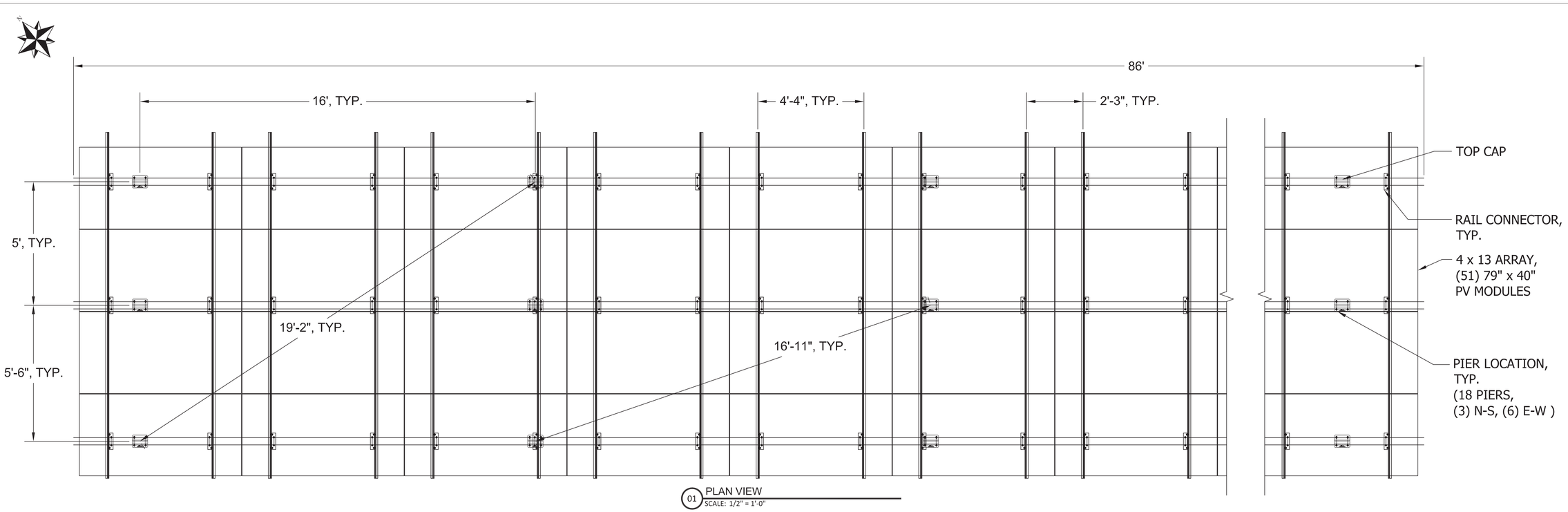
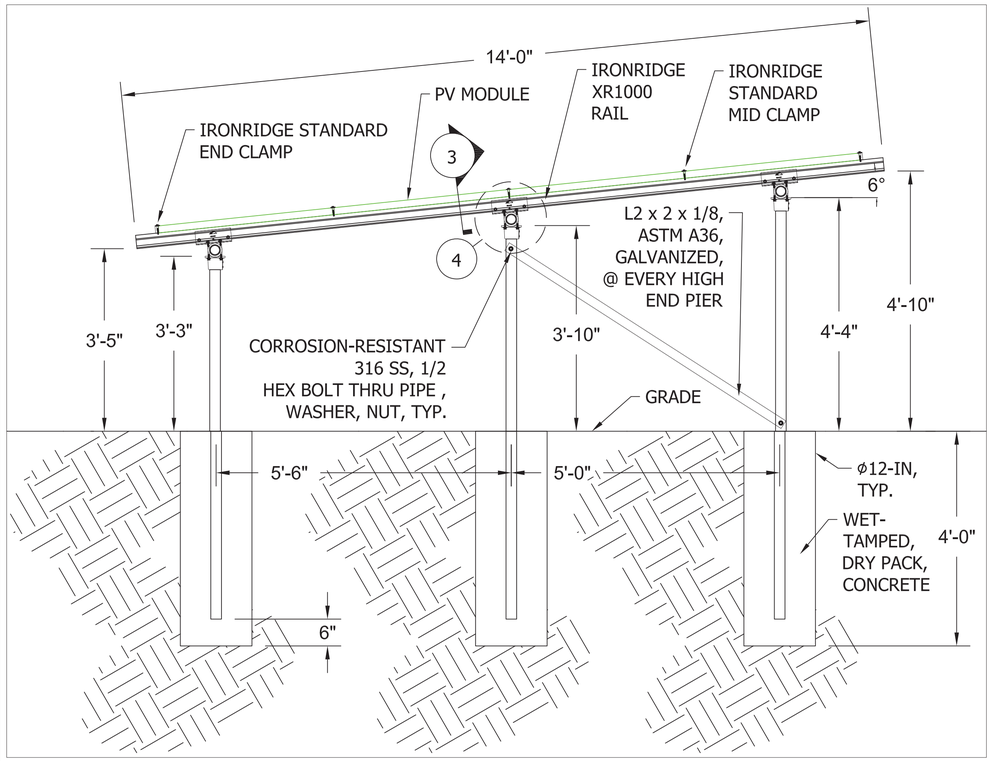
IRONRIDGE GROUND MOUNT PV SYSYEM STRUCTURAL PLAN

FBC 2020 (7TH EDITION) FLORIDA BUILDING CODE

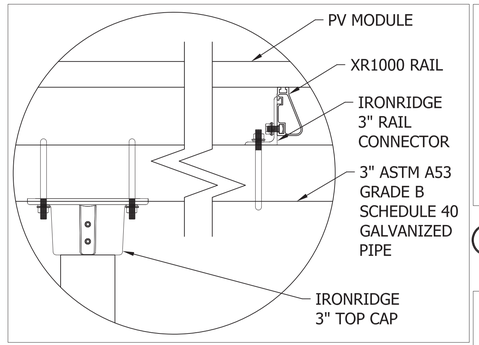
I CERTIFY THAT GROUND MOUNT PV INSTALLATION MADE IN ACCORDANCE WITH THIS PLAN CAN RESIST POSITIVE AND NEGATIVE WIND FORCES PREDICTED IN ACCORDANCE WITH ASCE 7-16. THIS IS ATTESTED TO BY MY SIGNATURE AND SEAL ON THIS DRAWING AT THE UPPER RIGHT.



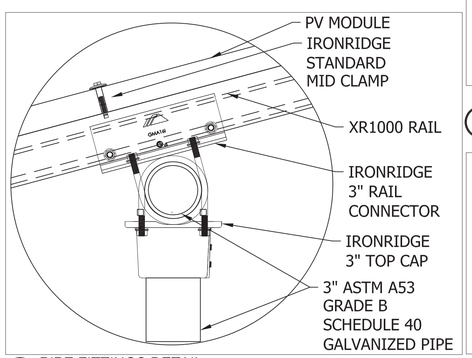
01 PLAN VIEW
SCALE: 1/2" = 1'-0"



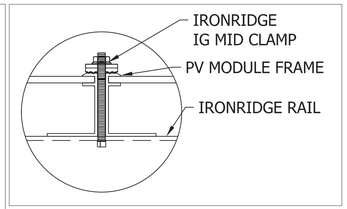
02 ELEVATION VIEW
SCALE: 3/4" = 1'-0"



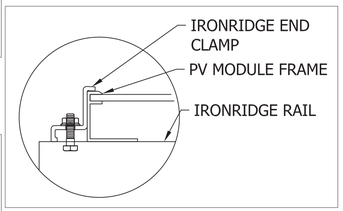
03 PIPE FITTINGS DETAIL
SCALE: NTS



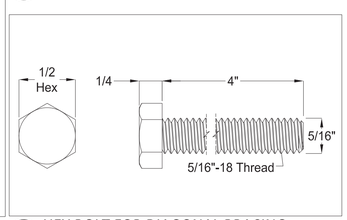
04 PIPE FITTINGS DETAIL
SCALE: NTS



05 IRONRIDGE MID-CLAMP
SCALE: NTS



06 IRONRIDGE STANDARD END-CLAMP
SCALE: NTS



06 HEX BOLT FOR DIAGONAL BRACING
SCALE: NTS

INSTALLATION NOTES

- **THIS PAPER PLAN IS INTENDED TO PROVIDE THE ESSENTIAL INFORMATION NEEDED BY AHJ (AUTHORITY HAVING JURISDICTION) AND INSTALLERS.**
- THIS IS A COMBINED SET OF STRUCTURAL AND ELECTRICAL PLANS. THE FIRST TWO SHEETS ARE STRUCTURAL, THE LAST TWO ARE ELECTRICAL.
- ALL VERTICAL AND HORIZONTAL PIPE SECTIONS SHALL BE GALVANIZED, ASTM A53, SCHEDULE 40, 3-INCH-DIAMETER.
- CONCRETE FOR ANCHORING PIERS SHALL BE 4000 PSI WET-TAMPED CONCRETE.
- SOIL CLASSIFICATION IS CONSERVATIVELY ASSUMED TO BE CLASS 4 AND LATERAL BEARING PRESSURE CAPACITY IS 150 PSF PER FOOT BASED ON FBC (2020), SECTION 1807, TABLE 1806.2 PRESUMPTIVE LOAD-BEARING VALUES.
- SEE DRAWINGS FOR MEANS & METHODS INFORMATION IN ADDITION TO THESE NOTES.
- ARRAY SHALL HAVE 51-PV MODULES. PV MODULES SHALL BE INSTALLED PORTRAIT, 13-MODULES WIDE BY 4-MODULES HIGH.
- PV MODULES SHALL REST UPON & BE CLAMPED TO NORTH-SOUTH IRONRIDGE XR1000 RAILS @ MODULE UPPER & LOWER ENDS (4-CLAMPS PER PV MODULE) BY IRONRIDGE BONDING MID CLAMPS/STANDARD END CLAMPS.
- EAST-WEST HORIZONTAL PIPE SECTIONS SHALL BE CONNECTED TO VERTICAL PIPE SECTIONS BY 2-CRS (CORROSION RESISTANT STEEL) U-BOLTS AS SHOWN IN DRAWINGS.
- EACH POST SHALL BE PLUMBED & TAMPED WITH DRY CONCRETE MIX BACK-FILL OF POST HOLE - USE WATER TO CONSOLIDATE WHILE TAMPING.
- CONTRACTOR SHALL FULFILL INSTALLATION ACCORDING TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- CONTRACTOR SHALL PROVIDE AHJ (AUTHORITY HAVING JURISDICTION) ADDITIONAL INFORMATION AS MAY BE REQUESTED.
- EOR (ENGINEER OF RECORD) PREFERS EMAIL COMMUNICATIONS: alper@iceli-pe.com

ENGINEER
ALPER ICELI
FL 90469
3753 LOCKRIDGE DR.
LAND O LAKES, FL 34638
(813) 406-7060
alper@iceli-pe.com

ALPER ICELI LICENSE No. 90469 STATE OF FLORIDA PROFESSIONAL ENGINEER

This item has been digitally signed and sealed by Alper Iceli, PE, on date shown above.

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

Digitally signed by Alper Iceli
Date: 2021.05.03 01:51:55 -04'00'

NAME OF OWNER:FRANKLIN ANITA DAWN CABRERA
ADDRESS:1322 SE EBENEZER RD LAKE CITY, FL 32025
PROPERTY ID#:31-4S-18-10519-004 (38586)

CONTRACTOR:

Dave's Home Helper Service, Inc.
36549 Laurel Oaks Dr.
Dade City, FL 33525
813-991-7596
EC13007006

DHHS-CABRERA STRUCTURAL SHEET 1
MAY.01-21

MEASUREMENTS CALLED OUT ARE NOT INTENDED TO BE EXACT.
AHJ, CONTRACTOR, & OWNER ARE NOTIFIED THAT SITE CONDITONS
WILL CAUSE VARIATIONS, WHICH ENGINEER OF RECORD (EOR)
DECLARES TO BE ACCEPTABLE.

* VERTICAL SUPPORT PIPE TO PROPERT LINE

01 PLAN VIEW
SCALE: 1/16" = 1'-0"

ATC Hazards by Location

Search Information

Address: 1322 Ebenezer Rd, Lake City, FL 32025, USA
Coordinates: 30.0950067, -82.5542964
Elevation: 143 ft
Timestamp: 2021-05-02T21:03:51.041Z
Hazard Type: Wind

ASCE 7-16

MRI 10-Year 74 mph
MRI 25-Year 83 mph
MRI 50-Year 89 mph
MRI 100-Year 97 mph
Risk Category I 109 mph
Risk Category II 119 mph
Risk Category III 129 mph

If the structure under consideration is a healthcare facility and you are also within 1 mile of the coastal mean high water line, you are in a wind-borne debris region. If other occupancy, use the Risk Category II basic wind speed contours to determine if you are in a wind-borne debris region.

Risk Category IV 134 mph

You are in a wind-borne debris region if you are also within 1 mile of the coastal mean high water line.

ASCE 7-10

MRI 10-Year 76 mph
MRI 25-Year 84 mph
MRI 50-Year 91 mph
MRI 100-Year 98 mph
Risk Category I 110 mph
Risk Category II 119 mph
Risk Category III-IV 129 mph

If the structure under consideration is a healthcare facility and you are also within 1 mile of the coastal mean high water line, you are in a wind-borne debris region. If other occupancy, use the Risk Category II basic wind speed contours to determine if you are in a wind-borne debris region.

ASCE 7-05

ASCE 7-05 Wind Speed 100 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region

Starling Madison Lofquist, Inc.
Consulting Structural and Forensic Engineers
5224 South 39th Street, Phoenix, Arizona 85040
tel: (602) 438-2500 fax: (602) 438-2505 ROC#291316 www.smleng.com

IronRidge
28357 Industrial Boulevard
Hayward, CA 94545

July 1, 2019
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Attn: Mr. Corey Geiger, VP New Markets, IronRidge Inc.

Subject: Ground Mounting System – Structural Analysis – 4 Module (XR1000)

Dear Sir:

We have analyzed the subject ground mounted structure and determined that it is in compliance with the applicable sections of the following Reference Documents:

Codes: ASCE/SEI 7-16 Min. Design Loads for Buildings & Other Structures
Florida Building Code, 2020 Edition
Other: AC428, Acceptance Criteria for Modular Framing Systems Used to Support PV Modules, dated Effective November 1, 2012 by ICC-ES
Aluminum Design Manual, 2015 Edition
IronRidge Exhibit EX-0001

The structure is a simple column (pier) and beam (cross pipe) system. The piers & cross pipes are ASTM A53 Grade B standard weight (schedule 40) steel pipes or Allied Mechanical Tubing. Please refer to Exhibit EX-0001 for approved pipe geometry and material properties. The tops of the piers are connected in the E-W direction by the cross pipes which cantilever over and extend past the end piers. The cross pipes are connected by proprietary IronRidge XR1000 Rails spanning up and down the slope which cantilever over and extend past the top and bottom cross pipes. There are typically two rails per column of modules. The modules are clamped to the rails by the IronRidge Module Mounting Clamps as shown in the attached Exhibit.

Gravity loads are transferred to the piers and foundations by the rails and cross pipes acting as simple beams. For lateral loads the system is either a cantilever structure or, when diagonal braces are provided, a braced frame. The effect of seismic loads (for all design categories A-F) have been determined to be less than the effect due to wind loads in all load conditions and combinations.

The pier spacing in the N-S direction is 7'-6". The pier spacing in the E-W direction is selected from load tables determined by the structural design for the specified slope, wind load, and snow load. The governing criteria for the pier spacing is either the spanning capacity of the cross pipes or the cantilever capacity of the pier. Simplified Load Tables 1A-F & 2A-F are included herein for reference.

More comprehensive information covering all load combinations is available at the IronRidge website, IronRidge.com.

Starling Madison Lofquist, Inc. Consulting Structural and Forensic Engineers

IronRidge
Mr. Corey Geiger
Ground Mounting System – Structural Analysis – 4 Module (XR1000)
July 1, 2019
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Table 2B - MAXIMUM PIER SPACING (in)

3" Unbraced Pipe Frame / Wind Speed & Exposure Category	Snow psf	Slope (deg) 0	5	10	15	20	25	30	35	40	45
100 mph Exposure C	0	212	217	188	181	171	163	139	117	100	85
	10	191	194	173	174	170	163	139	117	100	85
	20	165	167	155	154	153	153	139	117	100	85
	30	155	156	147	146	146	147	139	117	100	85
	40	142	143	135	135	137	139	139	117	100	85
	50	131	131	127	127	129	131	134	117	100	85
	60	121	121	120	119	122	125	129	117	100	85
105 mph Exposure C	0	204	178	182	148	137	134	126	107	91	77
	10	188	178	182	148	137	134	126	107	91	77
	20	162	164	152	148	137	134	126	107	91	77
	30	152	154	144	143	137	134	126	107	91	77
	40	140	141	134	133	134	134	126	107	91	77
	50	130	131	125	125	126	129	126	107	91	77
	60	121	121	118	118	120	123	126	107	91	77
110 mph Exposure C	0	198	202	171	166	157	150	115	97	83	70
	10	182	186	167	164	157	150	116	97	83	70
	20	159	161	149	147	145	145	115	97	83	70
	30	150	152	141	140	139	140	115	97	83	70
	40	138	139	131	130	131	132	116	97	83	70
	50	128	130	123	123	124	128	115	97	83	70
120 mph Exposure C	0	183	188	159	154	145	132	97	82	69	59
	10	174	177	155	154	145	132	97	82	69	59
	20	153	155	142	140	138	132	97	82	69	59
	30	145	147	138	134	133	132	97	82	69	59
	40	134	136	127	126	126	128	97	82	69	59
	50	125	127	119	119	120	121	97	82	69	59
130 mph Exposure C	0	171	175	145	143	135	112	82	70	59	50
	10	168	169	145	143	135	112	82	70	59	50
	20	147	150	138	134	131	112	82	70	59	50
	30	140	142	130	129	127	112	82	70	59	50
	40	130	132	122	121	121	112	82	70	59	50
	50	122	124	118	115	115	112	82	70	59	50
140 mph Exposure C	0	160	165	135	134	128	97	71	60	51	43
	10	158	162	135	134	128	97	71	60	51	43
	20	142	145	130	128	125	97	71	60	51	43
	30	135	138	125	123	121	97	71	60	51	43
	40	127	128	118	117	116	97	71	60	51	43
	50	119	121	112	111	111	97	71	60	51	43
150 mph Exposure C	0	150	156	130	128	118	84	62	52	44	38
	10	150	154	130	128	118	84	62	52	44	38
	20	137	140	125	123	118	84	62	52	44	38
	30	131	133	120	118	116	84	62	52	44	38
	40	123	125	114	113	111	84	62	52	44	38
160 mph Exposure C	0	142	146	122	118	107	74	54	46	39	33
	10	142	146	122	118	107	74	54	46	39	33
	20	132	135	120	117	107	74	54	46	39	33
	30	127	129	118	114	107	74	54	46	39	33
	40	119	121	110	108	107	74	54	46	39	33

Notes: see page 14

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IronRidge
Mr. Corey Geiger
Ground Mounting System – Structural Analysis – 4 Module (XR1000)
July 1, 2019
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Soil Class 4
Table 4B - MINIMUM FOUNDATION DEPTHS (in)

3" Pipe Frame Unbraced / Wind Speed & Exposure Category	Pier Dia (in)	Slope (deg) 0	5	10	15	20	25	30	35	40	45
100 mph Exposure C	12	42	48	54	60	72	84	90	90	90	90
	18	36	36	42	54	66	72	78	78	78	78
	20	36	36	42	48	60	66	72	72	72	72
	24	36	36	36	48	54	60	66	66	66	66
105 mph Exposure C	12	42	48	48	60	66	78	90	90	90	90
	18	36	36	42	54	60	72	78	78	78	78
	20	36	36	42	48	54	66	72	72	72	72
	24	36	36	36	42	54	60	66	66	66	66
110 mph Exposure C	12	48	54	54	66	78	84	90	90	90	90
	18	36	42	48	54	66	78	78	78	78	78
	20	36	36	42	54	60	72	72	72	72	72
	24	36	36	36	48	54	66	66	66	66	66
120 mph Exposure C	12	54	60	60	72	78	90	90	90	90	90
	18	42	48	48	60	72	78	78	78	78	78
	20	36	36	42	54	66	72	72	72	72	72
	24	36	36	42	48	60	66	66	66	66	66
130 mph Exposure C	12	54	66	66	78	84	90	90	90	90	90
	18	42	48	54	60	72	78	78	78	78	78
	20	36	42	42	54	66	72	72	72	72	72
	24	36	36	42	54	60	66	66	66	66	66
140 mph Exposure C	12	60	72	72	84	84	90	90	90	90	90
	18	48	54	54	66	72	78	78	78	78	78
	20	36	42	48	60	66	72	72	72	72	72
	24	36	36	42	54	66	66	66	66	66	*
150 mph Exposure C	12	66	78	78	90	90	90	90	90	90	90
	18	48	60	60	66	78	78	78	78	78	78
	20	42	48	48	60	72	72	72	72	72	*
	24	36	42	42	54	66	66	66	66	*	*
160 mph Exposure C	12	72	84	84	96	96	90	90	90	90	90
	18	54	60	60	72	78	78	78	78	78	78
	20	42	48	48	60	72	72	72	72	*	*
	24	36	42	48	54	66	66	66	*	*	*

Notes: see page 52

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IronRidge
Mr. Corey Geiger
Ground Mounting System – Structural Analysis – 4 Module (XR1000)
July 1, 2019
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Notes for Tables 3 & 4:
1. Concrete Weight = 145 pcf / f'c = 2500 psi
2. Provide Air Entraining Admixture for freeze and thaw cycles as required for colder climates.
3. Skin Friction per 2020 FBC 1810.3.3.1.4 & 5
4. Top 1'-0" of soil neglected for Skin Friction
5. Snow Load = 0 psf – tabulated values are conservative for Snow Loads > 0 psf
6. * indicates special foundation required. Contact IronRidge
7. Resistance to corrosion and/or sulfate attack, along with possible adverse effects due to expansive soils has not been considered in these foundation recommendations. SML Engineers assumes no liability with regard to these items.
8. Soil classification is to be determined and verified by the end user of this certification letter.

The analysis assumes that the array, including the connections and associated hardware, are installed in a workmanlike manner in accordance with the IronRidge Ground Mount Installation Manual and generally accepted standards of construction practice. Verification of PV Module capacity to support the loads associated with the given array shall be the responsibility of the Contractor or Owner and not IronRidge or Starling Madison Lofquist.

Please feel free to contact me at your convenience if you have any questions.

Respectfully yours,

Tres Warner, P.E.
Design Division Manager

Tres J Warner
Digitally signed by Tres J Warner
DN: c=US, o=Starling Madison Lofquist Inc, ou=A01410C00000174 8F7B422200003386, cn=Tres J Warner
Date: 2021.02.25 13:06:03 -07'00'

TRES J. WARNER LICENSE No 72547 STATE OF FLORIDA PROFESSIONAL ENGINEER
2.25.21 EXP 2.28.23

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http://files.ironridge.com/groundmounting/certification/XR1000SGA4/IronRidge_XR1000SGA4_Certification_UFO_FL.pdf

ULTIMATE WIND SPEED: 110 MPH
EXPOSURE CATEGORY: C
RISK CATEGORY: 1

SOIL CLASSIFICATION 4
(SECTION1806 PRESUMPTIVE LOAD-BEARING VALUES OF SOILS, FBC 7TH EDITION, 2020.)

SLOPE: 6°

PIER PILE DIAMETER PROVIDED: 12 INCHES.

PIER DEPTH REQUIRED PER MANUFACTURER'S RECOMMENDATION: 54 INCHES (FOR 2 ROWS OF VERTICAL SUPPORT PIPES (VSP)).
PIER DEPTH PROVIDED : 48 INCHES (3 ROWS OF VSP'S PROVIDED).

CONCRETE COMPRESSIVE STRENGTH REQUIRED PER MANUFACTURER'S RECOMMENDATION : 2500 PSI
CONCRETE PROVIDED: 4000 PSI, WET-TAMPED

MAXIMUM EAST-WEST PIER SPACING REQUIRED PER MANUFACTURER'S RECOMMENDATION: 202 INCHES.
EAST-WEST PIER SPACING PROVIDED : 192 INCHES.

02 WIND LOAD, PIER(PIPE) SPACING & PIER DEPTH
SCALE: N/A

ENGINEER
ALPER ICELI
FL 90469
3753 LOCKRIDGE DR.
LAND O LAKES, FL 34638
(813) 406-7060
alper@iceli-pe.com

ALPER ICELI LICENSE No. 90469 STATE OF FLORIDA PROFESSIONAL ENGINEER

This item has been digitally signed and sealed by Alper Iceli, PE, on date shown above.

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

NAME OF OWNER: FRANKLIN ANITA DAWN CABRERA
ADDRESS: 1322 SE EBENEZER RD LAKE CITY, FL 32025
PROPERTY ID#: 31-4S-18-10519-004 (38586)

CONTRACTOR:
Dave's Home Helper Service, Inc.
36549 Laurel Oaks Dr.
Dade City, FL 33525
813-991-7596
EC13007006

DHHS-CABRERA STRUCTURAL
SHEET 2
MAY.01-21

PV SYSYEM ELECTRICAL PLAN (ADDITION TO EXISTING SYSTEM)

THIS PLAN IS CERTIFIED BY ENGINEER OF RECORD AS CODE COMPLIANT & APPROVED FOR FLORIDA USE IN ACCORDANCE WITH HB 1021 ON ELECTRICAL PLANS.
http://www.floridabuilding.org/fbc/thecode/2017-6edition/HB1021-Construction.pdf

SYSTEM: 51-MISSION SOLAR MSE390R9S PV MODULES
51-SE P400 OPTIMIZERS
2-SE 10000H-US INVERTERS

CONTRACTOR SHALL COMPLY WITH SOLAR PROVISIONS 2018 NFPA 1.

1. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR RESPONSIBLE FOR COMPLYING WITH ALL LOCAL OR NATIONAL CODE REQUIREMENTS AND EQUIPMENT INSTALLATION INSTRUCTIONS.
2. ALL COMPONENTS MUST BE GROUNDED PER ARTICLES NEC (2017) 250 AND 690.
3. ALL EQUIPMENT SHALL BE LISTED PER NEC 690.4(B).
4. PER NEC 690.17, PROVIDE A WARNING SIGN AT ALL LOCATIONS WHERE TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION. SIGN SHALL READ "WARNING- ELECTRIC SHOCK HAZARD- DO NOT TOUCH TERMINALS- OR EQUIVALENT.
5. PER NEC 690.56, PROVIDE A PERMANENT PLAQUE OR DIRECTORY SHOWING ALL ELECTRIC POWER SOURCES ON THE PREMISES AT SERVICE ENTRANCE.
6. INTERCONNECTION METHOD SHALL COMPLY WITH NEC (2017) 705.12.
7. PV PERFORMANCE METER MAY OR MAY NOT BE REQUIRED BY THE AHJ AND/OR UTILITY FOR INTERCONNECTION.
8. WIRE SIZE ASSUMES THAT CONDUIT WILL BE RUN IN ATTIC SPACE OR LESS THAN 10' IS EXPOSED TO SUNLIGHT PER NEC (2017) 310.10. Exception: Where different ampacities apply to portions of a circuit, the higher ampacity shall be permitted to be used if the total portion(s) of the circuit with lower ampacity does not exceed the lesser of 3.0 m (10 ft) or 10 percent of the total circuit, NEC (2017) 310.15 (2).
9. UTILITY CONNECTION SHALL BE MADE BY LINE-SIDE TAP PER NEC ARTICLE 705.12(B)(2) LOCATED WITHIN CODE COMPLIANT ENCLOSURE.
10. AN OPTION FOR A SINGLE CIRCUIT BRANCH TO BE SPLIT INTO TWO SUB-CIRCUIT BRANCHES IS ACCEPTABLE.
11. ALL CONDUCTORS MUST BE COPPER.
12. ALL CONDUCTORS MUST BE COPPER, RATED FOR 600 V, 90 C° WET ENVIRONMET, TERMINALS ARE RATED FOR 75 C°.
13. ALL CONDUCTORS AND RACEWAYS SHALL BE SUPPORTED ON INTERVALS AND BY METHODS REQUIRED BY THE NEC (2017).
14. CONTRACTOR SHALL PROVIDE ADDITIONAL INFORMATION IF REQUIRED BY AHJ.
15. EOR PREFERS EMAIL COMMUNICATIONS alper@iceli-pe.com

01 ELECTRICAL NOTES.
SCALE:NTS

MODULE SPECIFICATIONS		
Module Make	MISSION SOLAR	
Module Model	MSE390R9S	
Pmax (STC)	390	W
Voc (STC)	48.96	V
Vmpp (STC)	41.05	V
Isc (STC)	10.024	A
Impp (STC)	9.499	A
NOCT	+ 46.43°C (±2°)	C
TC Isc	0.045	%/C
TC Voc	-0.28	%/C
TC Pmpp	-0.375	%/C
Operating Temp.	-40 to 85	C

INVERTER SPECIFICATIONS		
Inverter Make	Solardedge	
Inverter Model	SE-10000H-US	
Max. AC Power Output	10	kW
Max. Input Voltage	480	V
Nom. DC Voltage @240V	400	V
Nom. AC Voltage	240	V
Max. Continuous Output Current	42	A
Max. DC Current	27	A
Maximum DC Power (STC)	15500	W
CEC Efficiency	99	%

INVERTER SPECIFICATIONS		
Inverter Make	Solardedge	
Inverter Model	SE-10000H-US	
Max. AC Power Output	10	kW
Max. Input Voltage	480	V
Nom. DC Voltage @240V	400	V
Nom. AC Voltage	240	V
Max. Continuous Output Current	42	A
Max. DC Current	27	A
Maximum DC Power (STC)	15500	W
CEC Efficiency	99	%

System Voltage= Fixed String Volatge			
String #1	Vsys	400	V
String #2	Vsys	400	V
String #3	Vsys	400	V
String #4	Vsys	400	V

System Current = #Strings X Module Current (Isc or Imp)			
String #1	Impp	11.70	A
String #2	Impp	12.68	A
String #3	Impp	12.68	A
String #4	Impp	12.68	A

Circuit ampacity (DC) = Imax X 1.56			
String #1	Imax	18.25	A
String #2	Imax	19.77	A
String #3	Imax	19.77	A
String #4	Imax	19.77	A

STRING OPTIONS INV. #1	
Number of Modules	25
Number of strings	2
String #1	12
String #2	13
STC DC POWER (KW)	9.75
DC/AC SIZING	97.5

STRING OPTIONS INV. #2	
Number of Modules	26
Number of strings	2
String #3	13
String #4	13
STC DC POWER (KW)	10.14
DC/AC SIZING	101.4

OPTIMIZER SPECIFICATIONS		
Optimizer Make	SolarEdge	
Optimizer Model	P400	
Rated Input DC Power	400	W
Absolute Maximum Input Voltage	80	Vdc
Maximum Short Circuit Current (Isc)	10.1	Adc
MPPT Operating Range	8- 80	Vdc
Maximum DC Input Current	12.63	Adc
Maximum Output Voltage	60	Vdc
Maximum Output Current	15	Adc

Circuit Ampacity = Inverter AC output current X 1.25			
Inverter #1	Imax	52.5	A
Inverter #2	Imax	52.5	A

Array Watts = #Modules X Module STC Watts X .95 X Inverter Efficiency			
Array # 1 (INVERTER 1)		9.17	kW
Array # 2 (INVERTER 2)		9.54	kW

PHOTOVOLTAIC AC OUTPUT INV.#1		
NOMINAL AC VOLTAGE	240	V
AC OUTPUT CURRENT	42	A

PHOTOVOLTAIC AC OUTPUT INV.#2		
NOMINAL AC VOLTAGE	240	V
AC OUTPUT CURRENT	42	A

PHOTOVOLTAIC DC DISCONNECT #1		
RATED MPP1 CURRENT	11.70	A
RATED MPP1 CURRENT	12.68	A
RATED MPP VOLTAGE	480.0	V
MAX. SYSTEM VOLTAGE	400.0	V
MAX. SYS. CURRENT	27.00	A
SHORT CURCUIT CURRENT	45.00	A

PHOTOVOLTAIC DC DISCONNECT #2		
RATED MPP1 CURRENT	12.68	A
RATED MPP1 CURRENT	12.68	A
RATED MPP VOLTAGE	480.0	V
MAX. SYSTEM VOLTAGE	400.0	V
MAX. SYS. CURRENT	27.00	A
SHORT CURCUIT CURRENT	45.00	A

VOLTAGE DROP CALCULATIONS (Vd=2*L*R*I/1000)							
WIRE RUN	Vmp	Imp	R	L (ft)	Vd	%Vd	WIRE SIZE
PV STRING TO JUNCTION BOX, (STRINGS #2, #3 & #4)	400	12.7	2.01	40	2.04	0.51	#12
PV STRING TO JUNCTION BOX, (STRINGS #1)	400	11.7	2.01	40	1.88	0.47	#12
JUNCTION BOX TO INVERTER, (STRINGS #1)	400	11.7	1.26	25	0.74	0.18	#10
INVERTER #1 TO SUB-PANEL	240	42.0	0.501	5	0.21	0.09	#6
INVERTER #2 TO SUB-PANEL	240	42.0	0.501	5	0.21	0.09	#6
SUB-PANEL PV AC DISCONNECT	240	84.0	0.254	50	2.13	0.89	#3
PV AC DISCONNECT TO INTERCONNECTION	240	84.0	0.254	5	0.21	0.09	#3

02 SPECIFICATIONS, CALCULATIONS, & LABELS
SCALE:N/A

IN CASE OF EMERGENCY CALL
DAVE'S HOME HELPER SERVICE, INC.
(813) 991-7596
LABEL PLACEMENT: PV AC DISCONNECT,INTERCONNECTION, MAIN PANEL

EMERGENCY RESPONDER
THIS SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN
TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN THE ENTIRE PV SYSTEM.
SOLAR ELECTRIC PV PANELS
NFPA 111.12.2.1.1.1,1,11.12.2.1.4 AND NEC 690.56(C)(1)
LABEL PLACEMENT: PV AC DISCONNECT,INTERCONNECTION, MAIN SERVICE PANEL

WARNING: PHOTOVOLTAIC POWER SOURCE

MARKING AND LABELING REQUIREMENTS:
Markings shall comply with NEC (2017) 690.51 through 690.72 and shall be placed on ALL interior and exterior DC conduit, raceways, enclosures, and cable assemblies at least every 10 feet; at turns and above/below penetrations and all junction boxes.

WARNING
ELECTRICAL SHOCK HAZARD.
IF A GROUND FAULT IS INDICATED, NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED.
LABEL PLACEMENT: JUNCTION BOX & INVERTER

WARNING
ELECTRICAL SHOCK HAZARD.
DO NOT TOUCH TERMINALS.
TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.
LABEL PLACEMENT: AC DISCONNECT, NEAR BREAKER, (FRONT OF PANEL / DEAD FRONT)

WARNING
DUAL POWER SOURCES.
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM.
LABEL PLACEMENT: MAIN PANEL NEAR METER

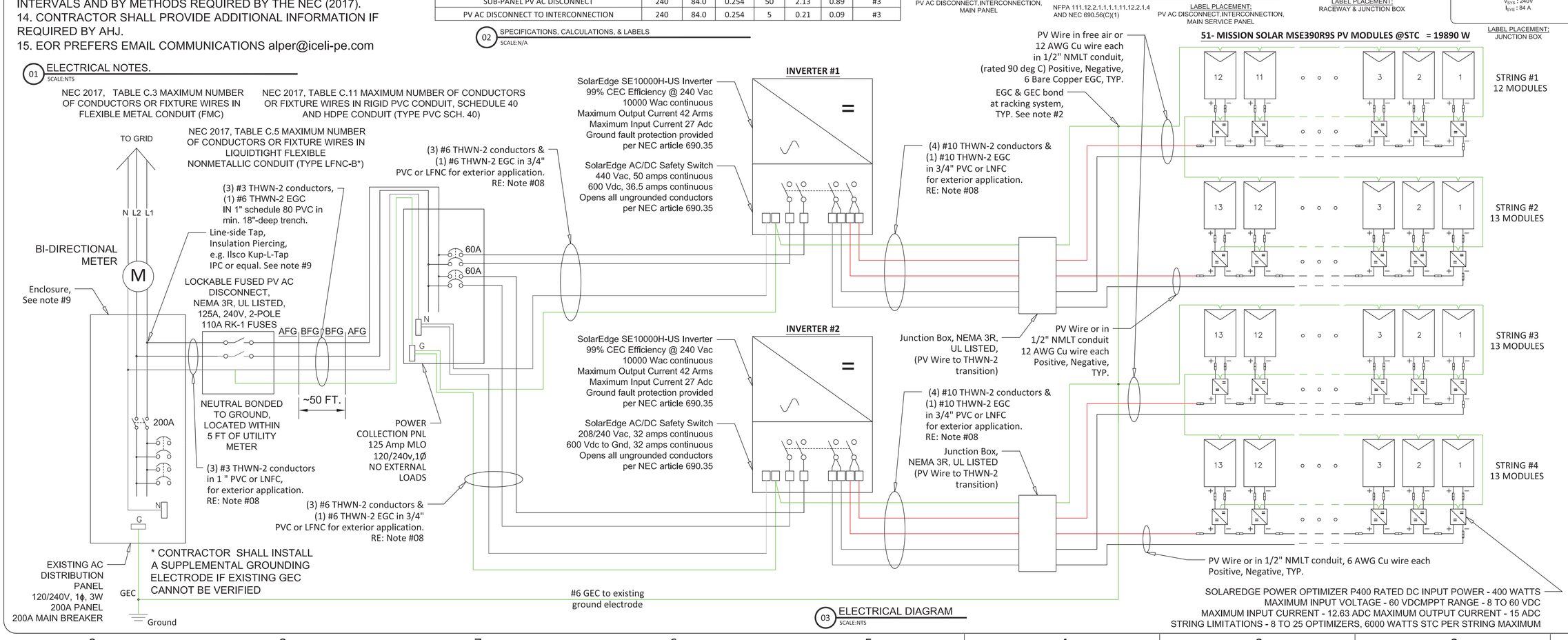
WARNING
DC SHOCK HAZARD.
V_{MAX} : 480 V
V_{MPP} : 400 V
I_{MAX}: 27 A
I_{MPPS} : 11.7 A
I_{MPPU} : 12.68 A
LABEL PLACEMENT: JUNCTION BOX

WARNING
ELECTRICAL SHOCK HAZARD.
NO USER-SERVICABLE PARTS INSIDE.
CONTACT AUTHORIZED SERVICER FOR ASSISTANCE.
LABEL PLACEMENT: AC DISCONNECT, JUNCTION BOX, INVERTER

WARNING
DC SHOCK HAZARD.
V_{MAX} : 480 V
V_{MPP} : 400 V
I_{MAX}: 27 A
I_{MPPS} : 11.7 A
I_{MPPU} : 12.68 A
LABEL PLACEMENT: JUNCTION BOX

PHOVOLTAIC POWER SOURCE
LABEL PLACEMENT: RACEWAY & JUNCTION BOX

PV AC DISCONNECT
V_{SYS} : 240V
I_{SYS} : 84 A
LABEL PLACEMENT: JUNCTION BOX



03 ELECTRICAL DIAGRAM
SCALE:NTS

NATIONAL ELECTRICAL CODE, NEC (2017)
ENGINEER
ALPER ICELI
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3753 LOCKRIDGE DR.
LAND O LAKES, FL 34638
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alper@iceli-pe.com

ALPER ICELI LICENSE No. 90469 STATE OF FLORIDA PROFESSIONAL ENGINEER

This item has been digitally signed and sealed by Alper Iceli, PE, on date shown above.

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

NAME OF OWNER: FRANKLIN ANITA
DAWN CABRERA
ADDRESS: 1322 SE EBENEZER RD
LAKE CITY, FL 32025
PROPERTY ID#: 31-4S-18-10519-004 (38586)

CONTRACTOR:
Dave's Home Helper Service, Inc.
36549 Laurel Oaks Dr.
Dade City, FL 33525
813-991-7596
EC13007006

DHHS-CABRERA

ELECTRICAL
MAY.01-21

PERC 72

CLASS LEADING 380-390W

ELECTRICAL SPECIFICATIONS

Electrical Parameters at Standard Test Conditions (STC)

Module Type			MSE375SR9S	MSE380SR9S	MSE385SR9S	MSE390SR9S
Power Output	Pmax	Wp	375	380	385	390
Module Efficiency		%	18.61	18.86	19.11	19.35
Tolerance			0~+3%	0~+3%	0~+3%	0~+3%
Short-Circuit Current	Isc	A	9.939	9.966	9.993	10.024
Open Circuit Voltage	Voc	V	48.02	48.31	48.53	48.96
Rated Current	Imp	A	9.360	9.385	9.426	9.499
Rated Voltage	Vmp	V	40.06	40.49	40.84	41.05
Fuse Rating			20	20	20	20

CERTIFICATIONS & TESTS

IEC

61215 - 61730 - 61701 - Salt mist

UL

UL 1703 listed

cULus LISTED CEC TÜV

TEMPERATURE COEFFICIENTS

Normal Operating Cell Temperature (NOCT)	46.43°C (±2°C)
Temperature Coefficient of Pmax	-0.375% / °C
Temperature Coefficient of Voc	-0.280% / °C
Temperature Coefficient of Isc	0.045% / °C

OPERATING CONDITIONS

Maximum System Voltage	1,500Vdc or 1000Vdc
Operating Temperature Range	-40°C (-40°F) to +85°C (185°F)
Maximum Series Fuse Rating	20A
Fire Safety Classification	Type 1, Class C
Front & Back Load (UL standard)	5631 Pa (117 psf) Tested to UL1703 standard
Hail Safety Impact Velocity	25mm at 23 m/s

MECHANICAL DATA

Solar Cells	P-type mono-crystalline silicon (158.75mm)
Cell Orientation	72 cells (6x12), 5 busbar
Module Dimension	1999mm x 1008mm x 40mm (78.7 in. x 39.68 in. x 1.58 in.)
Weight	23 kg (50.7 lb)
Front Glass	3.2mm (0.126 in.) tempered, low-iron, anti-reflective coating
Frame	Anodized aluminum alloy
Encapsulant	Ethylene vinyl acetate (EVA)
J-Box	Protection class IP67 with 3 bypass-diodes
Cables	PV wire, 1.2m (47.24 in.), 4mm^2 / 12 AWG
Connector	MC4 Compatible

SHIPPING INFORMATION

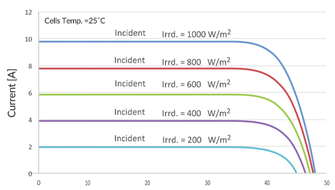
Container FT		Pallets	Panels	385 W
53'	Double stack	30	780	300.30 kW
40'	Double stack	24	624	240.24 kW

	Panels	Weight	Height	Width	Length
Pallet	26	1,414lbs	42.45"	45.50"	79.50"

Mission Solar Energy reserves the right to make specification changes without notice

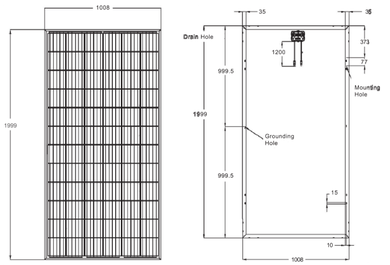
DOCUMENT #: C-BAS-MKTG-2019 REVISION #: R2 REVISION DATE: 4/28/2020

MSE385SR9S: 385WP, 72 CELL SOLAR MODULE CURRENT - VOLTAGE CURVE



Voltage [V]
Current-voltage characteristics with dependence on irradiance and module temperature

BASIC DESIGN (UNITS: mm)



MISSION SOLAR ENERGY™

Mission Solar Energy | 8303 S. New Braunfels Ave., San Antonio, Texas 78235
info@missionsolar.com | www.missionsolar.com

RoHS

Single Phase Inverter with HD-Wave Technology for North America

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

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5[1]							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current @240V[2]	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V[2]	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600ka Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Data, ANSI C12.20	Optional[3]							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect							
STANDARD COMPLIANCE								
Safety	UL1741, UL1741 SA, UL16998, CSA C22.2, Canadian AFCI according to T.I.L. M-07							
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)							
Emissions	FCC Part 15 Class B							
INSTALLATION SPECIFICATIONS								
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG					1" Maximum /14-4 AWG		
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG					1" Maximum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174					21.3 x 14.6 x 7.3 / 540 x 370 x 185		in / mm
Weight with Safety Switch	22 / 10		25.1 / 11.4	26.2 / 11.9		38.8 / 17.6		lb / kg
Noise	< 25				<50			dBA
Cooling	Natural Convection							
Operating Temperature Range	-13 to +140 / -25 to +60[4] (-40°F / -40°C option)[5]							°F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)							

[1] For other regional settings please contact SolarEdge support
[2] A higher current source may be used; the inverter will limit its input current to the values stated
[3] Revenue grade Inverter P/N: SExxxxH-US000NNC2
[4] For power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf
[5] -40 version P/N: SExxxxH-US000NNU4

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT							
Rated Input DC Power[1]	320	340	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125[2]	83[3]	Vdc
MPPT Operating Range	8 - 48		8 - 60	8 - 80	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11			10.1		14	Adc
Maximum DC Input Current	13.75			12.63		17.5	Adc
Maximum Efficiency	99.5						%
Weighted Efficiency	98.8					98.6	%
Overvoltage Category	II						
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)							
Maximum Output Current	15						Adc
Maximum Output Voltage	60				85		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)							
Safety Output Voltage per Power Optimizer	1 ± 0.1						Vdc
STANDARD COMPLIANCE							
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3						
Safety	IEC62109-1 (class II safety), UL1741						
RoHS	Yes						
INSTALLATION SPECIFICATIONS							
Maximum Allowed System Voltage	1000						Vdc
Compatible Inverters	All SolarEdge Single Phase and Three Phase inverters						
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1			129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 159 x 49.5 / 5.1 x 6.3 x 1.9	129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	630 / 1.4			750 / 1.7	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4[3]						
Output Wire Type / Connector	Double Insulated; MC4						
Output Wire Length	0.95 / 3.0		1.2 / 3.9				m / ft
Input Wire Length	0.16 / 0.52						m / ft
Operating Temperature Range	-40 - +85 / -40 - +185						°C / °F
Protection Rating	IP68 / NEMA6P						
Relative Humidity	0 - 100						%

[1] Rated STC power of the module. Module of up to +5% power tolerance allowed
[2] NEC 2017 requires max input voltage be not more than 80V
[3] For other connector types please contact SolarEdge

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

[4] For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
[5] It is not allowed to mix P405/P505 with P320/P340/P370/P400 in one string
[6] A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
[7] For SE14.4KUS/SE43.2KUS: It is allowed to install up to 6,500W per string when 3 strings are connected to the inverter (3 strings per unit for SE43.2KUS) and when the maximum power difference between the strings is up to 1,000W
[8] For SE30KUS/SE33.3KUS/SE66.6KUS/SE100KUS: It is allowed to install up to 15,000W per string when 3 strings are connected to the inverter (3 strings per unit for SE66.6KUS/SE100KUS) and when the maximum power difference between the strings is up to 2,000W

CE RoHS

01 PV MODULE SPEC. SHEET
SCALE: N/A

02 INVERTER SPEC. SHEET
SCALE: N/A

03 POWER OPTIMIZER SPEC. SHEET
SCALE: N/A

NATIONAL ELECTRICAL CODE, NEC (2017)

ENGINEER

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DATA
MAY.01-21