ROOF MOUNT PHOTOVOLTAIC SYSTEM

CODES:

THIS PROJECT COMPLIES WITH THE FOLLOWING: 2020 7TH EDITION FLORIDA BUILDING CODE: BUILDING

2020 7TH EDITION FLORIDA BUILDING CODE: RESIDENTIAL

2020 7TH EDITION FLORIDA BUILDING CODE: MECHANICAL 2020 7TH EDITION FLORIDA BUILDING CODE: PLUMBING

2020 7TH EDITION FLORIDA BUILDING CODE: FUEL GAS

2020 7TH EDITION FLORIDA BUILDING CODE: ENERGY CONSERVATION

2020 7TH EDITION FLORIDA BUILDING CODE: EXISTING BUILDING

2020 7TH EDITION FLORIDA BUILDING CODE: ACCESSIBILITY

2020 7TH EDITION FLORIDA FIRE PREVENTION CODE

2017 NATIONAL ELECTRIC CODE

AS ADOPTED BY COLUMBIA COUNTY (FL)

VICINITY MAP:



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CONSTRUCTION NOTES:

CONDUIT AND CONDUCTOR SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.

ALL SOLAR ENERGY SYSTEM EQUIPMENT SHALL BE SCREENED TO THE MAXIMUM EXTENT POSSIBLE AND SHALL BE PAINTED A COLOR SIMILAR TO THE SURFACE UPON WHICH THEY ARE MOUNTED.

MODULES SHALL BE TESTED, LISTED AND INDENTIFIED WITH FIRE CLASSIFICATION IN ACCORDANCE WITH UL 2703. SMOKE AND CARBON MONOXIDE ALARMS ARE REQUIRED PER SECTION R314 AND 315 TO BE VERIFIED AND INSPECTED BY INSPECTOR IN THE FIELD.

DIG ALERT (811) TO BE CONTACTED AND COMPLIANCE WITH EXCAVATION SAFETY PRIOR TO ANY **EXCAVATION TAKING PLACE**

PHOTOVOLTAIC SYSTEM GROUND WILL BE TIED INTO EXISTING GROUND AT MAIN SERVICE FROM DC DISCONNECT/INVERTER AS PER 2017 NEC SEC 250.166(A).

SOLAR PHOTOVOLTAIC SYSTEM EQUIPMENT WILL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF ART. 690 OF THE 2017 NEC

THE MAIN SERVICE PANEL WILL BE EQUIPPED WITH A GROUND ROD OR UFER

UTILITY COMPANY WILL BE NOTIFIED PRIOR TO ACTIVATION OF THE SOLAR PV SYSTEM

SOLAREDGE OPTIMIZERS ARE LISTED TO IEC 62109-1 (CLASS II SAFETY) AND UL 1741 STANDARDS

INSTALL CREW TO VERIFY ROOF STRUCTURE PRIOR TO COMMENCING WORK. EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNT.

Michael Riet 2023.05.15 15:38:36=04'00'

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JOHN HICKEY

327 NW CARR CT, LAKE CITY, FL 32055 AHJ: COLUMBIA COUNTY (FL) UTILITY: FPL - FLORIDA POWER & LIGHT METER: ACD8733

PHONE: (386) 867-0620 EMAIL: BIGDOGMOM1@GMAIL.COM

INANCE: OTHER

<u>SYSTEM:</u> SYSTEM SIZE (DC): 70 X 400 = 28.000 kW SYSTEM SIZE (AC): 20.000 kW @ 240V MODULES: 70 X FREEDOM FOREVER: FF-MP-BBB-400

OPTIMIZERS: 70 X SOLAREDGE S440 INVERTER 1: SOLAREDGE SE10000H-USRGM

INVERTER 2: SOLAREDGE SE10000H-USRGM

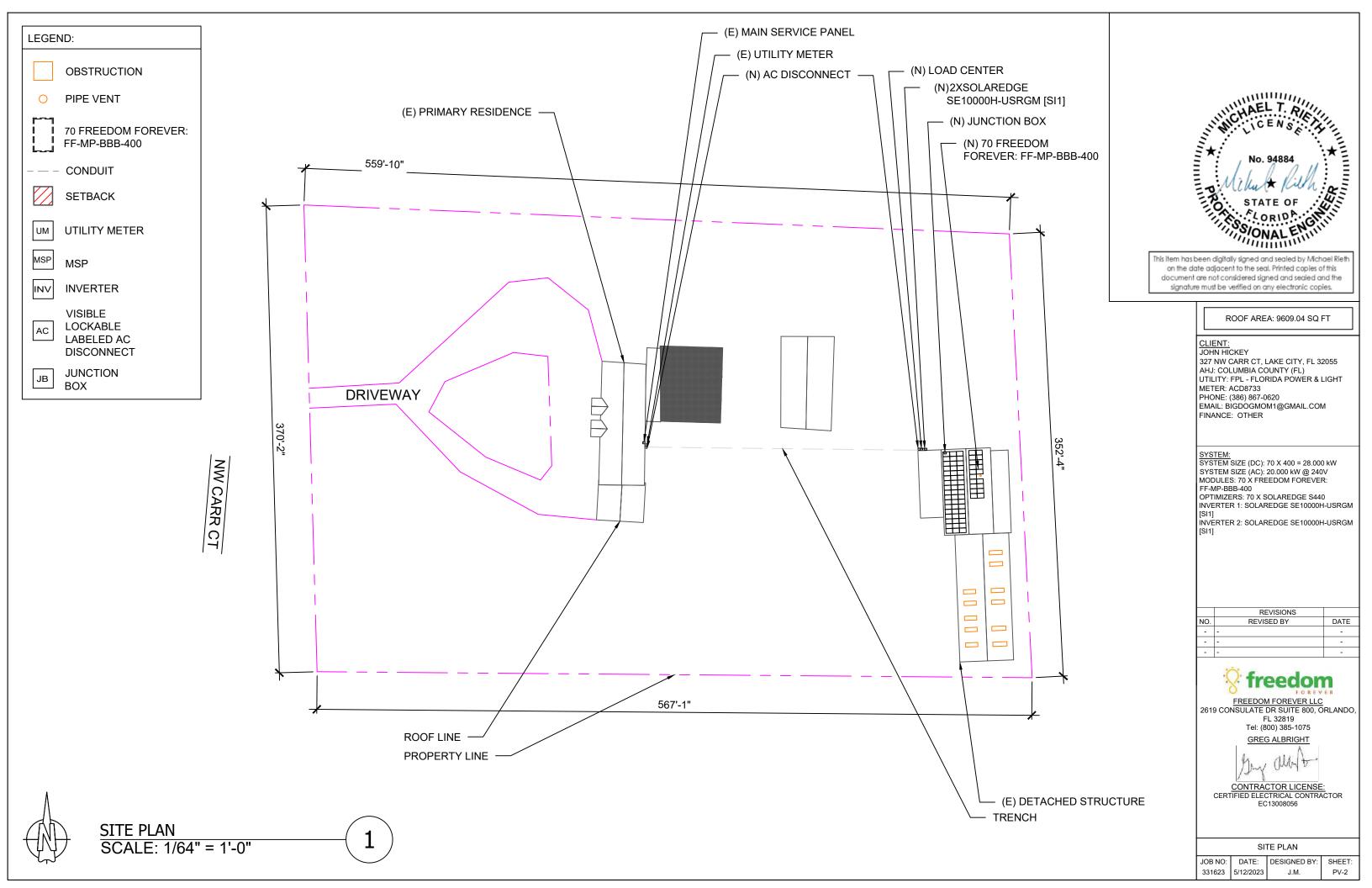
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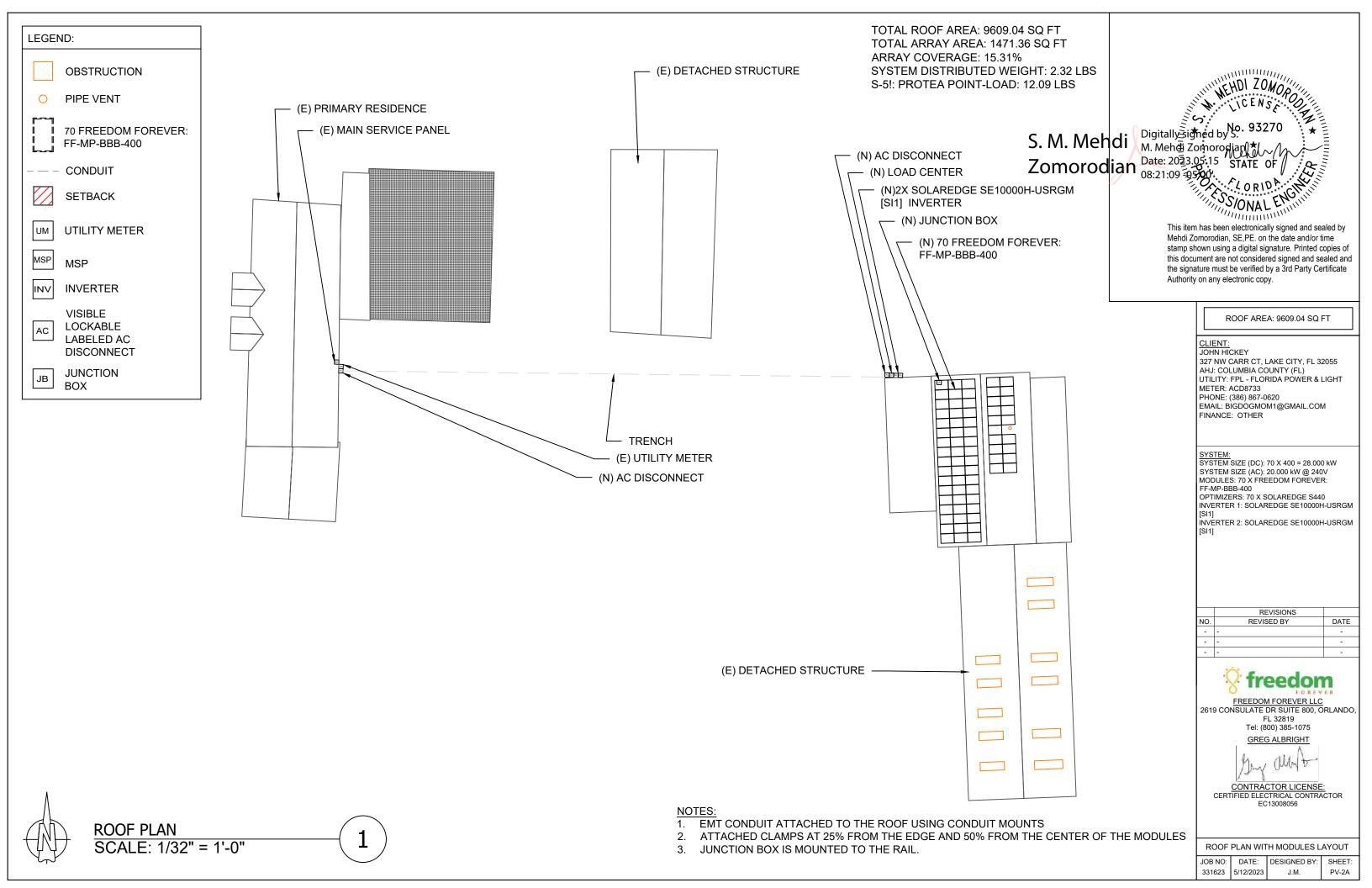


SITE LOCATION

331623 5/12/2023

DATE: DESIGNED BY





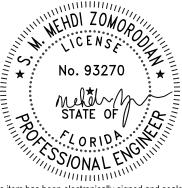
ROOF DETAILS:

TOTAL ROOF AREA: 9609.04 SQ FT TOTAL ARRAY AREA: 1471.36 SQFT

ARRAY COVERAGE: 15.31%

SYSTEM DISTRIBUTED WEIGHT: 2.32 LBS S-5!: PROTEA POINT-LOAD: 12.09 LBS

ROOF AREA STATEMENT							
ROOF	MODULE QUANTITY	ROOF PITCH	ARRAY PITCH	AZIMUTH	ROOF AREA	ARRAY AREA	
ROOF 1	51	20	20	267	1421.97 SQ FT	1071.99 SQ FT	
ROOF 2	19	20	20	87	1426.18 SQ FT	399.37 SQ FT	
					SQ FT	SQ FT	
					SQ FT	SQ FT	
					SQ FT	SQ FT	
					SQ FT	SQ FT	
					SQ FT	SQ FT	
					SQ FT	SQ FT	
					SQ FT	SQ FT	
					SQ FT	SQ FT	



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FREEDOM FOREVER LLC
2619 CONSULATE DR SUITE 800, ORLANDO,
FL 32819
Tel: (800) 295 1077

GREG ALBRIGHT

CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

JOB NO: DATE: DESIGNED BY: 331623 5/12/2023

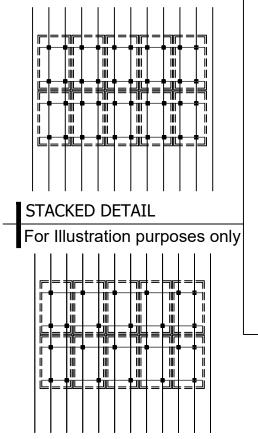
	TABLE 1 - ARRAY INSTALLATION									
	ROOF PITCH	ROOFING TYPE	ATTACHMENT TYPE	FRAMING TYPE1	MAX UNBRACED LENGTH(FT.)1	RAFTER/TRUSS SISTERING	PENETRATION PATTERN2	MAX ATTACHMENT SPACING (IN.)2	MAX RAIL OVERHANG(I N.)3	
ROOF 1	20	METAL	S-5 PROTEABRACKET	2X6 TRUSS @ 24" OC	4.00'	NOT REQ'D	STAGGERED	48" OC	16"	
ROOF 2	20	METAL	S-5 PROTEABRACKET	2X6 TRUSS @ 24" OC	4.00'	NOT REQ'D	STAGGERED	48" OC	16"	



^{2.} WHERE COLLAR TIES OR RAFTER SUPPORTS EXIST, CONTRACTOR SHALL USE RAFTERS WITH COLLAR TIES AS ATTACHMENT POINTS.

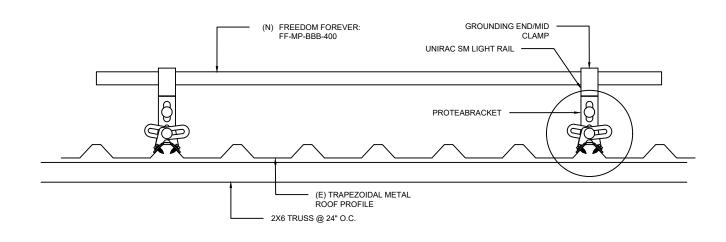
SOLAR PV ARRAY SECTION VIEW

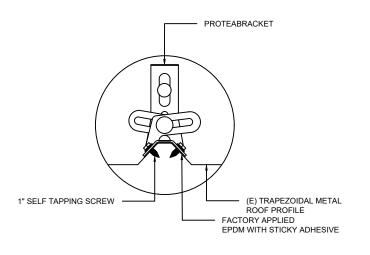
Scale: NTS



STAGGERED DETAIL

For Illustration purposes only





ATTACHMENT DETAIL

Scale: NTS



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2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819 Tel: (800) 385-1075 **GREG ALBRIGHT**

CONTRACTOR LICENSE: CERTIFIED ELECTRICAL CONTRACTOR EC13008056

MOUNTING DETAILS

DATE: DESIGNED BY: 331623 5/12/2023 J.M.

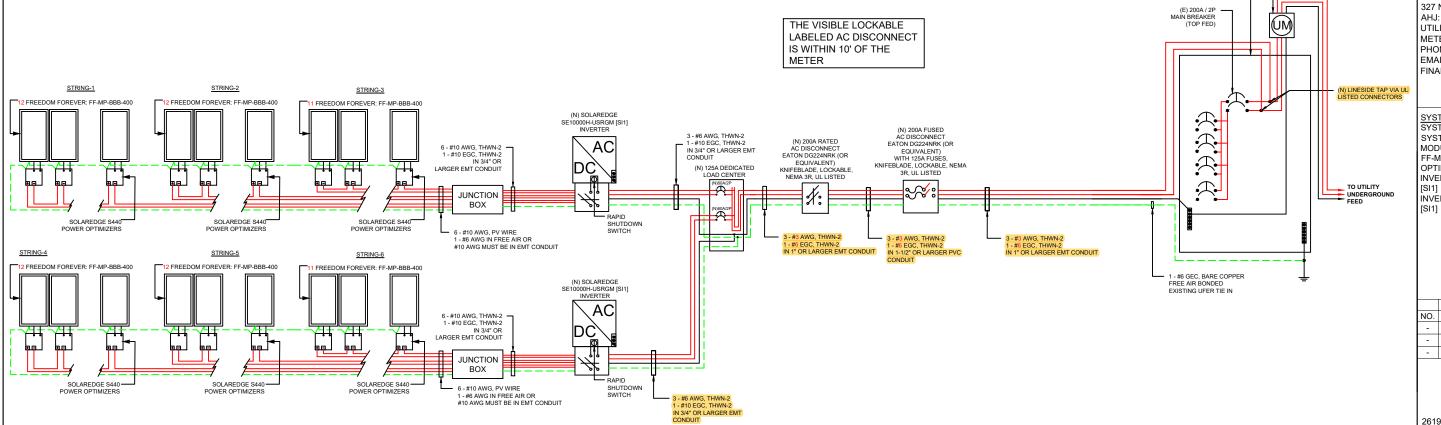
PV-3

^{3.} WHERE APPLICABLE FOR RAILED ATTACHMENT INSTALLATIONS.

BACKFEED FUSE SIZING MAX. CONTINUOUS OUTPUT 84.00A @ 240V X 1.25 = 105AMPS 125A FUSES - OK



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REVISIONS REVISED BY DATE

> freedom FREEDOM FOREVER LLC

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EC13008056

THREE LINE DIAGRAM

DESIGNED BY: 331623 5/12/2023 J.M.

ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS

CONDUIT AND CONDUCTORS SPECIFICATIONS ARE BASED



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	WIRE SCHEDULE											
RACEWAY #	EQUIPMENT			CONDUCTOR QTY.	AWG WIRE SIZE	STARTING ALLOWABLE AMPACITY @ 90°C 310.15(B)(16)	STARTING CURRENT APPLIED TO CONDUCTORS IN RACEWAY	TEMPERATURE CORRECTION FACTOR 310.15(B)(2)(a)	ADJUSTMENT FACTOR FOR MORE THAN 3 CONDUCTORS 310.15(B)(3)(a)	ADJUSTED CONDUCTOR AMPACITY @ 90°C	MAXIMUM CURRENT APPLIED TO CONDUCTORS IN RACEWAY	
1	DC	MODULE	ТО	OPTIMIZER	2	10	40	17.24	0.96	1	38.40	21.55
2	DC	OPTIMIZER	ТО	JUNCTION BOX	2	10	40	15.00	0.96	1	38.40	18.75
3	DC	JUNCTION BOX	то	INVERTER 1	6	10	40	15.00	0.96	0.8	30.72	18.75
4	DC	JUNCTION BOX	то	INVERTER 2	6	10	40	15.00	0.96	0.8	30.72	18.75
5	AC	INVERTER 1	то	DEDICATED LOAD CENTER	3	6	75	42.00	0.96	1	72.00	52.50
6	AC	INVERTER 2	то	DEDICATED LOAD CENTER	3	6	75	42.00	0.96	1	72.00	52.50
7	AC	DEDICATED LOAD CENTER	то	AC DISCONNECT	3	3	115	84.00	0.96	1	110.40	105.00
8	AC	AC DISCONNECT	то	POI	3	3	115	84.00	0.96	1	110.40	105.00

CONDUCTOR AMPACITY CALCULATIONS IN ACCORDANCE WITH NEC 690.8.

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REVISIONS REVISED BY DATE



CONTRACTOR LICENSE: CERTIFIED ELECTRICAL CONTRACTOR EC13008056

CONDUCTOR CALCULATIONS

JOB NO: DATE: DESIGNED BY: 331623 5/12/2023 J.M.

OCPD SIZES:

0A BREAKER
0A BREAKER
25A BREAKER

SERVICE LIST:

	-			
NONE				
				\neg

MATERIAL LICT.

Y.	PART	PART #	DESCRIPTION
0	MODULES	PV-110-400	FREEDOM FOREVER: FF-MP-BBB-400
0	OPTIMIZERS	OPT-130-440-2	SOLAREDGE S440 POWER OPTIMIZER - FRAME MOUNTED MODULE ADD-ON
	FITTINGS/ANCHORS	RAC-261-527	600VDC NEMA 3R UL LISTED JUNCTION BOX
!	ELECTRICAL ACCESSORIES	EA-350-326	STAUBLI / MULTI-CONTACT MC4 CONNECTORS (FEMALE)
	EQUIPMENT ACCESSORIES	EA-350-327	STAUBLI / MULTI-CONTACT MC4 CONNECTORS (MALE)
	INVERTERS	INV-120-108	SE10000H-US [SI1] RGM 240V INVERTER UL1741 SA CERTIFIED INTEGRATED ARC FAULT PROTECTION AND RAPID SHUTDOWN
	INVERTERS	INV-120-108	SE10000H-US [SI1] RGM 240V INVERTER UL1741 SA CERTIFIED INTEGRATED ARC FAULT PROTECTION AND RAPID SHUTDOWN
	LOAD CENTERS/MAIN PANELS	EE-151-101	125A DEDICATED LOAD CENTER
	DISCONNECTS	EE-321-201	200A RATED 240VAC NEMA 3R UL LISTED
	FUSES	BR-330-125	125A FUSE 1 PH 240VAC
	ELECTRICAL ACCESSORIES	EA-350-113	IDEAL B-TAP 4/0-10 AWG
2	FITTINGS/ANCHORS	RAC-240-401	S-5!: PROTEA
	RAILS	RAC-211-100	UNIRAC SM LIGHT RAIL 168 INCH (TOTAL 521 FEET NEEDED)
	FITTINGS/ANCHORS	RAC-261-517	BND T-BOLT AND NUT SS
	ENDS/MIDS	RAC-221-101	SM MIDCLAMP PRO DRK
	ENDS/MIDS	RAC-221-209	SM ENDCLAMP PRO W/ END CLAMP
	FITTINGS/ANCHORS	RAC-261-600	BND SPLICE BAR PRO SERIES MILL
	FITTINGS/ANCHORS	RAC-261-510	MICRO MNT BND TBOLT SS
	RAILS	RAC-211-209-NS	E-BOSS CONDUIT MOUNT COMP KIT
	RAILS	RAC-211-200	E-BOSS RAIL TRAY
	RAILS	RAC-211-206	E-BOSS BRIDGE TRAY
	RAILS	RAC-211-207	E-BOSS BRIDGE CLIPS
	FITTINGS/ANCHORS	RAC-260-300	BURNDY GROUND WEEB-LUG
,	FOOTINGS	RAC-241-100	UNIRAC L-FOOT SERRATED W/T-BOLT CLEAR (KIT)
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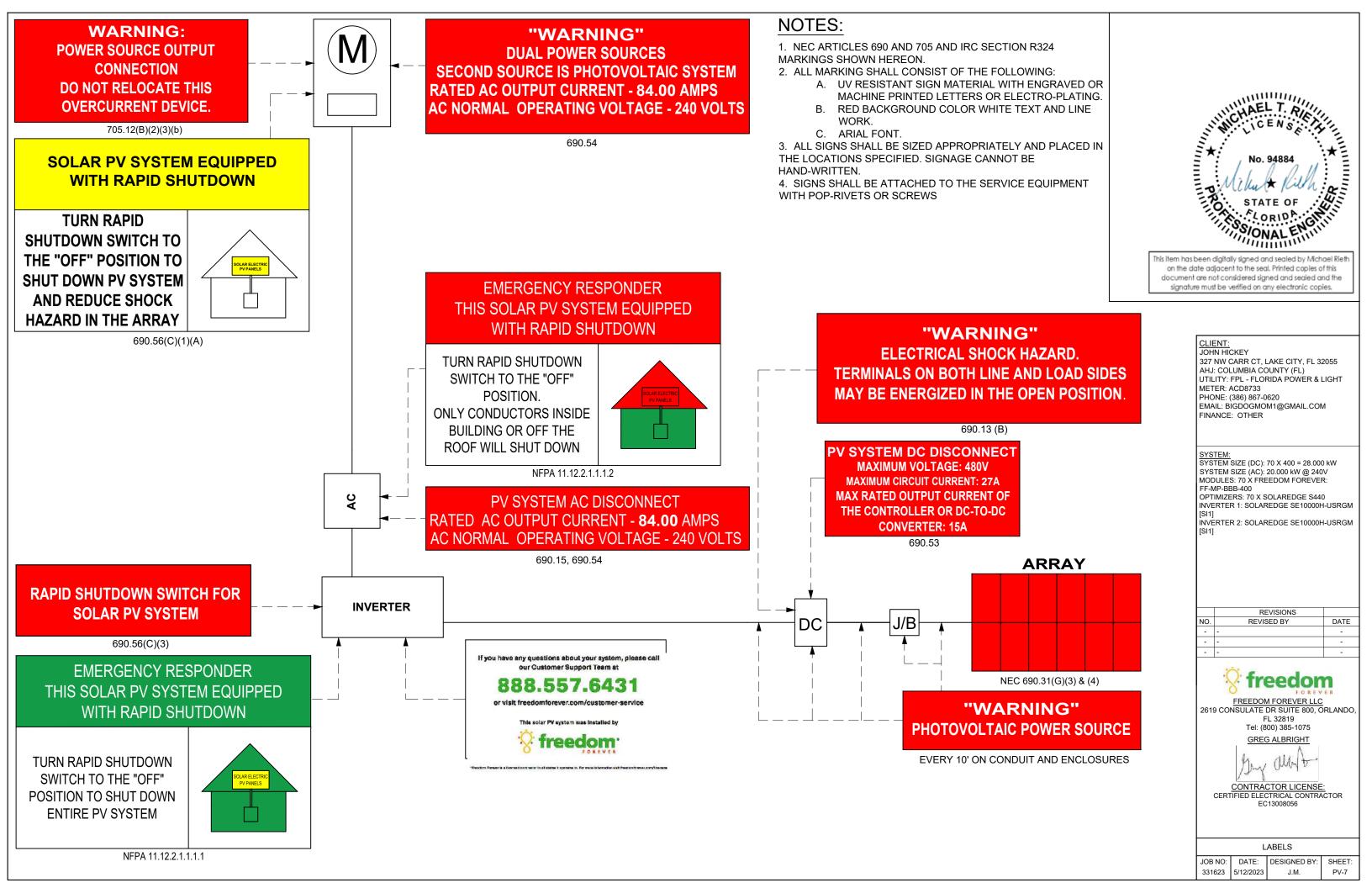
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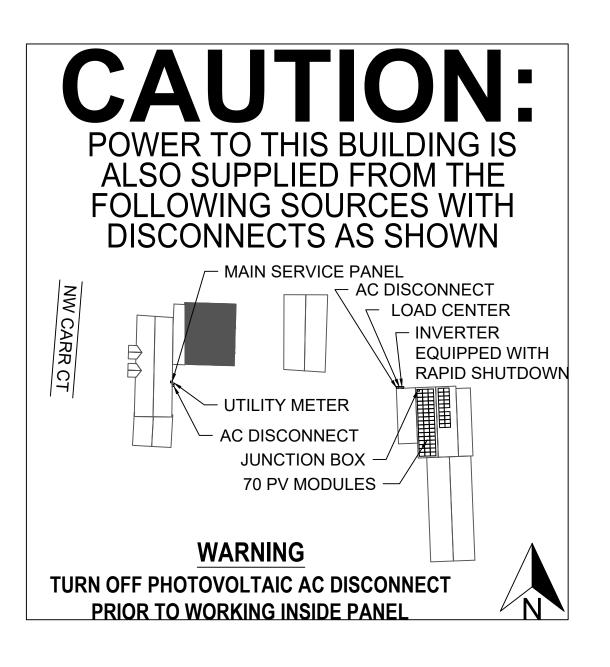
GREG ALBRIGHT

CONTRACTOR LICENSE:
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EC13008056

EQUIPMENT & SERVICE LIST

JOB NO: DATE: DESIGNED BY: 331623 5/12/2023 J.M.





NOTES:

- 1. NEC ARTICLES 690 AND 705 AND IRC SECTION R324 MARKINGS SHOWN HEREON.
- 2. ALL MARKING SHALL CONSIST OF THE FOLLOWING:
 - A. UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
 - B. RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
 - C. AERIAL FONT.
- 3. ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED. SIGNAGE CANNOT BE HAND-WRITTEN.
- 4. SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS.



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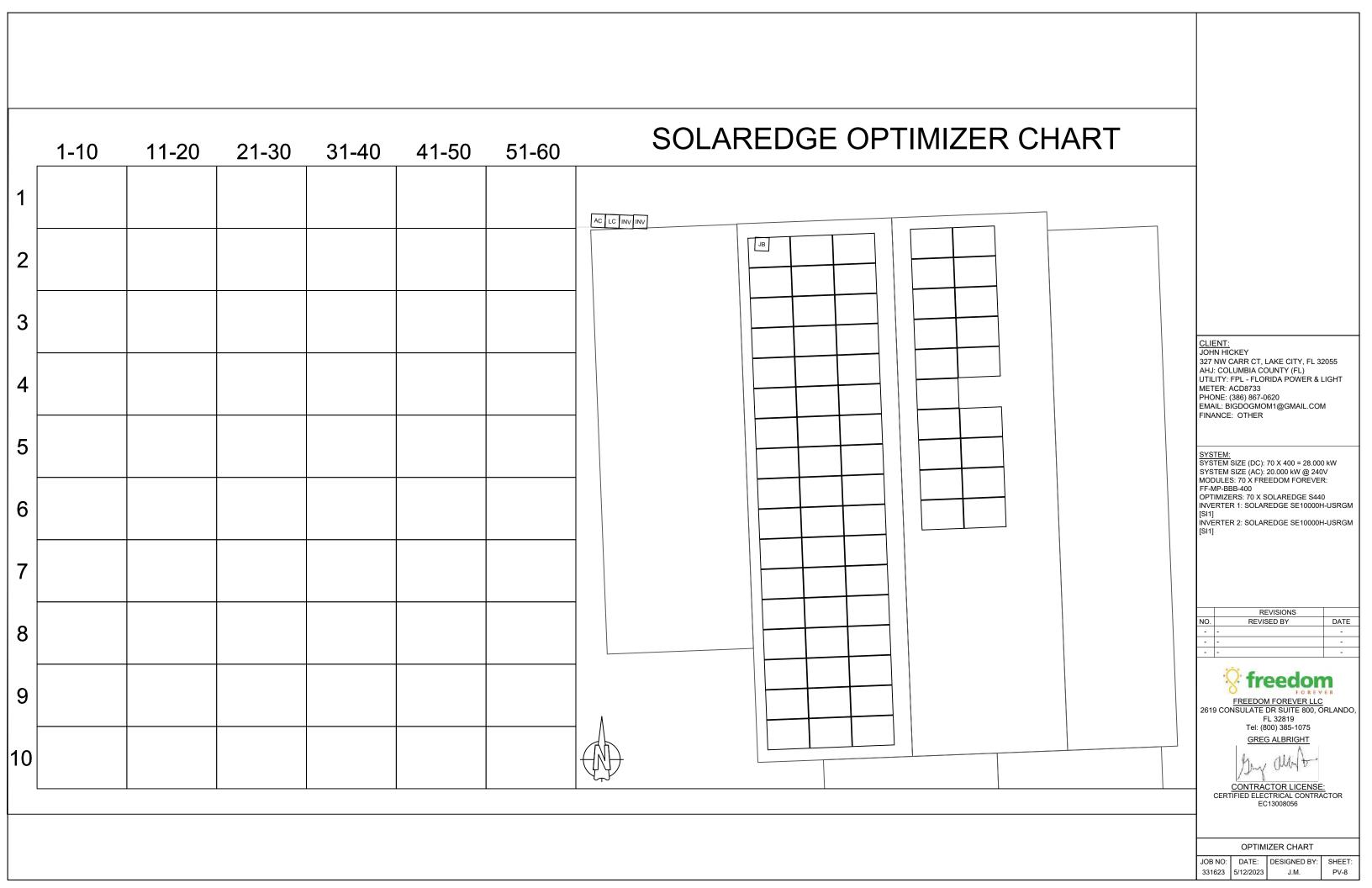
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CERTIFIED ELECTRICAL CONTRACTOR EC13008056

SITE PLACARD

331623 5/12/2023

J.M.



SAFETY PLAN

INSTRUCTIONS:

- USE SYMBOLS IN KEY TO MARK UP THIS SHEET.
- SAFETY PLAN MUST BE MARKED BEFORE JOB STARTS AS PART OF THE
- DOCUMENT ALL ADDITIONAL HAZARDS ON THIS PAGE & MAKE NOTES ON THE JHA SHEET

INCIDENT REPORTING:

INJURIES - CALL INJURY HOTLINE

(855) 400-7233

*If injury is life threatening, call 911 first THEN the Injury Hotline

NON-INJURIES - USE MOBILE INCIDENT REPORTING (Auto, Property Damage, Near Miss)



PLAN FOR WORKING SAFELY.

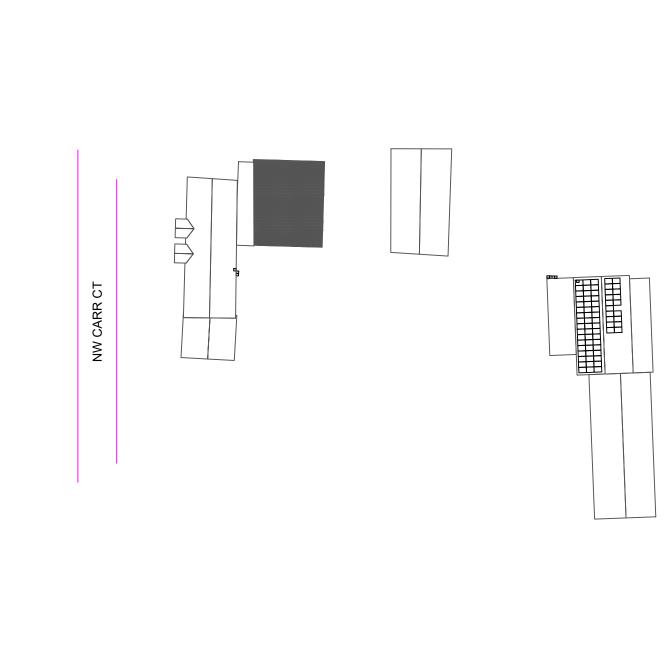
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$M \vdash \Delta \bowtie \vdash \searrow 1$	1 11 11 11 1		CILIBIIC:

NAME:					
ADDRESS:					
NEAREST HOSPITAL:					
NAME:					
ADDRESS:					
SAFETY COACH CONTACT INFORMATION: NAME:					
PHONE NUMBER:					



ALL EMPLOYEES ON SITE SHALL BE MADE AWARE OF THE SAFETY PLAN AND

SIGN INDICATING THAT THEY ARE AWARE OF THE HAZARDS ON-SITE AND THE



MARK UP KEY

- PERMANENT ANCHOR
- TEMPORARY ANCHOR
- **INSTALLER LADDER**
- JUNCTION / COMBINER BOX В
- S STUB-OUT
- **SKYLIGHT**
 - NO LADDER ACCESS (STEEP GRADE OR GROUND LEVEL **OBSTRUCTIONS**)
- RESTRICTED ACCESS
 - CONDUIT
- **GAS SHUT OFF**
- WATER SHUT OFF
- SERVICE DROP
- **POWER LINES**

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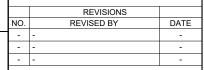
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BREAK AND WATER LOG

THIS LOG IS TO BE FILLED OUT ANY TIME THE TEMP EXCEEDS 90 DEGREES. THE CREW LEAD AND ROOF LEAD ARE RESPONSIBLE FOR ENSURING THIS IS COMPLETED AND UPLOADED AT THE END OF EVERYDAY WHEN TEMPS EXCEED 90 DEGREES

NAME	0800HRS	0900HRS	1000HRS	1100HRS	1200HRS	1300HRS	1400HRS	1500HRS	1600HRS	
										261
										JOB





FL 32819 Tel: (800) 385-1075 GREG ALBRIGHT

CERTIFIED ELECTRICAL CONTRACTOR EC13008056

SAFETY PLAN DB NO: DATE: DESIGNED BY:

331623 5/12/2023

JOB HAZARD ANALYSIS

Crew leader to fill out all sections below, hold a pre-job safety meeting with all personnel, and upload this completed document and the Safety Plan to Site Capture

Ladder Access

- Ladders must be inspected before each use.
- Extension ladders must be set up on a firm and level surface at a 4-to-1 rise to run angle (or 75 degrees) and the top must be secured to the structure. Extension style ladders placed on uneven, loose or slippery surfaces must additionally have the base firmly anchored or lashed so the base will not slip out.
- Extension ladders must be used with walk-through devices or the ladder must extend 36" above the stepping off point.
- A-frame ladders must only be climbed with the ladder spreader bars locked in the open position; A-frame ladders shall not be climbed while in the closed position (ex, closed and used while leaned against a structure).
- Additional notes:

Mobile Equipment

- Only Qualified operators will operate equipment; operators must maintain a certification on their person for the equipment being
- Type(s) of mobile equipment (Type/Make/Model):
- Qualified operator(s):

Material Handling and Storage

Materials will be staged/stored in a way that does not present a hazard to client, personnel or public. Materials stored on the roof will be physically protect from failing or sliding off.

Fall Protection

- A site-specific plan for fall prevention and protection is required prior to starting work and must remain onsite at all times until work is complete; a fall rescue plan must be outlined and discussed among the crew prior to work start.
- First-person-Up (FPU) must install their anchor and connect before any other task, including installing other anchors. The Last-Person-Down (LPD) must be the only person on a roof uninstalling fall protection.
- FPCP (name and title):
- FPU and LPD (name and title):

Electrical Safety

- The Electrical Qualified Person (EQP) is required onsite to perform electrical work.
- All electrical work will be performed with equipment in an electrically safe condition (de-energized) unless approval has been granted prior to work.
- Service drops and overhead electrical hazards will be indentified and protected from contact, as neccessary.
- EQP (name and tile):

Public Protection

- The safety of the Client and Public must be maintained at all
- The Client and the Public shall be prevented from entering the work zone through the use of barriers and/or signage, as required.
- Company, Client and Public property shall be protected from falling objects.
- Pets (including dogs) shall be secured by their owners prior to
- The Client should not leave pets, family members, or others in charge or care of Employees, Contractors, or Temporary Workers.

- Crew leader responsible for communication with the client:
- Client and public is excluded from work area by barricades (N/A,

Training and Pre-Job Safety Briefing

- All employees onsite shall be made aware of the specific hazards of this project and review this HJA during a pre-job briefing, and their signature indicates awareness of site conditions and the plan to eliminate any hazards identified prior to and during the
- Crew leader (name/title):
- Crew member (name/title):

Airborne Contaminants:

- Asbestos-containing (Transite) piping (ACP) Do not disturb (move, drill, cut fracture, etc.)
- Asbestos-containing thermal insulation (ACI) and Asbestos-containing duct wrapping (ACW) - do not disturb, no attic or crawlspace access is allowed if work to be performed could cause exposure to personnel, client or public.
- If yes, list specific tasks and protection in place:

Weather and Environment

- The site supervisor shall forecast the weather conditions at the job site, prior to crew arrival, in order to mitigate any hazards associated with inclement weather (heat, cold, wind, rain, etc.)
- The site supervisor will utilized a portable wind meter (anemometer) to verify actual onsite wind conditions, by checking at the ground and on any elevated work surface (ex, rooftop) prior to work start, at midday and prior to solar panel staging on a
- Elevated work involving the moving or maneuvering of solar panels shall cease at 25mph (sustained wind) until wind
- Forecasted weather maximum temp (degrees f):

Heat Related Illness Prevention

- Employees shall have access to potable drinking water that is fresh, pure, and suitably cool. The water shall be located as close as practicable to the areas where employees are working Water shall be supplied in sufficient quantity at the beginning of the work shift to provide at least one quart per employee per hour for drinking for the entire shift. Employees may begin the shift with smaller quantities of water if they identify the location and have effective means for replenishment during the shift to allow employees to drink on quart or more per hour. The frequent drinking of water shall be encouraged.
- Shade shall be present when temperature exceeds 80 degrees Fahrenheit. When the outdoor temperature in the work exceeds 80 degrees Fahrenheit, employees shall have and maintain one or more areas with shade at all times.
- New employees must be acclimatized. New employees will be monitored by their Crew Leader (site supervisor) for the first two (2) weeks of employment or longer when necessary.
- Employees will be allowed and encouraged to implement scheduled breaks during each shift. Employees must take cool-down breaks in the shade any time they feel the need to do so to protect them from overheating. Supervisors are REQUIRED to allow employees any break period they need during high heat conditions.
- Cool Vests are encouraged for all employees at all times during periods of high heat.
- Identify the location of the closet Occupational/Industrial Clinic or Hospital in case a crew member becomes ill.

What is the specific plan to provide and replenish sufficient water for all employees on site?

- If offsite replenish is necessary, where will you go to replenish water (location/address):
- Who will replenish the drinking water (name):

Restroom facilities

- Employees shall have access to restroom facilities with hand-washing stations. Use of onsite restroom is at the client's discretion (location is annotated below). If client does not give permission, location of suitable restroom facilities with hand-washing stations offsite will be provided. The onsite supervisor will identify location and make arrangements to ensure all employees have access at any point.
- Restroom facilities will be (circle one): Onsite Offsite If Offsite, add location name and address:
- Incident Reporting Procedure

Contact your Site Supervisor

Name:

Phone:

Contact your Manager

Name:

Phone:

Contact your Site Supervisor

Name:

Phone:

With: Your full name, phone number, office location, brief description of what happen and when.

NOTE ADDITIONAL HAZARDS NOT ADDRESSED ABOVE

(add as many as necessary by using additional sheets)

Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
1	

CLIENT: JOHN HICKEY 327 NW CARR CT, LAKE CITY, FL 32055 AHJ: COLUMBIA COUNTY (FL) UTILITY: FPL - FLORIDA POWER & LIGHT METER: ACD8733 PHONE: (386) 867-0620 EMAIL: BIGDOGMOM1@GMAIL.COM FINANCE: OTHER

<u>SYSTEM:</u> SYSTEM SIZE (DC): 70 X 400 = 28.000 kW SYSTEM SIZE (AC): 20.000 kW @ 240V MODULES: 70 X FREEDOM FOREVER: FF-MP-BBB-400 OPTIMIZERS: 70 X SOLAREDGE S440 INVERTER 1: SOLAREDGE SE10000H-USRGM INVERTER 2: SOLAREDGE SE10000H-USRGM

REVISIONS REVISED BY DATE

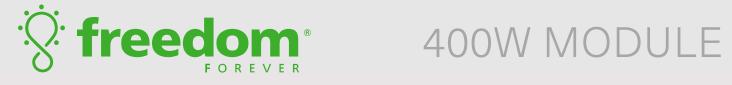
800, ORLANDO

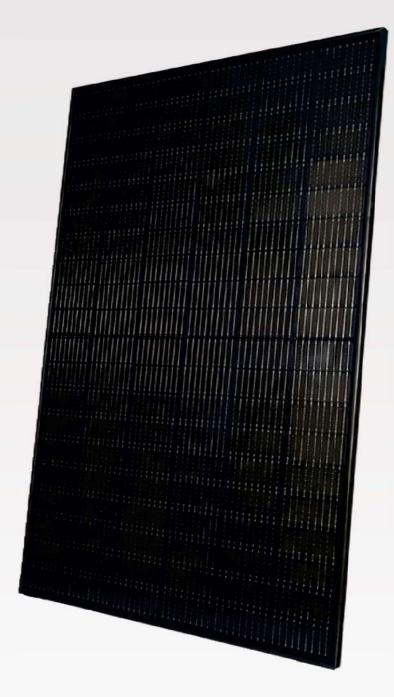
? freedom
FREEDOM FOREVER LLC 2619 CONSULATE DR SUITE 800, ORL/ FL 32819 Tel: (800) 385-1075
GREG ALBRIGHT

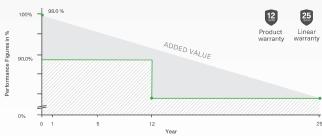
CONTRACTOR LICENSE: CERTIFIED ELECTRICAL CONTRACTOR EC13008056

SAFETY PLAN JOB NO: DATE: DESIGNED BY:

331623 5/12/2023 J.M.







MODULE SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

Characteristics	FF-MP-BBB-400
Maximum Power (Pmax)	400W
Maximum Power Voltage (Vmp)	31.01V
Maximum Power Current (Imp)[A]	12.90A
Open Circuit Voltage (Voc)[V]	37.04V
Short Circuit Current (Isc)[A]	13.79A
Module Efficiency	20.48%
Power Tolerance	0/+5W
STC	Irradiance of 1000W/m², AM1.5, Cell Temperature 25°C

MECHANICAL CHARACTERISTICS

Cell Type	Mono perc, 182 mm-half cells, 108 (6x9+6x9)
Weight	22.1 kgs (48.7 lbs)
Dimension	1722 x 1134 x 35 mm (67.80 x 44.65 x 1.38 in)
Front Glass	3.2 mm (.13 in)
Junction Box	IP68 (3 Bypass Diodes)
Output Cables	1200 mm (47.24 in)
Connector	Staubli MC4
Frame & Installation	Anodized aluminum profile

OPERATIONS CHARACTERISTICS

Operational Temperature	-40°C~+85°
Max System Voltage	1500V
Max Series Fuse Rating	25A
Safety Class	Class II
Fire Rating	Type 1

MECHANICAL LOADING

Snow Load	5,400Pa (113lb/ft2)
Rear Side Design Load	2,400Pa (50Ib/ft2)

PACKAGING INFORMATION

Container	20' GP	40' HC	
Pallets per Container	6	26	
Panels per Container	186	806	
Panels per Pallet	31	31	
Packaging Bon Weight	679 kg (1497 lbs)		
Panels per Pallet	1785 x 1130 x 1180 mm (70.28 x 44.49 x 46.46 in)		

TEMPERATURE RATINGS

Temperature Coefficient of P _{max}	-0.350%/°C
Temperature Coefficient of V _{oc}	-0.275%/°C
Temperature Coefficient of Isc	+0.045%/°C
Nominal Operating cell Temperature (NOCT)	42°C±2°C



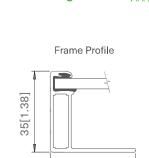






UL 61730 | UL 61215 | ISO 9001 | ISO 14001

† freedom

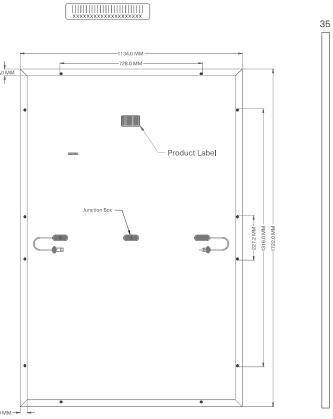


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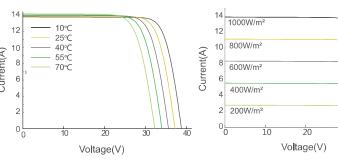
Side



1134±2



CURRENT-VOLTAGE CURVE



Back

Freedom 400W Module Datasheet | Version No: FF-MP-BBB-400



CERTIFICATE **OF COMPLIANCE**

CERTIFICATE

OF COMPLIANCE

This certificate confirms the model(s) for the product listed are in compliance and authorized to bear the Certification Mark(s) shown below when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This document is for use with the Design Light Consortium or California Energy Commission application only.

Basic Listee: PT IDN SOLAR TECH Freedom Forever Procurement LLC Multiple Listee:

KOMPLEK KABIL INDONUSA ESTATE,

43445 Business Park Drive, Suite 110, BLOK A NOMOR 19B, BATU BESAR, Address:

Temecula, CA 92590

Indonesia Country: USA Country:

Party Authorized to Apply Label: PT IDN SOLAR TECH

Batam

Address:

Standard(s):

Report Issuing Office: Intertek Testing Services Shanghai Limited

Authorized by: **Control Number:** *5019087*

for L. Matthew Snyder, Certification Manager

VALID LISTING MARKS



This Certificate of Compliance is for the exclusive use of Intertek's Client and is provided pursuant to the Certification Agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the Agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the Agreement, for any loss, expense or damage occasioned by the use of this Certificate. Only the Client is authorized to permit copying or distribution of this Certificate and then only in its entirety. Use of Intertek's Certification mark is restricted to the conditions laid out in the Agreement and in this Certificate. Any further use of the Intertek name for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. Initial Factory Assessments and Follow up Services are for the purpose of assuring appropriate usage of the Certification mark in accordance and appropriate usage of the Certification mark in accordance and the contract of the contract of the contract of the Certification of the Certificwith the Agreement, they are not for the purposes of production quality control and do not relieve the Client of their obligations in this respect.

> Intertek Testing Services NA Inc. 545 East Algonquin Road, Arlington Heights, IL 60005 Telephone 800-345-3851 or 847-439-5667

Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction [UL 61730-1:2017 Ed.1+R:30Apr2020]

Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction [CSA C22.2#61730-1:2019 Ed.2]

Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing [UL 61730-2:2017

Ed.1+R:30Apr2020]

Certificate for Report: 200900855SHA-001 Page **1** of **2** Certificate Issued: June 16, 2022

	Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing [CSA C22.2#61730-2:2019 Ed.2]				
	Terrestrial Photovoltaic (Pv) Modules - Design Qualification And Type Approval - Part 1: Test Requirements [UL 61215-1:2017 Ed.1]				
	Terrestrial Photovoltaic (PV) Modules - Design Qualification And Type Approval - Part 1-1: Special Requirements For Testing of Crystalline Silicon Photovoltaic (PV) Modules [UL 61215-1-1:2017 Ed.1]				
	Terrestrial Photovoltaic (Pv) Modules - Design Qualification And Type Approval - Part 2: Test Procedures[UL 61215-2:2017 Ed.1]				
Product:	Crystalline Silicon Photovoltaic (PV) Modules				
Brand Name:	Freedom Forever				
	MULTIPLE LISTEE 12 MODELS	BASIC LISTEE MODELS			
Models:	FF-MP-BBB- followed by 365, 370, 375 or 380.	NUSA120H- followed by 365, 370, 375 or 380; followed by MB.			
	FF-MP-BBB- followed by 395, 400, 405 or 410.	NUSA108H- followed by 395, 400, 405 or 410; followed by MB.			

Certificate for Report: 200900855SHA-001 Page 2 of 2 Certificate Issued: June 16, 2022

Power Optimizer For North America

S440, S500



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
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)



/ Power Optimizer For North America

S440, S500

	S440	S500	Unit
INPUT			
Rated Input DC Power ⁽¹⁾	440	500	W
Absolute Maximum Input Voltage (Voc)	- 1	60	Vdc
MPPT Operating Range	8	- 60	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15	Adc
Maximum Efficiency	9	9.5	%
Weighted Efficiency	9	98.6	%
Overvoltage Category		II	
OUTPUT DURING OPERATION			
Maximum Output Current		15	Adc
Maximum Output Voltage	1	60	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISC	ONNECTED FROM INVERTER O	R INVERTER OFF)	
Safety Output Voltage per Power Optimizer	1+	-/-0.1	Vdc
STANDARD COMPLIANCE			
Photovoltaic Rapid Shutdown System	NEC 2014, 2	2017 & 2020	
EMC	FCC Part 15 Class B, IEC	61000-6-2, IEC61000-6-3	
Safety	IEC62109-1 (clas	s II safety), UL1741	
Material	UL94 V-0,	UV Resistant	
RoHS	Υ	/es	
Fire Safety	VDE-AR-E 21	00-712:2013-05	
INSTALLATION SPECIFICATIONS			
Maximum Allowed System Voltage	10	000	Vdc
Dimensions (W x L x H)	129 x 153 x 30 /	5.07 x 6.02 x 1.18	mm / in
Weight (including cables)	655	5 / 1.5	gr/lb
Input Connector	M	C4 ⁽²⁾	
Input Wire Length	0.1,	/ 0.32	m/ft
Output Connector		1C4	
Output Wire Length	(+) 2.3, (-) 0.10 /	/ (+) 7.54, (-) 0.32	m/ft
Operating Temperature Range ⁽³⁾	-40 t	to +85	°C
Protection Rating	IP68 /	Туре6В	
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

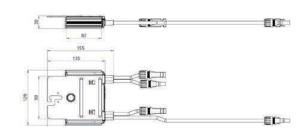
⁽³⁾ For ambient temperature above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Usi Inverter	ing a SolarEdge	Single Phase HD-Wave	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	S440, S500	8	14	18	
Maximum String Length (Powe	er Optimizers)	25		50(4)	
Maximum Nominal Power per	String	5700 (6000 with SE7600-US-SE11400-U)	6000	12750	W
Maximum Allowed Connected		Refer to Footnote 5	One String 7200W	15.00014	
(Permitted only when the difference strings is 1,000W or less)	e in connectea power between	Reier to Footnote 5	Two strings or more 7800W	15,000W	
Parallel Strings of Different Ler	gths or Orientations		Υ		

⁽⁴⁾ A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
(5) If the inverters rated AC power < maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power. Refer to: https://www.solaredge.com/
sites/default/files/se-power-optimizer-single-string-design-application-note.pdf
(6) It is not allowed to mix S-series and P-series Power Optimizers in new installations







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solaredge.com

^{*} Expected availability in 2022

Single Phase Inverter with HD-Wave Technology

for North America

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





Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014, NEC 2017 and NEC 2020 per article 690.11 and 690.12

- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)



solaredge.com

Single Phase Inverter with HD-Wave Technology for North America

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

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER			SE	ххххн-ххххх	BXX4			
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 MinNomMax. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage MinNomMax. (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	А
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	А
Power Factor				, Adjustable - 0.85 tc	0.85			
GFDI Threshold				1				Α
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			1	
Maximum Input Voltage				480				Vdc
Nominal DC Input Voltage		3	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				600kΩ Sensitivity				
Maximum Inverter Efficiency	99			Ğ	9.2			%
CEC Weighted Efficiency				99			99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption				< 2.5				W

⁽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

/ Single Phase Inverter with HD-Wave Technology for North America

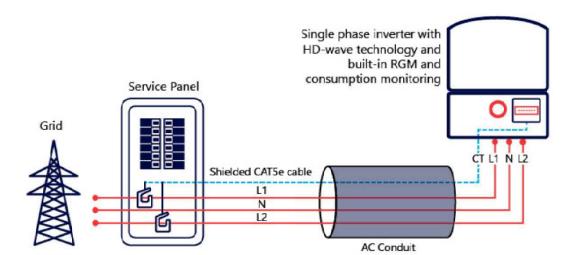
SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US SE11400H-US	;
ADDITIONAL FEATURES	•			•			•
Supported Communication Interfaces			RS485, Ethernet,	ZigBee (optional), C	ellular (optional)		
Revenue Grade Metering, ANSI C12.20				O - ti 1(2)			
Consumption metering				Optional ⁽³⁾			
Inverter Commissioning		With the SetAp	op mobile application	n using Built-in Wi-Fi	Access Point for Lo	ocal Connection	
Rapid Shutdown - NEC 2014, NEC 2017 and NEC 2020, 690.12			Automatic Rapid	Shutdown upon AC	Grid Disconnect		
STANDARD COMPLIANCE							
Safety		UL1741, U	L1741 SA, UL1699B, (CSA C22.2, Canadian	AFCI according to	T.I.L. M-07	
Grid Connection Standards			IEEE,		(HI)	-	
Emissions				FCC Part 15 Class B			
INSTALLATION SPECIFICAT	TONS						
AC Output Conduit Size / AWG Range		1"	Maximum / 14-6 AV	VG		1" Maximum /14-4 AWG	
DC Input Conduit Size / # of Strings / AWG Range		1" Maxir	num / 1-2 strings / 14	1-6 AWG		1" Maximum / 1-3 strings / 14-6 AWG	
Dimensions with Safety Switch (HxWxD)		17.7 x	14.6 x 6.8 / 450 x 37	0 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			-40	to +140 / -40 to +6	0(4)		°F/°C
Protection Rating			NEMA 4	(Inverter with Safet	/ Switch)		

⁽³⁾ Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BNI4 . For consumption metering, current transformers should be ordered separately. SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box

How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills





⁽⁴⁾ Full power up to at least 50°C / 122°F; for power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf

Product specifications

Eaton DG224NRK

Catalog Number: DG224NRK

Eaton General duty cartridge fuse safety switch, 200 A, NEMA 3R, Painted galvanized steel, Class H fuses, Fusible with neutral, Two-pole, Three-wire, Category: general duty safety switch, 240 V

General specifications

Product Name Catalog Number Eaton general duty cartridge fuse safety DG224NRK

switch

UPC

782113213507

Product Length/Depth Product Height 11.25 in 25.5 in

Product Width **Product Weight**

16 in 55 lb

Warranty Certifications

Eaton Selling Policy 25-000, one (1) year UL Listed

from the date of installation of the

Product or eighteen (18) months from the

date of shipment of the Product,

whichever occurs first.

Catalog Notes

Maximum hp ratings apply only when dual element fuses are used. 3-Phase hp rating shown is a grounded B phase

rating, UL listed.

Physical Attributes

Enclosure

NEMA 3R

Enclosure material

Painted galvanized steel

Fuse configuration

Fusible with neutral

Number Of Poles

Two-pole

Number of wires

Type

General duty, cartridge fused

Performance Ratings

Amperage Rating

200A

Fuse class provision

Class H fuses

Voltage rating

240V

Miscellaneous

Product Category

General duty safety switch

Resources

Catalogs

Eaton's Volume 2—Commercial Distribution

Multimedia

Double Up on Safety

Switching Devices Flex Center

Specifications and datasheets

Eaton Specification Sheet - DG224NRK



Eaton Corporation plc Eaton House 30 Pembroke Road Dublin 4, Ireland Eaton.com

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Pressure Cable Connectors File No. E-5238 Suitable for use on the line side of the service equipment.

INSULATION-PIERCING TAP CONNECTORS CONECTORES DE DERIVACIÓN OUE PERFORAN EL AISLAMIENTO

Installation Instructions:



Marning

Improperly installed electrical wiring can be dangerous and cause electrical fires. The connector chosen must be sized to the wires being used. Consult local building code before doing any electrical work. For assistance, refer to an instructional book or consult a qualified electrician.



♠ Warning

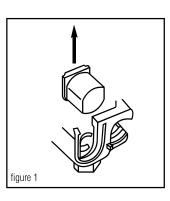
Contact with electricity can cause serious injury or death. Use on insulated cable only. [RHH, RHW(-2), THHN, THHW. THW. THWN. USE. XHHW(-2). Consult factory for other insulation types]. If the installation is to be made on an energized run, the tap conductor must be under no load and must not be grounded. Use electrically insulated gloves. De-energize the run cable if there are any questions of these conditions being met.

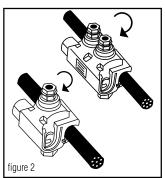
- 1. Determine the direction for the tap conductor to exit and discard one end cap. See figure 1.
- 2. Position the main (or feeder) side of the connector around the run cable and tighten the bolt finger tight. **See** figure 2. If required, loosen the bolt slightly to allow the connector to open completely. **DISASSEMBLY NOT RECOMMENDED.** The plastic "Turbo" spacer holds the connector open which eases installation and ensures proper
- 3. Cut the end of the tap cable squarely. **DO NOT STRIP CABLE INSULATION.**
- 4. Insert the tap cable into the tap side of the connector until it is seated in the remaining end cap. See figure 3.
- 5. Continue tightening the torque regulating bolt with a standard box or socket wrench until the torque regulating piece breaks away. If the connector has two (2) assembly bolts, alternately tighten until the hexagonal torque devices break away. **See figures 4a & 4b.** Note that the plastic "turbo" spacer on the side will also break. To make the installation even easier and to relieve torque from the cables, a second wrench can be used on the hexagonal piece on the bottom of the connector.

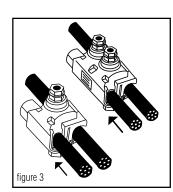
DO NOT use gripping type pliers, pipe, open ended or adjustable wrenches as these may damage the hexagonal torque regulating device. A torque wrench is not

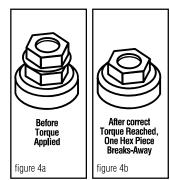
MAKE SURE ONLY THE TOP HEXAGONAL TORQUE DEVICE OF THE BOLT HEAD IS USED FOR ASSEMBLY. THE SECOND HEX PIECE [CLOSER TO THE BODY OF THE CONNECTOR] IS USED FOR DISASSEMBLY.

Note: The torque regulating bolt ensures the correct torque is applied to the conductors without using a torque wrench. Important information such as run and tap ranges, voltage ratings and material/temperature ratings is marked on the connector.









Instalación Instrucciones:

A Advertencia



Los cables eléctricos mal instalados pueden ser peligrosos y provocar incendios. El conector escogido debe ser de un tamaño adecuado para los cables que se utilicen. Consulte los códigos de construcción locales antes de efectuar trabajos eléctricos. Si necesita ayuda, consulte un libro de instrucciones o consulte con un electricista capacitado.

♠ Advertencia



Use sólo en cable aislado. [RHH, RHW(-2), THHN, THHW, THW, THWN, USE, XHHW(-2). Consulte con la fábrica para obtener información sobre otros tipos de aislamientol. Si se va a hacer la instalación sobre un cable con corriente el conductor derivado debe estar libre de carga y no debe estar aterado. Use quantes con aislamiento eléctrico. Quite le la corriente al cable del cual se hace la derivación si no se pueden cumplir estas condiciones. El contacto con electricidad puede producir lesiones graves o mortales.

- 1. Determine la dirección en la que el conductor derivado saldrá y deseche la tapa terminal sobrante. Vea la ilustración 1.
- 2. Coloque el lado principal (o de alimentación) del conector alrededor del cual se hace la derivación y apriete firmemente el dedo del perno. Vea la ilustración 2. Si hace falta, afloje el perno ligeramente para permitir que el conector se abra completamente. NO ES RECOMENDABLE DESARMAR EL **CONECTOR.** El espaciador "Turbo" de plástico mantiene al conector abierto. lo cual facilita la instalación y asegura que las conexiones se hagan correctamente.
- 3. Corte el extremo del cable de derivación perpendicularmente a su eje. NO PELE EL AISLAMIENTO DEL CABLE.
- 4. Inserte el cable de derivación en el lado de derivación del conector hasta que tope contra la tapa terminal que queda. Vea la
- 5. Continué apretando este perno que regula la torsión con una llave estándar o de cubo hasta que la pieza que regula la torsión se parta y se separe. Si el conector tiene dos (2) pernos de ensamblaie, apriételos alternativamente hasta que el dispositivo de regulación de torció se parta. Vea la ilustración 4a y 4b. Observe que el espaciador "turbo" de plástico en el costado también se fracturará. Para hacer esta instalación aún más fácil y para aliviar la torsión de los cables, se puede usar una segunda llave sobre la pieza hexagonal al fondo del conector.

NO USE alicates de presión. Haves de turbo. Haves **comunes o ajustables** ya que éstas pueden dañar el dispositivo hexagonal que regula la torsión. No se requiere una llave de torsión.

ASEGÚRESE QUE SE USE. PARA EL ENSAMBLADO. SÓLO EL DISPOSITIVO SUPERIOR DE REGULACIÓN DE TORSIÓN DE LA CABEZA DEL PERNO. LA SEGUNDA PIEZA HEXAGONAL (LA MÁS CERCANA AL CUERPO DEL CONECTOR) SE USA SÓLO PARA DESARMAR EL CONECTOR.

Nota: El perno regulador de torsión garantiza la aplicación de la torsión correcta a los conductores sin usar una llave de torsión. La información importante de longitud de cable pelado y de toma, las clasificaciones de materiales y temperatura está marcada en el

B-TAP® INSULATION PIERCING TAP CONNECTORS TOROUE AND **CURRENT RATINGS**

(Solid and/or Stranded)

CATALOG#	MAIN	TAP	NOMINAL Torque	TAP CURRENT RATIING (IN AMPS)*
BTC2/0-14	2/0-4	10-14 ⁺	80 IN. LBS.	40
BTC1/0-10	1/0-8	2-10++	80 IN. LBS.	130
BTC4/0-10	4/0-3	2-10+++	125 IN. LBS.	130
BTC4/0-6	4/0-2	1/0-6	160 IN. LBS.	170
BTC4/0-2	4/0-2	4/0-2	160 IN. LBS.	260
BTC250-6	250-4	4/0-6	160 IN. LBS.	260
BTC250-4	250-1	3/0-4	160 IN. LBS.	225
BTC250-2	250-1/0	4/0-2	160 IN. LBS.	260
BTC350-1/0	350-1/0	350-1/0	330 IN. LBS.	350
BTC500-4	500-2/0	4/0-4	330 IN. LBS.	260
BTC500-1/0	500-4/0	350-1/0	330 IN. LBS.	350
BTC500-14	750-3/0	10-14 ****	80 IN. LBS.	40
BTC750-250	750-250	500-250	330 IN. LBS.	430

+10-14 Cu SOLID/STRANDED: 10-12 AI SOLID/STRANDED

++2-10 Cu SOLID/STRANDED; 2-10 AI STRANDED

+++2-10 Cu SOLID/STRANDED: 2-8 AI STRANDED

++++10-14 Cu SOLID/STRANDED: 10-12 AI STRANDED

Full line is 600V dual-rated, 194°F(90°C)

* Based on NEC Table 310-16 1996 (Not more than 3 insulated conductors in a raceway at ambient temperature of 30° C) for the largest tap wire size.

WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov.



ADVERTENCIA: Cáncer y Daño Reproductivo - www.P65Warnings.ca.gov.

One year limited warranty. See idealind.com for more information.

Garantía limitada de un año. Visite www.idealind.com para obtener detalles de la garantía.



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2/9/23

ALL IDEAL Customers

Subject: The Buchanan B-TAP® splice/tap connectors meet the 2020 NEC

article 230.46 requirement for "line side applications"

The Buchanan B-TAP® brand of insulation piercing connectors which correspond to part numbers beginning with "BTC" meet the requirements of article 230.46 of the 2020 NEC. These products have already been tested to the newer requirements. The installation instructions are in the process of being updated to show the required notation: "suitable for use on the line side of the service equipment". This change will take a few weeks to get into our production.

In addition, the marking "SR" will be added to the product. That addition is in process and will take a few months to complete.

This notice will provide confirmation to the inspectors that B-TAP® products meet the requirements of the 2020 and 2023 NEC article 230.46 "Spliced and Tapped Conductors".

Sushil Keswani

Director of Engineering IDEAL Industries, Inc.,

Sull Hon

The Right Way!™

ProteaBracket[™]

A versatile bracket for mounting solar PV to trapezoidal roof profiles

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

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

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

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

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

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



NOW AVAILABLE IN ALUMINUM



Features and Benefits

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

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



www.S-5.com 888-825-3432 The Right Way![™]

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

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

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

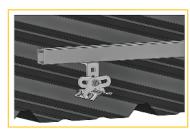
For design assistance, ask your distributor, or visit **www.S-5.com** for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

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

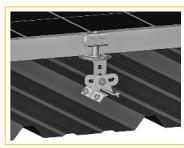
Multiple Attachment Options:



Side **Mount Rail**



Bottom Mount Rail



w/S-5!**PVKIT**TM (rail-less)

ProteaBracket™ 0.35" x 1.00" Slotted Hole

ProteaBracket fits profiles up to 3 inches

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



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

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

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SOLARMOUNT



SOLARMOUNT is the professionals' choice for residential PV mounting applications. Every aspect of the system is designed for an easier, faster installation experience. **SOLAR**MOUNT is a complete solution with revolutionary universal clamps, **FLASHKIT** PRO, full system UL 2703 certification and 25-year warranty. Not only is **SOLAR**MOUNT easy to install, but best-in-class aesthetics make it the most attractive on any block!





NOW FEATURING FLASHKIT PRO The Complete Roof Attachment Solution FEATURING SHED & SEAL TECHNOLOGY



NOW WITH UNIVERSAL MIDCLAMPS Accommodates 30mm-51mm module frames One tool, one-person installs are here!



REVOLUTIONARY NEW ENDCLAMPS Concealed design and included End Caps

THE PROFESSIONALS' CHOICE FOR RESIDENTIAL RACKING

BESTINSTALLATION EXPERIENCE • CURB APPEAL • COMPLETE SOLUTION • UNIRAC SUPPORT

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

SOLARMOUNT

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Quickly set modules flush to the roof on steep pitched roofs. Orient a large variety of modules in Portrait or Landscape. Tilt the system up on flat or low slow roofs. Components available in mill, clear, and dark finishes to optimize your design financials

BETTER RESULTS

MAXIMIZE PROFITABILITY ON EVERY JOB

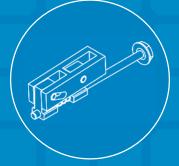
Trust Unirac to help you minimize both system and labor costs from the time the job is quoted to the time your teams get off the roof. Faster installs. Less Waste. More Profits

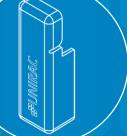
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WORK WITH THE INDUSTRIES MOST EXPERIENCED TEAM

Professional support for professional installers and designers. You have access to our technical support and training groups. Whatever your support needs, we've got you covered. Visit Unirac.com/solarmount for more information.

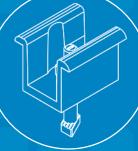
CONCEALED UNIVERSAL ENDCLAMPS





END CAPS INCLUDED WITH EVERY ENDCLAMP







U-BUILDER ONLINE DESIGN TOOL SAVES TIME & MONEY

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TECHNICAL SUPPORT

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

CERTIFIED OUALITY PROVIDER

Unirac is the only PV mounting vendor with ISO certifications for 9001:2008, 14001:2004 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

BANKABLE WARRANTY

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

ENHANCE YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN PUB2018AUG31-PRINTED UPDATE FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702



Certificate of Compliance

Certificate: 70131735 Master Contract: 266909

Project: 80082031 **Date Issued:** 2021-06-02

Issued To: Unirac

1411 Broadway NE

Albuquerque, New Mexico, 87102

United States

Attention: Klaus Nicolaedis

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

> Michael Hoffnagle Michael Hoffnagle



PRODUCTS

CLASS - C531302 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems CLASS - C531382 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems -

- - Certified to US Standards

Models:	SM	-	SOLARMOUNT Flush-to-Roof is an extruded aluminum rail PV racking system that is installed parallel to the roof in landscape or portrait orientations.
	ULA	-	Unirac Large Array is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules.

Solarmount

DOD 507 Rev. 2019-04-30 © 2018 CSA Group. All rights reserved



Certificate: 70131735 **Project:** 80082031

Master Contract: 266909 Date Issued: 2021-06-02

The system listed is designed to provide bonding/grounding, and mechanical stability for photovoltaic modules. The system is secured to the roof with the L-Foot components through the roofing material to building structure. Modules are secured to the racking system with stainless steel or aluminum mid clamps and Aluminum end clamps. The modules are bonded to the racking system with the stainless-steel bonding mid clamps with piercing points. The system is grounded with 10 AWG copper wire to bonding/grounding lugs. Fire ratings of Class A with Type 1, 2, 3, 10, 19, 22 or 25 for steep slope. Tested at 5" interstitial gap which allows installation at any stand-off height.

The grounding of the system is intended to comply with the latest edition of the National Electrical Code, to include NEC 250 & 690. Local codes compliance is required, in addition to national codes. All grounding/bonding connections are to be torqued in accordance with the Installation Manual and the settings used during the certification testing for the current edition of the project report.

The system may employ optimizers/micro-inverters and used for grounding when installed per installation instructions.

UL 2703 Mechanical Load ratings:

Downward Design Load (lb/ft²)	113.5
Upward Design Load (lb/ft²)	50.7
Down-Slope Load (lb/ft²)	16.13

Test Loads:

Downward Load (lb/ft²)	170.20
Upward Load (lb/ft²)	76.07
Down-Slope Load (lb/ft²)	24.2

Unirac Large Array

ULA is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules. ULA aluminum components merge with SM rails and installer-supplied steel pipe. The SM rail system is secured to the horizontal Pipe using the Rail Bracket components. The Rear and Front cap secures the horizontal Pipe to the vertical Pipe. The Front cap is also used to secure the Cross brace. A Slider is attached to the vertical Pipe to secure the Cross brace. The SM rails, caps, slider, rail brackets, and cross braces materials are 6105-T5 aluminum extrusion. Fasteners materials are 304 stainless steel. Horizontal and vertical pipe materials meet the minimum requirements of ASTM A53 for galvanized steel pipe in 2" and 3" diameter.

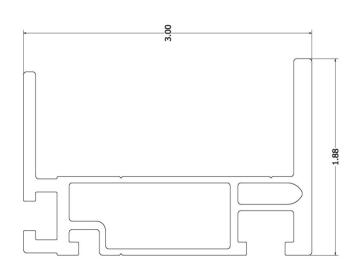
The mechanical load ratings from the SM test data will be applied to the ULA model.

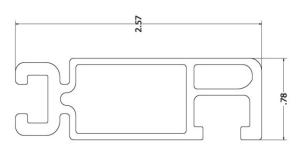
Fire Testing is not applicable due to being a ground mount system.

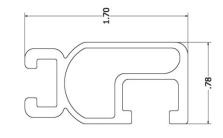
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SM SOLAR MOUNT







Properties	SOLARMOUNT Light	SOLARMOUNT Rail Profile 2	SOLARMOUNT HD	Units
BEAM HEIGHT	1.70	2.57	3.00	.Ľ
APPROX WEIGHT	0.491	0.728	1.271	plf
CROSS SECTION AREA	0.409	0.625	1.059	in²
SECTION MODULUS (X-AXIS)	0.15	0.363	0.898	in³
SECTION MODULUS (Y-AXIS)	0.067	0.113	0.221	in³
MOMENT OF INERTIA (X-AXIS)	0.13	0.467	1.45	in ⁴
MOMENT OF INERTIA (Y-AXIS)	0.026	0.045	0.267	in ⁴
RADIUS OF GYRATION (X-AXIS)	0.564	0.865	1.17	in
RADIUS OF GYRATION (Y-AXIS)	0.254	692.0	0.502	in

PAGE H3



Certificate

Certificate no.

US 82160015 01

License Holder: Unirac Inc. 1411 Broadway NE Albuquerque NM 87102 USA Manufacturing Plant: Unirac Inc. 1411 Broadway NE Albuquerque NM 87102

Test report no.: USA- 31440029 005
Tested to: UL 2703:2015

Client Reference: Tom Young

Certified Product: Module Rack Mounting System

License Fee - Units

Model Designation: SolarMount (SM)

7

Max System Voltage of PV Module: 1000 VDC
Max Size of PV Module: 20.8 sq.ft. surface area
Max Overcurrent Protection Rating of PV Module:
30 A when using the qualified grounding lugs;
20 A when using the Enphase micro inverter EGC.

Fire Rating: Class A when installed with Type 1, Type 2, Type3, or Type 10 fire rated modules.

(continued)

Appendix: 1,1-5

7

Licensed Test mark:



Date of Issue (day/mo/yr) 27/07/2016

 $T\ddot{\text{U}}\text{V Rheinland PTL, LLC, }1107\text{ W. Fairmont Drive, Building A, Tempe, }Arizona\ 85282, \\Tel \ (480)\ 966-1700, \\Fax \ (775)\ 314-6458$



January 20, 2021

Unirac 1411 Broadway Blvd. NE Albuquerque, NM 87102

Attn.: Unirac - Engineering Department

Re: Engineering Certification for the Unirac U-Builder 2.0 SOLARMOUNT Flush Rail

PZSE, Inc. - Structural Engineers has reviewed the Unirac SOLARMOUNT rails, proprietary mounting system constructed from modular parts which is intended for rooftop installation of solar photovoltaic (PV) panels; and has reviewed the Ubuilder Online tool. This U-Builder software includes analysis for the SOLARMOUNT LIGHT rail, SOLARMOUNT STANDARD rail, and SOLARMOUNT HEAVY DUTY rail with Standard and Pro Series hardware. All information, data and analysis contained within are based on, and comply with the following codes and typical specifications:

- 1. 2020 Florida Building Code, by Florida Building Commission
- 2. Minimum Design Loads for Buildings and other Structures, ASCE/SEI 7-16
- 3. 2018 International Building Code, by International Code Council, Inc. w/ Provisions from SEAOC PV-2 2017.
- 4. 2018 International Residential Code, by International Code Council, Inc. w/ Provisions from SEAOC PV-2 2017.
- AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES.
- 6. 2015 Aluminum Design Manual, by The Aluminum Association, 2015

Following are typical specifications to meet the above code requirements:

Design Criteria: Ground Snow Load = 0 - 100 (psf)

Basic Wind Speed = 85 - 190 (mph) Roof Mean Height = 0 - 60 (ft) Roof Pitch = 0 - 45 (degrees) Exposure Category = B, C & D

Attachment Spacing: Per U-builder Engineering report.

Cantilever: Maximum cantilever length is L/3, where "L" is the span noted in the U-Builder online

tool.

Clearance: 2" to 10" clear from top of roof to top of PV panel.

Tolerance(s): 1.0" tolerance for any specified dimension in this report is allowed for installation.

Installation Orientation: See SOLARMOUNT Rail Flush Installation Guide.

Landscape - PV Panel long dimension is parallel to ridge/eave line of roof and the PV

panel is mounted on the long side.

Portrait - PV Panel short dimension is parallel to ridge/eave line of roof and the PV panel

is mounted on the short side.

1478 Stone Point Drive, Suite 190, Roseville, CA 95661

7 916.961.3960 F 916.961.3965 W www.pzse.com



Components and Cladding Roof Zones:

The Components and Cladding Roof Zones shall be determined based on ASCE 7-16 Component and Cladding design.

Notes: 1) U-builder Online tool analysis is only for Unirac SM SOLARMOUNT Rail Flush systems only and do not

include roof capacity check.

2) Risk Category II per ASCE 7-16.

3) Topographic factor, kzt is 1.0.

4) Array Edge Factor Y_E = 1.5

5) Average parapet height is 0.0 ft.

6) Wind speeds are LRFD values.

7) Attachment spacing(s) apply to a seismic design category E or less.

Design Responsibility:

The U-Builder design software is intended to be used under the responsible charge of a registered design professional where required by the authority having jurisdiction. In all cases, this U-builder software should be used under the direction of a design professional with sufficient structural engineering knowledge and experience to be able to:

- Evaluate whether the U-Builder Software is applicable to the project, and
- Understand and determine the appropriate values for all input parameters of the U-Builder software.

This letter certifies that the Unirac SM SOLARMOUNT Rails Flush, when installed according to the U-Builder engineering report and the manufacture specifications, is in compliance with the above codes and loading criteria.

This certification <u>excludes</u> evaluation of the following components:

- The structure to support the loads imposed on the building by the array; including, but not limited to: strength
 and deflection of structural framing members, fastening and/or strength of roofing materials, and/or the effects
 of snow accumulation on the structure.
- 2) The attachment of the SM SOLARMOUNT Rails to the existing structure.
- 3) The capacity of the solar module frame to resist the loads.

This requires additional knowledge of the building and is outside the scope of the certification of this racking system.

If you have any questions on the above, do not hesitate to call.

Prepared by: PZSE, Inc. – Structural Engineers Roseville. CA

THIS ITEM HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY PAUL K. ZACHER, PE ON 01/20/2021 USING A SHA-1 AUTHENTICATION CODE.

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