# SURETTE RESIDENCE

## 16.88kW PV SYSTEM

## 1970 N US HWY 441,
## LAKE CITY, FL 32055

### PROJECT DESCRIPTION:

45x375 LG NEON2: LG375N1C-A6 (375W) MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES

SYSTEM SIZE: 16.88 kW DC STC
ARRAY AREA #1: 585.10 SQ FT.
ARRAY AREA #2: 253.55 SQ FT.
ARRAY AREA #3: 39.01 SQ FT.

EQUIPMENT SUMMARY
45 LG NEON2: LG375N1C-A6 (375W) MODULES
45 ENPHASE: IQ7PLUS-72-2-US MICROINVERTERS

RACKING: UNIRAC LIGHT RAIL
ATTACHMENT: S-5-PROTEA

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

### 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 (FBC)
FLORIDA MECHANICAL CODE, 7TH EDITION 2020 (FMC)
NATIONAL ELECTRICAL CODE 2017 (NEC)
ASCE 7-16

### OWNER

SURETTE, ANDRA

### INSTALLER

SUNPRO SOLAR
4492 Eagle Falls Place,
Tampa, FL 33619
(866) 450-1012

### ENGINEER

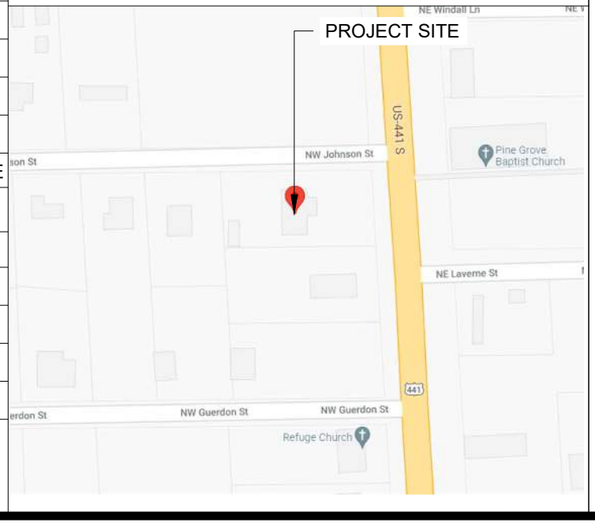
Castillo Engineering Services LLC
620 N. Wymore Road, Suite 250, Maitland, FL 32751
TEL: (407) 289-2575
Ermocrates E. Castillo
License#: FL PE 52590

### 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-02.2 | STRUCTURE CALCULATION |
| E-01 | ELECTRICAL LINE DIAGRAM |
| E-02 | WIRING CALCULATIONS |
| E-03 | SYSTEM LABELING |
| DS-01-07 | 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 7th ED., 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, THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION

Castillo Engineering
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ERMOCRATES E. CASTILLO - FL PE 52590



REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
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PROJECT INSTALLER

SUNPRO

No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER
Signature with seal
Digitally signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:00

PROJECT NAME

SURETTE RESIDENCE
1970 N US HWY 441,
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 |
| ACD | AC Disconnect |
| APPROX | Approximate |
| AWG | American Wire Gauge |
| BAT | Battery |
| CB | Combiner Box |
| DC | Direct Current |
| DISC | Disconnect |
| (E) | Existing |
| EL | Elevation |
| EQ | Equal |
| GP | Generation Panel |
| JB | Junction Box |
| MCB | Main Combiner Box |
| MFR | Manufacturer |
| MID | Microgrid Interconnect Device |
| 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 |
| TBD | To Be Determined |
| TYP | Typical |
| UNO | Unless Noted Otherwise |
| 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 45x375 LG NEON2: LG375N1C-A6 (375W) Modules with a combined STC rated dc output power of 16,875W. The modules are connected into 45 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.

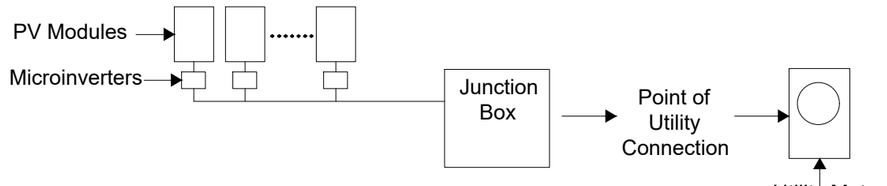



Figure 1: PV System Block Diagram

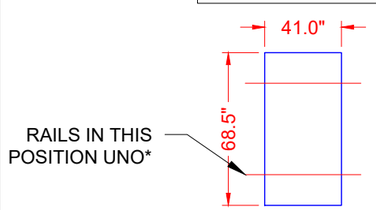
The inverter meets the requirements of IEEE 1547 and UL 1741.

**FALL PROTECTION:**
ANCHORAGES USED FOR ATTACHMENT OF PERSONAL FALL ARREST EQUIPMENT MUST BE INDEPENDENT OF ANY ANCHORAGE BEING USED TO SUPPORT OR SUSPEND PLATFORMS, AND CAPABLE OF SUPPORTING AT LEAST 5,000 POUNDS PER EMPLOYEE ATTACHED, OR MUST BE DESIGNED AND USED AS FOLLOWS:

- AS PART OF A COMPLETE PERSONAL FALL ARREST SYSTEM WHICH MAINTAINS A SAFETY FACTOR OF AT LEAST TWO.
- UNDER THE SUPERVISION OF A QUALIFIED PERSON

**ADDITIONAL INFORMATION**

- 29 CFR 1926 SUBPART M, FALL PROTECTION. OSHA STANDARD.
- 1926.502, FALL PROTECTION SYSTEMS CRITERIA AND PRACTICES
  - 1926.502(D)(15)




LG NEON2:
LG375N1C-A6 (375W)
MODULES

| ALLOWABLE/DESIGN PRESSURE | PSF |
|---|---|
| DOWN PRESSURE | 126 |
| UPLIFT PRESSURE, 2 RAILS | 89 |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REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
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PROJECT INSTALLER

SUNPRO


PROJECT NAME

SURETTE RESIDENCE

1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME

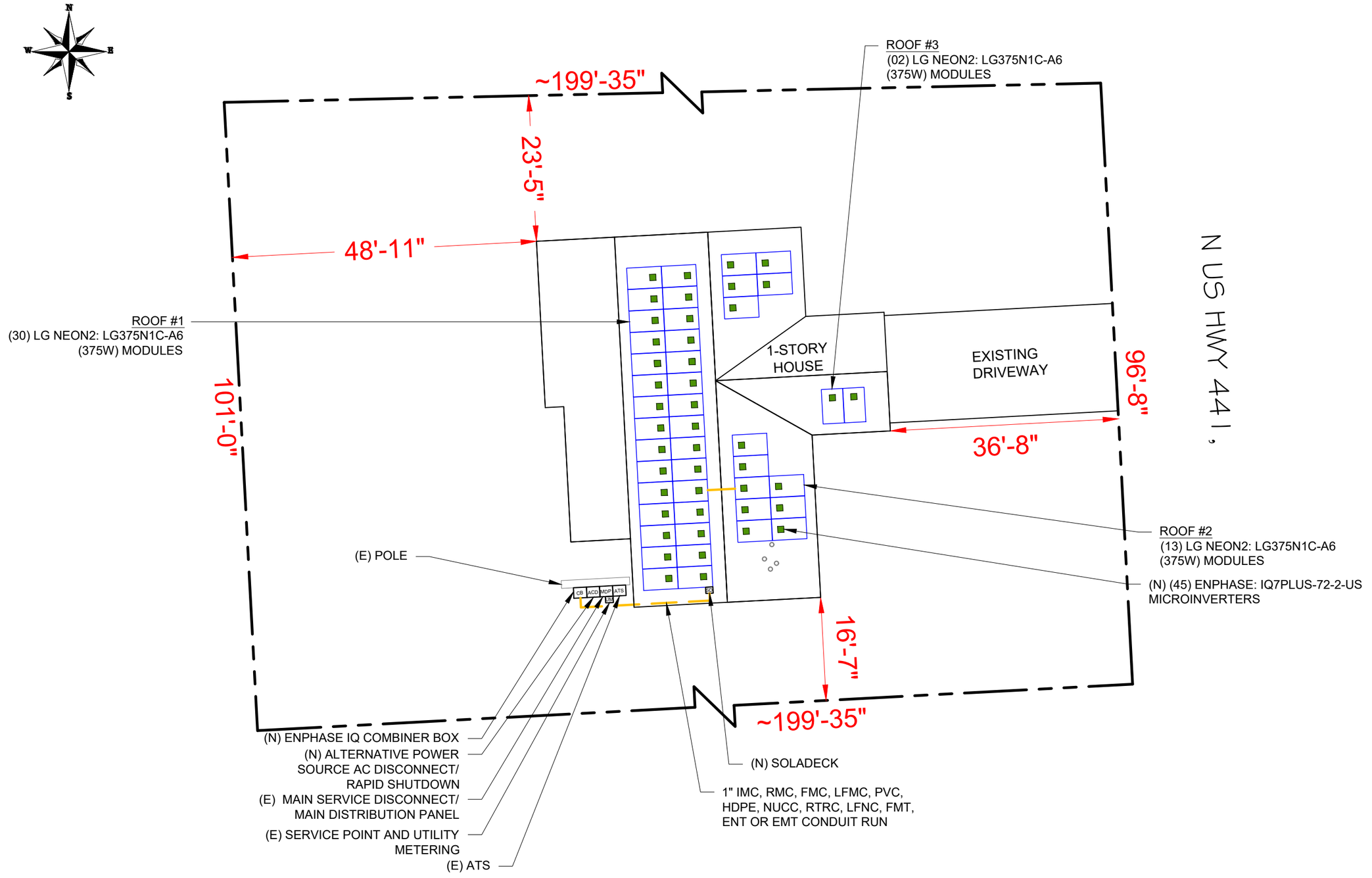
NOTES AND DESCRIPTION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

A-00




1 ROOF PLAN WITH PROPERTY LINES

A-01

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

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

Signature with Seal

Digitally signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:03

PROJECT NAME

SURETTE RESIDENCE

1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME

ROOF PLAN

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

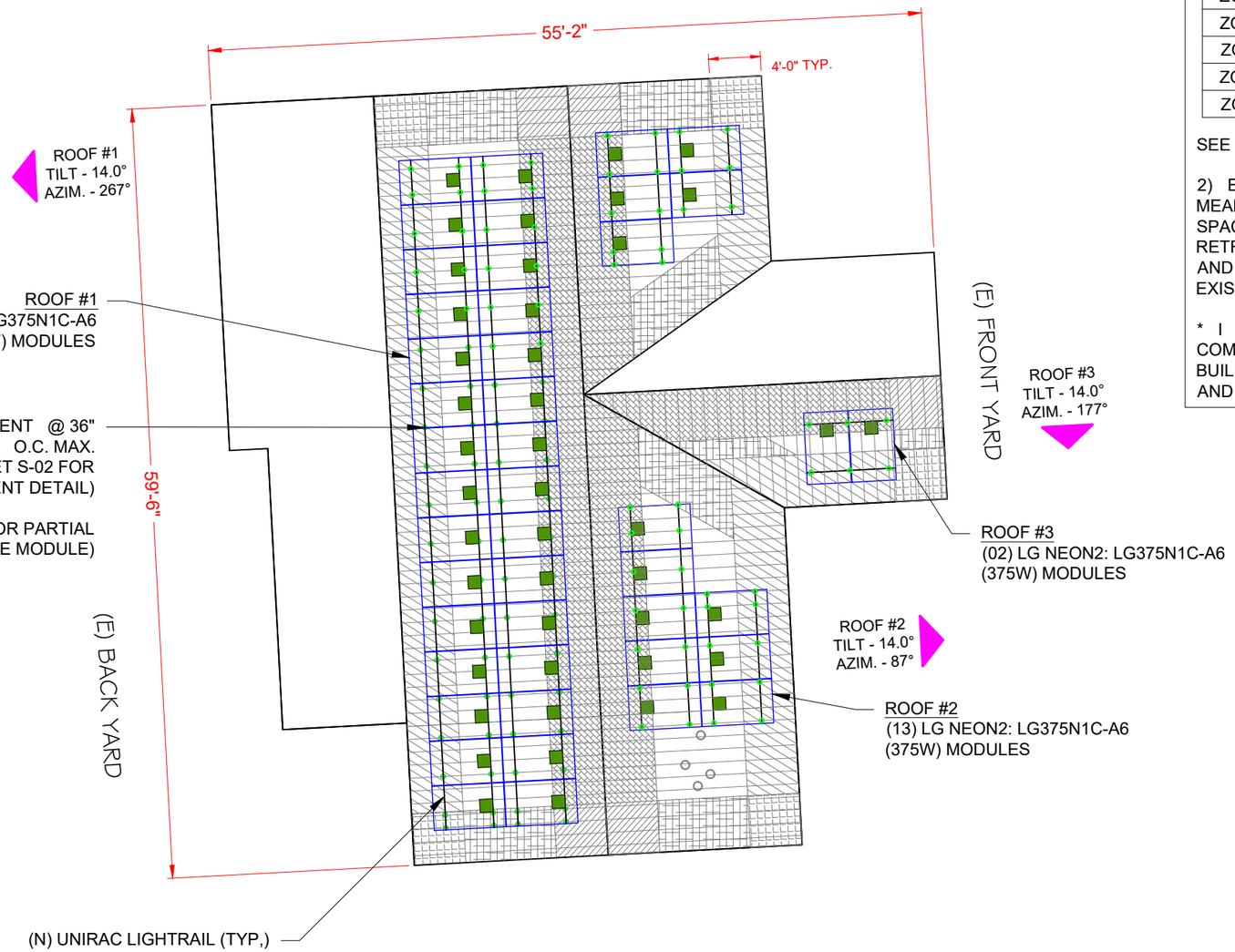
A-01

## MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 45 MODULES
MODULE TYPE = LG NEON2: LG375N1C-A6 (375W) MODULES
MODULE WEIGHT = 41.01 LBS / 18.6 KG.
MODULE DIMENSIONS = 68.5"x 41.0" = 19.50 SF
UNIT WEIGHT OF ARRAY = 2.10 PSF


### 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 | SEAM SPACING |
|---|---|---|---|---|---|---|---|---|
| #1 | METAL | 585.10 | 892.50 | 65.56 | 14.0° | 267° | 2"X4" | 12" o.c. |
| #2 | METAL | 253.55 | 749.37 | 33.83 | 14.0° | 87° | 2"X4" | 12" o.c. |
| #3 | METAL | 39.01 | 191.74 | 20.34 | 14.0° | 177° | 2"X4" | 12" 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 | 3' - 0" | 1' - 0" | 3' - 0" | 1' - 0" |
| ZONE 1' | X | X | X | X |
| ZONE 2e | 3' - 0" | 1' - 0" | 3' - 0" | 1' - 0" |
| ZONE 2n | 3' - 0" | 1' - 0" | 3' - 0" | 1' - 0" |
| ZONE 2r | 3' - 0" | 1' - 0" | 3' - 0" | 1' - 0" |
| ZONE 3e | 3' - 0" | 1' - 0" | 3' - 0" | 1' - 0" |
| ZONE 3r | 3' - 0" | 1' - 0" | 3' - 0" | 1' - 0" |

SEE SHEET S-02.1 FOR SUPPORTING CALCULATIONS

2) EXISTING RESIDENTIAL BUILDING IS AN METAL ROOF WITH MEAN ROOF HEIGHT OF 15 FT AND SYP 2"X4" ROOF TRUSSES SPACED 12" O.C. EXISTING ROOF SLOPE FOR SOLAR SYSTEM RETROFIT IS 14.0 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 2020 7TH ED., CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES AND EQUIPMENT DEAD LOADS. *

### LEGEND

- 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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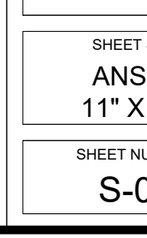


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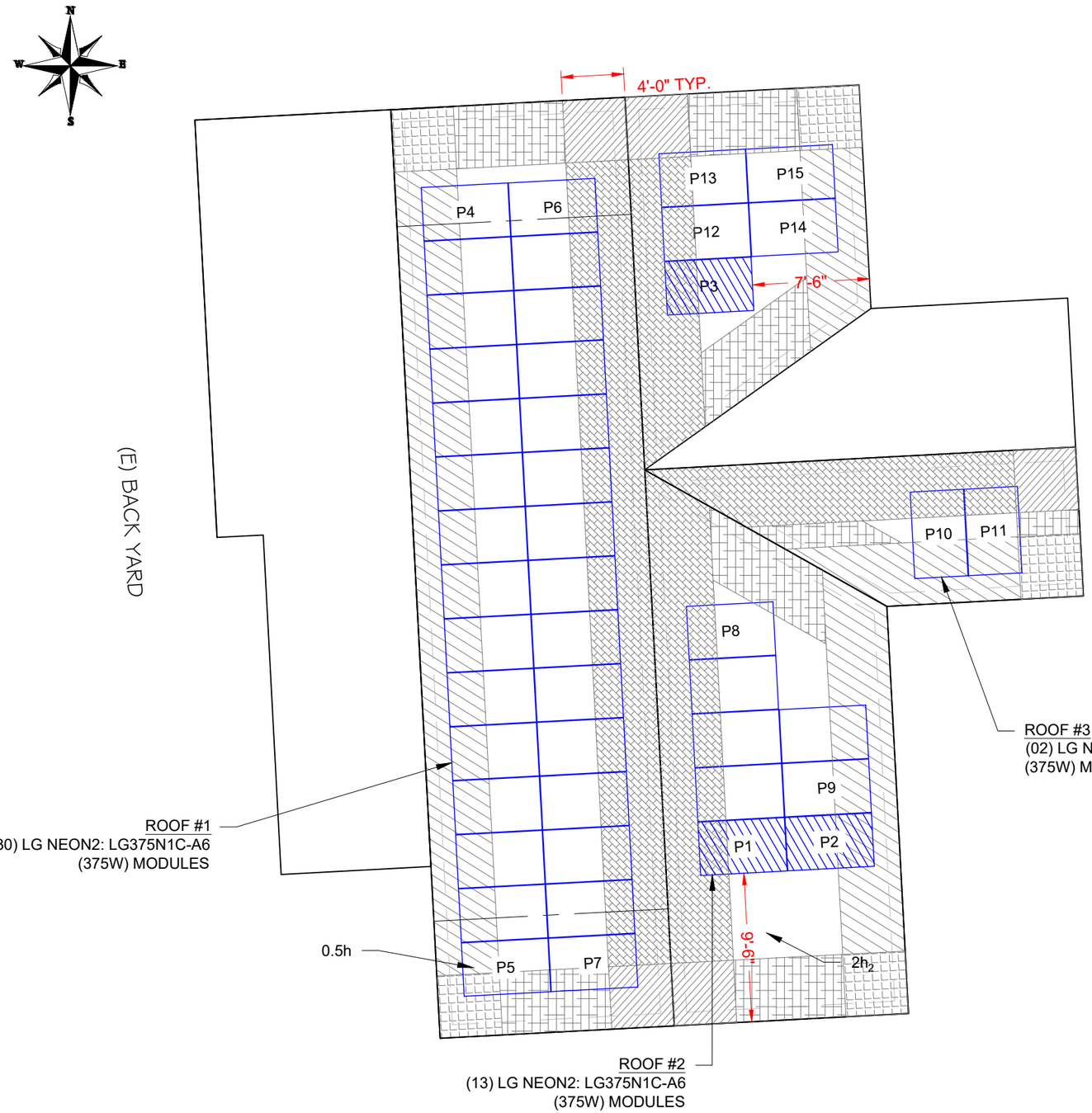
PROJECT NAME

SURETTE RESIDENCE
1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME
MODULE LAYOUT

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01




## FOR EXPOSED MODULES

| 1 | 1' | 2e | 2n | 2r | 3e | 3r |
|---|---|---|---|---|---|---|
| 24.3 | 0 | 24.3 | 30.5 | 30.5 | 30.5 | 35.9 |

| Module Size | 19.51 | Sq. ft. |
|---|---|---|

| | Exposed modules | | | | | | | Partial |
|---|---|---|---|---|---|---|---|---|
| | 1 | 1' | 2e | 2n | 2r | 3e | 3r | Pressure |
| P1 | 13.16 | 0 | 0 | 0 | 6.34 | 0 | 0 | 26.30 |
| P2 | 11.35 | 0 | 8.16 | 0 | 0 | 0 | 0 | 24.30 |
| P3 | 12.36 | 0 | 0 | 0 | 7.14 | 0 | 0 | 26.55 |

## FOR NON-EXPOSED MODULES

| 1 | 1' | 2e | 2n | 2r | 3e | 3r |
|---|---|---|---|---|---|---|
| 16.2 | 0 | 16.2 | 20.3 | 20.3 | 20.3 | 23.9 |

| Module Size | 19.51 | Sq. ft. |
|---|---|---|

| | Non-Exposed modules | | | | | | | Partial |
|---|---|---|---|---|---|---|---|---|
| | 1 | 1' | 2e | 2n | 2r | 3e | 3r | Pressure |
| P4 | 11.35 | 0 | 8.16 | 0 | 0 | 0 | 0 | 16.20 |
| P5 | 6.71 | 0 | 4.83 | 4.63 | 0 | 3.32 | 0 | 17.85 |
| P6 | 13.16 | 0 | 0 | 0 | 6.35 | 0 | 0 | 17.53 |
| P7 | 7.79 | 0 | 0 | 5.36 | 3.75 | 0 | 2.59 | 19.12 |
| P8 | 12.64 | 0 | 0 | 0.52 | 6.34 | 0 | 0 | 17.63 |
| P9 | 11.35 | 0 | 8.16 | 0 | 0 | 0 | 0 | 16.20 |
| P10 | 5.42 | 0 | 8.16 | 0 | 5.92 | 0 | 0 | 17.44 |
| P11 | 5.19 | 0 | 7.79 | 0.24 | 5.65 | 0.36 | 0.26 | 17.59 |
| P12 | 12.36 | 0 | 0 | 0 | 7.14 | 0 | 0 | 17.69 |
| P13 | 11.37 | 0 | 0 | 0.98 | 6.57 | 0 | 0.57 | 17.99 |
| P14 | 12.15 | 0 | 7.36 | 0 | 0 | 0 | 0 | 16.20 |
| P15 | 11.18 | 0 | 6.77 | 0.96 | 0 | 0.58 | 0 | 16.51 |

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS: 89 PSF

$2h_2$ DISTANCE : 0' - 10"
0.5h DISTANCE : 7' - 6"

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.

## LEGEND

- EXPOSED MODULE
- EDGE 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: 1/8" = 1'-0"

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Signature with Seal

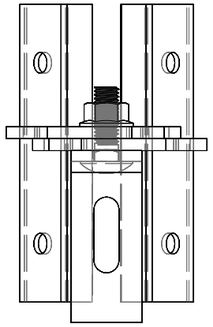
PROJECT NAME

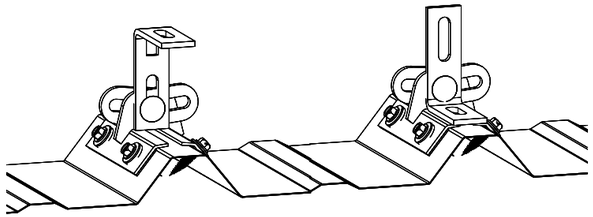
SURETTE RESIDENCE
1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME
PARTIAL PRESSURE AND MODULES EXPOSURE

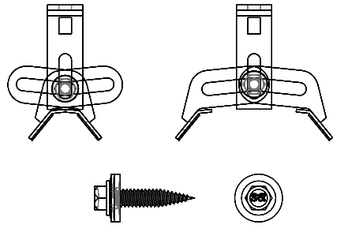
SHEET SIZE
ANSI B
11" X 17"

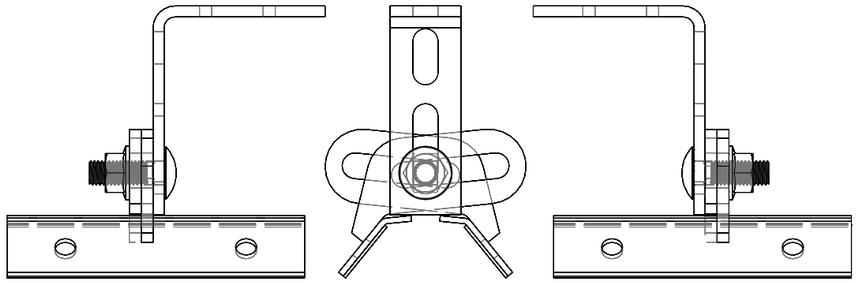
SHEET NUMBER
S-01.1





**ProteaBracket**



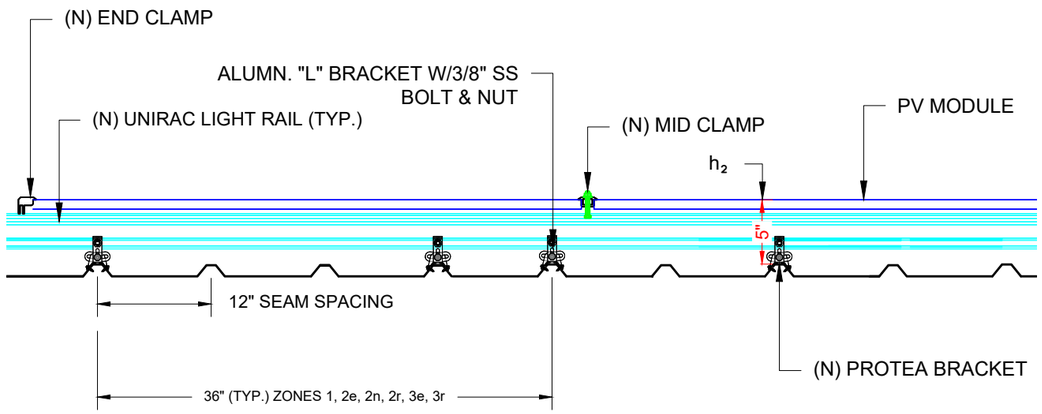


LEFT VIEW FRONT VIEW RIGHT VIEW

**FOR STANDING SEAM SPECIFIC MECHANICAL LOAD TEST INFORMATION AND CLAMP INSTALLATION INFORMATION PLEASE VISIT: WWW.S-5.COM**

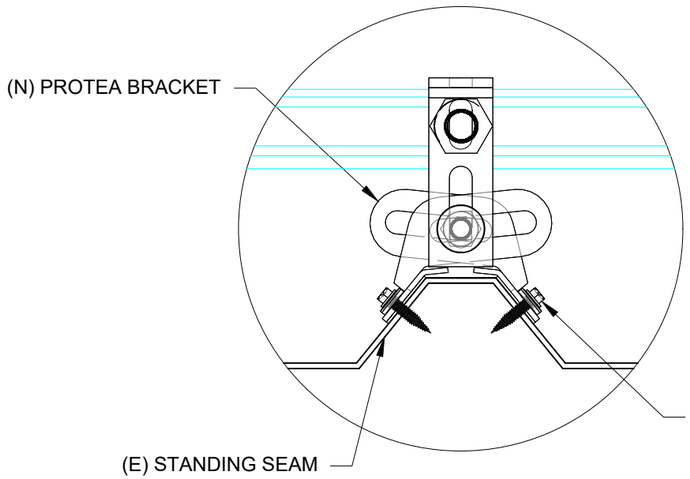
## 1 ATTACHMENT DETAIL

S-02 SCALE: 3" = 1'-0"




## 2 ATTACHMENT DETAIL

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




## 3 ENLARGED VIEW

S-02 SCALE: 3" = 1'-0"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PROJECT INSTALLER

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Signature with seal

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1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME

ATTACHMENT DETAIL

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11" X 17"

SHEET NUMBER

S-02

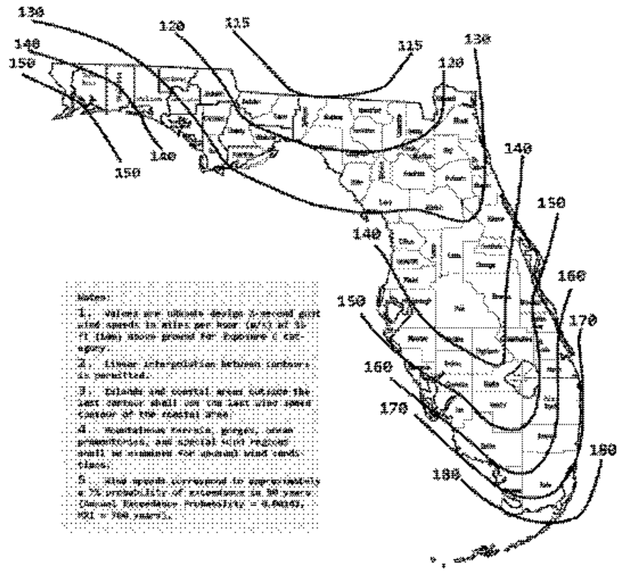


FIGURE 1609.3(1)
ULTIMATE DESIGN WIND SPEEDS, $V_{ULT}$, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

## 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) | 55.2 | ROOF SLOPE | 3 /12 | |
| ROOF WIDTH (ft) | 59.6 | ROOF SLOPE (°) | 14.0 | |
| PARAPET HEIGHT (ft) | 0.0 | ROOF TYPE | GABLE | |
| MODULE LENGTH (in) | 68.5 | ULTIMATE WIND SPEED | 120 | mph |
| MODULE WIDTH (in) | 41.0 | 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) | 174.0 | $K_e$ | 0.994 | |
| HVHZ | NO | $K_z$ | 0.575 | |

### DESIGN CALCULATIONS

VELOCITY PRESSURE (q) = $.00256*K_E K_Z K_{ZT} K_D V^2$
VELOCITY PRESSURE(ASD) 10.7 psf

| | | | | | | |
|---|---|---|---|---|---|---|
| WIDTH OF PRESSURE COEFFICIENT | 55.2' * 10% | = | 5.52' | 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 | 0.467 | -2.023 |
| | ZONE 1' | X | X |
| | ZONE 2e | 0.467 | -2.023 |
| | ZONE 2n | 0.467 | -2.585 |
| | ZONE 2r | 0.467 | -2.585 |
| | ZONE 3e | 0.467 | -2.585 |
| | ZONE 3r | 0.467 | -3.078 |

INTERNAL PRESSURE COEFFICIENT (+/-) 0.18

### DESIGN PRESSURES

| ROOF ZONE | DOWN | UP | | | | |
|---|---|---|---|---|---|---|
| 1 | 16.0 | -23.7 | psf | | | |
| 1' | X | X | psf | | | |
| 2e | 16.0 | -23.7 | psf | Module allowable uplift pressure | 89 | psf |
| 2n | 16.0 | -29.7 | psf | Module allowable down pressure | 126 | psf |
| 2r | 16.0 | -29.7 | psf | | | |
| 3e | 16.0 | -29.7 | psf | | | |
| 3r | 16.0 | -35.0 | psf | | | |

### ARRAY FACTORS

| | | | |
|---|---|---|---|
| ARRAY EDGE FACTOR (EXPOSED) | 1.5 | SOLAR PANEL PRESSURE EQUALIZATION FACTOR | 0.68396 |
| ARRAY EDGE FACTOR (NON-EXPOSED) | 1 | | |

### ADJUSTED DESIGN PRESSURES

| ROOF ZONE | DOWN | UP (Exposed) | UP (N. Exposed) | |
|---|---|---|---|---|
| 1 | 16.0 | -24.3 | -16.2 | psf |
| 1' | X | X | X | psf |
| 2e | 16.0 | -24.3 | -16.2 | psf |
| 2n | 16.0 | -30.5 | -20.3 | psf |
| 2r | 16.0 | -30.5 | -20.3 | psf |
| 3e | 16.0 | -30.5 | -20.3 | psf |
| 3r | 16.0 | -35.9 | -23.9 | psf |

### ATTACHMENTS USED

| | | |
|---|---|---|
| ATTACHMENT MODEL | S-5 protea | |
| ATTACHMENT STRENGTH | 422 | lbs |

### MAX DESIGN LOADS ALLOWABLE

| LIMIT MAX SPAN TO | 36 | in | | | | |
|---|---|---|---|---|---|---|
| RAFTER/SEAM SPACING | 12 | in | NO. OF RAILS | Exposed: 2 | Non. Exp: 2 | |
| ROOF ZONE | DOWN | UP (Exposed) | UP (N. Exposed) | | SPANS (E) | SPANS (N.E) |
| 1 | 137.0 | 207.8 | 138.6 | lbs | 36 in | 36 in |
| 1' | X | X | X | lbs | X in | X in |
| 2e | 137.0 | 207.8 | 138.6 | lbs | 36 in | 36 in |
| 2n | 137.0 | 260.8 | 173.9 | lbs | 36 in | 36 in |
| 2r | 137.0 | 260.8 | 173.9 | lbs | 36 in | 36 in |
| 3e | 137.0 | 260.8 | 173.9 | lbs | 36 in | 36 in |
| 3r | 137.0 | 307.3 | 204.9 | lbs | 36 in | 36 in |

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ERMOCRATES E. CASTILLO - FL PE 52590



REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
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| | | |
| | | |

PROJECT INSTALLER

SUNPRO


Digitally signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:05
Signature with seal

PROJECT NAME

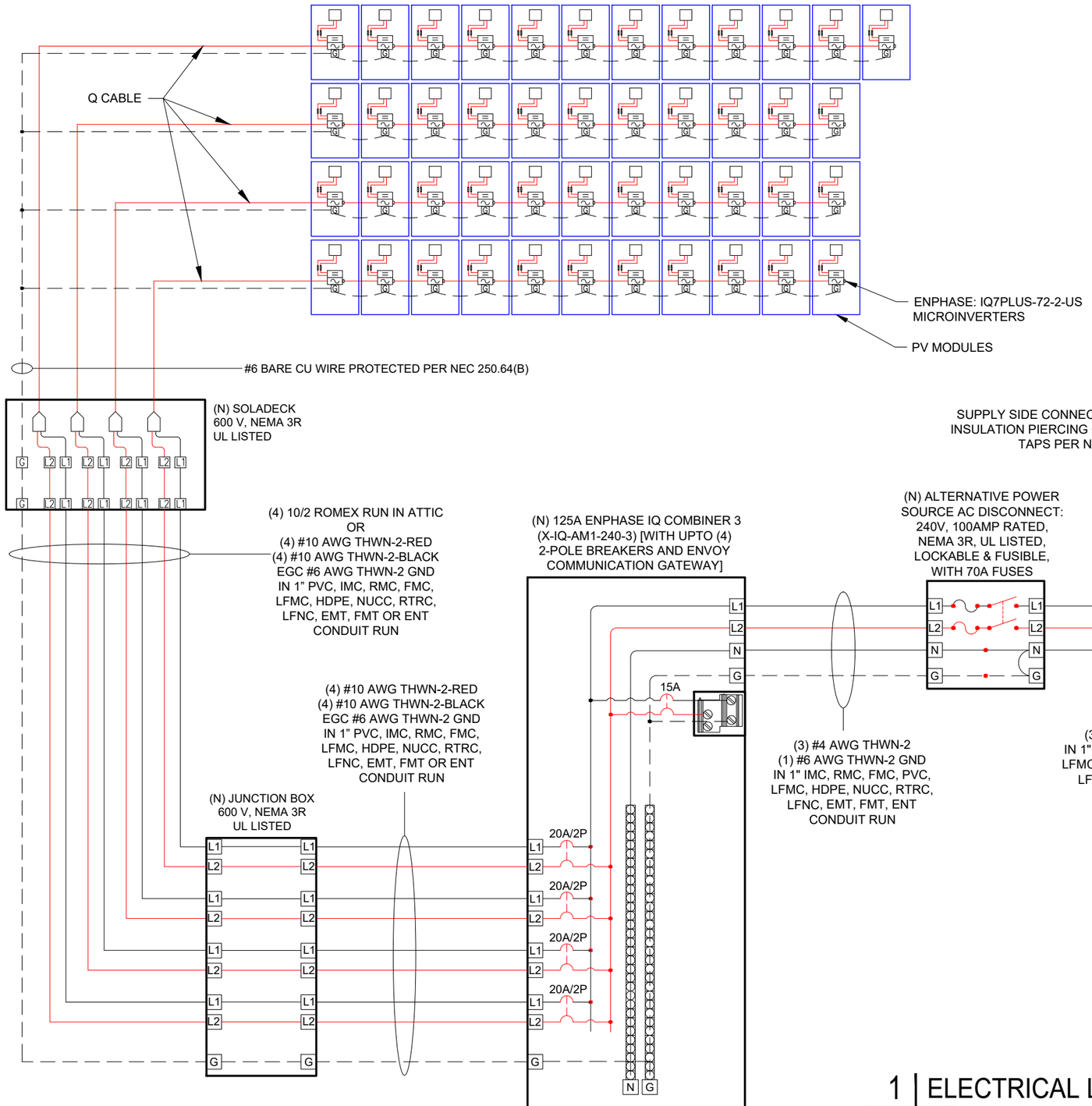
SURETTE RESIDENCE

1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME
STRUCTURE CALCULATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-02.2




1 | ELECTRICAL LINE DIAGRAM

E-01 | SCALE: NTS

SOLAR ARRAY (16.875 kW-DC STC)

(45) LG NEON2: LG375N1C-A6 (375W) MODULES
(01) BRANCH OF 12 MODULES &
(03) BRANCH 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 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.
4. REFER SHEET NUMBER DS-08 FOR LOAD CALCULATION.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ERMOCRATES E. CASTILLO - FL PE 52590




REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
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PROJECT INSTALLER

SUNPRO

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

Signature with Seal

Digitally signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:05

PROJECT NAME

SURETTE RESIDENCE

1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME

ELECTRICAL
LINE DIAGRAM

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

E-01

# ELECTRICAL CALCULATION

| | |
|---|---|
| Module Manufacturer | LG |
| Module Model | LG375N1C-A6 |
| Inverter Manufacturer | Enphase |
| Inverter Model | Enphase IQ 7 Plus |
| Modules/Branch Circuit 1 | 12 |
| Modules/Branch Circuit 2 | 11 |
| Modules/Branch Circuit 3 | 11 |
| Modules/Branch Circuit 4 | 11 |
| Total Array Power (kW) | 16.88 |
| System AC Voltage | 240V 1-Phase |

| Module Properties | | | |
|---|---|---|---|
| Voc | 41.8 | Isc | 11.35 |
| Vmpp | 35.3 | Imp | 10.63 |
| TC Voc | -0.26%/°C | TC Vmp | -0.34%/°C |
| Pmp | 375.0 | NOCT | 45 °C |

| Design Temperature | |
|---|---|
| Min. Ambient Temp. °F | 32 |
| Max. Ambient Temp. °F | 117 |
| Calculated Max. Voc | 45 |
| Calculated Min Vmp | 28 |
| **Conduit Fill** | |
| Number of conduits | 1 |

| 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 Calculations**

| Circuit | Max Amps | 1.25 x Max Amps | AWG | 90 °C Ampacity | Ambient Emp °F | Temp Derate | Conduit Fill | Fill Derate | Derated Ampacity | Maximum Circuit Breaker |
|---|---|---|---|---|---|---|---|---|---|---|
| Circuit 1 | 14.5 | 18.1 | #10 | 40 | 130 | 0.76 | 8 | 0.7 | 21.28 | 20 A |
| Circuit 2 | 13.3 | 16.6 | #10 | 40 | 130 | 0.76 | 8 | 0.7 | 21.28 | 20 A |
| Circuit 3 | 13.3 | 16.6 | #10 | 40 | 130 | 0.76 | 8 | 0.7 | 21.28 | 20 A |
| Circuit 4 | 13.3 | 16.6 | #10 | 40 | 130 | 0.76 | 8 | 0.7 | 21.28 | 20 A |
| AC Combiner Panel Output | 54.4 | 68.0 | #4 | 95 | 95 | 0.96 | 3 | 1 | 91.2 | 70 A |

| Maximum Circuit Voltage Drop | 2% |
|---|---|

**Voltage Drop Calculations**

| Circuit | AWG | Circular Mills | I | V | Max Length |
|---|---|---|---|---|---|
| Circuit 1 | #10 | 10380 | 14.5 | 240 | 133 Feet |
| Circuit 2 | #10 | 10380 | 13.3 | 240 | 145 Feet |
| Circuit 3 | #10 | 10380 | 13.3 | 240 | 145 Feet |
| Circuit 4 | #10 | 10380 | 13.3 | 240 | 145 Feet |
| Combiner Panel Output | #4 | 41740 | 54.4 | 240 | 143 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
- Information 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, THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION

# 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 DEGREE 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).
17. THIS SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN OF PV CONDUCTORS IN COMPLIANCE WITH NEC 690.12.
18. LABELING IN COMPLIANCE WITH NEC 690.12 AND 690.56(C) IS SHOWN ON SHEET E-03.
19. ALL CONDUITS TO BE INSTALLED A MIN OF 7/8" ABOVE THE ROOF SURFACE.


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ERMOCRATES E. CASTILLO - FL PE 52590




REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
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PROJECT INSTALLER

SUNPRO

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

Digitally signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:06

Signature with Seal

PROJECT NAME

SURETTE RESIDENCE

1970 N US HWY 441,
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))

**RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM**

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

ADHESIVE FASTENED SIGNS:
- THE LABEL SHALL BE VISIBLE, REFLECTIVE AND SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED [NFPA 11.12.2.1]
- 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]

16.88 kW SOLAR DISCONNECT LOCATED

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

## AC COMBINER BOX

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

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

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

**SOLAR CONNECTION LINE SIDE TAP**

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

**PHOTOVOLTAIC SYSTEM AC DISCONNECT**
RATED AC OPERATING CURRENT 54.4 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 |

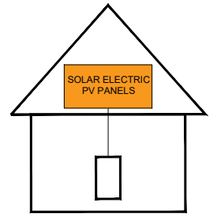
LABEL LOCATION:
COMBINER BOX
(PER CODE: NEC690.52)

## AC DISCONNECT

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

## SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

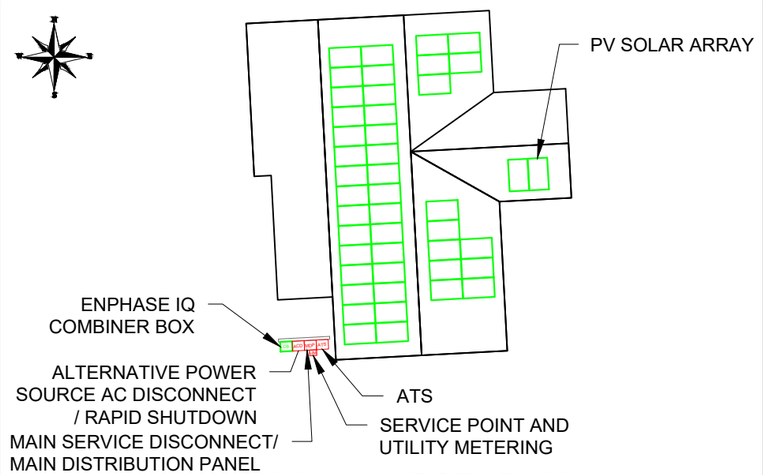
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY




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

## CAUTION:

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN




LABEL LOCATION:
MAIN SERVICE DISCONNECT / MAIN DISTRIBUTION PANEL, PV DISCONNECT
(TEXT HEIGHT SHOULD BE A MINIMUM OF 3/8")
(PER CODE: NEC 690.56(B) AND NEC 705.10)

Castillo Engineering
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CASTILLO ENGINEERING SERVICES, LLC
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620 N. WYMORE ROAD, SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590



REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
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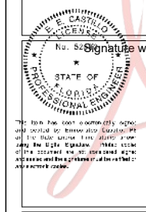
PROJECT INSTALLER

SUNPRO




Digitally signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:06
Signature with seal

PROJECT NAME
SURETTE RESIDENCE
1970 N US HWY 441, LAKE CITY, FL 32055

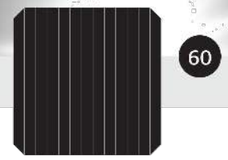
SHEET NAME
SYSTEM LABELING

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-03

# LG NeON®2

LG375N1C-A6




## 375W

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

Made in USA Foreign-Inverted Parts

## 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 MonoX® 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

LG375N1C-A6


Made in USA

### General Data

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

### Certifications and Warranty

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

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

### Temperature Characteristics

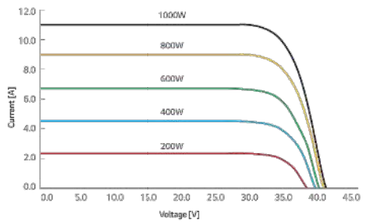
| | | |
|---|---|---|
| NMOT* | [°C] | 42 ± 3 |
| Pmax | [%/°C] | -0.34 |
| Voc | [%/°C] | -0.26 |
| Isc | [%/°C] | 0.03 |

*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 | | LG375N1C-A6 |
|---|---|---|
| Maximum Power (Pmax) | [W] | 281 |
| MPP Voltage (Vmpp) | [V] | 33.2 |
| MPP Current (Impp) | [A] | 8.48 |
| Open Circuit Voltage (Voc) | [V] | 39.4 |
| Short Circuit Current (Isc) | [A] | 9.13 |

### I-V Curves




### Electrical Properties (STC*)

| Model | | LG375N1C-A6 |
|---|---|---|
| Maximum Power (Pmax) | [W] | 375 |
| MPP Voltage (Vmpp) | [V] | 35.3 |
| MPP Current (Impp) | [A] | 10.63 |
| Open Circuit Voltage (Voc, ± 5%) | [V] | 41.8 |
| Short Circuit Current (Isc, ± 5%) | [A] | 11.35 |
| Module Efficiency | [%] | 20.7 |
| Bifaciality Coefficient of Power | [%] | 10 |
| Power Tolerance | [%] | 0 ~ +3 |

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

### Operating Conditions

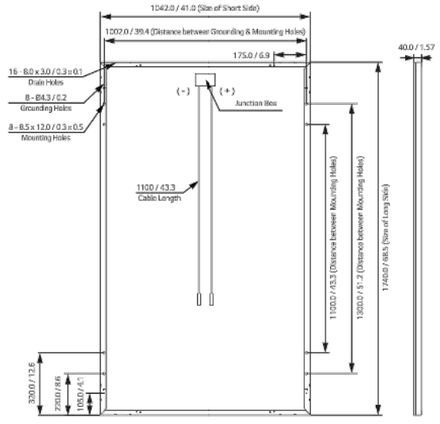
| | | |
|---|---|---|
| Operating Temperature | [°C] | -40 ~ +85 |
| Maximum System Voltage | [V] | 1,000 |
| Maximum Series Fuse Rating | [A] | 20 |
| Mechanical Test Load* (Front) | [Pa/psf] | 5,400 |
| Mechanical Test Load* (Rear) | [Pa/psf] | 4,000 |

*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)





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Lincolnshire, IL 60069
www.lg-solar.com


Product specifications are subject to change without notice.
LG375N1C-A6_AUS.pdf
012221




Castillo Engineering
SOLAR DONE RIGHT®

CASTILLO ENGINEERING SERVICES, LLC
COA # 28345
620 N. WYMORE ROAD,
SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590




REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
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PROJECT INSTALLER

SUNPRO

Digitally signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:07

PROJECT NAME

SURETTE RESIDENCE

1970 N US HWY 441,
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,

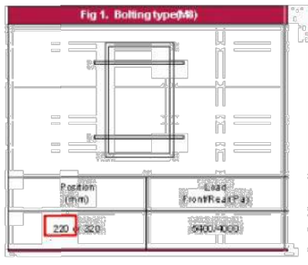
Upon your request we have conducted in house tests to determine the structural performance of the LG Module frames listed below. Our test results meet the requirements you presented in our conference call on January 29th. We will present the test criteria, results, and product limitations that may result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

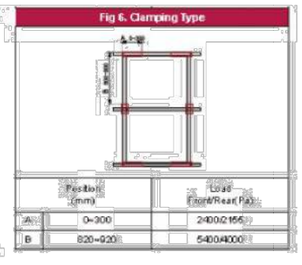
The specifications and conditions presented in this letter apply retroactively to the following LG module(s);

| | 2 Rails | 3 Rails |
|---|---|---|
| **Front** | 9,000Pa | 9,000Pa |
| **Rear** | 6,350Pa | 9,000Pa |
| **Model** | LGxxxN1C(K)-N5(L5), LGxxxN1C(K)-A6(B6)<br>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.

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PROJECT INSTALLER

SUNPRO

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:07

PROJECT NAME

SURETTE RESIDENCE
1970 N US HWY 441,
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 SAFETY US CA E341165

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

ENPHASE.

## 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**

ENPHASE.


2018-02-08

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PROJECT INSTALLER

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Date: 2021.10.28 16:39:08

PROJECT NAME

SURETTE RESIDENCE
1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

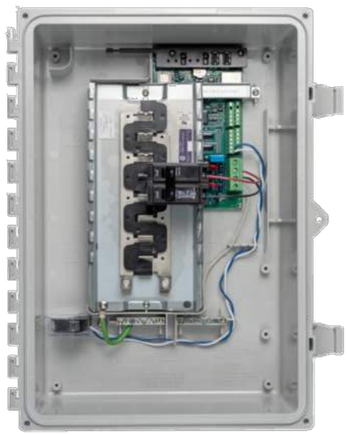
SHEET NUMBER
DS-03

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
- Supports Ensemble Communications Kit for communication with Enphase Encharge™ storage and Enphase Enpower™ smart switch

### Simple

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

### Reliable

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

UL LISTED

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

ENPHASE

## Enphase IQ Combiner 3

| | |
|---|---|
| **MODEL NUMBER** | |
| IQ Combiner 3<br>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™<br>CELLMODEM-03 (4G/12-year data plan)<br>CELLMODEM-01 (3G/5-year data plan)<br>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**<br>**CT-200-SPLIT**<br>*** Consumption monitoring is required for Enphase Storage Systems** | **Split core current transformers enable whole home consumption metering (+/- 2.5%).** |
| Ensemble Communications Kit<br>COMMS-KIT-01 | Installed at the IQ Envoy. For communications with Enphase Encharge™ storage and Enphase Enpower™ smart switch. Includes USB cable for connection to IQ Envoy or Enphase IQ Combiner™ and allows wireless communication with Encharge and Enpower. |
| **Circuit Breakers**<br>**BRK-10A-2-240**<br>**BRK-15A-2-240**<br>**BRK-20A-2P-240** | **Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers.**<br>**Circuit breaker, 2 pole, 10A, Eaton BR210**<br>**Circuit breaker, 2 pole, 15A, Eaton BR215**<br>**Circuit breaker, 2 pole, 20A, Eaton BR220** |
| EPLC-01 | Power line carrier (communication bridge pair), quantity - one pair |
| XA-SOLARSHIELD-ES | Replace the default solar shield with this Ensemble Combiner Solar Shield to match the look and feel of the Enphase Enpower™ smart switch and the Enphase Encharge™ storage system |
| **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)** | **80 A of distributed generation / 95 A with IQ Envoy breaker included** |
| Envoy breaker | 10A or 15A rating GE Q-line/Siemens Type QP /Eaton BR series 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**<br>• **60 A breaker branch input: 4 to 1/0 AWG copper conductors**<br>• **Main lug combined output: 10 to 2/0 AWG copper conductors**<br>• **Neutral and ground: 14 to 1/0 copper conductors**<br>**Always follow local code requirements for conductor sizing.** |
| Altitude | To 2000 meters (6,560 feet) |
| **INTERNET CONNECTION OPTIONS** | |
| Integrated Wi-Fi | 802.11b/g/n |
| **Ethernet** | **Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)** |
| Cellular | CELLMODEM-M1 4G based LTE-M cellular modem (not included). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations. |
| **COMPLIANCE** | |
| Compliance, Combiner | UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003<br>Production metering: ANSI C12.20 accuracy class 0.5 (PV production) |
| **Compliance, IQ Envoy** | **UL 60601-1/CANCSA 22.2 No. 61010-1** |

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

ENPHASE



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PROJECT INSTALLER

SUNPRO

Digitally signed by: Ermocrates E Castillo
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Signature with seal

PROJECT NAME

SURETTE RESIDENCE
1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
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

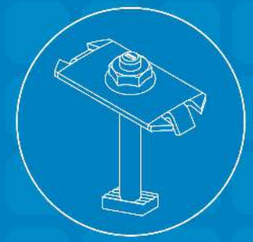
### ONE PRODUCT - MANY APPLICATIONS

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.

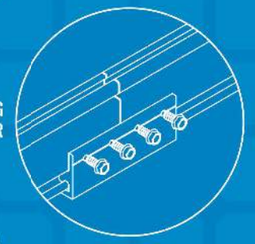
## AUTOMATED DESIGN TOOL

### 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.

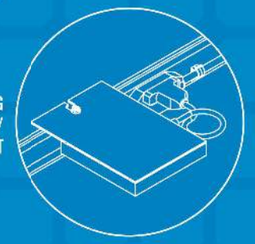


INTEGRATED BONDING MIDCLAMP



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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SUNPRO

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

Signature with Seal

Digitally signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:09

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1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-05

# S-5!®

## The Right Way!™

**NEW**

**NOW AVAILABLE IN ALUMINUM**

ProteaBracket™

## ProteaBracket™

**A versatile bracket for mounting solar PV to trapezoidal roof profiles**

ProteaBracket™ is now made in aluminum. Still the most versatile trapezoidal metal roof attachment solution on the market, the S-5! ProteaBracket just got better!

The bracket features an adjustable attachment base and module attachment options to accommodate different roof profile dimensions and mounting options.

Our pre-applied EPDM gasket with peel and stick adhesive makes installation a snap, ensuring accurate and secure placement the first time.

With no messy sealants, faster installation, and a weather-proof fit, ProteaBracket offers you the most versatile solar attachment solution available.

**ProteaBracket* can be used for rail mounting or "direct-attach" with S-5! PVKIT™**

*When ProteaBracket is used in conjunction with the S-5! PVKIT, an additional nut is required during installation.

## Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot™
- Load-tested for engineered application
- Corrosion-resistant materials
- Adjustable - Fits rib profiles up to 3"
- Peel-and-Stick prevents accidental shifting during installation
- Fully pre-assembled
- 25-year warranty*

*See www.S-5.com for details.

The right way to attach solar PV to trapezoidal roof profiles!

888-825-3432 | www.S-5.com | MADE IN USA

# S-5!®

The Right Way!™

**ProteaBracket™ is the perfect solar attachment solution for most trapezoidal rib, exposed-fastened metal roof profiles!**

**ProteaBracket™** is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

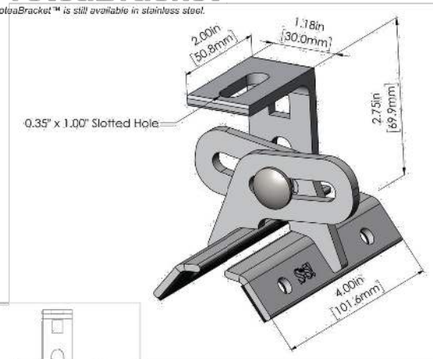
**Note:** All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

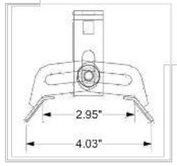
For design assistance, ask your distributor, or visit **www.S-5.com** for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

**S-5!® holding strength is unmatched in the industry.**

## ProteaBracket™

*ProteaBracket™ is still available in stainless steel.*

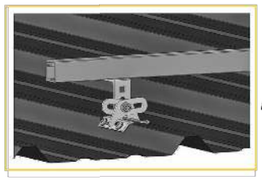


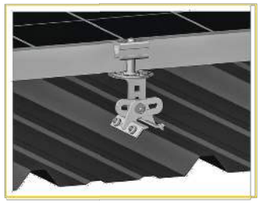

**ProteaBracket fits profiles up to 3 inches**

## Multiple Attachment Options:

*Side Mount Rail*



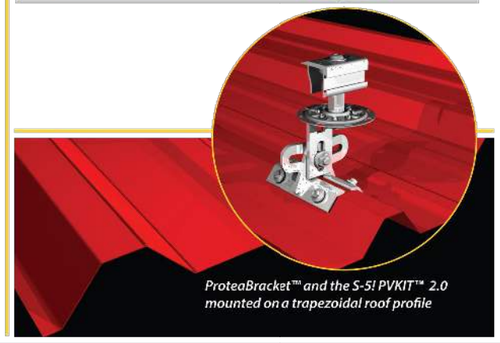
*Bottom Mount Rail*



*w/ S-5! PVKIT™ (rail-less)*

**INSTALLATION:**

**No surface preparation needed. (1)** Wipe away excess oil and debris. **(2)** Peel off adhesive release paper. **(3)** Align and mount bracket directly onto crown of panel. **(4)** Secure ProteaBracket through pre-punched holes, using piercing-point S-5! screws.



*ProteaBracket™ and the S-5! PVKIT™ 2.0 mounted on a trapezoidal roof profile*

**S-5!® Warning! Please use this product responsibly!**

**Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents, and trademarks, visit the S-5! website at www.S-5.com.**



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REVISIONS

| DESCRIPTION | DATE | REV |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

PROJECT INSTALLER

SUNPRO

Digitally Signed by: Ermocrates E Castillo
Date: 2021.10.28 16:39:09

PROJECT NAME

SURETTE RESIDENCE
1970 N US HWY 441,
LAKE CITY, FL 32055

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-06

# Residential Standard Calculation

by: John Bokolli

Version 2011 L

9/25/1997

**Job Name**

**Marc Jones Construction, LLC Sunpro Solar**

10/19/2021 15:29

## STEP 1 Article 220.42 & 220.52

| | | | | | |
|---|---|---|---|---|---|
| sq. ft | 1512 | General Lighting load | 4,536 VA | | |
| | 4 | Small Appliance | 6,000 VA | | |
| | 1 | Laundry circuit | 1,500 VA | | |
| | | Gen.Lgt, Sm App.& Laun. Load | 12,036 VA | | |
| | | | 3,000 VA | @ 100%= | 3,000 VA |
| | | | 9,036 VA | @ 35% = | 3,163 VA |
| | | | VA | @ 25% = | VA |

**General Lighting Demand Load** **6,163 VA**

## STEP 2 Article 220.50 & 220.51

**A/C Condenser & Fixed Electric Space Heating**

| | | | | | QTY | | |
|---|---|---|---|---|---|---|---|
| 5 ton | 7,130 VA | AHU 1 | 9.6kW | 10,800 VA | 1 | Total | 1 |
| A/C #2 | VA | AHU 2 | Select | VA | Qty | Heating Load | 10,800 VA |
| A/C #3 | VA | AHU 3 | Select | VA | Qty | CU Load | 8,330 VA |
| A/C #4 | VA | AHU 4 | Select | VA | Qty | | |
| A/C #5 | VA | AHU 5 | Select | VA | Qty | | |

**Greater of Heat @ 100% vs.A/C @ 100%** **10,800 VA**

## STEP 3 Article 220.53

| | | | | |
|---|---|---|---|---|
| 4,500 VA | 1 | Water Heater | 4,500 VA | |
| 1,400 VA | 1 | Refrigerator | 1,400 VA | |
| 600 VA | | Freezer | VA | |
| 1,030 VA | 1 | Dishwasher | 1,030 VA | |
| 690 VA | | Disposal | VA | |
| 400 VA | | R / Hood | VA | |
| 1,630 VA | 1 | Microwave | 1,630 VA | |
| ☐ 4,000 VA | | Microwave | VA | |
| 170 VA | | Mini Refrig | VA | |
| ☐ 400 VA | | Wine Clr | VA | |
| ☐ 5,000 VA | | Insta Hot | VA | |
| 1,500 VA | | Ironing Center | VA | |
| ☐ select | | Jacuzzi Tub | VA | |
| ☐ select | | Sprinkler Pump | VA | |
| ☐ select | | Well Pump | VA | |
| select | | Fountain Pump | VA | |
| select | | Elevator | VA | |
| | | Pool Equip. Panel | VA 100% Demand | |
| ☐ | | GATES | VA No Demand | |
| ☐ | | Other load | VA No Demand | |

**Appliance Demand Load** **8,560 VA**

**Dryer Demand Load** **5,000 VA**

**Range Demand Load** **8,000 VA**

**Service Demand** **38,523 VA**

**Demand Load** **161 A**

**Neutral Demand** **76 A**

**Min.Service Req.** **175 A**

**Min. Feeder size** **1/0**

**Min. Neutral size** **4**

**Eq. Grding Cond.** **6**

☐ **Copper**

Total Appliance Load **8,560 VA**

4 or more demand @ 75% plus 100% demand loads **6,420 VA**

**STEP 4 Article 220.54**

Electric Clothes Dryers **5,000 VA**

**STEP 5 Article 220.55**

Electric Ranges **10,000 W** Col C demand **8000**

**or** Number of appliances

☐ Check Box for Gas Range

| | | |
|---|---|---|
| Cooktop | Col B demand | |
| Cooktop | Col B demand | |
| Oven(s) | Col B demand | |
| Oven(s) | Col B demand | |
| Number of appliances | 0 Dem. Factor | 0% |
| Cooktop & Oven Demand Load | | W |

jmp1jds@comcast.net

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