



Freedom Forever
43445 BUSINESS PARK DR #110,
TEMECULA, CA 92590 Phone Number:
[\(800\) 385-1075](tel:(800)385-1075)
LICENSE: 1029644

Pikes Peak Regional Building Department
Building Department
May 5, 2023

Project Address: 1832 North Tejon Street, Colorado
Springs, CO 80907

Plan revisions clouded on plans and noted below.

1. System revised to (12) Hanwha Q cell 400 watt modules in order to meet the requirements
2. Inverte changed to SE3800

PHOTOVOLTAIC SYSTEM

CODES:

THIS PROJECT COMPLIES WITH THE FOLLOWING:
 2015 INTERNATIONAL BUILDING CODE
 2020 NATIONAL ELECTRICAL CODE
 2015 INTERNATIONAL FIRE CODE
 2015 INTERNATIONAL PLUMBING CODE
 2015 INTERNATIONAL MECHANICAL CODE
 2015 INTERNATIONAL RESIDENTIAL CODE
 AS ADOPTED BY **PIKES PEAK REGIONAL BUILDING DEPARTMENT**

CONSTRUCTION NOTES:

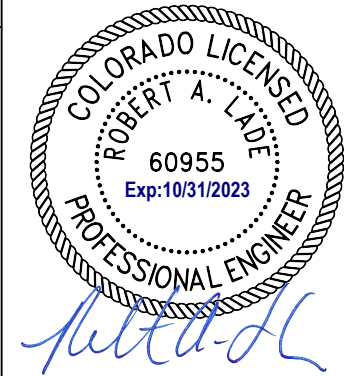
CONDUIT AND CONDUCTOR SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.

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.

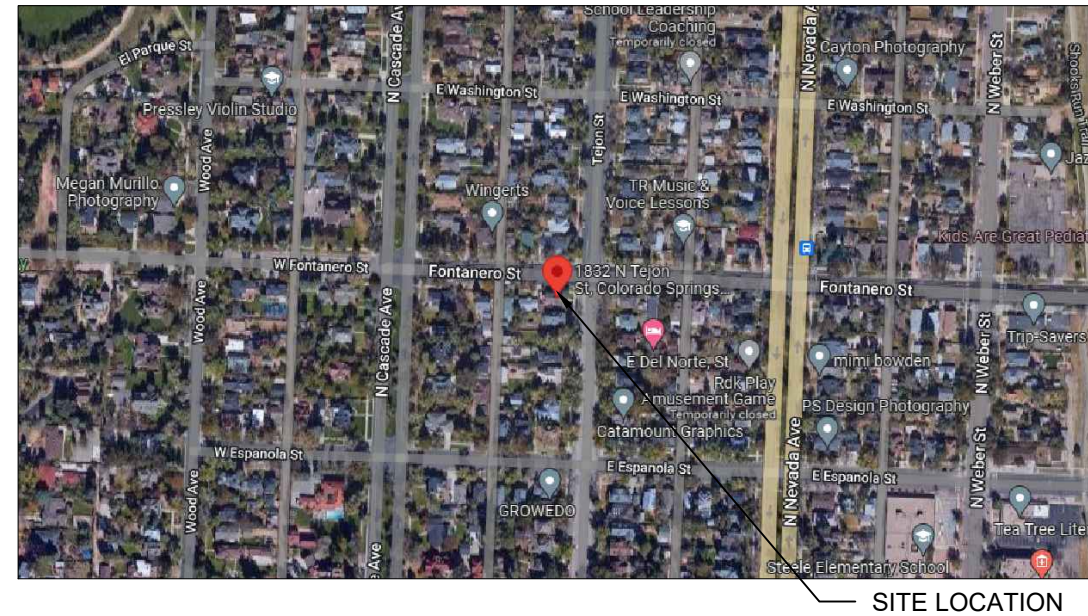
MODULES SHALL BE TESTED, LISTED AND IDENTIFIED WITH FIRE CLASSIFICATION IN ACCORDANCE WITH UL 2703. SMOKE AND CARBON MONOXIDE ALARMS ARE REQUIRED PER SECTION R314 AND 315 TO BE VERIFIED AND INSPECTED BY INSPECTOR IN THE FIELD.

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).



VICINITY MAP:



SITE LOCATION

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

SOLAREEDGE 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.

ALL CONDUIT AND ELECTRIC EQUIPMENT AND HARDWARE WILL BE MATCHED TO THE EXTERIOR COLOR OF THE HOUSE AND WHEN POSSIBLE WILL BE IN LOCATIONS TO MINIMIZE VISUAL IMPACT FROM THE STREET.

SOLAR PANELS WILL BE FLUSH MOUNTED TO THE ROOF WITH A MAXIMUM HEIGHT OF 3" MAXIMUM FROM THE ROOF SURFACE LOCATED ONLY ON THE BACK SIDE OF THE HOUSE IN SUCH A WAY TO MINIMIZE VISUAL IMPACT FROM THE STREET DIRECTIONS

SOLAR PANELS WILL BE FLUSH MOUNTED TO THE ROOF WITH A MAXIMUM HEIGHT OF 3" MAXIMUM FROM THE ROOF SURFACE LOCATED ONLY ON THE BACK SIDE OF THE HOUSE IN SUCH A WAY TO MINIMIZE VISUAL IMPACT FROM THE STREET DIRECTIONS

STRUCTURAL NOTES :

1. THESE PLANS ARE STAMPED FOR STRUCTURAL CODE COMPLIANCE OF THE ROOF FRAMING SUPPORTING THE PROPOSED PV INSTALLATION ONLY.
2. THESE PLANS ARE NOT STAMPED FOR WATER LEAKAGE.
3. PV MODULES, RACKING, AND ATTACHMENT COMPONENTS MUST FOLLOW MANUFACTURER GUIDELINES AND REQUIREMENTS.
4. PLEASE SEE THE ACCOMPANYING STRUCTURAL CALCULATIONS REPORT FOR ADDITIONAL INFORMATION.
5. PRIOR TO COMMENCEMENT OF WORK, THE SOLAR INSTALLER SHALL VERIFY THE ROOF FRAMING INFO BEFORE INSTALLATION AND NOTIFY THE E.O.R. IF THERE IS ANY INCONSISTENCY BETWEEN SITE VERIFICATION AND FOLLOWING: **2x6 RAFTERS @ 16" OC SPACING WITH MAX UNSUPPORTED SPAN EQUAL OR LESS THAN 12 FT.**

CLIENT:
 LISA HINES
 1832 NORTH TEJON STREET, COLORADO SPRINGS, CO 80907
 AHJ: PIKES PEAK REGIONAL BUILDING DEPARTMENT
 UTILITY: CSU - COLORADO SPRINGS UTILITIES
 METER: 421965
 PHONE: (719) 660-5247

SYSTEM:
 SYSTEM SIZE (DC): 12 X 400 = 4.800 kW
 SYSTEM SIZE (AC): 3.800 kW @ 240V
 MODULES: 12 X HANWHA QCELL: Q.PEAK DUO BLK ML-G10+ 400
 OPTIMIZERS: 12 X SOLAREEDGE S440
 INVERTER: SOLAREEDGE SE3800H-US [S11]

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


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 FREEDOM FOREVER LLC
 9959 E GEDDES AVE, CENTENNIAL, CO 80112
 Tel: (800) 385-1075
 GREG ALBRIGHT

 CONTRACTOR LICENSE:
 ELECTRICAL CONTRACTOR 23393

SITE LOCATION			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
247476	5/3/2023	L.M.	PV-1

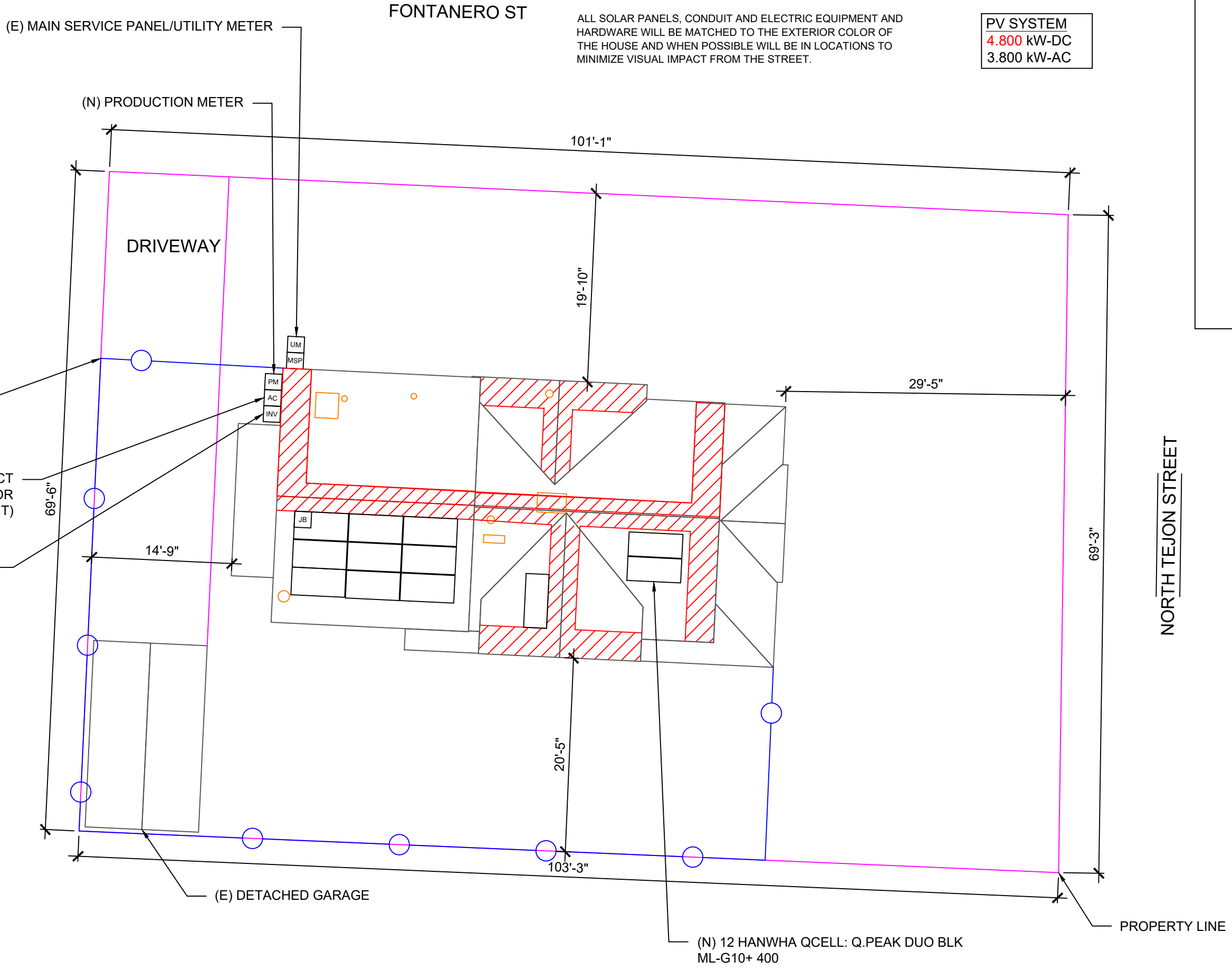
LEGEND:

-  CHIMNEY
-  PIPE VENT
-  MODULES
-  CONDUIT
-  SETBACK
-  AC DISCONNECT
-  PRODUCTION METER
-  JUNCTION BOX
-  INVERTER
-  MAIN SERVICE PANEL

FENCE/GATE NOT LOCKED

(N) UTILITY DISCONNECT EATON DG221URB (OR EQUIVALENT)

(N) SOLAREEDGE SE3800H-US [S11] INVERTER WITH RAPID SHUTDOWN



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ALL SOLAR PANELS, CONDUIT AND ELECTRIC EQUIPMENT AND HARDWARE WILL BE MATCHED TO THE EXTERIOR COLOR OF THE HOUSE AND WHEN POSSIBLE WILL BE IN LOCATIONS TO MINIMIZE VISUAL IMPACT FROM THE STREET.

PV SYSTEM
 4.800 kW-DC
 3.800 kW-AC



ROOF AREA: 1639.86 SQ FT

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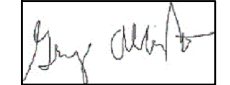
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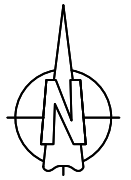


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



SITE PLAN
 SCALE: 3/32" = 1'-0"

1

SITE PLAN			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
247476	5/3/2023	L.M.	PV-2

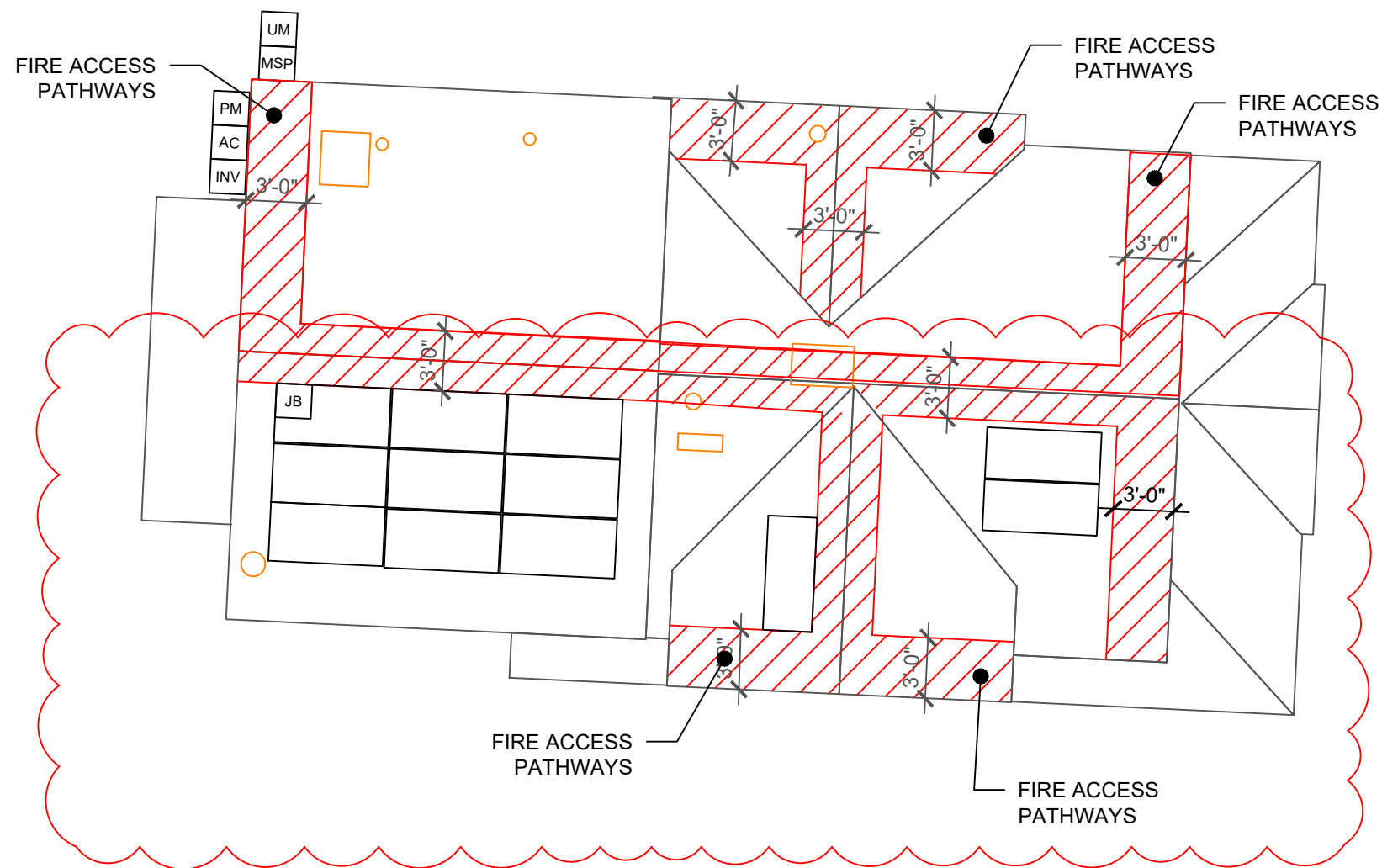
LEGEND:

-  CHIMNEY
-  PIPE VENT
-  MODULES
-  CONDUIT
-  SETBACK
-  AC DISCONNECT
-  PRODUCTION METER
-  JUNCTION BOX
-  INVERTER
-  MAIN SERVICE PANEL

MODIFIED SETBACKS PROPOSED AT RIDGE:
 TOTAL ARRAY AREA = 253.68 SF
 TOTAL ROOF AREA = 1639.86 SF
 TOTAL ARRAY AREA AS A % TO ROOF AREA = 15.47%
 15.47% < 33%

PV SYSTEM
 4.800 kW-DC
 3.800 kW-AC

THIS SYSTEM DESIGNED WITH:
 WIND SPEED: 130
 SNOW LOAD: 30



ROOF AREA: 1639.86 SQ FT

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ROOF PLAN WITH MODULES LAYOUT

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ROOF PLAN
 SCALE: 1/8" = 1'-0"

1

NOTES:

1. EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNTS
2. ATTACHED CLAMPS AT 25% FROM THE EDGE AND 50% FROM THE CENTER OF THE MODULES
3. JUNCTION BOX IS MOUNTED TO THE RAIL.

ROOF DETAILS:

TOTAL ROOF AREA: 1639.86 SQ FT
 ARRAY COVERAGE: 15.47%
 SYSTEM DISTRIBUTED WEIGHT: 2.29 LBS
 SFM INFINITY \ ROCKIT MICRORAIL POINT-LOAD: 19.4 LBS



ROOF AREA STATEMENT

ROOF	MODULE QUANTITY	ROOF PITCH	ARRAY PITCH	AZIMUTH	ROOF AREA	ARRAY AREA
1	9	20°	20°	183°	299.88 SQ FT	190.26 SQ FT
2	1	20°	20°	272°	120 SQ FT	21.14 SQ FT
3	2	20°	20°	183°	247.51 SQ FT	42.28 SQ FT

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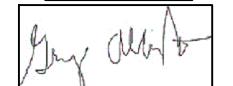
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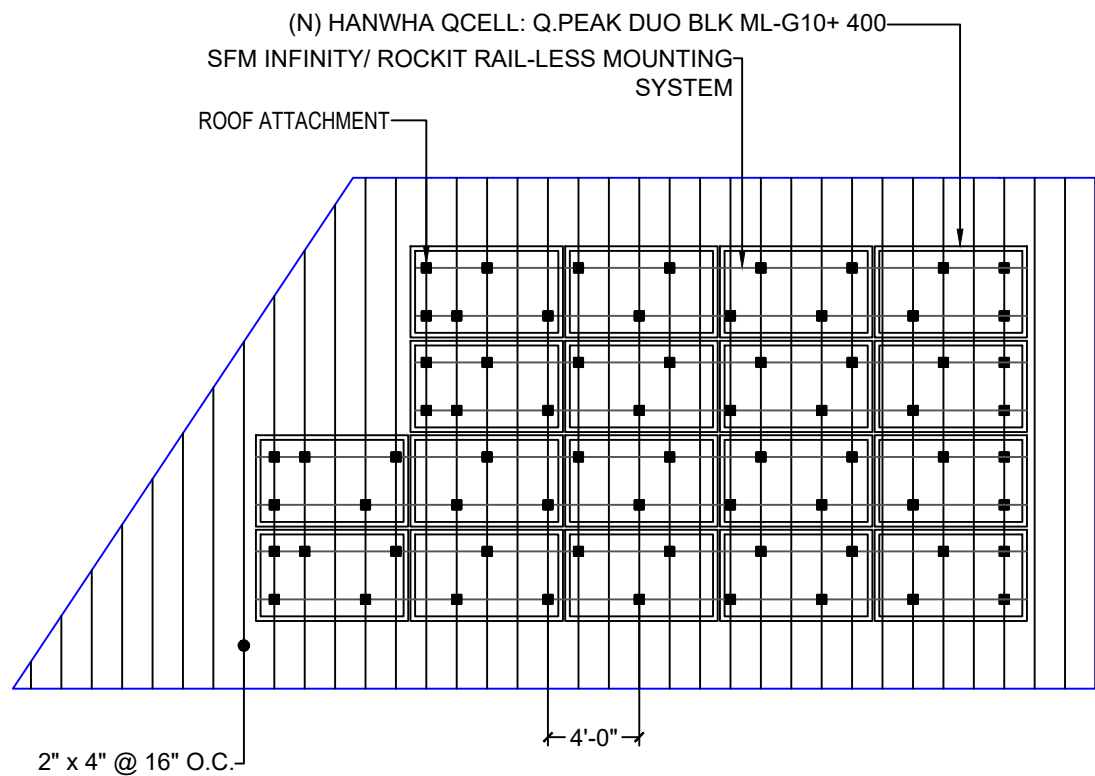
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ROOF DETAILS

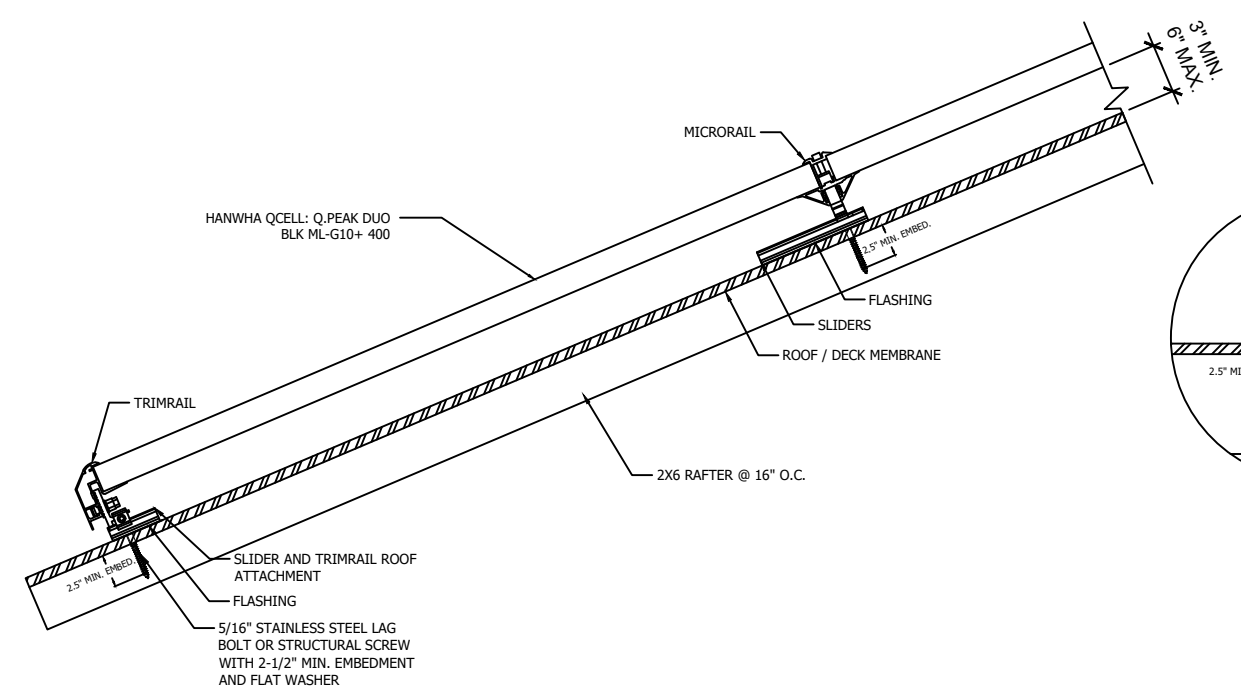
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PARTIAL ROOF FRAMING PLAN

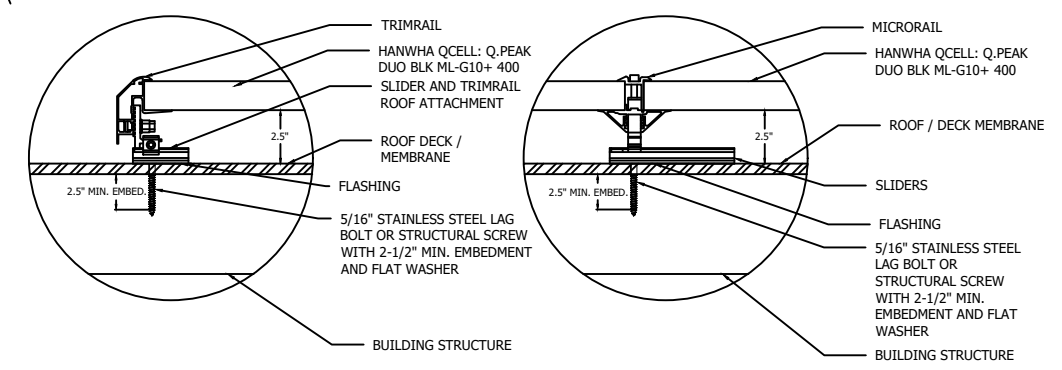
Scale: NTS

MAX ATTACHMENT SPAN - 48" STAGGERED



SOLAR PV ARRAY SECTION VIEW

Scale: NTS



ATTACHMENT DETAIL

Scale: NTS



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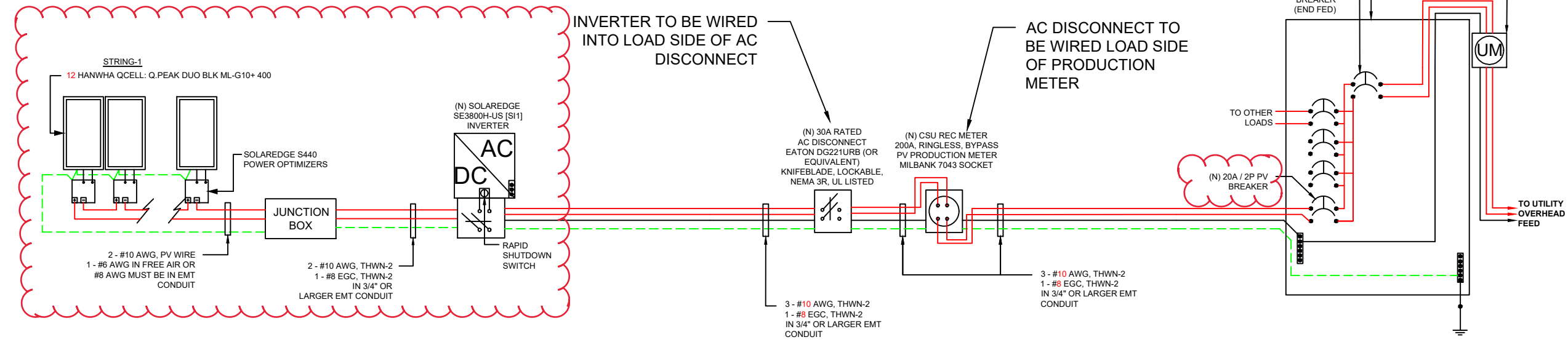
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MOUNTING DETAILS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
247476	5/3/2023	L.M.	PV-3

BACKFEED BREAKER SIZING				
MAX. CONTINUOUS OUTPUT 16.00A @ 240V				
16.00	X	1.25	=	20.00AMPS 20A BREAKER - OK
SEE 705.12 OF 2017 NEC				
200	X	1.20	=	240
240	-	150	=	90A ALLOWABLE BACKFEED



INVERTER TO BE WIRED INTO LOAD SIDE OF AC DISCONNECT

AC DISCONNECT TO BE WIRED LOAD SIDE OF PRODUCTION METER

LOCKABLE DISCONNECT, WITHIN 10' OF THE METER, MUST BE PROVIDED THAT IS READILY ACCESSIBLE AT ALL TIMES TO THE ASSOCIATION'S PERSONNEL.

CONNECT TO EXISTING UFER

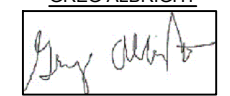
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THREE LINE DIAGRAM

JOB NO: 247476	DATE: 5/3/2023	DESIGNED BY: L.M.	SHEET: PV-4
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WIRE SCHEDULE													
RACEWAY #	EQUIPMENT				WIRE LOCATION	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	TO	OPTIMIZER	ROOF / FREE-AIR	2	10	40	13.93	0.96	1	38.40	17.41
2	DC	OPTIMIZER	TO	JUNCTION BOX	ROOF / FREE-AIR	2	10	40	15.00	0.96	1	38.40	18.75
3	DC	JUNCTION BOX	TO	INVERTER	EXTERIOR WALL	2	10	40	15.00	0.96	1	38.40	18.75
4	AC	INVERTER	TO	AC DISCONNECT	EXTERIOR WALL	3	10	40	16.00	0.96	1	38.40	20.00
5	AC	AC DISCONNECT	TO	PRODUCTION METER	EXTERIOR WALL	3	10	40	16.00	0.96	1	38.40	20.00
6	AC	PRODUCTION METER	TO	POI	EXTERIOR WALL	3	10	40	16.00	0.96	1	38.40	20.00

CONDUCTOR AMPACITY CALCULATIONS IN ACCORDANCE WITH NEC 690.8.

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CONDUCTOR CALCULATIONS			
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MAIN PHOTOVOLTAIC SYSTEM DISCONNECT
690.13(B)

DO NOT DISCONNECT UNDER LOAD
NEC 690.15 (B) & NEC 690.33(D)(2)

WARNING
SINGLE 120-VOLT SUPPLY DO NOT CONNECT MULTIWIRED BRANCH CIRCUITS
NEC 710.15(C) & 692.9 (C)

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
NEC 705.12(D) & NEC 690.59

WARNING
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL
NEC 110.27(C) & OSHA 1910.145(F)(7)

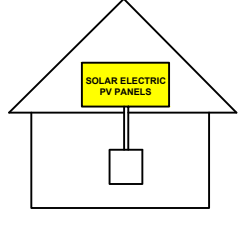
WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
706.15(C)(4) & 690.13(B)

WARNING
THIS EQUIPMENT FED BY MULTIPLE SOURCES: TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN POWER SUPPLY SHALL NOT EXCEED AMPACITY OF BUSBAR
NEC 705.12(B)(3)(3)

WARNING
THE DISCONNECTION OF THE GROUNDED CONDUCTOR(S) MAY RESULT IN OVERVOLTAGE ON THE EQUIPMENT
NEC 690.31(E)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM
690.56(C)(3)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY
IFC 605.11.3.1(1) & 690.56(C)



CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED
NEC 705.12(D) & NEC 690.59

WARNING
POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.
NEC 705.12(C) & NEC 690.59

WARNING
ARC FLASH AND SHOCK HAZARD APPROPRIATE PPE REQUIRED
24 INCH FLASH HAZARD BOUNDARY
3 CALCM² FLASH HAZARD AT 18 INCHES
480 VAC SHOCK HAZARD WHEN COVER IS REMOVED
42 INCH LIMITED APPROACH
12 INCH RESTRICTED APPROACH - 500 V CLASS 00 GLOVES
1 INCH PROHIBITED APPROACH - 500 V CLASS 00 GLOVES
LOCATION: 1832 NORTH TEJON STREET, COLORADO SPRINGS, CO 80907

PHOTOVOLTAIC AC DISCONNECT
NEC 690.13(B)

PHOTOVOLTAIC AC DISCONNECT
RATED AC OUTPUT CURRENT: **16.00A**
NOMINAL OPERATING AC VOLTAGE: **240V**
NEC 690.54

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
NEC 705.12(D) & NEC 690.59

SOLAR PV DC CIRCUIT
EVERY 10' ON CONDUIT AND ENCLOSURES
NEC 690.31(O)(2)

PHOTOVOLTAIC POWER SOURCE
EVERY 10' ON CONDUIT AND ENCLOSURES
NEC 690.31(D)(2)

MAXIMUM VOLTAGE **480** V
MAXIMUM CIRCUIT CURRENT **10.5** A
MAX DC-DC CONVERTER OUTPUT CURRENT **15** A

NOTES:

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

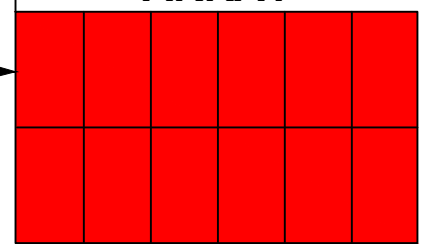
PHOTOVOLTAIC DC DISCONNECT
NEC 690.13(B)

MAXIMUM DC VOLTAGE OF PV SYSTEM
NEC 690.53

WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT
706.15(C)(4) & 690.13(B)

WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
706.15(C)(4) & 690.13(B)

WARNING
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL
NEC 110.27(C) & OSHA 1910.145(F)(7)



NEC 690.31(G)(3) & (4)

CLIENT:
LISA HINES
1832 NORTH TEJON STREET, COLORADO SPRINGS, CO 80907
AHJ: PIKES PEAK REGIONAL BUILDING DEPARTMENT
UTILITY: CSU - COLORADO SPRINGS UTILITIES
METER: 421965
PHONE: (719) 660-5247

SYSTEM:
SYSTEM SIZE (DC): 12 X 400 = 4.800 kW
SYSTEM SIZE (AC): 3.800 kW @ 240V
MODULES: 12 X HANWHA QCELL: Q.PEAK DUO BLK ML-G10+ 400
OPTIMIZERS: 12 X SOLAREEDGE S440
INVERTER: SOLAREEDGE SE3800H-US [S11]

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NO.	REVISED BY	DATE
1	A.W.K.	8/29/2022
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-	-	-

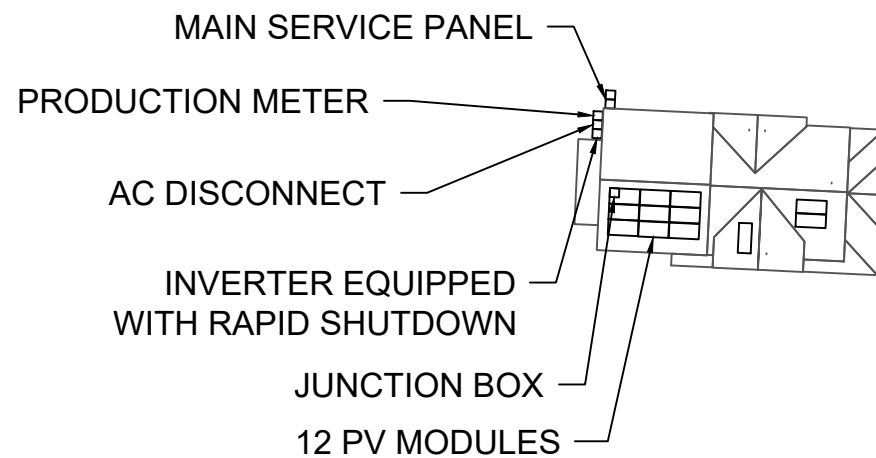
freedom FOREVER
FREEDOM FOREVER LLC
9959 E GEDDES AVE, CENTENNIAL, CO 80112
Tel: (800) 385-1075

GREG ALBRIGHT
Greg Albright
CONTRACTOR LICENSE:
ELECTRICAL CONTRACTOR 23393

LABELS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
247476	5/3/2023	L.M.	PV-7

CAUTION:

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



WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL



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GREG ALBRIGHT

CONTRACTOR LICENSE:
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SITE PLACARD

JOB NO:	DATE:	DESIGNED BY:	SHEET:
247476	5/3/2023	L.M.	PV-7A

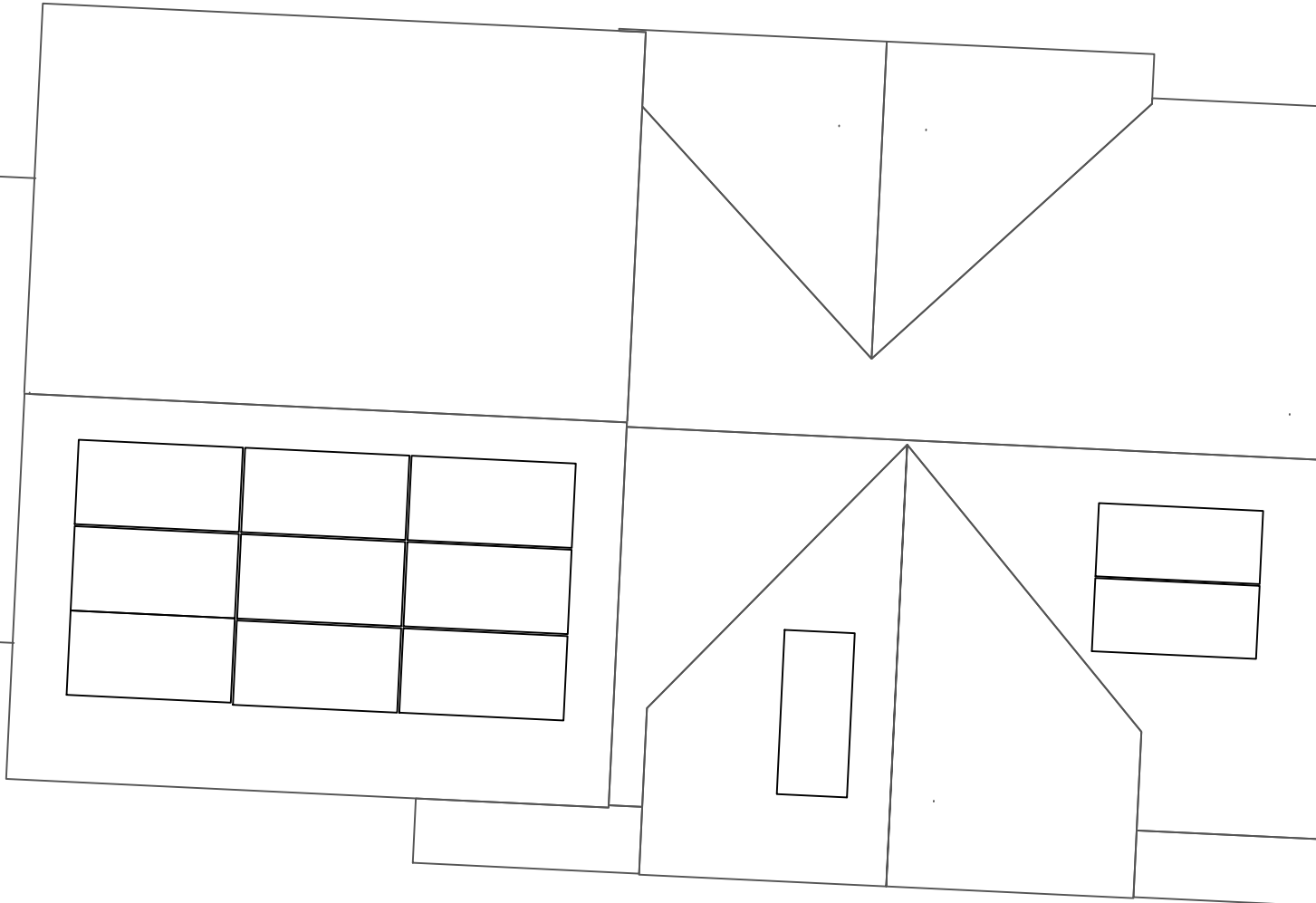
NOTES:

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.

SOLAREEDGE OPTIMIZER CHART

1-10 11-20 21-30 31-40 41-50 51-60

1
2
3
4
5
6
7
8
9
10



CLIENT:
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 9959 E GEDDES AVE, CENTENNIAL, CO 80112
 Tel: (800) 385-1075

GREG ALBRIGHT

CONTRACTOR LICENSE:
 ELECTRICAL CONTRACTOR 23393

OPTIMIZER CHART			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
247476	5/3/2023	L.M.	PV-8

SAFETY PLAN

MARK UP KEY

INSTRUCTIONS:

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

IN CASE OF EMERGENCY

INJURY HOTLINE
(855) 400-7233

NEAREST HOSPITAL OR OCCUPATIONAL/INDUSTRIAL CLINIC

NAME: _____

ADDRESS: _____

SAFETY COACH CONTACT INFORMATION

NAME: _____

PHONE NUMBER: _____

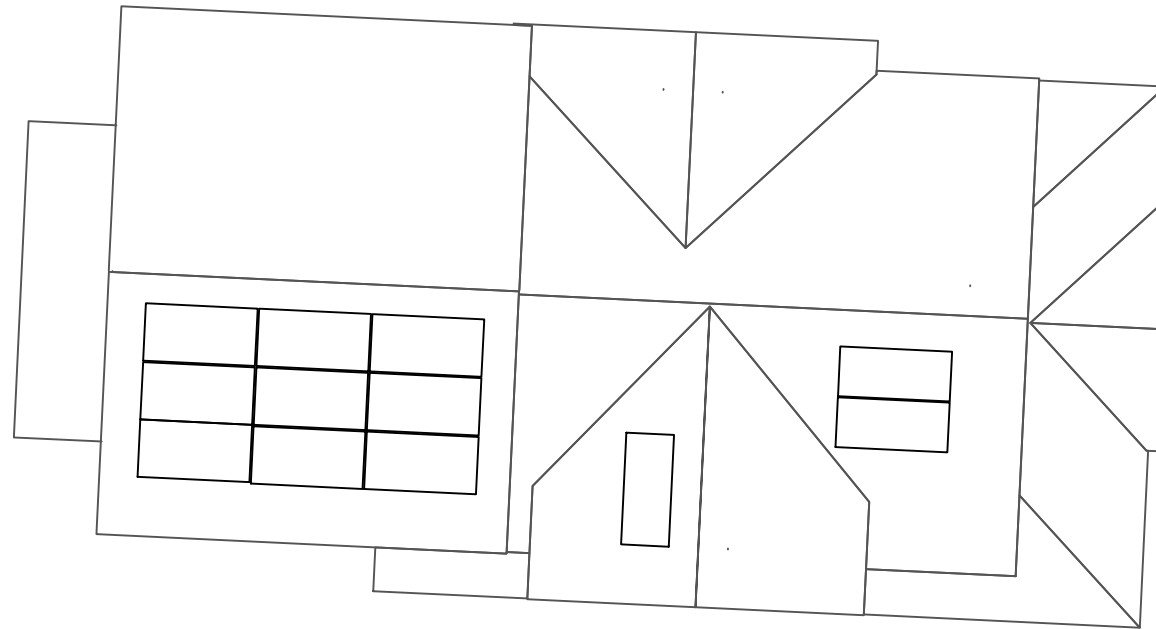
ALL EMPLOYEES ON SITE SHALL BE MADE AWARE OF THE SAFETY PLAN AND SIGN INDICATING THAT THEY ARE AWARE OF THE HAZARDS ON-SITE AND THE PLAN FOR WORKING SAFELY.

NAME

SIGNATURE

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

DATE: _____ TIME: _____



- P PERMANENT ANCHOR
- T TEMPORARY ANCHOR
- IL INSTALLER LADDER
- B JUNCTION / COMBINER BOX
- S STUB-OUT
- SKYLIGHT
- NO LADDER ACCESS (STEEP GRADE OR GROUND LEVEL OBSTRUCTIONS)
- RESTRICTED ACCESS
- CONDUIT
- GAS SHUT OFF
- H₂O WATER SHUT OFF
- 7 SERVICE DROP
- Z POWER LINES

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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

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-	-	-

FREEDOM FOREVER LLC
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Tel: (800) 385-1075

GREG ALBRIGHT

CONTRACTOR LICENSE:
ELECTRICAL CONTRACTOR 23393

SAFETY PLAN			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
247476	5/3/2023	L.M.	PV-9

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 operated.
- 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 identified and protected from contact, as necessary.

EQP (name and title):

Public Protection

- The safety of the Client and Public must be maintained at all times.
- 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 work start.
- 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, Yes, No):

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 project.

Crew leader (name/title):

Crew member (name/title):

Crew member (name/title):

Crew member (name/title):

Crew member (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 roof.
- Elevated work involving the moving or maneuvering of solar panels shall cease at 25mph (sustained wind) until wind subsides.

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:

CLIENT:
LISA HINES
1832 NORTH TEJON STREET, COLORADO SPRINGS, CO 80907
AHJ: PIKES PEAK REGIONAL BUILDING DEPARTMENT
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OPTIMIZERS: 12 X SOLAREEDGE S440
INVERTER: SOLAREEDGE SE3800H-US [S11]

REVISIONS		
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9959 E GEDDES AVE, CENTENNIAL, CO 80112
Tel: (800) 385-1075

GREG ALBRIGHT

Greg Albright

CONTRACTOR LICENSE:
ELECTRICAL CONTRACTOR 23393

SAFETY PLAN

JOB NO:	DATE:	DESIGNED BY:	SHEET:
247476	5/3/2023	L.M.	PV-10

powered by

Q.ANTUM DUO Z

Q.PEAK DUO BLK ML-G10+

385-405

ENDURING HIGH PERFORMANCE



BREAKING THE 20% EFFICIENCY BARRIER

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



THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

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



INNOVATIVE ALL-WEATHER TECHNOLOGY

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



ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID Technology, Anti PID Technology¹, Hot-Spot Protect and Traceable Quality Tra.Q™.



EXTREME WEATHER RATING

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



A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty².

¹ APT test conditions according to IEC/TS 62804-1:2015, method A (-1500 V, 96h)

² See data sheet on rear for further information.



6 BUSBAR CELL TECHNOLOGY

12 BUSBAR CELL TECHNOLOGY

THE IDEAL SOLUTION FOR:



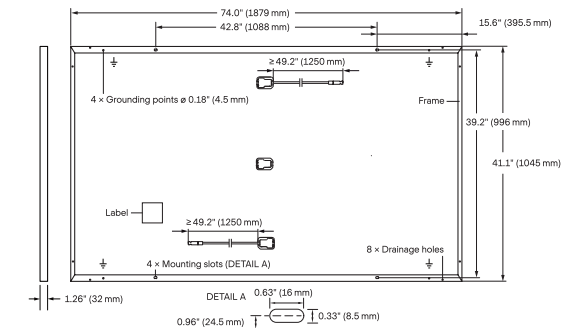
Rooftop arrays on residential buildings

Engineered in Germany



MECHANICAL SPECIFICATION

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm ² Solar cable; (+) ≥ 49.2 in (1250 mm), (-) ≥ 49.2 in (1250 mm)
Connector	Stäubli MC4; IP68

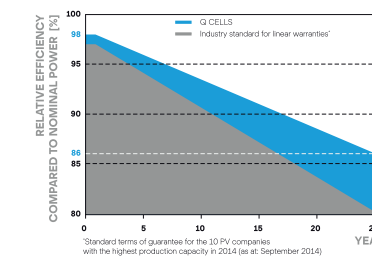


ELECTRICAL CHARACTERISTICS

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

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

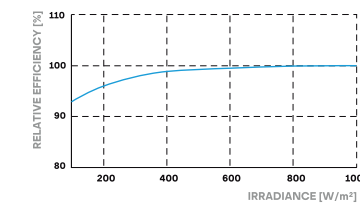
Q CELLS PERFORMANCE WARRANTY



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

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

PERFORMANCE AT LOW IRRADIANCE



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

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I _{SC}	α [%/K]	+0.04	Temperature Coefficient of V _{OC}	β [%/K]	-0.27
Temperature Coefficient of P _{MPP}	γ [%/K]	-0.34	Nominal Module Operating Temperature	NMOT [°F]	109 ± 5.4 (43 ± 3 °C)

PROPERTIES FOR SYSTEM DESIGN

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

³ See Installation Manual

QUALIFICATIONS AND CERTIFICATES

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



PACKAGING INFORMATION

Horizontal packaging	76.4 in 1940 mm	43.3 in 1100 mm	48.0 in 1220 mm	1656 lbs 751 kg	24 pallets	24 pallets	32 modules
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Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.

400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

Power Optimizer For North America

S440, S500



POWER OPTIMIZER

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)

* Expected availability in 2022

solaredge.com

solaredge

Power Optimizer For North America S440, S500

	S440	S500	Unit
INPUT			
Rated Input DC Power ⁽¹⁾	440	500	W
Absolute Maximum Input Voltage (Voc)	60		Vdc
MPPT Operating Range	8 - 60		Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5	15	Adc
Maximum Efficiency	99.5		%
Weighted Efficiency	98.6		%
Oversvoltage Category	II		
OUTPUT DURING OPERATION			
Maximum Output Current	15		Adc
Maximum Output Voltage	60		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)			
Safety Output Voltage per Power Optimizer	1+/-0.1		Vdc
STANDARD COMPLIANCE			
Photovoltaic Rapid Shutdown System	NEC 2014, 2017 & 2020		
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3		
Safety	IEC62109-1 (class II safety), UL1741		
Material	UL94 V-0, UV Resistant		
RoHS	Yes		
Fire Safety	VDE-AR-E 2100-712:2013-05		
INSTALLATION SPECIFICATIONS			
Maximum Allowed System Voltage	1000		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 / 1.5		gr / lb
Input Connector	MC4 ⁽²⁾		
Input Wire Length	0.1 / 0.32		m / ft
Output Connector	MC4		
Output Wire Length	(+) 2.3, (-) 0.10 / (+) 7.54, (-) 0.32		m / ft
Operating Temperature Range ⁽³⁾	-40 to +85		°C
Protection Rating	IP68 / Type6B		
Relative Humidity	0 - 100		%

(1) Rated power of the module at STC will not exceed the power optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed

(2) For other connector types please contact SolarEdge

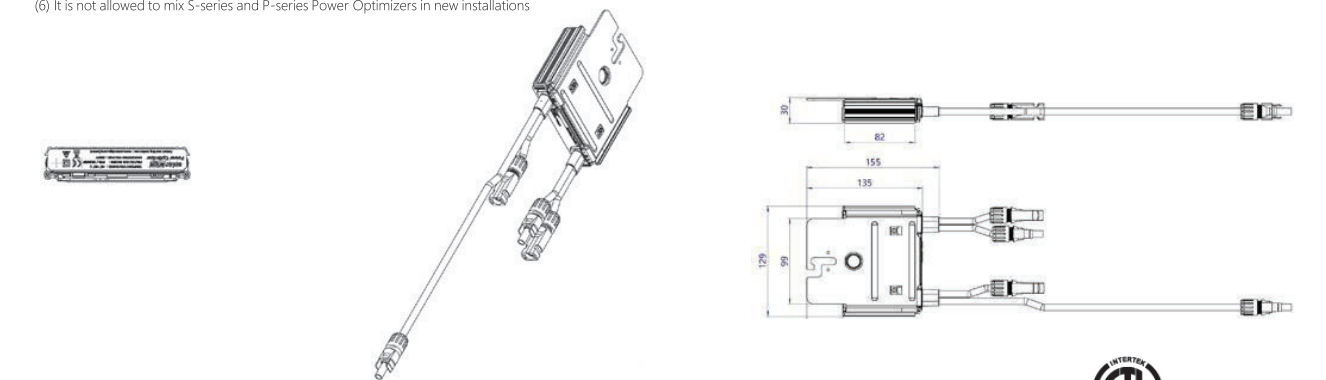
(3) For ambient temperature above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Using a SolarEdge Inverter	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 (Power Optimizers)	25		50 ⁽⁴⁾	
Maximum Nominal Power per String	5700 (6000 with SE7600-US-SE11400-U)	6000	12750	W
Maximum Allowed Connected Power per String ⁽⁵⁾ (Permitted only when the difference in connected power between strings is 1,000W or less)	Refer to Footnote 5	One String 7200W Two strings or more 7800W	15,000W	
Parallel Strings of Different Lengths or Orientations	Y			

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

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

12-25
YEAR
WARRANTY



INVERTERS

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)

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	SEXXXXH-XXXXXBXX4							
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
Power Factor	1, Adjustable - 0.85 to 0.85							
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							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	600k _a Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
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

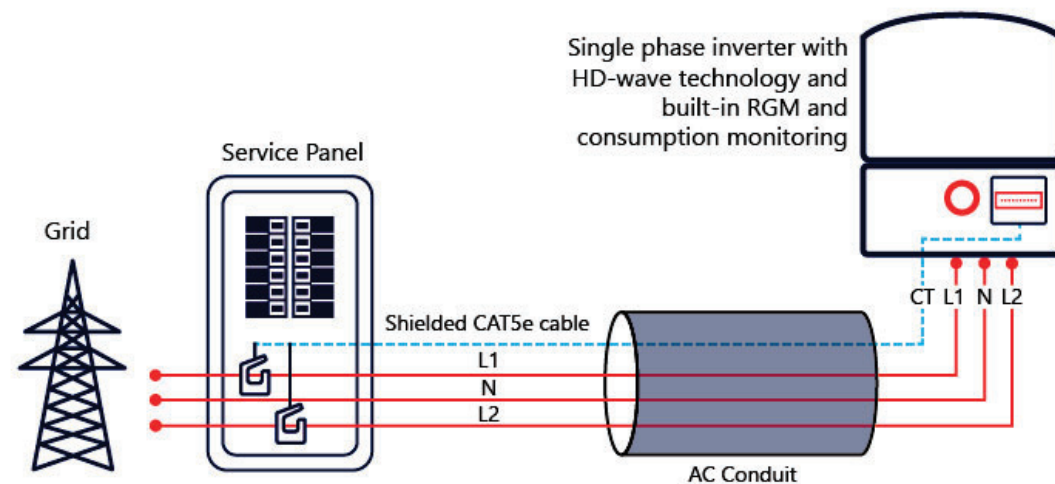
MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
ADDITIONAL FEATURES							
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional ⁽³⁾						
Consumption metering							
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection						
Rapid Shutdown - NEC 2014, NEC 2017 and NEC 2020, 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect						
STANDARD COMPLIANCE							
Safety	UL1741, UL1741 SA, UL1699B, 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			
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6			
Noise	< 25			< 50			
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁴⁾						
Protection Rating	NEMA 4X (Inverter with Safety 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

(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>

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



pe.eaton.com

Eaton general duty non-fusible safety switch

DG221URB

UPC:782113120232

Dimensions:

- **Height:** 10.81 IN
- **Length:** 6.88 IN
- **Width:** 6.38 IN

Weight:6 LB

Notes:WARNING! Switch is not approved for service entrance unless a neutral kit is installed.

Warranties:

- Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

Specifications:

- **Type:** Non-fusible, single-throw
- **Amperage Rating:** 30A
- **Enclosure:** NEMA 3R, Rainproof
- **Enclosure Material:** Painted galvanized steel
- **Fuse Configuration:** Non-fusible
- **Number Of Poles:** Two-pole
- **Number Of Wires:** Two-wire
- **Product Category:** General duty safety switch
- **Voltage Rating:** 240V

Supporting documents:

- [Eatons Volume 2-Commercial Distribution](#)
- [Eaton Specification Sheet - DG221URB](#)

Certifications:

- UL Listed

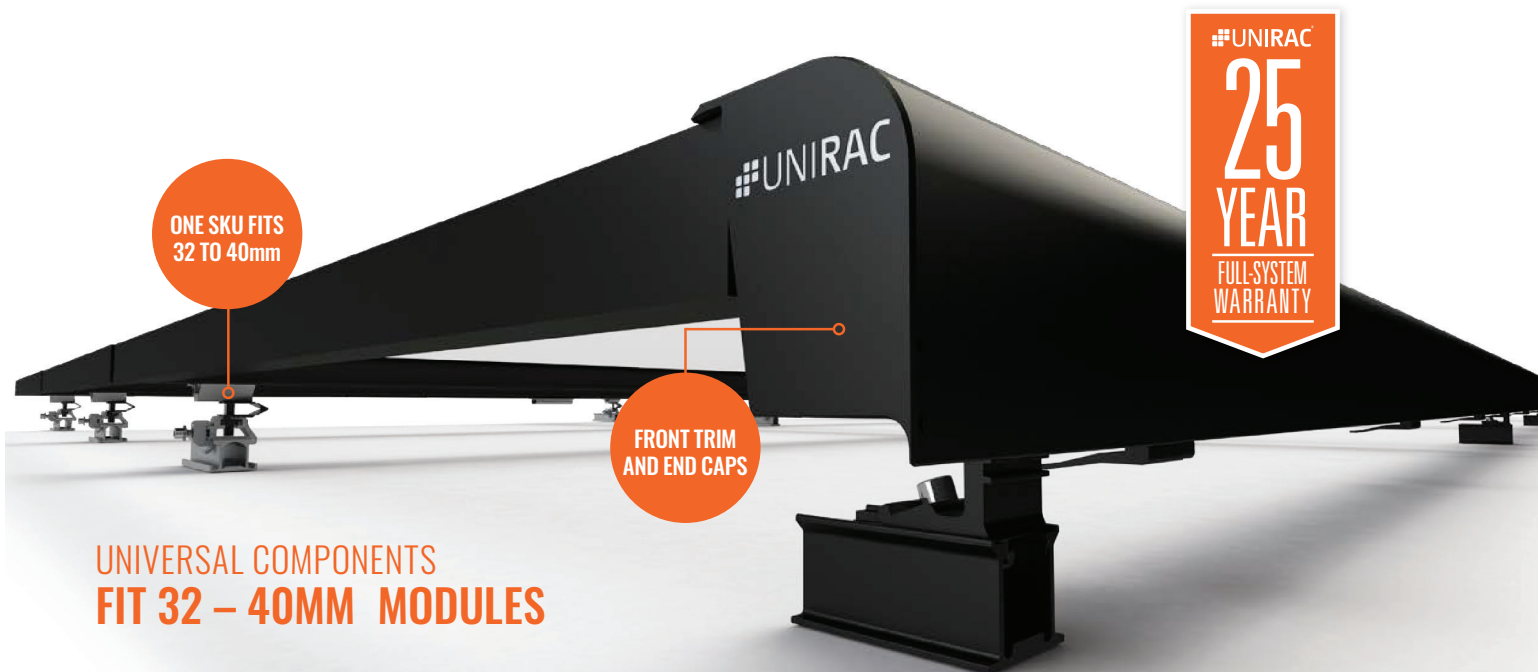
Product compliance: No Data



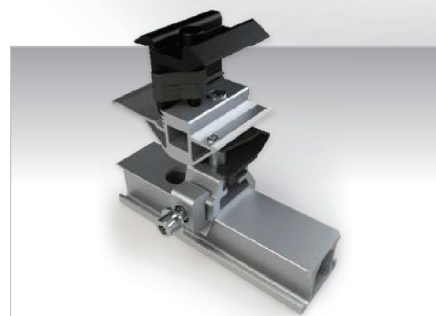
SFM INFINITY



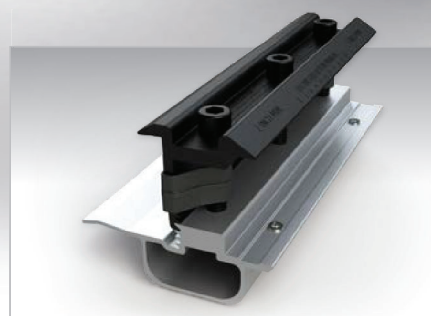
Take your business to the next level with **SFM INFINITY**, UNIRAC's rail-less PV mounting system for flush mount installations on comp shingle and tile roofs. An advanced 3rd generation product platform in use by top solar contractors nationwide, **SFM INFINITY** optimizes your operations on and off the roof, with approximately 40% less labor, 30% logistics savings, and 20% fewer roof attachments than traditional solar racking. Plus, 87% of homeowners prefer **SFM INFINITY's** aesthetics.



UNIVERSAL COMPONENTS
FIT 32 – 40MM MODULES



SUPERIOR PERFORMANCE
Enhance your business with two installs per day and 30% less cost.



EASY INSTALLATION
Pre-assembled components, 20% fewer roof attachments, and level array in seconds with post height adjustment.



HOMEOWNER PREFERRED
More than 4 out of 5 homeowners prefer **SFM INFINITY'S** aesthetics over a leading rail brand.

REVOLUTIONIZING ROOFTOP SOLAR

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

SFM INFINITY

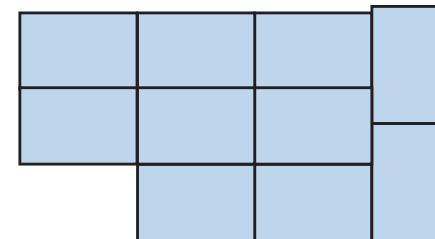
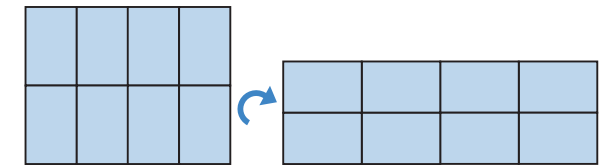
DESIGN GUIDELINES



While you will see advantages simply from switching to **SFM INFINITY**, the following guidelines will help you to maximize its benefits.

DEFAULT TO LANDSCAPE

When possible, design in landscape orientation in order to fit more modules on the roof and minimize roof attachments.



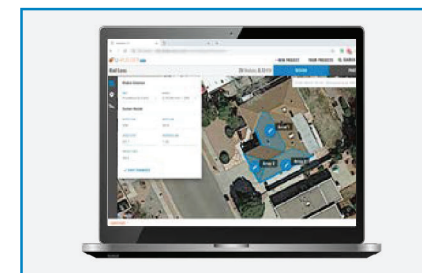
MIX MODULE ORIENTATIONS

SFM INFINITY is easily configured in mixed array shapes and module orientations to maximize array density and to avoid vent pipes and other obstacles. Because mounting locations are not constrained by rails, **SFM INFINITY** has unmatched flexibility to enhance your projects.

CONSULT THE QUICK TIPS VIDEOS

Visit UNIRAC's mobile-friendly library of short, topic-specific videos which answer common questions and demonstrate how simple it is to install **SFM INFINITY**.

Quick Tips Videos: <https://unirac.com/SFM-Infinity/>



DESIGN IN U-BUILDER

Layout your arrays in **U-Builder**, UNIRAC's free solar design software, to optimize **SFM INFINITY'S** capabilities, including mixing module orientations and minimizing roof attachments. Quickly create layouts on Google or Bing Maps and generate project documents.

U-Builder: <https://design.unirac.com/>

REVOLUTIONIZING ROOFTOP SOLAR

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

2.0 Product Description	
Product	Photovoltaic Mounting System, Sun Frame Microrail - Installed Using Unirac Installation Guide, Rev PUB2019MAR01 with Annex North Row Extension Installation Guide Rev PUB2019FEB20
Brand name	Unirac
Description	<p>The product covered by this report is the Sun Frame Micro Rail roof mounted Photovoltaic Rack Mounting System. This system is designed to provide bonding and grounding to photovoltaic modules. The mounting system employs anodized or mill finish aluminum brackets that are roof mounted using the slider, outlined in section 4 of this report. There are no rails within this product, whereas the 3" Micro Rail, Floating Splice, and 9" Attached Splice electrically bond the modules together forming the path to ground.</p> <p>The Micro Rails are installed onto the module frame by using a stainless steel bolt anodized with black oxide with a stainless type 300 bonding pin, torqued to 20 ft-lbs, retaining the modules to the bracket. The bonding pin of the Micro Rail when bolted and torqued, penetrate the anodized coating of the photovoltaic module frame to contact the metal, creating a bonded connection from module to module.</p> <p>The grounding of the entire system is intended to be in accordance with the latest edition of the National Electrical Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems. Any local electrical codes must be adhered in addition to the national electrical codes. The Grounding Lug is secured to the photovoltaic module, torqued in accordance with the installation manual provided in this document.</p> <p>Other optional grounding includes the use of the Enphase UL2703 certified grounding system, which requires a minimum of 2 micro-inverters mounted to the same rail, and using the same engage cable.</p>
Models	Unirac SFM

2.0 Product Description	
Model Similarity	NA
Ratings	<p>Fuse Rating: 30A</p> <p>Module Orientation: Portrait or Landscape Maximum Module Size: 17.98 ft² UL2703 Design Load Rating: 33 PSF Downward, 33 PSF Upward, 10 PSF Down-Slope Tested Loads - 50 psf/2400Pa Downward, 50psf/2400Pa Uplift, 15psf/720Pa Down Slope Trina TSM-255PD05.08 and Sunpower SPR-E20-327 used for Mechanical Loading</p> <p>Increased size ML test: Maximum Module Size: 22.3 ft² UL2703 Design Load Rating: 113 PSF Downward, 50 PSF Upward, 30 PSF Down-Slope LG355S2W-A5 used for Mechanical Loading test. Mounting configuration: Four mountings on each long side of panel with the longest span of 24"</p> <p>UL2703 Design Load Rating: 46.9 PSF Downward, 40 PSF Upward, 10 PSF Down-Slope LG395N2W-A5, LG360S2W-A5 and LG355S2W-A5 used for used for Mechanical Loading test. Mounting configuration: Six mountings for two modules used with the maximum span of 74.5"</p> <p>Fire Class Resistance Rating: - Class A for Steep Slope Applications when using Type 1 Modules. Can be installed at any interstitial gap. Installations must include Trim Rail. - Class A for Steep Slope Applications when using Type 2 Modules. Can be installed at any interstitial gap. Installations must include Trim Rail. - Class A Fire Rated for Low Slope applications with Type 1 or 2 listed photovoltaic modules. This system was evaluated with a 5" gap between the bottom of the module and the roof's surface</p> <p><i>See section 7.0 illustration # 1 and 1a for a complete list of PV modules evaluated with these racking systems</i></p>
Other Ratings	NA

AUTHORIZATION TO MARK

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.

Applicant: Unirac, Inc	Manufacturer: Cixi Emeka Aluminum Co. Ltd
Address: 1411 Broadway Blvd NE Albuquerque, NM 87102	Address: No. 688 ChaoSheng Road Cixi City Zhejiang Province 315311
Country: USA	Country: China
Contact: Klaus Nicolaedis Tom Young	Contact: Jia Liu Robin Luo
Phone: 505-462-2190 505-843-1418	Phone: +86-15267030962 +86-13621785753
FAX: NA klaus.nicolaedis@unirac.com	FAX: NA
Email: toddg@unirac.com	Email: jia.liu@cxymj.com buwan.luo@cxymj.com

Party Authorized To Apply Mark: Same as Manufacturer
Report Issuing Office: Lake Forest, CA U.S.A.

Control Number: 5003705

Authorized by: *Natalie Johnson*
for Dean Davidson, Certification Manager



This document supersedes all previous Authorizations to Mark for the noted Report Number.

This Authorization to Mark 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 Authorization to Mark. Only the Client is authorized to permit copying or distribution of this Authorization to Mark 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 Authorization to Mark. 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 with 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 Fax 312-283-1672

Standard(s):	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels [UL 2703: 2015 Ed.1]
Product:	Photovoltaic Mounting System, Sun Frame Microrail - Installed Using Unirac Installation Guide, Rev PUB2019MAR01 with Annex North Row Extension Installation Guide Rev PUB2019FEB20
Brand Name:	Unirac
Models:	Unirac SFM



May 20, 2021

EcoFasten Solar LLC
4141 W Van Buren St, Ste 2
Phoenix, AZ 85009
TEL: (877) 859-3947

Attn.: Eco Fasten Solar LLC - Engineering Department

Re: Report # 2015-05584HG.07.01 – EcoFasten - Rock-It System for Gable and Hip Roofs
Subject: Engineering Certification for the State of Colorado

PZSE, Inc. – Structural Engineers has provided engineering and span tables for the EcoFasten - Rock-It System, as presented in PZSE Report # 2015-05584HG.07.01, "Engineering Certification for the EcoFasten - ClickFit System for Gable and Hip Roofs". All information, data, and analysis therein are based on, and comply with, the following building codes and typical specifications:

- Building Codes:
1. ASCE/SEI 7-16, Minimum Design Loads for Buildings and Other Structures, by American Society of Civil Engineers
 2. 2018 International Building Code, by International Code Council, Inc.
 3. 2018 International Residential Code, by International Code Council, Inc.
 4. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES
 5. Aluminum Design Manual 2015, by The Aluminum Association, Inc.
 6. ANSI/AWC NDS-2018, National Design Specification for Wood Construction, by the American Wood Council

Design Criteria:

Risk Category II
Seismic Design Category = A - E
Exposure Category = B, C & D
Basic Wind Speed (ultimate) per ASCE 7-16 = 90 mph to 180 mph
Ground Snow Load = 0 to 60 (psf)

This letter certifies that the loading criteria and design basis for the EcoFasten - Rock-It System Span Tables are in compliance with the above codes.

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

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

