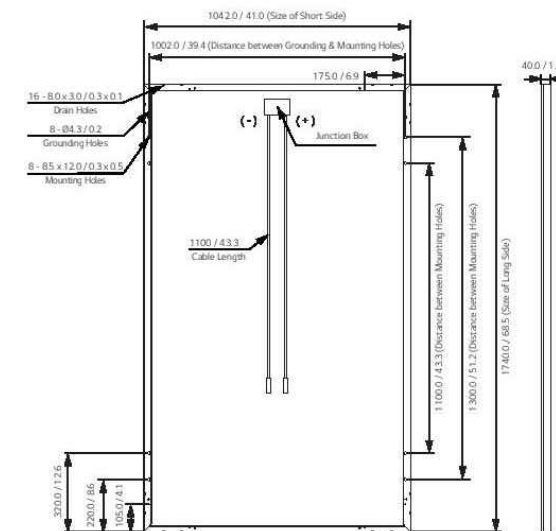
Operating Temperature	[°C]	-40 ~ +95
Maximum System Voltage	[V]	1,000
Maximum Series Fuse Rating	[A]	20
Mechanical Test Load (Front)	[Pa/psf]	5,400
Mechanical Test Load (Rear)	[Pa/psf]	4,000

*Based on IEC 61215-2 - 2016 (Test Load = Design Load x Safety Factor (1.5))
Mechanical Test Loads: 6,000Pa / 5,400Pa based on IEC 61215 - 2005

Packaging Configuration

Number of Modules per Pallet	[EA]	25
Number of Modules per 40' Container	[EA]	650
Number of Modules per 53' Container	[EA]	850
Packaging Box Dimensions (L x W x H)	[mm]	1,790 x 1,120 x 1,213
Packaging Box Dimensions (L x W x H)	[in]	70.5 x 44.1 x 47.8
Packaging Box Gross Weight	[kg]	500
Packaging Box Gross Weight	[lb]	1,102

Dimensions (mm/inch)



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PROJECT NAME & ADDRESS
CHRISTOPHER BAIRD RESIDENCE
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B 11" X 17"

SHEET NUMBER
PV-11



LG Electronics USA, Inc.
Solar Business Division
2000 Milbrook Drive
Lincolnshire, IL 60069
www.lg-solar.com

Product specifications are subject to change without notice.
LG370-380N1C-A6_AUS.pdf
121520
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Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.



Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell/120 half-cell and 72-cell/144 half-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell/144 half-cell modules.



To learn more about Enphase offerings, visit enphase.com



Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US	IQ7PLUS-72-2-US
Commonly used module pairings ¹	235 W - 350 W +	235 W - 440 W +
Module compatibility	60-cell/120 half-cell PV modules only	60-cell/120 half-cell and 72-cell/144 half-cell PV modules
Maximum input DC voltage	48 V	60 V
Peak power tracking voltage	27 V - 37 V	27 V - 45 V
Operating range	16 V - 48 V	16 V - 60 V
Min/Max start voltage	22 V / 48 V	22 V / 60 V
Max DC short circuit current (module Isc)	15 A	15 A
Overvoltage class DC port	II	II
DC port backfeed current	0 A	0 A
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	

OUTPUT DATA (AC)	IQ 7 Microinverter		IQ 7+ Microinverter	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range ²	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit ³	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	18 mA		18 mA	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
EFFICIENCY	@240 V	@208 V	@240 V	@208 V
Peak efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %

MECHANICAL DATA

Ambient temperature range	-40°C to +65°C
Relative humidity range	4% to 100% (condensing)
Connector type	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)
Dimensions (HxWxD)	212 mm x 175 mm x 30.2 mm (without bracket)
Weight	1.08 kg (2.38 lbs)
Cooling	Natural convection - No fans
Approved for wet locations	Yes
Pollution degree	PD3
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure
Environmental category / UV exposure rating	NEMA Type 6 / outdoor

FEATURES

Communication	Power Line Communication (PLC)
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.

1. No enforced DC/AC ratio. See the compatibility calculator at <https://enphase.com/en-us/support/module-compatibility>.
 2. Nominal voltage range can be extended beyond nominal if required by the utility.
 3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit enphase.com



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22171 MCH RD
 MANDEVILLE, LA 70471
 PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	03/19/2022	

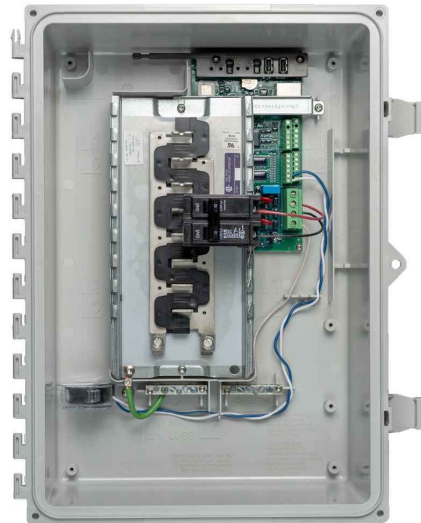
DATE: 03/19/2022		
PROJECT NAME & ADDRESS		
CHRISTOPHER BAIRD RESIDENCE	330 SIERRA TRAIL, SPRING LAKE, NC 28390	

SHEET NAME EQUIPMENT SPECIFICATION
SHEET SIZE ANSI B 11" X 17"
SHEET NUMBER PV-12

Enphase IQ Combiner 3

(X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3™** with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.



Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring

Simple

- Reduced size from previous combiner
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- UL listed

Enphase IQ Combiner 3

MODEL NUMBER

IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%).
---------------------------------	--

ACCESSORIES and REPLACEMENT PARTS (not included, order separately)

Enphase Mobile Connect™ CELLMODEM-03 (4G/12-year data plan) CELLMODEM-01 (3G/5-year data plan) CELLMODEM-M1 (4G based LTE-M/5-year data plan)	Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.)
Consumption Monitoring* CT CT-200-SPLIT	Split core current transformers enable whole home consumption metering (+/- 2.5%).
* Consumption monitoring is required for Enphase Storage Systems	
Wireless USB adapter COMMS-KIT-01	Installed at the IQ Envoy. For communications with Enphase Encharge™ storage and Enphase Enpower™ smart switch. Includes USB cable for connection to IQ Envoy or Enphase IQ Combiner™ and allows redundant wireless communication with Encharge and Enpower.
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3

ELECTRICAL SPECIFICATIONS

Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80A of distributed generation / 90A with IQ Envoy breaker included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy

MECHANICAL DATA

Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5" x 14.75" x 6.63"). Height is 21.06" (53.5 cm with mounting brackets).
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)

INTERNET CONNECTION OPTIONS

Integrated Wi-Fi	802.11b/g/n
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) or CELLMODEM-M1 (4G based LTE-M) (not included)

COMPLIANCE

Compliance, Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit enphase.com

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2019-11-04



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22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	03/19/2022	

DATE: 03/19/2022

PROJECT NAME & ADDRESS

CHRISTOPHER
BAIRD
RESIDENCE
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-13

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	03/19/2022	

DATE: 03/19/2022

PROJECT NAME & ADDRESS

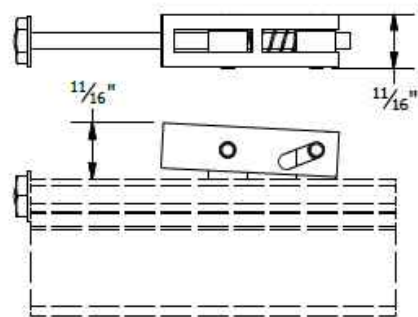
CHRISTOPHER
BAIRD
RESIDENCE
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
EQUIPMENT
SPECIFICATION

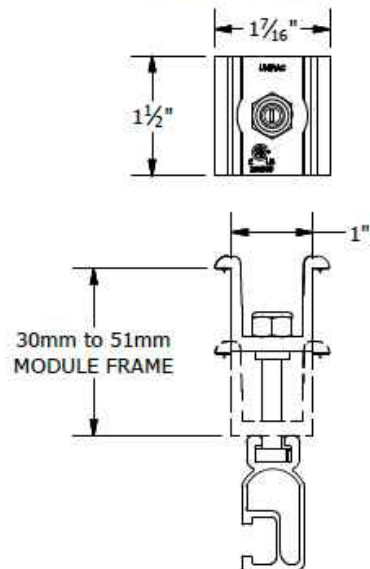
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-14

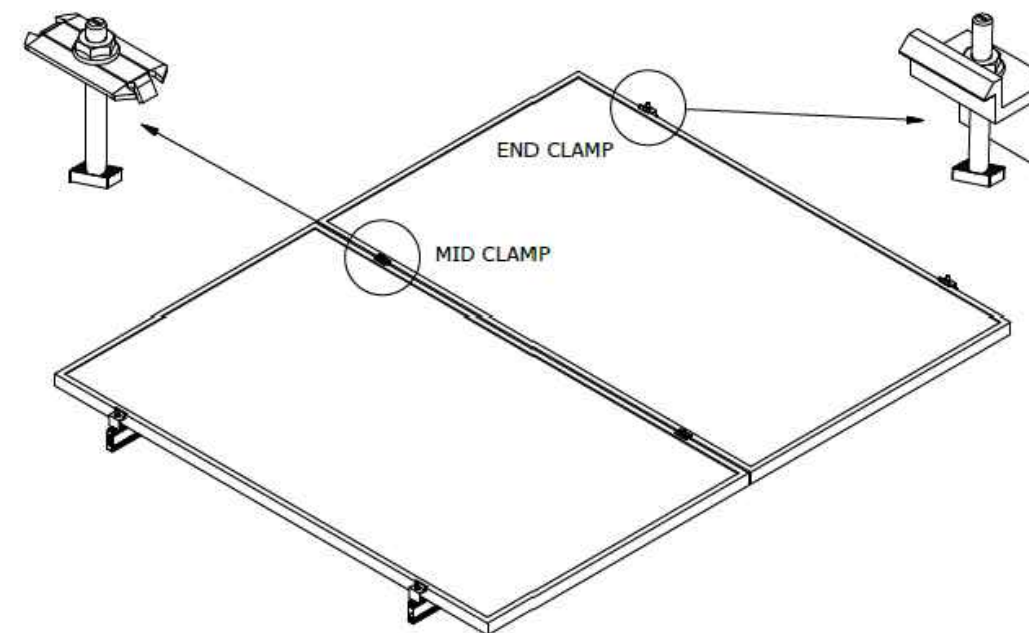
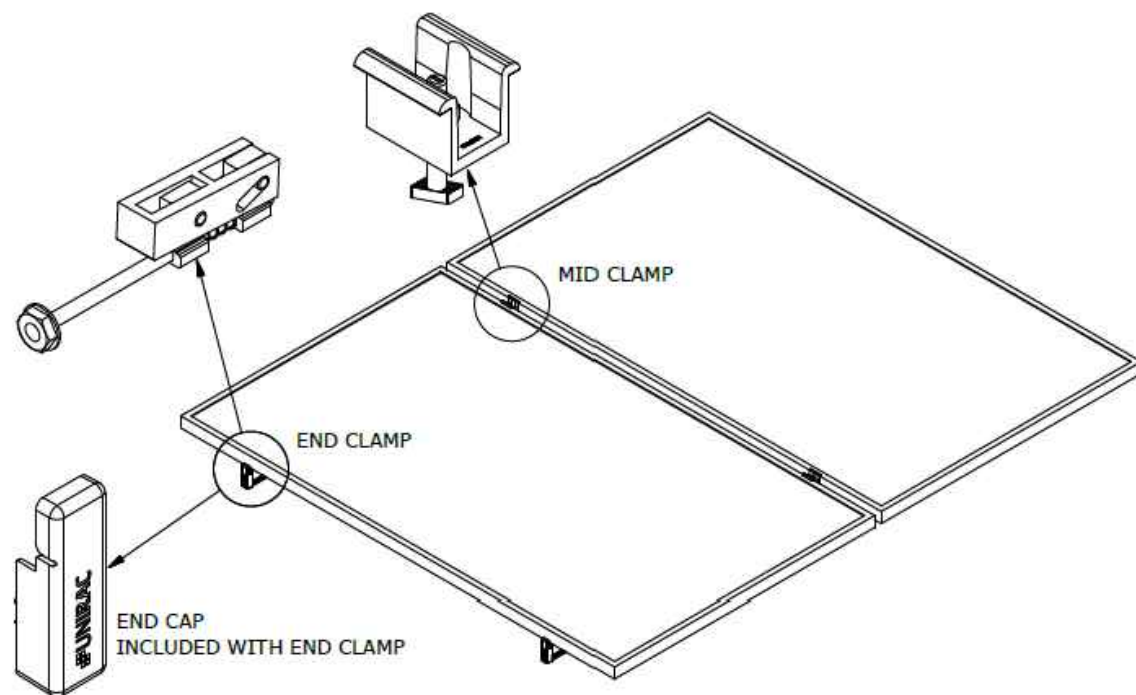
PRO SERIES END CLAMP



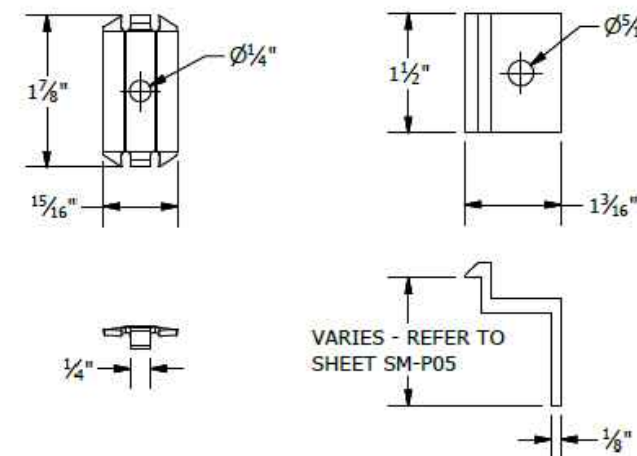
PRO SERIES MID CLAMP



PART # TABLE	
P/N	DESCRIPTION
302035M	ENDCLAMP PRO
302030M	MIDCLAMP PRO - MILL
302030D	MIDCLAMP PRO - DRK



PART # TABLE	
P/N	DESCRIPTION
302027C	SM BND MIDCLAMP BC SS
302027D	SM BND MIDCLAMP BC DRK SS
302028C	SM BND MIDCLAMP EF SS
302028D	SM BND MIDCLAMP EF DRK SS
302029C	SM BND MIDCLAMP DK SS
302029D	SM BND MIDCLAMP DK DRK SS
FOR BONDING END CLAMP REFER TO SHEET SM-P05	



BONDING SM MID CLAMP BONDING SM END CLAMP

UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	PRO SERIES BONDING CLAMPS
REVISION DATE:	10/26/2017

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE
NOMINAL

PRODUCT PROTECTED BY
ONE OR MORE US PATENTS

LEGAL NOTICE

SM-A01
SHEET

UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	BONDING TOP CLAMPS
REVISION DATE:	10/26/2017

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE
NOMINAL

PRODUCT PROTECTED BY
ONE OR MORE US PATENTS

LEGAL NOTICE

SM-A01A
SHEET

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	03/19/2022	

DATE: 03/19/2022

PROJECT NAME & ADDRESS

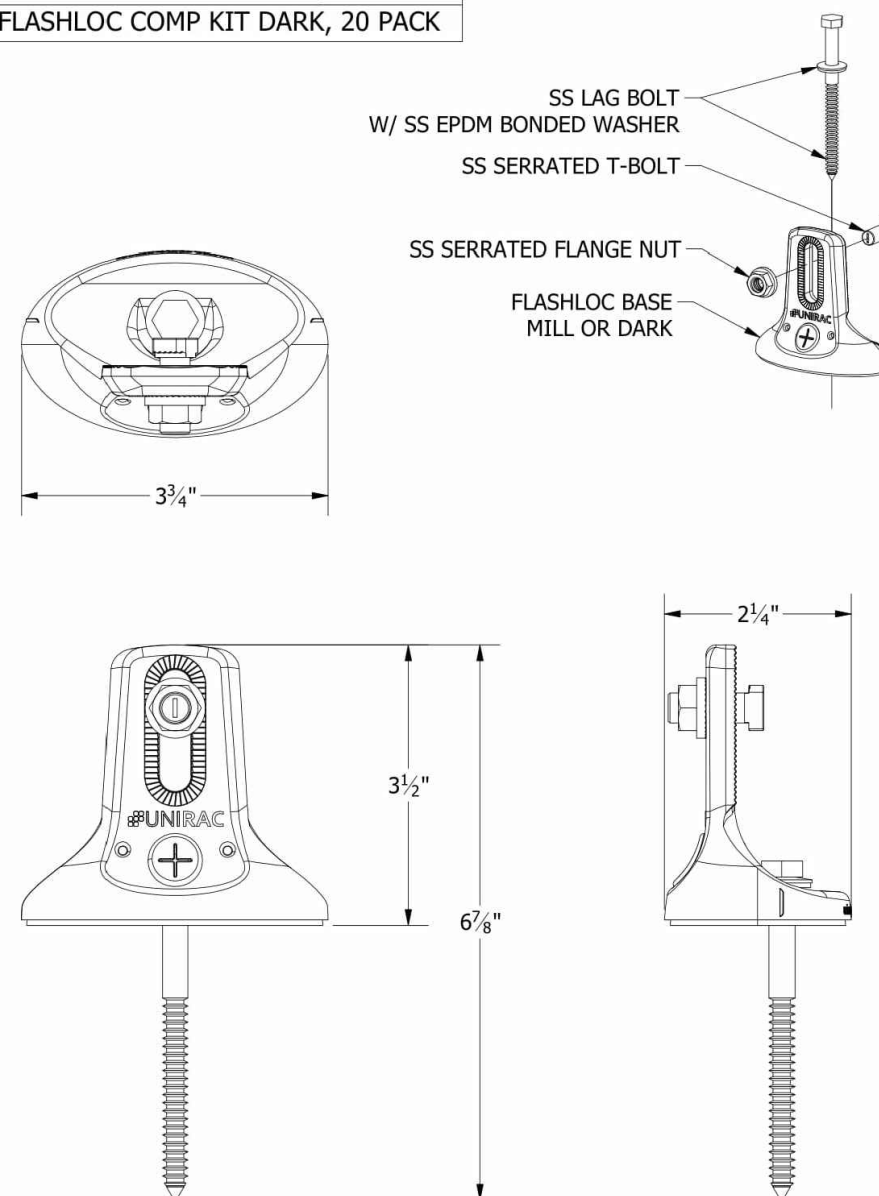
**CHRISTOPHER
BAIRD
RESIDENCE**
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
**EQUIPMENT
SPECIFICATION**

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

SHEET NUMBER
PV-15

PART TABLE	
P/N	DESCRIPTION
004085M	FLASHLOC COMP KIT MILL, 20 PACK
004085D	FLASHLOC COMP KIT DARK, 20 PACK



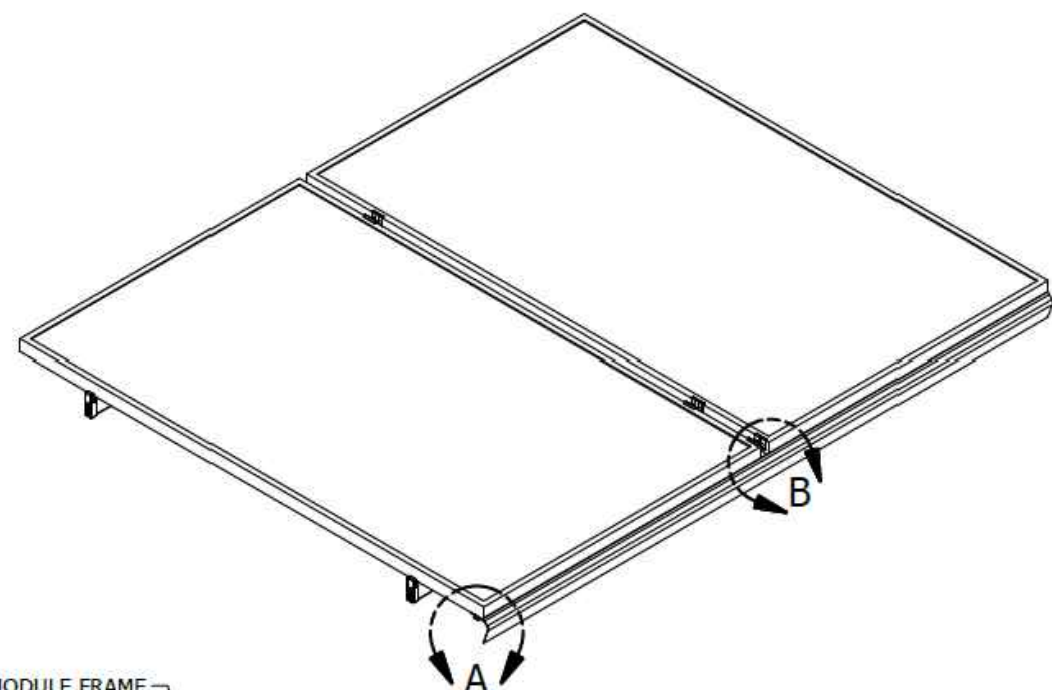
UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DRAWING
DESCRIPTION:	FLASHLOC COMP KIT
REVISION DATE:	10/3/2019

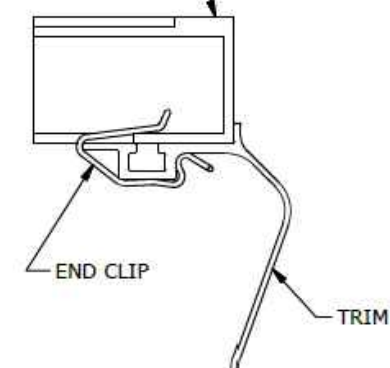
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE
NOMINAL

PRODUCT PROTECTED BY
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LEGAL NOTICE

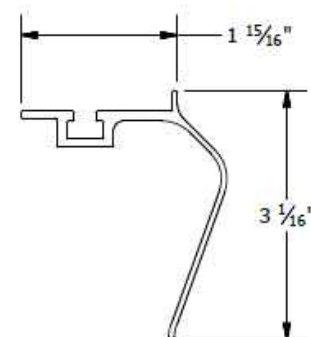
FL-A01
SHEET



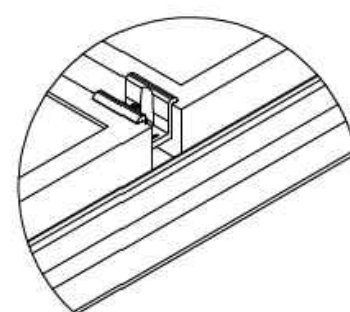
MODULE FRAME



DETAIL A
TRIM END CLIP



TRIM



DETAIL B
MID CLAMP TRIM CONNECTION

PART # TABLE		
P/N	DESCRIPTION	LENGTH
206072D-B	SM TRIM DRK	168"
008025S	SM TRIM END CLIP	-

UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART & ASSEMBLY
DESCRIPTION:	SM TRIM END CLIP
REVISION DATE:	9/27/2017

DRAWING NOT TO SCALE
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NOMINAL

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LEGAL NOTICE

SM-A02
SHEET

FLASH LOC

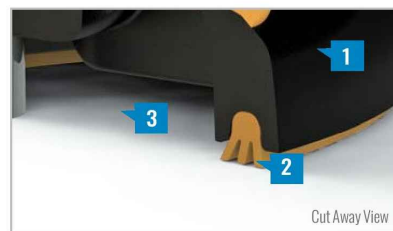


FLASHLOC is the ultimate attachment for composition shingle and rolled comp roofs. The all-in-one mount installs fast — no kneeling on hot roofs to install flashing, no prying or cutting shingles, no pulling nails. Simply drive the lag bolt and inject sealant into the base. **FLASHLOC's** patented TRIPLE SEAL technology preserves the roof and protects the penetration with a permanent pressure seal. Kitted with lag bolts, sealant, and hardware for maximum convenience. Don't just divert water, **LOC it out!**



PROTECT THE ROOF

Install a high-strength waterproof attachment without lifting, prying or damaging shingles.



LOC OUT WATER

With an outer shield **1** contour-conforming gasket **2** and pressurized sealant chamber **3** the Triple-Loc Seal delivers a 100% waterproof connection.



HIGH-SPEED INSTALL

Simply drive lag bolt and inject sealant into the port **4** to create a permanent pressure seal.

FASTER INSTALLATION. 25-YEAR WARRANTY.

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

FLASH LOC

INSTALLATION GUIDE



PRE-INSTALL

Snap chalk lines for attachment rows. On shingle roofs, snap lines 1-3/4" below upslope edge of shingle course. Locate rafters and mark attachment locations.

At each location, drill a 7/32" pilot hole. Clean roof surface of dirt, debris, snow, and ice, then fill pilot hole with sealant.

NOTE: Space mounts per racking system install specifications. When down pressure is ≥ 34 psf, span may not exceed 2 ft.



STEP 1: SECURE

Place **FLASHLOC** over pilot hole with lag on down-slope side. Align indicator marks on sides of mount with chalk line. Pass included lag bolt and sealing washer through **FLASHLOC** into pilot hole. Drive lag bolt until mount is held firmly in place.

NOTE: The EPDM in the sealing washer will expand beyond the edge of the metal washer when proper torque is applied.



STEP 2: SEAL

Insert tip of UNIRAC provided sealant into port. Inject until sealant exits both vents.

Continue array installation, attaching rails to mounts with provided T-bolts.

NOTE: When **FLASHLOC** is installed over gap between shingle or tabs or vertical joints, fill gap/joint with sealant between mount and upslope edge of shingle course.

Use only provided sealant.

FASTER INSTALLATION. 25-YEAR WARRANTY.

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

SUNPRO

22171 MCH RD
MANDEVILLE, LA 70471
PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	03/19/2022	

DATE: 03/19/2022		
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PROJECT NAME & ADDRESS
CHRISTOPHER BAIRD RESIDENCE
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
EQUIPMENT SPECIFICATION

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

SHEET NUMBER
PV-16

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	03/19/2022	

DATE: 03/19/2022

PROJECT NAME & ADDRESS

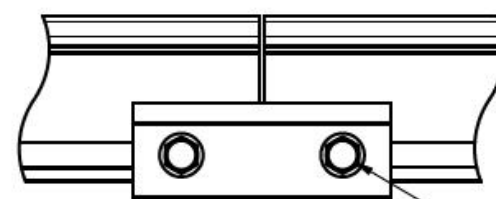
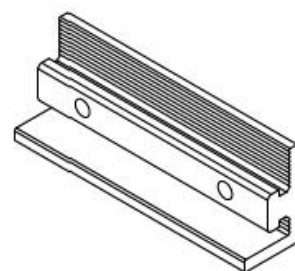
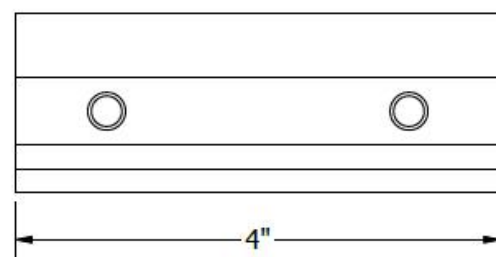
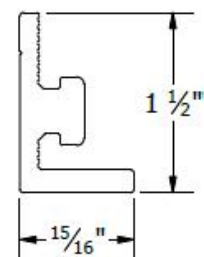
CHRISTOPHER
BAIRD
RESIDENCE
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

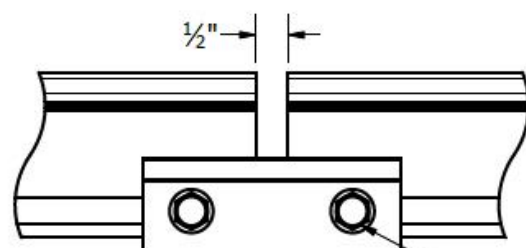
SHEET NUMBER
PV-17

BONDING SPLICE BAR



TYPICAL SPLICE BAR DETAIL

5/16"-18 TYPE F THREAD CUTTING SCREWS INCLUDED



TYPICAL EXPANSION JOINT DETAIL

NOTE THAT ONLY 2 SCREWS ARE USED AT AN EXPANSION JOINT. THE SPLICE BAR DOES NOT BOND ACROSS AN EXPANSION JOINT. SEE INSTALLATION GUIDE FOR INSTRUCTION.

PART # TABLE

P/N	DESCRIPTION
303019M	BND SPLICE BAR PRO SERIES MILL
303019D	BND SPLICE BAR PRO SERIES DRK



1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE: SOLARMOUNT
DRAWING TYPE: PART & ASSEMBLY
DESCRIPTION: BONDING SPLICE BAR PRO SERIES
REVISION DATE: 8/23/2018

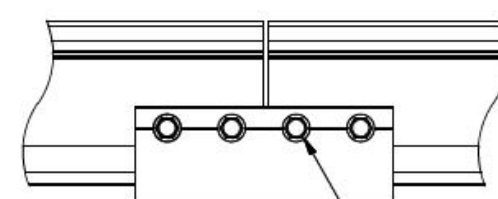
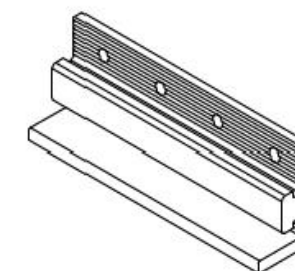
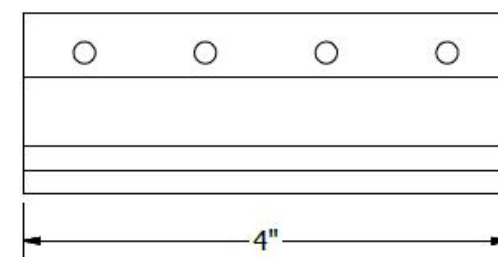
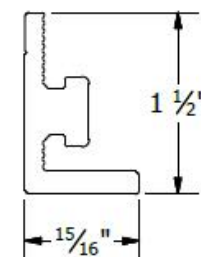
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PRODUCT PROTECTED BY ONE OR MORE US PATENTS
LEGAL NOTICE

SM-A05

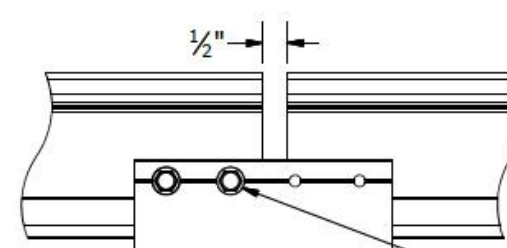
SHEET

BONDING SPLICE BAR



TYPICAL SPLICE BAR DETAIL

#12 X 3/4" SELF DRILLING SS SCREWS INCLUDED



TYPICAL EXPANSION JOINT DETAIL

NOTE THAT ONLY 2 SCREWS ARE USED AT AN EXPANSION JOINT. THE SPLICE BAR DOES NOT BOND ACROSS AN EXPANSION JOINT. SEE INSTALLATION GUIDE FOR INSTRUCTION.

PART # TABLE

P/N	DESCRIPTION
303018C	BND SPLICE BAR SERRATED CLR
303018D	BND SPLICE BAR SERRATED DRK



1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE: SOLARMOUNT
DRAWING TYPE: PART & ASSEMBLY
DESCRIPTION: BONDING SPLICE BAR
REVISION DATE: 9/27/2017

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE US PATENTS
LEGAL NOTICE

SM-A05

SHEET

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	03/19/2022	

DATE: 03/19/2022

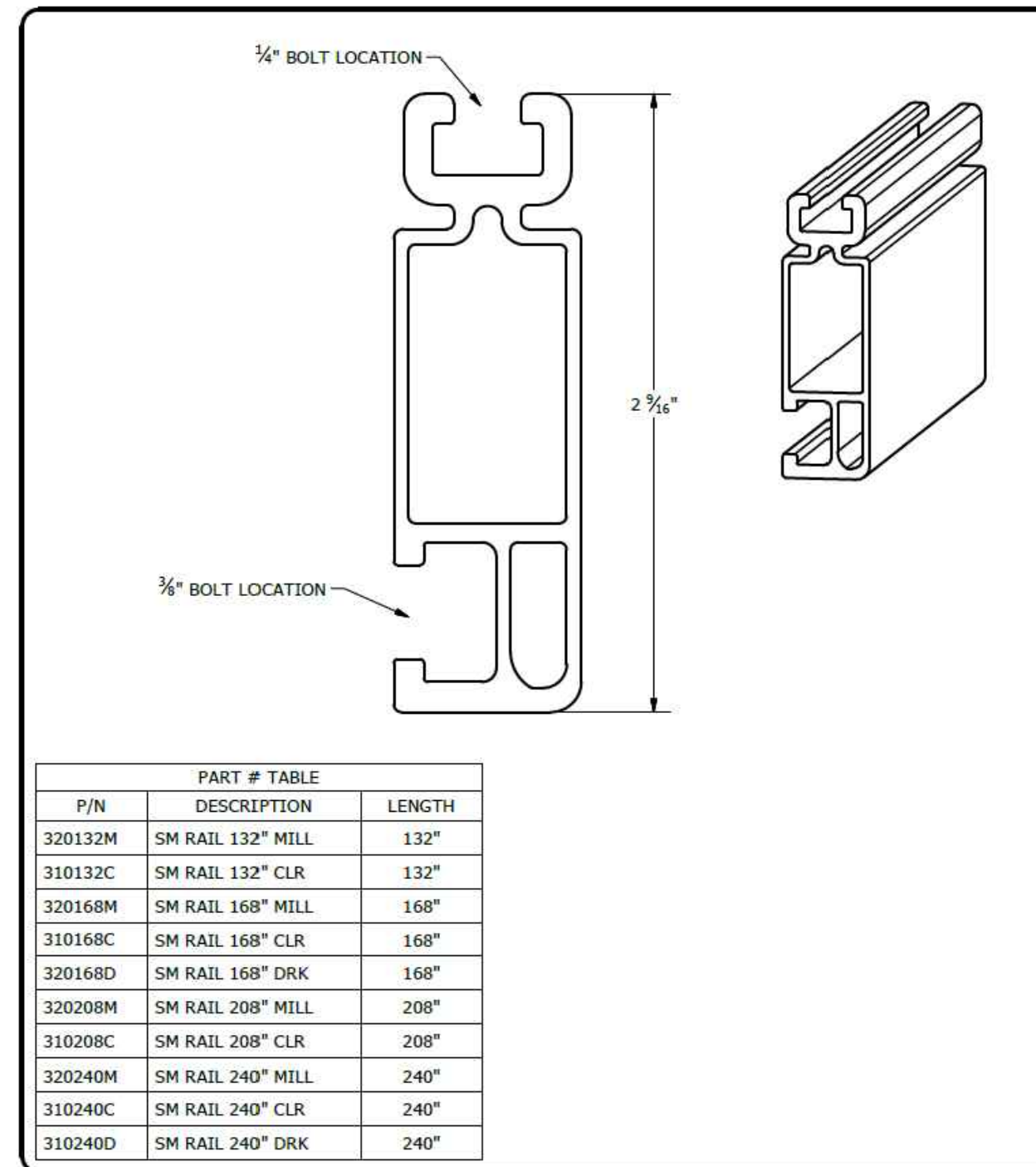
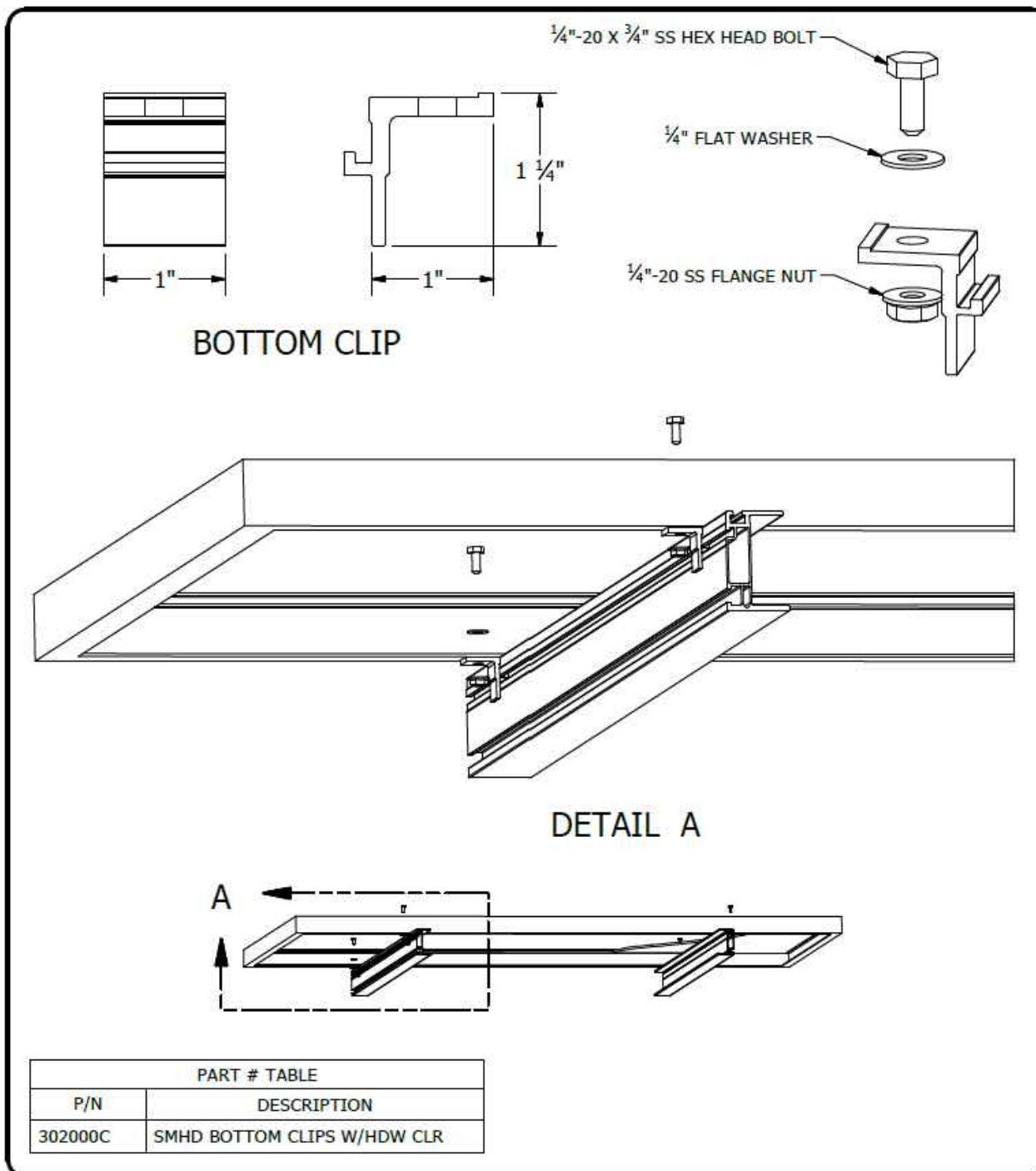
PROJECT NAME & ADDRESS

CHRISTOPHER
BAIRD
RESIDENCE
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

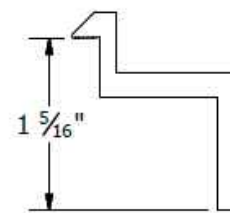
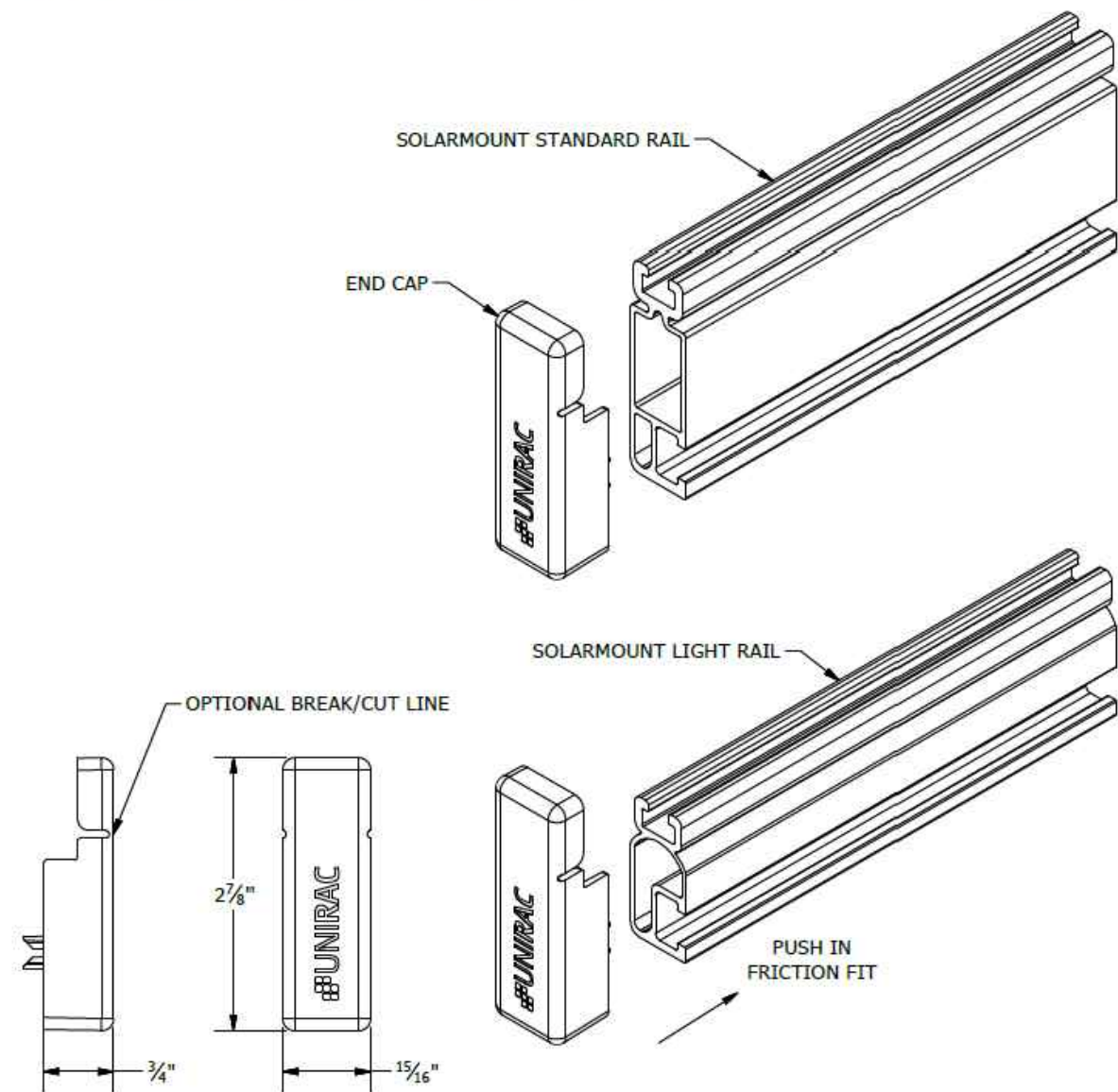
SHEET NUMBER
PV-18



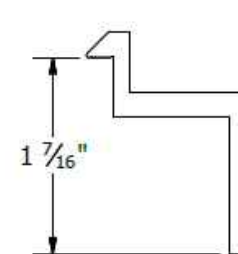
<p>1411 BROADWAY BLVD. NE ALBUQUERQUE, NM 87102 USA PHONE: 505.242.6411 WWW.UNIRAC.COM</p>	PRODUCT LINE:	SOLARMOUNT HD	DRAWING NOT TO SCALE ALL DIMENSIONS ARE NOMINAL PRODUCT PROTECTED BY ONE OR MORE US PATENTS LEGAL NOTICE	SM-A10 SHEET
	DRAWING TYPE:	PART & ASSEMBLY		
	DESCRIPTION:	BOTTOM CLIP		
	REVISION DATE:	9/27/2017		

<p>1411 BROADWAY BLVD. NE ALBUQUERQUE, NM 87102 USA PHONE: 505.242.6411 WWW.UNIRAC.COM</p>	PRODUCT LINE:	SOLARMOUNT	DRAWING NOT TO SCALE ALL DIMENSIONS ARE NOMINAL PRODUCT PROTECTED BY ONE OR MORE US PATENTS LEGAL NOTICE	SM-P01 SHEET
	DRAWING TYPE:	PART DETAIL		
	DESCRIPTION:	STANDARD RAIL		
	REVISION DATE:	9/11/2017		

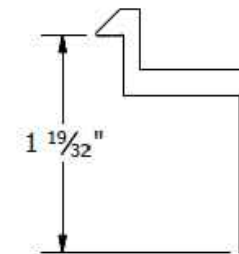
- NOTES:
 1. END CAP INCLUDED WITH EVERY END CLAMP.
 2. END CAP FITS SOLARMOUNT LIGHT AND STANDARD RAIL PROFILES.



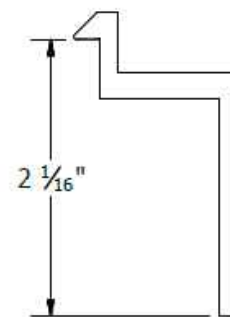
B CLAMP
 30mm to 32mm Module Thickness
 (1.18" to 1.26")



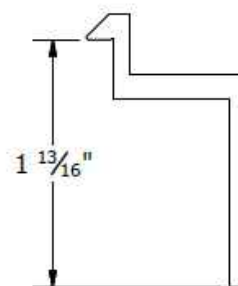
C CLAMP
 33mm to 36mm Module Thickness
 (1.30" to 1.42")



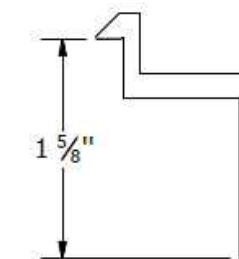
D CLAMP
 38mm to 40mm Module Thickness
 (1.50" to 1.57")



E CLAMP
 50mm to 51mm Module Thickness
 (1.97" to 2.00")

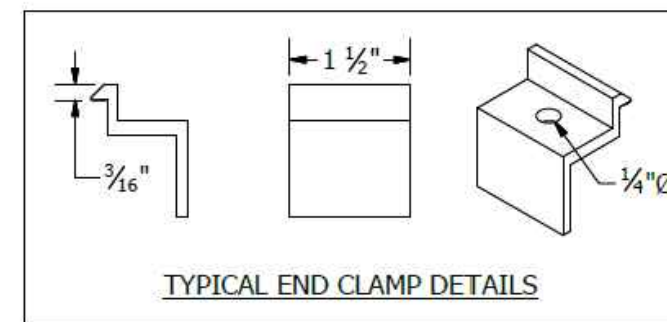


F CLAMP
 45mm to 47mm Module Thickness
 (1.77" to 1.85")



K CLAMP
 39mm to 41mm Module Thickness
 (1.54" to 1.61")

PART # TABLE	
P/N	DESCRIPTION
302021C	SM ENDCLAMP B CLR AL
302021D	SM ENDCLAMP B DRK AL
302022C	SM ENDCLAMP C CLR AL
302022D	SM ENDCLAMP C DRK AL
302023C	SM ENDCLAMP D CLR AL
302023D	SM ENDCLAMP D DRK AL
303024C	SM ENDCLAMP E CLR AL
302024D	SM ENDCLAMP E DRK AL
302025C	SM ENDCLAMP F CLR AL
302025D	SM ENDCLAMP F DRK AL
302026C	SM ENDCLAMP K CLR AL
302026D	SM ENDCLAMP K DRK AL



UNIRAC
 1411 BROADWAY BLVD. NE
 ALBUQUERQUE, NM 87102 USA
 PHONE: 505.242.6411
 WWW.UNIRAC.COM

PRODUCT LINE: SOLARMOUNT
 DRAWING TYPE: PART DETAIL
 DESCRIPTION: END CAPS
 REVISION DATE: 9/27/2017

DRAWING NOT TO SCALE
 ALL DIMENSIONS ARE
 NOMINAL
 PRODUCT PROTECTED BY
 ONE OR MORE US PATENTS
 LEGAL NOTICE

SM-P04
 SHEET

UNIRAC
 1411 BROADWAY BLVD. NE
 ALBUQUERQUE, NM 87102 USA
 PHONE: 505.242.6411
 WWW.UNIRAC.COM

PRODUCT LINE: SOLARMOUNT
 DRAWING TYPE: PART DETAIL
 DESCRIPTION: END CLAMPS -
 TOP MOUNTING
 REVISION DATE: 9/27/2017

DRAWING NOT TO SCALE
 ALL DIMENSIONS ARE
 NOMINAL
 PRODUCT PROTECTED BY
 ONE OR MORE US PATENTS
 LEGAL NOTICE

SM-P05
 SHEET

SUNPRO

22171 MCH RD
 MANDEVILLE, LA 70471
 PHONE: 9152011490

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	03/19/2022	

DATE: 03/19/2022

PROJECT NAME & ADDRESS

CHRISTOPHER
 BAIRD
 RESIDENCE
 330 SIERRA TRAIL,
 SPRING LAKE, NC 28390

SHEET NAME
 EQUIPMENT
 SPECIFICATION

SHEET SIZE
 ANSI B
 11" X 17"

SHEET NUMBER
 PV-19

SolaDeck

FLASHED PV ROOF-MOUNT COMBINER/ENCLOSURE

Basic Features

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included



SolaDeck Model SD 0783



SolaDeck UL50 Type 3R Enclosures

Available Models:

- Model SD 0783 - (3" fixed Din Rail)
- Model SD 0786 - (6" slotted Din Rail)



SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.

Max Rated - 600VDC, 120AMPS

Model SD 0783-41 3" Fixed Din Rail fastened using Norlock System

**Typical System Configuration

- 4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
- 1- Power Distribution Block 600VDC 175AMP
- 1- Bus Bar with UL lug

Model SD 0786-41 6" Slotted Din Rail fastened using steel studs

**Typical System Configuration

- 4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
- 4- Din Rail Mounted Terminal Blocks
- Bus Bars with UL lug

**Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.



Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.



Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.



Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

RSTC Enterprises, Inc • 2219 Heimstead Road • Eau Claire, WI 54703
For product information call 1(866) 367-7782

SUNPRO

22171 MCH RD
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REVISIONS		
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BAIRD
RESIDENCE
330 SIERRA TRAIL,
SPRING LAKE, NC 28390

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-20