JONES RESIDENCE

29.20kW PV SYSTEM

421 SE ALFRED MARKHAM ST, LAKE CITY, FL 32025

PROJECT DESCRIPTION:

80x365 REC SOLAR: REC365AA (365W) MODULES
GROUND MOUNTED SOLAR PHOTOVOLTAIC MODULES

SYSTEM SIZE: 29.200 kW DC STC
TOLAL ARRAY AREA: 1506.67 SQ FT.

EQUIPMENT SUMMARY

80	REC SOLAR: REC365AA (365W) MODULES
03	SMA: SB7.7-1SP-US-40 INVERTERS
01	SMA: SB3.0-1SP-US-40 INVERTER
01	TESLA BACKUP GATEWAY 2
03	TESLA POWERWALL 2

RACKING: 2x8 OSPREY UNIT
ATTACHMENT: 2x8 OSPREY UNIT

DESIGN FACTORS:

WIND SPEED (ULT):	110
WIND SPEED (ASD):	85
RISK CATEGORY:	II
EXPOSURE:	C

AUTHORITY HAVING JURISDICTION:
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 (FBC)
FLORIDA MECHANICAL CODE, 7TH EDITION 2020 (FMC)
NATIONAL ELECTRICAL CODE 2017 (NEC)
ASCE 7-16

OWNER

JONES, BILL

INSTALLER

POWER PRODUCTION MANAGEMENT
625 NW 8th Ave,
Gainesville, FL 32601
(352) 263-0766

ENGINEER

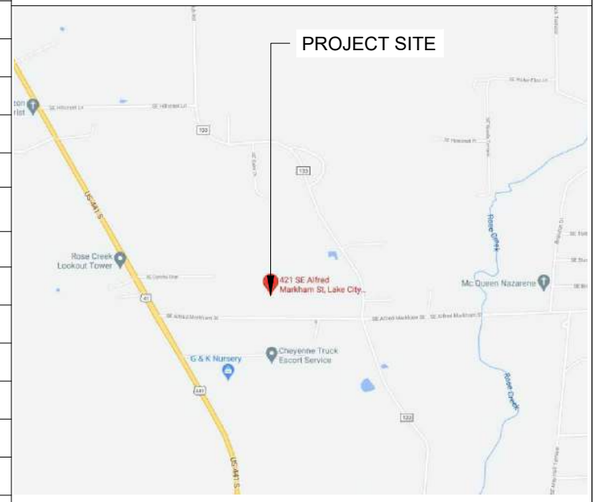
Castillo Engineering Services LLC
620 N. Wymore Road, Suite 250, Maitland, FL 32751
TEL: (407) 289-2575
Ermocrates E. Castillo
License#: FL PE 52590

SHEET INDEX

SHEET #	SHEET DESCRIPTION
G-01	COVER SHEET
A-00	NOTES AND DESCRIPTION
A-01	SITE PLAN
S-01	MODULE LAYOUT
S-02	ATTACHMENT DETAIL
E-01	ELECTRICAL LINE DIAGRAM
E-02	WIRING CALCULATIONS
E-02.1	WIRING CALCULATIONS
E-03	SYSTEM LABELING
DS-01-08	DATA SHEETS

SITE PLAN

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.

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

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

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

Signature with Seal

Digitally Signed by: Ermocrates E Castillo
Date: 2021.06.01 12:31:23

PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

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	Alternating Current Disconnect
APPROX	Approximate
AWG	American Wire Gauge
BAT	Tesla Powerwall
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 Notified 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 80x365 REC SOLAR: REC365AA (365W) Modules with a combined STC rated dc output power of 29,200W. The modules are connected into 03 SMA: SB7.7-1SP-US-40 & 01 SMA: SB3.0-1SP-US-40 Inverters. 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.

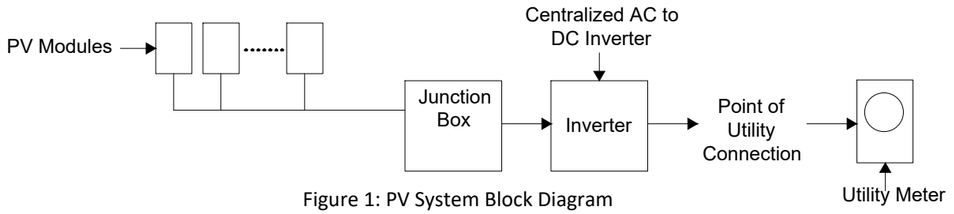


Figure 1: PV System Block Diagram

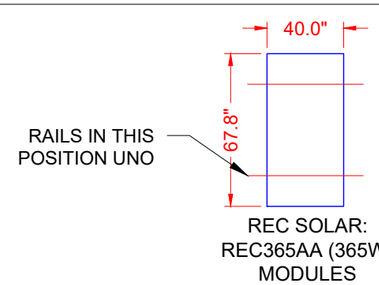
The inverter meets the requirements of IEEE 1547 and UL 1741.

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)



REC SOLAR:
REC365AA (365W)
MODULES

Castillo Engineering
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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

PROJECT INSTALLER

POWER™ PRODUCTION MANAGEMENT, INC.

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

Digitally signed by: Ermocrates E Castillo
Date: 2021.06.01 12:31:24

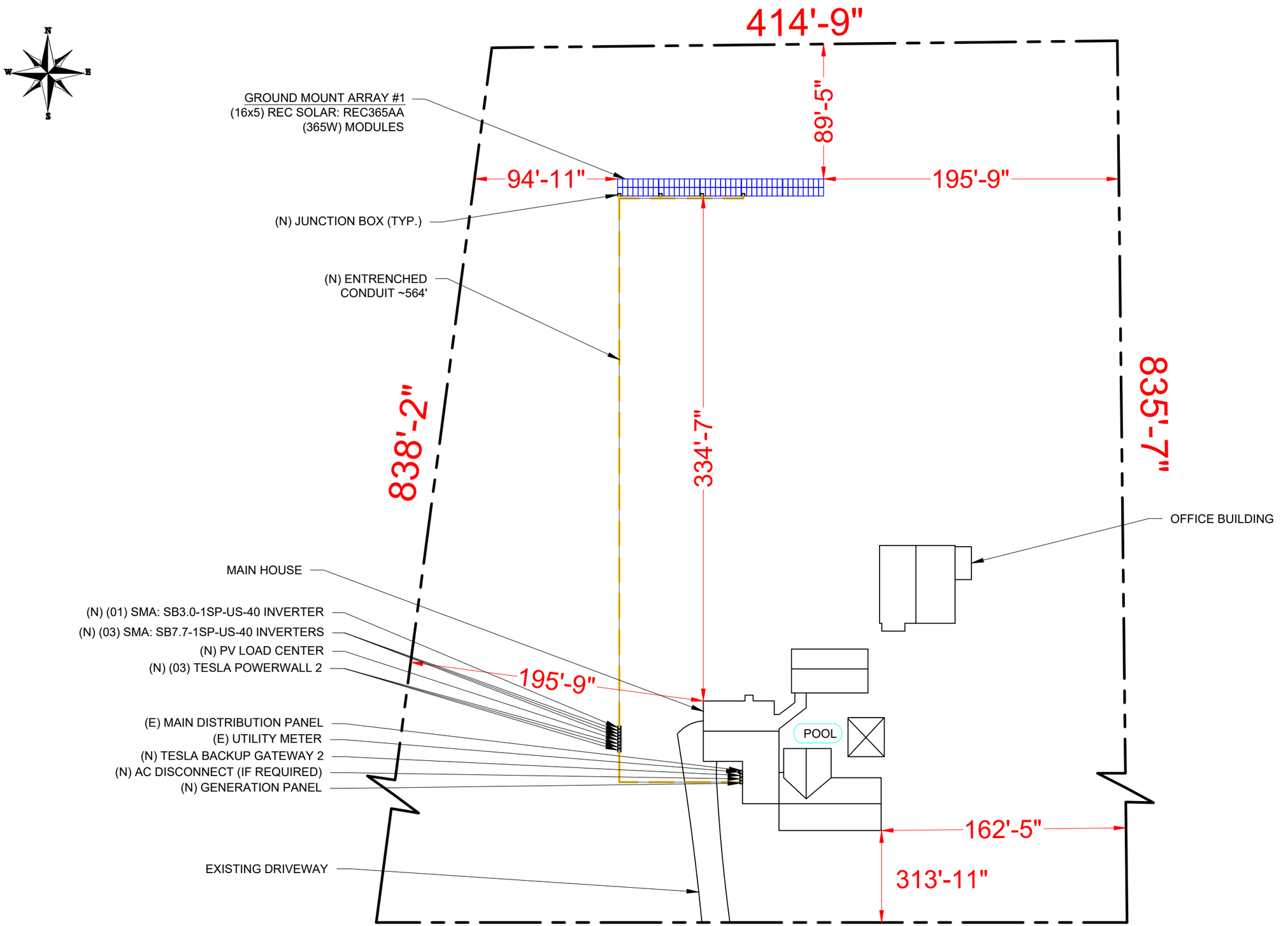
PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
NOTES AND DESCRIPTION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
A-00



1 SITE PLAN WITH PROPERTY LINES
A-01 SCALE: 1/64" = 1'-0"

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PROJECT NAME
JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
SITE PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
A-01

MODULE TYPE, DIMENSIONS & WEIGHT

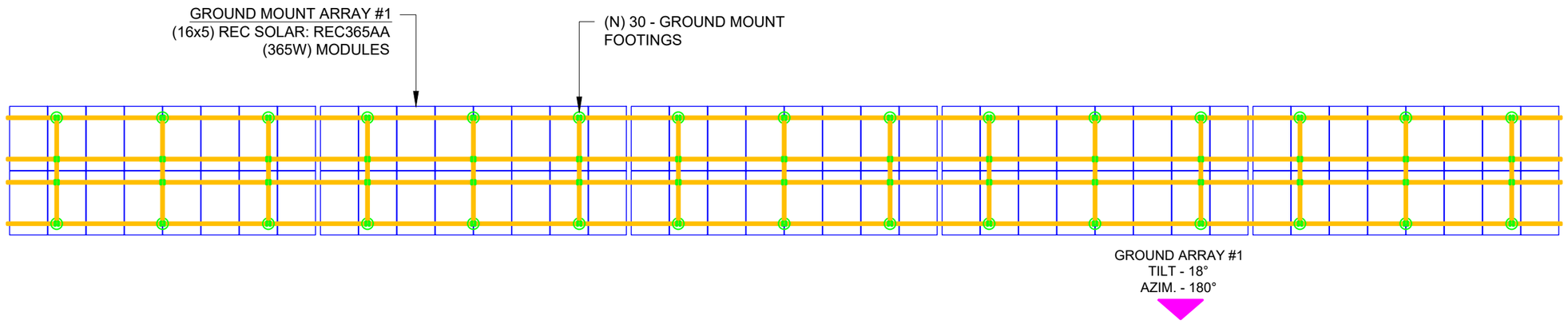
NUMBER OF MODULES = 80 MODULES
MODULE TYPE = REC SOLAR: REC365AA (365W) MODULES
MODULE WEIGHT = 42.99 LBS / 19.5 KG.
MODULE DIMENSIONS = 67.8"x 40.0" = 18.83 SF
UNIT WEIGHT OF ARRAY = 2.28 PSF

GROUND MOUNT FOR PV PANEL GENERAL NOTES:

1. APPLICABLE CODE: ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES COMPATIBLE WITH 2020 FLORIDA BUILDING CODE (7th EDITION).
2. GROUND RACK SHOWN MAY BE SLOPED UP TO A MAXIMUM 18°.
3. SOIL BEARING CAPACITY ASSUMED TO BE THE FOLLOWING: UNDISTURBED COMPACTED SAND, SILTY SAND, CLAYEY SAND, SILTY GRAVEL AND CLAYEY GRAVEL
WITH VERTICAL FOUNDATION PRESSURE OF 2,000 PSF AND LATERAL BEARING PRESSURE OF 150 PSF / FT BELOW NATURAL GRADE THAT CONTINUES TO HOLD IT SHAPE BEFORE AND AFTER INSTALLATION. IN THE CASE OF LOOSE SANDS, MUD, SILTS, OR ORGANIC TYPE SOILS, LARGER FOOTER SIZE WILL BE REQUIRED. CONTRACTOR SHALL NOTIFY ENGINEER TO RE-SIZE FOOTERS. SEE FBC CHAPTER 18 SECTION 1806.2 FOR ADDITIONAL DETAILS AND EXCEPTIONS.
4. REFER TO UNIRAC FOR ALL COMPONENT SPECIFICATION AND INSTALLATION INSTRUCTIONS.
5. CONTRACTOR/INSTALLER SHALL INSTALL GROUND RACK SYSTEM WITHIN NEW OR EXISTING PROPERTY SETBACKS PER GOVERNING BUILDING DEPARTMENT.
6. THIS SHEET REFLECTS STRUCTURAL CONNECTIONS AND STRUCTURAL DETAILS OF GROUND RACK ONLY. INSTALL SOLAR PV MODULES PER MANUFACTURER RECOMMENDATIONS.
7. CONCRETE SHALL BE NORMAL WEIGHT 3000 PSI MINIMUM.
8. ALL DISSIMILAR METALS & MATERIALS SHALL BE SEPARATED WITH NEOPRENE OR EQUAL.
9. CONTRACTOR CAN MAKE FINAL ADJUSTMENTS ON SITE TO ACCOMODATE ACTUAL FIELD CONDITIONS

-- DESIGN CRITERIA FOR GROUND RACK AND ALL CONNECTIONS THIS SHEET IS BASED ON MAIN WIND FORCE RESISTING SYSTEM (MWFRS) VULT = 110 MPH WITH EXPOSURE "C", RISK CATEGORY I, MONOSLOPE FREE ROOF AND H < 15'-0" PER ASCE 7-16 "MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES" AND 2017 F.B.C. (7th EDITION). SITE SPECIFIC ENGINEERS APPROVAL IS REQUIRED IF SITE REQUIREMENTS EXCEEDS DESIGN CRITERIA.

(E) BACK YARD



(E) FRONT YARD

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

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Signature with Seal

PROJECT NAME

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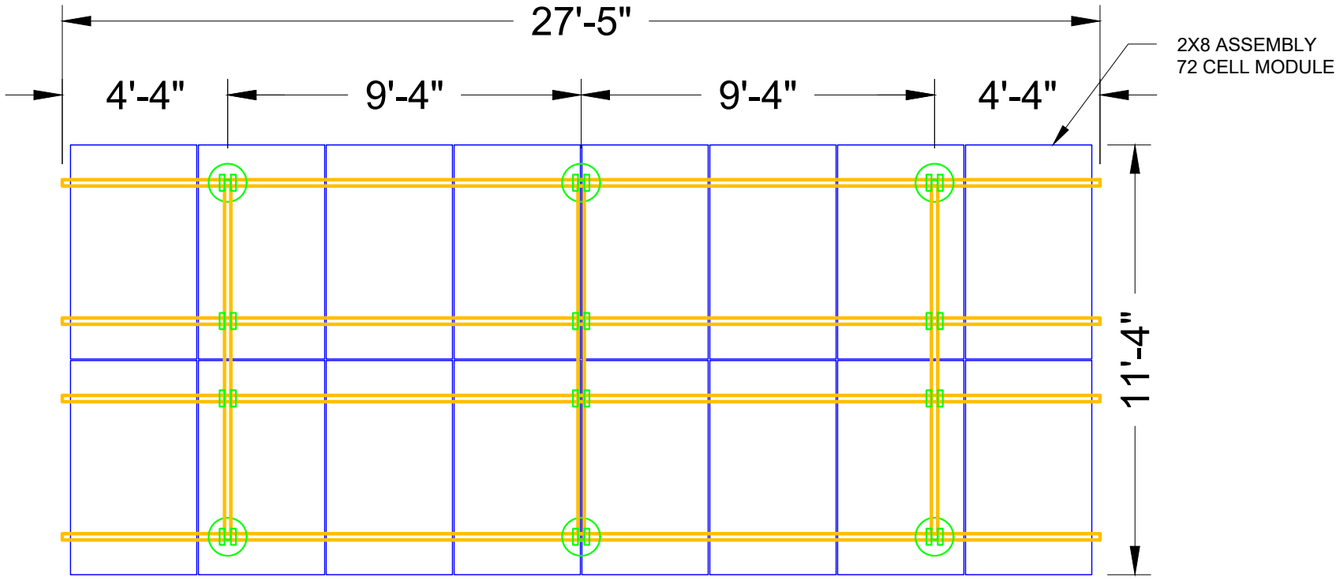
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
MODULE LAYOUT

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01



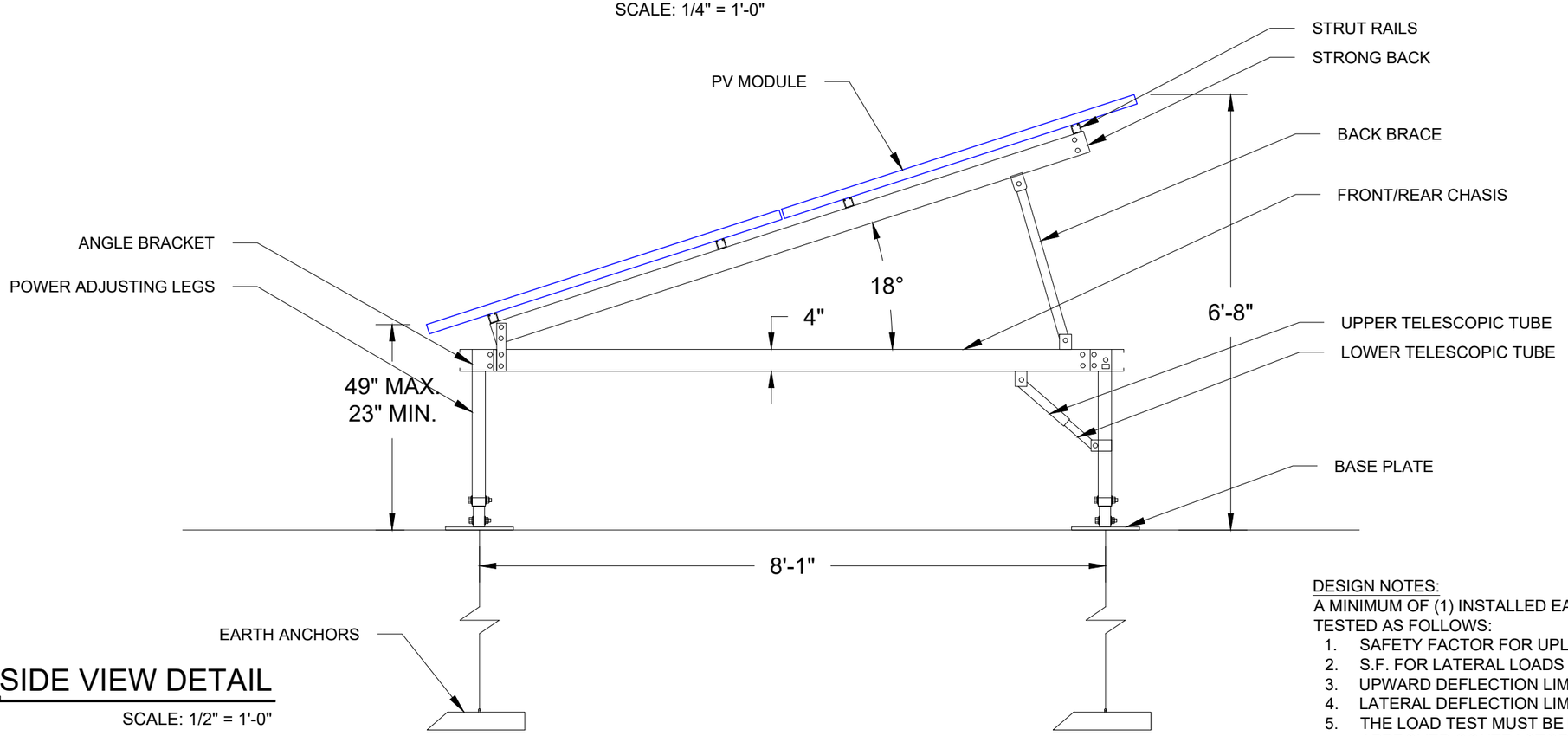
1 ARRAY#1, #2 #3, #4 & #5 STRUCTURE DETAIL 2X8 RACKS

S-02

SCALE: 1/4" = 1'-0"

REQUIRED EARTH ANCHOR TEST LOADS

	Design Wind Speed (V)	72 Cell Modules		60 Cell Modules	
18° TILT	ASCE 7-16 (or 7-10)	Back Legs	Front Legs	Back Legs	Front Legs
		Load (lbs.)	Load (lbs.)	Load (lbs.)	Load (lbs.)
	100 MPH	1700	800	1400	700
	110 MPH	2000	900	1700	800
	115 MPH	2200	1000	1900	900
	120 MPH	2400	1100	2000	900
	130 MPH	2800	1300	2400	1100
	140 MPH	3200	1500	2700	1300
	150 MPH	3700	1700	3100	1400



2 SIDE VIEW DETAIL

S-02

SCALE: 1/2" = 1'-0"

DESIGN NOTES:

A MINIMUM OF (1) INSTALLED EARTH ANCHOR MUST BE TESTED AS FOLLOWS:

1. SAFETY FACTOR FOR UPLIFT TO BE 1.5
2. S.F. FOR LATERAL LOADS TO BE 2.0
3. UPWARD DEFLECTION LIMIT AFTER ANCHOR SET = 1/2"
4. LATERAL DEFLECTION LIMIT AFTER ANCHOR SET = 1"
5. THE LOAD TEST MUST BE PERFORMED BY AN APPROVED CONTRACTOR.

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ERMOCRATES E. CASTILLO - FL PE 52590

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

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PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME

ATTACHMENT DETAIL

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

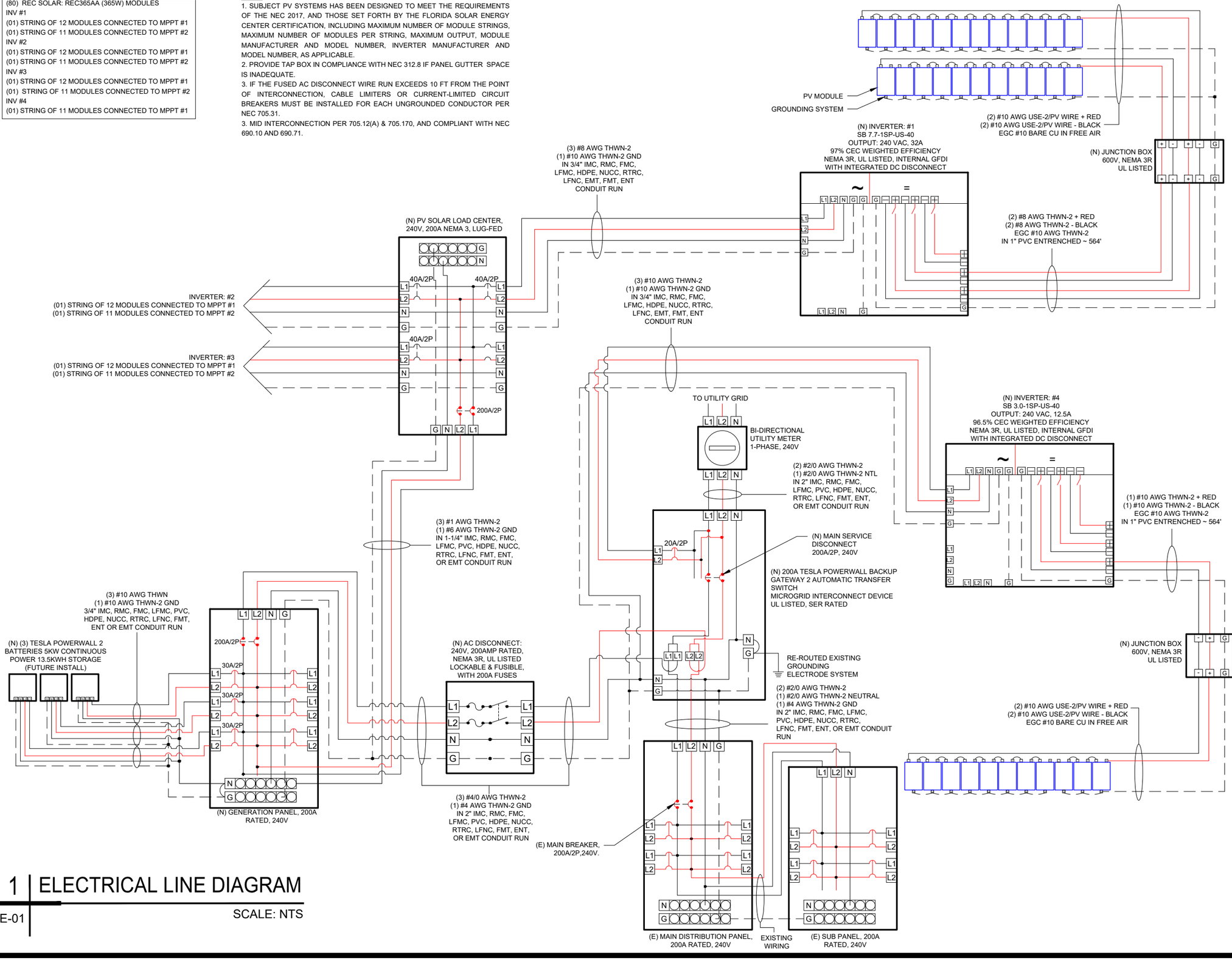
S-02

SOLAR ARRAY (29.200 kW-DC STC)

(80) REC SOLAR: REC365AA (365W) MODULES
INV #1
(01) STRING OF 12 MODULES CONNECTED TO MPPT #1
(01) STRING OF 11 MODULES CONNECTED TO MPPT #2
INV #2
(01) STRING OF 12 MODULES CONNECTED TO MPPT #1
(01) STRING OF 11 MODULES CONNECTED TO MPPT #2
INV #3
(01) STRING OF 12 MODULES CONNECTED TO MPPT #1
(01) STRING OF 11 MODULES CONNECTED TO MPPT #2
INV #4
(01) STRING OF 11 MODULES CONNECTED TO MPPT #1

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.
3. MID INTERCONNECTION PER 705.12(A) & 705.170, AND COMPLIANT WITH NEC 690.10 AND 690.71.



1 ELECTRICAL LINE DIAGRAM

E-01

SCALE: NTS

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SUITE 250,
MAITLAND, FL 32751
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Date: 2021.06.01 12:31:25

PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
ELECTRICAL
LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-01

DC CONDUCTOR AMPACITY CALCULATIONS: ARRAY TO JUNCTION BOX (INV#1, INV#2 & INV#3):

EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER 310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a)	0.80
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) 1.25 X 1.25 X Isc	16.03A
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(2)(a) TEMP. CORRECTION PER 310.15(B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY	30.72A
RESULT SHOULD BE GREATER THAN (16.03A) OTHERWISE INCREASE THE SIZE OF THE CONDUCTOR AND ITS AMPACITY	

FROM JUNCTION BOX TO INVERTER (INV#1, INV#2 & INV#3):

EXPECTED WIRE TEMP (In Celsius)	25°
TEMP. CORRECTION PER 310.15(B)(2)(a)	1.0
NO. OF CURRENT CARRYING CONDUCTORS	8
CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a)	0.70
CIRCUIT CONDUCTOR SIZE	8 AWG
CIRCUIT CONDUCTOR AMPACITY	55A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) 1.25 X1.25 X Isc	16.03A
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(2)(a) TEMP. CORRECTION PER 310.15(B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY	38.5A
RESULT SHOULD BE GREATER THAN (16.03A) OTHERWISE INCREASE THE SIZE OF THE CONDUCTOR AND ITS AMPACITY	

AC CONDUCTOR AMPACITY CALCULATIONS: INVERTER TO LOAD CENTER (INV#1, INV#2 & INV#3):

No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER 310.15(B)(3)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	1
CIRCUIT CONDUCTOR SIZE	8AWG
CIRCUIT CONDUCTOR AMPACITY	55A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B) & 705.12.D.2 1.25 X MAX INVERTER OUTPUT CURRENT	40A
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(2)(a) TEMP. CORRECTION PER 310.15(B)(3)(a)X CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	52.8A
Result should be greater than (40A) otherwise increase the size of the conductor and its ampacity	

AC CONDUCTOR AMPACITY CALCULATIONS:

No. OF INVERTER	4
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER 310.15(B)(3)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	1
CIRCUIT CONDUCTOR SIZE	1 AWG
CIRCUIT CONDUCTOR AMPACITY	130A

LOAD CENTER TO GENERATION PANEL

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B) & 705.12.D.2 1.25 X MAX INVERTER OUTPUT CURRENT(32A + 32A + 32A)	120.0A
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(2)(a) TEMP. CORRECTION PER 310.15(B)(3)(a)X CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	139.2A
Result should be greater than (120.0A) otherwise increase the size of the conductor and its ampacity	

GENERATION PANEL AMPACITY CALCULATIONS:

No. OF INVERTER	4
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER 310.15(B)(3)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	1
CIRCUIT CONDUCTOR SIZE	4/0AWG
CIRCUIT CONDUCTOR AMPACITY	260A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B) & 705.12.D.2 CURRENT FROM SLC + BATTERIES (120A + 90A)	210A
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(2)(a) TEMP. CORRECTION PER 310.15(B)(3)(a)X CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	249.6A
Result should be greater than (210A) otherwise increase the size of the conductor and its ampacity	

DC PHOTOVOLTAIC POWER SOURCE TO BE INSTALLED AT INVERTER #1, #2 & #3 PER NEC 690.53 & 690.54	
OPERATING CURRENT	12.0A
OPERATING VOLTAGE	456.0V
MAXIMUM SYSTEM VOLTAGE	531.60V
SHORT CIRCUIT CURRENT	12.83A

INVERTER #1, #2 & #3 SPECIFICATIONS	
MANUFACTURER	SMA
MODEL #	SB7.7-1SP-US-40
NOMINAL AC POWER	7.7 KW
NOMINAL OUTPUT VOLTAGE	240V
NOMINAL OUTPUT CURRENT	32 A

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER	REC SOLAR
MODEL #	REC365AA
PMAX	365W
VMP	38.0V
IMP	9.60A
VOC	44.3V
ISC	10.26A
MODULE DIMENSION	67.8"L x 40.0"W x 1.2"D (In Inch)

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
0.80	4-6
0.70	7-9
0.50	10-20

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.

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.) UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
12.) MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
13.) RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
14.) CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
15.) CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).

Castillo Engineering
DESIGNED TO PERMIT®
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

PROJECT INSTALLER

POWER™ PRODUCTION MANAGEMENT, INC.

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

Digitally Signature with Seal
Signed by: Ermocrates E Castillo
Date: 2021.06.01 12:31:25

PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
WIRING CALCULATIONS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-02

DC CONDUCTOR AMPACITY CALCULATIONS:
ARRAY TO JUNCTION BOX (INV#4):

EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER 310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	2
CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a)	1
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	16.03A
1.25 X 1.25 X Isc	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(2)(a)	38.4A
TEMP. CORRECTION PER 310.15(B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY	
RESULT SHOULD BE GREATER THAN (16.03A) OTHERWISE INCREASE THE SIZE OF THE CONDUCTOR AND ITS AMPACITY	

FROM JUNCTION BOX TO INVERTER (INV#4):

EXPECTED WIRE TEMP (In Celsius)	25°
TEMP. CORRECTION PER 310.15(B)(2)(a)	1.0
NO. OF CURRENT CARRYING CONDUCTORS	2
CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a)	1.0
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	16.03A
1.25 X1.25 X Isc	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(2)(a)	40.0A
TEMP. CORRECTION PER 310.15(B)(2)(a) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY	
RESULT SHOULD BE GREATER THAN (16.03A) OTHERWISE INCREASE THE SIZE OF THE CONDUCTOR AND ITS AMPACITY	

AC CONDUCTOR AMPACITY CALCULATIONS:
INVERTER TO LOAD CENTER (INV#4):

No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER 310.15(B)(3)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	1
CIRCUIT CONDUCTOR SIZE	10AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B) & 705.12.D.2	15.63A
1.25 X MAX INVERTER OUTPUT CURRENT	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC 310.15(B)(2)(a)	38.4A
TEMP. CORRECTION PER 310.15(B)(3)(a)X CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	
Result should be greater than (15.63A) otherwise increase the size of the conductor and its ampacity	

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 .
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15.) CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).

DC PHOTOVOLTAIC POWER SOURCE TO BE INSTALLED AT INVERTER #4 PER NEC 690.53 & 690.54	
OPERATING CURRENT	12.0A
OPERATING VOLTAGE	418.0V
MAXIMUM SYSTEM VOLTAGE	487.30V
SHORT CIRCUIT CURRENT	12.83A

INVERTER #4 SPECIFICATIONS	
MANUFACTURER	SMA
MODEL #	SB3.0-1SP-US-40
NOMINAL AC POWER	3.0 KW
NOMINAL OUTPUT VOLTAGE	240V
NOMINAL OUTPUT CURRENT	12.8 A

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER	REC SOLAR
MODEL #	REC365AA
PMAX	365W
VMP	38.0V
IMP	9.60A
VOC	44.3V
ISC	10.26A
MODULE DIMENSION	67.8"L x 40.0"W x 1.2"D (In Inch)

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
0.80	4-6
0.70	7-9
0.50	10-20

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
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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

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.06.01 12:31:26
Signature with Seal

PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME

WIRING CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

E-02.1

⚠ 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 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 108.5 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))

INVERTER #1, #2 & #3

MAXIMUM SYSTEM VOLTAGE (VOC)	531.60	**V**
MAXIMUM CIRCUIT CURRENT (Isc)	12.83	**A**
MAXIMUM RATED OUTPUT OF DC TO DC CONVERTER (Idc)	15	**A**

LABEL LOCATION:
DC DISCONNECT, INVERTER
(PER CODE: NEC690.53)

INVERTER #4

MAXIMUM SYSTEM VOLTAGE (VOC)	487.30	**V**
MAXIMUM CIRCUIT CURRENT (Isc)	12.83	**A**
MAXIMUM RATED OUTPUT OF DC TO DC CONVERTER (Idc)	15	**A**

LABEL LOCATION:
DC DISCONNECT, INVERTER
(PER CODE: NEC690.53)

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

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(D)(2)(3)(c))

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ERMOCRATES E. CASTILLO - FL PE 52590

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PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

ERMOCRATES E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER
Signature with Seal
Digitally Signed by: Ermocrates E Castillo
Date: 2021.06.01 12:31:26

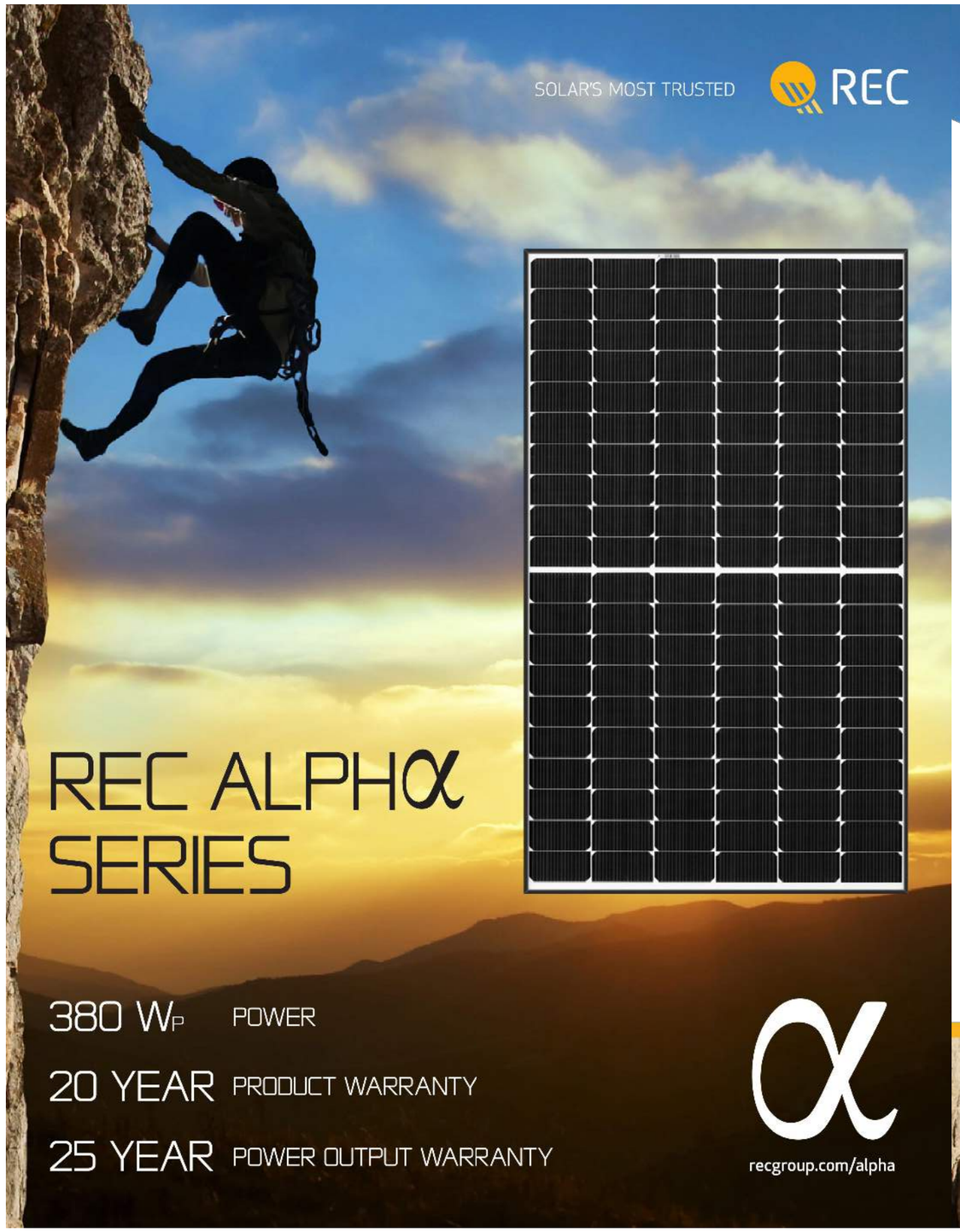
PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
SYSTEM LABELING

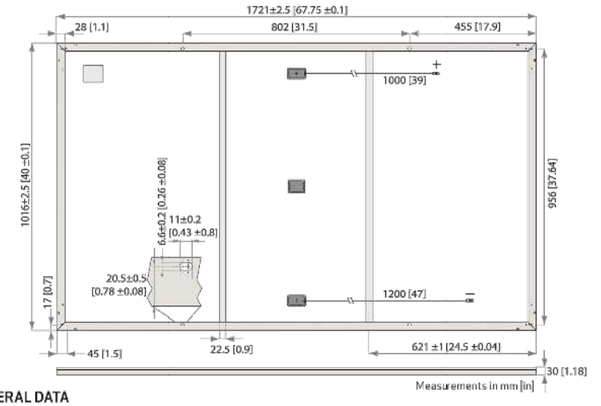
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-03



REC ALPHα SERIES

PRODUCT DATASHEET



GENERAL DATA

Cell type:	120 half-cut cells with REC heterojunction cell technology 6 strings of 20 cells in series	Junction box:	3-part 3 bypass diodes, IP67 rated in accordance with IEC 62790
Glass:	0.13 in (3.2 mm) solar glass with anti-reflection surface treatment	Cable:	12 AWG (4 mm²) PV wire, 39 + 47 in (1 + 1.2 m) in accordance with EN 50618
Backsheet:	Highly resistant polymeric construction	Connectors:	Stäubli MC4PV-KBT4/KST4, 12 AWG (4 mm²) in accordance with IEC 62852 IP68 only when connected
Frame:	Anodized aluminum (black)	Origin:	Made in Singapore

ELECTRICAL DATA @ STC

Product Code*: RECxxxAA					
Nominal Power - P_{MPP} (Wp)	360	365	370	375	380
Watt Class Sorting - (W)	-0/+5	-0/+5	-0/+5	-0/+5	-0/+5
Nominal Power Voltage - V_{MPP} (V)	37.7	38.0	38.3	38.7	39.0
Nominal Power Current - I_{MPP} (A)	9.55	9.60	9.66	9.72	9.76
Open Circuit Voltage - V_{OC} (V)	44.1	44.3	44.5	44.6	44.7
Short Circuit Current - I_{SC} (A)	10.23	10.26	10.30	10.40	10.46
Panel Efficiency (%)	20.6	20.9	21.2	21.4	21.7

Values at standard test conditions (STC: air mass AM 1.5, irradiance 10.75 W/sq ft (1000 W/m²), temperature 77°F (25°C), based on a production spread with a tolerance of V_{OC} & I_{SC} ±3% within one watt class. * Where xxx indicates the nominal power class (P_{MPP}) at STC above.

ELECTRICAL DATA @ NMOT

Product Code*: RECxxxAA					
Nominal Power - P_{MPP} (Wp)	274	278	282	286	290
Nominal Power Voltage - V_{MPP} (V)	35.5	35.8	36.1	36.4	36.7
Nominal Power Current - I_{MPP} (A)	7.71	7.76	7.80	7.85	7.88
Open Circuit Voltage - V_{OC} (V)	41.6	41.7	41.9	42.0	42.1
Short Circuit Current - I_{SC} (A)	8.26	8.29	8.32	8.40	8.45

Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m², temperature 68°F (20°C), windspeed 3.3 ft/s (1 m/s). * Where xxx indicates the nominal power class (P_{MPP}) at STC above.

CERTIFICATIONS

IEC 61215:2016, IEC 61730:2016, UL 1703, UL 61730	
IEC 62804	PID
IEC 61701	Salt Mist
IEC 62716	Ammonia Resistance
UL 1703	Fire Type Class 2
IEC 62782	Dynamic Mechanical Load
IEC 61215-2:2016	Hailstone (35mm)
AS4040.2 NCC 2016	Cyclic Wind Load
ISO 14001:2004, ISO 9001:2015, OHSAS 18001:2007	

WARRANTY

20 year product warranty
25 year linear power output warranty
Maximum annual power degression of 0.25% p.a.
Guarantees 92% of power after 25 years
See warranty conditions for further details.

MECHANICAL DATA

Dimensions:	67.8 x 40 x 1.2 in (1721 x 1016 x 30 mm)
Area:	18.8 sq ft (1.75 m²)
Weight:	43 lbs (19.5 kg)

MAXIMUM RATINGS

Operational temperature:	-40... +85°C
Maximum system voltage:	1000 V
Design load (+): snow Maximum test load (+):	4666 Pa (97.5 lbs/sq ft)* 7000 Pa (146 lbs/sq ft)*
Design load (-): wind Maximum test load (-):	2666 Pa (55.6 lbs/sq ft)* 4000 Pa (83.5 lbs/sq ft)*
Max series fuse rating:	25 A
Max reverse current:	25 A

* Calculated using a safety factor of 1.5
* See installation manual for mounting instructions

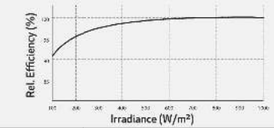
TEMPERATURE RATINGS*

Nominal Module Operating Temperature:	44°C (±2°C)
Temperature coefficient of P_{MPP}:	-0.26 %/°C
Temperature coefficient of V_{OC}:	-0.24 %/°C
Temperature coefficient of I_{SC}:	0.04 %/°C

*The temperature coefficients stated are linear values

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



Founded in Norway in 1996, REC is a leading vertically integrated solar energy company. Through integrated manufacturing from silicon to wafers, cells, high-quality panels and extending to solar solutions, REC provides the world with a reliable source of clean energy. REC's renowned product quality is supported by the lowest warranty claims rate in the industry. REC is a Bluestar Elkem company with headquarters in Norway and operational headquarters in Singapore. REC employs around 2,000 people worldwide, producing 1.5 GW of solar panels annually.

REC
www.recgroup.com

Specifications subject to change without notice.

Ref: PM-DS-12-01-Rev-B 08.19

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COA # 28345
620 N. WYMORE ROAD,
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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

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Signature with Seal

PROJECT NAME

JONES RESIDENCE

421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-01

REC Americas LLC
1420 Gateway Dr, Suite 170
San Mateo, CA 94404
Dir 805 704 3226
Fax 805 457 6104
www.recgroup.com

REC

Castillo Engineering Services, LLC
2925 W. State Road 434, Suite 111,
Longwood, Fl 32779

RE: REC Modules Max Wind Load

San Luis Obispo, 18 February 2021

To Whom it May Concern;

REC Americas LLC confirms that the REC Twin Peak 3M series (RECXXXTP3M) and REC Alpha Series (RECXXXAA) modules have passed UL2703 Mechanical Load testing at a test load of +/-113 PSF utilizing four-point attachments on the long side of the module.

Please be in touch with the REC Technical Department if you have any questions.

Sincerely,

George McClellan
REC Americas LLC
Senior Technical Sales Manager

Castillo Engineering
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Signature with Seal

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421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-02

SUNNY BOY
3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

Value-Added Improvements
- Superior integration with SMA's MLPE Power+ Solution
- World's first Secure Power Supply* now offers up to 2,000 W
- Full grid management capabilities ensure a utility-compliant solution for any market

Reduced Labor
- New Installation Assistant with direct access via smartphone minimizes time in the field
- Advanced communication interface with fewer components creates 50% faster setup and commissioning

Unmatched Flexibility
- SMA's proprietary OptiTrac™ Global Peak technology mitigates shade with ease
- Multiple independent MPPTs accommodate hundreds of stringing possibilities

Trouble-Free Servicing
- Two-part enclosure concept allows for simple, expedited servicing
- Equipped with SMA Smart Connected, a proactive service solution that is integrated into Sunny Portal

SUNNY BOY 3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

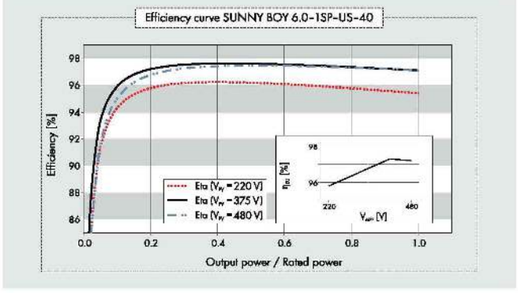
Reduce costs across your entire residential business model

The residential PV market is changing rapidly. Your bottom line matters more than ever—so we've designed a superior residential solution to help you decrease costs at every stage of your business operations. The Sunny Boy 3.0-US/3.8-US/5.0-US/6.0-US/7.0-US/7.7-US join the SMA lineup of field-proven solar technology backed by the world's #1 service team, along with a wealth of improvements. Simple design, improved stocking and ordering, value-driven sales support and streamlined installation are just some of the ways that SMA helps your business operate more efficiently. And, Sunny Boy's superior integration with the innovative Power+ Solution means installers have even more flexibility in addressing their toughest challenges. Finally, SMA Smart Connected will automatically detect errors and initiate the repair and replacement process so that installers can reduce service calls and save time and money.

www.SMA-America.com

Technical data	Sunny Boy 3.0-US		Sunny Boy 3.8-US		Sunny Boy 5.0-US	
	208 V	240 V	208 V	240 V	208 V	240 V
Input (DC)						
Max. PV power	4260 Wp		5396 Wp		7100 Wp	
Max. DC voltage	600 V					
Rated MPP voltage range	155 - 480 V		195 - 480 V		220 – 480 V	
MPPT operating voltage range	100 – 550 V					
Min. DC voltage / start voltage	100 V / 125 V					
Max. operating input current per MPPT	10 A					
Max. short circuit current per MPPT	18 A					
Number of MPPT tracker / string per MPPT tracker	2/1				3 / 1	
Output (AC)						
AC nominal power	3000 W	3000 W	3330 W	3800 W	5000 W	5000 W
Max. AC apparent power	3000 VA	3000 VA	3330 VA	3800 VA	5000 VA	5000 VA
Nominal voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
AC voltage range	183 – 229 V	211 – 264 V	183 – 229 V	211 – 264 V	183 – 229 V	211 – 264 V
AC grid frequency	60 Hz / 50 Hz					
Max. output current	14.5 A	12.5 A	16.0 A	16.0 A	24.0 A	24.0 A
Power factor (cos φ)	1					
Output phases / line connections	1 / 2					
Harmonics	< 4 %					
Efficiency						
Max. efficiency	97.2 %	97.6 %	97.2 %	97.5 %	97.2 %	97.5 %
CEC efficiency	96 %	96.5 %	96.5 %	96.5 %	96.5 %	97 %
Protection devices						
DC disconnect device / DC reverse polarity protection	● / ●					
Ground fault monitoring / Grid monitoring	●					
AC short circuit protection	●					
All-pole sensitive residual current monitoring unit (RCMU)	●					
Arc fault circuit interrupter (AFCI)	●					
Protection class / overvoltage category	I / IV					
General data						
Dimensions (W / H / D) in mm (in)	535 x 730 x 198 (21.1 x 28.5 x 7.8)					
Packaging dimensions (W / H / D) in mm (in)	600 x 800 x 300 (23.6 x 31.5 x 11.8)					
Weight / packaging weight	26 kg (57 lb) / 30 kg (66 lb)					
Temperature range: operating / non-operating	-25°C ...+60°C / -40°C ...+60°C					
Environmental protection rating	NEMA 3R					
Noise emission (typical)	39 dB(A)					
Internal power consumption at night	< 5 W					
Topology / Cooling concept	Transformerless / Convection					
Features						
Ethernet ports	2					
Secure Power Supply	●*					
Display (2 x 16 characters)	●					
WLAN / Sensor module / External WLAN antenna	● / ○ / ○					
Cellular (4G / 3G) / Revenue Grade Meter	○ / ○**					
Warranty: 10 / 15 / 20 years	●/○/○					
Certificates and approvals	UL 1741, UL 1741 SA incl. Rule 21 RSD, UL 1998, UL 1699B, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA V22.2 107.1-1, HECO SRD-UL-1741-SA-V1.1					
● Standard features ○ Optional features – Not available Data at nominal conditions						
NOTE: US inverters ship with gray lids. * Not compatible with the Power+ Solution Shutdown functionality **Standard in SBX.X-1TP-US-40						
Type designation	SB3.0-1SP-US-40 / SB3.0-1TP-US-40		SB3.8-1SP-US-40 / SB3.8-1TP-US-40		SB5.0-1SP-US-40 / SB5.0-1TP-US-40	
Accessories						

Sensor module MD.SEN-US-40 | External WLAN antenna EXTANT-US-40 | SMA Rooftop Communication Kit ROOFCOMMKIT-P2-US | Revenue Grade Meter Kit RGM05KIT-US-10 | Cellular Modem Kit CELLMODKIT-US-10



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

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

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

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Date: 2021.06.01 12:31:27
Signature with Seal

PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-03

SUNNY BOY
3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

Value-Added Improvements
- Superior integration with SMA's MLPE Power+ Solution
- World's first Secure Power Supply* now offers up to 2,000 W
- Full grid management capabilities ensure a utility-compliant solution for any market

Reduced Labor
- New Installation Assistant with direct access via smartphone minimizes time in the field
- Advanced communication interface with fewer components creates 50% faster setup and commissioning

Unmatched Flexibility
- SMA's proprietary OptiTrac™ Global Peak technology mitigates shade with ease
- Multiple independent MPPTs accommodate hundreds of stringing possibilities

Trouble-Free Servicing
- Two-part enclosure concept allows for simple, expedited servicing
- Equipped with SMA Smart Connected, a proactive service solution that is integrated into Sunny Portal

SUNNY BOY 3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

Reduce costs across your entire residential business model

The residential PV market is changing rapidly. Your bottom line matters more than ever—so we've designed a superior residential solution to help you decrease costs at every stage of your business operations. The Sunny Boy 3.0-US/3.8-US/5.0-US/6.0-US/7.0-US/7.7-US join the SMA lineup of field-proven solar technology backed by the world's #1 service team, along with a wealth of improvements. Simple design, improved stocking and ordering, value-driven sales support and streamlined installation are just some of the ways that SMA helps your business operate more efficiently. And, Sunny Boy's superior integration with the innovative Power+ Solution means installers have even more flexibility in addressing their toughest challenges. Finally, SMA Smart Connected will automatically detect errors and initiate the repair and replacement process so that installers can reduce service calls and save time and money.

www.SMA-America.com

Technical data	Sunny Boy 6.0-US		Sunny Boy 7.0-US		Sunny Boy 7.7-US	
	208 V	240 V	208 V	240 V	208 V	240 V
Input (DC)						
Max. PV power	8520 Wp		9940 Wp		10905 Wp	
Max. DC Voltage	600 V					
Rated MPP Voltage range	220 - 480 V		245 - 480 V		270 - 480 V	
MPPT operating voltage range	100 - 550 V					
Min. DC voltage / start voltage	100 V / 125 V					
Max. operating input current per MPPT	10 A					
Max. short circuit current per MPPT	18 A					
Number of MPPT tracker / string per MPPT tracker	3 / 1					
Output (AC)						
AC nominal power	5200 W	6000 W	6660 W	7000 W	6660 W	7680 W
Max. AC apparent power	5200 VA	6000 VA	6660 VA	7000 VA	6660 VA	7680 VA
Nominal voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
AC voltage range	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V
AC grid frequency	60 Hz / 50 Hz					
Max. output current	25.0 A	25.0 A	32.0 A	29.2 A	32.0 A	32.0 A
Power factor (cos φ)	1					
Output phases / line connections	1 / 2					
Harmonics	< 4 %					
Efficiency						
Max. efficiency	97.2 %	97.6 %	97.1 %	97.5 %	97.1 %	97.5 %
CEC efficiency	96.5 %	97 %	96.5 %	97 %	96.5 %	97 %
Protection devices						
DC disconnect device / DC reverse polarity protection	● / ●					
Ground fault monitoring / Grid monitoring	●					
AC short circuit protection	●					
All-pole sensitive residual current monitoring unit (RCMU)	●					
Arc fault circuit interrupter (AFCI)	●					
Protection class / overvoltage category	I / IV					
General data						
Dimensions (W / H / D) in mm (in)	535 x 730 x 198 (21.1 x 28.5 x 7.8)					
Packaging Dimensions (W / H / D) in mm (in)	600 x 800 x 300 (23.6 x 31.5 x 11.8)					
Weight / packaging weight	26 kg (57 lb) / 30 kg (66 lb)					
Temperature range: operating / non-operating	-25°C ...+60°C / -40°C ...+60°C					
Environmental protection rating	NEMA 3R					
Noise emission (typical)	39 dB(A)		45 dB(A)			
Internal power consumption at night	< 5 W					
Topology / Cooling concept	Transformerless / Convection		Transformerless / Fan			
Features						
Ethernet ports	2					
Secure Power Supply	●*					
Display (2 x 16 characters)	●					
WLAN / Sensor module / External WLAN antenna	● / o / o					
Cellular (4G / 3G) / Revenue Grade Meter	o / o**					
Warranty: 10 / 15 / 20 years	●/o/o					
Certificates and approvals	UL 1741, UL 1741 SA incl. Rule 21 RSD, UL 1998, UL 1699B, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA V22.2 107.1-1, HECO SRD-UL-1741-SA-V1.1					
● Standard features o Optional features – Not available Data at nominal conditions NOTE: US inverters ship with gray lids. * Not compatible with the Power+ Solution Shutdown functionality						
NOTE: US inverters ship with gray lids. * Not compatible with the Power+ Solution Shutdown functionality **Standard in SBX.X-1TP-US-40						
Type designation	SB6.0-1SP-US-40 / SB6.0-1TP-US-40		SB7.0-1SP-US-40 / SB7.0-1TP-US-40		SB7.7-1SP-US-40 / SB7.7-1TP-US-40	

POWER+ SOLUTION

The SMA Power+ Solution combines legendary SMA inverter performance and intelligent DC module-level electronics in one cost-effective, comprehensive package. This means that you can achieve maximum solar power production for your customers while also realizing significant installation savings.

NEW! Advanced communication interface allows for 50% faster setup and commissioning thanks to reduced components and a simplified process.

Visit www.SMA-America.com for more information.

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

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PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

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PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-04

POWERWALL

Tesla Powerwall is a fully-integrated AC battery system for residential or light commercial use. Its rechargeable lithium-ion battery pack provides energy storage for solar self-consumption, time-based control, and backup.

Powerwall's electrical interface provides a simple connection to any home or building. Its revolutionary compact design achieves market-leading energy density and is easy to install, enabling owners to quickly realize the benefits of reliable, clean power.

PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240 V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Total Energy[1]	14 kWh
Usable Energy[1]	13.5 kWh
Real Power, max continuous[2]	5 kW (charge and discharge)
Real Power, peak (10 s, off-grid/backup)[2]	7 kW (charge and discharge)
Apparent Power, max continuous	5.8 kVA (charge and discharge)
Apparent Power, peak (10 s, off-grid/backup)	7.2 kVA (charge and discharge)
Maximum Supply Fault Current	10 kA
Maximum Output Fault Current	32 A
Overcurrent Protection Device	30 A
Imbalance for Split-Phase Loads	100%
Power Factor Output Range	+/– 1.0 adjustable
Power Factor Range (full-rated power)	+/– 0.85
Internal Battery DC Voltage	50 V
Round Trip Efficiency[1,3]	90%
Warranty	10 years

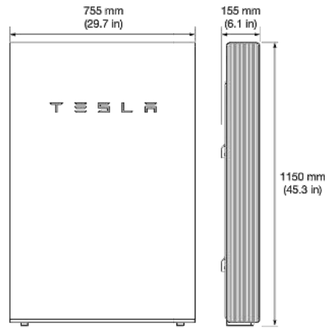
[1]Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
[2]In Backup mode, grid charge power is limited to 3.3 kW.
[3]AC to battery to AC, at beginning of life.

COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 1973, UL 9540, IEEE 1547, UN 38.3
Grid Connection	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)

MECHANICAL SPECIFICATIONS

Dimensions	1150 mm x 755 mm x 155 mm (45.3 in x 29.7 in x 6.1 in)
Weight	125 kg (276 lbs)
Mounting options	Floor or wall mount

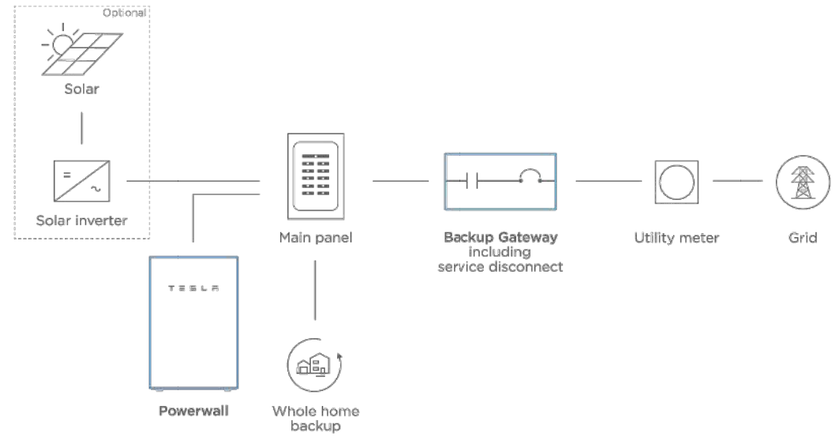


ENVIRONMENTAL SPECIFICATIONS

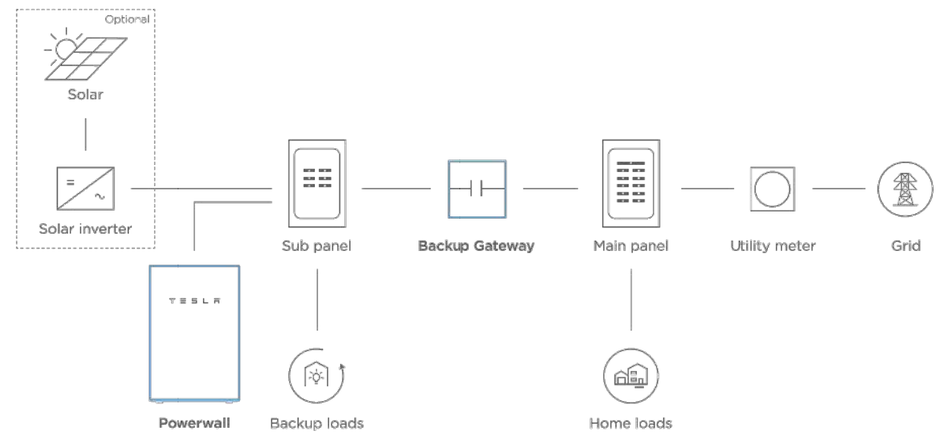
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Optimum Temperature	0°C to 30°C (32°F to 86°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	–20°C to 30°C (–4°F to 86°F) Up to 95% RH, non-condensing State of Energy (SoE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring Compartment)
Wet Location Rating	Yes
Noise Level @ 1m	< 40 dBA at 30°C (86°F)

TYPICAL SYSTEM LAYOUTS

WHOLE HOME BACKUP



PARTIAL HOME BACKUP



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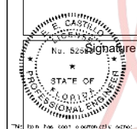
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.



Digitally Signed by: Ermocrates E Castillo
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Signature not Seal

PROJECT NAME

JONES RESIDENCE
421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-05

POWERWALL
Backup Gateway 2

The Backup Gateway 2 for Tesla Powerwall provides energy management and monitoring for solar self-consumption, time-based control, and backup.

The Backup Gateway 2 controls connection to the grid, automatically detecting outages and providing a seamless transition to backup power. When equipped with a main circuit breaker, the Backup Gateway 2 can be installed at the service entrance. When the optional internal panelboard is installed, the Backup Gateway 2 can also function as a load center.

The Backup Gateway 2 communicates directly with Powerwall, allowing you to monitor energy use and manage backup energy reserves from any mobile device with the Tesla app.

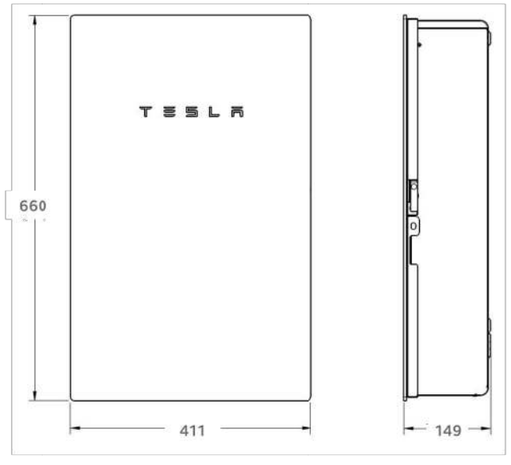
PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Current Rating	200 A
Maximum Input Short Circuit Current	10 kA[1]
Overcurrent Protection Device	100-200A; Service Entrance Rated[1]
Overvoltage Category	Category IV
AC Meter	Revenue accurate (+/– 0.2 %)
Primary Connectivity	Ethernet, Wi-Fi
Secondary Connectivity	Cellular (3G, LTE/4G)[2]
User Interface	Tesla App
Operating Modes	Support for solar self-consumption, time-based control, and backup
Backup Transition	Automatic disconnect for seamless backup
Modularity	Supports up to 10 AC-coupled Powerwalls
Optional Internal Panelboard	200A 6-space / 12 circuit Eaton BR Circuit Breakers
Warranty	10 years

[1] When protected by Class J fuses, Backup Gateway 2 is suitable for use in circuits capable of delivering not more than 22kA symmetrical amperes.
[2] The customer is expected to provide internet connectivity for Backup Gateway 2; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

MECHANICAL SPECIFICATIONS

Dimensions	660 mm x 411 mm x 149 mm (26 in x 16 in x 6 in)
Weight	20.4 kg (45 lb)
Mounting options	Wall mount, Semi-flush mount



COMPLIANCE INFORMATION

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS CSA 22.2 0.19, CSA 22.2 205
Emissions	FCC Part 15, ICES 003

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

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421 SE ALFRED MARKHAM ST,
LAKE CITY, FL 32025

SHEET NAME
DATA SHEET

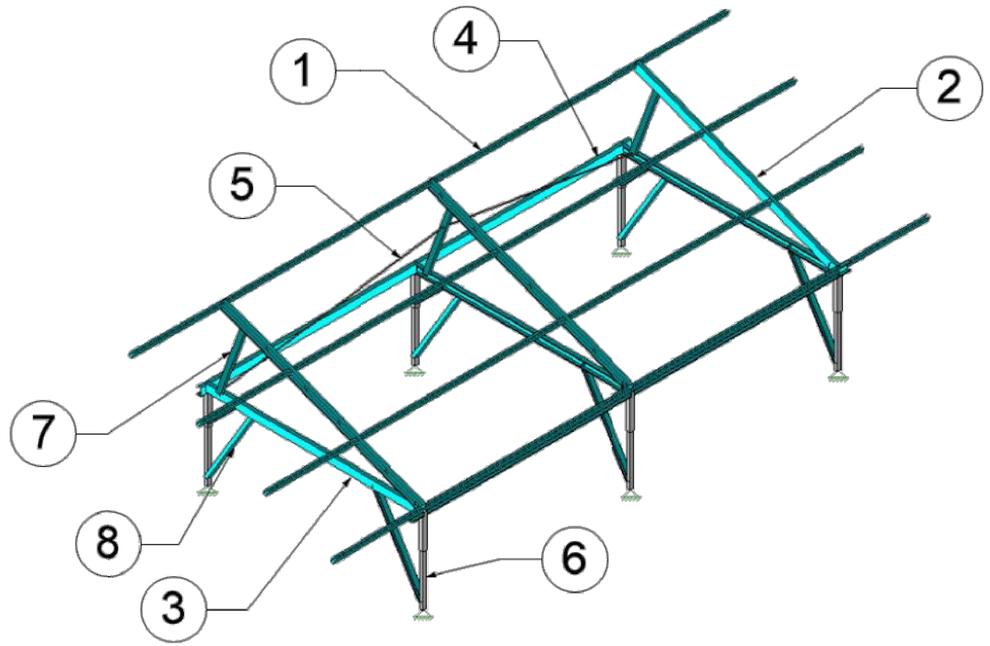
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-06

ENGINEERED POWER SOLUTIONS

1405 SPRING STREET, SUITE 204
PASO ROBLES, CA 93446
(805) 423-1326

2x8 Osprey Unit



#	Component	Standard (STD)	Heavy Duty (HD)	Extra Heavy Duty (XHD)	High Snow Load (HSL)
1	Rails	1-5/8"x1-5/8"x14 ga. Strut (80 ksi)	1-5/8"x2-7/16"x14 ga. Strut (80 ksi)	1-5/8"x2-7/16"x14 ga. Strut (80 ksi)	1-3/4"x2-7/16"x12 ga. Strut (80 ksi)
2	Strongback	2"x4"x16 ga. Channel (50 ksi)	2"x4"x14 ga. Channel (50 ksi)	2"x4"x12 ga. Channel (50 ksi)	2"x4"x12 ga. Channel (50 ksi)
3	Chassis Stud	2"x4"x16 ga. Channel (50 ksi)	2"x4"x14 ga. Channel (50 ksi)	2"x4"x12 ga. Channel (50 ksi)	2"x4"x12 ga. Channel (50 ksi)
4	Chassis Rail	2"x4"x16 ga. Channel (50 ksi)	2"x4"x14 ga. Channel (50 ksi)	2"x4"x12 ga. Channel (50 ksi)	2"x4"x12 ga. Channel (50 ksi)
5	Cable Brace	3/16" Cable (36 ksi)	3/16" Cable (36 ksi)	3/16" Cable (36 ksi)	3/16" Cable (36 ksi)
6	Post	Telescoping Tube Assembly	Telescoping Tube Assembly	Telescoping Tube Assembly	Telescoping Tube Assembly
7	Backstay	1-5/8"x1-5/8"x14 ga. Strut (80 ksi)	0-30°: 1-5/8"x1-5/8"x14 ga. Strut (80 ksi) 35-45°: 1-5/8"x1-5/8"x12 ga. Strut (50 ksi)	0-30°: 1-5/8"x1-5/8"x14 ga. Strut (80 ksi) 35-45°: 1-5/8"x1-5/8"x12 ga. Strut (50 ksi)	0-30°: 1-5/8"x1-5/8"x14 ga. Strut (80 ksi) 35-45°: 1-5/8"x1-5/8"x12 ga. Strut (50 ksi)
8	Chassis Brace	Telescoping Tube Assembly	Telescoping Tube Assembly	Telescoping Tube Assembly	Telescoping Tube Assembly

*Standard Units use the Chassis Brace on the back legs only.
**Standard Units use 12”x12”x1/4” baseplates. All other units use 18”x18”x1/4” baseplates

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LAKE CITY, FL 32025

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-07

TLA4 Anchor

GRIPPLE

Product Data Sheet

Terra-Lock™ Earth Percussion Anchors are designed to provide drive efficiency and maximize load capacity across a wide range of applications. The Terra-Lock™ A4 Anchor is Gripple's largest anchor. It is made of corrosion resistant Zinc Aluminum and will provide the holding capacity your project needs for many years.

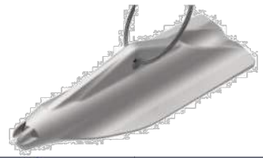
Component	Type	Material	Test Method	Physical Properties
Anchor Head	TLA4	Zinc-Aluminum Alloy - ZA 2 (1)	ASTM B-240-10	6.50" x 2.36" x 1.40" (L x W x H) Bearing Area: 12 in^2

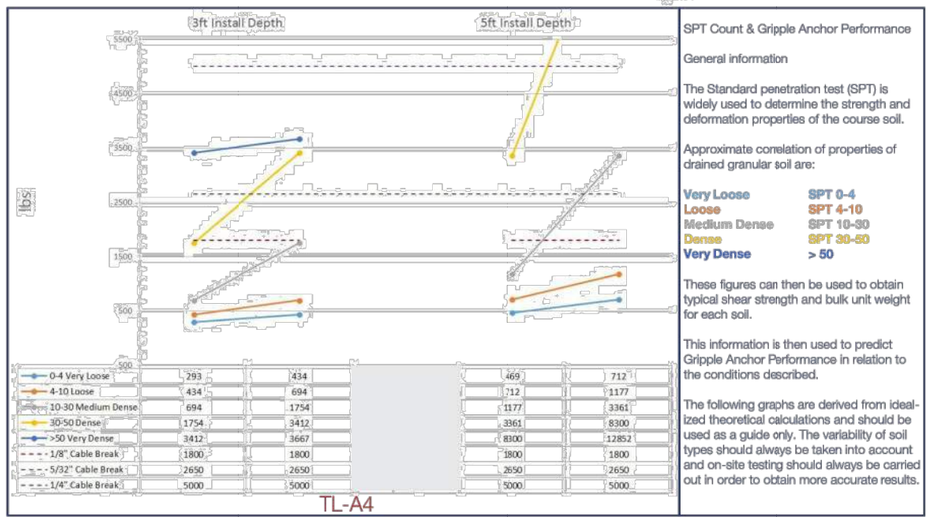
(1) Corrosion resistant pressure die cast zinc alloy

Performance Properties	Value	Data
Typical Anchor Load Range(2)	lbs	500 – 2,300
Maximum Working Load(2)	lbs	2,520
Ultimate Anchor Pull Out(3)	lbs	8,300

(2) Values are soil dependent; See graph on the following page.

(3) Value based on an install depth of 5ft in very dense soil.





SPT Count & Gripple Anchor Performance

General information

The Standard penetration test (SPT) is widely used to determine the strength and deformation properties of the course soil.

Approximate corelation of properties of drained granular soil are:

Very Loose	SPT 0-4
Loose	SPT 4-10
Medium Dense	SPT 10-30
Dense	SPT 30-50
Very Dense	> 50

These figures can then be used to obtain typical shear strength and bulk unit weight for each soil.

This information is then used to predict Gripple Anchor Performance in relation to the conditions described.

The following graphs are derived from idealized theoretical calculations and should be used as a guide only. The variability of soil types should always be taken into account and on-site testing should always be carried out in order to obtain more accurate results.

www.gripple.com

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Tel +1 866 474 7753 Fax +1 800 654 0689 email grippleinc@gripple.com

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SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-08