ISBEL RESIDENCE

20.81kW PV SYSTEM

1912 W US HWY 90 LAKE CITY, FL 32055

PROJECT DESCRIPTION:

57x365 LG NEON: LG365N1C-A6 (365W) MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES

SYSTEM SIZE: 20.81 kW DC STC
ARRAY AREA #1: 331.50 SQ FT.
ARRAY AREA #2: 351.50 SQ FT.
ARRAY AREA #3: 136.50 SQ FT.
ARRAY AREA #4: 97.50 SQ FT.
ARRAY AREA #5: 97.50 SQ FT.
ARRAY AREA #6: 58.50 SQ FT.
ARRAY AREA #7: 39.00 SQ FT.

EQUIPMENT SUMMARY
57 LG NEON: LG365N1C-A6 (365W) MODULES
57 ENPHASE IQ7PLUS-72-2-US MICROINVERTERS

RACKING: UNIRAC LIGHT RAIL
ATTACHMENT: UNIRAC FLASHLOC

DESIGN FACTORS:
WIND SPEED (ULT): 120
WIND SPEED (ASD): 93
RISK CATEGORY: II
EXPOSURE: B

AUTHORITY HAVING JURISDICTION:
MUNICIPALITY OF COLUMBIA COUNTY

CODES AND STANDARDS

GOVERNING CODES :
FLORIDA RESIDENTIAL CODE, 7TH EDITION 2020 (FRC)
FLORIDA PLUMBING CODE, 7TH EDITION 2020 (FPC)
FLORIDA BUILDING CODE, 7TH EDITION 2020 EDITION (FBC)
FLORIDA MECHANICAL CODE, 7TH EDITION 2020 (FMC)
NATIONAL ELECTRICAL CODE 2017 (NEC)
ASCE 7-16

OWNER

ISBEL, STEVEN

INSTALLER

SUNPRO SOLAR
4492-4494 EAGLE FALLS PLACE
TAMPA, FL 33619
PH: (866) 450-1012

ENGINEER

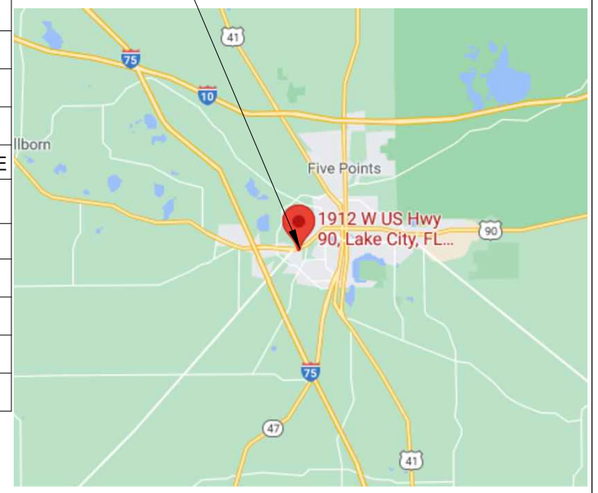
Castillo Engineering Services LLC
620 N. Wymore Road, Suite 250,Maitland, FL 32751
TEL: (407) 289-2575
Ermocrates E. Castillo
License#: FL PE 52590

SHEET INDEX

SHEET #	SHEET DESCRIPTION
G-01	COVER SHEET
A-00	NOTES AND DESCRIPTION
A-01	ROOF PLAN
S-01	MODULE LAYOUT
S-01.1	PARTIAL PRESSURE AND MODULES EXPOSURE
S-02	ATTACHMENT DETAIL
S-02.1	STRUCTURE CALCULATION
E-01	ELECTRICAL LINE DIAGRAM
E-02	WIRING CALCULATIONS
E-03	SYSTEM LABELING
DS-01-06	DATA SHEETS

HOUSE PHOTO

VICINITY MAP



STRUCTURAL CERTIFICATION:

I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL 2020, CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES, AND EQUIPMENT DEAD LOADS.

ELECTRICAL CERTIFICATION:

I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE PV ELECTRICAL SYSTEM AND ELECTRICAL COMPONENTS ARE DESIGNED AND APPROVED USING THE STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE. FBC 107.

Castillo Engineering
SOLAR DONE RIGHT®
CASTILLO ENGINEERING SERVICES, LLC
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SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

ERMOCRATES E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER
Signature with Seal
Digitally Signed by: Ermocrates E Castillo
Date: 2021.05.17 16:38:49

PROJECT NAME

ISBEL RESIDENCE
1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME
COVER SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
G-01

Symbols:

Section..... X / X-XX — Sheet where section is located

Elevation ..... X / X-XX — Detail ID Letter; Sheet where section is located

Detail ..... X / X-XX — Detail ID Letter; Sheet where section is located

Detail ..... (Enlarged Plan) X / X-XX — Detail ID Letter; Area to be enlarged; Sheet where section is located

Keyed Notes ..... 1 — Keyed note designation on applicable sheet

Ground Terminal .....

Grounding Point/rod....

Solar Panel ..... or 00 — Module with Source Circuit number

Combiner Box ..... CB

AC Disconnect ..... ACD

Main Distribution Panel ..... MDP

Fuse .....

Overcurrent Breaker ..

Inverter .....

Transformer .....

Automatic ..... Transfer Switch ATS

Vent, Attic fan (Roof obstruction)

PV Roof Attachment

Trusses

Conduit

Fire Access

Abbreviations:

AC	Alternating Current
APPROX	Approximate
AWG	American Wire Gauge
BAT	Tesla Powerwall
CB	Combiner Box
DC	Direct Current
ACD	Alternating Current Disconnect
DISC	Disconnect
(E)	Existing
EL	Elevation
EQ	Equal
GP	Generation Panel
JB	Junction Box
MCB	Main Combiner Box
MFR	Manufacturer
MIN	Minimum
MISC	Miscellaneous
MDP	Main Distribution Panel
(N)	New
NAVD	North American Vertical datum
OCPD	OverCurrent Protection Device
POCC	Point Of Common Coupling
PV	Photovoltaic
SF	Squarefoot/feet
STC	Standard Test Conditions
SD	Soladeck
TEG	Tesla Backup Gateway 2
TBD	To Be Determined
TYP	Typical
UON	Unless Otherwise Notified
UM	Utility meter
VIF	Verify In Field
WP	Weather Proof

System Description

This system is a grid-tied, PV system, with PV generation consisting of 57 LG NEON: LG365N1C-A6 (365W) MODULES with a combined STC rated dc output power of 20805 W. The modules are connected into 57 ENPHASE IQ7PLUS-72-2-US MICROINVERTERS. The inverter has electronic maximum power point tracking to maximize energy captured by the PV modules. The inverter also has an internal ground fault detection and interruption device that is set to disconnect the array in the event that a ground fault that exceeds one ampere should occur. The inverter has DC and AC disconnect integrated system and labels are provided as required by the *National Electrical Code*

When the sun is shining, power from the PV array is fed into the inverter, where it is converted from DC to AC. The inverter output is then used to contribute to the power requirements of the occupancy. If PV power meets the requirements of the loads of the occupancy, any remaining PV power is sold back to the utility. When utility power is available, but PV power is not available, building loads are supplied by the utility.

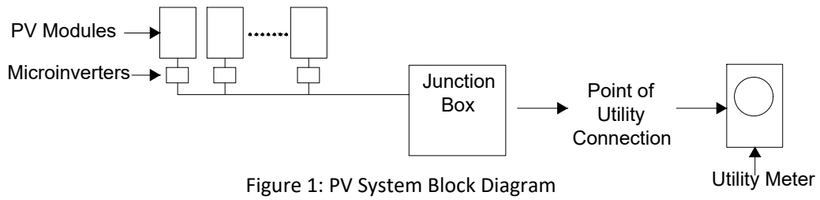
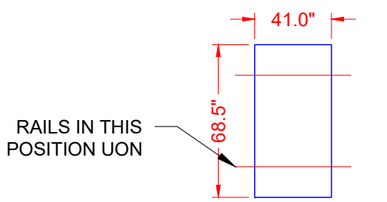


Figure 1: PV System Block Diagram

The inverter meets the requirements of IEEE 1547 and UL 1741.

Approximate system output: 29,922 kWh per year.



LG NEON:
LG365N1C-A6 (365W)
MODULE

ALLOWABLE/DESIGN PRESSURE	PSF
DOWN PRESSURE	125
UPLIFT PRESSURE, 2 RAILS	88

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

Digitally signed by: Ermocrates E Castillo
Date: 2021.05.17 16:38:50

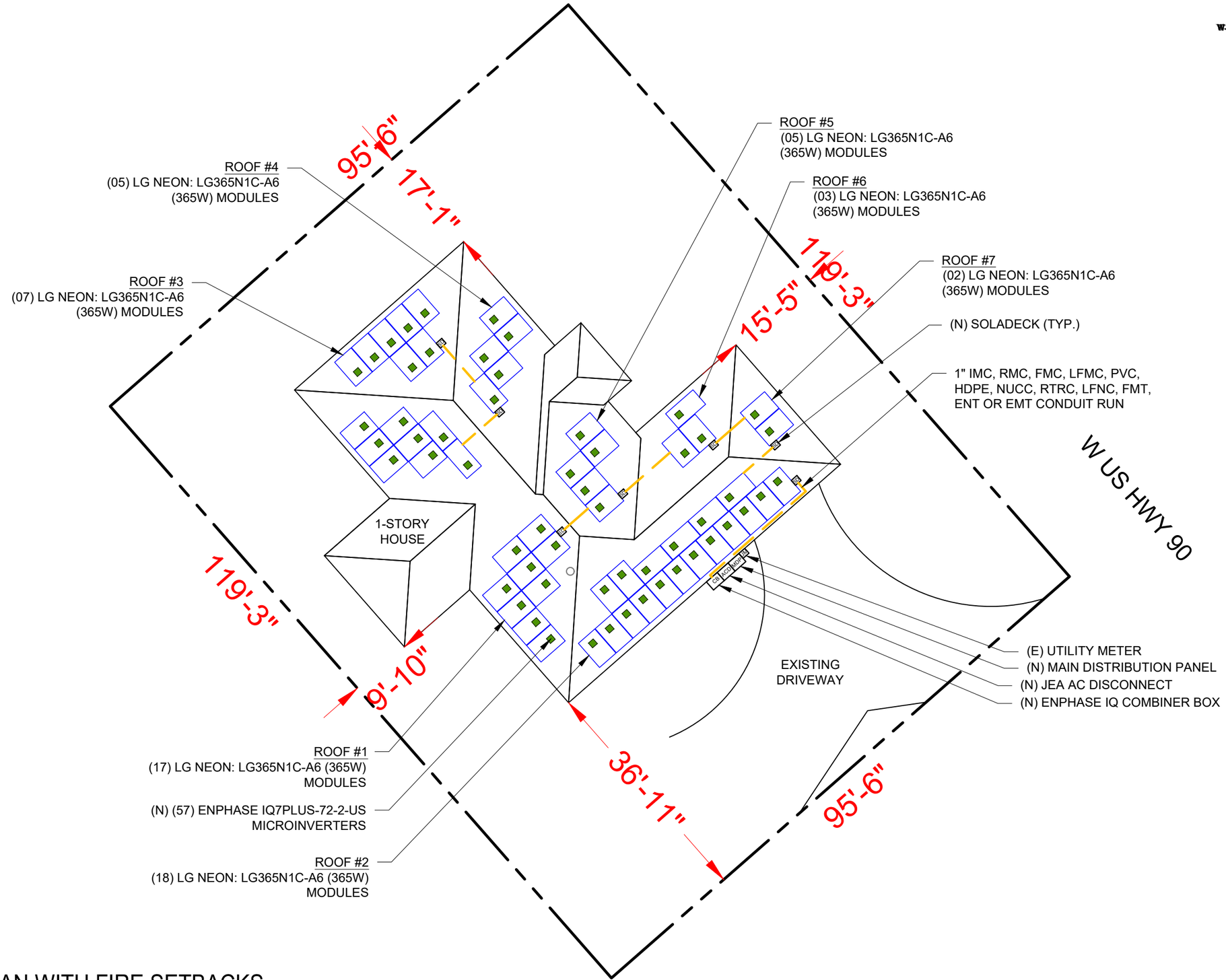
PROJECT NAME

ISBEL RESIDENCE
1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME
NOTES AND DESCRIPTION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
A-00



1 A-01 ROOF PLAN WITH FIRE SETBACKS AND PROPERTY LINES

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

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PROJECT INSTALLER

SUNPRO

E. CASTILLO LICENSE No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.05.17 16:38:51
Signature with Seal

PROJECT NAME

ISBEL RESIDENCE
1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME
ROOF PLAN

SHEET SIZE
ANSI B
11" X 17"

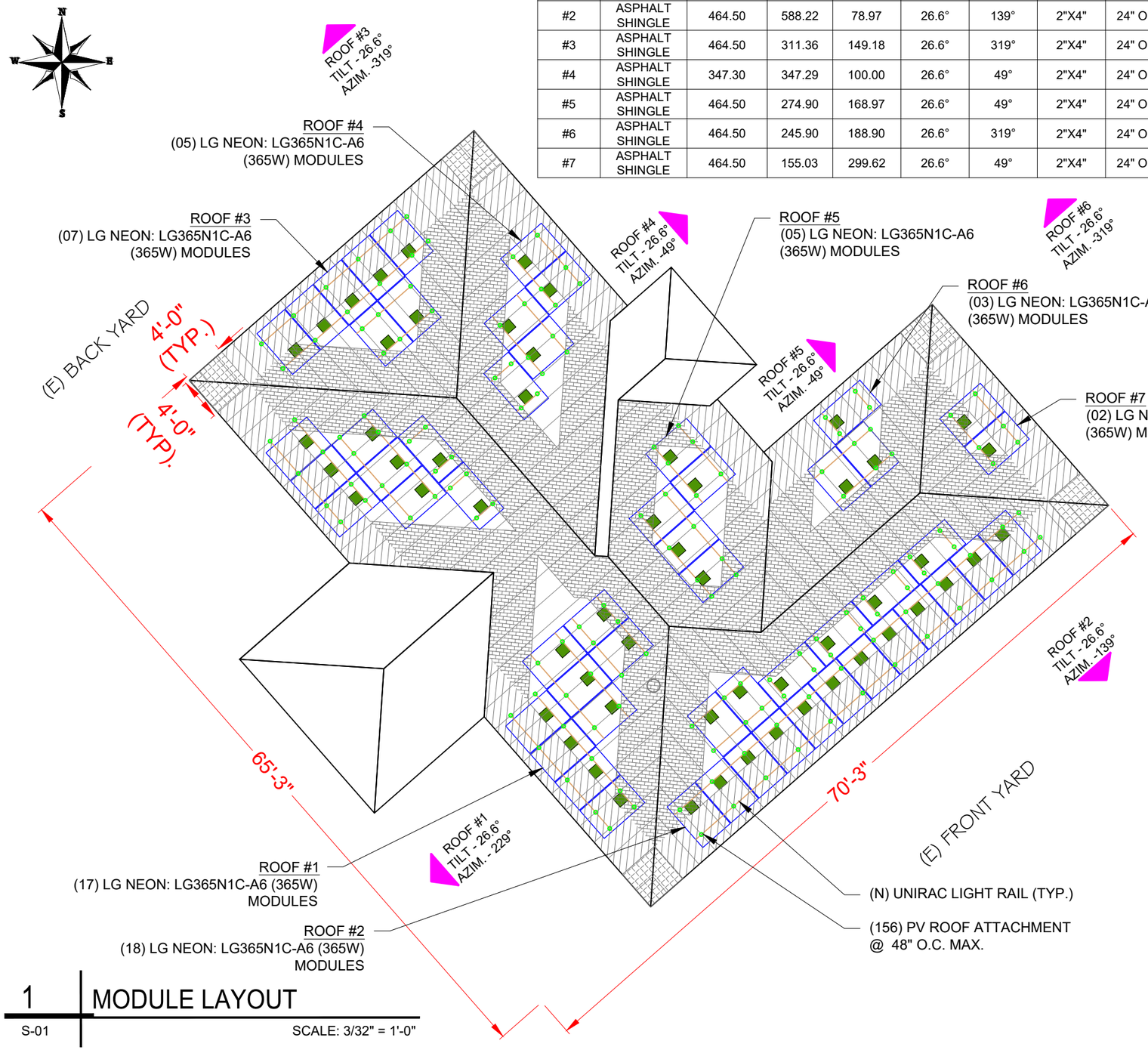
SHEET NUMBER
A-01

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 57 MODULES
MODULE TYPE = LG NEON: LG365N1C-A6 (365W) MODULES
WEIGHT = 41.01 LBS / 18.6 KG.
MODULE DIMENSIONS = 68.5" x 41.0" = 19.50 SF
UNIT WEIGHT OF ARRAY = 2.10 PSF

TOTAL ARRAY AREA & ROOF AREA CALC'S

ROOF	ROOF TYPE	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)	TILT	AZIMUTH	TRUSS SIZE	TRUSS SPACING
#1	ASPHALT SHINGLE	331.50	757.27	43.78	26.6°	229°	2"X4"	24" O.C.
#2	ASPHALT SHINGLE	464.50	588.22	78.97	26.6°	139°	2"X4"	24" O.C.
#3	ASPHALT SHINGLE	464.50	311.36	149.18	26.6°	319°	2"X4"	24" O.C.
#4	ASPHALT SHINGLE	347.30	347.29	100.00	26.6°	49°	2"X4"	24" O.C.
#5	ASPHALT SHINGLE	464.50	274.90	168.97	26.6°	49°	2"X4"	24" O.C.
#6	ASPHALT SHINGLE	464.50	245.90	188.90	26.6°	319°	2"X4"	24" O.C.
#7	ASPHALT SHINGLE	464.50	155.03	299.62	26.6°	49°	2"X4"	24" O.C.



1 MODULE LAYOUT
S-01 SCALE: 3/32" = 1'-0"

GENERAL INSTALLATION PLAN NOTES:

1) ROOF ATTACHMENTS TO SYP TRUSSES SHALL BE INSTALLED AS SHOWN IN SHEET S-02 AND AS FOLLOWS FOR EACH WIND ZONE:

WIND ZONES	NON - EXPOSED MODULES		EDGE / EXPOSED MODULES	
	SPAN	CANTILEVER	SPAN	CANTILEVER
ZONE 1	4' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 1'	X	X	X	X
ZONE 2e	4' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 2n	X	X	X	X
ZONE 2r	4' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 3e	4' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 3r	X	X	X	X

2) EXISTING RESIDENTIAL BUILDING IS AN ASPHALT SHINGLE ROOF WITH MEAN ROOF HEIGHT IS 15 FT AND SYP 2"X4" ROOF TRUSSES SPACED 24" O.C. EXISTING ROOF SLOPE FOR SOLAR SYSTEM RETROFIT IS 26.6 DEGREES. CONTRACTOR TO FIELD VERIFY AND SHALL REPORT TO THE ENGINEER IF ANY DISCREPANCIES EXIST BETWEEN PLANS AND IN FIELD CONDITIONS.

* I CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE LATERAL AND UPLIFT WIND LOADS AND EQUIPMENT DEAD LOADS. *

LEGEND

- EDGE MODULE
- EXPOSED MODULE
- NON- EXPOSED MODULE
- MISSING MODULE
- MIN. MODULE EDGE DISTANCE LINE
- MODULE EXPOSURE LINE
- WIND ZONE 1 (TYP)
- WIND ZONE 2e (TYP)
- WIND ZONE 2n (TYP)
- WIND ZONE 2r (TYP)
- WIND ZONE 3r (TYP)
- WIND ZONE 3e (TYP)

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

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SHEET NAME
MODULE LAYOUT

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01

	1	1'	2e	2n	2r	3e	3r
	16.00	0.00	16.00	0.00	16.00	16.00	0.00

Module Size 19.5 Sqft.

Non-Exposed modules								Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P1	1.12	0.00	11.82	0.00	6.55	0.00	0.00	16.00
P2	7.68	0.00	11.82	0.00	0.00	0.00	0.00	16.00
P3	10.56	0.00	0.00	0.00	8.94	0.00	0.00	16.00
P4	12.76	0.00	0.00	0.00	6.74	0.00	0.00	16.00
P5	7.46	0.00	11.81	0.00	0.23	0.00	0.00	16.00
P6	12.43	0.00	0.00	0.00	7.07	0.00	0.00	16.00
P7	0.62	0.00	11.81	0.00	7.07	0.00	0.00	16.00
P8	7.69	0.00	11.81	0.00	0.00	0.00	0.00	16.00
P9	16.33	0.00	0.00	0.00	3.17	0.00	0.00	16.00
P10	15.38	0.00	0.00	0.00	4.12	0.00	0.00	16.00
P11	0.91	0.00	11.81	0.00	6.77	0.00	0.00	16.00
P12	13.64	0.00	0.00	0.00	5.86	0.00	0.00	16.00
P13	2.82	0.00	9.77	0.00	6.91	0.00	0.00	16.00
P14	13.66	0.00	0.00	0.00	5.84	0.00	0.00	16.00
P15	9.95	0.00	2.56	0.00	6.98	0.00	0.00	16.00
P16	1.05	0.00	12.04	0.00	6.40	0.00	0.00	16.00
P17	7.46	0.00	12.04	0.00	0.00	0.00	0.00	16.00
P18	11.93	0.00	0.00	0.00	7.57	0.00	0.00	16.00

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS: 88 PSF

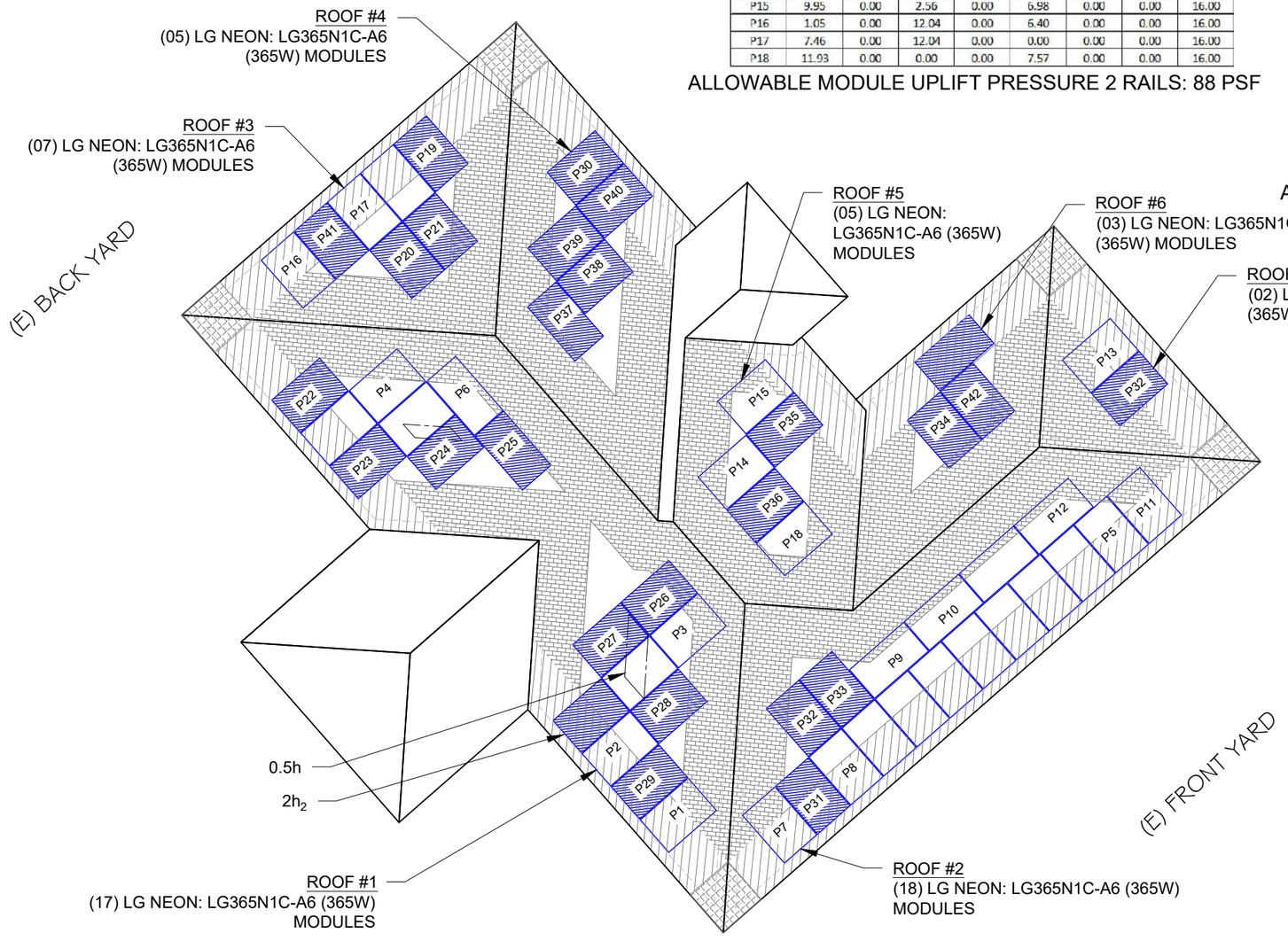
	1	1'	2e	2n	2r	3e	3r
	16.00	0.00	21.60	0.00	21.60	21.60	0.00

Module Size 19.5 Sqft.

Exposed modules								Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P19	6.47	0.00	12.04	0.00	0.99	0.00	0.00	19.74
P20	17.00	0.00	0.00	0.00	2.50	0.00	0.00	16.72
P21	14.60	0.00	0.00	0.00	4.90	0.00	0.00	17.41
P22	5.70	0.00	11.91	0.00	1.90	0.00	0.00	19.96
P23	7.68	0.00	11.82	0.00	0.00	0.00	0.00	19.40
P24	19.23	0.00	0.00	0.00	0.27	0.00	0.00	16.08
P25	15.98	0.00	0.00	0.00	3.51	0.00	0.00	17.00
P26	12.88	0.00	0.00	0.00	6.62	0.00	0.00	17.90
P27	18.79	0.00	0.00	0.00	0.71	0.00	0.00	16.20
P28	16.97	0.00	0.00	0.00	2.53	0.00	0.00	16.73
P29	7.54	0.00	11.82	0.00	0.14	0.00	0.00	19.43
P30	7.14	0.00	11.73	0.00	0.63	0.00	0.00	19.55
P31	7.27	0.00	11.81	0.00	0.42	0.00	0.00	19.51
P32	16.02	0.00	0.00	0.00	3.48	0.00	0.00	17.00
P33	19.01	0.00	0.00	0.00	0.49	0.00	0.00	16.14
P34	16.76	0.00	0.20	0.00	2.54	0.00	0.00	16.79
P35	16.90	0.00	2.56	0.00	0.04	0.00	0.00	16.75
P36	18.82	0.00	0.00	0.00	0.68	0.00	0.00	16.19
P37	14.09	0.00	0.00	0.00	5.41	0.00	0.00	17.55
P38	18.88	0.00	0.00	0.00	0.62	0.00	0.00	16.18
P39	15.46	0.00	0.00	0.00	4.04	0.00	0.00	17.16
P40	7.77	0.00	11.73	0.00	0.00	0.00	0.00	19.37
P41	7.33	0.00	12.04	0.00	0.13	0.00	0.00	19.50
P42	14.74	0.00	0.20	0.00	4.57	0.00	0.00	17.37

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS: 88 PSF

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS: 88 PSF



NOTE : PARTIAL PRESSURES OF THE WIND ZONES ON ALL MODULES HAVE BEEN VERIFIED AND ARE WITHIN THE ALLOWABLE PER THE MANUFACTURER SPECIFICATION, INSTALLER SHOULD FOLLOW THE LAYOUT TO AVOID HIGHER ZONAL PARTIAL PRESSURES. ANY CHANGES IN LAYOUT SHOULD BE REPORTED BACK TO THE ENGINEER OF RECORD.

$2h_2$ DISTANCE : 10"
0.5h DISTANCE : 7' - 6"

LEGEND

- EDGE MODULE
- EXPOSED MODULE
- NON- EXPOSED MODULE
- MISSING MODULE
- MIN. MODULE EDGE DISTANCE LINE
- MODULE EXPOSURE LINE
- WIND ZONE 1 (TYP)
- WIND ZONE 2e (TYP)
- WIND ZONE 2n (TYP)
- WIND ZONE 2r (TYP)
- WIND ZONE 3r (TYP)
- WIND ZONE 3e (TYP)

1 PARTIAL PRESSURE AND MODULES EXPOSURE

S-01.1 SCALE: 3/32" = 1'-0"

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

ERMOCRATES E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signature with seal
Signed by: Ermocrates E Castillo
Date: 2021.05.17 16:38:52

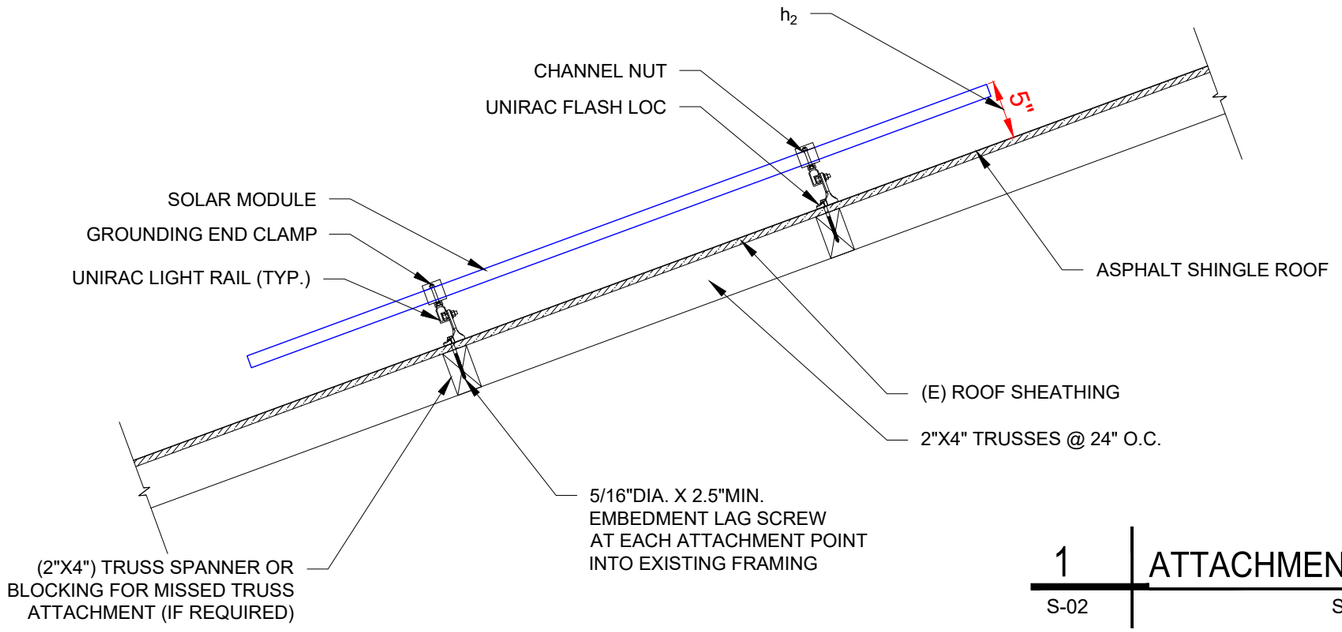
PROJECT NAME

ISBEL RESIDENCE
1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME
PARTIAL PRESSURE AND MODULES EXPOSURE

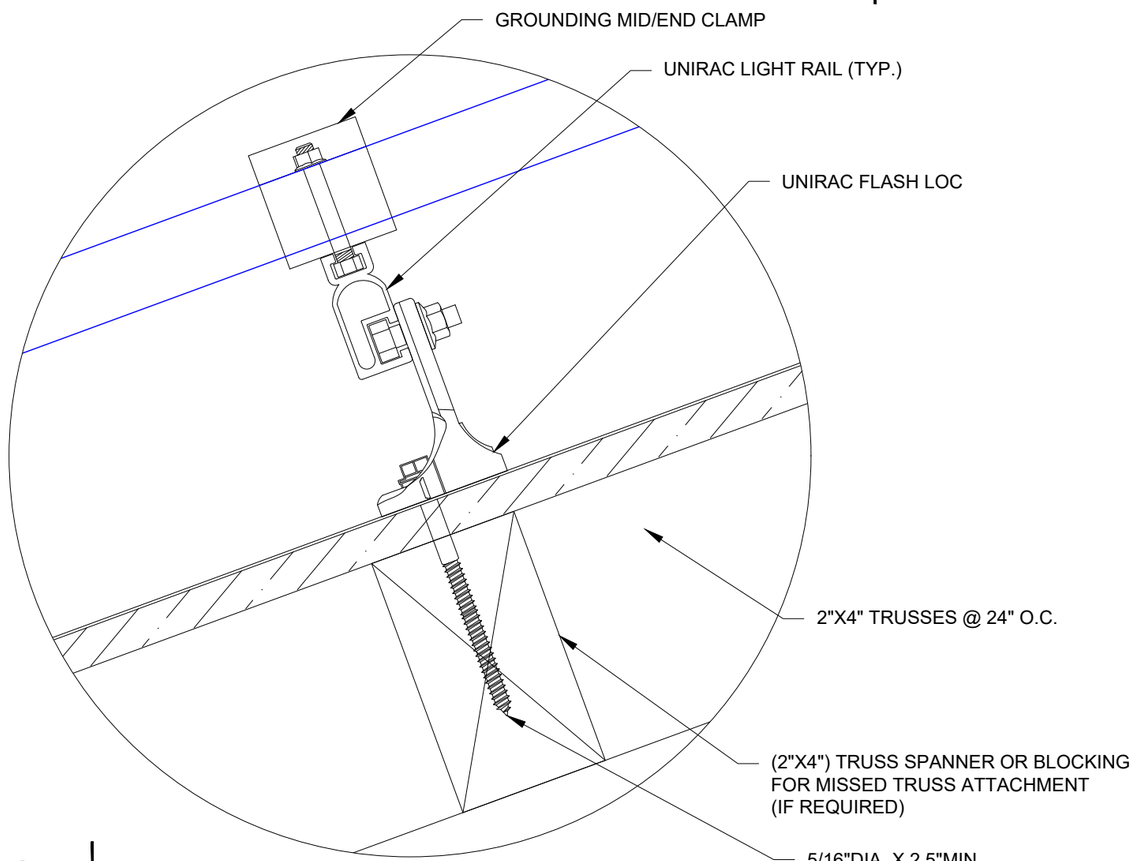
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01.1



1 | ATTACHMENT DETAIL

S-02 SCALE -1"=1'-0"



2 | ATTACHMENT DETAIL (ENLARGED VIEW)

S-02 SCALE: 1"=2"

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

ERMOCRATES E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signature with Seal
Signed by: Ermocrates E Castillo
Date: 2021.05.17 16:38:53

PROJECT NAME

ISBEL RESIDENCE

1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME

ATTACHMENT DETAIL

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

S-02

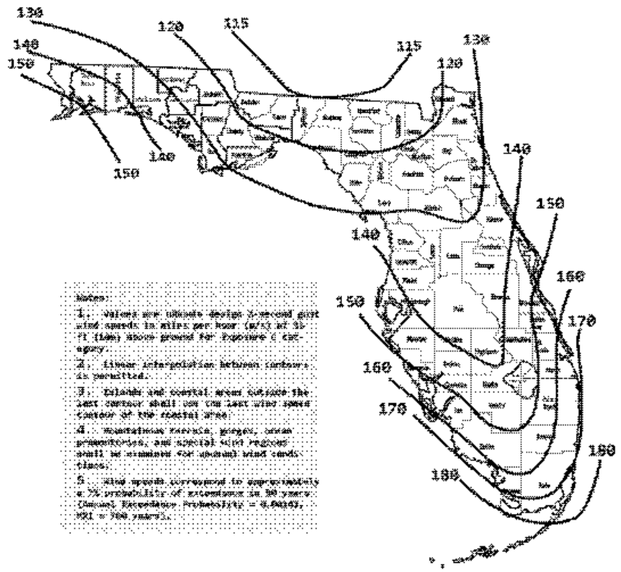

FIGURE 1609.3(1)
ULTIMATE DESIGN WIND SPEEDS, V_{ULT}, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

WIND LOAD CALCULATIONS FOR MODULES INSTALLED ON ROOFS WITH A HEIGHT LESS THAN 60'

SITE INFORMATION				
FBC VERSION	2020	RISK CATEGORY	II	
MEAN ROOF HEIGHT (ft)	15.0	EXPOSURE CATEGORY	B	
ROOF LENGTH (ft)	70.3	ROOF SLOPE	6 /12	
ROOF WIDTH (ft)	65.3	ROOF SLOPE (°)	26.6	
PARAPET HEIGHT (ft)	0.0	ROOF TYPE	HIP	
MODULE LENGTH (in)	68.5	ULTIMATE WIND SPEED	120	mph
MODULE WIDTH (in)	41.00	NOMINAL WIND SPEED	93	mph
MODULE ORIENTATION	PORTRAIT	EXPOSURE FACTOR (C_e)	1.000	
MODULE AREA (sq. ft.)	19.50	TEMPERATURE FACTOR (C_t)	1.000	
GROUND SNOW LOAD (psf)	0.0	IMPORTANCE FACTOR (I_s)	1.000	
DEAD LOAD (psf)	3.0	SLOPE FACTOR (C_s)	0.910	
SLOPED ROOF SNOW LOAD (psf)	0.0	K_D	0.850	
EFFECTIVE WIND AREA (ft^2)	19.5	K_{ZT}	1.000	
GROUND ELEVATION (ft)	100.0	K_H	0.996	
HVHZ	NO	K_z	0.575	

DESIGN CALCULATIONS

VELOCITY PRESSURE (q_z) = $.00256*K_E K_Z K_{ZT} K_D V^2$

VELOCITY PRESSURE(ASD) 10.8 psf

WIDTH OF PRESSURE COEFFICIENT	65.3' * 10%	=	6.53'	ZONE WIDTH A	4 FT
	15' * 40%	=	6'	ZONE 2 WIDTH	N/A (FOR (°) < 7°)
				ZONE 3 WIDTH	N/A (FOR (°) < 7°)

EXTERNAL PRESSURE COEFFICIENT	ZONE 1	0.584	-1.226
	ZONE 1'	0.584	X
	ZONE 2e	0.584	-1.777
	ZONE 2n	0.584	X
	ZONE 2r	0.584	-1.777
	ZONE 3e	0.584	-1.777
	ZONE 3r	0.584	X
INTERNAL PRESSURE COEFFICIENT (+/-)		0.18	

DESIGN PRESSURES

ROOF ZONE	DOWN	UP				
1	16.0	-15.1	psf			
1'	16.0	X	psf			
2e	16.0	-21.1	psf	Module allowable uplift pressure	88	psf
2n	16.0	X	psf	Module allowable down pressure	125	psf
2r	16.0	-21.1	psf			
3e	16.0	-21.1	psf			
3r	16.0	X	psf			

ARRAY FACTORS

ARRAY EDGE FACTOR (EXPOSED)	1.5	SOLAR PANEL PRESSURE EQUALIZATION FACTOR	0.684
ARRAY EDGE FACTOR (NON-EXPOSED)	1		

ADJUSTED DESIGN PRESSURES

ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)	
1	16.0	-16.0	-16.0	psf
1'	16.0	X	X	psf
2e	16.0	-21.6	-16.0	psf
2n	16.0	X	X	psf
2r	16.0	-21.6	-16.0	psf
3e	16.0	-21.6	-16.0	psf
3r	16.0	X	X	psf

ATTACHMENTS USED

ATTACHMENT MODEL	Lag Bolts- Shingle	
ATTACHMENT STRENGTH	476	lbs

MAX DESIGN LOADS ALLOWABLE

LIMIT MAX SPAN TO **48** **in**

RAFTER/SEAM SPACING **24** **in** **NO. OF RAILS** **Exposed: 2** **Non. Exp: 2**

ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)		SPANS (E)	SPANS (N.E)
1	182.7	182.7	182.7	lbs	48 in	48 in
1'	0.0	X	X	lbs	X in	X in
2e	182.7	246.8	182.7	lbs	48 in	48 in
2n	0.0	X	X	lbs	X in	X in
2r	182.7	246.8	182.7	lbs	48 in	48 in
3e	182.7	246.8	182.7	lbs	48 in	48 in
3r	0.0	X	X	lbs	X in	X in

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MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.05.17 16:38:54
Signature with Seal

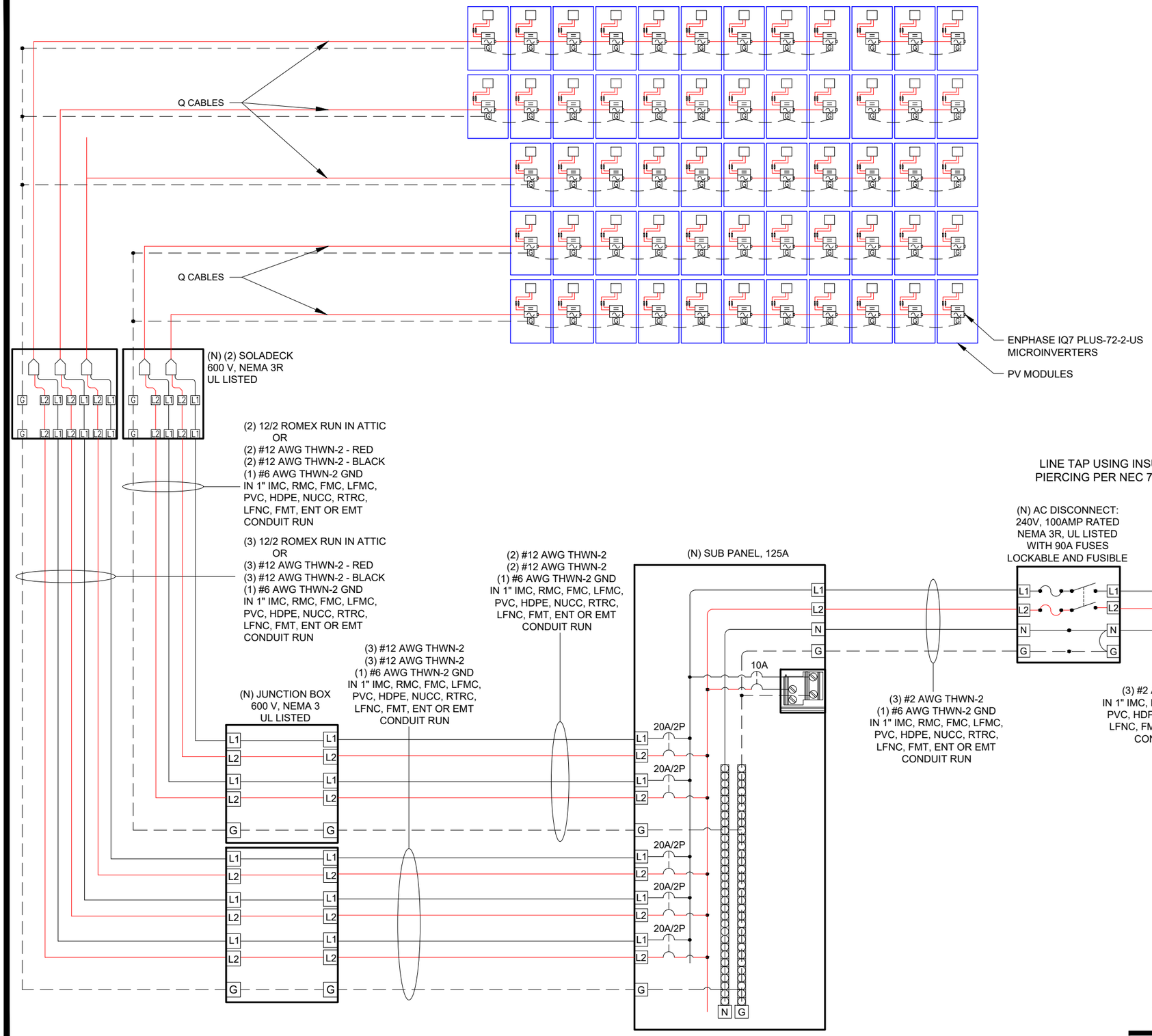
PROJECT NAME

ISBEL RESIDENCE
1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME
STRUCTURE CALCULATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-02.1



SOLAR ARRAY (20.81 KW-DC STC) TOTAL

(57) LG365N1C-A6 (365W) MODULES
(02) STRINGS OF 12 MODULES
(03) STRINGS OF 11 MODULES

NOTE:

1. SUBJECT PV SYSTEMS HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION, INCLUDING MAXIMUM NUMBER OF MODULE STRINGS, MAXIMUM NUMBER OF MODULES PER STRING, MAXIMUM OUTPUT, MODULE MANUFACTURER AND MODEL NUMBER, INVERTER MANUFACTURER AND MODEL NUMBER, AS APPLICABLE
2. PROVIDE TAP BOX IN COMPLIANCE WITH NEC 312.8 IF PANEL GUTTER SPACE IS INADEQUATE.
3. IF THE FUSED AC DISCONNECT WIRE RUN EXCEEDS 10 FT FROM THE POINT OF INTERCONNECTION, CABLE LIMITERS OR CURRENT-LIMITED CIRCUIT BREAKERS MUST BE INSTALLED FOR EACH UNGROUNDED CONDUCTOR PER NEC 705.31.

1 | ELECTRICAL LINE DIAGRAM

E-01

SCALE: NTS

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

PROJECT NAME

ISBEL RESIDENCE

1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME

ELECTRICAL
LINE DIAGRAM

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

E-01

AC CONDUCTOR AMPACITY CALCULATIONS:
FROM ROOF TOP SOLADECK TO COMBINER BOX

Module Manufacturer	LG
Module Model	LG365N1C-A6
Inverter Manufacturer	Enphase
Inverter Model	Enphase IQ 7 Plus
Modules/Branch Circuit 1	12
Modules/Branch Circuit 2	12
Modules/Branch Circuit 3	11
Modules/Branch Circuit 4	11
Modules/Branch Circuit 5	11
Total Array Power (kW)	20.81
System AC Voltage	240V 1-Phase

Module Properties			
Voc	41.6	Isc	11.27
Vmpp	34.5	Imp	10.58
TC Voc	-0.26%/ °C	TC Vmp	-0.34%/ °C
Pmp	365.0	NOCT	45 °C

Design Temperature	
Min. Ambient Temp. °F	32
Max. Ambient Temp. °F	117
Calculated Max. Voc	45
Calculated Min Vmp	27
Conduit Fill	
Number of conduits	2

Inverter Properties	
Output Voltage	240 L-L 1-ph
Max Input DC Voltage	60 Vdc
Operating Range	16 - 60 Vdc
MPPT Voltage Range	27 - 45 Vdc
Start Voltage	22 Vdc
Max Input Power	440 Wdc
Continuous AC Power	290 VA

Ampacity Calcultions

Circuit	Max Amps	1.25 x Max Amps	AWG	90 °C Ampacity	Ambient Temp °F	Temp Derate	Conduit Fill	Fill Derate	Derated Ampacity	Maximum Circuit Breaker
Circuit 1	14.5	18.1	#12	30	95	0.96	5	0.8	23.04	20 A
Circuit 2	14.5	18.1	#12	30	95	0.96	5	0.8	23.04	20 A
Circuit 3	13.3	16.6	#12	30	95	0.96	5	0.8	23.04	20 A
Circuit 4	13.3	16.6	#12	30	95	0.96	5	0.8	23.04	20 A
Circuit 5	13.3	16.6	#12	30	95	0.96	5	0.8	23.04	20 A
AC Combiner Panel Output	68.9	86.1	#2	130	95	0.96	3	1	124.8	90 A

Maximum Circuit Voltage Drop	2%

Voltage Drop Calculations

Circuit	AWG	Circular Mills	I	V	Max Length
Circuit 1	#12	6530	14.5	240	84 Feet
Circuit 2	#12	6530	14.5	240	84 Feet
Circuit 3	#12	6530	13.3	240	91 Feet
Circuit 4	#12	6530	13.3	240	91 Feet
Circuit 5	#12	6530	13.3	240	91 Feet
Combiner Panel Output	#2	66360	68.9	240	179 Feet

Notes

	Temp derate based on NEC Table 310.15(B)(2)(a)
	Conduit fill derate based on NEC Table 310.15(B)(3)(a)
	Maximum Voc calculated using module manufacture temperature coefficients per NEC 690.7(A)
	Unless otherwise specified, all wiring must be THHN or THWN-2 Copper
	All wire sizes listed are the minimum allowable
	In any cell indicates that the system is safe and complies with NEC requirements
	In any cell indicates a potentially unsafe condition
	Information input by system designer
	Informaton obtained from manufacturer datasheets

I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE PV ELECTRICAL SYSTEM AND ELECTRICAL COMPONENTS ARE DESIGNED AND APPROVED USING THE STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE. FBC 107.

AC CONDUCTOR AMPACITY CALCULATIONS:
FROM AC COMBINER BOX TO MSP

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT. THE TERMINALS ARE RATED FOR 75 DEGREES C.
3. THE WIRES ARE SIZED ACCORDING TO NEC. 110.14 .
4. 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.
5. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
6. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
7. WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
8. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
9. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
10. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
11. THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE .
12. UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
13. MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
14. RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
15. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
16. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).

ENPHASE IQ7PLUS-72-2-US MICROINVERTER		
Input Data (DC)		
	Recommended Input Power (STC)	235-400W +
	Maximum Input DC Voltage	60V
	Peak Power Tracking Voltage	27V-45V
	Operating Range	16V-60V
	Min. / Max. Start Voltage	22V / 60V
	Max DC Short Circuit Current	15A
Output Data (AC)		
	Maximum Output Power	290W
	Nominal Output Current	1.21A
	Nominal Voltage / Range	240V/211-264V
	Nominal Frequency / Range	60 Hz
	Extended Frequency / Range	47-68 Hz
	Power Factor at rated power	1.0
	Maximum unit per 20A Branch Circuit	13 (240 VAC)

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MAITLAND, FL 32751
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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

ERMOCRATES E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.05.17 16:38:56
Signature not verified

PROJECT NAME

ISBEL RESIDENCE

1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME

WIRING CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

E-02

⚠ WARNING

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

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.13(B))

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL LOCATION:
AC DISCONNECT
(PER CODE: NEC690.56(C)(3))

ADHESIVE FASTENED SIGNS:
- THE LABEL SHALL BE SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED.
- WHERE REQUIRED ELSEWHERE IN THIS CODE, ALL FIELD APPLIED LABELS, WARNINGS, AND MARKINGS SHOULD COMPLY WITH ANSI Z535.4 [NEC 110.21(B) FIELD MARKING].
- ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT [IFC 605.11.1.3]

PHOTOVOLTAIC SYSTEM AC DISCONNECT
RATED AC OPERATING CURRENT 68.9 AMPS
AC NOMINAL OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC690.54)

WARNING
INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

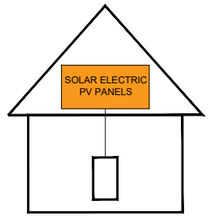
DATA PER PANEL

NOMINAL OPERATING AC VOLTAGE -	240	V
NOMINAL OPERATING AC FREQUENCY-	60	Hz
MAXIMUM AC POWER-	290	VA
MAXIMUM AC CURRENT-	1.21	A
MAXIMUM OVERCURRENT DEVICE RATING FOR AC MODULE PROTECTION PER CIRCUIT-	20	A

LABEL LOCATION:
COMBINER BOX
(PER CODE: NEC690.52)

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 LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.56(C)(1)(a), IFC 605.11.3.1(1)

AC COMBINER BOX

LABEL LOCATION:
COMBINER BOX
(PER CODE: NEC690.52)

AC DISCONNECT

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC690.54)

SOLAR CONNECTION LINE SIDE TAP

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(A))

SOLAR BREAKER

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

PHOTOVOLTAIC SYSTEM MICROINVERTERS LOCATED UNDER EACH PV MODULE IN ROOF TOP ARRAY

LABEL LOCATION:
INVERTER
(PER CODE: NEC690.52)

20.81 KW SOLAR DISCONNECT LOCATED

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC690.54)

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MAITLAND, FL 32751
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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.05.17 16:38:57
Signature with Seal

PROJECT NAME

ISBEL RESIDENCE
1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME
SYSTEM LABELING

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-03

LG NeON®2

LG365N1C-A6

60

365W

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.

25 YEAR PRODUCT • PERFORMANCE • LABOR WARRANTY

c UL us

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 MonoX® series to the market, which is now available in 32 countries. The NeON® (previous MonaX® 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 Life's Good

LG NeON®2

LG365N1C-A6

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	18.5 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 61701:2011 Severity 6
Ammonia Corrosion Test	IEC 62716 : 2013
Module Fire Performance	Type 1 (UL 61730)
Fire Rating	Class C (UL 790)
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

Temperature Characteristics

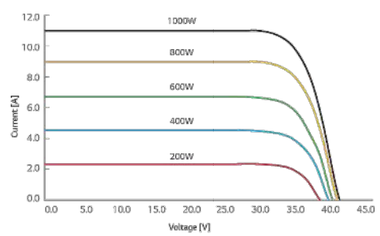
NMOT*	[°C]	42 ± 3
Pmax	[%/°C]	-0.34
Voc	[%/°C]	-0.26
Isc	[%/°C]	0.03

*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		LG365N1C-A6
Maximum Power (Pmax)	[W]	273.4
MPP Voltage (Vmpp)	[V]	32.4
MPP Current (Impp)	[A]	8.44
Open Circuit Voltage (Voc)	[V]	39.2
Short Circuit Current (Isc)	[A]	9.06

I-V Curves



Electrical Properties (STC*)

Model		LG365N1C-A6
Maximum Power (Pmax)	[W]	365
MPP Voltage (Vmpp)	[V]	34.5
MPP Current (Impp)	[A]	10.58
Open Circuit Voltage (Voc, ± 5%)	[V]	41.6
Short Circuit Current (Isc, ± 5%)	[A]	11.27
Module Efficiency	[%]	20.1
Bifaciality Coefficient of Power	[%]	10
Power Tolerance	[%]	0 ~ +3

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

Operating Conditions

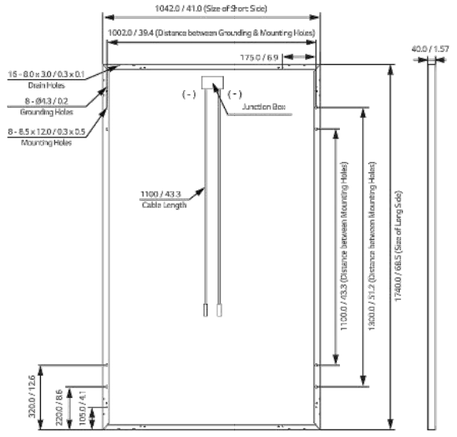
Operating Temperature	[°C]	-40 ~+85
Maximum System Voltage	[V]	1,000
Maximum Series Fuse Rating	[A]	20
Mechanical Test Load* (Front)	[Pa/psf]	5,400
Mechanical Test Load* (Rear)	[Pa/psf]	4,000

*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)



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

Product specifications are subject to change without notice.
LG365N1C-A6.pdf
011821

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

ERMOCRATES E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.05.17 16:38:58
Signature with Seal

PROJECT NAME

ISBEL RESIDENCE
1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-01

LG Electronics U.S.A., Inc.
111 Sylvan Avenue
Englewood Cliffs, NJ 07632
201.816.2000

Friday, February 5, 2021

RE: Mechanical Load Testing to Determine Structural Performance under Uniform Static Pressure

To: Castillo Engineering,

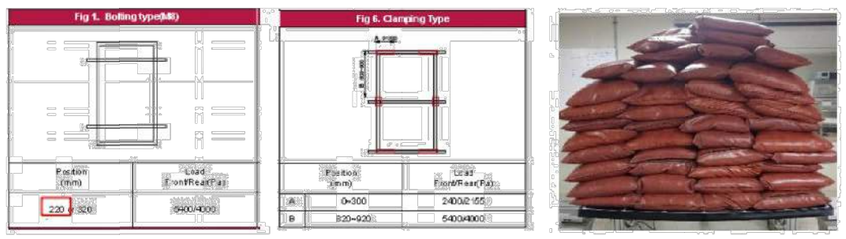
Upon your request we have conducted in house tests to determine the structural performance of the LG Module frames listed below. Our test results meet the requirements you presented in our conference call on January 29th. We will present the test criteria, results, and product limitations that may result from these test conditions in this letter.

The specifications and conditions presented in this letter apply retroactively to the following LG module(s);

	2 Rails	3 Rails
Front	9,000Pa	9,000Pa
Rear	6,350Pa	9,000Pa
Model	LGxxxN1C(K)-N5(L5), LGxxxN1C(K)-A6(B6) LGxxxQ1C(K)-V5, LGxxxQ1C(K)-A6	

***The result is based on test load.**

Our R&D department has tested these modules to determine the structural performance of under uniform static loading to represent the effects of a wind load on the module. This test was designed only to determine structural performance; the revised specifications apply only to the mechanical performance of the module. *A safety factor of 1.5 should be applied to these test loads for obtaining design loads. It is not recommend designing any system to the full test load.*



The scope of this test does not include electrical functionality or performance testing. Subjecting the module to these pressures may result in power degradation or total power loss. The electrical function and power generation warranties and specifications of these products are not altered by this document.

If you have any additional questions or concerns about this letter or the test protocol, contact your LG Solar Sales Representative.

Castillo Engineering
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TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

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PROJECT NAME

ISBEL RESIDENCE
1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-02

Data Sheet
Enphase Microinverters
Region: US

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 seamlessly with the Enphase IQ Envoy™, Enphase Q Aggregator™, 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 and 72-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 modules.

UL CERTIFIED SMEIYUS CA E341165

To learn more about Enphase offerings, visit **enphase.com**

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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 PV modules only		60-cell and 72-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	1.15 A	1.21 A	1.39 A
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	0 A		0 A	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
Peak CEC efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA	**IQ 7 Microinverter**			
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 (WxHxD)	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 and NEC-2017 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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2018-02-08

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

ERMOCRATES E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.05.17 16:39:00
Signature with Seal

PROJECT NAME

ISBEL RESIDENCE
1912 W US HWY 90
LAKE CITY, FL 32055

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

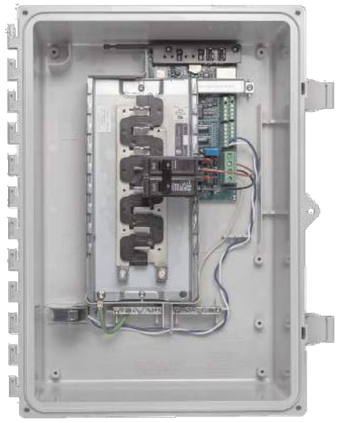
SHEET NUMBER
DS-03

Data Sheet
Enphase Networking

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 warranty
- UL listed

LISTED

To learn more about Enphase offerings, visit **enphase.com**

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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%).
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 2
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 (5,560 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

* Consumption monitoring is required for Enphase Storage Systems.

To learn more about Enphase offerings, visit **enphase.com**

2018-09-13

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

ERMOCRATES E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signature with Seal
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Date: 2021.05.17 16:39:01

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SHEET NAME
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11" X 17"

SHEET NUMBER
DS-04

SOLARMOUNT

UNIRAC

SOLARMOUNT defined the standard in solar racking. Features are designed to get installers off the roof faster. Our grounding & bonding process eliminates copper wire and grounding straps to reduce costs. Systems can be configured with standard or light rail to meet your design requirements at the lowest cost possible. The superior aesthetics package provides a streamlined clean edge for enhanced curb appeal, with no special brackets required for installation.

Now Featuring:

THE NEW FACE OF SOLAR RACKING

Superior Aesthetics Package

LOSE ALL OF THE COPPER & LUGS
System grounding through Enphase microinverters and trunk cables

SMALL IS THE NEXT NEW BIG THING
Light Rail is Fully Compatible with all SM Components

ENHANCED DESIGN & LAYOUT TOOLS
Featuring Google Map Capabilities within U-Builder

FAST INSTALLATION. SUPERIOR AESTHETICS

OPTIMIZED COMPONENTS • VERSATILITY • DESIGN TOOLS • QUALITY PROVIDER

SOLARMOUNT

UNIRAC

OPTIMIZED COMPONENTS

INTEGRATED BONDING & PRE-ASSEMBLED PARTS

Components are pre-assembled and optimized to reduce installation steps and save labor time. Our new grounding & bonding process eliminates copper wire and grounding straps or bonding jumpers to reduce costs. Utilize the microinverter mount with a wire management clip for an easier installation.

VERSATILITY

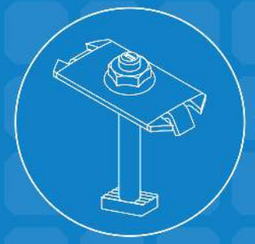
ONE PRODUCT - MANY APPLICATIONS

Quickly set modules flush to the roof or at a desired tilt angle. Change module orientation to portrait or landscape while securing a large variety of framed modules on flat, low slope or steep pitched roofs. Available in mill, clear and dark anodized finishes to outperform your projects financial and aesthetic aspirations.

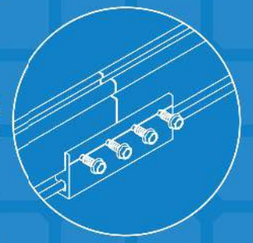
AUTOMATED DESIGN TOOL

DESIGN PLATFORM AT YOUR SERVICE

Creating a bill of materials is just a few clicks away with U-Builder, a powerful online tool that streamlines the process of designing a code compliant solar mounting system. Save time by creating a user profile, and recall preferences and projects automatically when you log in. You will enjoy the ability to share projects with customers: there's no need to print results and send to a distributor, just click and share.

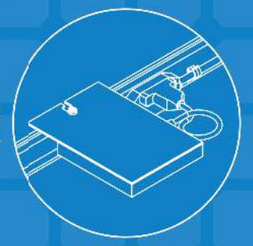


INTEGRATED BONDING MIDCLAMP



INTEGRATED BONDING SPLICE BAR

INTEGRATED BONDING L-FOOT w/ T-BOLT



INTEGRATED BONDING MICROINVERTER MOUNT w/ WIRE MANAGEMENT

LISTED **UL2703**

BONDING & GROUNDING
MECHANICAL LOADING
SYSTEM FIRE CLASSIFICATION

UNIRAC CUSTOMER SERVICE MEANS THE HIGHEST LEVEL OF PRODUCT SUPPORT

UNMATCHED EXPERIENCE | CERTIFIED QUALITY | ENGINEERING EXCELLENCE | BANKABLE WARRANTY | DESIGN TOOLS | PERMIT DOCUMENTATION

TECHNICAL SUPPORT

Unirac's technical support team is dedicated to answering questions & addressing issues in real time. An online library of documents including engineering reports, stamped letters and technical data sheets greatly simplifies your permitting and project planning process.

CERTIFIED QUALITY PROVIDER

Unirac is the only PV mounting vendor with ISO certifications for 9001:2015, 14001:2015 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

BANKABLE WARRANTY

Don't leave your project to chance. Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are receiving products of exceptional quality. SOLARMOUNT is covered by a twenty five (25) year limited product warranty and a five (5) year limited finish warranty.

PROTECT YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

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DS-05

FLASH LOC

UNIRAC
BETTER SOLAR STARTS HERE

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. **FLASH**LOC'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 Seal technology 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

UNIRAC
BETTER SOLAR STARTS HERE

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. Next, BACKFILL ALL PILOT HOLES WITH SEALANT.

NOTE: Space mounts per racking system install specifications.

STEP 1: SECURE

Place **FLASH**LOC 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 **FLASH**LOC 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 **FLASH**LOC is installed over gap between shingle tabs or vertical joints, fill gap/joint with sealant between mount and upslope edge of shingle course.

NOTE: When installing included rail attachment hardware, torque nut to 30 ft/lbs.

USE ONLY UNIRAC APPROVED SEALANTS: Chemlink Duralink 50 (included in kit) or Chemlink M-1

FASTER INSTALLATION. 25-YEAR WARRANTY.

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

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