

SCOPE OF WORK:

TO INSTALL A ROOF MOUNTED SOLAR PHOTOVOLTAIC SYSTEM AT THE OWNER RESIDENCE LOCATED AT 283 CECILIA WAY, BELVEDERE TIBURON, CA 94920
 THE POWER GENERATED BY THE PV SYSTEM WILL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ELECTRICAL SERVICE EQUIPMENT.
 THE PV SYSTEM DOES INCLUDE STORAGE BATTERIES.

EQUIPMENT SUMMARY

36 HELIENE 66M HJT(360W) MODULES
01 SOL-ARK-12K-P (240V) INVERTER
03 KILO-VAULT 7.5KWH HAB V4 BATTERY
36 TIGO TS4-A-O OPTIMIZER

GENERAL NOTES:

- THESE CONSTRUCTION DOCUMENTS HAVE BEEN BASED ON FIELD INSPECTIONS AND OTHER INFORMATION AVAILABLE AT THE TIME. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS IN CONSTRUCTION DETAILS.
- ARCHITECT HAS NOT BEEN RETAINED TO SUPERVISE ANY CONSTRUCTION OR INSTALLATION OF ANY EQUIPMENT AT SITE.
- CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TOOLS, OBTAINS ALL PERMITS, LICENSES AND PAY ALL REQUIRED FEES AND COMPLETE INSTALLATION.
- CONTRACTOR HAS THE FULL RESPONSIBILITY TO CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK. ANY WORK STARTED BEFORE CONSULTATION AND ACCEPTANCE BY THE ENGINEER SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBJECT TO CORRECTION BY THEM WITHOUT ADDITIONAL COMPENSATION.
- DAMAGE CAUSED TO THE EXISTING STRUCTURE, PIPES, DUCTS, WINDOWS, WALL, FLOORS, ETC. SHALL BE REPAIRED TO THE ORIGINAL CONDITION OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST.
- THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR THE PROPER INSTALLATION AND COMPLETION OF THE WORK WITH APPROVED MATERIALS.
- NO CHANGES ARE TO BE MADE WITHOUT THE CONSULTATION AND APPROVAL OF THE ARCHITECT.
- CONTRACTOR SHALL OBTAIN BUILDING PERMIT. NO WORK TO START UNLESS BUILDING PERMIT IS PROPERLY DISPLAYED.
- ALL WORKMANSHIP AND MATERIALS SHALL BE OF FIRST QUALITY AND IN COMPLIANCE WITH THE REQUIREMENTS OF THE CA BUILDING CODE, THE DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ALL PERTINENT AGENCIES.
- IT IS ESSENTIAL THAT ALL WORK PROCEED WITH THE MAXIMUM COOPERATION OF ALL PARTIES AND WITH MINIMUM INTERFERENCE TO THE OCCUPANTS WITHIN THE BUILDING. THE OWNER'S DIRECTIONS IN THIS REGARD SHALL BE FULLY COMPLIED WITH.
- ALL EXPOSED PLUMBING, HVAC, ELECTRICAL DUCTWORK, PIPING AND CONDUITS ARE TO BE PAINTED BY GENERAL CONTRACTOR.
- THE CONTRACTOR SHALL PERFORM THE WORK IN STRICT CONFORMANCE WITH THE LOCAL LAWS, REGULATIONS AND THE NATIONAL ELECTRIC CODE.
- THE CONTRACTOR SHALL OBTAIN ALL PERMITS, APPROVALS, AFFIDAVITS, CERTIFICATIONS, ETC. AND PAY ALL FEES AS REQUIRED BY THE LOCAL AUTHORITIES.
- CONTRACTORS SHALL OBTAIN FIRE CERTIF. UPON COMPLETION OF WORK.

ELECTRICAL NOTES:

- THE EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE INSTALLED ONLY BY QUALIFIED PEOPLE. A QUALIFIED PERSON IS ONE WHO HAS SKILLS AND KNOWLEDGE RELATED TO THE CONSTRUCTION AND OPERATION OF THE ELECTRICAL EQUIPMENT AND INSTALLATIONS AND HAS RECEIVED SAFETY TRAINING TO RECOGNIZE AND AVOID THE HAZARDS INVOLVED. (CEC 690.4(E) AND 705.6)
- LOCAL UTILITY PROVIDER SHALL BE NOTIFIED PRIOR TO USE AND ACTIVATION OF ANY SOLAR PHOTOVOLTAIC INSTALLATION. FOR A LINE SIDE TAP CONNECTION, UTILITY NEEDS TO BE NOTIFIED WELL IN ADVANCE TO COORDINATE BUILDING ELECTRICAL SHUT OFF.
- NEW CONDUIT ROUTING SHOWN IS ESSENTIALLY SCHEMATIC. SUBCONTRACTOR SHALL LAY OUT RUNS TO SUIT FIELD CONDITIONS AND THE COORDINATION REQUIREMENTS OF OTHER TRADES.
- ARRAY WIRING SHOULD NOT BE READILY ACCESSIBLE EXCEPT TO QUALIFIED PERSONNEL.
- ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE WATERTIGHT AND APPROVED FOR USE IN WET LOCATIONS. (CEC 314.15A).
- WIRING METHODS FOR PV SYSTEM CONDUCTORS AREN'T PERMITTED WITHIN 10 IN. OF THE ROOF DECKING OR SHEATHING EXCEPT WHERE LOCATED DIRECTLY BELOW THE ROOF SURFACE THAT'S COVERED BY PV MODULES AND ASSOCIATED EQUIPMENT WIRING
- BACK-FED BREAKER MUST BE AT THE OPPOSITE END OF BUS BAR FROM THE MAIN BREAKER OR MAIN LUG SUPPLYING CURRENT FROM THE UTILITIES.
- ALL CONDUCTORS AND WIRE TIES EXPOSED TO SUNLIGHT ARE LISTED AS UV RESISTANT.
- CONTRACTOR SHALL FOLLOW ALL ELECTRICAL EQUIPMENT LABELING REQUIREMENTS IN CEC 690 AND CFC 2022
- PV SOURCE, OUTPUT AND INVERTER CIRCUITS SHALL BE IDENTIFIED AT ALL POINTS OF TERMINATION, CONNECTION, AND SPLICES. THE MEANS OF ID CAN BE SEPARATE COLOR CODING, MARKING TAPE, TAGGING ETC. (CEC 690.4).
- MEASURE THE LINE-TO-LINE AND LINE-TO-NEUTRAL VOLTAGE OF ALL SERVICE ENTRANCE CONDUCTORS PRIOR TO INSTALLING ANY SOLAR EQUIPMENT. THE VOLTAGES FOR THE 240VAC RATED.

GOVERNING CODES

2022 CALIFORNIA ELECTRICAL CODE.
 2022 CALIFORNIA RESIDENTIAL CODE.
 2022 CALIFORNIA FIRE CODE.
 2022 CALIFORNIA BUILDING CODE.
 2022 CALIFORNIA GREEN BUILDING STANDARDS CODE.
 2022 CALIFORNIA ENERGY CODE.
 2022 CALIFORNIA PLUMBING CODE.

WIRING AND CONDUIT NOTES:

- ALL CONDUIT SIZES AND TYPES, SHALL BE LISTED FOR ITS PURPOSE AND APPROVED FOR THE SITE APPLICATIONS
- ALL PV CABLES AND HOMERUN WIRES BE #10AWG *USE-2, PV WIRE, OR PROPRIETARY SOLAR CABLING SPECIFIED BY MFR, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED
- ALL CONDUCTORS AND OCPD SIZES AND TYPES SPECIFIED ACCORDING TO [CEC 690.8 (A)(1) & (B)(1)], [CEC 240] [NEC 690.7] FOR MULTIPLE CONDUCTORS
- ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE DERATED ACCORDING TO [CEC TABLE 310.15 (B)(2)(C)] BLACK ONLY*
- PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 600V PER CEC 2008 OR 1000V PER CEC 2022
- 4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS
- ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION
- VOLTAGE DROP LIMITED TO 2%
- AC CONDUCTORS >4AWG COLOR CODED OR MARKED: PHASE A OR L1- BLACK, PHASE B OR L2- RED, PHASE C OR L3- BLUE, NEUTRAL- WHITE/GRAY

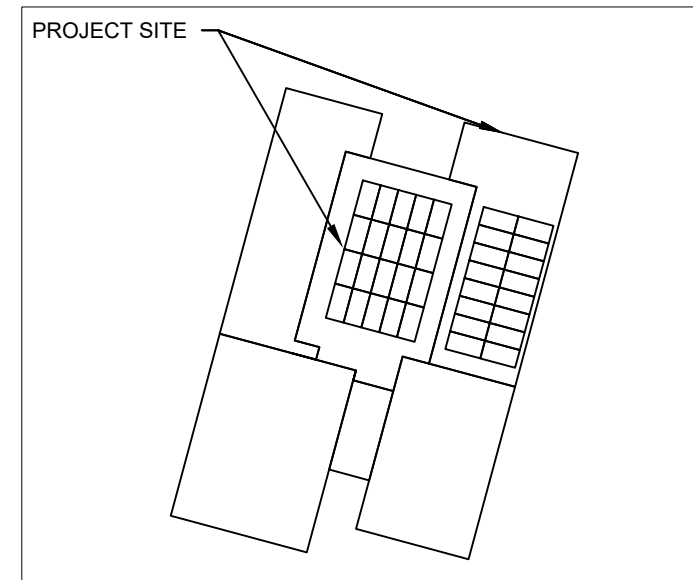
SYSTEM RATING

12.96KWDC

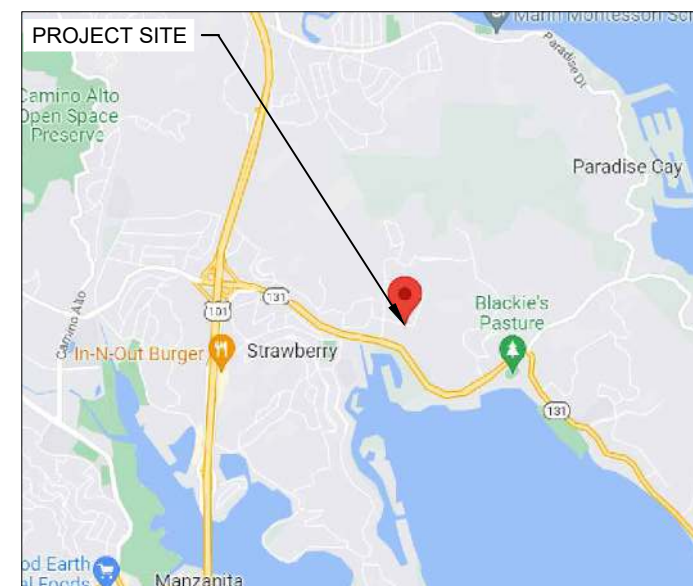
12.00 KWAC

SHEET INDEX

PV-0	COVER PAGE
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PV-2	ARRAY PLAN & MODULES
PV-2A	STRING LAYOUT & BOM
PV-3	ATTACHMENT DETAIL
PV-3A	ATTACHMENT DETAIL
PV-4	ELECTRICAL LINE DIAGRAM & CALCS.
PV-4A	SPECIFICATIONS & CALCULATION
PV-5	SIGNAGE
PV-6+	EQUIPMENT SPECIFICATIONS



1 PV-0 HOUSE PHOTO SCALE: NTS



2 PV-0 VICINITY MAP SCALE: NTS

LAKESHORE SOLAR

SYSTEM INFO.

(36) HELIENE 66M HJT(360W)

(01) SOL-ARK-12K-P (240V)

DC SYSTEM SIZE: 12.96 KWDC

AC SYSTEM SIZE: 12.00 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

**CARY WHITE
 RESIDENCE**
 283 CECILIA WAY
 BELVEDERE TIBURON, CA 94920
 PH.# : (415) 613-5589
 Email: carywhite@live.com

DATE: 03/10/2023

SHEET NAME

COVER PAGE

SHEET SIZE

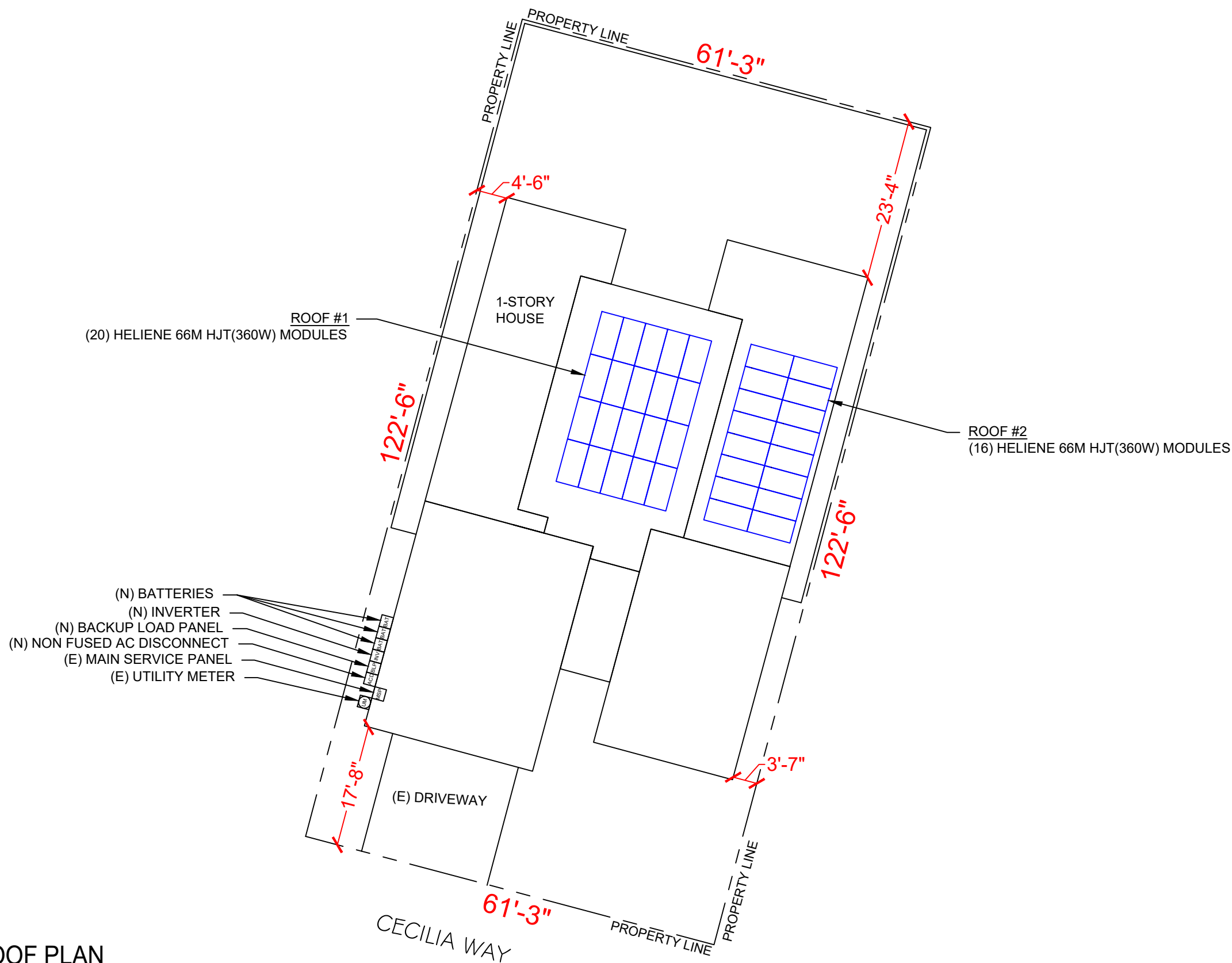
**ANSI B
 11" X 17"**

SHEET NUMBER

PV-0

SITE NOTES

- A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
- THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS AN UTILITY INTERACTIVE SYSTEM WITH STORAGE BATTERIES.
- THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION [CEC 110.26]



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SHEET NAME

SITE PLAN

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-1



1

PLOT PLAN WITH ROOF PLAN

PV-1

SCALE: 1/16" = 1'-0"

DESIGN SPECIFICATION	
RISK CATEGORY:	II
CONSTRUCTION:	SFD
ZONING:	RESIDENTIAL
SNOW LOAD (ASCE 7-16):	0
EXPOSURE CATEGORY:	C
WIND SPEED (ASCE 7-16):	91 MPH

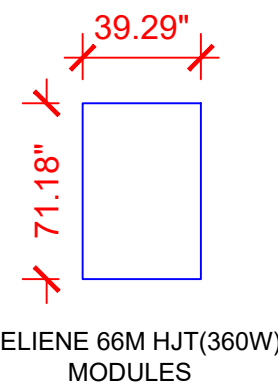
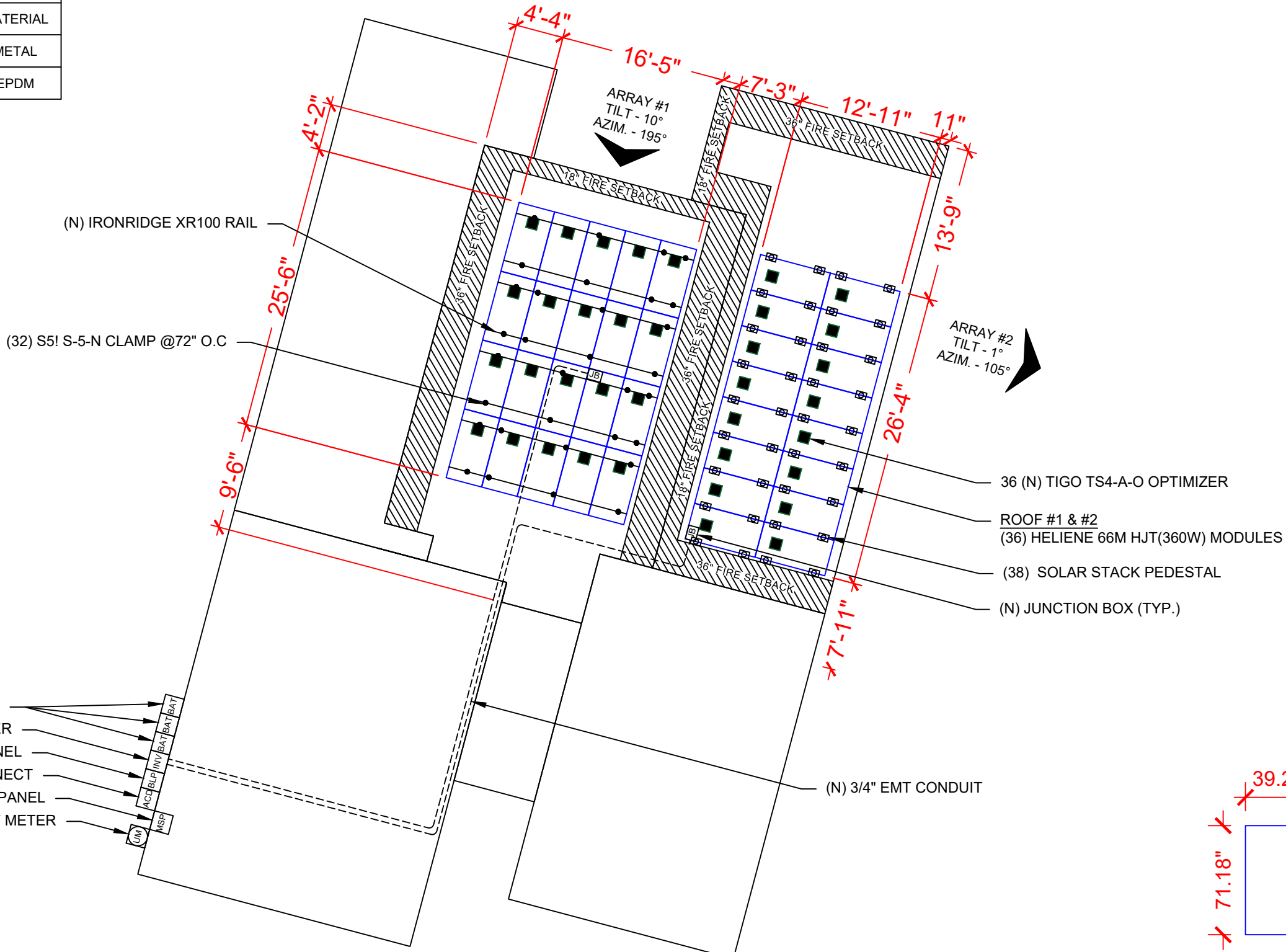
MODULE TYPE, DIMENSIONS & WEIGHT	
NUMBER OF MODULES:	36 MODULES
MODULE TYPE:	HELIENE 66M HJT(360W)
MODULE WEIGHT:	44.90 LBS
MODULE DIMENSIONS:	71.18" x 39.29" = 19.42SF
UNIT WEIGHT OF AREA:	2.31 PSF

ROOF DESCRIPTION					
ROOF	ROOF TILT	AZIMUTH	RAFTER SIZE	RAFTER SPACING	ROOF MATERIAL
#1	10°	195°	2"X6"	24" o.c.	FLAT TILE
#2	1°	105°	2"X6"	24" o.c.	FLAT TILE

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODU LES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	20	419.61	886.52	47
#2	16	340.69	746.30	46
TOTAL ROOF AREA COVER BY ARRAY AREA(%)		760.3	3804.81	20

ROOF DESCRIPTION					
ROOF	ROOF TILT	AZIMUTH	RAFTER SIZE	RAFTER SPACING	ROOF MATERIAL
#1	10°	195°	2"X6"	24" o.c.	SEAM METAL
#2	1°	105°	2"X6"	24" o.c.	GRAY EPDM

LEGEND	
[JB]	- JUNCTION BOX
[INV]	- INVERTER
[ACD]	- NON FUSED AC DISCONNECT
[MSP]	- MAIN SERVICE PANEL
[UM]	- UTILITY METER
[BLP]	- BACKUP LOAD PANEL
[BAT]	- BATTERY
○	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
●	- ROOF ATTACHMENT
---	- CONDUIT



SYSTEM INFO.		
(36)HELIENE 66M HJT(360W)		
(01) SOL-ARK-12K-P (240V)		
DC SYSTEM SIZE: 12.96 KWDC		
AC SYSTEM SIZE: 12.00 KWAC		

REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS
CARY WHITE RESIDENCE
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 Email: carywhite@live.com

DATE: 03/10/2023

SHEET NAME
ARRAY PLAN & MODULES

SHEET SIZE
**ANSI B
 11" X 17"**

SHEET NUMBER
PV-2

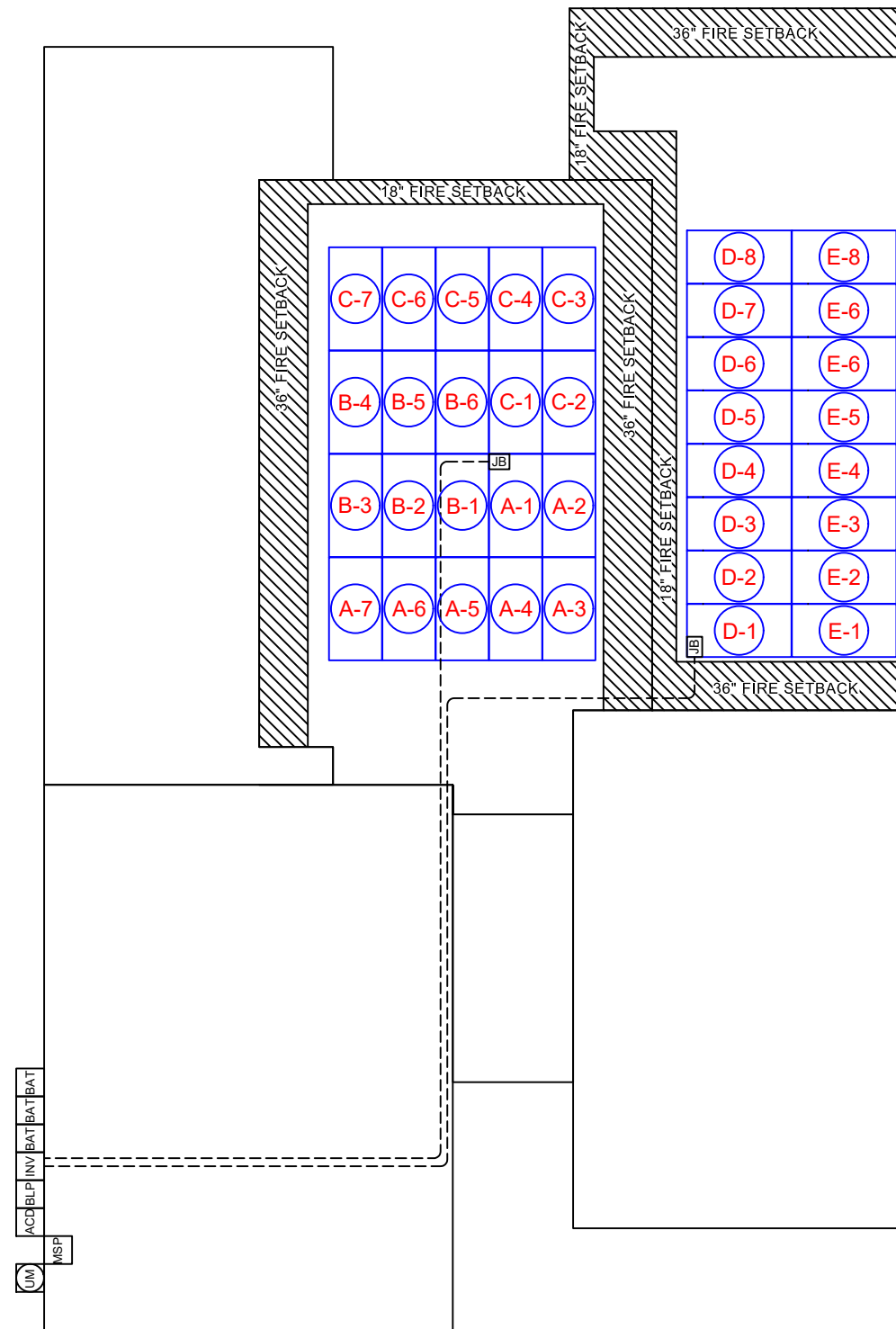


BILL OF MATERIALS

EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	36	HELIENE 66M HJT(360W) MODULES
INVERTER	1	SOL-ARK-12K-P (240V) INVERTER
OPTIMIZER	36	TIGO TS4-A-O OPTIMIZERS
NON FUSED AC DISCONNECT	1	60A NON-FUSED AC DISCONNECT 240V, NEMA 3R, UL LISTED
JUNCTION BOX	2	JUNCTION BOX NEMA 3R, UL LISTED
BATTERY	2	KILO-VAULT 7.5kWh HAB V4 BATTERY
BACKUP PANEL	1	200A RATED BACKUP LOAD PANEL, 240V, NEMA 3R, UL LISTED
ATTACHMENT	32	S-5! S-5-U CLAMP
ATTACHMENT	32	M8-1.25 SS HEX FLANGE BOLT (13MM SOCKET)
ATTACHMENT	64	3/8-24 SS ROUND POINT SETSCREW (3/16 HEX DRIVE)
ATTACHMENT	32	L-FOOT KIT
ATTACHMENT	38	SOLAR STACK PEDESTAL
RAILS	17	IRONRIDGE XR100 RAIL (168")
BONDED SPLICE	12	SPLICE KIT
CLAMPS	84	UNIVERSAL FASTENING OBJECT(UFO)
CLAMPS	24	STOPPER SLEEVES
GROUNDING LUG	6	GROUNDING LUG

A B C D E - MODULE STRINGING

(E) BACK OF RESIDENCE



(E) FRONT OF RESIDENCE

CECILIA WAY



1

ARRAY PLAN WITH STRING LAYOUT & BOM

PV-2A

SCALE: 1/32" = 1'-0"

LAKESHORE SOLAR

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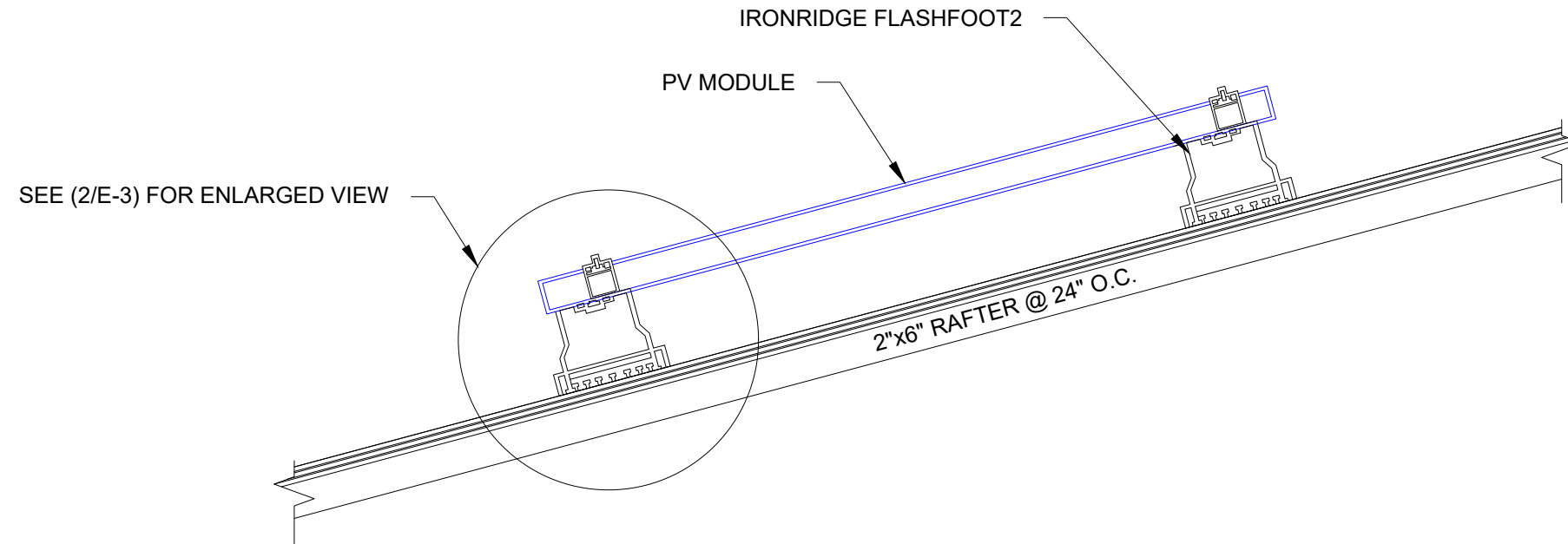
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STRING LAYOUT & BOM

SHEET SIZE

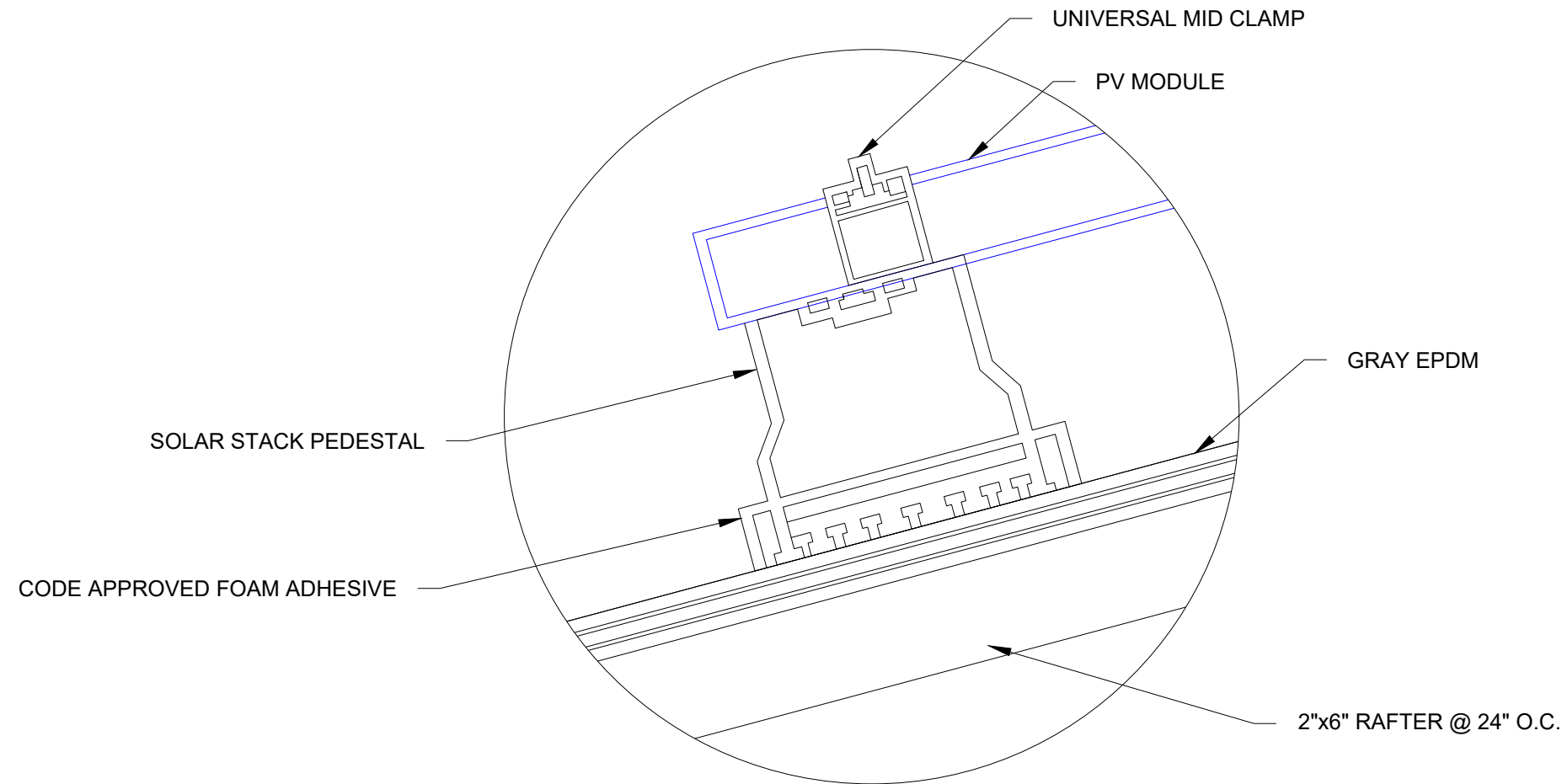
ANSI B
11" X 17"

SHEET NUMBER

PV-2A



1 | ATTACHMENT DETAILS
PV-3



2 | ENLARGED VIEW FOR ATTACHMENT DETAILS
PV-3 SCALE: NTS

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PV-3

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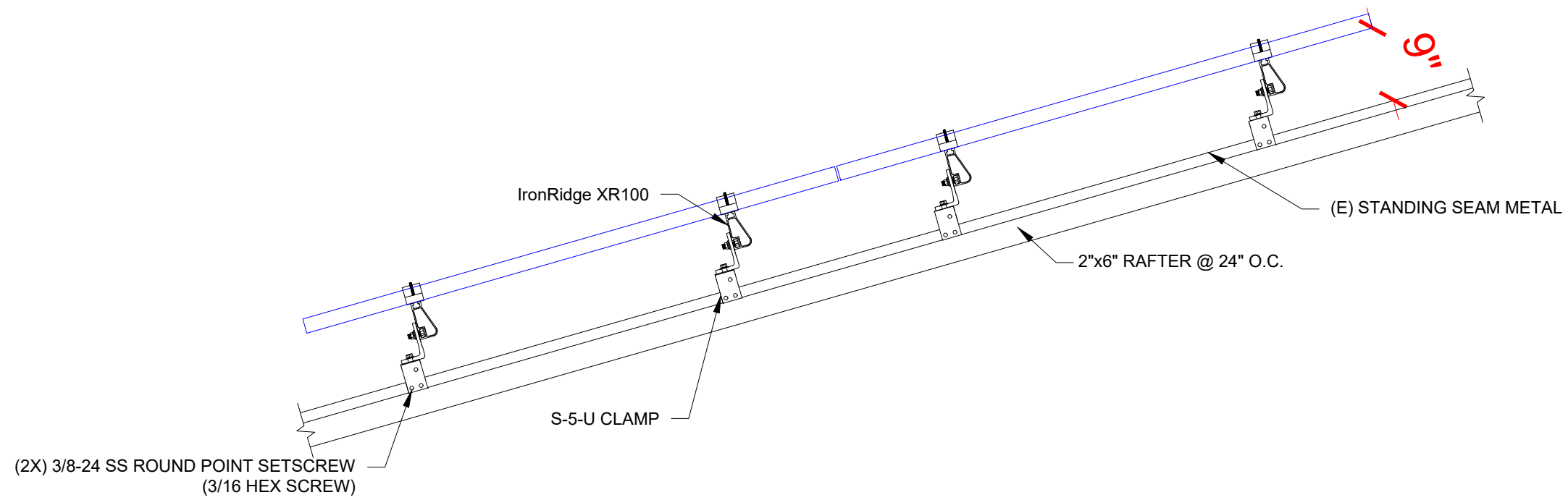
SHEET NAME
**ATTACHMENT
 DETAIL**

SHEET SIZE

**ANSI B
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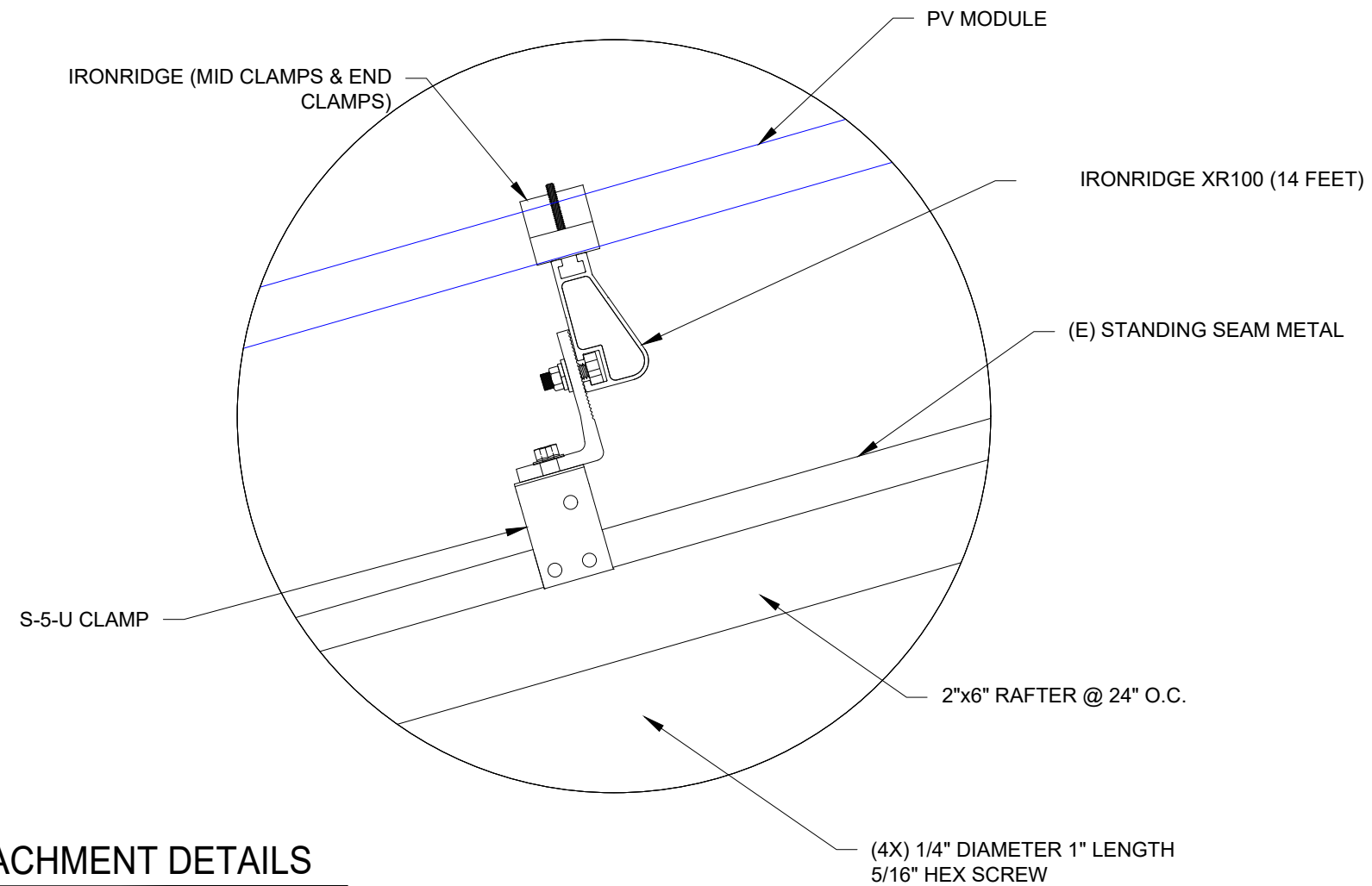
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PV-3A



1 ATTACHMENT DETAILS

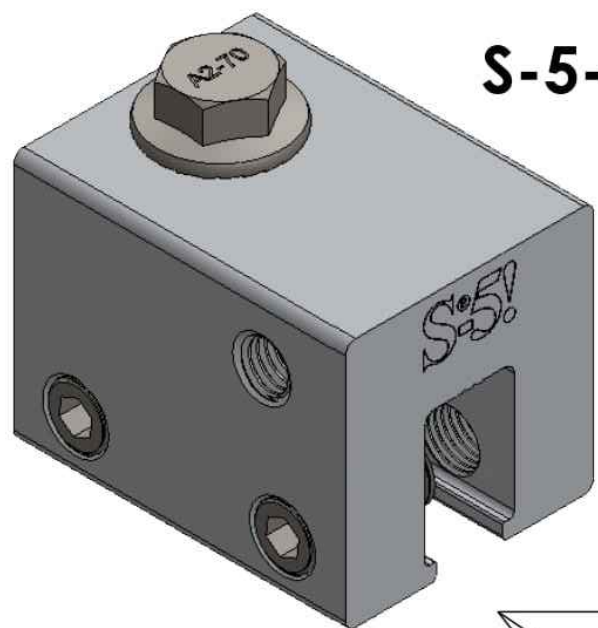
PV-3A



2 ENLARGED VIEW FOR ATTACHMENT DETAILS

PV-3A

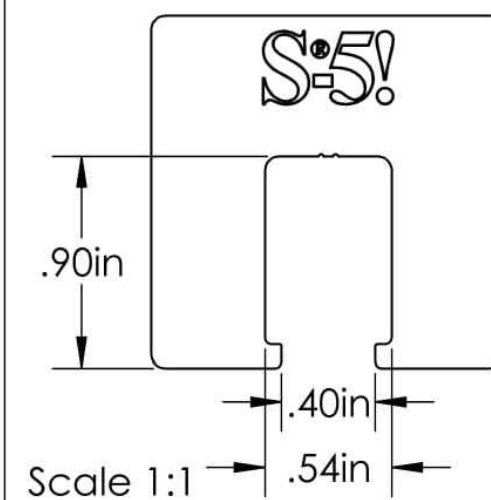
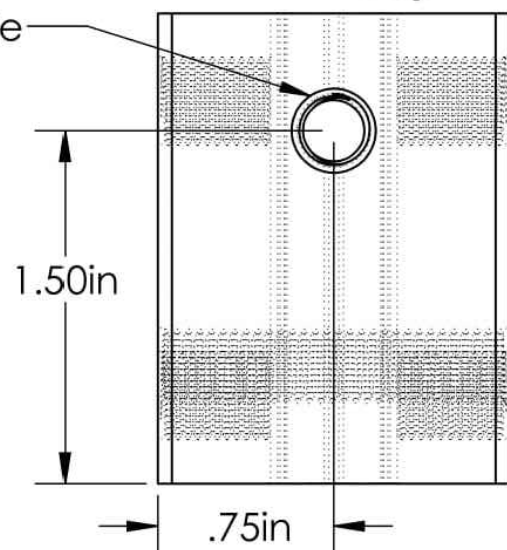
SCALE: NTS



S-5-U

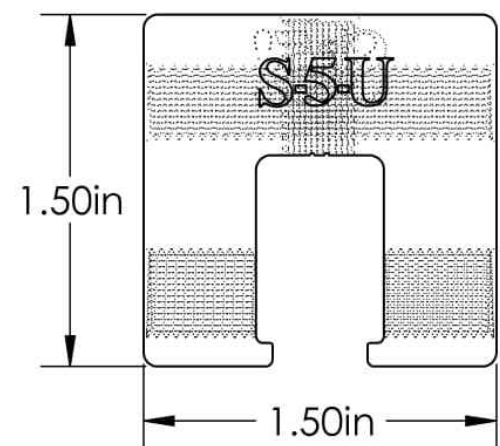
M8-1.25 Threaded Hole

Top



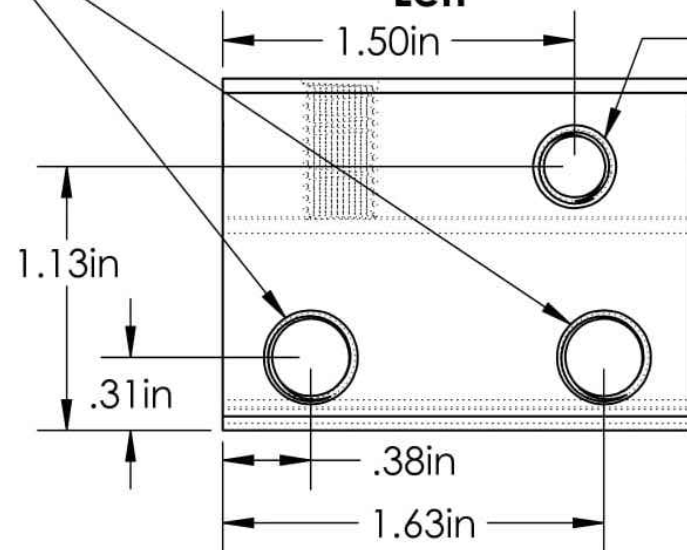
Scale 1:1

Back

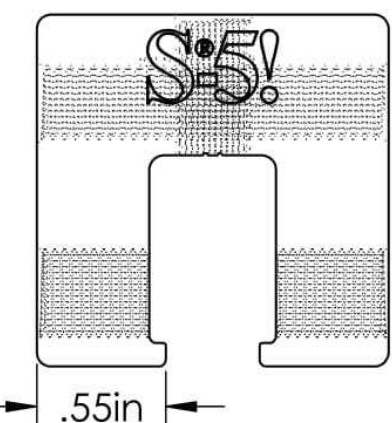


(2x) 3/8-24 Threaded Hole

Left



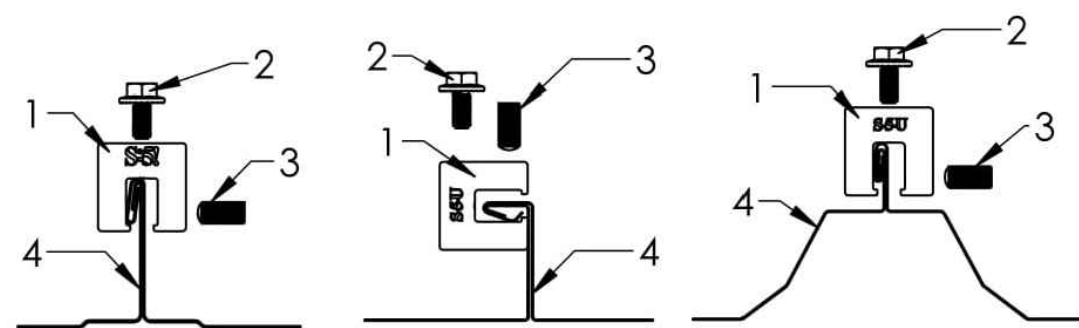
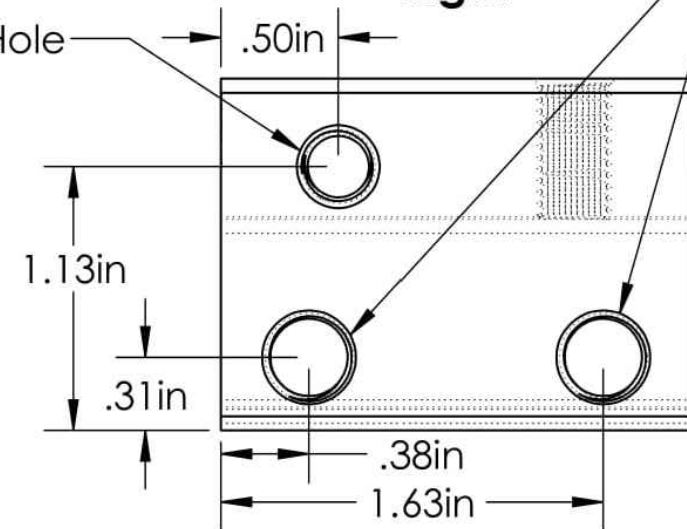
Front



M8-1.25 Threaded Through Hole

(2x) 3/8-24 Threaded Hole

Right



General Notes:

1. S-5-U Clamp
2. M8-1.25 SS Hex Flange Bolt (13mm Socket)
3. 3/8-24 SS Round Point Setscrew (3/16 Hex Drive)
4. Example roof

FOR STANDING SEAM SPECIFIC MECHANICAL LOAD TEST INFORMATION AND CLAMP INSTALLATION INFORMATION PLEASE VISIT: WWW.S-5.COM

MATERIAL: 6061 T6 Al	 The Right Way!	METAL ROOF INNOVATIONS, LTD. 8655 TABLE BUTTE RD COLORADO SPRINGS, CO 80908 719-495-0518 719-495-0045(FAX)	
EST ASSEMBLY WEIGHT: 0.373 lbs		TITLE S-5-U	DRAWING NO. U11-B-16-D
SUPPLIED HARDWARE: M8-1.25 x 16 mm HEX Bolt (2x) 3/8-24 x .800" Setscrews	SCALE: 1:1	EST. WEIGHT: Clamp: 0.304 lbs Setscrew: 0.0170 lbs Bolt: 0.0345 lbs	
<small>S-5!® PRODUCTS ARE PROTECTED BY MULTIPLE U.S. AND FOREIGN PATENTS. VISIT OUR WEBSITE AT WWW.S-5.COM FOR COMPLETE INFORMATION ON PATENTS AND TRADEMARKS.</small>			

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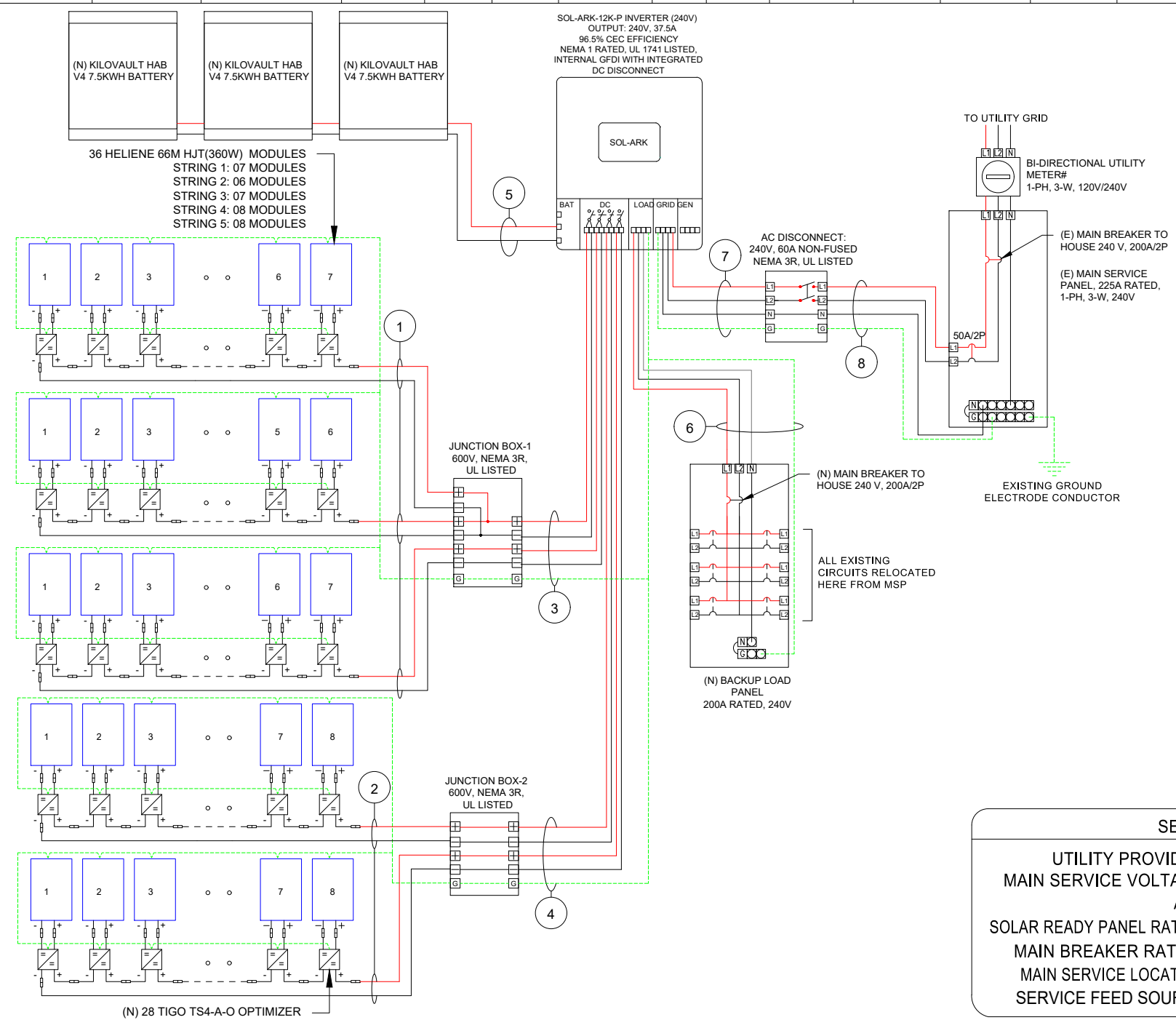
DATE: 03/10/2023

SHEET NAME
**ATTACHMENT
 DETAIL**

SHEET SIZE
**ANSI B
 11" X 17"**

SHEET NUMBER
PV-3B

ID	TYP.	INITIAL CONDUCTOR LOCATION	FINAL CONDUCTOR LOCATION	CONDUCTOR			CONDUIT	# OF PARALLEL CIRCUITS	CURRENT-CARRYING CONDUCTORS IN CONDUIT	CONDUIT FILL %	OCPD	EGC		TEMP. CORR. FACTOR		CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	LENGTH	VOLTAGE DROP
1	3	STRING	JUNCTION BOX-1	10 AWG	PV WIRE	COPPER	Open Air	1	2	N/A	N/A	N/A	N/A	0.82	(48°C)	N/A	12.0A	15.0A	40A	32.8	75°C	27FT	0.35%
2	2	STRING	JUNCTION BOX-2	10 AWG	PV WIRE	COPPER	Open Air	1	2	N/A	N/A	N/A	N/A	0.82	(48°C)	N/A	12.0A	15.0A	40A	32.8	75°C	32FT	0.42%
3	1	JUNCTION BOX-1	INVERTER	10 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	2	4	19.09%	N/A	6 AWG	THWN-2, COPPER	1.00	(26°C)	0.8	12.0A	15.0A	40A	32.0A	75°C	80FT	1.05%
4	1	JUNCTION BOX-2	INVERTER	10 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	2	4	19.09%	N/A	6 AWG	THWN-2, COPPER	1.00	(26°C)	0.8	12.0A	15.0A	40A	32.0A	75°C	82FT	1.08%
5	1	INVERTER	BATTERY	3/0 AWG	THWN-2	COPPER	MIN 2" Dia EMT	1	2	15.10%	N/A	8 AWG	THWN-2, COPPER	1.00	(26°C)	1	120.0A	150.0A	225A	225.0A	75°C	5FT	0.05%
6	1	BACKUP LOAD PANEL	INVERTER	3/0 AWG	THWN-2	COPPER	MIN 2" Dia EMT	1	3	22.65%	200A	6 AWG	THWN-2, COPPER	1.00	(26°C)	1	160.0A	200.0A	225A	225.0A	75°C	5FT	0.07%
7	1	INVERTER	NON FUSED AC DISCONNECT	8 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	1	3	26.73%	N/A	8 AWG	THWN-2, COPPER	1.00	(26°C)	1	37.5A	46.9A	55A	55.0A	75°C	5FT	0.13%
8	1	NON FUSED AC DISCONNECT	MSP	8 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	1	3	26.73%	50A	8 AWG	THWN-2, COPPER	1.00	(26°C)	1	37.5A	46.9A	55A	55.0A	75°C	5FT	0.13%



SERVICE INFO.

UTILITY PROVIDER: PACIFIC GAS AND ELECTRIC
 MAIN SERVICE VOLTAGE: 240V
 AHJ: TIBURON TOWN
 SOLAR READY PANEL RATING: 225A
 MAIN BREAKER RATING: 200A
 MAIN SERVICE LOCATION: WEST
 SERVICE FEED SOURCE: OVERHEAD

LAKESHORE SOLAR

SYSTEM INFO.

(36) HELIENE 66M HJT(360W)
(01) SOL-ARK-12K-P (240V)
DC SYSTEM SIZE: 12.96 KWDC
AC SYSTEM SIZE: 12.00 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

CARY WHITE
RESIDENCE
 283 CECILIA WAY
 BELVEDERE TIBURON, CA 94920
 PH.# : (415) 613-5589
 Email: carywhite@live.com

DATE: 03/10/2023

SHEET NAME
ELECTRICAL LINE & CALCS.

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL	HELIENE 66M HJT(360W) MODULE
VMP	40.45V
IMP	8.90A
VOC	48.62V
ISC	9.41A
TEMP. COEFF. VOC	-0.26%/°C
MODULE DIMENSION	71.18"(L) x 39.29"(W)
PANEL WATTAGE	360W

INVERTER SPECIFICATION	
MANUFACTURER / MODEL	SOL-ARK-12K-P (240V)
NOMINAL AC POWER	12000W
NOMINAL OUTPUT VOLTAGE	240VAC
CONTINUOUS OUTPUT CURRENT	37.5 A

OPTIMIZER SPECIFICATION	
MANUFACTURER / MODEL	TIGO TS4-A-O OPTIMIZER
MAXIMUM CURRENT	15A
MAXIMUM POWER	700W
NOMINAL OUTPUT CURRENT	16-80V

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	3°C
AMBIENT TEMP (HIGH TEMP 2%)	26°C
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	90°C
CONDUCTOR TEMPERATURE RATE	48°C
MODULE TEMPERATURE COEFFICIENT OF VOC	-0.26%/°C

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

LAKESHORE SOLAR

SYSTEM INFO.
(36)HELIENE 66M HJT(360W)
(01) SOL-ARK-12K-P (240V)
DC SYSTEM SIZE: 12.96 KWDC
AC SYSTEM SIZE: 12.00 KWAC

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PH.# : (415) 613-5589
Email: carywhite@live.com

DATE: 03/10/2023

SHEET NAME
**SPECIFICATIONS
CALC.**

SHEET SIZE
**ANSI B
11" X 17"**

SHEET NUMBER
PV-4A

1

! WARNING

ELECTRIC SHOCK HAZARD

TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
MAIN SERVICE PANEL/AC DISCONNECT/INVERTER/
AC COMBINER
2022 CEC 690.13(B)

2

WARNING PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
DC CONDUIT
EVERY 10' AND ON CONDUIT BODIES WHEN
EXPOSED
2022 CEC 690.31(G)(D)(3)

3

PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT 37.5A
NOMINAL OPERATING AC VOLTAGE 240 VAC

LABEL LOCATION:
MAIN SERVICE PANEL
2022 CEC 690.13(B)

4

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:
INVERTER
AT OR WITHIN 3' OF THE DC COMBINER
SWITCH
2022 CEC 690.56(C)(3)

5

! CAUTION

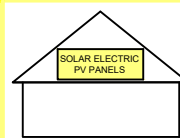
DUAL POWER SOURCE
SECOND SOURCE US PHOTOVOLTAIC

LABEL LOCATION:
MAIN SERVICE PANEL/AC DISCONNECT/AC COMBINER/
REVENUE METER
2022 CEC 705.12(B)(3)

6

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



LABEL LOCATION:
MAIN SERVICE PANEL
IF MSD IS OUTSIDE PLACE IT THERE / IF
MSD IS INSIDE PLACE ON THE AC DISCONNECT
2022 CEC 690.56(C)(1)(a)

ADHESIVE FASTENED SIGNS:
• ANSI Z535.4-2011 PRODUCT SAFETY SIGNS AND LABELS, PROVIDES GUIDELINES FOR SUITABLE FONT SIZES, WORDS, COLORS, SYMBOLS, AND LOCATION REQUIREMENTS FOR LABELS. CEC 110.21(B)(1)
• THE LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED. CEC 110.21(B)(3)
• ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT.

7

PHOTOVOLTAIC SYSTEM UTILITY DISCONNECT SWITCH

LABEL LOCATION:
AC DISCONNECT
2022 CEC 690.56(C)(3)

8

PV SOLAR BREAKER

DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
POINT-OF-INTERCONNECTION OR AT MAIN
SERVICE DISCONNECT (MSP)
PER CODE: 2022 CEC 705.12(B)(3)(2)

9

SERVICE DISCONNECT

SECTIONNEUR PRINCIPALE

SERVICIO DE DESCONEXION

LABEL LOCATION:
AC DISCONNECT
2022 CEC 230.66

10

BATTERY DISCONNECT

DO NOT RELOCATE THIS OVERCURRENT DEVICE

REQ'D BY: CEC 705.12(B)(2)(3)(b)
LABEL LOCATION:
BATTERY BREAKERS

11

WARNING ARC FLASH & SHOCK HAZARD

NOMINAL ESS VOLTAGE: 240V
MAX SHORT-CIRCUIT CURRENT: 37.5A
ASSOCIATED CLEARING TIME: 60ms
DATE CALCULATION WAS PERFORMED: 03/10/2023

LABEL LOCATION:
POWERWALL BREAKER

12

WARNING

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

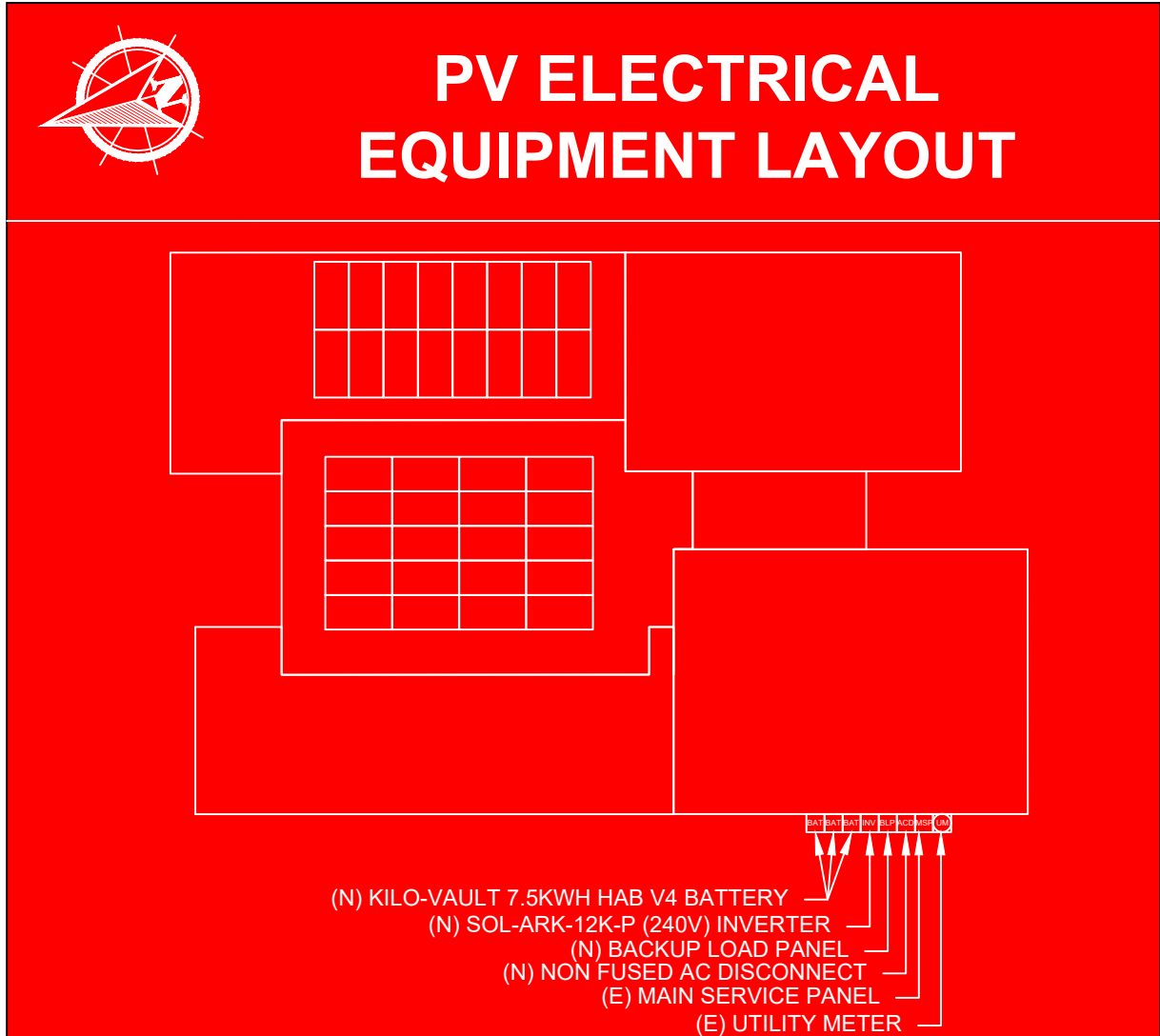
REQ'D BY: CEC 705.12(B)(2)(3)(c)

13

CAUTION-QUAD POWER SOURCE

FIRST SOURCE IS UTILITY ELECTRICAL GRID
SECOND SOURCE IS AC BATTERY
THIRD SOURCE IS PV INVERTER
FOURTH SOURCE IS GENERATOR

REQ'D BY: CEC 705.10
LABEL LOCATION:
SUB PANEL OR BACKUP LOADS PANEL, BATTERY, INVERTER OUTPUT
PANEL, MAIN SERVICE PANEL, METER/MAIN, AND PV AC DISCONNECT



LAKESHORE SOLAR

SYSTEM INFO.

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(01) SOL-ARK-12K-P (240V)
DC SYSTEM SIZE: 12.96 KWDC
AC SYSTEM SIZE: 12.00 KWAC

REVISIONS

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Email: carywhite@live.com

DATE: 03/10/2023

SHEET NAME
SIGNAGE

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-5



66M HJT All Black Module

66 Cell M2+ Heterojunction 360W - 370W

20.5%

Super high efficiency advanced HJT cells with Smartwire technology using 18 round microwires in place of traditional flat busbars. The round shape of the microwire creates light trapping effect which reduces shading by 25%.

Stability & Looks

HJT cells, based on N-type silicon result in extremely low LID & PID, reducing annual degradation and guaranteeing more power.

Anti-Reflective

Premium solar glass with anti reflective coating delivers more energy throughout the day while the HJT cells excel in low light and high temperature conditions.

High Reliability

HJT cell combines the advantages of N-type crystalline silicon with the excellent absorption and passivation of amorphous silicon.



Manufactured Using International Quality System Standards: ISO9001

World-class Quality

- Heliene's fully automated manufacturing facilities with state-of-the-art robotics and computer aided inspection systems ensure the highest level of product quality and consistency
- All manufacturing locations are compliant with international quality standards and are ISO 9001 certified
- Heliene modules have received Top Performer rankings in several categories from PV Evolution Labs (PV EL) independent quality evaluations

Local Sales, Service, and Support

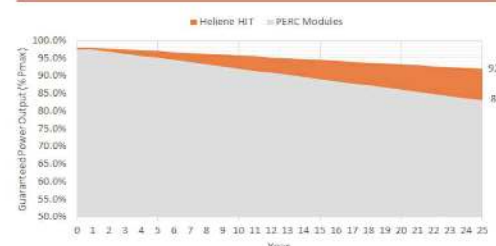
- With sales offices across the U.S. and Canada, Heliene prides itself on unsurpassed customer support for our clients. Heliene has become the brand of choice for many of the leading residential installers, developers and Independent Power Producers due to our innovative technology, product customization capability and just in time last-mile logistics support
- Local sales and customer support means answered phone calls and immediate answers to your technical and logistics questions. We understand your project schedules often change with little warning and endeavor to work with you to solve your project management challenges

Bankable Reputation

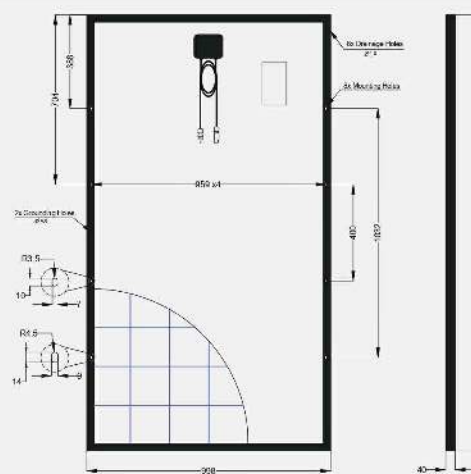
- Established in 2010, Heliene is recognized as highly bankable Tier 1 manufacturer of solar modules and has been approved for use by the U.S. Department of Defense, U.S. Army Corps of Engineers and from numerous top tier utility scale project debt providers
- By investing heavily in research and development, Heliene has been able to stay on the cutting edge of advances in module technology and manufacturing efficiency

No Compromise Guarantee

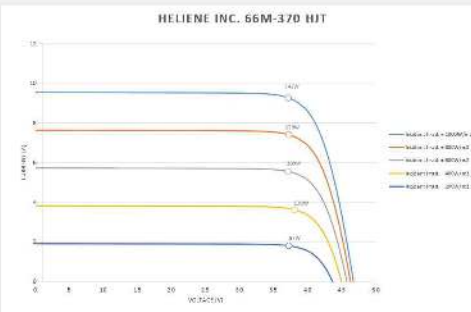
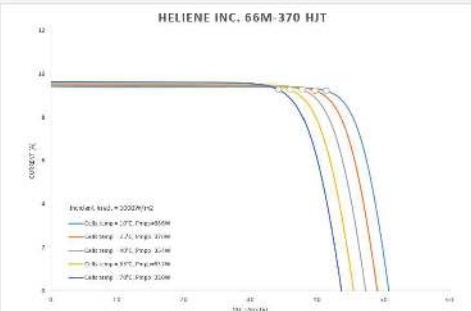
25 Year Product Warranty
25 Year Linear Performance Guarantee



Dimensions for 66M HJT All Black Series Modules



I-V Curves for 66M HJT All Black Series Modules



Certifications



HSPE_66M_M2+_HJT_REV.07.pdf
August 16th, 2022

Electrical Data (STC)

Parameter	Unit	370	365	360
Peak Rated Power	P_{mpp} (W)	370	365	360
Maximum Power Voltage	V_{mpp} (V)	41.20	40.80	40.45
Maximum Power Current	I_{mpp} (A)	8.98	8.95	8.90
Open Circuit Voltage	V_{oc} (V)	49.02	48.82	48.62
Short Circuit Current	I_{sc} (A)	9.48	9.45	9.41
Module Efficiency *	Eff (%)	20.5	20.2	20.0
Maximum Series Fuse Rating	MF (A)	15	15	15
Power Output Tolerance		[-0/+3 %]		

STC - Standard Test Conditions: Irradiation 1000 W/m² - Air mass AM 1.5 - Cell temperature 25°C
* Calculated using maximum power based on full positive output tolerance [-0/+3%]

Electrical Data (NMOT)

Parameter	Unit	275	270	265
Maximum Power - Pmax (Wp)	P_{mpp} (W)	275	270	265
Maximum Power Voltage - Vmpp (V)	V_{map} (V)	38.28	37.73	37.22
Maximum Power Current - Impp (A)	I_{mpp} (A)	7.18	7.16	7.12
Open Circuit Voltage - Voc (V)	V_{oc} (V)	46.25	46.06	45.87
Short Circuit Current - Isc (A)	I_{sc} (A)	7.63	7.60	7.57

NMOT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind speed 1m/s

Mechanical Data

Solar Cells	66 Heterojunction N-type cells (157.35 x 157.35mm)
Module Construction	Framed Glass-Backsheet
Dimensions (L x W x D)	1808 x 998 x 40mm (71.18 x 39.29 x 1.6 inch)
Weight	20.4 kg (44.9lbs)
Frame	Double Webbed 15-Micron Anodized Aluminum Alloy
Glass	3.2mm Low-Iron Content, High-Transmission, PV Solar Glass with Anti Reflective Coating
Junction Box	IP68 Rated Junction Box with 3 Bypass Diodes
Output Cables	1.2-meter (47.24-inch) Symmetrical Cables
Connectors	Multi-Contact (Staubli) MC4

Certifications

UL Certification: UL61215, UL61730

Temperature Ratings

Nominal Operating Cell Temperature (NOCT)	+42°C (±2°C)
Temperature Coefficient of P_{max}	-0.294%/°C
Temperature Coefficient of V_{oc}	-0.257%/°C
Temperature Coefficient of I_{sc}	0.0374%/°C

Maximum Ratings

Operational Temperature	-40°C - +85°C
Max System Voltage	600V (1000V Optional)
Mech. Load Test (Front)	113 psf / 5400 Pa
Mech. Load Test (Back)	50 psf / 2400 Pa
Fire Rating	Type 2 (Type 1 Optional)

Warranty

25 Year Product Warranty	
25 Year Linear Power Guarantee	

Packaging Configuration

Modules per box:	26 pieces
Modules per 53' trailer:	780 pieces

The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the ongoing innovation and product enhancements. Heliene Inc. reserves the right to make necessary adjustment to the information described herein at any time without prior notice. PV modules should be handled and installed only by qualified people. Please carefully read safety and installation instructions available for download from Heliene website before using Heliene PV modules. For warranty details, please refer to Product Warranty Document, also available for download from Heliene website.

LAKESHORE SOLAR

SYSTEM INFO.

(36)HELIENE 66M HJT(360W)
(01) SOL-ARK-12K-P (240V)
DC SYSTEM SIZE: 12.96 KWDC
AC SYSTEM SIZE: 12.00 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

CARY WHITE
RESIDENCE
283 CECILIA WAY
BELVEDERE TIBURON, CA 94920
PH.# : (415) 613-5589
Email: carywhite@live.com

DATE: 03/10/2023

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-6



Sol-Ark 12K-P Spec Sheet



Solar Input Power 12000W	
Max Allowed PV Power	6500W + 6500W = 13000W
Max PV Power Delivered to Battery & AC Outputs	12000W
Max DC Voltage (Voc)	500V @ 18A, 450V @ 20A
MPPT Voltage Range	150-425V
Starting Voltage	125V
Number of MPPT	2
Max Solar Strings Per MPPT	2
Max DC Current per MPPT (Self Limiting)	20A
Max AC Coupled Input (Micro/String Inverters)	9600W

AC Output Power 9kW On-Grid & Off-Grid	
Connections	120/240/208V Split Phase
Continuous AC Power to Grid (On-Grid)	9000W 37.5A-L (240V)
Continuous AC Power to Load (Off-Grid)	9000W 37.5A-L (240V)
Surge AC Power 10sec	16,000VA L-L (240V)
Surge AC Power 100ms	25,000VA L-L(240V)
Parallel Stacking	Yes
Frequency	60/50Hz
Continuous AC Power with Grid or Generator	15120W 63A L-L (240V)
CEC Efficiency	96.5% (Peak 97.5%)
Idle Consumption Typical—No Load	60W
Sell Back Power Modes	Limited to Household/Fully Grid-Tied
Design (DC to AC)	Transformerless DC
Response Time (Grid-Tied to Off-Grid)	4ms
Power Factor	+/- 0.9 - 1.0

Battery (optional) Output Power 9000W	
Type	Lead-Acid or Li-Ion
Nominal DC Input	48V
Capacity	50 — 9900Ah
Voltage Range	43.0 — 63.0V
Continuous Battery Charging Output	185A
Charging Curve	3-Stage w/ Equalization
Grid to Batt Charging Efficiency	96.0%
External Temperature Sensor	Included
Current Shunt for Accurate % SOC	Integrated
External Gen Start Based on Voltage or %SOC	Integrated
Communication to Lithium Battery	CanBus & RS485

General	
Dimensions (H x W x D)	30.0" x 18.3" x 10.0"
Weight	78 lbs
Enclosure	NEMA 3R
Ambient Temperature	-25-55°C, >45°C Derating
Installation Style	Wall-Mounted
Wi-Fi & LAN Communication	Included
Standard Warranty (verified by HALT Testing)	10 Years

Protections & Certifications	
Electronics Certified Safety by SGS Labs to NEC & UL Specs - NEC 690.4B & NEC 705.4/6	Yes
Grid Sell Back — UL1741-2010/2018, IEE-E1547a-2003/2014, FCC 15 Class B, UL1741SA,	Yes
PV DC Disconnect Switch — NEC 240.15	Integrated
Ground Fault Detection — NEC 690.5	Integrated
PV Rapid Shutdown Control — NEC 690.12	Integrated
PV Arc Fault Detection — NEC 690.11	Integrated
PV Input Lightning Protection	Integrated
PV String Input Reverse Polarity Protection	Integrated
AC Output Breakers - 63A	Integrated
250A Battery Breaker / Disconnect	Integrated
Surge Protection	DC Type II / AC Type II

LAKESHORE SOLAR

SYSTEM INFO.		
(36) HELIENE 66M HJT(360W)		
(01) SOL-ARK-12K-P (240V)		
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DATE: 03/10/2023

SHEET NAME
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SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-7



TS4-A-O

PV Module Advanced Add-On

The TS4-A-O (Optimization) is the advanced add-on optimization solution that brings smart module functionality to standard PV modules for higher reliability. Improve energy efficiency by upgrading underperforming PV systems or adding smart features to new installations.

The TS4-A-O with UHD-Core technology and expanded specifications supports PV modules up to 500W.

Included Features



Module-level **optimization** for increased energy yield and greater design flexibility



Manual or automatic module-level **shutdown**



Module-level **monitoring** for energy production tracking and system management

Easy Installation

Snap to standard module frame or remove brackets for rack mounting

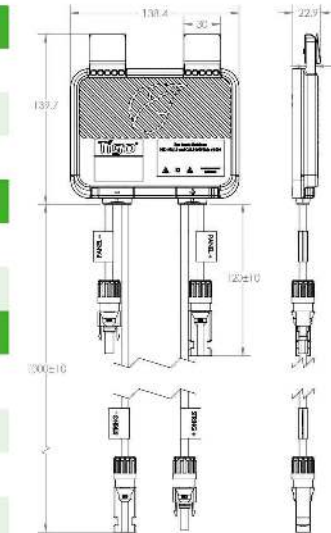
Smart Commissioning

Configure and commission with your Android or iOS mobile device



TS4-A-O SPECIFICATIONS

Environmental	
Operating Temperature Range	-40°C to +85°C (-40°F to +185°F)
Outdoor Rating	IP68
Maximum Elevation	2000m
Mechanical	
Dimensions	138.4mm x 139.7mm x 22.9mm
Weight	520g
Electrical	
Total Max Input Voltage (V _{oc} @ Lowest Temperature)	90V
Voltage Range	16 - 90V
Maximum Current	12A
Maximum Power	500W
Output Cable Length	1.2m (standard)
Connectors	MC4 (standard)
Communication Type	Wireless
Recommended Fuse Rating	15A



TAP required for module-level shutdown and CCA required for monitoring with TS4-A-O.

ORDERING INFORMATION

Standard	
451-00252-32	1500V UL / 1000V TÜV, 1.2m cable, MC4
Options	
451-00257-12	1000V UL / TÜV, 1.2m cable, MC4 comparable
451-00252-32	1500V UL / 1000V TÜV, 1.2m cable, MC4
451-00261-32	1500V UL / TÜV, 1.2m cable, EVO2

For sales info:
sales@tigoenergy.com

For product info:
 Visit tigoenergy.com/products

For technical info:
 Visit support.tigoenergy.com

For additional info and product selection assistance, use Tigo's online design tool at tigoenergy.com/design



SYSTEM INFO.

(36) HELIENE 66M HJT(360W)

(01) SOL-ARK-12K-P (240V)

DC SYSTEM SIZE: 12.96 KWDC

AC SYSTEM SIZE: 12.00 KWAC

REVISIONS

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DATE: 03/10/2023

SHEET NAME
 EQUIPMENT
 SPECIFICATION

SHEET SIZE

ANSI B
 11" X 17"

SHEET NUMBER

PV-8



KiloVault® HAB™ V4

7.5kWh Lithium Wall-Mount Energy Storage System



KiloVault® HAB™ V4 Lithium Wall-Mount Energy Storage System

Revolutionary, Expandable, Safe, Deep Cycle Solar Batteries

KiloVault® HAB™ V4 Wall Mount Energy Storage System is now ETL Certified to UL Standard 1973. Additional enhancements for the HAB V4 allow this new version to be compatible with prior versions. Also, the communication ports include a universal connector, allowing for setup to be even more convenient.

Electrical Specifications

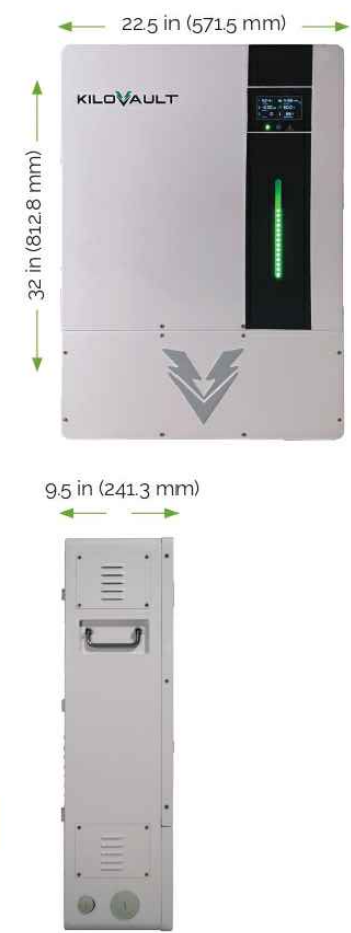
ITEM	SPECS
Model	HAB™ 7.5
Battery Type	LFP
Maximum Continuous Charge Current	50 A*
Maximum Continuous Discharge Current	60 A*
Maximum Continuous Discharge Power	7.2 kW
Minimum Discharge Voltage	48.0 V
Nominal Energy	7.5 kWh
Usable Energy	7.0 kWh
Nominal Capacity	150 Ah
Nominal Voltage	51.2 VDC
Peak Discharge Current	(3s) 500 A
Peak Discharge Power	(3s) 25 kW
Standard Charge Voltage	56.0 V
Weight	Over 207 lb (94 kg)
WiFi	802.11 b/g/n
Intra-Battery Network	CAN bus
Modbus	via RJ45 Connector
Compliance Certifications:	Certified ETL to UL Standard 1973; UL1642; UN38.3; IEC62619; OSHA 18001/ISO45001; ISO 9001/1400
Warranty	10 Year Limited Warranty*

*Manufacturer Operating Parameters by Charging Profile

	10 Year Extended Life Warranty	7.5 Year Extended Charge Rate Warranty
Discharge Rate	60 A	150 A
Charge Rate	50 A	120 A
Cycle Life	6000 Cycles (80% DoD)	4000 Cycles (80% DoD)

Physical Specifications

ITEM	SPECS
Weight	230 lb (105 kg)
Height	32 in (812.8 mm)
Width	22.5 in (571.5 mm)
Depth	9.5 in (241.3 mm)
Hanging Bracket	0.51 in (13 mm)
Ingress Rating	IP54 with vented plates IP55 with solid plates



Environmental Specifications

ITEM	SPECS
Working Environment	Indoors or outdoors, away from direct exposure to rain or sun
Operating Temperature	32° to 113° F (0° to 45° C)
Recommended Operating Temp	77° (F25° C)
Storage Temperature	-4 to 110° F (-20° C to 45° C)
Maximum Altitude	Under 9843 feet (3000 m)

Integrated WiFi for Management

Built-in WiFi allows connection to a local device or the HAB IT cloud performance monitoring network.

NEW!

Certified ETL to UL Standard 1973

A safety standard for batteries in an energy storage system. Now, systems can be approved and installed more quickly, in applications and projects that require it.

Integrated Inverter Communication Support

Built-in Modbus provides digital communications with advanced inverters from Schneider and others.

NEW!

Compatible with V2 and V3

Battery Management System (BMS) firmware and hardware have been updated to allow earlier versions and the V4 to be used together, if expansion is needed.

Increased Ventilation

Improved performance in warm climates, prolonging the life of the cells, and the life of the battery. Solid plates to swap in the vents for weather resistance.

LED/LCD

Intelligent LED & LCD Display

Easily view state of charge with the LED bar and access detailed performance and operating data on the built-in LCD display.

Larger Wiring Access Panel

More space for making connections. Entry available from left, right and bottom - giving greater flexibility and easier serviceability.

Expandable To 3.3 MWh/Month

Parallel up to 14 HABs to provide 3.3 Megawatt hours of storage per month.

LAKESHORE SOLAR

SYSTEM INFO.		
(36) HELIENE 66M HJT(360W)		
(01) SOL-ARK-12K-P (240V)		
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AC SYSTEM SIZE: 12.00 KWAC		

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283 CECILIA WAY
BELVEDERE TIBURON, CA 94920
PH.# : (415) 613-5589
Email: carywhite@live.com

DATE: 03/10/2023

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
**ANSI B
11" X 17"**

SHEET NUMBER
PV-9

KLV-DS-HABV4UL-102021



S-5![®]

The Right Way![®]

S-5-U Clamp

The S-5-U clamp is by far our most popular and most versatile clamp. It fits about 85% of the standing seam profiles manufactured in North America—including most structural and architectural profiles. It can be used on vertically oriented seams and, by rotating the clamp 90 degrees, it can also be used on most horizontal 2" seam profiles.

Its simple design, generous dimensioning, and multiple hole orientations are what make the S-5-U clamp so versatile for use with the S-5![®] snow retention products, such as ColorGard[®], as well as with other heavy-duty applications.

Installation is as simple as setting the specially patented round-point setscrews into the clamp, placing the clamp on the seam, and tightening them to the specified tension. Then, affix ancillary items using the bolt provided with the product. Go to www.S-5.com/tools for information and tools available for properly attaching and tensioning S-5! clamps.

S-5-U Mini Clamp

The S-5-U Mini is a bit shorter than the S-5-U and has one setscrew rather than two. The mini is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!^{*}

*S-5! mini clamps are not compatible with, and should not be used with S-5! SnoRail™/SnoFence™ or ColorGard® snow retention systems.



The S-5-U clamp is our most popular and versatile clamp, fitting about 85% of the standing seam profiles in North America.

S-5-U and S-5-U Mini

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

S-5![®]

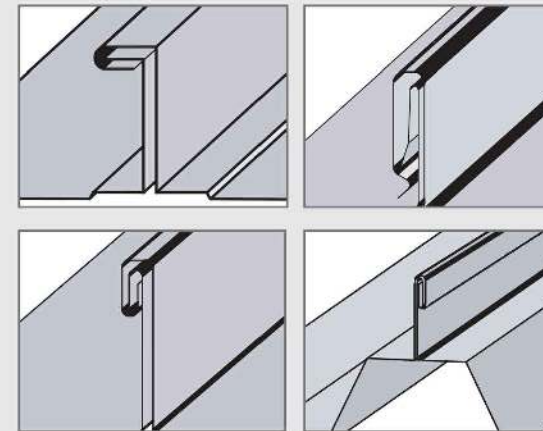
The Right Way![®]

The strength of the S-5-U clamp is in its simple design. The patented setscrews will slightly dimple the metal seam material but not pierce it—leaving the roof manufacturer's warranty intact.

The S-5-U and S-5-U Mini clamps are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-U is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit www.S-5.com for more information including CAD details, metallurgical compatibilities and specifications.

The S-5-U clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5![®] holding strength is unmatched in the industry.

Example Profiles



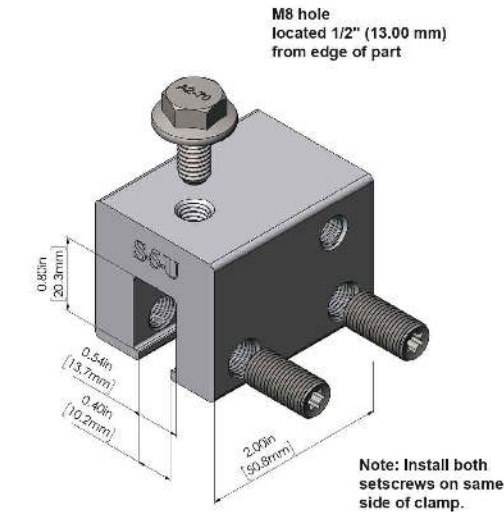
For horizontal seams under 0.65", do not use this clamp. Visit www.S-5.com for more detailed information and proper clamp usage.

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

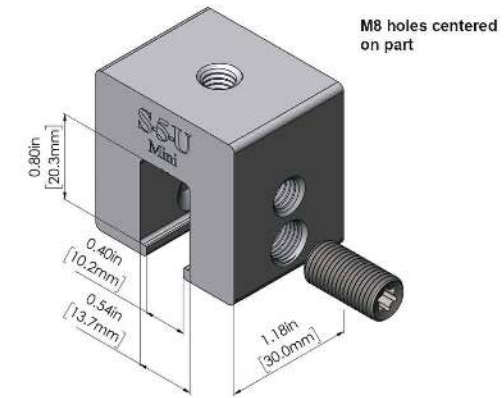
Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. For maximum holding strength, setscrews should be tensioned and re-tensioned as the seam material compresses. Clamp setscrew tension should be verified using a calibrated torque wrench between 160 and 180 inch pounds when used on 22ga steel, and between 130 and 150 inch pounds for all other metals and thinner gauges of steel. Consult the S-5! website at www.S-5.com for published data regarding holding strength.

Copyright 2021, Metal Roof Innovations, Ltd. S-5! products are patent protected. S-5! aggressively protects its patents, trademarks, and copyrights. Version 081721.

S-5-U Clamp



S-5-U Mini Clamp



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

Distributed by

LAKESHORE SOLAR

SYSTEM INFO.

(36) HELIENE 66M HJT(360W)

(01) SOL-ARK-12K-P (240V)

DC SYSTEM SIZE: 12.96 KWDC

AC SYSTEM SIZE: 12.00 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

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PV-10

OVERVIEW

Evolving from the Double Down mounting system, Solar Stack is a unique, innovative pedestal that mounts solar panels to roofs with a code-approved adhesive.

BENEFITS

Zero Roof Penetration

Solar Stack is the only solar panel mounting system that promises ZERO roof penetrations. Its innovative, rackless technology allows solar components to stay affixed to the roof through severe weather and all seasons without a single hole being drilled.

Ease of Installation

Installation is a snap! Solar Stack cuts solar panel installation time in half and saves money. You'll never have to install anchors or locate structural connection points. Additionally, Solar Stack eliminates crawling into hot—or cold—attic spaces for to install solar panels.

No Holes | No Leaks

Since Solar Stack maintains the structural integrity of the roof, there's no extra steps needed to prevent water intrusion associated with roof penetration. Property owners receive total peace of mind and their roof warranties remain intact.

Durability and Reliability

Solar Stack meets or exceeds the most stringent wind code requirements, having undergone rigorous testing by accredited facilities and earning certification from the state of Florida for use in High-Velocity Hurricane Zones.

Keep the Roof Intact with Solar Stack.



SOLAR STACK
BY UNIRAC

Don't rack it. Stack it.

PATENTED
All Rights Reserved

US PATENT No 8,104,231
US PATENT No 8,615,954
US PATENT No 9,315,999

505-242-6411
www.solarstack.com

ZERO PENETRATION
MOUNTING TECHNOLOGY

LAKESHORE SOLAR

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USE

The Solar Stack mounting system is both durable and versatile—it can be used with any style of solar panel for any kind of roof. As the only mounting system of its kind to earn Florida Product Approval for use in High-Velocity Hurricane Zones, homeowners and business owners have one less thing to worry about when a serious storm threatens.

INSTALLATION

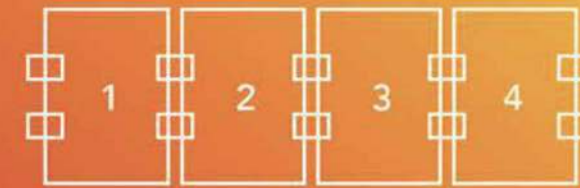
It really is as easy as 1-2-3!

1. Apply code-approved adhesive to roof underlayment after preparing surface*
2. Set and position Solar Stack pedestal into adhesive
3. Connect solar panel equipment to Solar Stack

**All roof surfaces must be free of any debris, dirt, grease, oil, and standing water before adhesive is applied. Follow adhesive manufacturer's application instructions.*



STACKING IS SIMPLE



One panel shares four Solar Stack pedestals.
Two Solar Stack pedestals per panel .
(4 x 0.5 = 2)

*Note: Panels on end only share two
Solar Stack = three pedestals per end panel*



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PV-12



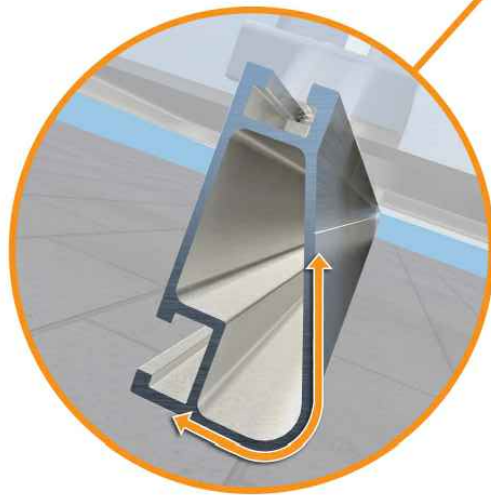
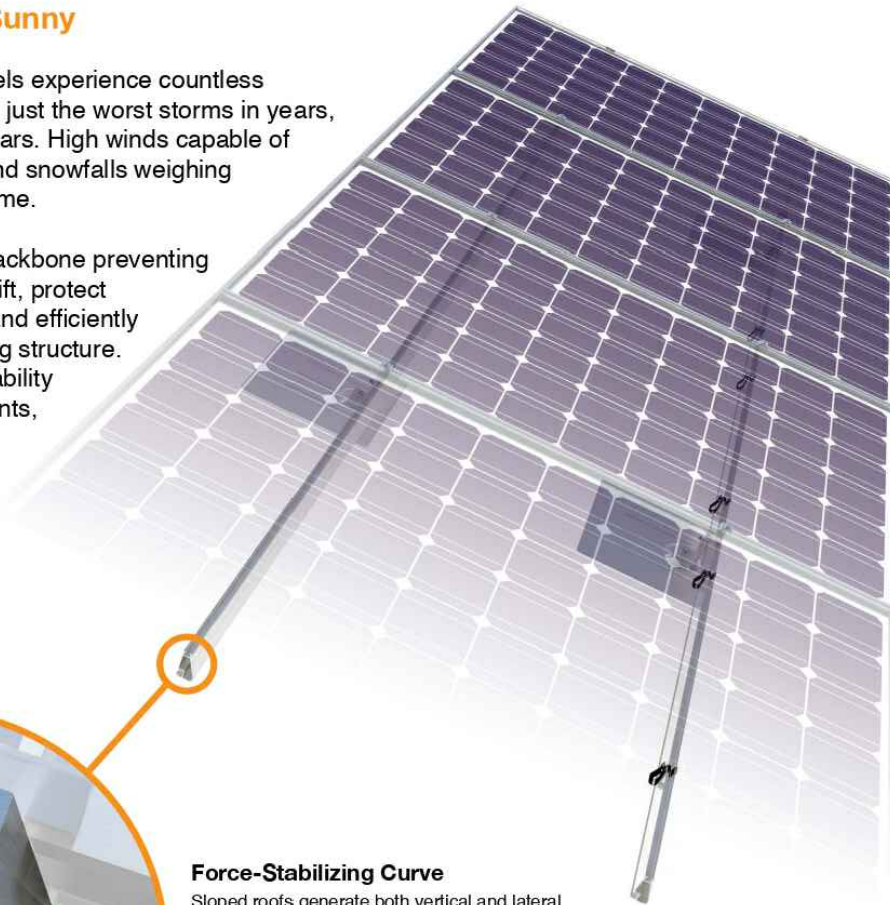
XR Rail Family

Tech Brief

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs



XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.

Tech Brief



XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100						
	120						
	140	XR10		XR100		XR1000	
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						

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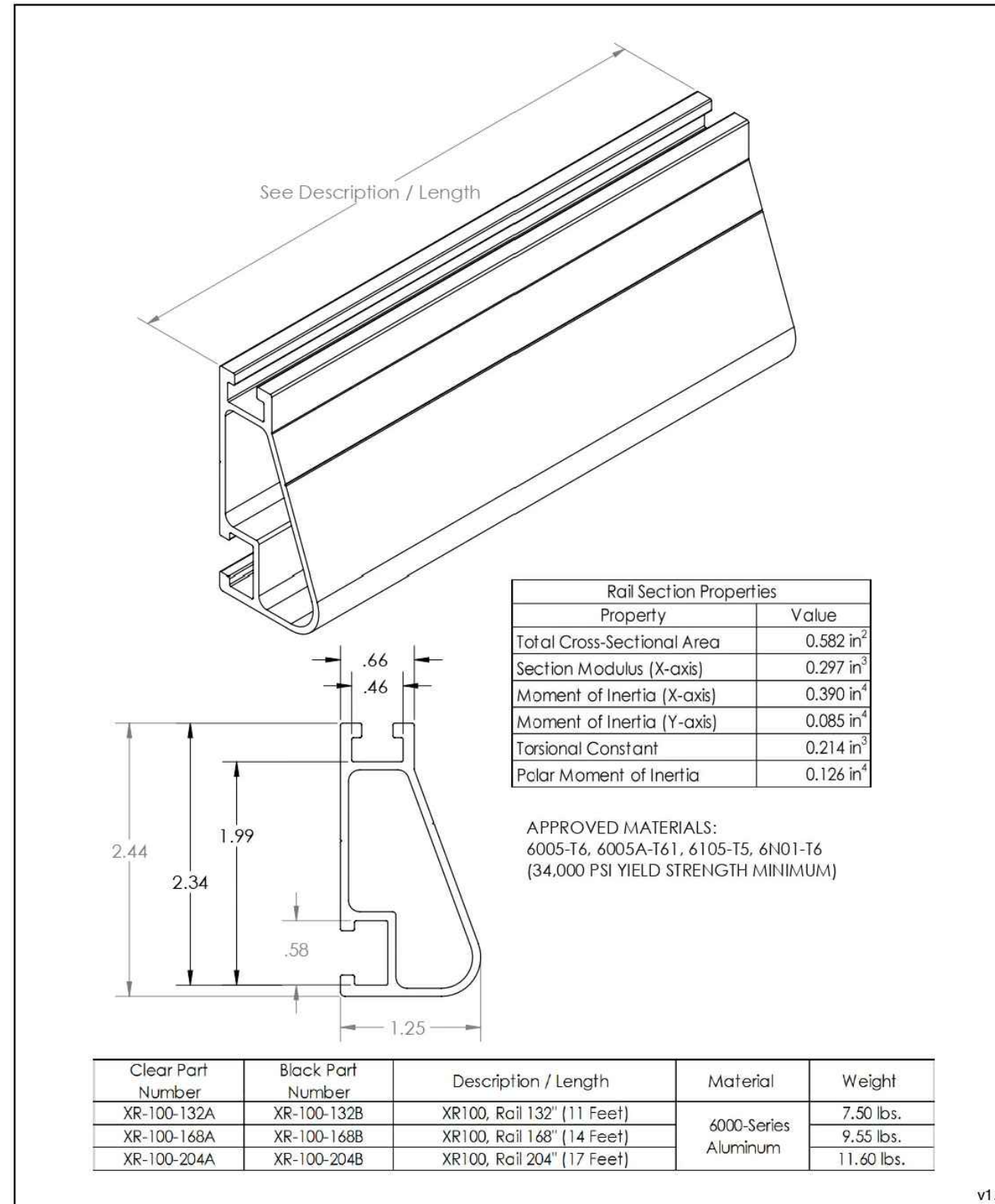
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XR100 Rail



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