9240 Limonite Ave.
Jurupa Valley, CA 92509
(909) 566-0066

24-03399

Re: The Vinyard Residence

Project Address: 9325 Sw Tustenuggee Ave Lake City , FL 32024

To whom it may concern:

I have reviewed the following information regarding photovoltaic module installation on the roof of the above referenced home:

Design drawings of the proposed PV system layout, including details to mount the new solar panels to the existing roof prepared for Better Earth.

Based on the above information, I have evaluated the structural capacity of the existing roof system to support the additional loads imposed by the solar panels and have the following comments related to my review and evaluation:

A. Description of Residence:

The existing residence is typical wood framing construction. All wood material utilized for the roof system is assumed to be SP #2 or better with standard construction components and consists of the following:

- Roofing: Metal Paneling
- Roof framing : 1x2 Trusses at 24 in. on center.

B. Loading Criteria - FBC 2023, ASCE 7-16, IRC SECTION R324

Dead Load:

2.0	PSF	Metal Paneling roofing
1.5	PSF	1/2" Plywood
1.5	PSF	1x2 Trusses
3.0	PSF	Proposed Solar Panels/Mounting Hardware

8.0 PSF = Roof Dead Load

20.0 PSF = Roof Live Load

156 mph Design Wind Speed (3-second gust) Risk Category II

0 PSF = Snow Load (Based on local requirements)

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C. Framing

Per the FBC 2023 , 1x2 SP #2 lumber at 24 in. on center with 10 psf dead load shall not exceed 7'-9" in unsupported span length.

D. Solar Panel Racking and Anchorage

1 The solar panels shall be mounted in accordance with the most recent "Unirac Flush Mount Installation Manual", which can be found on the Unirac Solar website (www.unirac.com).

2 Per the U-Builder Project Report, dated 01-20-21 and sealed by Paul K. Zacher, the maximum anchor spacing for 160 mph wind speed, 0 psf ground snow load, exposure C, and roof pitch of 7-27° is 64 in. O.C. which can be found on the Unirac Solar website (www.unirac.com).

3 Maximum allowable pullout per ICC ESR-1976 for a 1/4-14 HWH TEK self tapping screw is 273 lbs. Please see anchorage calculations on the following page. Maximum anchor spacing of 4 ft. is adequate.

4 Racking supports shall be staggered to the roof framing for best lifetime performance of the system.

E. Summary

Based on the information herein and attached to this letter, it is my professional opinion that the proposed installation of the roof mounted photovoltaic modules at the project referenced is structurally adequate and meets or exceeds current industry practices and standards.

F. Limitations

Installations of solar modules and related equipment must be performed in accordance with manufacturer recommendations, local codes, local regulations, industry best practices, and applicable safety standards. Owner and/or Contractor must notify Engineer should any damage, deterioration, or discrepancies between current condition of the structure or otherwise as this letter describes before proceeding with construction. This letter applies only to regions of the structure where solar modules will be supported and the supporting elements.

Please do not hesitate to contact me should you have any comments or questions.
Sincerely,

Ryan McPherson, P.E.
Lic. 91670

(909) 566-0066
se@mcpe.group

Ryan J McPherson

Digitally signed by Ryan J McPherson
DN: CN=Ryan J McPherson, ...
Reason: I have reviewed this document
Date: 2024.07.23 15:49:55-07'00'

RYAN JAMES McPHERSON
LICENSE
No. 91670
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

EXP. 2/28/25

This item has been digitally signed and sealed by Ryan McPherson, PE, on Jul 22, 2024

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Wind Uplift Anchorage

Rooftop Solar Panels Wind Pressures (ASCE 7 - Section 29.4)

V_{ult} =	156.0	mph	K_{zt} =	1.00	(sec 26.8.2)	h = 15	ft
Exposure Category =	C		K_z =	0.85	(sec 26.10.1)		
Roof Zone =	2		K_d =	0.85	(sec 26.6)		
Panel θ =	7-27	deg	K_e =	1.00	(sec 26.9)		
qh = 0.00256 Kz Kzt Kd Ke V			q_h =	45.01	(eq. 26.10-1)		
GP_p =	-2	uplift					

Flush Mounted Panels - ASCE Section 29.4.4 (where applicable)

γ_E =	1.5	FIG 29.4-7)	γ_c =	0.97	(fig 29.4-7)	hpt = 0	
γ_a =	0.76	(fig 29.4-8)	γ_p =	0.9	(fig 29.4-7)	ω =	0.00 deg (panel tilt)
GP_p =	-2	uplift	GC_{rm} =	1.4	uplift		

Flat Roof Panels - ASCE Section 29.4.3 (where applicable)

$p = q_h (GP_p) \gamma_E \gamma_a$ (eq 29.4-7)

p = -103.1 p.s.f.

$p = q_h (GC_{rn}) \gamma_E \gamma_C \gamma_p$ (eq 29.4-6)

p = 82.5 p.s.f.

Check Anchorage to Existing Structure

0.6DL - 0.6W controlling load combination (eq. 16-15 for ASD)

DL =	2.8	p.s.f.	dead load of panel (inlcuding rack system)
W =	103.1	p.s.f.	wind load normal to face of panel
$Area_{lag}$ =	12.3	sq. ft.	area tributary to each anchor
SP_{anc} =	4.0	ft.	spacing of anchors

$P_{uplift} = Area_{lag} (0.6DL - 0.6W)$ = 742.3 lbs total uplift on anchor

Material =	0.075	in. thk. stl	anchor material
Dia_{lag} =	1/4-14	in.	diameter of screw
W_{lag} =	273	lb.	withdrawal load per ICC ESR3223
No_{screws} =	3		number of screws in withdrawal

Pallow = Wlag * Noscrews = 819 lbs total allowable withdrawal on anchor

$$\frac{P_{uplift}}{P_{allow}} = \mathbf{0.91} \quad \mathbf{< 1.00} \quad \textbf{Anchor is OK!}$$

Anchorage = USE (1) S-5! VERSA BRACKET W/ (3) 1/4"-14 'HWH' SELF TAPPING TEK SCREWS

McPherson Engineering	Battery/Stud Wall Check	By:

PROPERTIES:

$h_{max} := 9ft$ max. stud height

$W_{pwrwl} := 400lb$ max weight of battery pack

$SP := 16in$ spacing of studs

SEISMIC LOADS: ASCE 7-16

Seismic Ground Motion Values

$Site\_Class := D$ Site Class (Section 11.4.2)

$S_s := 0.081$ Short-period Spectral Response Acceleration

$S_1 := 0.049$ 1-Sec Period Spectral Response Acceleration

$F_a := 1.2$ TABLE 11.4-1 $F_v := 1.7$ TABLE 11.4-2

$S_{DS} := \frac{2}{3} \cdot F_a \cdot S_s$ $S_{DS} = 0.1$ Short Period Design Spectral Acceleration Parameter (Eq. 11.4-3)

$S_{D1} := \frac{2}{3} \cdot F_v \cdot S_1$ $S_{D1} = 0.1$ 1-Sec Period Design Spectral Acceleration Parameter (Eq. 11.4-4)

ASCE 7-16 Section 13.6 Mechanical and Electrical Components:

$a_p := 1$ $R_p := 2.5$ $\Omega_0 := 1.5$ Table 13.6-1 $I_p := 1$ Section 13.1.3

$z := 4.5 = 4.5$ $h := 15 = 15$ $W_p := W_{pwrwl} = 400\,lb$

$$F_p := \frac{0.4 \cdot a_p \cdot S_{DS} \cdot W_p}{\left(\frac{R_p}{I_p}\right)} \cdot \left(1 + 2\frac{z}{h}\right)$$

$F_{p\_max} := 1.6 \cdot S_{DS} \cdot I_p \cdot W_{pwrwl} = 41.5\,lb$

$F_{p\_min} := 0.3 \cdot S_{DS} \cdot I_p \cdot W_{pwrwl} = 7.8\,lb$

$F_p = 7.8\,lb$ design seismic force

STUD LOADING:

$DL_r := 20psf$ roof dead load

$LL_r := 20psf$ roof live load

$DL := 0psf$ floor dead load

$LL := 0psf$ floor live load

$DL_w := 15psf$ wall dead load

$trib\_w := 12.50ft$ maximum tributary width of framing on wall

$w_{dl\_r} := DL_r \cdot trib\_w \cdot SP = 333.3\,lb$

$w_{ll\_r} := LL_r \cdot trib\_w \cdot SP = 333.3\,lb$

$w_{dl} := DL \cdot trib\_w \cdot SP = 0$

$w_{ll} := LL \cdot trib\_w \cdot SP = 0$

$V_{max} := \frac{F_p}{2} = 3.9\,lb$ maximum lateral seismic force (2 studs required for mounting)

$w_{wl} := DL_w \cdot 2h_{max} \cdot SP = 360\,lb$ $w_{wl} + w_{dl} + w_{dl\_r} = 693.3\,lb$ (ENERCALC INPUT - STUD CHECK)

McPherson Engineering	Battery/Stud Wall Check	By:

ATTACHMENT TO WOOD WALL:

$D := \frac{1}{4}in$ diam. of screw $No_{lags} := 4$ number of lags

$\frac{F_p}{No_{lags}} = 1.9\,lb$ withdrawl force of 4 lag bolts

$W := 258\frac{lb}{in}$ pounds per inch of thread penetration (Table 12.2A NDS)

$p := 1.5in$ thr'd length of screw

$F_a := W \cdot p = 387\,lb$ $Z_{ll} := 150lb$ $\frac{p}{D} = 6$ reduce lag shear capacity by for embed. depth

$\frac{F_a \cdot No_{lags}}{F_p} = 199.1$ **> 1.0**

$\frac{Z_{ll} \cdot \frac{p}{8 \cdot D} \cdot No_{lags}}{W_p} = 1.1$ **> 1.0**

USE (4) 1/4" LAG BOLTS WITH 1.5" MIN. PENETRATION TO (E) STUDS, combined withdrawal and shear loading condition is OK by inspection

UNLOADED EDGE DISTANCE:

$Lag_{diam} := \frac{1}{4}in$ diam. of screw

$D_{edge} := 1.5 \cdot Lag_{diam}$ $D_{edge} = 0.4 \cdot in$ Required edge distance PER NDS 2018 TABLE 12.5.1E

$2 \cdot D_{edge} + Lag_{diam} = 1 \cdot in$ Total width required

Unloaded edge condition based on drywall, plaster, or plywood walls utilized for stabilizing weak axis bending on studs

USE 2x STUD MINIMUM

STUD CONNECTION @ TOP/BOTTOM PLATE:

$Z := 141lb$ NDS Table 11-N, for 1in Side Member Penetration w/ 16d Common Toe-Nails

$C_{tn} := 0.83$ Toe-Nail factor (NDS 11.5.4) $Z' := Z \cdot C_{tn}$ $Z' = 117\,lb$

$No_{nails} := 2$ Typical number of nails used for stud to top/bottom plate

$Z_a := Z' \cdot No_{nails}$ $Z_a = 234.1\,lb$ Shear capacity for (2) 16d common toenails

$R_{stud} := 16lb$ Reaction per enercalc stud check

$\frac{R_{stud}}{Z_a} = 0.07$ **< 1.0**

McPherson Engineering
92440 Limonite Ave.
Jurupa Valley, CA 92509
(909) 566-0066
SE@MCPE.Group

Project Title:
Engineer:
Project ID:
Project Descr: McPherson Engineering

Wood Column

Project File: wall stud check_backup_1 - Copy.ec6

DESCRIPTION: stud check

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2012

General Information

Analysis Method	Allowable Stress Design		
End Fixities	Top Fixed, Bottom Fixed		
Overall Column Height	9 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir - Larch		
Wood Grade	No.2		
Fb +	900.0 psi	Fv	180.0 psi
Fb -	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	31.20 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Wood Section Name	**2x4**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**1.50** in	Allow Stress Modification Factors	
Exact Depth	**3.50** in	Cf or Cv for Bending	1.50
Area	5.250 in^2	Cf or Cv for Compressio	1.150
Ix	5.359 in^4	Cf or Cv for Tension	1.50
Iy	0.9844 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis : Fully braced against buckling ABOUT X-X Axis

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 10.238 lbs * Dead Load Factor
AXIAL LOADS . . .
Gravity: Axial Load at 9.0 ft, D = 0.6930, Lr = 0.3330 k
BENDING LOADS . . .
Battery: Lat. Point Load at 4.50 ft creating Mx-x, E = 0.010 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1271 : 1**

Load Combination	+D+Lr
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	1.036 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,552.50 psi

PASS Maximum Shear Stress Ratio = **0.005556 : 1**

Load Combination	+D+0.70E
Location of max.above base	9.0 ft
Applied Design Shear	1.0 psi
Allowable Shear	180.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0050 k	Bottom along Y-Y	0.0050 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.007652 in at 4.530 ft above base
for load combination : E Only

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	1.000	1.000	0.08628	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+Lr	1.000	1.000	0.1271	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750Lr	1.000	1.000	0.1169	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.70E	1.000	1.000	0.08628	PASS	0.0 ft	0.005556	PASS	9.0 ft
+D+0.5250E	1.000	1.000	0.08628	PASS	0.0 ft	0.004167	PASS	9.0 ft
+0.60D	1.000	1.000	0.05177	PASS	0.0 ft	0.0	PASS	9.0 ft
+0.60D+0.70E	1.000	1.000	0.05177	PASS	0.0 ft	0.005556	PASS	9.0 ft

McPherson Engineering
92440 Limonite Ave.
Jurupa Valley, CA 92509
(909) 566-0066
SE@MCPE.Group

Project Title:
Engineer:
Project ID:
Project Descr: McPherson Engineering

Wood Column

Project File: wall stud check_backup_1 - Copy.ec6

LIC# : KW-06013840, Build:20.22.10.25 McPherson Engineering

DESCRIPTION: stud check

Maximum Reactions

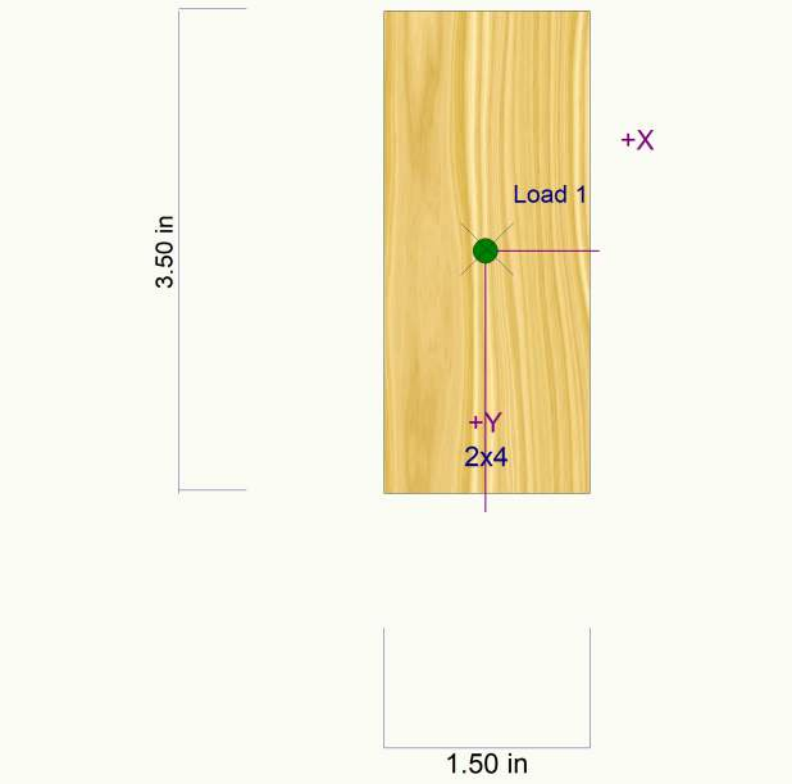
Note: Only non-zero reactions are listed.

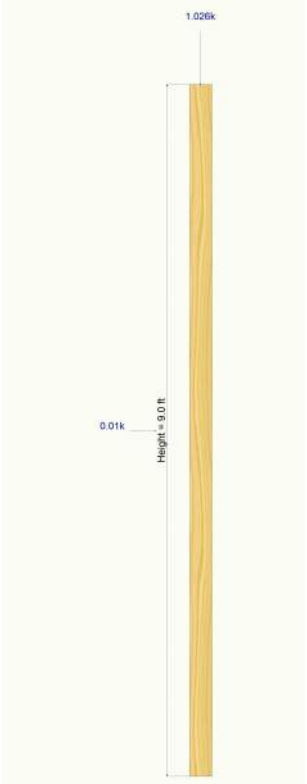
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						0.703					
+D+Lr						1.036					
+D+0.750Lr						0.953					
+D+0.70E				0.004	0.004	0.703				0.008	-0.008
+D+0.5250E				0.003	0.003	0.703				0.006	-0.006
+0.60D						0.422					
+0.60D+0.70E				0.004	0.004	0.422				0.008	-0.008
Lr Only						0.333					
E Only				0.005	0.005					0.011	-0.011

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E	0.0000 in	0.000 ft	0.005 in	4.530 ft
+D+0.5250E	0.0000 in	0.000 ft	0.004 in	4.530 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.005 in	4.530 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.008 in	4.530 ft

Sketches





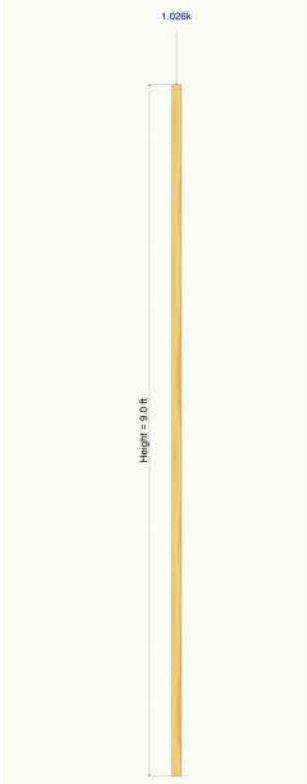


TABLE OF CONTENTS

PROPERTY INFORMATION

OWNER:	Arnold Vinyard
PHONE:	1386-965-5846
EMAIL:	arnoldvinyard85@gmail.com
CONTRACTOR:	BETTER EARTH ELECTRIC INC.
PHONE:	(888) 373-9379
AUTHORITIES HAVING JURISDICTION	
BUILDING:	LAKE CITY (FL)
UTILITY:	CLAY ELECTRIC COOPERATIVE

DESIGN SPECIFICATIONS	
OCCUPANCY:	R-3/U
CONSTRUCTION:	V-B
NAME:	RESIDENTIAL
SNOW LOAD:	0 PSF
WIND EXPOSURE:	C
WIND SPEED:	156 MPH
ROOF SURFACE:	2073 SQ.FT.
PV SQ FOOTAGE:	359.1 SQ.FT.
PV COVERAGE:	17.32 %
WEIGHT OF EQUIPMENT:	810.7 LBS
WEIGHT PER ATTACHMENT:	25.33 LBS
DISTRIBUTED WEIGHT:	2.26 PSF
NO. OF STORIES:	1
FIRE SPRINKLERS:	NO

LOT INFORMATION	
APN:	325S1709477112
LOT AREA:	47044.8
LIVING AREA:	1248

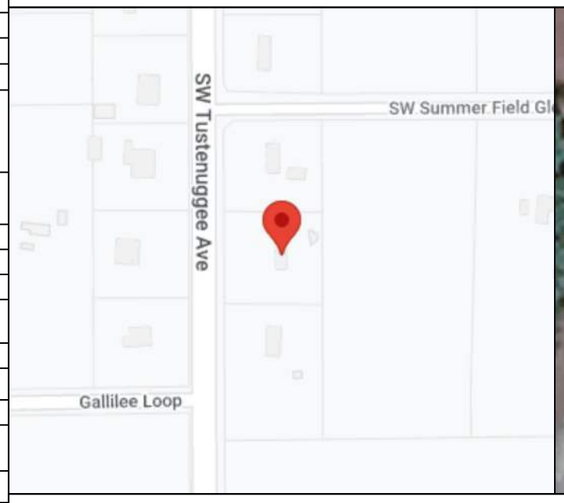
Arnold Vinyard

9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024

APN: 325S1709477112

SYSTEM SIZE: 6970 DC

SYSTEM SIZE: 6000 AC



PROJECT DETAILS

MODULE INFORMATION	
MODULE QTY:	17
MODULE MFG:	QCELLS NORTH AMERICA
MODULE TYPE:	Q.PEAK DUO BLK ML-G10+ 410

INVERTER INFORMATION	
INVERTER MFG:	SOLAREDGE
INVERTER QTY:	1
INVERTER MODEL:	6000H-US (ENERGY HUB)
INVERTER TYPE:	RGM
INVERTER VOLTAGE:	240V

POWER OPTIMIZER INFORMATION	
OPTIMIZER QTY:	17
OPTIMIZER MFG:	SOLAREDGE
OPTIMIZER TYPE:	S500

MOUNTING INFORMATION	
MOUNT FLASHING QTY:	32
MOUNT FLASHING MFG:	UNIRAC
MOUNT FLASHING TYPE:	S-5! VERSABRACKET

RAILING INFORMATION	
RAILING MFG:	UNIRAC
RAILING TYPE:	UNIRAC SM LIGHT

ENERGY STORAGE SYSTEM INFORMATION	
BATTERY QTY:	1
BATTERY MFG:	FRANKLIN WH
BATTERY TYPE:	APOWER X - 13.6kWh

EXISTING SOLAR INFORMATION - N/A

JURISDICTION STAMPS:

Ryan J McPherson

RYAN JAMES McPHERSON
LICENSE
No. 91670
STATE OF FLORIDA
PROFESSIONAL ENGINEER

EXP. 2/28/25

This item has been digitally signed and sealed by Ryan McPherson, PE, on Jul 22, 2024

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

ADDITIONAL SCOPE OF WORK

MAIN PANEL UPGRADE: N/A

DERATE MAIN BREAKER: N/A

UPSIZE MAIN BREAKER: N/A

EV CHARGER: N/A

ESS: OUTDOORS ON EXTERIOR WALL - (1) FRANKLIN WH APOWER X AT 13.6kWh EACH

BATTERY TO BE INSTALLED AT LEAST 3' FROM WINDOWS, DOORS, VENTS, AND GAS.

ESS IS NOT SUBJECT TO VEHICLE IMPACT.

INSTALLER NOTES:

BETTER EARTH ELECTRIC INC.
4040 N COMBEE ROAD, STE. 12
LAKELAND, FL 33805

PHONE #: (888) 373-9379
LIC #: 13011324

Roger Gaydou

NEW PV SYSTEM: 6970W DC / 6000W AC

Arnold Vinyard
9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024

APN: 325S1709477112

DRAWING TITLE: **COVER SHEET**

DRAWING PAGE: **001 CS**

DATE: 7/10/2024	TIME: 05:29 PM	DESIGNER: TAYLOR BICKFORD	DESIGNER SIGNATURE: Taylor Bickford	SCALE:

GENERAL NOTES

1. THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE 2020 NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES
2. THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
3. ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4: PV MODULES: UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519 COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY
4. NEC REFERS SPECIFICALLY TO "UNGROUNDED" PV SYSTEMS. ALSO DESIGNATED AS "TRANSFORMERLESS" BY INVERTER MANUFACTURERS AND "NON-ISOLATED" BY UNDERWRITERS LABORATORY
5. INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE LISTED FOR THIS USE
6. AS SPECIFIED BY THE AHJ, EQUIPMENT USED IN UNGROUNDED SYSTEMS LABELED ACCORDING TO NEC
7. MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7
8. ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3]
9. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ
10. SOLAR PV MODULES (PANELS) CANNOT BE INSTALLED OVER OR BLOCK ANY ATTIC VENTS, PLUMBING VENTS, FURNACE OR WATER HEATER VENTS ETC
11. ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY
12. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. GROUND MOUNTED SYSTEMS, WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF OF THE ROOF SURFACE

JURISDICTION NOTES

ELECTRICAL NOTES

1. PV SOURCE CIRCUIT(S) ARE TO BE SUNLIGHT-RESISTANT PV-WIRE AS PERMITTED BY CEC 690.31(B).
2. ALL DIRECT CURRENT CIRCUITS ARE TO BE INSTALLED IN METAL RACEWAY FROM THE POINT OF PENETRATION OF THE SURFACE OF THE BUILDING OR STRUCTURE TO THE MAIN SERVICE PANEL AS MANDATED BY NEC 690.31(E).
3. WEATHERPROOF J-BOX – NEMA 3R.
4. ROOFTOP CONDUIT SHALL BE A MINIMUM OF 7/8" ABOVE THE ROOF SURFACE.
5. ALL WORK SHALL COMPLY WITH THE 2020 NATIONAL ELECTRICAL CODE AND 2020 FL STATE AMENDMENTS

CODE REFERENCES

2020 NATIONAL ELECTRIC CODE - NFPA 70
8TH EDITION 2020 FLORIDA BUILDING CODE - RESIDENTIAL
8TH EDITION 2020 FLORIDA BUILDING CODE - BUILDING
8TH EDITION 2020 FLORIDA BUILDING CODE - ENERGY
8TH EDITION 2020 FLORIDA BUILDING CODE - TEST PROTOCOL
8TH EDITION 2020 FLORIDA BUILDING CODE - PLUMBING
8TH EDITION 2020 FLORIDA BUILDING CODE - MECHANICAL
8TH EDITION 2020 FLORIDA BUILDING CODE - EXISTING BUILDING
8TH EDITION 2020 FLORIDA BUILDING CODE - FUEL GAS
8TH EDITION 2020 FLORIDA BUILDING CODE - ACCESSIBILITY
8TH EDITION 2020 FLORIDA FIRE PREVENTION CODE
FAIR HOUSING GUIDELINES

UTILITY NOTES

JURISDICTION STAMPS:

CONSTRUCTION NOTES

1. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
2. ALL OUTDOOR EQUIPMENT SHALL BE RAIN TIGHT WITH MINIMUM NEMA 3R RATING.
3. ALL LOCATIONS ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION.
4. THE SOLAR INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING OR MECHANICAL VENTS.
5. A LADDER WILL BE IN PLACE FOR INSPECTIONS IN COMPLIANCE WITH OSHA REGULATIONS.
6. MODULE MOUNTING STRUCTURE WILL BE TIED DIRECTLY INTO STRUCTURAL ELEMENTS OF SINGLE FAMILY DWELLING ROOF TRUSSES / RAFTERS OR BEAMS ACCORDING TO MOUNTING STRUCTURE DIRECTIONS.
7. ROOF COVERING PENETRATIONS SHALL BE DESIGNED, INSTALLED AND MAINTAINED IN ACCORDANCE WITH BUILDING CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERINGS SHALL SERVE TO PROTECT THE BUILDING STRUCTURE.
8. CONDUIT, WIRING SYSTEMS, AND RACEWAYS FOR PHOTOVOLTAIC CIRCUITS SHALL BE LOCATED AS CLOSE AS POSSIBLE TO THE RIDGE, HIP, OR VALLEY. THIS EQUIPMENT SHALL ALSO BE LOCATED AS CLOSE AS POSSIBLE TO AN OUTSIDE WALL TO REDUCE TRIP HAZARDS AND MAXIMIZE VENTILATION OPPORTUNITIES.
9. MODULES MUST HAVE 6" CLEARANCE FROM ALL VENTS AND OBSTRUCTIONS.

RYAN JAMES McPHERSON
LICENSE
No. 91670
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

EXP. 2/28/25

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Ryan J McPherson

better earth
BETTER EARTH ELECTRIC INC.
4040 N COMBEE ROAD, STE. 12
LAKELAND, FL 33805
PHONE #: (888) 373-9379
LIC #: 13011324
Roger Gaydou

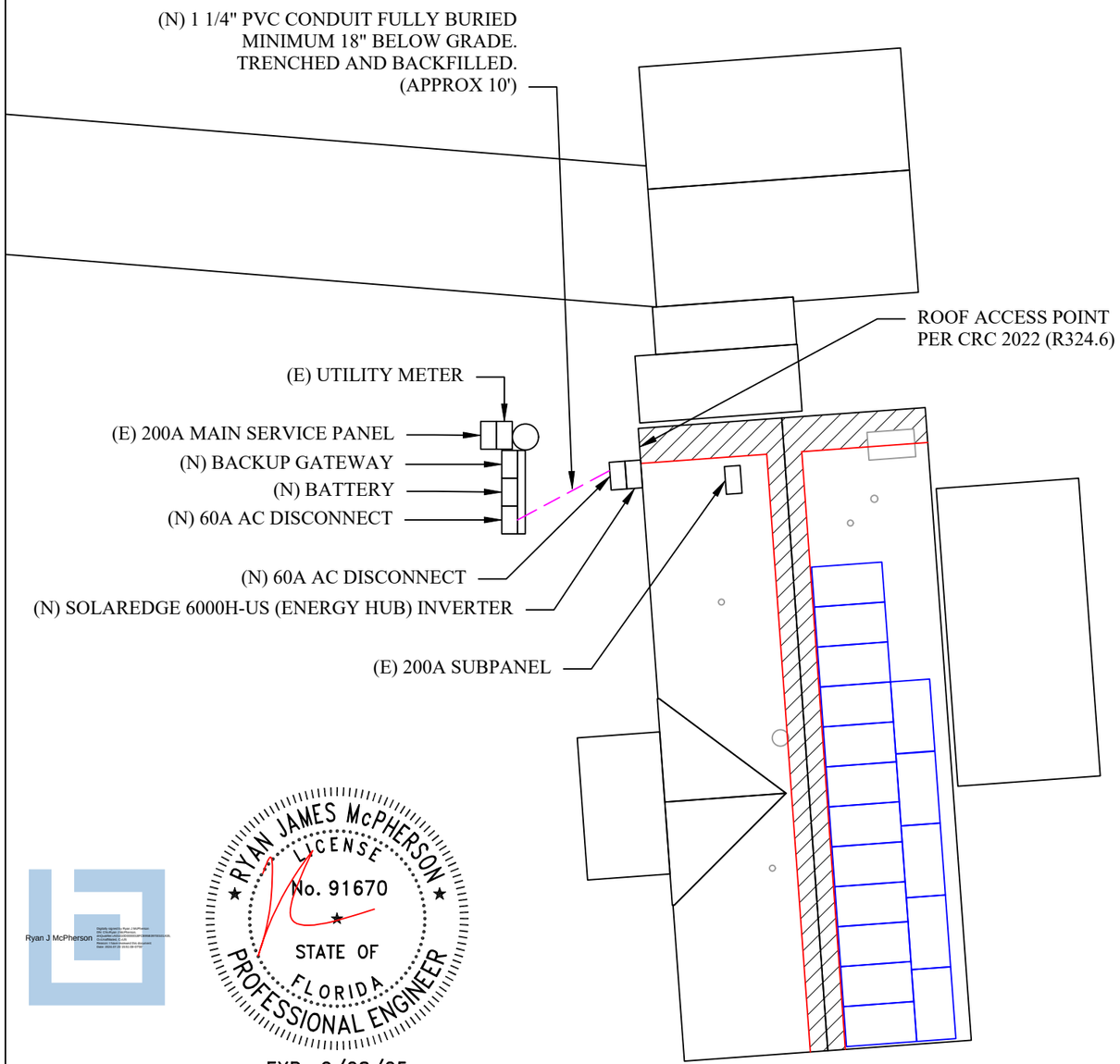
NEW PV SYSTEM: 6970W DC / 6000W AC

Arnold Vinyard
9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024
APN: 325S1709477112

DRAWING TITLE: **NOTES SHEET**

DRAWING PAGE: **002 NS1**

DATE: 7/10/2024	TIME: 05:29 PM	DESIGNER: TAYLOR BICKFORD	DESIGNER SIGNATURE: Taylor Bickford	SCALE:



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JURISDICTION STAMPS:

NOTES:

MODULE QTY: 17
MODULE MFG: QCELLS NORTH AMERICA
MODULE TYPE: Q.PEAK DUO BLK ML-G10+ 410

BETTER EARTH ELECTRIC INC.
4040 N COMBEE ROAD, STE. 12
LAKELAND, FL 33805

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NEW PV SYSTEM: 6970W DC / 6000W AC

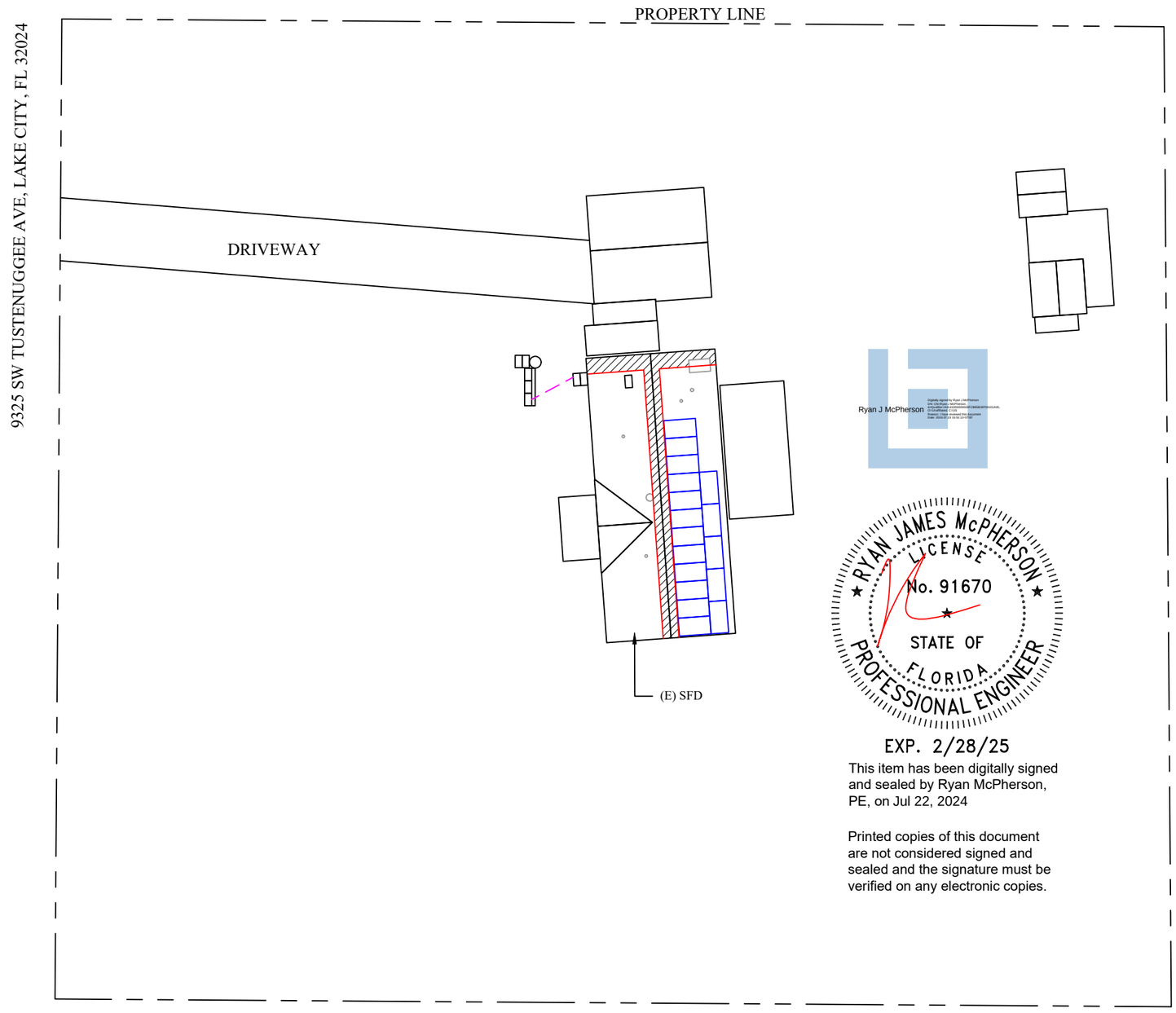
Arnold Vinyard
9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024

APN: 325S1709477112

DRAWING TITLE:
SITE PLAN

DRAWING PAGE:
003 SP1

DATE: 7/10/2024	TIME: 05:29 PM	DESIGNER: TAYLOR BICKFORD	DESIGNER SIGNATURE: Taylor Bickford	SCALE: 1" = 12'



Ryan J McPherson
Digitally signed by Ryan J McPherson
DN: C=US, E=rmcpherson@better.com, CN=Ryan J McPherson
Reason: I have reviewed this document
Date: 2024.07.22 15:56:13-04'00'

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PROFESSIONAL ENGINEER

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N

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NEW PV SYSTEM: 6970W DC / 6000W AC

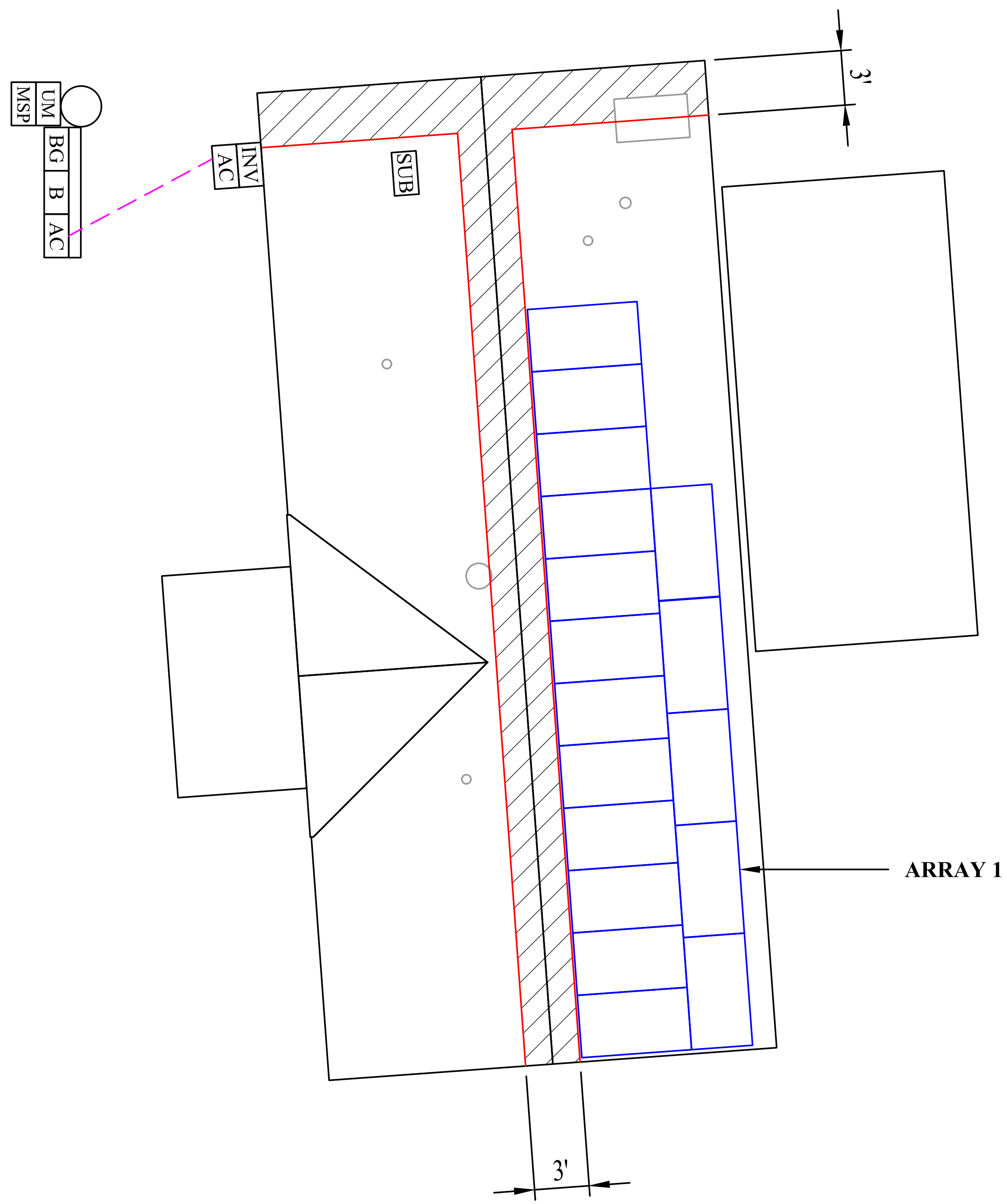
Arnold Vinyard
9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024

APN: 325S1709477112

DRAWING TITLE:
PROPERTY PLAN

DRAWING PAGE:
003.1 SP2

DATE: 7/10/2024	TIME: 05:29 PM	DESIGNER: TAYLOR BICKFORD	DESIGNER SIGNATURE: Taylor Bickford	SCALE: 1" = 23.52'



ROOF DETAILS:

ARRAY 1:	
MODULE QTY:	17
TILT:	12°
AZIMUTH:	86°
MATERIAL:	Metal Corrugated/Tin

Ryan J McPherson

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JURISDICTION STAMPS:

LEGEND:

MSP	(E) 200A MAIN SERVICE PANEL	UM	UTILITY METER (IF SEPARATED)
INV	(N) SOLAREDGE 6000H-US (ENERGY HUB) INVERTER		
SUB	SUB PANEL	B	BATTERY
ACL	AC COMBINER PANEL	BG	BACKUP GATEWAY
AC	AC DISCONNECT	EV	EV CHARGER
DC	DC DISCONNECT	JB	JUNCTION BOX
PV	PV METER		FIRE CODE SETBACK

EMT CONDUIT	PVC TRENCH	(E) SOLAR MODULE

CONDUIT RUN TO BE DETERMINED IN FIELD

N

better earth

BETTER EARTH ELECTRIC INC.
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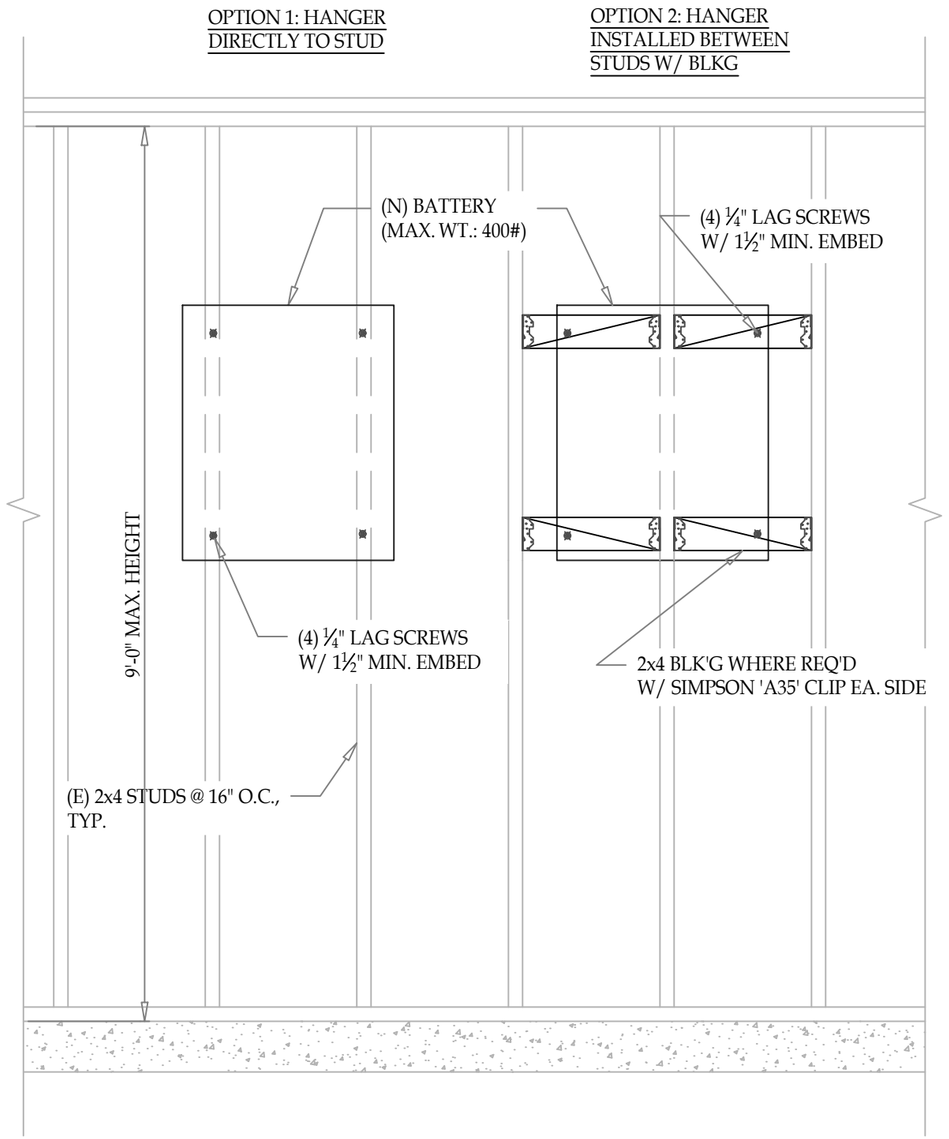
APN: 325S1709477112

DRAWING TITLE:
ROOF PLAN

DRAWING PAGE:
004 RP1

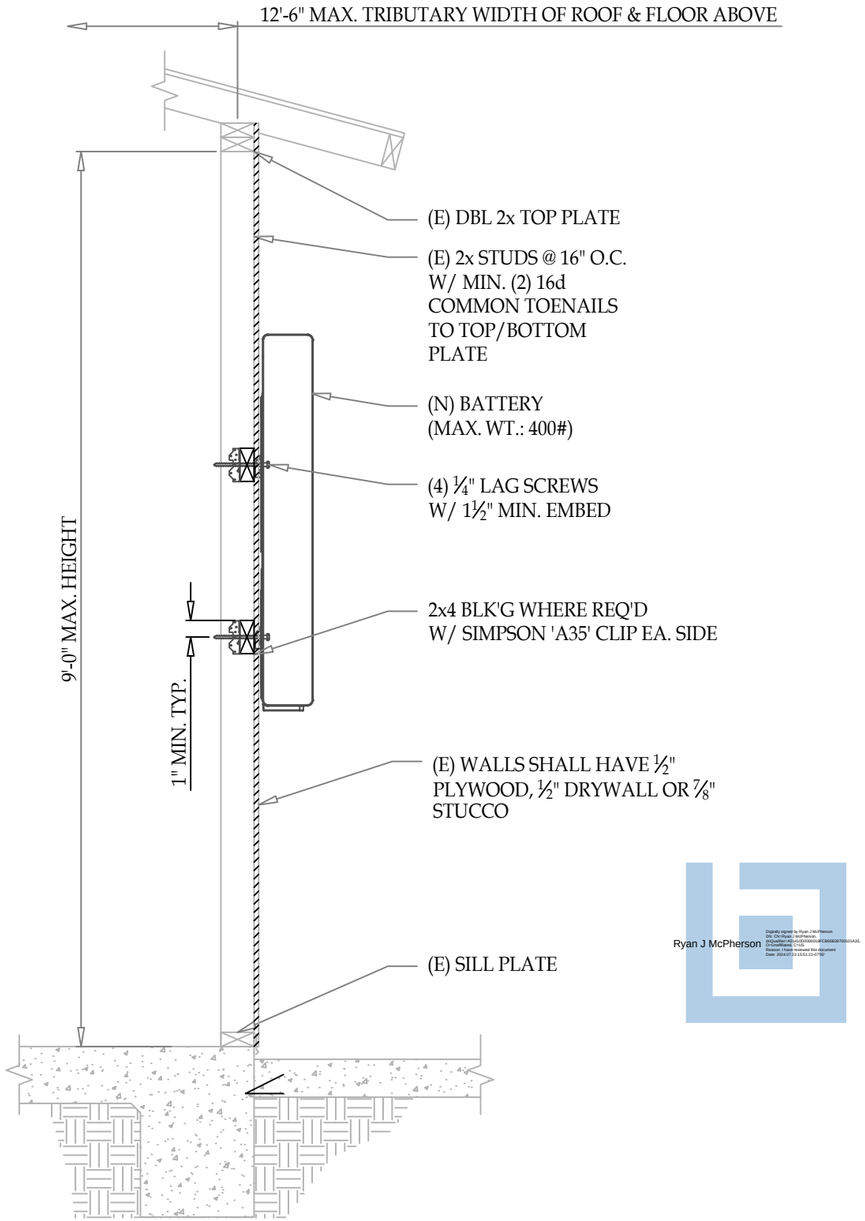
DATE: 7/10/2024	TIME: 05:29 PM	DESIGNER: TAYLOR BICKFORD	DESIGNER SIGNATURE: Taylor Bickford	SCALE: 1" = 8.93'



EQUIPMENT WALL MOUNT

SCALE: N.T.S.

2



TYP. NOTES & SPECS

SCALE: N.T.S.

1

McPHERSON ENGINEERING
RYAN JAMES McPHERSON, P.E.
9240 LIMONITE AVE,
JURUPA VALLEY, CA 92509
(909) 566-0066
SE@MCPE.GROUP

PROJECT LOCATION:

THE VINYARD RESIDENCE
9325 SW TUSTENUGGEE AVE, LAKE CITY, FL 32024

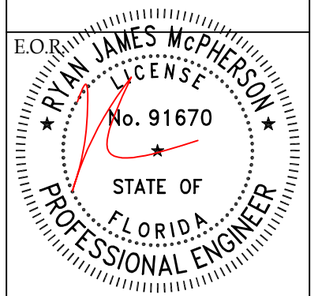
PROJECT DESCRIPTION:

BATTERY WALL MOUNT

SHEET DESCRIPTION:

DETAILS

E.O.R.



EXP. 2/28/25

DATE: 7/22/24

SCALE: N.T.S

PROJECT #: 24105399

SHEET #:

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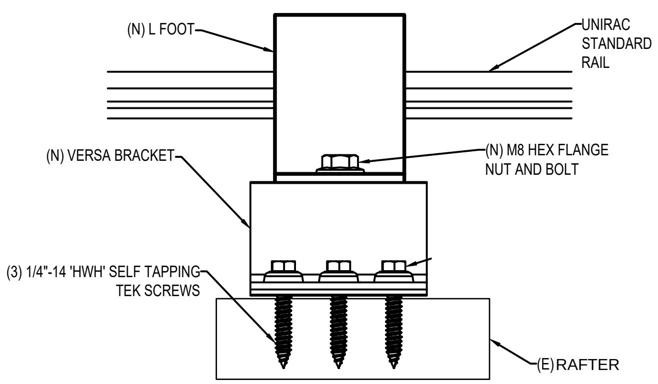
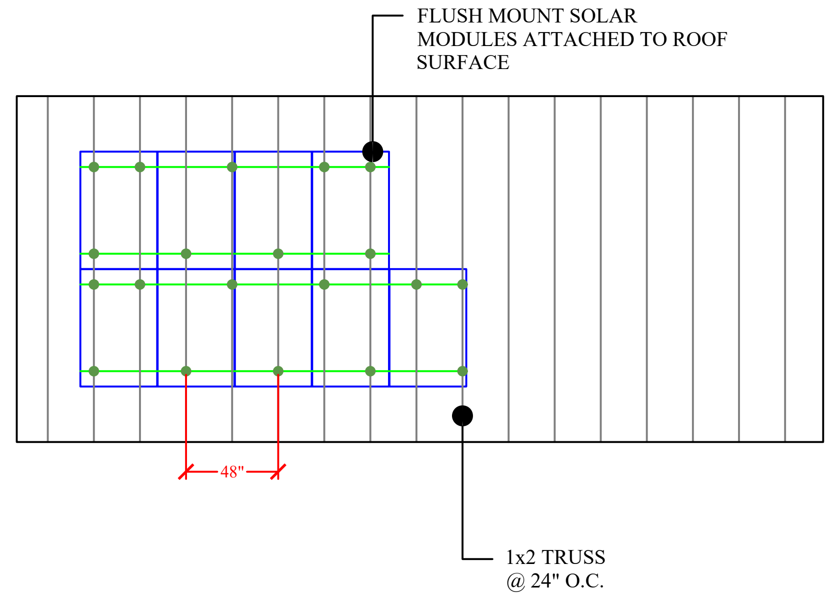
S-1

ATTACHMENT DETAIL

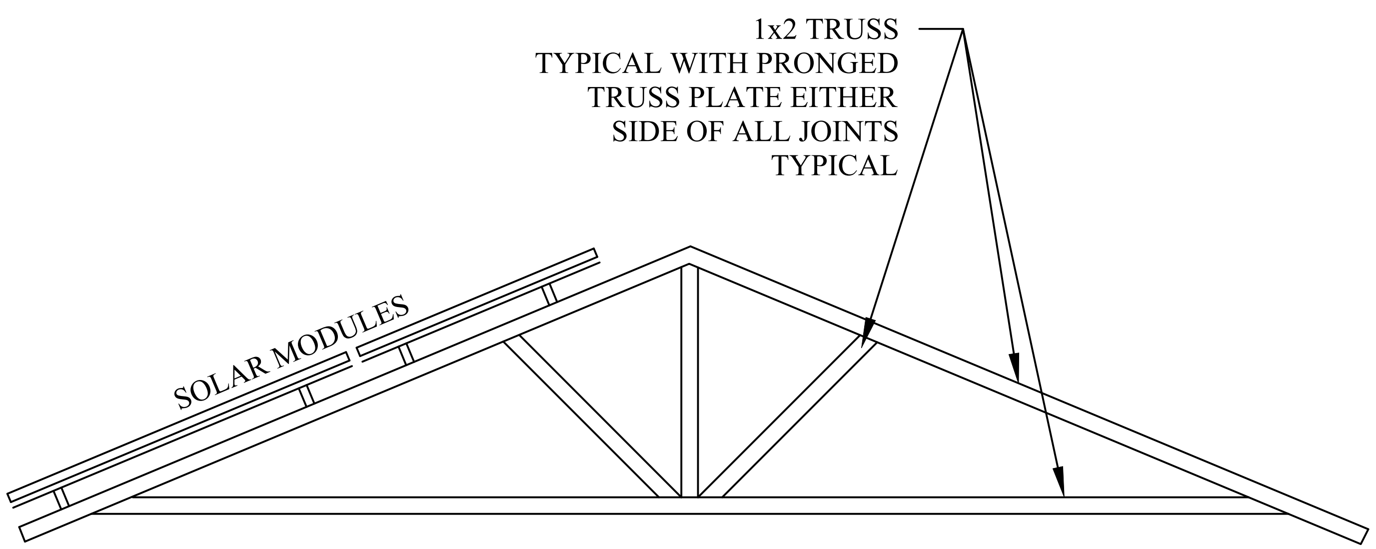


TYP ROOF ATTACHMENT PLAN



JURISDICTION STAMPS:

FRONT VIEW TYP FRAMING DETAIL



RYAN JAMES McPHERSON
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INSTALLER NOTES:

better earth

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4040 N COMBEE ROAD, STE. 12
LAKELAND, FL 33805

PHONE #: (888) 373-9379
LIC #: 13011324

Roger Gaydou

NEW PV SYSTEM: 6970W DC / 6000W AC

Arnold Vinyard
9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024

APN: 325S1709477112

DRAWING TITLE:
RACKING & FRAMING DETAILS

DRAWING PAGE:
005 RF1

DATE: 7/10/2024 | TIME: 05:29 PM | DESIGNER: TAYLOR BICKFORD | DESIGNER SIGNATURE: Taylor Bickford | SCALE:

STRING CALCULATIONS - INVERTER 1		
STRING DETAILS	STRING 1	STRING 2
POWERBOX MAX OUTPUT CURRENT	15A	15A
OPTIMIZERS IN SERIES	8	9
NOMINAL STRING VOLTAGE	380V	380V
ARRAY OPERATING CURRENT	25A	25A

INVERTER 1 SPECS	
6000H-US (ENERGY HUB)_RGM	
AC VOLTAGE	GROUND
240V	
MAX OCPD	RATED POWER
35A	6000W
MAX OUTPUT	MAX INPUT
25A	17A
MAX INPUT	EFFICIENCY
480V	CEC

JURISDICTION STAMPS:

RYAN JAMES McPHERSON
LICENSE
No. 91670
STATE OF FLORIDA
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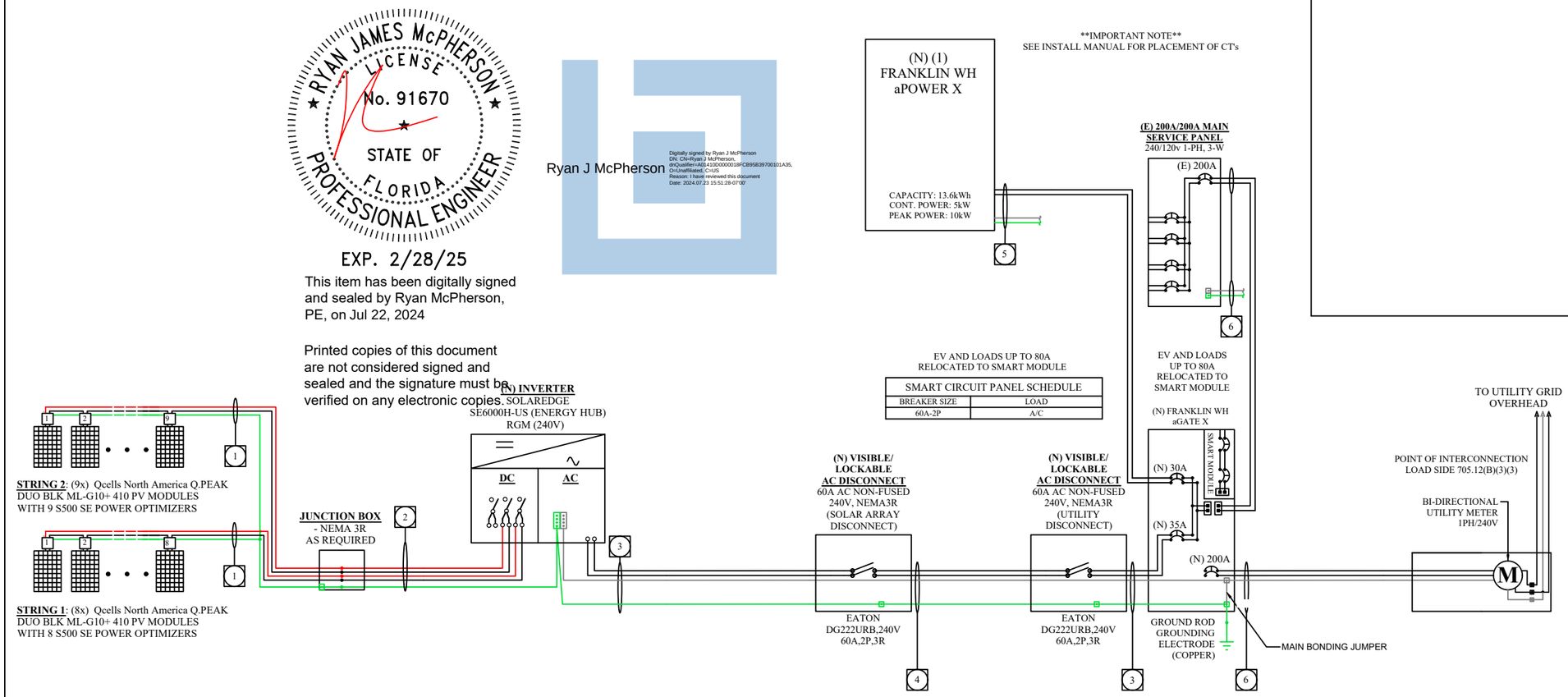
DN: CN=Ryan J McPherson, dnQualifier=A01410D0000018FCB95B3970010A35, O=Unaffiliated, C=US
Reason: I have reviewed this document
Date: 2024.07.23 15:51:28-07'00'



METER NUMBER: 156218646

AHJ/UTILITY NOTES:

SOLAREDGE INVERTER(S) RSD COMPLIANT PER 690.12

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	CONDUCTOR (CU)	CONDUIT	CONDUCTORS IN CONDUIT	EGC	TEMP. CORR. FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING
1	#10 PV Wire, in open air	N/A	N/A	#6	0.91	15	18.75	40	36.4	90
2	#10 THWN-2, in conduit	3/4" EMT	4 & (1)G	#8	0.91	15	18.75	40	36.4	90
3	#8 THWN-2, in conduit	3/4" EMT	3 & (1)G	#8	0.91	25	31	55	55	90
4	#8 THWN-2, in conduit (18" UG)	1 1/4" PVC	3 & (1)G	#8	0.91	25	31	55	55	90
5	#10 THWN-2, in conduit	3/4" EMT	3 & (1)G	#8	0.91	21	26	40	36.4	90
6	2/0 THWN-2, in conduit	2" PVC	3 & (1)G	#4	0.91	——	——	195	177.45	90

DESIGN TEMPERATURES	
ASHRAE 2% HIGH	37°C
ASHRAE EXTREME LOW	-3°C

MODULE SPECS	
QCELLS NORTH AMERICA Q.PEAK DUO BLK ML-G10+ 410	
PMAX	PTC
410W	381W
ISC	IMP
11.2A	10.89A
VOC	VMP
45.37V	37.64V
TEMP. COEFF. OF VOC	
-0.122	

POWER OPTIMIZERS	
SOLAREDGE S440 OPTIMIZER	
RATED INPUT	MAX OUTPUT
440W	15A
MAX ISC	MAX DC
15A	60V
WEIGHTED EFFICIENCY	
98.6	

SYSTEM SUMMARY
ARRAY STC POWER
6970W
ARRAY PTC POWER
6477W
MAX AC CURRENT
25A
MAX AC POWER
6000W

INSTALLER NOTES:

BETTER EARTH ELECTRIC INC.
4040 N COMBEE ROAD, STE. 12
LAKELAND, FL 33805

PHONE #: (888) 373-9379
LIC #: 13011324

Roger Gaydou

NEW PV SYSTEM: 6970W DC / 6000W AC

Arnold Vinyard
9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024

APN: 325S1709477112

DRAWING TITLE:
LINE DIAGRAM & DESIGN TABLES

DRAWING PAGE:
006 LD1

DATE: 7/10/2024 | TIME: 05:29 PM | DESIGNER: TAYLOR BICKFORD | DESIGNER SIGNATURE: Taylor Bickford | SCALE:

LABELING PLAN

① WARNING: PHOTOVOLTAIC POWER SOURCE

[690.31(D)(2)] PLACE ON JUNCTION BOXES AND CONDUIT EVERY 10'

② DC DISCONNECT
DC PHOTOVOLTAIC POWER SOURCE

MAXIMUM SYSTEM VOLTAGE:	480 VDC
MAXIMUM CIRCUIT CURRENT:	25 AMPS
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-DC CONVERTER (IF INSTALLED)	15 AMPS

[690.53] AT EACH DC DISCONNECT MEANS (INVERTER 1)

③ WARNING!
ELECTRIC SHOCK HAZARD
TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

[690.13(B)] PLACE THIS LABEL ON ALL DISCONNECTING MEANS WHERE ENERGIZED IN AN OPEN POSITION

④ RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

[690.56(C)(2)] PLACE ON INVERTER

⑤ AC DISCONNECT
AC PHOTOVOLTAIC POWER SOURCE

MAX AC OPERATING CURRENT:	25A MAX
AC OPERATING VOLTAGE:	240 VAC

[690.54] PLACE LABEL AT "INTERACTIVE POINT OF INTERCONNECTION" (AT MAIN SERVICE PANEL *AND* SUBPANEL IF APPLICABLE)

⑥ THIS PANEL IS FED BY MULTIPLE SOURCES (UTILITY & SOLAR)

[690.64(B)(4)] PLACE LABEL ON ALL EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTORS SUPPLIED FROM MULTIPLE SOURCES

⑦ WARNING
INVERTER OUTPUT CONNECTION
DON'T RELOCATE THIS OVERCURRENT DEVICE

PLACE THIS LABEL AT P.O.C. TO SERVICE DISTRIBUTION EQUIPMENT (I.E. MAIN PANEL *AND* SUBPANEL IF APPLICABLE)

⑧ AC DISCONNECT
AC PHOTOVOLTAIC POWER SOURCE

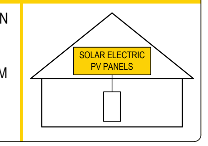
[690.14(C)(2)] PLACE ON AC DISCONNECT

⑨ WARNING!
THIS EQUIPMENT FED BY MULTIPLE SOURCES.
TOTAL RATING OF ALL OVERCURRRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR

[705.12(B)(3)(3)] PLACE THIS LABEL AT P.O.C. TO SERVICE DISTRIBUTION EQUIPMENT

⑩ 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



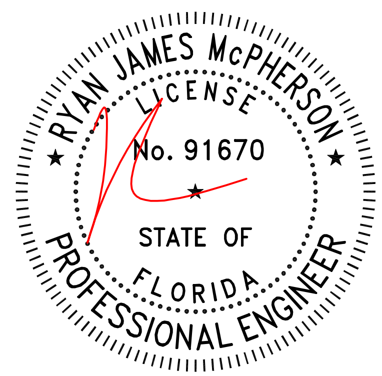
FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY: SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION. [690.56(C)]

⑪ PV SOLAR BREAKER
DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATED INSIDE PANEL NEXT TO PV BREAKER

LABELING NOTES:
1.1 LABELING REQUIREMENTS BASED ON THE NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535.
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.

Ryan J McPherson



EXP. 2/28/25

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ADDITIONAL PLACARDS FOR ENERGY STORAGE SYSTEM

ENERGY STORAGE SYSTEM DISCONNECT

PLACE ON ACCESSIBLE ESS DISCONNECT

BACKUP LOAD CENTER

[NEC 408.4] PLACE ON BACKUP LOAD CENTER

CAUTION
DO NOT ADD NEW LOADS

[NEC 220] PLACE ON BACKUP LOAD CENTER

CAUTION
THIS PANEL HAS SPLICED FEED-THROUGH CONDUCTORS. LOCATION OF DISCONNECT AT ENERGY STORAGE BACK UP LOAD PANEL.

[312.8(A)(3)] PLACE ON MAIN PANEL IF POINT OF INTERCONNECTION IS SUPPLY SIDE

CAUTION
TRI POWER SOURCE.
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
THIRD SOURCE IS ENERGY STORAGE SYSTEM

[705.12(D)(3)] PLACE ON MAIN PANEL IF PV SYSTEM IS ALSO CONNECTED TO PANEL

ONLY 1 REQUIRED

ENERGY STORAGE SYSTEM ON SITE LOCATED WITHIN LINE OF SIGHT

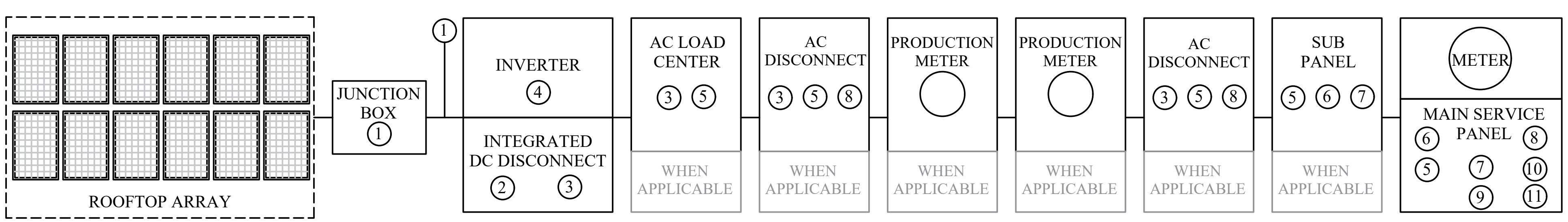
PLACE ON MAIN PANEL IF ESS IS IN LINE OF SIGHT

ENERGY STORAGE SYSTEM ON SITE LOCATED ON ADJACENT WALL

PLACE ON MAIN PANEL IF ESS IS ON ADJACENT WALL

ENERGY STORAGE SYSTEM ON SITE LOCATED ON OPPOSITE WALL

PLACE ON MAIN PANEL IF ESS IS ON OPPOSITE WALL



JURISDICTION STAMPS:

PROPERTY MAP

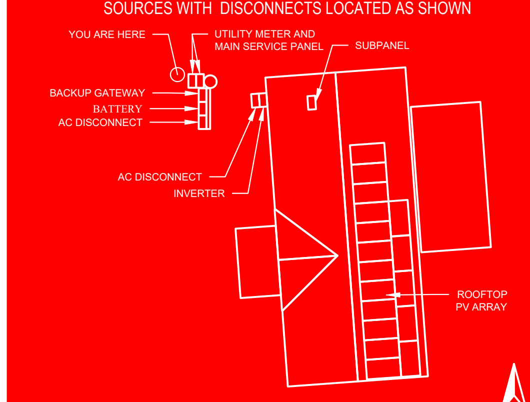
6"X6" DISCONNECT DIRECTORY PLAQUE
INSTALL AT MAIN SERVICE PANEL

NOTES:

FORMAT
1. WHITE LETTERING ON A RED BACKGROUND
2. MINIMUM 3/8 INCHES LETTER HEIGHT
3. ALL LETTERS SHALL BE CAPITALIZED
4. ARIAL OR SIMILAR FONT (NON-BOLD)

CAUTION: MULTIPLE SOURCES OF POWER

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



9325 SW TUSTENUGGEE AVE, LAKE CITY, FL 32024

SERVICE BY QUALIFIED PERSONNEL ONLY

MATERIAL
REFLECTIVE, WEATHER RESISTANT MATERIAL
SUITABLE FOR THE ENVIRONMENT (USE UL-969 AS STANDARD FOR WEATHER RATING).
DURABLE ADHESIVE MATERIALS

INSTALLER NOTES:

better earth

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LAKELAND, FL 33805

PHONE #: (888) 373-9379
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Roger Gaydou

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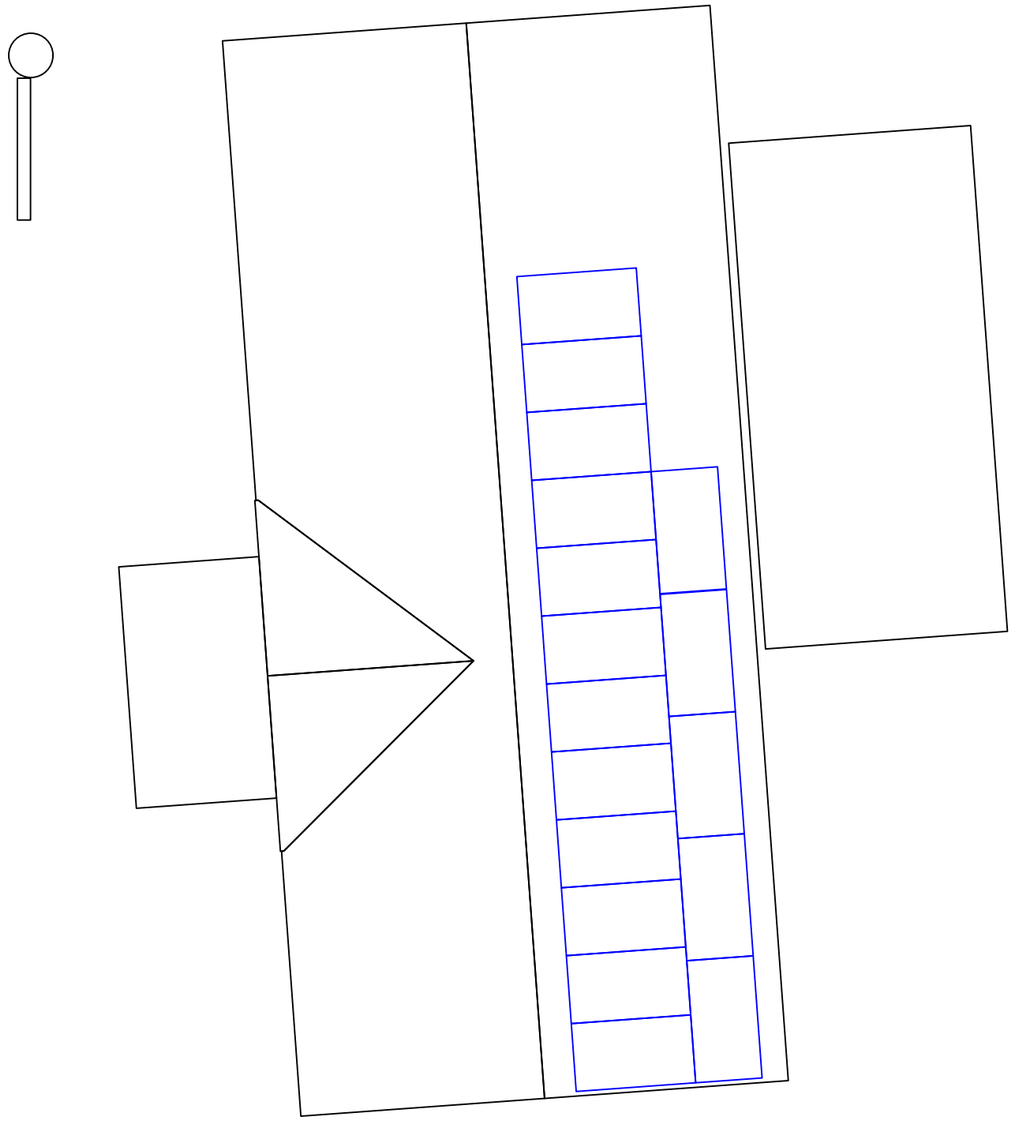
Arnold Vinyard
9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024
APN: 325S1709477112

DRAWING TITLE:
PLACARD & PLACARD MAP

DRAWING PAGE:
007 PP1

DATE: 7/10/2024	TIME: 05:29 PM	DESIGNER: TAYLOR BICKFORD	DESIGNER SIGNATURE: Taylor Bickford	SCALE:



1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72

INSTALLER NOTES:

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APN: 325S1709477112

DRAWING TITLE:
OPTIMIZER MAP

DRAWING PAGE:
008 OM1

DATE: 7/10/2024	TIME: 05:29 PM	DESIGNER: TAYLOR BICKFORD	DESIGNER SIGNATURE: Taylor Bickford	SCALE:

JOB HAZARD ANALYSIS

Use the space below to draft a JHA. Be sure to include all indicators found in the Legend.

LEGEND	
(H)	HAZARD
(A)	ANCHOR POINT
(L)	LADDER
(E)	ENTRY / EXIT
	WORK ANGLE
	ELECTRICAL ZONE
	WORK ZONE
	1 ¼" PVC TRENCH

NEAREST MEDICAL FACILITY:

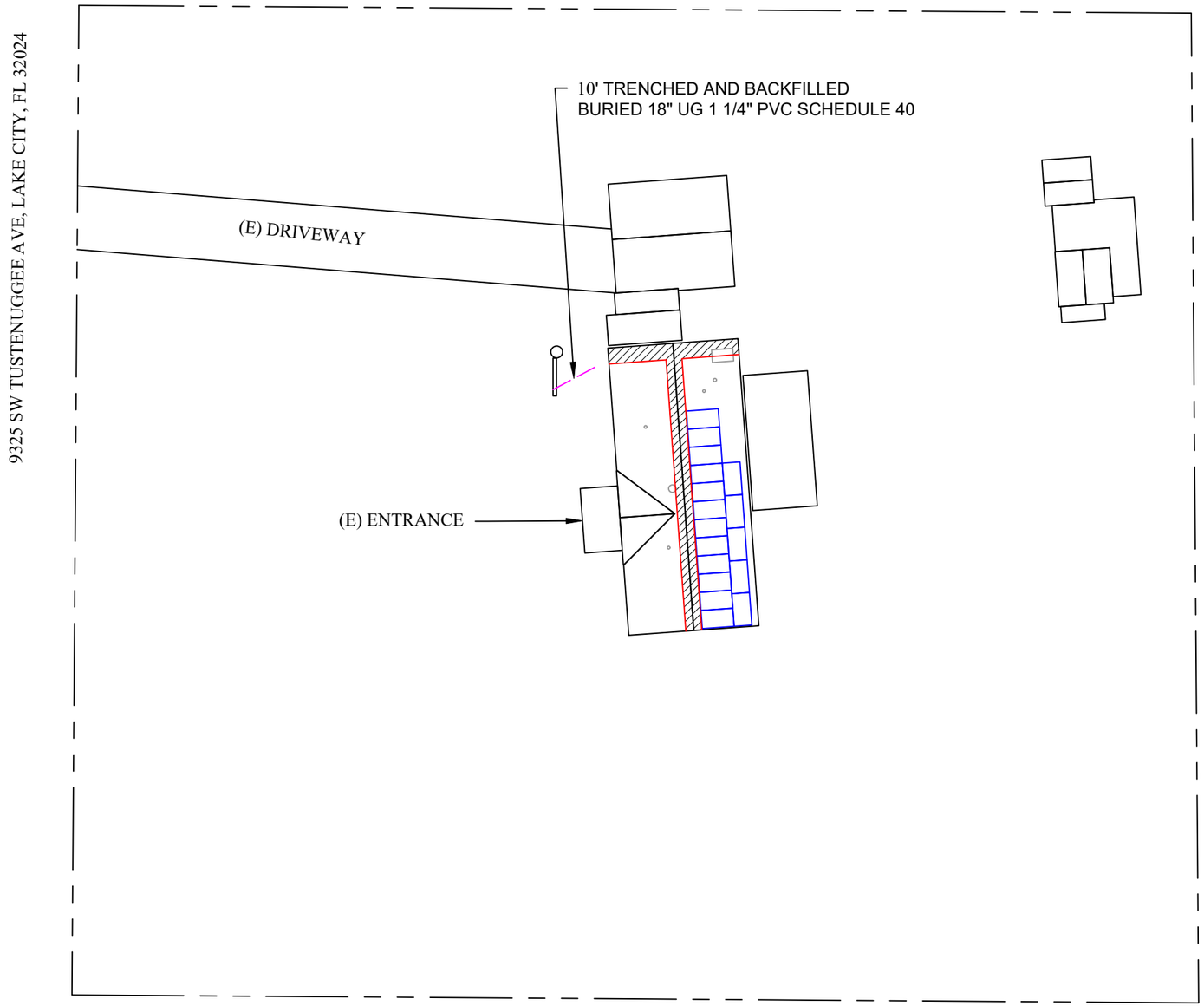
NAME:

PHONE:

ADDRESS:

CREW LEAD:

CREW:



INSTALLER NOTES:

BETTER EARTH ELECTRIC INC.
4040 N COMBEE ROAD, STE. 12
LAKELAND, FL 33805

PHONE #: (888) 373-9379
LIC #: 13011324

Roger Gaydou

NEW PV SYSTEM: 6970W DC / 6000W AC

Arnold Vinyard
9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024

APN: 325S1709477112

DRAWING TITLE: **JOB HAZARD ANALYSIS**

DRAWING PAGE: **009 JH1**

DATE: 7/10/2024	TIME: 05:29 PM	DESIGNER: TAYLOR BICKFORD	DESIGNER SIGNATURE: Taylor Bickford	TEMPLATE VERSION: B41

ELECTRICAL LOAD CALCULATIONS

	Single Family Dwelling Electrical Service Load Calculation (MSP)									
	Customer Name: Arnold Vinyard									
	Address: 9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024									
						(E) Bus Bar:	200A			
						(E) Main Breaker:	200A			
						Minimum Service Size:	132.47			
1	**General Lighting Loads 220-16(a)/ (b)**									
	Dwelling	1248	sq. ft X 3 VA =				3744	VA		
	Small Appliance Loads - 1500 VA X			2	Circuits =		3000	VA		
	Laundry Load - 1500 VA X			1	Circuits =		1500	VA		
	General Lighting Total						**8244**	**VA**		
2	**Cooking Equipment Loads 220.55 - Nameplate Value**									
	Range	@	40	Amps X	240	Volts =	7200	VA		
	Cooktop	@	0	Amps X	240	Volts =	0	VA		
	Oven	@	0	Amps X	240	Volts =	0	VA		
	Cooking Equipment Total						**7200**	**VA**		
3	**Electric Dryer 220.54 (Nameplate, 5000 VA minimum)**									
	Dryer qty:		1				5000	VA		
	Dryer Total						**5000**	**VA**		
4	**Heating and Cooling Loads - 220.82(c)**									
	AC 1	@	23.2	Amps X	230	Volts =	5336	VA		
	AC 2	@	0	Amps X	240	Volts =	0.00	VA		
	Furnace	@	30	Amps X	120	Volts =	2700.00	VA		
	Furnace	@	30	Amps X	120	Volts =	2700.00	VA		
	Heating/ Cooling Total						**10736**	**VA**		
5	**EV charger loads 625.41**									
	EV Charger 1	@	0	Amps X	240	Volts =	0	VA		
	EV Charger 2	@	0	Amps X	240	Volts =	0	VA		
	EV Charging Total						**0**	**VA**		
6	**Other Loads - Nameplate**									
	Disposal	@	1	Qty.			900	VA		
	Dishwasher	@	1	Qty.			1200	VA		
	Microwave	@	1	Qty.			1600	VA		
	Refridgerator	@	1	Qty.			1800	VA		
	Other Loads - As per breaker size									
	Furnace	@	0	Amps X	240	Volts =	0	VA		
	RV	@	30	Amps X	240	Volts =	5400	VA		
	Miscellaneous Load 2	@	30	Amps X	120	Volts =	2700	VA		
	Water Pump	@	20	Amps X	240	Volts =	3600	VA		
	Garage	@	0	Amps X	240	Volts =	0	VA		
	Welder	@	0	Amps X	240	Volts =	0	VA		
		@	0	Amps X	240	Volts =	0	VA		
	Fixed Appliance Total						**17200**	**VA**		
7	**Subtotal**						37644	**VA**		
8	**First 10,000 VA X 100%**						10000	VA		
	Remaining Loads	@	27644	VA	40%		11058	VA		
	Cooling/Heating Loads	@	10736	VA	100%		10736			
	EV Charger	@	0	VA	100%		0			
9	**Total Load**						31794	VA		
10	**Minimum Service Size =**		Total Load in VA				132.47	A		
			240 Volts							

	Single Family Dwelling Electrical Service Load Calculation (SUBPANEL)									
	Customer Name: Arnold Vinyard									
	Address: 9325 Sw Tustenuggee Ave, LAKE CITY, FL 32024									
						(E) Bus Bar:	200A			
						(E) Main Breaker:	200A			
						Minimum Service Size:	90.74			
1	**General Lighting Loads 220-16(a)/ (b)**									
	Dwelling	1248	sq. ft X 3 VA =				3744	VA		
	Small Appliance Loads - 1500 VA X			2	Circuits =		3000	VA		
	Laundry Load - 1500 VA X			1	Circuits =		1500	VA		
	General Lighting Total						**8244**	**VA**		
2	**Cooking Equipment Loads 220.55 - Nameplate Value**									
	Range	@	40	Amps X	240	Volts =	7200	VA		
	Cooktop	@	0	Amps X	240	Volts =	0	VA		
	Oven	@	0	Amps X	240	Volts =	0	VA		
	Cooking Equipment Total						**7200**	**VA**		
3	**Electric Dryer 220.54 (Nameplate, 5000 VA minimum)**									
	Dryer qty:		1				5000	VA		
	Dryer Total						**5000**	**VA**		
4	**Heating and Cooling Loads - 220.82(c)**									
	AC 1	@	0	Amps X	230	Volts =	0	VA		
	AC 2	@	0	Amps X	240	Volts =	0.00	VA		
	Furnace	@	30	Amps X	120	Volts =	2700.00	VA		
	Furnace	@	30	Amps X	120	Volts =	2700.00	VA		
	Heating/ Cooling Total						**5400**	**VA**		
5	**EV charger loads 625.41**									
	EV Charger 1	@	0	Amps X	240	Volts =	0	VA		
	EV Charger 2	@	0	Amps X	240	Volts =	0	VA		
	EV Charging Total						**0**	**VA**		
6	**Other Loads - Nameplate**									
	Disposal	@	1	Qty.			900	VA		
	Dishwasher	@	1	Qty.			1200	VA		
	Microwave	@	1	Qty.			1600	VA		
	Refridgerator	@	1	Qty.			1800	VA		
	Other Loads - As per breaker size									
	Furnace	@	0	Amps X	240	Volts =	0	VA		
	Miscellaneous Load 1	@	0	Amps X	240	Volts =	0	VA		
	Miscellaneous Load 2	@	0	Amps X	120	Volts =	0	VA		
	Water Pump	@	0	Amps X	240	Volts =	0	VA		
	Garage	@	0	Amps X	240	Volts =	0	VA		
	Welder	@	0	Amps X	240	Volts =	0	VA		
		@	0	Amps X	240	Volts =	0	VA		
	Fixed Appliance Total						**5500**	**VA**		
7	**Subtotal**						25944	**VA**		
8	**First 10,000 VA X 100%**						10000	VA		
	Remaining Loads	@	15944	VA	40%		6378	VA		
	Cooling/Heating Loads	@	5400	VA	100%		5400			
	EV Charger	@	0	VA	100%		0			
9	**Total Load**						21778	VA		
10	**Minimum Service Size =**		Total Load in VA				90.74	A		
			240 Volts							

JURISDICTION STAMPS:

BETTER EARTH ELECTRIC INC.
4040 N COMBEE ROAD, STE. 12
LAKELAND, FL 33805

PHONE #: (888) 373-9379
LIC #: 13011324

Roger Gaydou

NEW PV SYSTEM: 6970W DC / 6000W AC

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APN: 325S1709477112

DRAWING TITLE:
ELEC LOAD CALCS

DRAWING PAGE:
010 EL1

DATE: 7/10/2024	TIME: 05:29 PM	DESIGNER: TAYLOR BICKFORD	DESIGNER SIGNATURE: Taylor Bickford	SCALE:

Q.PEAK DUO BLK ML-G10+ SERIES

385 - 410 Wp | 132 Cells
20.9 % Maximum Module Efficiency

MODEL Q.PEAK DUO BLK ML-G10+

6 busbar cell technology

12 busbar cell technology

Breaking the 20 % efficiency barrier

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9 %.

A reliable investment

Inclusive 25-year product warranty and 25-year linear performance warranty[1].

Enduring high performance

Long-term yield security with Anti LeTID Technology, Anti PID Technology[2] and Hot-Spot Protect.

Extreme weather rating

High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

Innovative all-weather technology

Optimal yields, whatever the weather with excellent low-light and temperature behaviour.

The most thorough testing programme in the industry

Qcells is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

[1] See data sheet on rear for further information.
[2] APT test conditions according to IEC/TS 62804-1:2015, method A (−1500 V, 96 h)

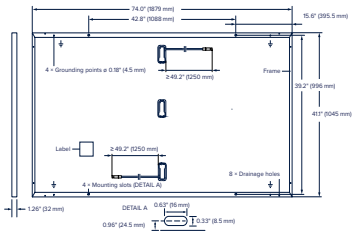
The ideal solution for:

Rooftop arrays on residential buildings

Q.PEAK DUO BLK ML-G10+ SERIES

Mechanical Specification

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodised aluminium
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 49.2 in (1250 mm), (−) ≥ 49.2 in (1250 mm)
Connector	Stäubli MC4; IP68

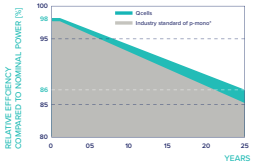


Electrical Characteristics

POWER CLASS			385	390	395	400	405	410
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / −0 W)								
Minimum	Power at MPP[1]	P_{MPP} [W]	385	390	395	400	405	410
	Short Circuit Current[1]	I_{SC} [A]	11.04	11.07	11.10	11.14	11.17	11.20
	Open Circuit Voltage[1]	V_{OC} [V]	45.19	45.23	45.27	45.30	45.34	45.37
	Current at MPP	I_{MPP} [A]	10.59	10.65	10.71	10.77	10.83	10.89
	Voltage at MPP	V_{MPP} [V]	36.36	36.62	36.88	37.13	37.39	37.64
	Efficiency[1]	η [%]	≥19.6	≥19.9	≥20.1	≥20.4	≥20.6	≥20.9
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]								
Minimum	Power at MPP	P_{MPP} [W]	288.8	292.6	296.3	300.1	303.8	307.6
	Short Circuit Current	I_{SC} [A]	8.90	8.92	8.95	8.97	9.00	9.03
	Open Circuit Voltage	V_{OC} [V]	42.62	42.65	42.69	42.72	42.76	42.79
	Current at MPP	I_{MPP} [A]	8.35	8.41	8.46	8.51	8.57	8.62
	Voltage at MPP	V_{MPP} [V]	34.59	34.81	35.03	35.25	35.46	35.68

[1] Measurement tolerances P_{MPP} ±3 %; I_{SC}; V_{OC} ±5 % at STC: 1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3 • [2] 800 W/m², NMOT, spectrum AM 1.5

Qcells PERFORMANCE WARRANTY

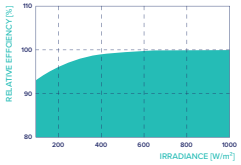


At least 98 % of nominal power during first year. Thereafter max. 0.5 % degradation per year. At least 93.5 % of nominal power up to 10 years. At least 86 % of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Qcells sales organisation of your respective country.

*Standard terms of guarantee for the 5 PV companies with the highest production capacity in 2021 (February 2021)

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²).

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	−0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	−0.34	Nominal Module Operating Temperature	NMOT	[°F]	109 ± 5.4 (43 ± 3 °C)

Properties for System Design

Maximum System Voltage	V_{SYS}	[V]	1000 (IEC) / 1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating		[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push / Pull[3]		[lbs / ft²]	75 (3600 Pa) / 55 (2660 Pa)	Permitted Module Temperature on Continuous Duty	−40 °F up to +185 °F (−40 °C up to +85 °C)
Max. Test Load, Push / Pull[3]		[lbs / ft²]	113 (5400 Pa) / 84 (4000 Pa)		

[3] See Installation Manual

Qualifications and Certificates

UL 61730, CE-compliant,
Quality Controlled PV - TÜV Rheinland,
IEC 61215:2016, IEC 61730:2016,
U.S. Patent No. 9,893,215 (solar cells),

Qcells pursues minimizing paper output in consideration of the global environment.

Note: Installation instructions must be followed. Contact our technical service for further information on approved installation of this product.
Hanwha Q CELLS America Inc. 400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL hqc-inquiry@qcells.com | WEB www.qcells.com

SolarEdge Home Hub Inverter

For North America

SE3800H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US(1)

HOME BACKUP

Optimized battery storage with HD-Wave technology

- Record-breaking 99% weighted efficiency with 200% DC oversizing
- Small, lightweight, and easy to install
- Modular design, future ready with optional upgrades to:
  - DC-coupled storage for full or partial home backup
  - Built-in consumption monitoring
  - Direct connection to the SolarEdge Home EV Charger
- Multi-inverter, scalable storage solution
  - With enhanced battery power up to 10kW
- Integrated arc fault protection and rapid shutdown for NEC 2014, NEC 2017 and NEC 2020, per article 690.11 and 690.12
- Embedded revenue grade production data, ANSI C12.20 Class 0.5

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SolarEdge Home Hub Inverter

For North America

SE3800H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US(1)

Applicable to inverters with part number	SEXXXXH-USSNBBXX4				SE11400H – XXXXXBXX5	Units
	SE3800H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
OUTPUT – AC ON GRID						
Rated AC Power	3800 @ 240V 3300 @ 208V	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208	W
Maximum AC Power Output	3800 @ 240V 3300 @ 208V	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208	W
AC Frequency Range (min - nom - max)	59.3 – 60 – 60.5(2)					Hz
Maximum Continuous Output Current @ 240V	16	25	32	42	47.5	A
Maximum Continuous Output Current @ 208V	16	24	-	-	48.5	A
GFDI Threshold	1					A
Total Harmonic Distortion (THD)	< 3					%
Power Factor	1, adjustable -0.85 to 0.85					
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes					
Charge Battery from AC (if allowed)	Yes					
Typical Nighttime Power Consumption	< 2.5					W
OUTPUT – AC BACKUP(3)						
Rated AC Power in Backup Operation(4)	3800 7600*	6000	7600 10300*	10300	10300	W
AC L-L Output Voltage Range in Backup	211 – 264					Vac
AC L-N Output Voltage Range in Backup	105 – 132					Vac
AC Frequency Range in Backup (min - nom - max)	55 – 60 – 65					Hz
Maximum Continuous Output Current in Backup Operation	16 32*	25	32 43*	43	43	A
GFDI	1					A
THD	< 5					%
OUTPUT – SOLAREDGE HOME EV CHARGER AC						
Rated AC Power	9600					W
AC Output Voltage Range	211 – 264					Vac
On-Grid AC Frequency Range (min - nom - max)	59.3 – 60 – 60.5					Hz
Maximum Continuous Output Current @240V (grid, PV and battery)	40					Aac
INPUT – DC (PV AND BATTERY)						
Transformer-less, Ungrounded	Yes					
Max Input Voltage	480					Vdc
Nom DC Input Voltage	380					Vdc
Reverse-Polarity Protection	Yes					
Ground-Fault Isolation Detection	600kΩ Sensitivity					
INPUT – DC (PV)						
Maximum DC Power @ 240V	7600 15200*	12000	15200 22800*	22000	22800	W
Maximum DC Power @ 208V	6600	10000	-	-	20000	W
Maximum Input Current(5) @ 240V	10.5 20*	16.5	20 31*	27	31	Adc
Maximum Input Current(5) @ 208V	9	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45					
Maximum Inverter Efficiency	99.2					%
CEC Weighted Efficiency	99				99 @ 240V 98.5 @ 208V	%
2-pole Disconnection	Yes					

* Supported with PN SExxxxH-USMMxxxxxx or SExxxxH-USMNxxxxxx.

(1) These specifications apply to inverters with part numbers SExxxxH-USSMxxxxx or SExxxxH-USSNxxxxxx and connection unit model number DCD-1PH-US-PxH-F-x.

(2) For other regional settings please contact SolarEdge support.

(3) Not designed for standalone applications and requires AC for commissioning. Backup functionality is only supported for 240V grid.

(4) Rated AC power in Backup Operation is valid for installations with multiple inverters. For a single backup inverter operation, rated AC power in Backup is 90% of the value stated.

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

SolarEdge Home Hub Inverter

For North America

SE3800H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US(1)

Applicable to inverters with part number	SEXXXXH-USSNBBXX4				SE11400H – XXXXXBXX5	Units
	SE3800H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
OUTPUT – DC (BATTERY)						
Supported Battery Types	SolarEdge Home Battery, LG RESU Prime(6)					
Number of Batteries per Inverter	Up to 3 SolarEdge Home Battery, up to 2 LG RESU Prime					
Continuous Power(7)	7600	10000				W
Peak Power(7)	7600	10000				W
Max Input Current	20	26.5				Adc
2-pole Disconnection	Yes					
SMART ENERGY CAPABILITIES						
Consumption Metering	Built-in(8)					
Backup & Battery Storage	With Backup Interface (purchased separately) for service up to 200A; up to 3 inverters					
EV Charging	Direct connection to SolarEdge Home EV Charger					
ADDITIONAL FEATURES						
Supported Communication Interfaces	RS485, Ethernet, Cellular(9), Wi-Fi (optional), SolarEdge Home Network (optional)					
Revenue Grade Metering, ANSI C12.20	Built-in(8)					
Integrated AC, DC and Communication Connection Unit	Yes					
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi Access Point for local connection					
DC Voltage Rapid Shutdown (PV and Battery)	Yes, according to NEC 2014, NEC 2017 and NEC 2020 690.12					
STANDARD COMPLIANCE						
Safety	UL1741, UL1741 SA, UL1741 SB, UL1741 PCS, UL1699B, UL1998, UL9540, CSA 22.2					
Grid Connection Standards	IEEE1547-2018, Rule 21, Rule 14H					
Emissions	FCC part 15 class B					
INSTALLATION SPECIFICATIONS						
AC Output and EV AC Output Conduit Size / AWG Range	1" maximum / 14-4 AWG					
DC Input (PV and Battery) Conduit Size / AWG Range	1" maximum / 14-6 AWG					
Dimensions with Connection Unit (H x W x D)	17.7 x 14.6 x 6.8 / 450 x 370 x 174		17.7 x 14.6 x 6.8 / 450 x 370 x 174 17.7 x 14.6 x 6.8 / 450 x 370 x 174*	21.06 x 14.6 x 7.3 / 535 x 370 x 185	21.06 x 14.6 x 8.2 / 535 x 370 x 208(10)	in / mm
Weight with Connection Unit	26 / 11.8		26 / 11.8 41.7 / 18.9*	41.7 / 18.9	44.9 / 20.3(10)	lb / kg
Noise	< 25 < 50*	< 25	< 50			dBA
Cooling	Natural Convection					
Operating Temperature Range	-40 to +140 / -40 to +60(11)					°F / °C
Protection Rating	NEMA 4					

(6) The part numbers SExxxxH-USxMxxxxx only support the SolarEdge Home Battery. The part numbers SExxxxH-USxNxxxxx support both SolarEdge Home Battery and LG RESU Prime batteries. Requires supporting inverter firmware.
(7) Discharge power is limited up to the inverter rated AC power for on-grid and backup applications.
(8) For consumption metering current transformers should be ordered separately: SECT-SPL-225A-T-20 or SEACT0750-400NA-20 units per box. Revenue grade metering is only for production metering.
(9) Information concerning the Data Plan's terms & conditions is available in the following link: SolarEdge Communication Plan Terms and Conditions)
(10) SE11400H-USxxxBxx**5** is the updated PN, though SE11400H-USxxxBxx**4** will still be available. All specifications are similar for both models, **EXCLUDING** the weight and dimensions [HxWxD]; The weight and dimensions of SE11400H-USxxxBxx**4** are 17.6 [kg] and 21.06-14.6-7.3 / 535-370-185 [in/mm], accordingly.
(11) Full power up to at least 50°C / 122°F, for power de-rating information refer to the Temperature De-Rating Technical Note for North America.

SolarEdge is a global leader in smart energy technology. By leveraging world-class engineering capabilities and with a relentless focus on innovation, SolarEdge creates smart energy solutions that power our lives and drive future progress.

SolarEdge developed an intelligent inverter solution that changed the way power is harvested and managed in photovoltaic (PV) systems. The SolarEdge DC optimized inverter maximizes power generation while lowering the cost of energy produced by the PV system.

Continuing to advance smart energy, SolarEdge addresses a broad range of energy market segments through its PV, storage, EV charging, UPS, and grid services solutions.

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Cautionary Note Regarding Market Data and Industry Forecasts: This brochure may contain market data and industry forecasts from certain third-party sources. This information is based on industry surveys and the preparer's expertise in the industry and there can be no assurance that any such market data is accurate or that any such industry forecasts will be achieved. Although we have not independently verified the accuracy of such market data and industry forecasts, we believe that the market data is reliable and that the industry forecasts are reasonable.

CE

solaredge

Power Optimizer

For North America

S440 / S500 / S500B / S650B

POWER OPTIMIZER

Enabling PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- Detects abnormal PV connector behavior, preventing potential safety issues*
- Module-level voltage shutdown for installer and firefighter safety
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- Faster installations with simplified cable management and easy assembly using a single bolt
- Flexible system design for maximum space utilization
- Compatible with bifacial PV modules

* Functionality subject to inverter model and firmware version

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Power Optimizer

For Residential Installations

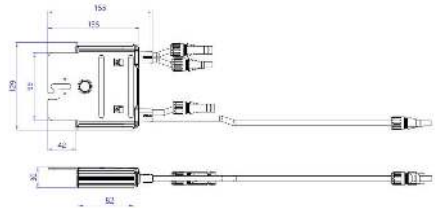
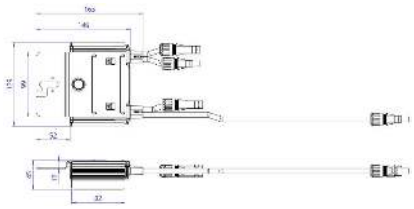
S440 / S500 / S500B / S650B

	S440	S500	S500B	S650B	UNIT
INPUT					
Rated Input DC Power(1)	440	500		650	W
Absolute Maximum Input Voltage (Voc)	60		125	85	Vdc
MPPT Operating Range	8 – 60		12.5 – 105	12.5 - 85	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15			Adc
Maximum Efficiency	99.5				%
Weighted Efficiency	98.6				%
Overvoltage Category	II				
OUTPUT DURING OPERATION					
Maximum Output Current	15				Adc
Maximum Output Voltage	60		80		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)					
Safety Output Voltage per Power Optimizer	1 ± 0.1				Vdc
STANDARD COMPLIANCE(2)					
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3, CISPR11, EN-55011				
Safety	IEC62109-1 (class II safety), UL1741				
Material	UL94 V-0, UV Resistant				
RoHS	Yes				
Fire Safety	VDE-AR-E 2100-712:2018-12				
INSTALLATION SPECIFICATIONS					
Maximum Allowed System Voltage	1000				Vdc
Dimensions (W x L x H)	129 x 155 x 30		129 x 165 x 45		mm
Weight	720		790		gr
Input Connector	MC4(3)				
Input Wire Length	0.1				m
Output Connector	MC4				
Output Wire Length	(+) 2.3, (-) 0.10				m
Operating Temperature Range(4)	-40 to +85				°C
Protection Rating	IP68				
Relative Humidity	0 – 100				%

(1) Rated power of the module at STC will not exceed the Power Optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed.
(2) For details about CE compliance, see Declaration of Conformity – CE.
(3) For other connector types please contact SolarEdge.
(4) Power de-rating is applied for ambient temperatures above +85°C for S440 and S500, and for ambient temperatures above +75°C for S500B. Refer to the Power Optimizers Temperature De-Rating Technical Note for details.

PV System Design Using a SolarEdge Inverter(5)		SolarEdge Home Wave Inverter Single Phase	SolarEdge Home Short String Inverter Three Phase	Three Phase for 230/400V Grid	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500	8	9	16	18	
	S500B, S650B	6	8	14		
Maximum String Length (Power Optimizers)		25	20	50		
Maximum Continuous Power per String		5700	5625	11,250	12,750	W
Maximum Allowed Connected Power per String(6) (In multiple string designs, the maximum is permitted only when the difference in connected power between strings is 2,000W or less)		6800(7)	See(6)	13,500	15,000	W
Parallel Strings of Different Lengths or Orientations		Yes				

(5) It is not allowed to mix S-series and P-series Power Optimizers in new installations in the same string.
(6) If the inverter's rated AC power ≤ maximum continuous power per string, then the maximum connected power per string will be able to reach up to the inverters maximum input DC power. Refer to the Single String Design Guidelines application note.
(7) For inverters with a rated AC power ≥ 8000W that are connected to at least two strings.

S440, S500 (Flat Bracket)	S500B, S650B (Bent Bracket)
	

RoHS

FRANKLINWH

aGate

Intelligent energy management system

Serves as the controller for all home power sources by interconnecting solar, grid, batteries, and a standby generator to supply electricity to the home. Seamlessly transitions the home supply from grid power to backup power so that always-on appliances, such as the refrigerator and network router, will not be affected when grid goes down.

12 Years Warranty

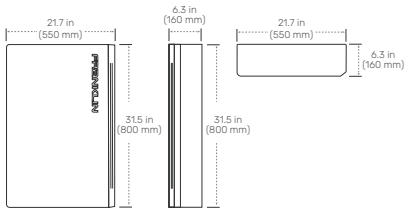
- ✓ Micro-grid interconnect device (MID)
- ✓ Integrated PV and grid metering
- ✓ Auto load-shedding
- ✓ Compatible with micro and string solar inverter
- ✓ Optional Smart-Circuits Module
- ✓ Optional Generator Module

PERFORMANCE SPECIFICATIONS

Coupling	AC-coupled
Nominal AC Voltage	120 / 208 V, 120 / 240 V, 60 Hz
Phase	2 W+N+PE
aPower Over Current Protection Device	100 A Max
Solar Input Over Current Protection Device	80 A Max
Backup Load Port Over Current Protection Device	200 A Max
Generator Over Current Protection Device[1]	200 A Max
Smart Circuits Over Current Protection Device[2]	Opt. a 1 × 80 A Max @ 208 V / 240 V & 1 × 50 A Max @ 208 V / 240 V Opt. b 1 × 80 A Max @ 208 V / 240 V & 2 × 50 A Max @ 120 V
Maximum Supply Fault Current	20 kA
Busbar Rating	280 A
Work Modes	Self-Consumption, Time of Use, Emergency Backup
Communications	Ethernet / 4G / Wifi
User Interface	FranklinWH App
Warranty	12 years

MECHANICAL SPECIFICATIONS

Dimensions (H × W × D)	31.5 in × 21.7 in × 6.3 in (800 mm × 550 mm × 160 mm)
Weight	50 lb (23 kg)
Mounting	Wall mount or floor mount



COMPLIANCE INFORMATION

Certifications	UL 1741[3], UL 1741 PCS[3], UL 67[3], UL 869A[3], UL 916[3], CAN/CSA C22.2 No. 107.1-16, CSA C22.2 No. 29, CSA C22.2 No. 0.19
Seismic	AC 156, OSHPD, IEEE 693-2005 (high)
Environmental	California Proposition 65 RoHS Directive 2011 / EU
Emissions	FCC Part 15 Class B, ICES 003

ENVIRONMENTAL SPECIFICATIONS

Enclosure Type	NEMA 3R
Operating Temperature	-4°F to 122°F (-20°C to 50°C)
Operating Humidity (RH)	Up to 100% RH, condensing
Altitude	Maximum 9,843 ft (3,000 m)
Environment	Indoor and outdoor rated

1. Generator Module is optional.
2. Smart Circuit Module is optional.
3. Sections from these standards were used during the safety evaluation and included in the UL 1741 listing.

FRANKLINWH

aPower

AC-coupled battery

Store solar generated power while the sun is shining. Use the stored energy when needed to lower electric bills. Run heavy loads such as air conditioners and water heaters as usual even during grid outages. Provide homeowner peace of mind by fully charging before severe weather events.

12 Years Warranty

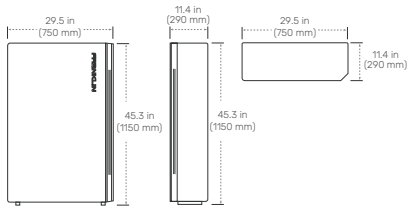
- ✓ Safe LFP chemistry
- ✓ Built-in inverter
- ✓ 13.6 kWh per unit, up to 204 kWh (15 units) per aGate
- ✓ 5 kW continuous / 10 kW peak for 10s (discharge)
- ✓ Normal operations down to -4°F (-20°C)
- ✓ IP67 protection
- ✓ Single aPower capable of starting a 4-Ton AC
- ✓ First-of-its-kind 208 V compliant battery for multi-family housing

PERFORMANCE SPECIFICATIONS

Battery Chemistry	Lithium Iron Phosphate (LFP)
Usable System Energy	13.6 kWh per unit, up to 15 units[1] per aGate
Aggregate Throughput	43 MWh
Real Power (charge)	5 kW continuous, 7.6 kW peak for 30 minutes
Real Power (discharge)	5 kW continuous, 10 kW peak for 10 seconds
Load Start Capability	118 A LRA[2]
Nominal AC Voltage	120 / 208 V, 120 / 240 V, 60 Hz
Coupling	AC-coupled
Phase	2 W+N+PE
Round Trip Efficiency	89%[3]
Work Modes	Self-Consumption, Time of Use, Emergency Backup
Noise Emission	<30 dB (A)[4]
User Interface	FranklinWH App
Warranty	12 years

MECHANICAL SPECIFICATIONS

Dimensions (H × W × D)	45.3 in × 29.5 in × 11.4 in (1150 mm × 750 mm × 290 mm)
Weight	395 lb (179 kg)
Mounting	Wall mount or floor mount
Cooling	Natural air-cooled design



COMPLIANCE INFORMATION

Certifications	UL 9540, UL 9540A, UL 1741, UL 1973, IEEE 1547, IEEE 1547.1, UN 38.3,CAN/CSA C22.2 No. 107.1-16
Seismic	AC 156, OSHPD, IEEE 693-2005 (high)
Environmental	California Proposition 65 RoHS Directive 2011 / EU
Emissions	FCC Part 15 Class B, ICES 003

ENVIRONMENTAL SPECIFICATIONS

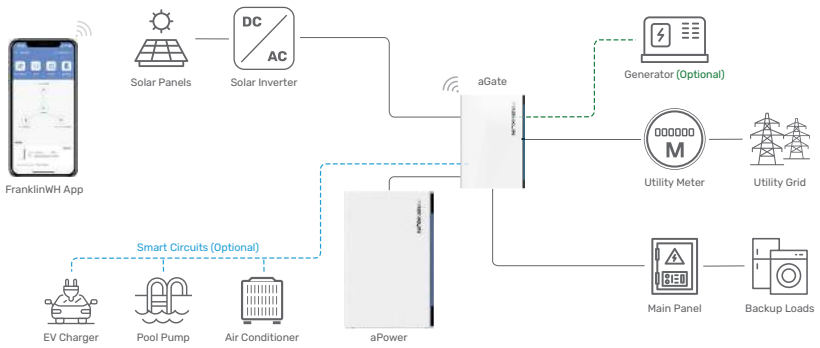
Ingress Protection	IP67 (Battery and power converter system), IP56 (Wiring compartment)
Operating Temperature	-4°F to 122°F (-20°C to 50°C)
Operating Humidity (RH)	Up to 100% RH, condensing
Altitude	Maximum 9,843 ft (3,000 m)
Environment	Indoor and outdoor rated

1. For 120 / 208V applications, max. 4 aPowers per aGate can be connected in parallel. Please contact us if you have large capacity requirements.
2. Load start capability may vary.
3. At beginning of life, AC to battery to AC, 50% power rating.
4. 5 kW discharge power, no fan running.

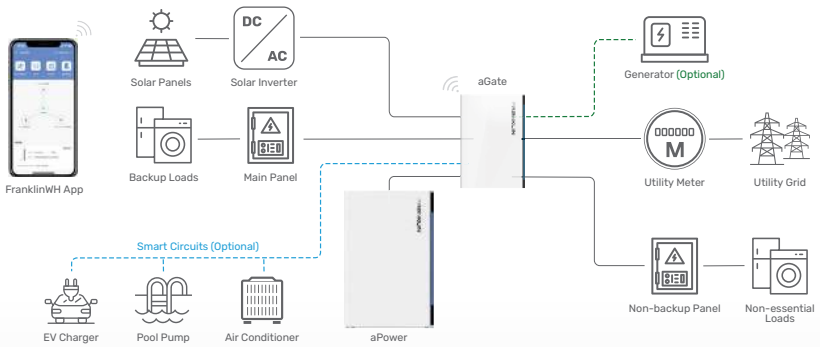
DATASHEET

Franklin Home Power Solution

Whole Home Backup



Partial Home Backup



Address: 1731 Technology Dr., Suite 530 San Jose, CA 95110 **Telephone:** +1 888-837-2655 **Email:** info@franklinwh.com **Website:** www.franklinwh.com

S-5!®

The Right Way!

The right way to attach almost anything to metal roofs!

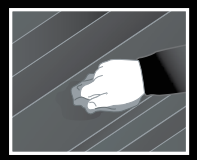
VersaBracket™

VersaBracket™ can be used to mount almost anything to an exposed-fastened roof system and is compatible with almost any trapezoidal exposed-fastened profile. No messy sealants to apply! No chance for leaks! The VersaBracket comes with factory-applied butyl sealant already in the base, and the S-5!® patented reservoir conceals the sealant from UV exposure, preventing drying and cracks.

Installation is simple! VersaBracket is mounted in the flat of the panel, directly into the supporting structure of the roof, i.e. wood decking, wood or steel purlins or trusses. No surface preparation is necessary; simply wipe away excess oil and debris, peel the release paper from the base, align, and apply. Secure through the pre-punched holes using the appropriate screws for the supporting structure.

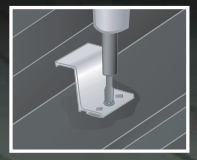
VersaBracket is so strong, it will even support heavy-duty applications like snow retention. For exposed-fastened trapezoidal profiles, the VersaBracket is the perfect match for our ColorGard® snow retention systems (for corrugated roofs use CorruBracket™). VersaBracket is extremely economical and facilitates quick and easy installation.

1



2

3



VersaBracket™

S-5!® VersaBracket™ is the right way to attach almost anything to exposed-fastened roof profiles, including PV through rail methods.

888-825-3432 | www.S-5.com |

MADE IN THE USA

S-5!®

The Right Way!

VersaBracket™ can be used for almost any attachment need, including S-5!® ColorGard®, on all types of exposed-fastened metal roofing. No messy sealants to apply. The factory-applied butyl sealant waterproofs and makes installation a snap!

To accommodate various rib heights, **VersaBracket™** comes in two heights—the 2.65" VersaBracket-67™ and the 1.86" VersaBracket-47™. The VersaBracket-67 mounting face has no holes or slots; thus, ancillary items are typically secured using self-tapping screws. The VersaBracket-47 comes with a 1" slot on top as the standard part. Other hole and slot configurations available with minimum purchase requirements (contact your distributor for available configurations). Each VersaBracket comes with factory-applied butyl sealant in the base. A structural aluminum attachment bracket, VersaBracket is compatible with most common metal roofing materials. For design assistance, ask your distributor, or use our web-based calculator at **www.S-5.com** for job-specific system engineering and design of your next snow retention project. Also, please visit our website for more information including CAD details, metallurgical compatibilities, and specifications.

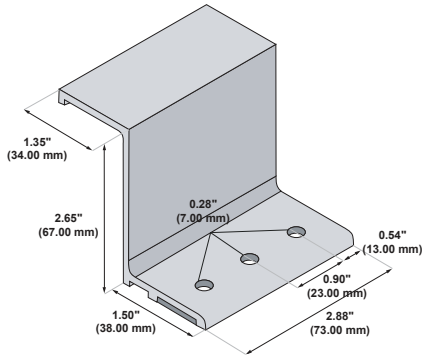
The VersaBracket has been tested for load-to-failure results on wood decking, metal, and wood purlins. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

Example Profile

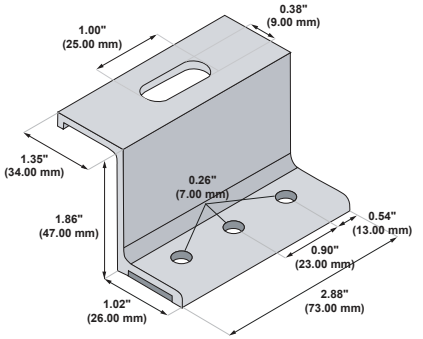
Example Applications

ColorGard

VersaBracket-67™



VersaBracket-47™



3 holes are provided for versatility. Some installations require only 2 fasteners. See the load table on the S-5! website and the installation instructions for more details.

Due to varied applications, mounting hardware is not furnished with part.

Please note: All measurements are rounded to the second decimal place.

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.

Distributed by

SOLARMOUNT

UNIRAC
BETTER SOLAR STARTS HERE

FEATURING SOLARMOUNT

- Designed for Unirac's Solarmount rail systems and certified to UL2703A for low-slope AND steep-slope roofs
- One-step butyl application for easy install and reliable waterproofing

DIFFERENT CLAMPS FOR DIFFERENT NEEDS

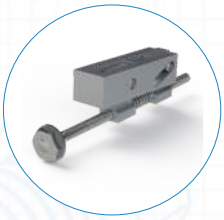
- Universal AF mid clamps and end clamps adjust to module heights from 30-46mm in a great looking, easy to install fastener
- Pro-series clamps feature hidden fasteners for fantastic aesthetics
- Standard clamps feature tight row spacing and various clamps to accommodate module frames up to 51mm in height

OPTIONS FOR ANY APPLICATION

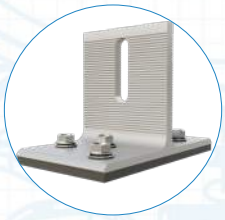
- Solarmount Standard and Solarmount Light rails profiles for installations across the country, including Puerto Rico
- Huge selection of attachments for any roof form comp shingle to tile
- Adjustable tilt legs certified to UL2703 to dial in your system just right


UNIVERSAL END CLAMP


UNIVERSAL MID CLAMP


CONCEALED SM END CLAMP


SM PRO SERIES MID CLAMP


SOLARMOUNT BUTYL


SOLARMOUNT PROFILE AND LIGHT PROFILE

WHY SOLARMOUNT?

SOLARMOUNT is the professionals' choice for residential PV mounting applications. Every aspect of the system is designed for an easier, faster installation experience. SOLARMOUNT is a complete solution with universal clamps, tons of attachment options, full system UL 2703 certification, and 25-year warranty. Sleek rails for both light and heavy duty applications, with optional trim, make for a reliable, cost-effective, great looking racking solution.

FOR QUESTIONS OR CUSTOMER SERVICE CONTACT:
505-242-6411 | SALES@UNIRAC.COM | WWW.UNIRAC.COM
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CONFORMS TO UL2703

ISO 9001:2015 14001:2015 CERTIFIED