

October 11, 2021

Encōr Solar, LLC
3401 N. Thanksgiving Way, Ste 450
Lehi, UT 84043

RE: Engineering Services
Eichorn Residence
92 Arden Ct, Lillington, NC
6 kW System
Solo Job #1546159

To Whom It May Concern,

We have reviewed the following information regarding the solar panel installation for this project. Alterations to these documents or plans shall not be made without direct written consent of the Engineer of Record.

A. Assumptions from Field Observation provided by Encōr Solar, LLC

The following structural design regarding the proposed alterations have been prepared from these assumptions. The verification of the field observations is the responsibility of the contractor. **Prior to commencement of work, the contractor shall verify the framing sizes, spacings, and spans noted in the sealed plans, calculations, and/or certification letter and notify the Engineer of Record of any discrepancies.**

	<u>Roof</u>
Roof Finish :	Asphalt Shingle
Roof Underlayment :	OSB
Roof Profile :	Gable
Roof Structural System :	Metal Plate Trusses
Truss Top Chord/Setup :	2 x 4 / Fink
Chord/Rafter Wood Grade :	Southern Pine #2 or better
Truss/Rafter Spacing :	24" o.c.
Roof Slope :	30 deg
Max Top Chord/Rafter Span :	6.66 ft
Bearing Wall Type :	Convl Lt-Frame Constr
Foundation :	Permanent Concrete
Stories :	Two

B. Building Design Criteria

Code :	2018 IRC (ASCE 7-16)	Risk Category :	II
Roof Live Load :	20 psf (0 psf at panels)	Occupancy Class :	R-3
Ground Snow Load :	15 psf	Roof Dead Load :	6.5 psf
Ult Wind Speed :	120 mph	PV Dead Load :	<u>3 psf</u>
Exposure Category :	C	Total Dead Load :	9.5 psf

C. Summary of Existing Structure Results

Roof

After review of the field observations and based on our calculations and in accordance with the applicable building codes and current industry standards, the existing roof structure supporting the proposed alterations consisting of the solar array has been determined to be:

- Adequate to support the additional imposed loads. **No structural upgrades are required.**

D. Solar Panel Support Bracket Anchorage

- 1. Solar panels shall be designed, mounted, and installed in accordance with the most recent "UniRac Installation Manual", which can be found on the UniRac website (<http://unirac.com/>).
- 2. Manufacturer's Panel Bracket Connection to Roof Chord/Rafter Member:

Fastener : (1) 5/16" Lag Screw per Bracket
 NDS Withdrawl Value : 307 lbs/inch
 Min. Thread Length and Penetration Depth : 2.5"

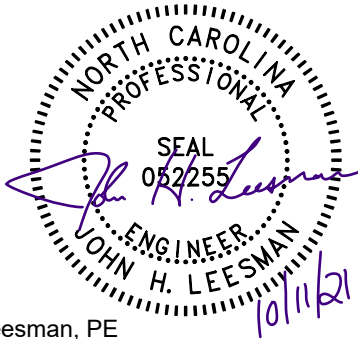
- 3. Considering the existing roof's slope, size, spacing, condition, and calculated loads, the panel bracket supports shall be placed no greater than 48 in. o/c.
- 4. Panel supports connections shall be staggered to distribute load to adjacent trusses.

E. Overall Summary

Based on the information supplied to us at the time of this report, on the evaluation of the existing structure, and solar array panel bracket connection, it is our opinion that the roof system will adequately support the additional loads imposed by the solar array. This evaluation conforms to 2018 IRC and current industry standards.

Should you have any questions regarding this letter or if you require further information, do not hesitate to contact me.

Sincerely,

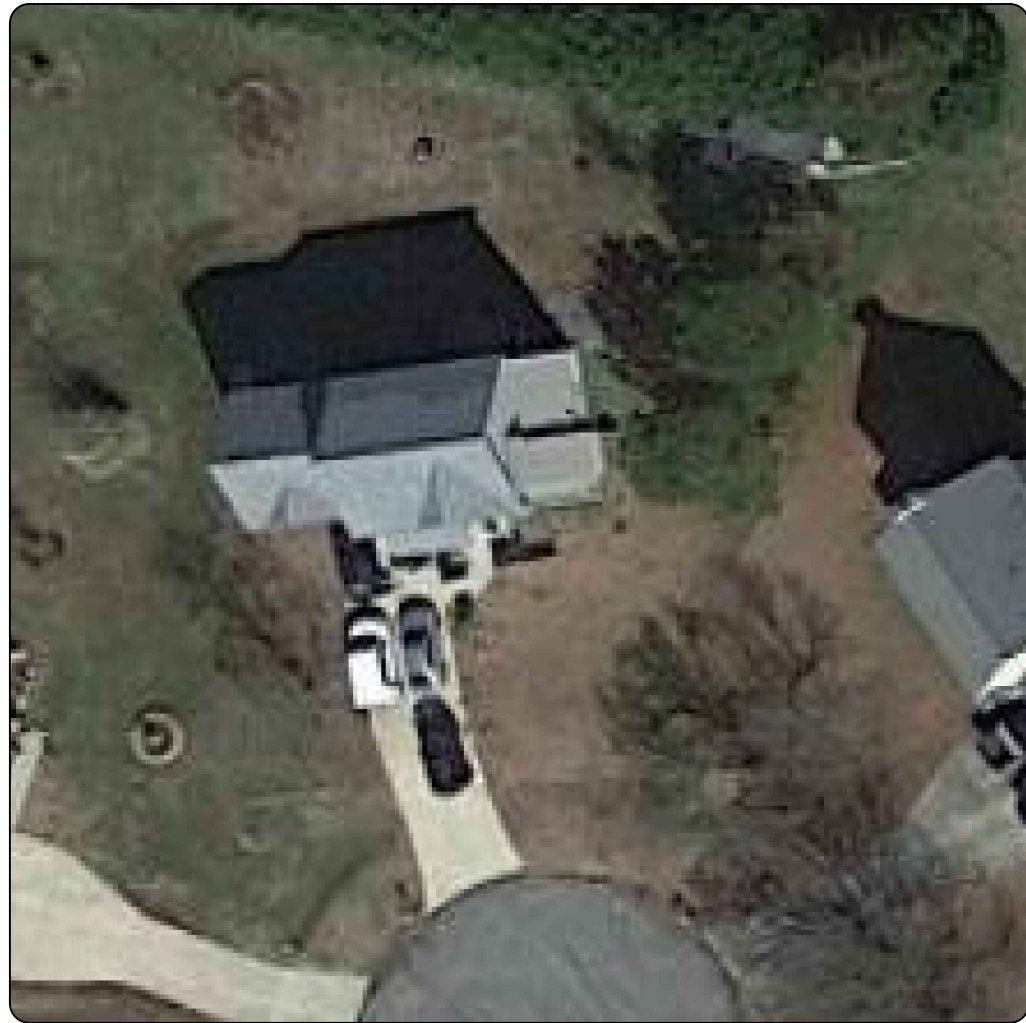


John H. Leesman, PE
License No. 52255

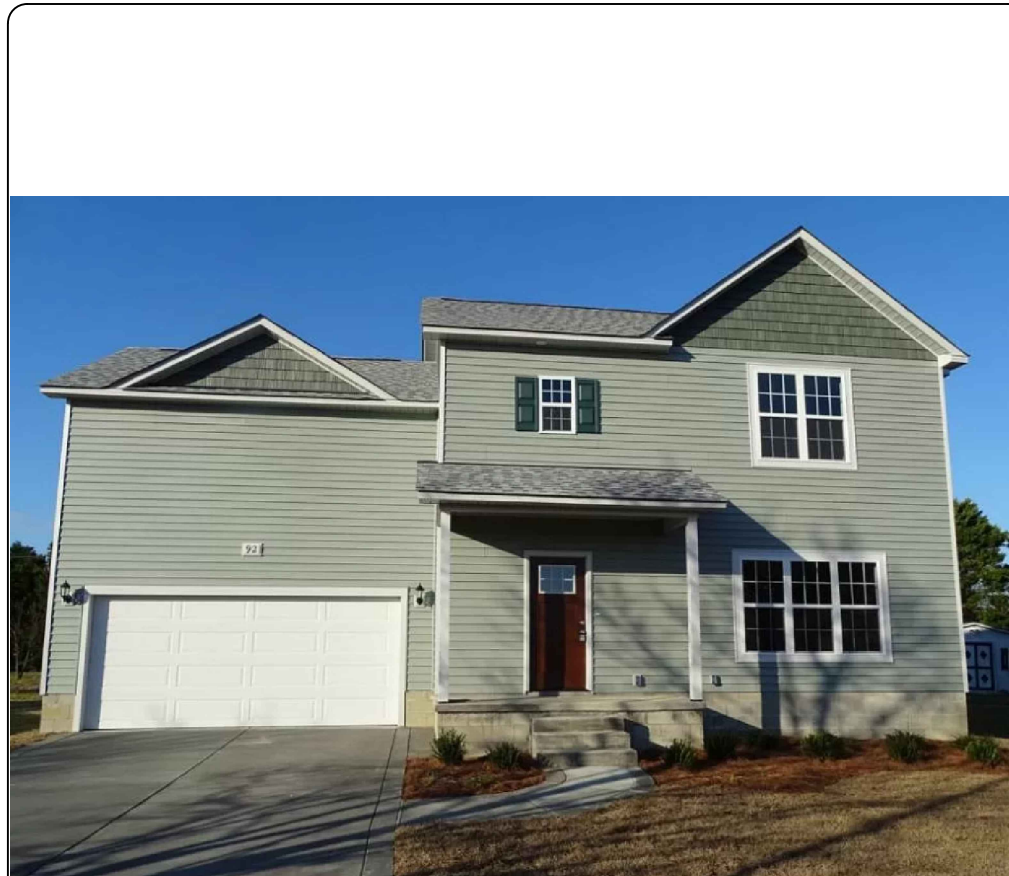
Limits of Scope of Work and Liability

The existing structure is assumed to have been designed and constructed following appropriate codes at the time of erection and assumed to have appropriated permits. The calculations performed are only for the roof framing supporting the solar array installation referenced in the stamped plans and were completed according to generally recognized structural analysis standards and procedures, professional engineering, and design experience opinions and judgements. Existing deficiencies which are unknown or were not observed during the time the site observation are not included in this scope of work. All solar panel modules, racking, and mounting equipment shall be designed and installed per the manufacturer's approved installation specifications. The Engineer of Record and the engineering consulting firm assume no responsibility for misuse or improper installation. This analysis is not stamped for water leakage. Framing was determined on information in provided plans and/or photos, along with engineering judgement. Prior to commencement of work, the contractor shall verify the framing sizes, spacings, and spans noted in the stamped plans, calculations, and/or certification letter and notify the Engineer of Record of any discrepancies prior to starting construction. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation. The contractor shall also verify that there are no damage/deficiencies (i.e., dry rot, water damage, termite damage, framing member/connection damage, etc.) to framing that was not addressed in the stamped plans, calculations, and/or certification letter and notify the Engineer of Record of any concerns prior to starting construction.

AERIAL VIEW:



STREET VIEW:



CONTRACTOR INFORMATION:
ENCOR SOLAR, LLC
3401 N. Thanksgiving Way #150
Lehi, UT 84043
License # 297625

SITE INFORMATION

Nathanael Eichorn
92 Arden Ct
Lillington, NC 27546
AC SYSTEM SIZE: 6 kW AC
DC SYSTEM SIZE: 7.14 kW DC
Lat, 35.4605049
Long, -78.7798292
(17) LG LG420QAK-A6 PV MODULES

(1) SolarEdge SE6000H-US (240V)
INVERTER(S)
Duke Energy

GENERAL NOTES

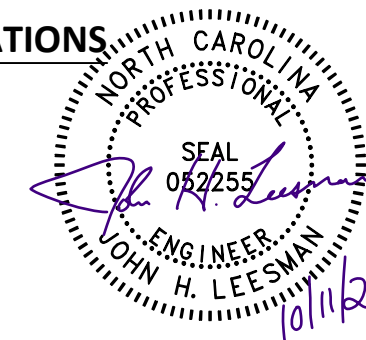
1. INSTALLATION OF SOLAR PHOTOVOLTAIC SYSTEM SHALL BE IN ACCORDANCE WITH NEC ARTICLE 690, AND ALL OTHER APPLICABLE NEC CODES WHERE NOTED OR EXISTING.
2. PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL COMPLY WITH NEC ARTICLE 110.
3. ALL WIRES, INCLUDING THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE IN ACCORDANCE WITH NEC ARTICLE 250
4. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE; THIS SYSTEM IS UTILITY INTERACTIVE PER UL 1741 AND DOES NOT INCLUDE STORAGE BATTERIES OR OTHER ALTERNATIVE STORAGE SOURCES.
5. ALL DC WIRES SHALL BE SIZED ACCORDING TO [NEC 690.8]
6. DC CONDUCTORS SHALL BE WITHIN PROTECTED RACEWAYS IN ACCORDANCE WITH [NEC 690.31]
7. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL JURISDICTIONAL BUILDING CODE.

PHOTOVOLTAIC (PV) SYSTEM SPECIFICATIONS

EQUIPMENT:
AC SYSTEM SIZE: 6 kW AC
DC SYSTEM SIZE: 7.14 kW DC
(17) LG LG420QAK-A6 PV MODULES
(1) SolarEdge SE6000H-US (240V) INVERTER(S)
RACKING: SnapNrack - 48" O.C.

APPLICABLE GOVERNING CODES

- 2017 NEC
- 2018 IRC
- 2018 IFC
- 2018 IBC
- 2018 NC RBC



SITE SPECIFICATIONS

OCCUPANCY: R-3
ZONING: RESIDENTIAL



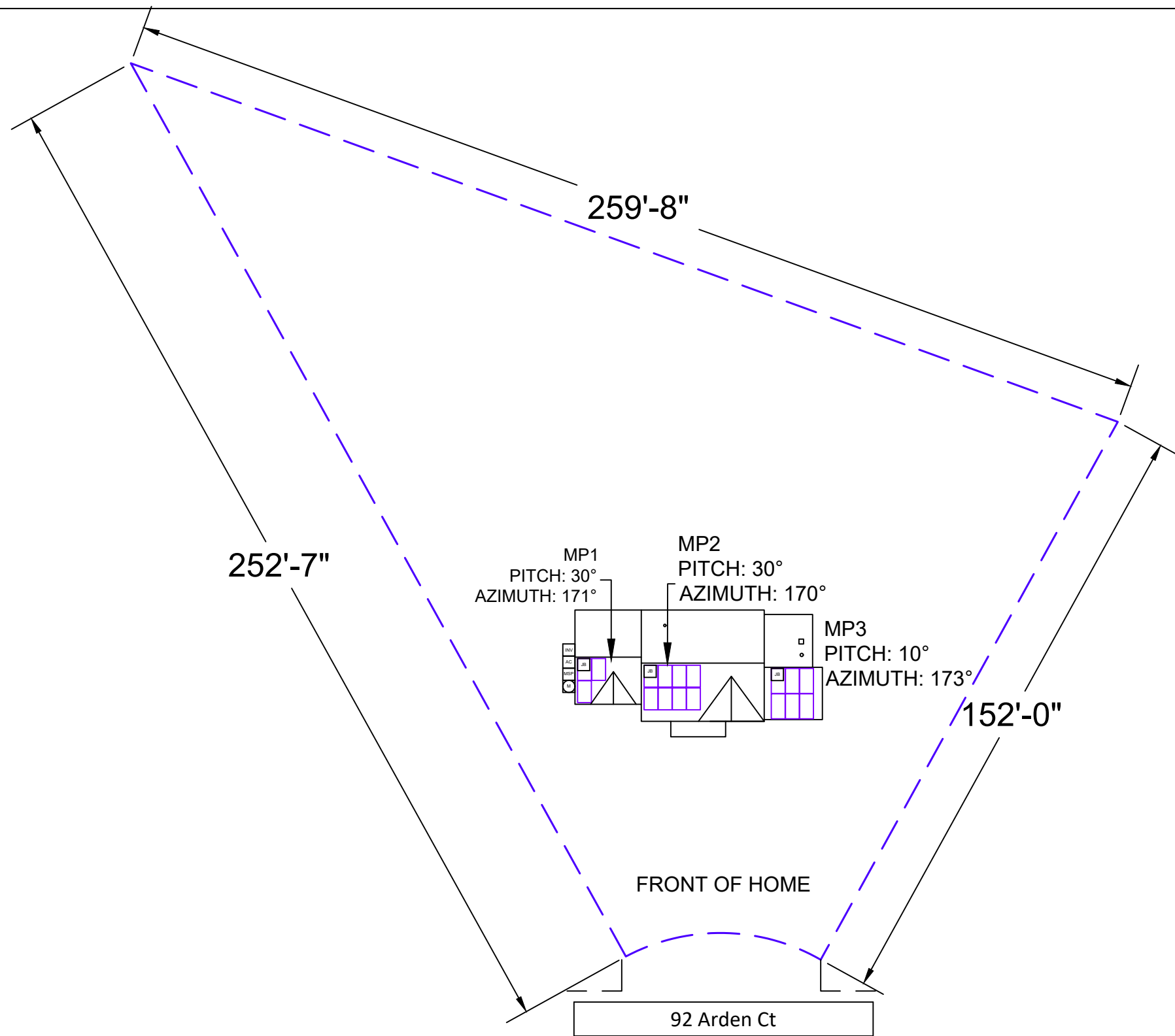
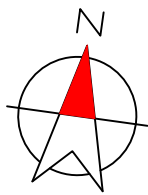
SHEET INDEX:

- PV01 COVER PAGE
- PV02 SITE PLAN
- PV03 ROOF ATTACHMENTS
- PV04 MOUNTING DETAIL
- PV05 LINE DIAGRAM
- PV06 LABELS
- PV07 PLACARD
- PV08 SITE PHOTOS

DRAWN BY: SoloCAD

DATE:
October 11, 2021

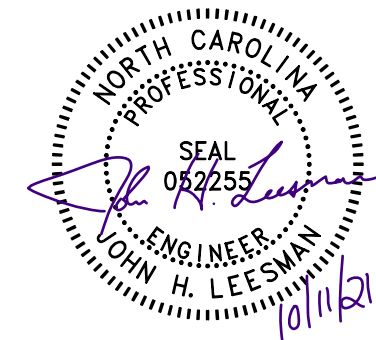
COVER PAGE - PV01



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 Duke Energy



EQUIPMENT LEGEND:

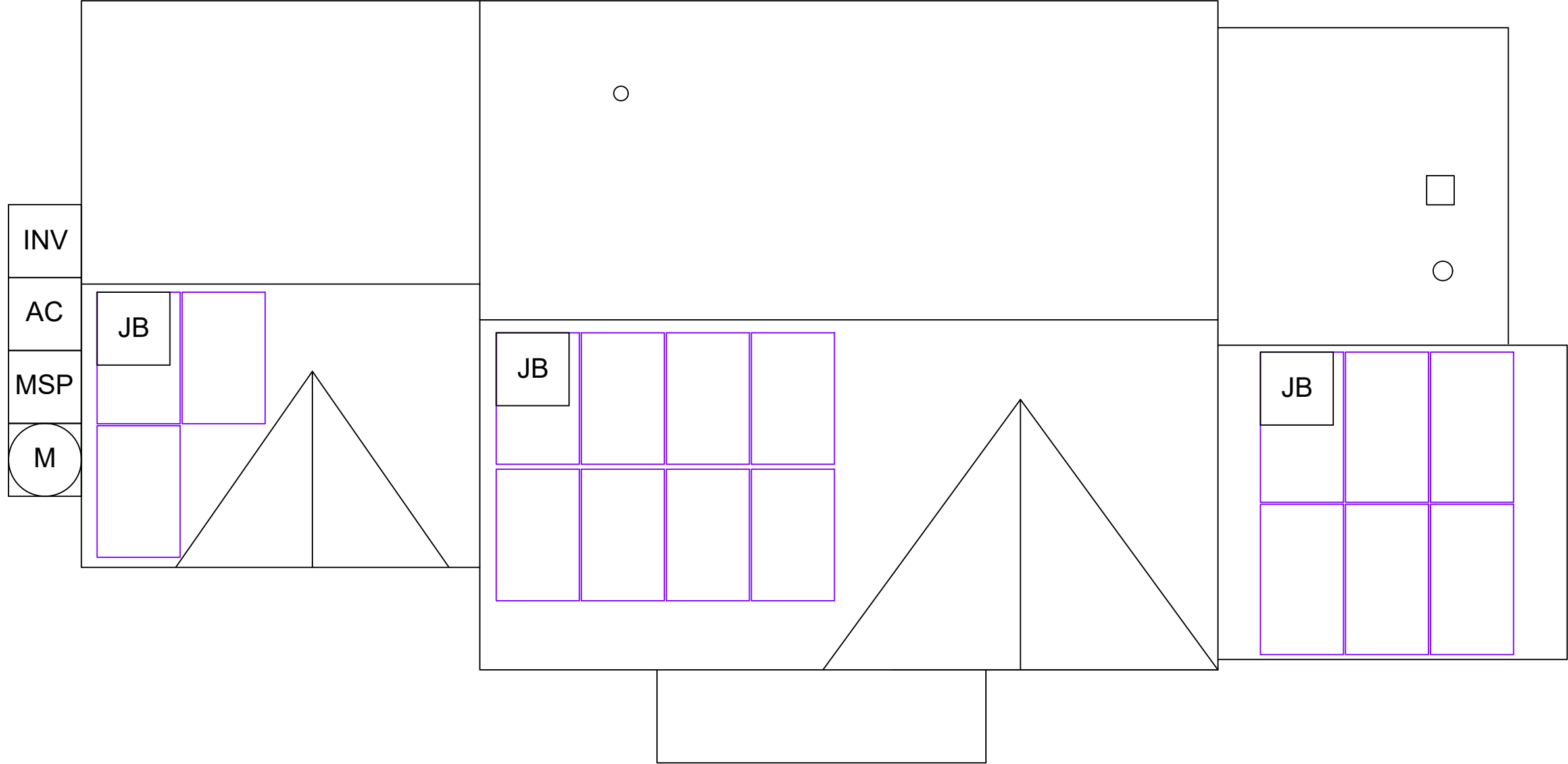
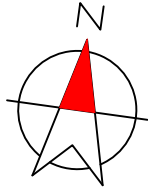
- | | | | | | |
|--------------------|--|--------------|-------------|------------------------------|--------------|
| UTILITY METER | VISIBLE, LOCKABLE, LABELED AC DISCONNECT | INVERTER | SUB PANEL | FIRE ACCESS PATHWAY (3' TYP) | BATTERY(IES) |
| MAIN SERVICE PANEL | METER SOCKET (FOR UTILITY PV METER) | COMBINER BOX | LOAD CENTER | PROPERTY LINE | |

#NAME?

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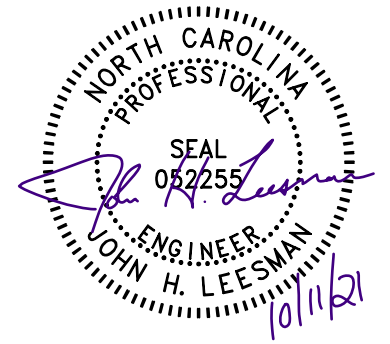
SITE PLAN - PV02



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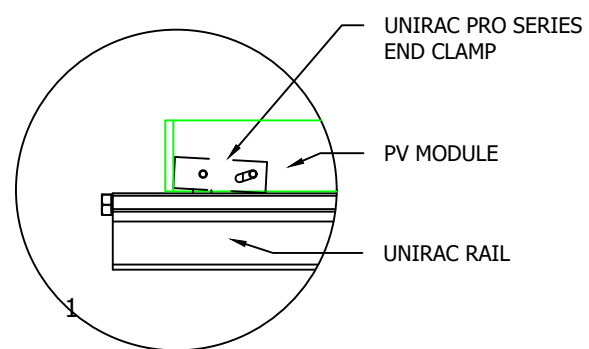


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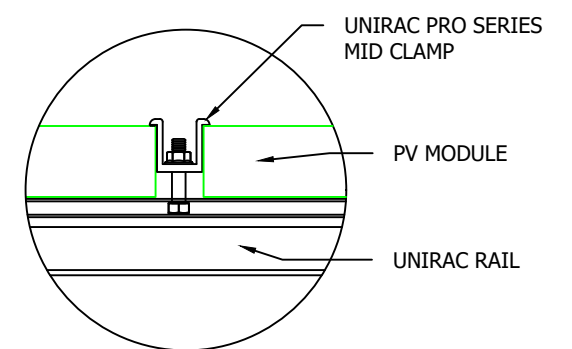
DATE:
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ROOF ATTACHMENTS - PV03

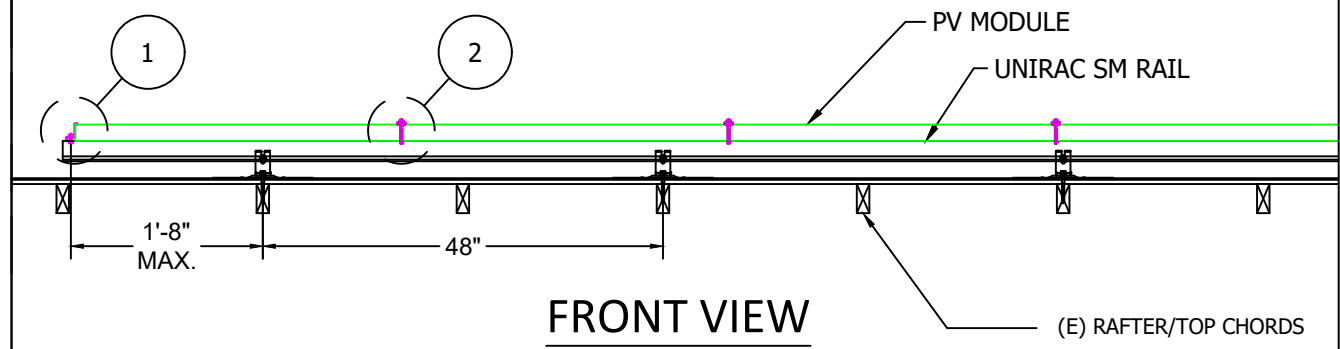
EQUIPMENT INFORMATION:		ROOF INFO:		PHOTOVOLTAIC ARRAY STRUCTURAL CRITERIA:	
RAIL MANUFACTURER	SnapNrack	ROOF TYPE	asphalt_shingle	PV MODULE COUNT:	17
RAIL PART NUMBER	Standard Rail	ROOF FRAMING	manufactured_truss	ARRAY AREA:	MODULE COUNT * 18.06ft ² = 307.02
ATTACHMENTS	Unirac - FLASHKIT PRO	RAFTER/TOP CHORD SIZE	2x4	ROOF AREA:	1613 ft ²
ATTACHMENT QTY	38	RAFTER/TOP CHORD SPACING	24"	PERCENT OF ROOF COVERED:	19%
SPLICE QTY	0	ATTACHMENT SPACING	48"	ARRAY WEIGHT:	MODULE COUNT * 50lbs = 850
MIDCLAMP QTY	22			DISTRIBUTED LOAD:	ARRAY LBS/ATTACHMENTS = 22.37
ENDCLAMP QTY	24			POINT LOAD: (lbs/ft ²)	(ARRAY) WEIGHT/AREA = 2.77 lbs/ft ²



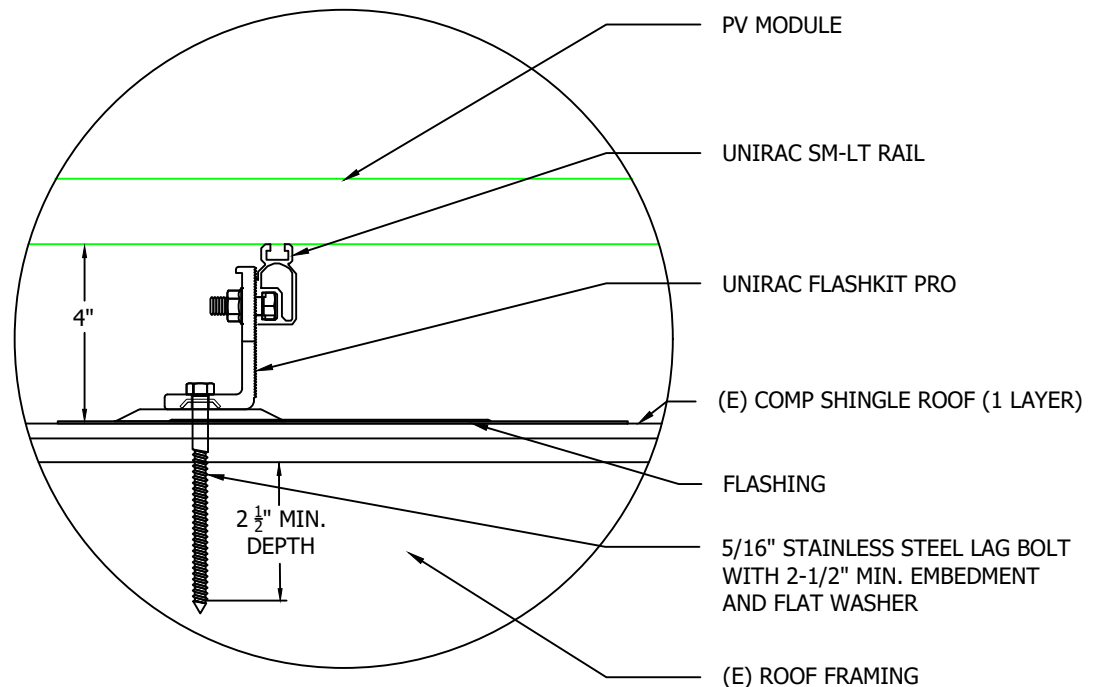
1 END CLAMP DETAILS



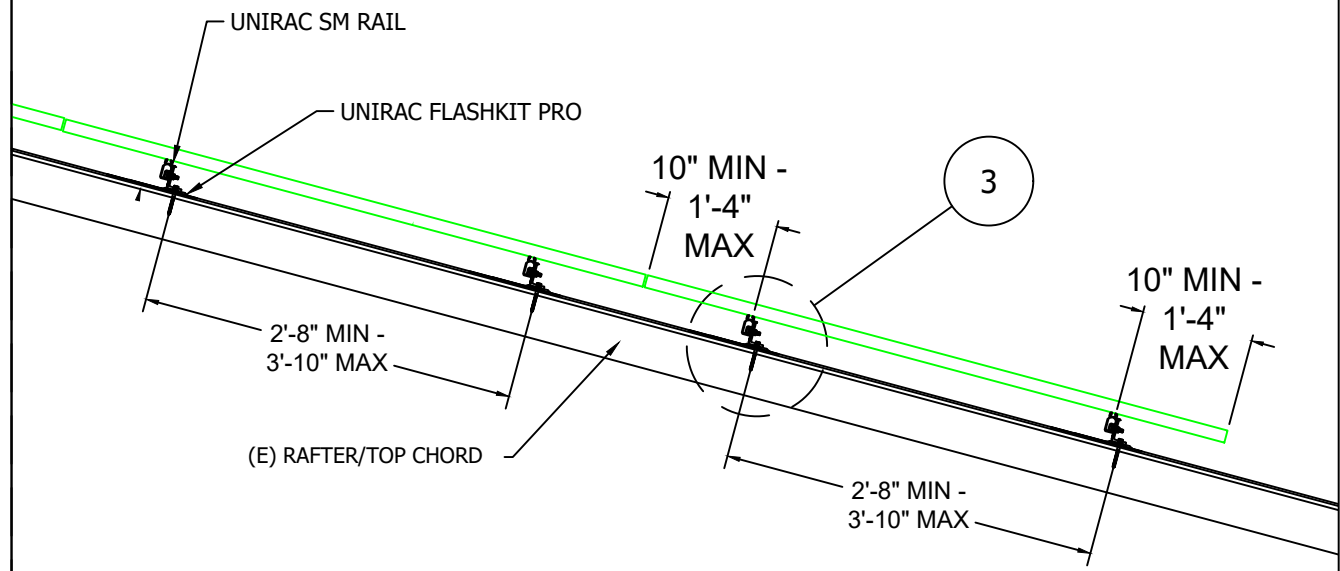
2 MID CLAMP DETAILS



FRONT VIEW



3 DETAIL, MOUNTING AND FLASHING



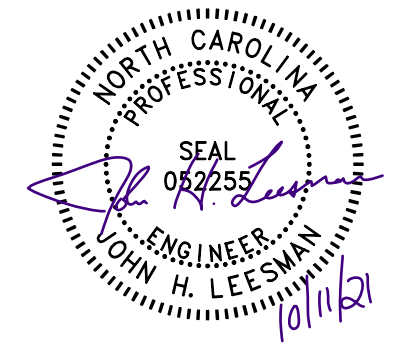
SIDE VIEW



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MOUNTING DETAIL - PV04

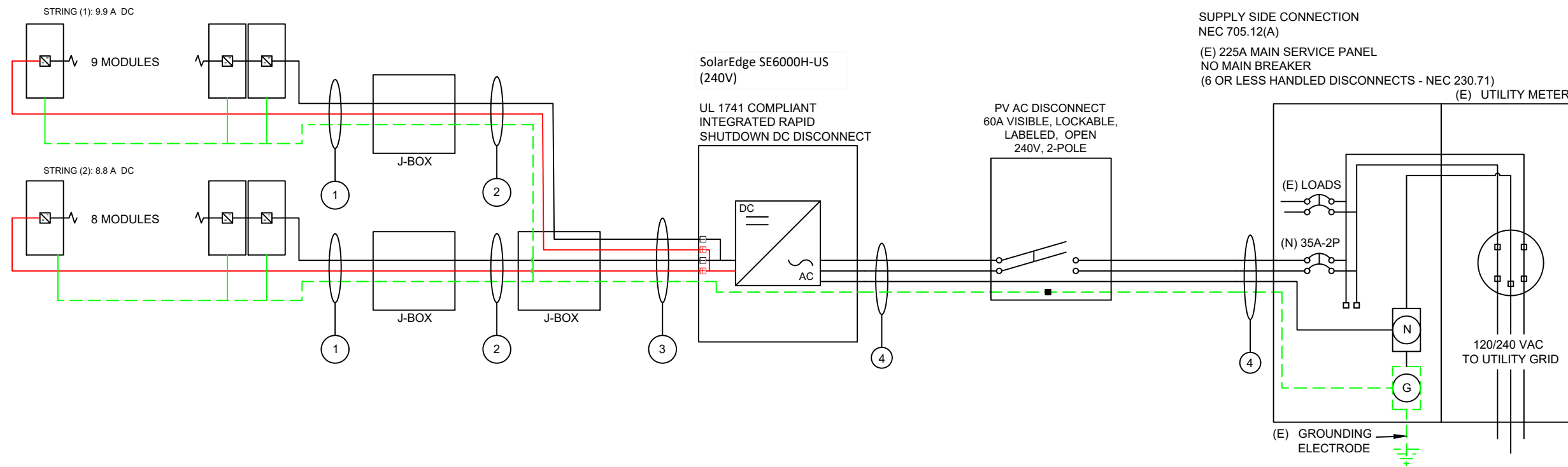
EQUIPMENT INFORMATION:		ROOF INFO:		PHOTOVOLTAIC ARRAY STRUCTURAL CRITERIA:	
RAIL MANUFACTURER	SnapNrack	ROOF TYPE	asphalt_shingle	PV MODULE COUNT:	17
RAIL PART NUMBER	Standard Rail	ROOF FRAMING	manufactured_truss	ARRAY AREA:	MODULE COUNT * 18.06ft ² = 307.02
ATTACHMENTS	Unirac - FLASHKIT PRO	RAFTER/TOP CHORD SIZE	2x4	ROOF AREA:	1613 ft ²
ATTACHMENT QTY	38	RAFTER/TOP CHORD SPACING	24"	PERCENT OF ROOF COVERED:	19%
SPLICE QTY	0	ATTACHMENT SPACING	48"	ARRAY WEIGHT:	MODULE COUNT * 50lbs = 850
MIDCLAMP QTY	22			DISTRIBUTED LOAD:	ARRAY LBS/ATTACHMENTS = 22.37
ENDCLAMP QTY	24			POINT LOAD: (lbs/ft ²)	(ARRAY) WEIGHT/AREA = 2.77 lbs/ft ²

Conduit & Conductor Schedule									
TAG	WIRE GAUGE	DESCRIPTION	QTY	CONDUIT SIZE	CONDUCTOR RATING	# OF CONDUCTORS DERATE	TEMP. DERATE	CONDUCTOR RATING W/DERATES	CONDUIT FILL
1	10 AWG	PV-WIRE, USE-2, COPPER (L1, L2)	(2)	N/A - FREE AIR	40A	N/A - FREE AIR	0.91	36.4A	N/A - FREE AIR
	6 AWG	BARE, COPPER (GROUND)	(1)						
2	10 AWG	THWN-2, or THHN, or 10/2 NM-B COPPER - (L1, L2)	(2)	3/4" EMT	40A	1	0.91	36.4A	11.9%
	10 AWG	THWN-2, or THHN, or 10/2 NM-B COPPER - (GROUND)	(1)						
3	10 AWG	THHN/THWN-2, COPPER - (L1, L2)	(4)	3/4" EMT	40A	0.8	0.91	29.12A	19.8%
	10 AWG	THHN/THWN-2 - (GROUND)	(1)						
4	8 AWG	THWN-2 COPPER - (L1, L2, NEUTRAL)	(3)	3/4" EMT	50A	1	0.91	45.5A	24.6%
	10 AWG	THWN-2 COPPER - (GROUND)	(1)						

EQUIPMENT SCHEDULE:			
TYPE:	QTY:	DESCRIPTION:	RATING:
MODULES:	(17)	LG LG420QAK-A6	420 W
INVERTERS:	(1)	SolarEdge SE6000H-US (240V)	6000 W
AC DISCONNECT(S):	(1)	PV AC DISCONNECT, 240V, 2-POLE	60A
DC OPTIMIZERS:	(17)	SolarEdge P505	15 Adc



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SUPPLY SIDE CONNECTION
 NEC 705.12(A)

(E) 225A MAIN SERVICE PANEL
 NO MAIN BREAKER
 (6 OR LESS HANDLED DISCONNECTS - NEC 230.71)
 (E) UTILITY METER

GROUNDING & GENERAL NOTES:

- PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
- DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
- ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
- JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOXES DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
- AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.

INTERCONNECTION NOTES

- GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9] & [NEC 230.95]
- SUPPLY SIDE INTERCONNECTION ACCORDING TO [NEC705.12(A)]

DISCONNECT NOTES

- 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)
- AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH.

#NAME?

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DATE:
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LINE DIAGRAM - PV05

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

LABEL 1
FOR PV DISCONNECTING MEANS WHERE THE LINE AND
LOAD TERMINALS MAY BE ENERGIZED IN THE OPEN
POSITION.
[NEC 690.13(B)]

WARNING
THIS EQUIPMENT IS FED BY MULTIPLE
SOURCES. TOTAL RATING OF ALL
OVERCURRENT DEVICES, EXCLUDING
MAIN SUPPLY OVERCURRENT
DEVICE, SHALL NOT EXCEED
AMPACITY OF BUSBAR.

LABEL 2
PLACED ADJACENT TO THE BACK-FED BREAKER
FROM THE INVERTER IF TIE IN CONSISTS OF
LOAD SIDE CONNECTION TO BUSBAR.
[NEC 705.12(B)(2)(3)(b)]

WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE
THIS OVERCURRENT
DEVICE

LABEL 3
PLACED ADJACENT TO THE BACK-FED BREAKER
FROM THE INVERTER IF TIE IN CONSISTS OF
LOAD SIDE CONNECTION TO BUSBAR.
[NEC 705.12(B)(2)(3)(c)]

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

LABEL 4
EQUIPMENT CONTAINING OVERCURRENT
DEVICES IN CIRCUITS SUPPLYING POWER
TO A BUSBAR OR CONDUCTOR SUPPLIED
FROM MULTIPLE SOURCES SHALL BE
MARKED TO INDICATE THE PRESENCE OF
ALL SOURCES [NEC 705.12(B)(3)]

PHOTOVOLTAIC AC DISCONNECT
RATED AC OUTPUT CURRENT: 25
NOMINAL OPERATING AC VOLTAGE: 240

LABEL 5
AT POINT OF INTERCONNECTION, MARKED
AT AC DISCONNECTING MEANS.
[NEC 690.54, NEC 690.13 (B)]

LABELING NOTES:

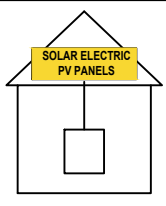
1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED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

**WARNING: PHOTOVOLTAIC
POWER SOURCE**

LABEL 6
AT DIRECT-CURRENT EXPOSED RACEWAYS, CABLE TRAYS, COVERS
AND ENCLOSURES OF JUNCTION BOXES, AND OTHER WIRING METHODS;
SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY
ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.
[NEC 690.31(G)(3&4)]

**SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN**

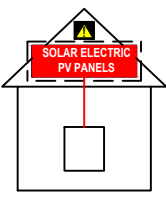
TURN RAPID SHUTDOWN
SWICH TO THE "OFF"
POSITION TO SHUT DOWN
PV SYSTEM AND REDUCE
SHOCK HAZARD IN ARRAY



LABEL 7
FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS
LEAVING THE ARRAY:
SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE
DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED
AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID
SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION.
[NEC 690.56(C)(1)(A)]

**SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN**

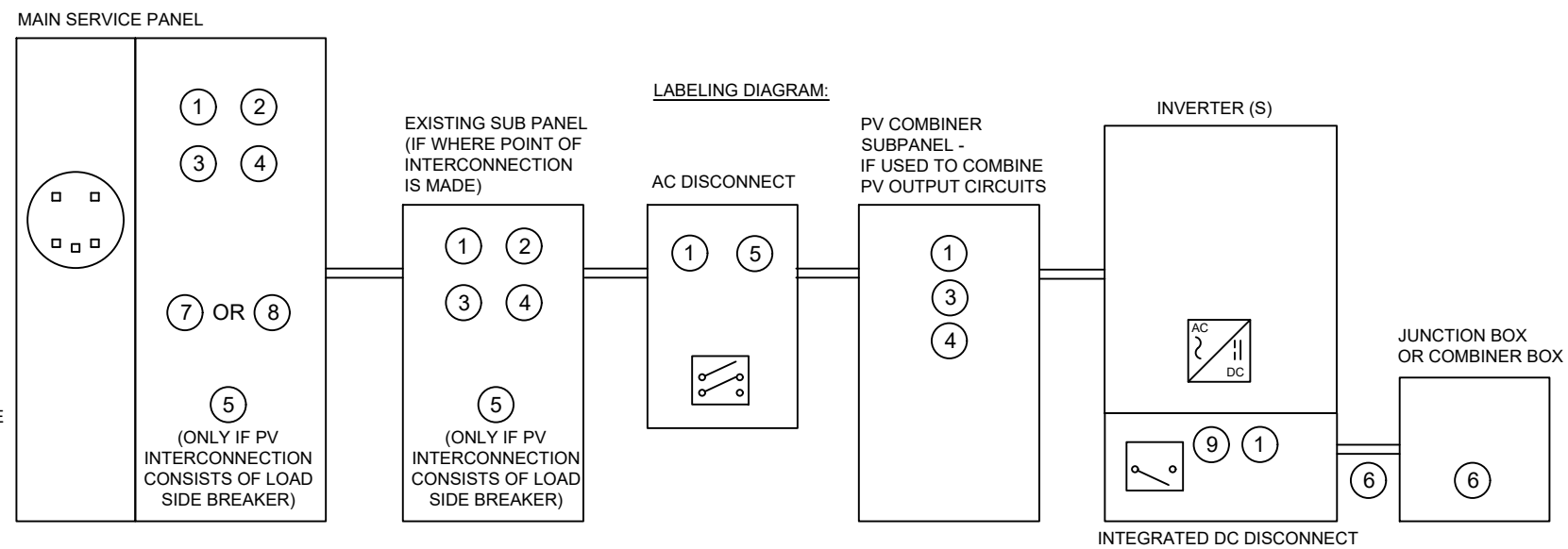
TURN RAPID SHUTDOWN
SWITCH TO THE "OFF"
POSITION TO SHUT DOWN
CONDUCTORS OUTSIDE
THE ARRAY. CONDUCTORS
WITHIN THE ARRAY REMAIN
ENERGIZED IN SUNLIGHT



LABEL 8
FOR PV SYSTEMS THAT ONLY SHUT DOWN
CONDUCTORS LEAVING THE ARRAY:
SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT
AWAY FROM SERVICE DISCONNECTING MEANS TO
WHICH THE PV SYSTEMS ARE CONNECTED AND
SHALL INDICATE THE LOCATION OF ALL IDENTIFIED
RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME
LOCATION.
[NEC 690.56(C)(1)(b)]

**RAPID SHUTDOWN
SWITCH FOR
SOLAR PV SYSTEM**

LABEL 9
SIGN LOCATED AT RAPID SHUT DOWN
DISCONNECT SWITCH [NEC 690.56(C)(3)].



*ELECTRICAL DIAGRAM SHOWN ABOVE 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 ON THE ELECTRICAL DIAGRAM PAGE.



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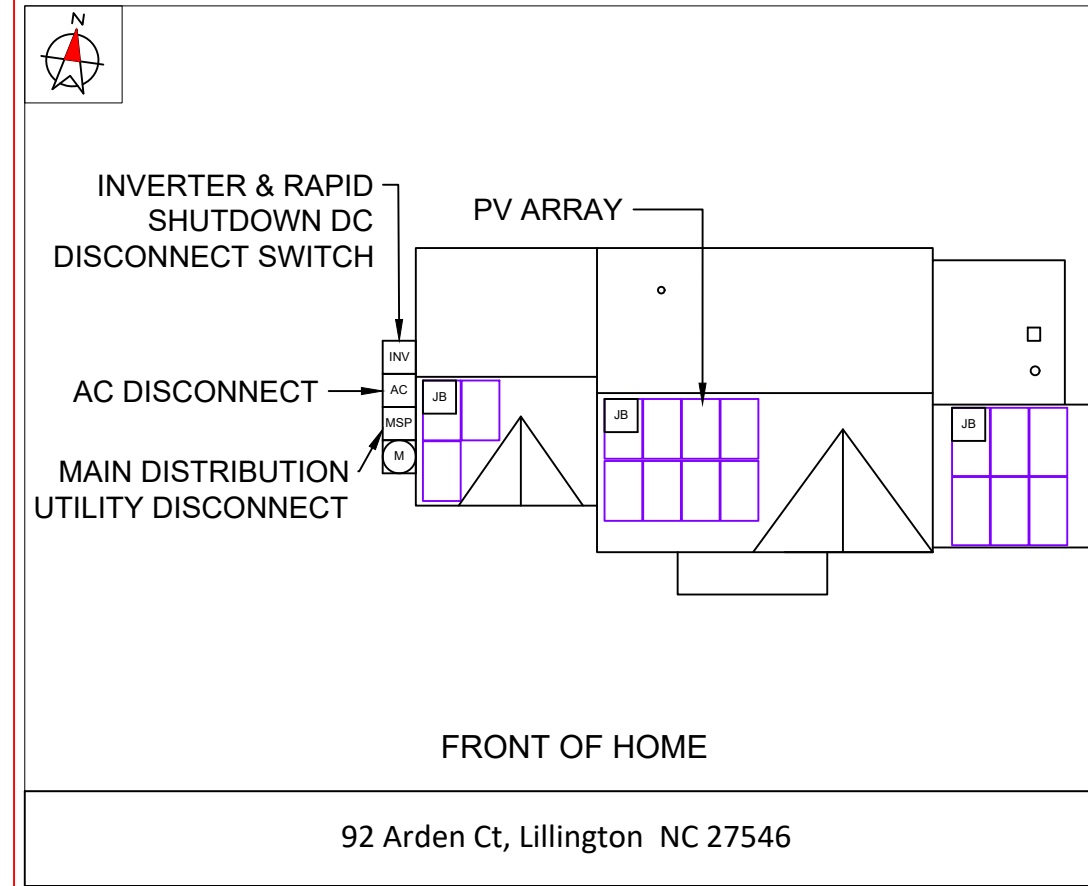
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LABELS - PV06

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:



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])



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PLACARD - PV07

SITE PHOTOS:



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ENCOR SOLAR, LLC
 3401 N. Thanksgiving Way #150
 Lehi, UT 84043
 License # 297625

SITE INFORMATION

Nathanael Eichorn
 92 Arden Ct
 Lillington, NC 27546
 AC SYSTEM SIZE: 6 kW AC
 DC SYSTEM SIZE: 7.14 kW DC
 Lat, 35.4605049
 Long, -78.7798292
 (17) LG LG420QAK-A6 PV MODULES
 (1) SolarEdge SE6000H-US (240V)
 INVERTER(S)
 Duke Energy



DRAWN BY: SoloCAD

DATE:
 October 11, 2021

SITE PHOTOS - PV08

LG NeON[®]R Prime

LG420QAK-A6 Preliminary

420W

LG Solar's NeON[®]R Prime is a powerful solar module that provides premium performance. The NeON[®]R incorporates a cell structure without electrodes on the front to maximize light utilization and enhance reliability. Providing added value for the customer beyond efficiency, this module features an enhanced warranty, outstanding durability, solid performance in real-world conditions and aesthetic design suitable for roofs.



Features

Roof Aesthetics
LG NeON[®]R has been designed with aesthetics in mind: the lack of any electrodes on the front creates an improved, modern aesthetic.

25-Year Limited Product Warranty
The NeON[®]R 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.

Enhanced Performance Warranty
LG NeON[®]R has an enhanced performance warranty. After 25 years, LG NeON[®]R is guaranteed at least 92.5% of initial performance.

More Generation Per Square Meter
The LG NeON[®]R has been designed to significantly enhance its output, making it efficient even in limited space.

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), NeONP2, NeONP2 BiFacial won the "Innovator AWARD" in 2013, 2015 and 2016, which demonstrates LG's leadership and innovation in the solar industry.



LG NeON[®]R Black

Preliminary

LG420QAK-A6

General Data

Cell Properties (Material/Type)	Monocrystalline/N-type
Cell Maker	LG
Cell Configuration	66 Cells (6 x 11)
Module Dimensions (L x W x H)	1,910mm x 1,042mm x 40mm
Weight	20.5 kg
Glass (Material)	Tempered Glass with AR Coating
Backsheet (Color)	Black
Frame (Material)	Anodized Aluminium
Junction Box (Protection Degree)	IP 68 with 3 Bypass Diodes
Cables (Length)	1,250mm 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
Salt Mist Corrosion Test	OHSAS 18001
Ammonia Corrosion Test	IEC 61701 : 2012 Severity 6
Hail Test	IEC 62716 : 2013
Module Fire Performance	25mm (1") diameter at 23m/s (52mph)
Fire Rating	Type 2 (UL 61730)
Solar Module Product Warranty	Class C (UL 790, UL/ORD C 1703)
Solar Module Output Warranty	25 Year Limited
Solar Module Output Warranty	Linear Warranty*

*Improved: 1st year 98.5%, from 2-24th year -0.25%/year down, 92.5% for 25 years (TBD)
**In Progress

Temperature Characteristics

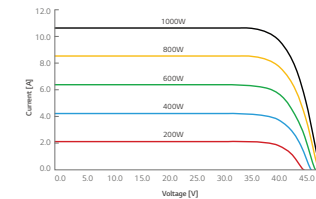
NMOT*	[°C]	44 ± 3
Pmax	[%/°C]	-0.29
Voc	[%/°C]	-0.24
Isc	[%/°C]	0.04

*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	LG420QAK-A6	
Maximum Power (Pmax)	[W]	319
MPP Voltage (Vmpp)	[V]	39.0
MPP Current (Impp)	[A]	8.17
Open Circuit Voltage (Voc)	[V]	45.8
Short Circuit Current (Isc)	[A]	8.73

I-V Curves



Electrical Properties (STC*)

Model	LG420QAK-A6	
Maximum Power (Pmax)	[W]	420
MPP Voltage (Vmpp)	[V]	41.3
MPP Current (Impp)	[A]	10.19
Open Circuit Voltage (Voc, ± 5%)	[V]	48.0
Short Circuit Current (Isc, ± 5%)	[A]	10.83
Module Efficiency	[%]	21.1
Power Tolerance	[%]	0 - + 3

*STC (Standard Test Condition): Irradiance 1000 W/m², cell temperature 25°C, AM 1.5
Measure Tolerance: ± 3%

Operating Conditions

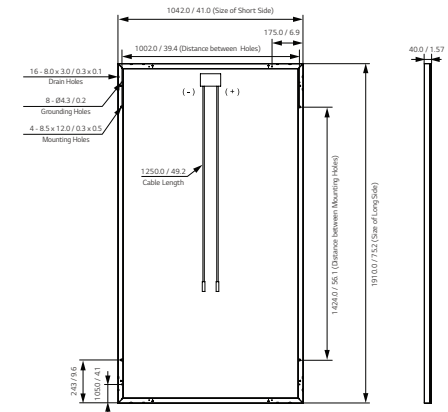
Operating Temperature*	[°C]	-40 - +85
Maximum System Voltage	[V]	1,000
Maximum Series Fuse Rating	[A]	20
Mechanical Test Load** (Front)	[Pa/psf]	5,400
Mechanical Test Load** (Rear)	[Pa/psf]	4,000

*The operating ambient temperature of these devices may exceed 40°C at full load for all wire sizes if is determined suitable in the field use application.
**Based on IEC 61215-2 : 2016 (Test Load = Design Load x Safety Factor (1.5))

Packaging Configuration

Number of Modules per Pallet	[EA]	25
Number of Modules per 40' Container	[EA]	600
Number of Modules per 50' Container	[EA]	TBD
Packaging Box Dimensions (L x W x H)	[mm]	1,960 x 1,120 x 1,221
Packaging Box Dimensions (L x W x H)	[in]	77.2 x 44.1 x 48.1
Packaging Box Gross Weight	[kg]	549
Packaging Box Gross Weight	[lb]	1,210

Dimensions (mm/inch)



LG Electronics USA, Inc.
Solar Business Division
2000 Millbrook Drive
Lincolnton, NC 28059
www.lg-solar.com

Product specifications are subject to change without notice.
LG420QAK-A6.pdf
12/10/20

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Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

12-25
YEAR
WARRANTY



INVERTERS

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

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Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US		
OUTPUT									
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac	
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac	
AC Frequency (Nominal)	59.3 - 60 - 60.5 ¹⁾							Hz	
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A	
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A	
GFDI Threshold	1							A	
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes								
INPUT									
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W	
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W	
Transformer-less, Ungrounded	Yes								
Maximum Input Voltage	480							Vdc	
Nominal DC Input Voltage	380				400			Vdc	
Maximum Input Current @240V ²⁾	8.5	10.5	13.5	16.5	20	27	30.5	Adc	
Maximum Input Current @208V ²⁾	-	9	-	13.5	-	-	27	Adc	
Max. Input Short Circuit Current	45							Adc	
Reverse-Polarity Protection	Yes								
Ground-Fault Isolation Detection	600ka Sensitivity								
Maximum Inverter Efficiency	99	99.2						%	
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%	
Nighttime Power Consumption	< 2.5							W	
ADDITIONAL FEATURES									
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)								
Revenue Grade Data, ANSI C12.20	Optional ³⁾								
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect								
STANDARD COMPLIANCE									
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07								
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (H)								
Emissions	FCC Part 15 Class B								
INSTALLATION SPECIFICATIONS									
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG				1" Maximum / 14-4 AWG				
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG				1" Maximum / 1-3 strings / 14-6 AWG				
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174				21.3 x 14.6 x 7.3 / 540 x 370 x 185				in / mm
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6				lb / kg	
Noise	< 25				< 50				dBA
Cooling	Natural Convection								
Operating Temperature Range	-13 to +140 / -25 to +60 ⁴⁾ (-40°F / -40°C option) ⁵⁾							°F / °C	
Protection Rating	NEMA 4X (Inverter with Safety Switch)								

¹⁾ For other regional settings please contact SolarEdge support

²⁾ A higher current source may be used; the inverter will limit its input current to the values stated

³⁾ Revenue grade inverter P/N: SE000H-US000NNC2

⁴⁾ For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

⁵⁾ -40 version P/N: SE000H-US000NNU4

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505



POWER OPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

solaredge.com



/ Power Optimizer For North America

P320 / P340 / P370 / P400 / P405 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT							
Rated Input DC Power ⁽¹⁾	320	340	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125 ⁽²⁾	87 ⁽²⁾	Vdc
MPPT Operating Range	8 - 48		8 - 60	8 - 80	12.5 - 105	12.5 - 87	Vdc
Maximum Short Circuit Current (Isc)	11			10.1		14	Adc
Maximum DC Input Current	13.75			12.5		17.5	Adc
Maximum Efficiency	99.5						%
Weighted Efficiency	98.8					98.6	%
Overvoltage Category	II						
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)							
Maximum Output Current	15						Adc
Maximum Output Voltage	60			85			Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)							
Safety Output Voltage per Power Optimizer	1 ± 0.1						Vdc
STANDARD COMPLIANCE							
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3						
Safety	IEC62109-1 (class II safety), UL1741						
Material	UL94 V-0, UV Resistant						
RoHS	Yes						
INSTALLATION SPECIFICATIONS							
Maximum Allowed System Voltage	1000						Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters						
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1		129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 159 x 49.5 / 5.1 x 6.3 x 1.9	129 x 162 x 59 / 5.1 x 6.4 x 2.3		mm / in
Weight (including cables)	630 / 1.4		750 / 1.7	845 / 1.9	1064 / 2.3		gr / lb
Input Connector	Single or dual MC4 ⁽³⁾						
Input Wire Length	0.16 / 0.52						m / ft
Output Wire Type / Connector	Double Insulated / MC4						
Output Wire Length	0.9 / 2.95		1.2 / 3.9				m / ft
Operating Temperature Range	-40 - +85 / -40 - +185						°C / °F
Protection Rating	IP68 / NEMA6P						
Relative Humidity	0 - 100						%

⁽¹⁾ Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed

⁽²⁾ NEC 2017 requires max input voltage be not more than 80V

⁽³⁾ For other connector types please contact SolarEdge

PV System Design Using a SolarEdge Inverter ⁽⁴⁾⁽⁵⁾	Single Phase HD-Wave	Single phase	Three Phase 208V	Three Phase 480V	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400	8	10	18	
	P405 / P505	6	13 (12 with SE3K)	14	
Maximum String Length (Power Optimizers)		25	25	50 ⁽⁶⁾	
Maximum Power per String	5700 (6000 with SE7600-US - SE11400-US)	5250	6000 ⁽⁷⁾	12750 ⁽⁸⁾	W
Parallel Strings of Different Lengths or Orientations	Yes				

⁽⁴⁾ For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf

⁽⁵⁾ It is not allowed to mix P405/P505 with P320/P340/P370/P400 in one string

⁽⁶⁾ A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement

⁽⁷⁾ For SE14.4KUS/SE43.2KUS: It is allowed to install up to 6,500W per string when 3 strings are connected to the inverter (3 strings per unit for SE43.2KUS) and when the maximum power difference between the strings is up to 1,000W

⁽⁸⁾ For SE30KUS/SE33.3KUS/SE66.6KUS/SE100KUS: It is allowed to install up to 15,000W per string when 3 strings are connected to the inverter (3 strings per unit for SE66.6KUS/SE100KUS) and when the maximum power difference between the strings is up to 2,000W

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CE RoHS

Ultra Rail




The Ultimate Value in Rooftop Solar

 Industry leading Wire Management Solutions

 Mounts available for all roof types

 Single Tool Installation

 All SnapNrack Module Clamps & Accessories are compatible with both rail profiles

Start Installing Ultra Rail Today

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DESIGN
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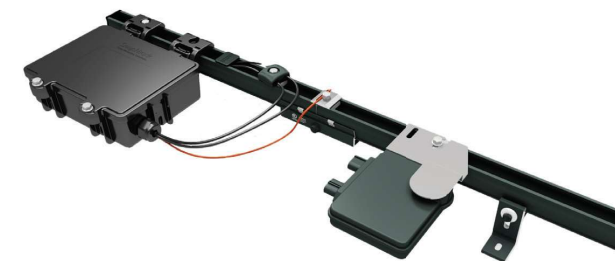
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SnapNrack Ultra Rail System

A sleek, straightforward rail solution for mounting solar modules on all roof types. Ultra Rail features two rail profiles; UR-40 is a lightweight rail profile that is suitable for most geographic regions and maintains all the great features of SnapNrack rail, while UR-60 is a heavier duty rail profile that provides a larger rail channel and increased span capabilities. Both are compatible with all existing mounts, module clamps, and accessories for ease of install.

The Entire System is a Snap to Install

- New Ultra Rail Mounts include snap-in brackets for attaching rail
- Compatible with all the SnapNrack Mid Clamps and End Clamps customers love
- Universal End Clamps and snap-in End Caps provide a clean look to the array edge



Unparalleled Wire Management

- Open rail channel provides room for running wires resulting in a long-lasting quality install
- Industry best wire management offering includes Junction Boxes, Universal Wire Clamps, MLPE Attachment Kits, and Conduit Clamps
- System is fully bonded and listed to UL 2703 Standard

Heavy Duty UR-60 Rail

- UR-60 rail profile provides increased span capabilities for high wind speeds and snow loads
- Taller, stronger rail profile includes profile-specific rail splice and end cap
- All existing mounts, module clamps, and accessories are retained for the same great install experience



Quality. Innovative. Superior.

SnapNrack Solar Mounting Solutions are engineered to optimize material use and labor resources and improve overall installation quality and safety.

877-732-2860

www.snapnrack.com

contact@snapnrack.com

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FLASHKIT PRO



FLASHKIT PRO is the complete attachment solution for composition shingle roofs. Featuring Unirac's patented SHED & SEAL technology, a weather proof system which provides the ultimate protection against roof leaks. Kitted in 10 packs for maximum convenience, flashings and hardware are available in Mill or Dark finishes. With FLASHKIT pro, you have everything you need for a quick, professional installation.



TRUSTED WATER SEAL FLASHINGS
FEATURING SHED & SEAL TECHNOLOGY



YOUR COMPLETE SOLUTION
Flashings, lags, continuous slot L-Feet and hardware



CONVENIENT 10 PACKS
Packaged for speed and ease of handling

FLASHKIT PRO

INSTALLATION GUIDE



FLASHKIT PRO IS THE COMPLETE FLASHING AND ATTACHMENT SOLUTION FOR COMPOSITION ROOFS.



STEP 1
INSTALL FLASHKIT PRO FLASHING



STEP 2
INSTALL L-FOOT



STEP 3
ATTACH L-FOOT TO RAIL

PRE-INSTALL

- Locate roof rafters and snap chalk lines to mark the installation point for each roof attachment.
- Drill a 7/32" pilot hole at each roof attachment. Fill each pilot hole with sealant.

STEP 1 INSTALL FLASHKIT PRO FLASHING

- Add a U-shaped bead of roof sealant to the underside of the flashing with the open side of the U pointing down the roof slope. Slide the aluminum flashing underneath the row of shingles directly up slope from the pilot hole as shown. Align the indicator marks on the lower end of the flashing with the chalk lines on the roof to center the raised hole in the flashing over the pilot hole in the roof. When installed correctly, the flashing will extend under the two courses of shingles above the pilot hole.

STEP 2 INSTALL L-FOOT

- Fasten L-foot and Flashing into place by passing the included lag bolt and pre-installed stainless steel-backed EPDM washer through the L-foot EPDM grommet, and the raised hole in the flashing, into the pilot hole in the roof rafter.

- Drive the lag bolt down until the L-foot is held firmly in place. It is normal for the EPDM on the underside of the stainless steel backed EPDM washer to compress and expand beyond the outside edge of the steel washer when the proper torque is applied.

TIP:

- Use caution to avoid over-torquing the lag bolt if using an impact driver.
- Repeat Steps 1 and 2 at each roof attachment point.

STEP 3 ATTACH L-FOOT TO RAIL

- Insert the included 3/8" -16 T-bolts into the lower slot on the Rail (sold separately), spacing the bolts to match the spacing between the roof attachments.
- Position the Rail against the L-Foot and insert the threaded end of the T-Bolt through the continuous slot in the L-Foot. Apply anti-seize to bolt threads to prevent galling of the T-bolt and included 3/8" serrated flange nut. Place the 3/8" flange nut on the T-bolt and finger tighten. Repeat STEP 3 until all L-Feet are secured to the Rail with a T-bolt. Adjust the level and height of the Rail and torque each bolt to 30ft-lbs.

FASTER INSTALLATION. 25-YEAR WARRANTY.

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

THE COMPLETE ROOF ATTACHMENT SOLUTION

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