

August 4, 2025

SunDay Solar
1139 River Road,
Charlottesville, VA 22901

Re: Engineering Services
Virginia Asphalt
1536 Avon Street EXT, Charlottesville, VA
8.260 kW System

To Whom It May Concern:

We have received information regarding solar panel installation on the roof of the above referenced structure. Our evaluation of the structure is to verify the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar system.

A. Site Assessment Information

1. Site visit documentation identifying attic information including size and spacing of framing for the existing roof structure.
2. Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information will be utilized for approval and construction of the proposed system.

B. Description of Structure:

Roof Framing: Prefabricated wood trusses at 24" on center. All truss members are constructed of 2x4 dimensional lumber.
Roof Material: Metal roofing
Roof Slopes: 34 degrees
Attic Access: Accessible
Foundation: Permanent

C. Loading Criteria Used

- **Dead Load**
 - Existing Roofing and framing = 7 psf
 - New Solar Panels and Racking = 3 psf
 - TOTAL = 10 PSF
- **Live Load** = 20 psf (reducible) – 0 psf at locations of solar panels
- **Ground Snow Load** = 30 psf
- **Wind Load** based on ASCE 7-22
 - Ultimate Wind Speed = 110 mph (based on Risk Category II)
 - Exposure Category C

Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the 2021 Virginia Construction Code. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.

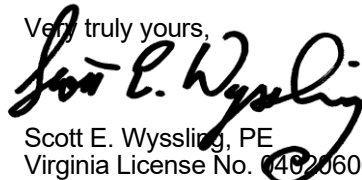
D. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent "S-5 Installation Manual". If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. System will be attached to the metal roofing material utilizing the patented S-5 connection. Installation of the connections shall be in accordance with the manufacturer's recommendations.
3. Considering the wind speed, roof slopes, size and spacing of framing members, and condition of the roof, the panel supports shall be placed no greater than 48" on center.

Based on the above evaluation, this office certifies that with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. This evaluation is in conformance with the 2021 Virginia Construction Code, current industry standards and practice, and is based on information supplied to us at the time of this report.

Should you have any questions regarding the above or if you require further information do not hesitate to contact me.

Very truly yours,


Scott E. Wyssling, PE
Virginia License No. 0402060608
Virginia COA # 407008373



Wyssling Consulting, PLLC
76 N. Meadowbrook Drive, Alpine UT
Virginia COA # 407008373
Signed 8/04/2025

VIRGINIA ASPHALT

AHJ

ALBEMARLE COUNTY

UTILITY

VIRGINIA ELECTRIC & POWER CO

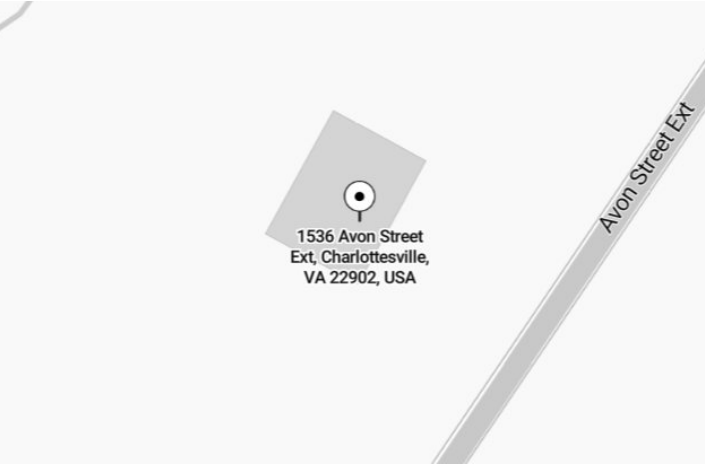
SCOPE OF WORK

(N) 8.260KW DC/7.680KW AC ROOF MOUNTED PV SYSTEM

(14) HANWHA QCELLS Q.PEAK DUO XL-G11.2 590 MODULES

(01) FRONIUS PRIMO GEN24 7.7 (240V) INVERTER

VICINITY MAP



CODES AND STANDARDS WITH AMENDMENTS

2021 VUSBC
2021 VCC
2021 VRC
2021 VSFPC
2020 NEC

ENVIRONMENTAL
WIND SPEED: 110 MPH
SNOW LOAD: 30 PSF
EXPOSURE CATEGORY: C

GENERAL NOTES

PROJECT NOTES:
- THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURER'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
- THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
- GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE POWER OPTIMIZER IN ACCORDANCE WITH NEC 690.41(B)
- ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4: PV MODULES: UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519 COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY
- MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
- ALL INVERTERS, PHOTOVOLTAIC MODULES,PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4. SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
- ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.

METER NO: 200018660

SHEET INDEX

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PV-6.6	RESOURCE DOCUMENT
PV-6.7	RESOURCE DOCUMENT

CONTRACTOR



ENTERO ENERGY OF VA DBA
SUNDAY SOLAR
1139 RIVER RD,
CHARLOTTESVILLE, VA
22901, USA
+1 434 977 4292
LIC TYPE: CLASS A AES ELE
LIC NO.: 2705134552

PROJECT INFO & ADDRESS
VIRGINIA ASPHALT
**1536 AVON STREET EXT,
CHARLOTTESVILLE,
VA 22902, USA**

SYSTEM SIZE
DC SIZE: 8.260 KW DC-(STC)
AC SIZE: 7.680 KW AC



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Virginia COA # 407008373
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SIGNATURE

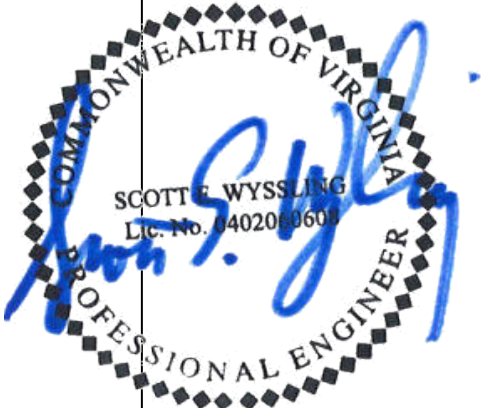
PV-1

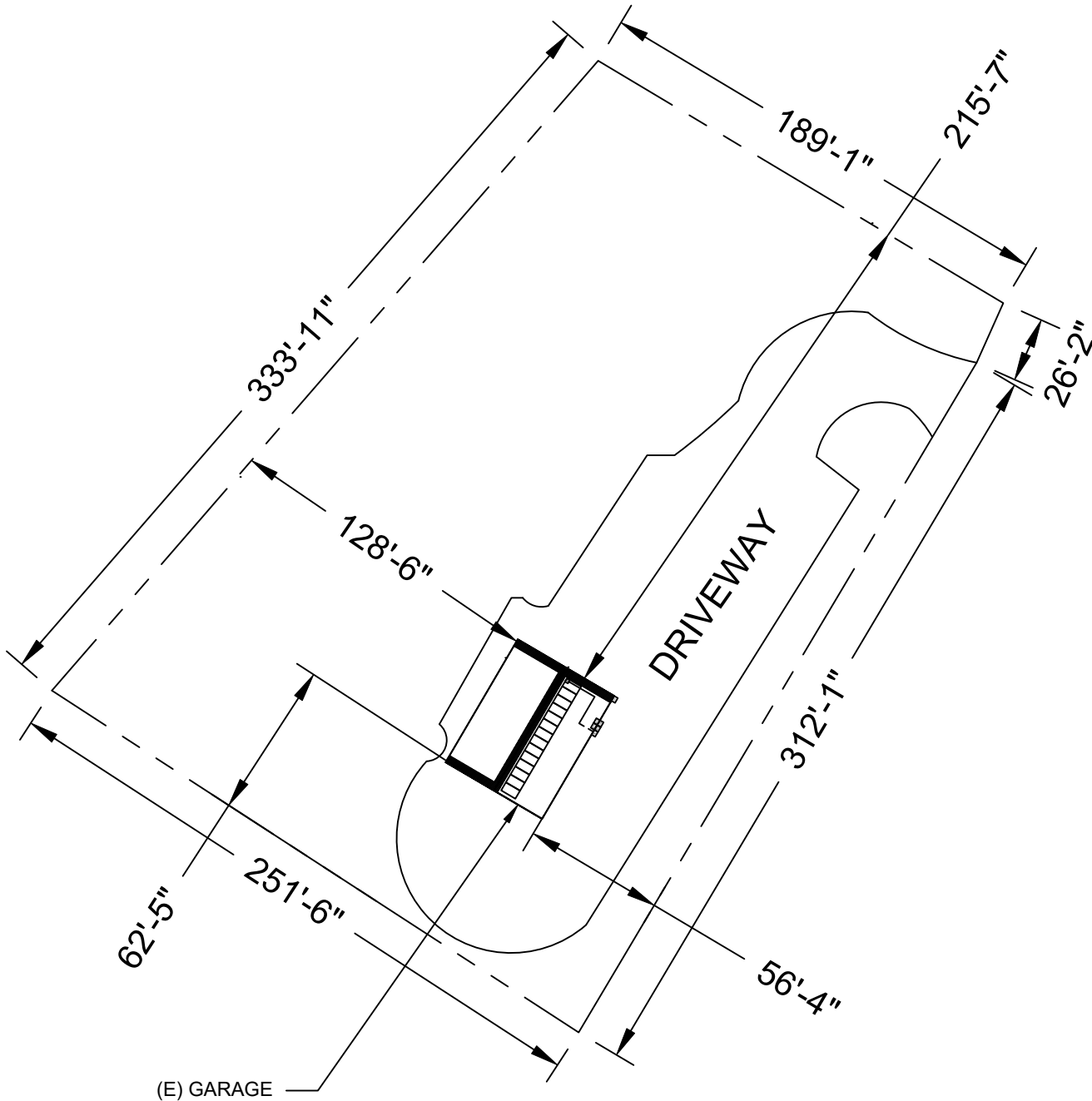
COVER SHEET

SCOPE OF WORK

- (N) 8.260KW DC/7.680KW AC ROOF MOUNTED PV SYSTEM
- (14) HANWHA QCELLS Q.PEAK DUO XL-G11.2 590 MODULES
- (01) FRONIUS PRIMO GEN24 7.7 (240V) INVERTER

TOTAL ROOF SQUARE FOOTAGE IS: 3074.4 FT²
NEW ARRAY SQUARE FOOTAGE IS: 412.87 FT²
COVERED BY SOLAR IS: 13.43%

CONTRACTOR	
	
ENTERO ENERGY OF VA DBA SUNDAY SOLAR 1139 RIVER RD, CHARLOTTESVILLE, VA 22901, USA +1 434 977 4292 LIC TYPE: CLASS A AES ELE LIC NO.: 2705134552	
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SYSTEM SIZE DC SIZE: 8.260 KW DC-(STC) AC SIZE: 7.680 KW AC	
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PV-2	
SITE PLAN-1	



AVON STREET EXT

- LEGEND
-  FIRE PATHWAYS
 -  PROPERTY LINE
 -  FENCE
 -  SKYLIGHT/CHIMNEY
 -  VENT/OBSTRUCTION



SITE PLAN-1
SCALE:1/64"=1'-0"

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PV-2.1

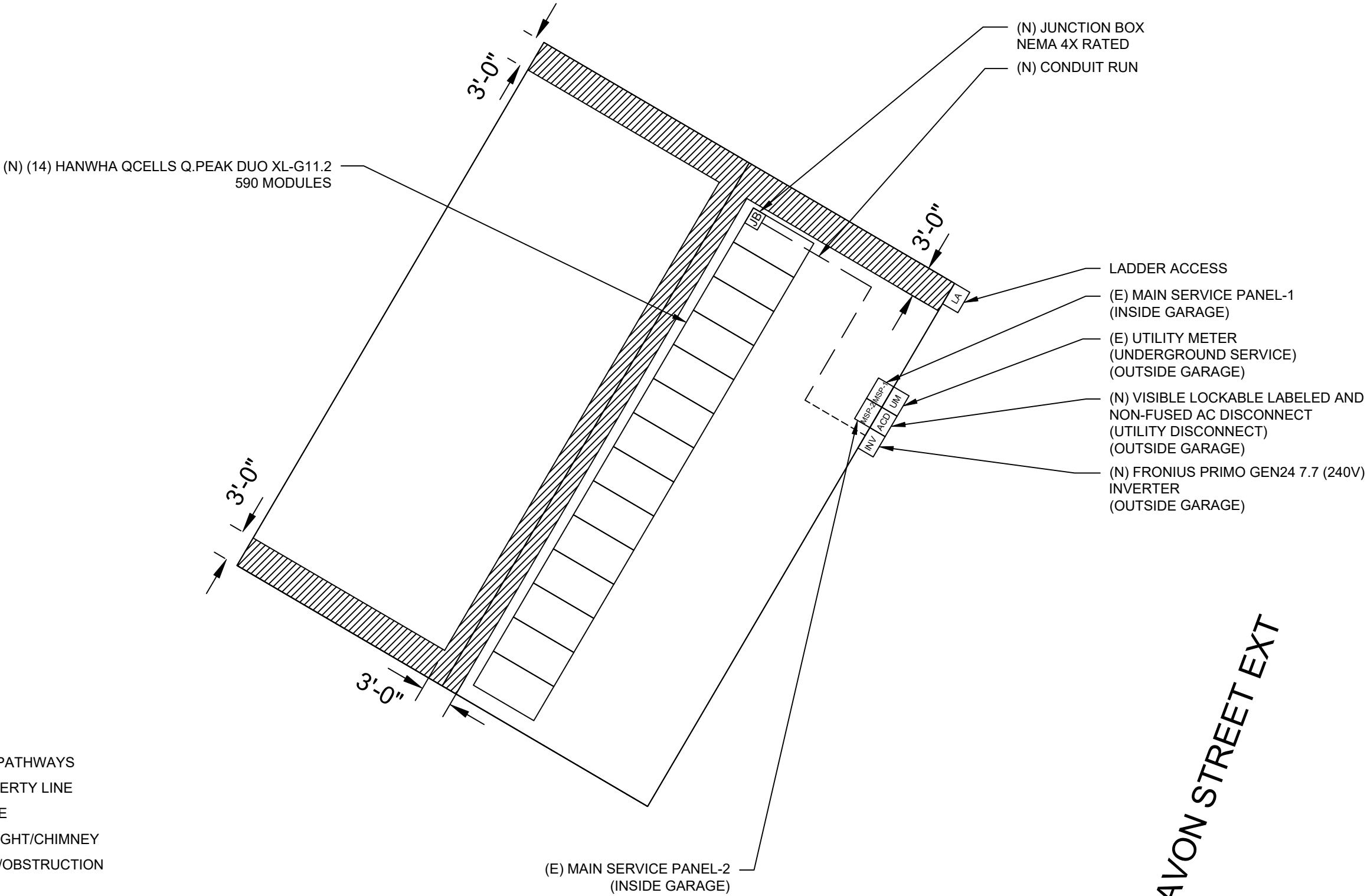
SITE PLAN-2

LEGEND

- FIRE PATHWAYS
- PROPERTY LINE
- FENCE
- SKYLIGHT/CHIMNEY
- VENT/OBSTRUCTION

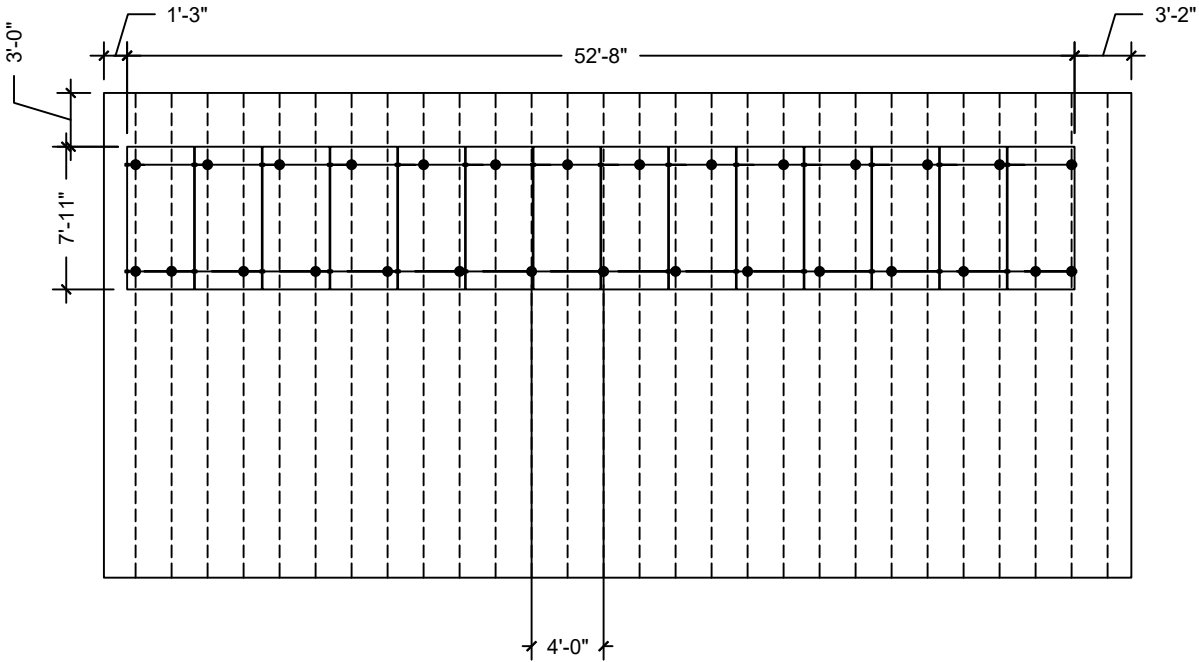


SITE PLAN-2
SCALE:3/32" = 1'-0"



ROOF SECTION(S)

ROOF 1	ROOF MATERIAL -
	CORRUGATED METAL
	TRUSS SIZE - 2"X4"
	O.C. SPACING - 24"
	MODULES - 14



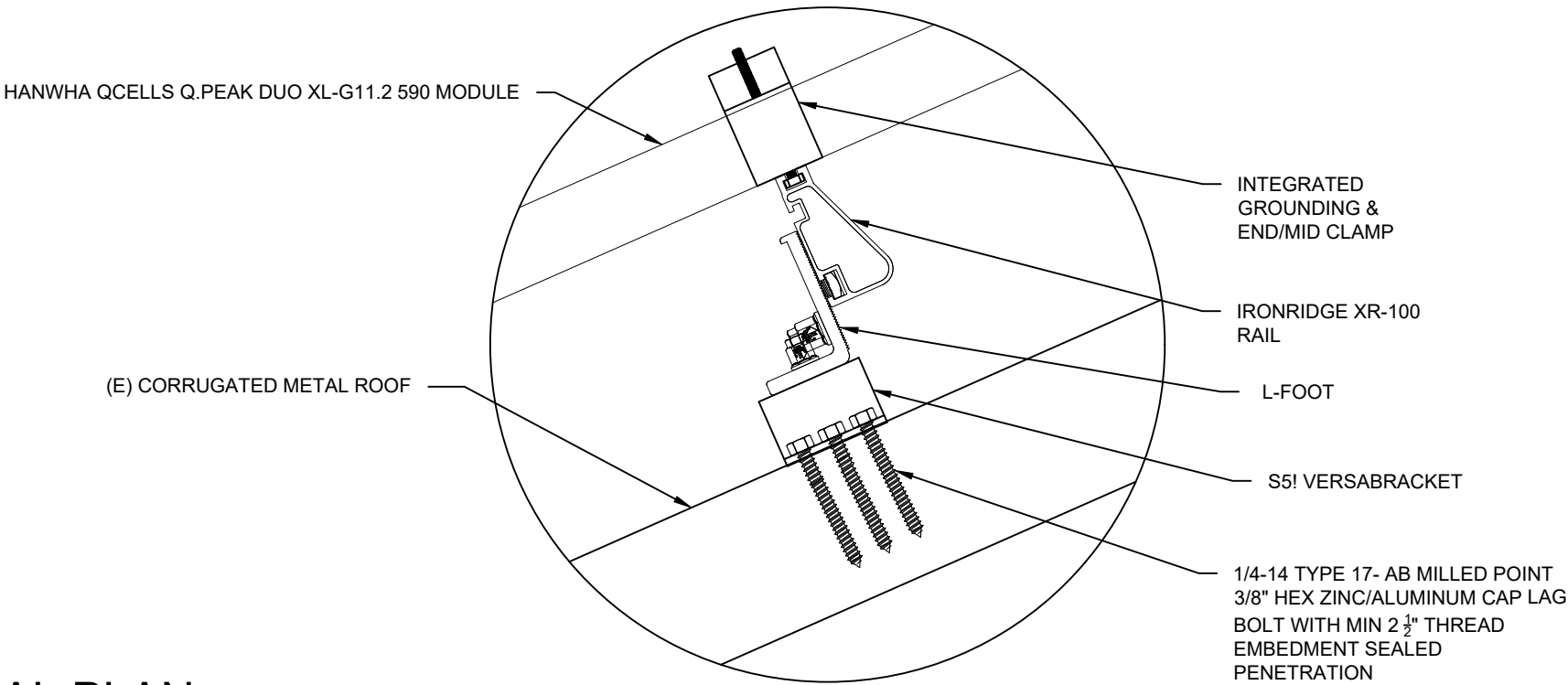
- CLAMP
- S5! VERSABRACKET
- IRONRIDGE XR-100 RAIL
- TRUSS

29 - TOTAL MOUNT

ARRAY 1
TILT- 34 DEG
AZIMUTH - 120 DEG

DEAD LOAD CALCULATION			
BOM	QUANTITY	LBS/UNIT	TOTAL WEIGHT(LBS)
HANWHA QCELLS Q.PEAK DUO XL-G11.2 590 MODULES	14	69	966.00
MID-CLAMP	26	0.26	6.76
END-CLAMP	4	0.36	1.44
RAIL LENGTH	8	9.55	76.40
SPLICE BAR	6	0.5	3.00
S5! VERSABRACKET	29	0.31	8.99
L-FOOT	29	0.22	6.38
TOTAL WEIGHT OF THE SYSTEM (LBS)			1068.97
TOTAL ARRAY AREA ON THE ROOF (SQ.FT)			412.87
WEIGHT PER SQ.FT. (LBS)			2.34
WEIGHT PER PENETRATION (LBS)			36.861034

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



1 | STRUCTURAL PLAN
SCALE:NTS

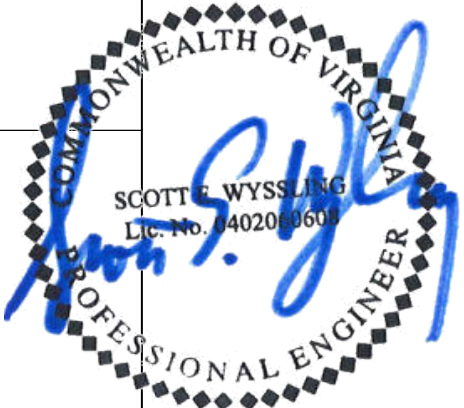
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PV-3
ATTACHMENT AND
STRUCTURAL PLAN

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	HANWHA QCELLS Q.PEAK DUO XL-G11.2 590
VMP	45.33V
IMP	13.01A
VOC	53.70V
ISC	13.59A
TEMP. COEFF. VOC	-0.27%/K
MODULE DIMENSION	95.12"L x 44.65"W x 1.38"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	FRONIUS PRIMO GEN24 7.7 (240V)
NOMINAL AC POWER	7680 W
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	32 A

NOTE:
- ALL CONDUCTORS ARE COPPER UNLESS OTHERWISE NOTED.
-SOLAR BREAKER LOCATED AT THE FURTHEST END OF BUSBAR FROM THE MAIN BREAKER OR FEEDER UNIT

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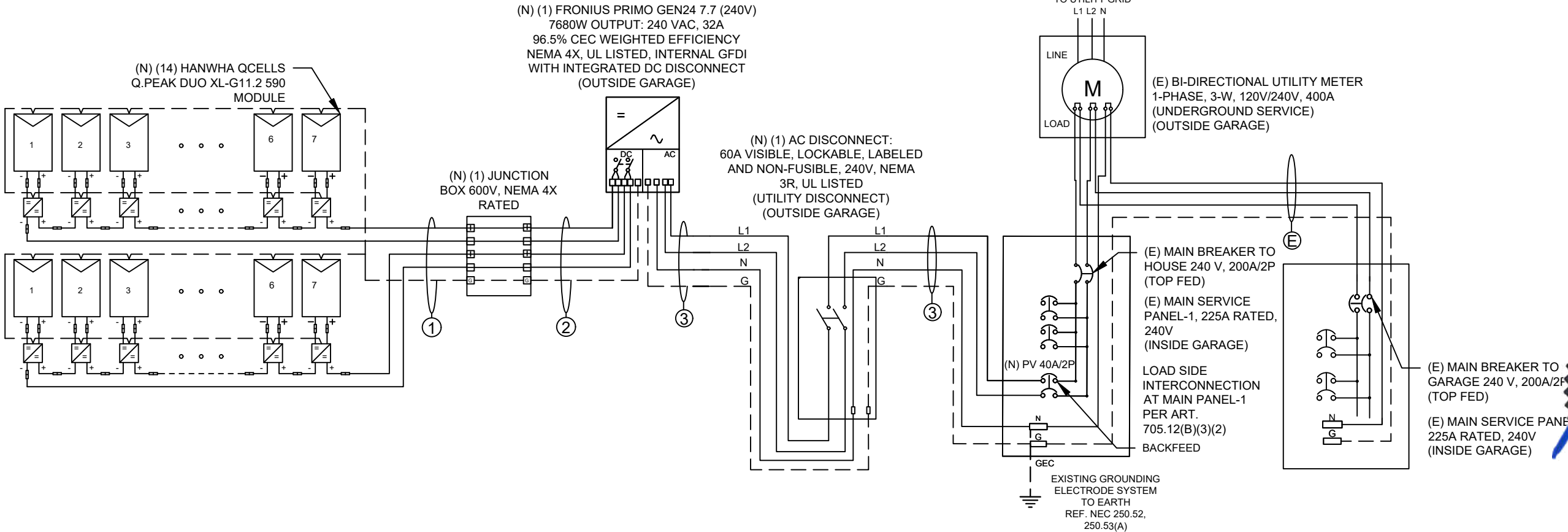
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PV-4	
ELECTRICAL	



ID	PHASE CONDUCTOR AND NEUTRAL QTY, SIZE AND TYPE PER CONDUIT			GROUND CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT			CONDUIT SIZE	CONDUIT TYPE
1	4	AWG #10	PV-WIRE/USE-2	1	AWG #10	BARE COPPER IN FREE AIR	N/A	FREE AIR
2	4	AWG #10	THWN-2	1	AWG #10	THWN-2	3/4"	EMT
3	3	AWG #8	THWN-2	1	AWG #10	THWN-2	3/4"	EMT
E	EXISTING CONDUIT & CONDUCTORS							

INTERCONNECTION 120% RULE - NEC 705.12(B)(3)(2)
UTILITY FEED + SOLAR BACKFEED 200+ 40 = 240A
BUS RATING x 120% 225A x 120% = 270.0A

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

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-17°C
AMBIENT TEMP (HIGH TEMP 2%)	34°C
CONDUIT HEIGHT	7/8"
ROOF TOP TEMP	56°C
CONDUCTOR TEMPERATURE RATE	90°C
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.27%/K

DC CONDUCTOR AMPACITY CALCULATIONS:
ARRAY TO JUNCTION BOX :

EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE 310.15(B)(1)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC 310.15(C)(1)	1
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	11.05A
1.25 X I _{sc}	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	38.40A
TEMP. CORRECTION PER TABLE 310.15(B)(1) X CONDUIT FILL CORRECTION PER NEC 310.15(C)(1) X CIRCUIT CONDUCTOR AMPACITY	
RESULT SHOULD BE GREATER THAN (11.05A) OTHERWISE LESS THE ENTRY FOR CIRCUIT CONDUCTOR SIZE AND AMPACITY	

DC CONDUCTOR AMPACITY CALCULATIONS:
FROM JUNCTION BOX TO INVERTER:

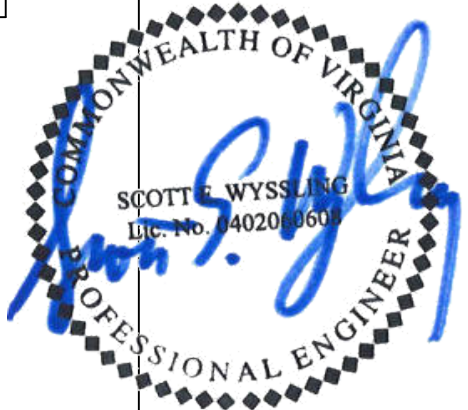
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE 310.15(B)(1)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC 310.15(C)(1)	0.8
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	11.05A
1.25 X Isc	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	30.72A
TEMP. CORRECTION PER TABLE 310.15(B)(1) X CONDUIT FILL CORRECTION PER NEC 310.15(C)(1) X CIRCUIT CONDUCTOR AMPACITY	
RESULT SHOULD BE GREATER THAN (11.05A) OTHERWISE LESS THE ENTRY FOR CIRCUIT CONDUCTOR SIZE AND AMPACITY	

AC CONDUCTOR AMPACITY CALCULATIONS:
AFTER INVERTER:

NO. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	34°
TEMP. CORRECTION PER TABLE 310.15(B)(1)	0.94
NO. OF CURRENT CARRYING CONDUCTORS	2
CONDUIT FILL CORRECTION PER NEC 310.15(C)(1)	1
CIRCUIT CONDUCTOR SIZE	8 AWG
CIRCUIT CONDUCTOR AMPACITY	50A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	40.00A
1.25 X MAX INVERTER OUTPUT CURRENT	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	47.00A
TEMP. CORRECTION PER TABLE 310.15(B)(1) X CONDUIT FILL CORRECTION PER NEC 310.15(C)(1) X CIRCUIT CONDUCTOR AMPACITY	
RESULT SHOULD BE GREATER THAN (40.00A) OTHERWISE LESS THE ENTRY FOR CIRCUIT CONDUCTOR SIZE AND AMPACITY	

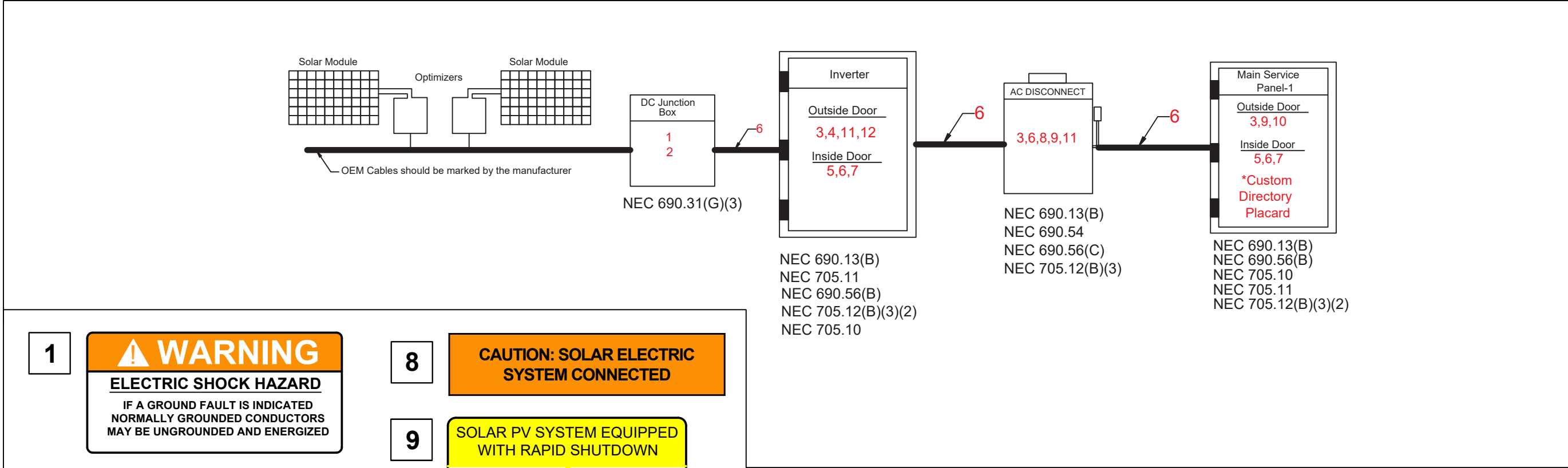


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PV-4.1	
ELECTRICAL CALCULATIONS	

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PROJECT INFO & ADDRESS VIRGINIA ASPHALT 1536 AVON STREET EXT, CHARLOTTESVILLE, VA 22902, USA SYSTEM SIZE DC SIZE: 8.260 KW DC-(STC) AC SIZE: 7.680 KW AC



1

⚠

WARNING

ELECTRIC SHOCK HAZARD

IF A GROUND FAULT IS INDICATED NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED

2

⚠

WARNING

ELECTRIC SHOCK HAZARD

THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED

3

⚠

WARNING

ELECTRIC SHOCK HAZARD

DO NOT TOUCH TERMINALS TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

4

⚡

WARNING - Electric Shock Hazard

No user serviceable parts inside

Contact authorized service provider for assistance

5

⚠

WARNING: DUAL POWER SOURCE

SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

6

⚠

WARNING: PHOTOVOLTAIC POWER SOURCE

7

⚠

WARNING

INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

8

⚠

CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED

9

☀

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

10

⚠

CAUTION: SOLAR CIRCUIT

11

⚠

PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OUTPUT CURRENT 32.00 AMPS

NOMINAL OPERATING AC VOLTAGE 240 VOLTS

12

⚠

PHOTOVOLTAIC SYSTEM DC DISCONNECT

OPERATING CURRENT- 22 A

OPERTAING VOLTAGE(Vmp) 385 V

MAXIMUM SYSTEM VOLTAGE 600 V

SHORT CIRCUIT CURRENT (Isc) 17.7 A

CAUTION

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

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PV-5

LABELS



Specifications subject to technical changes © **Q CELLS** Q PEAK DUO XL-G11 2 570-590 2020-11 Rev01 EN

Technical data

7.7/10.0 kW

			Primo GEN24 208-240					
				7.7		10.0		
Input data	Number of MPP trackers			2				
	DC input voltage range ($U_{dc\ min} - U_{dc\ max}$)	V		65–600				
			208 V _{ac}	220 V _{ac}	240 V _{ac}	208 V _{ac}	220 V _{ac}	240 V _{ac}
	Nominal input voltage ($U_{dc,r}$)	V	365	365	385	365	365	385
	Feed-in start voltage ($U_{dc\ start}$)	V		80				
	Usable MPP voltage range	V		65–480		65–480		
	MPP voltage range (at rated power)	V		260–480		260–480		
			MPPT1	MPPT2		MPPT1	MPPT2	
	Max. usable input current ($I_{dc\ max}$)	A	22	22		22	22	
	Max. short circuit current per MPPT ($I_{sc\ pv}$) ¹	A	41.25	36		41.25	36	
	Number of DC connections		2	2		2	2	
			MPPT1	MPPT2	Total	MPPT1	MPPT2	Total
	Max. usable DC power	W	8,000	8,000	8,000	10,250	10,250	10,250
	Max. PV generator output	W _{peak}	11,520	11,520	11,520	13,500	13,000	15,000
Output data			208 V _{ac}	220 V _{ac}	240 V _{ac}	208 V _{ac}	220 V _{ac}	240 V _{ac}
	AC rated power ($P_{ac,r}$)	W	7,680	7,680	7,680	9,450	10,000	10,000
	Apparent power	VA	7,680	7,680	7,680	9,450	10,000	10,000
	Max. Output power	VA	7,680	7,680	7,680	9,450	10,000	10,000
	Nom. AC output current	A	36.9	34.9	32.0	45.45	45.45	41.7
	Mains connection ($U_{ac,r}$)	V	1-NPE 208 V / 220 V / 240 V (+ 10 % / - 12 %)					
	Frequency (frequency range $f_{min} - f_{max}$)	Hz	50 Hz / 60 Hz (45 Hz–66 Hz)					
	Distortion factor	%	< 3.5					
	Power factor ($\cos \varphi_{ac,r}$)		0.8–1 ind. / cap.					
Output data PV Point			120 V _{ac}	220 V _{ac}	240 V _{ac}	120 V _{ac}	220 V _{ac}	240 V _{ac}
	Nom. Output power PV Point	VA	1,560	2,860	3,120	1,560	2,860	3,120
	Nominal AC voltage PV Point	V	1-NPE 120 V / 220 V / 240 V					
	Switching time	sec.	< 35					

¹ I_{sc} (STC) of the strings multiplied by 1.25 must be less or equal than ISC PV according to NEC 2023. This value needs to be divided by the amount of strings connected to the MPPT.

			Primo GEN24 208-240					
			7.7			10.0		
General data	Dimensions (height × width × depth)	inch/mm	23.0 x 20.8 x 7.1 / 583 x 529 x 180					
	Weight (inverter)	lbs./kg	45.97 lbs. / 20.85 kg					
	Protection class		Type 4X					
	Protection class		1					
	Night consumption	W	< 10					
	Overvoltage category (DC/AC) ²		2/4					
	Cooling		Active Cooling Technology					
	Installation		Indoor and outdoor installation					
	Ambient temperature range	°F/°C	-40 to +140 / -40 to +60					
	Permissible humidity	%	0–100					
	Noise emissions	dB (A)	< 52					
	Max. altitude	ft/m	13,123 / 4,000					
	Connection technology DC PV		2x DC+1, 2x DC+2 and 4x DC- spring-type terminals for solid: copper stranded / fine stranded: copper AWG 14-8					
Connection technology AC		Spring-type terminals for solid: copper stranded / fine stranded: copper: AWG 12-6 Backup power spring-type terminals: AWG 16-8						
Certificates and standard compliance		UL 1741 Third Edition (incl. UL1741 Supplement SA and SB), UL CRD - Non-Isolated EPS Interactive PV Inverters Rated Less Than 30kVA UL1998 (for functions: AFCI, RCMU, PVRSE and isolation monitoring), IEEE 1547:2018 incl. IEEE 1547a:2020, IEEE 1547.1:2020, IEEE 1547:2003 incl. IEEE 1547.1:2005 ANSI/IEEE C62.41, FCC Part 15 A & B, NEC 2023 Article 690, CSA C22. 2 No. 107.1-16 (reaffirmed 2021), CSA C22.2 No.290-19, CSA C22.2 No.330-23, CSA C22.3 No.9:20 UL1699B:2021						
Country of manufacture		Austria						
Efficiency			208 V _{ac}	220 V _{ac}	240 V _{ac}	208 V _{ac}	220 V _{ac}	240 V _{ac}
	Max. Efficiency	%	97.2	97.2	97.5	97.2	97.2	97.5
	CEC (η _{CEC})	%	96.5	96.5	96.5	97	97	97
	MPP adjustment efficiency	%	> 99.9					
Protective equipment	DC insulation measurement		Integrated					
	DC disconnecter		Integrated					
	Reverse polarity protection		Integrated					
	Arc Fault Circuit Interruption (Arc Guard)		Integrated					
Interfaces	WLAN / 2 × Ethernet LAN		Fronius Solar.web, Modbus TCP SunSpec, Fronius Solar API (JSON)					
	6 digital inputs		Connection to ripple control receiver, energy management					
	6 digital inputs/outputs		Integrated					
	Emergency shutdown (WSD)		Integrated					
	Data logger and web server		Modbus RTU SunSpec (third-party) / Fronius Smart Meter					

² According to UL 1741.

CONTRACTOR



ENTERO ENERGY OF VA DBA
SUNDAY SOLAR
1139 RIVER RD,
CHARLOTTESVILLE, VA
22901, USA
+1 434 977 4292
LIC TYPE: CLASS A AES ELE
LIC NO.: 2705134552

PROJECT INFO & ADDRESS
VIRGINIA ASPHALT
1536 AVON STREET EXT,
CHARLOTTESVILLE,
VA 22902, USA

SYSTEM SIZE
DC SIZE: 8.260 KW DC-(STC)
AC SIZE: 7.680 KW AC

DRAWN BY SNH

DATE 8/2/2025

REVISION

SIGNATURE

PV-6.1

RESOURCE
DOCUMENT

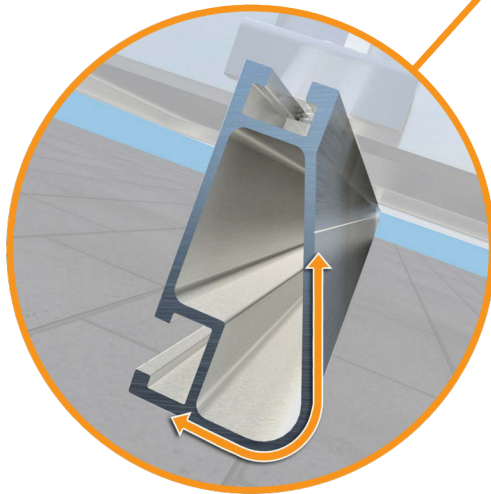
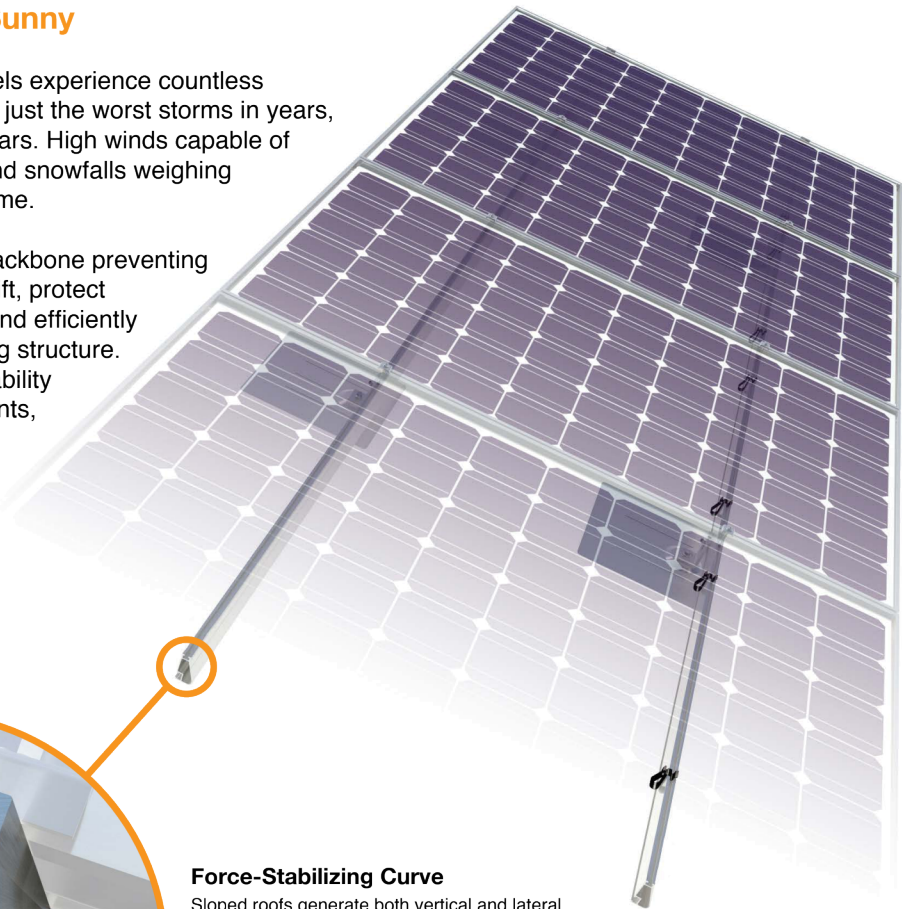


XR Rail Family

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



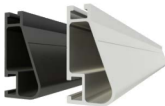
XR Rails are compatible with FlashFoot and other pitched roof attachments.



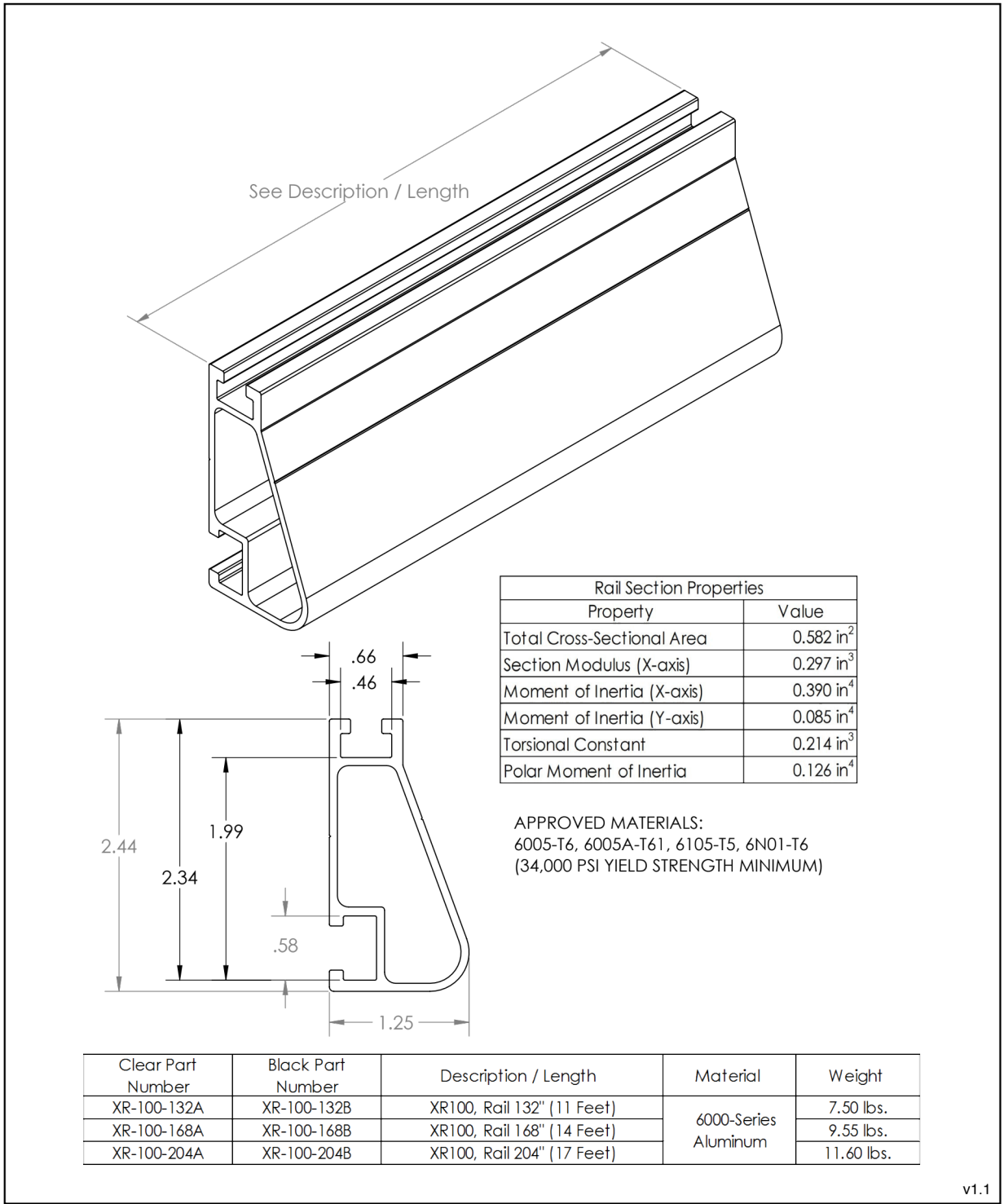
IronRidge offers a range of tilt leg options for flat roof mounting applications.

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.



XR100 Rail



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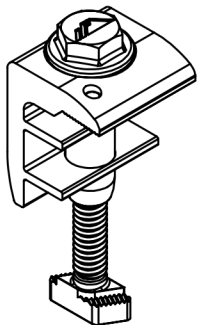
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DATE 8/2/2025
REVISION

SIGNATURE
PV-6.2
RESOURCE DOCUMENT

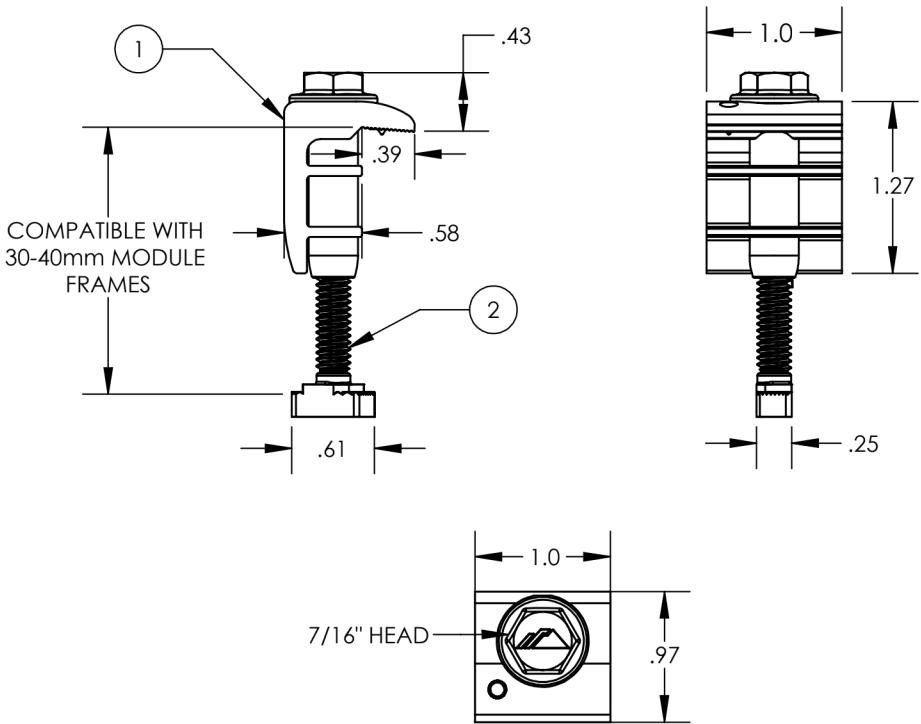


End Fastening Object

Cut Sheet



PART NO.	DESCRIPTION
UFO-END-01-A1	END FASTENING OBJECT (END CLAMP, 30-40mm), MILL
UFO-END-01-B1	END FASTENING OBJECT (END CLAMP, 30-40mm), BLACK



ITEM NO.	MATERIAL	FINISH
1	6000 SERIES ALUMINUM	MILL OR BLACK
2	300 SERIES STAINLESS STEEL	CLEAR AND BLACK

v1.0

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DRAWN BY	SNH
DATE	8/2/2025
REVISION	

SIGNATURE

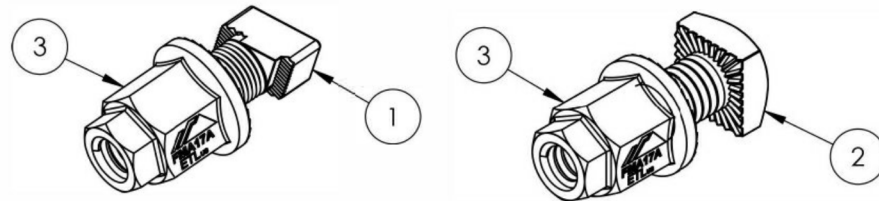
PV-6.3

RESOURCE
DOCUMENT



Bonding Hardware

Cut Sheet

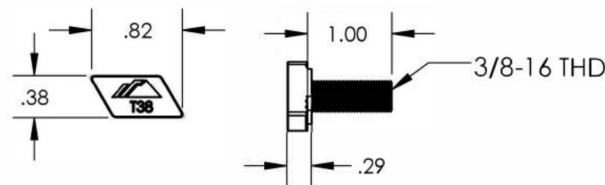


ITEM NO.	DESCRIPTION
1	BOLT, T CSTM, 3/8-16
2	BOLT, BONDING 3/8-16 SQ HEAD
3	NUT, BONDING STEP

BONDING HARDWARE

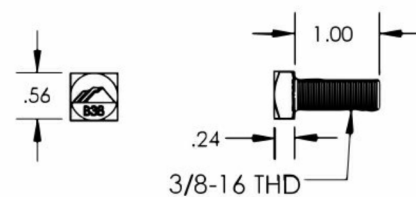
Part Number	Description
BHW-TB-02-A1	T-BOLT, BONDING HARDWARE
BHW-SQ-02-A1	SQUARE-BOLT, BONDING HARDWARE

1) BOLT, T CSTM, 3/8-16



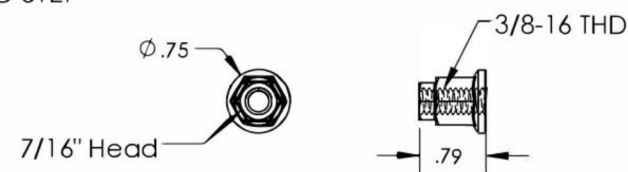
Property	Value
Material	300 Series Stainless Steel
Finish	Clear

2) BOLT, BONDING 3/8-16 SQ HEAD



Property	Value
Material	300 Series Stainless Steel
Finish	Clear

3) NUT, BONDING STEP



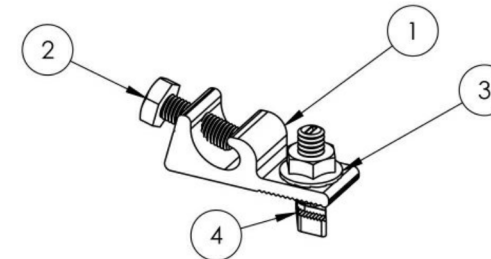
Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v1.30



Grounding Lug

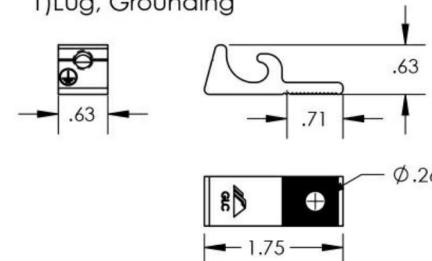
Cut Sheet



ITEM NO.	DESCRIPTION
1	LUG, GROUNDING, LAY-IN - LOW PROFILE
2	BOLT, 1/4-28 X .750" HEX CS SST
3	NUT, FLANGE HEX 1/4-20 SST
4	BOLT, T CSTM 1/4-20 X 1.188" LOCK SS

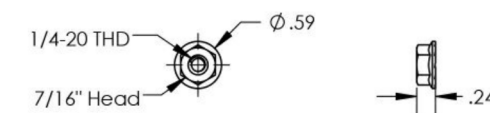
Part Number	Description	Wire Size Range (AWG)
XR-LUG-03-A1	GROUNDING LUG, LOW PROFILE	4-10

1) Lug, Grounding



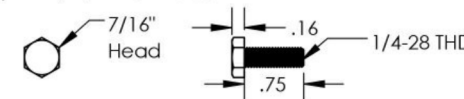
Property	Value
Material	Tin Plated Copper
Finish	Clear Matte

3) Nut, Flange Hex 1/4-20



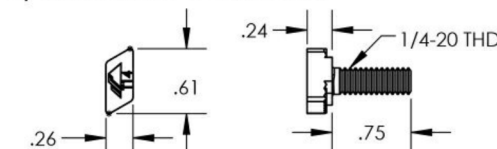
Property	Value
Material	300 Series Stainless Steel
Finish	Clear

2) Bolt, 1/4-28 x .750 Hex



Property	Value
Material	300 Series Stainless Steel
Finish	Clear

4) Bolt, T CSTM 1/4-20 x .750



Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v1.10

CONTRACTOR



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LIC NO.: 2705134552

PROJECT INFO & ADDRESS

VIRGINIA ASPHALT
1536 AVON STREET EXT,
CHARLOTTESVILLE,
VA 22902, USA

SYSTEM SIZE

DC SIZE: 8.260 KW DC-(STC)
AC SIZE: 7.680 KW AC

DRAWN BY SNH

DATE 8/2/2025

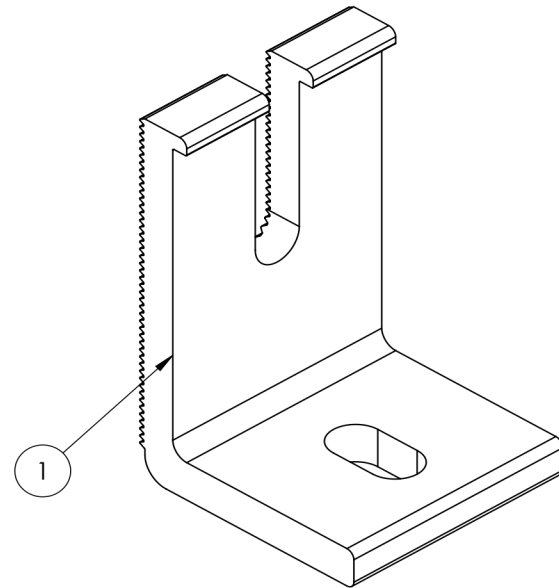
REVISION

SIGNATURE

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RESOURCE
DOCUMENT

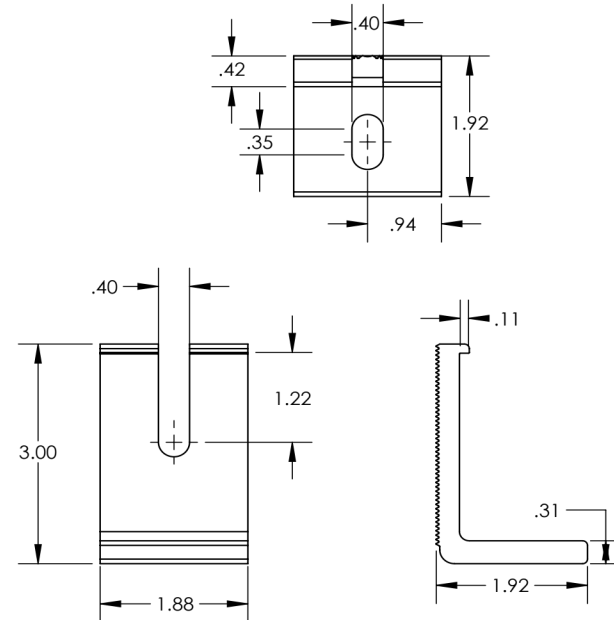
L-Foot



ITEM NO	DESCRIPTION	QTY IN KIT
1	FOOT, EXTRUDED L - SLOTTED	4

PART NUMBER	DESCRIPTION
FM-LFT-003	Kit, 4Pcs, Slotted L-Foot, Mill
FM-LFT-003-B	Kit, 4Pcs, Slotted L-Foot, Black

1) Foot, Extruded L - Slotted



v1.11

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DC SIZE: 8.260 KW DC-(STC)
AC SIZE: 7.680 KW AC

DRAWN BY	SNH
DATE	8/2/2025
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PV-6.5

**RESOURCE
DOCUMENT**



UFO® Family of Components

Tech Brief

Simplified Grounding for Every Application

The UFO® family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge® XR Rails®. All system types that feature the UFO® family—Flush Mount®, Tilt Mount® and Ground Mount®—are fully listed to the UL 2703 standard.

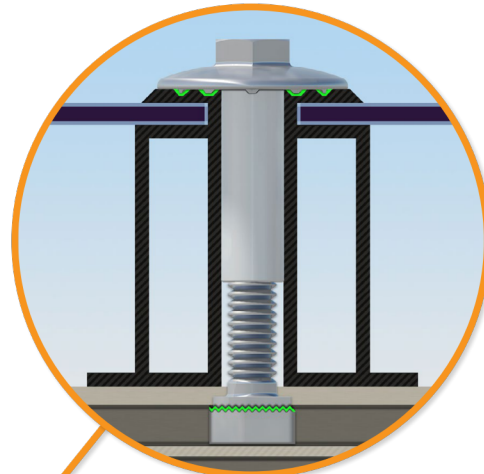
UFO® hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.

Only for installation and use with IronRidge products in accord with written instructions. See [IronRidge.com/UFO](https://www.ironridge.com/UFO)



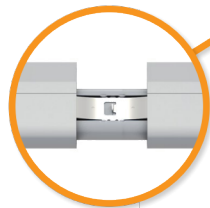
Stopper Sleeve

The Stopper Sleeve snaps onto the UFO®, converting it into a bonded end clamp.



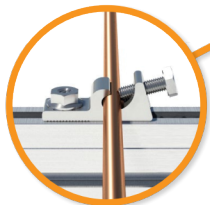
Universal Fastening Object (UFO®)

The UFO® securely bonds solar modules to XR Rails®. It comes assembled and lubricated, and can fit a wide range of module heights.



BOSS® Splice

Bonded Structural Splice connects rails with built-in bonding teeth. No tools or hardware needed.



Grounding Lug

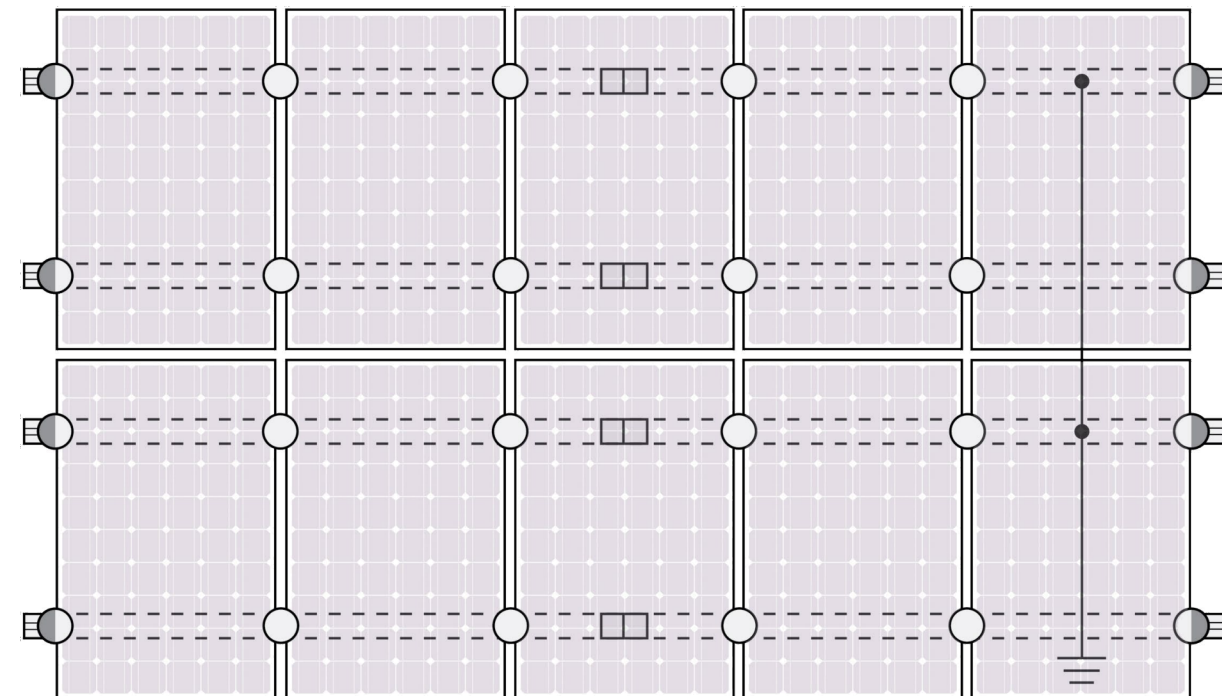
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



Bonded Attachments

The bonding bolt attaches and bonds the L-foot® to the rail. It is installed with the same socket as the rest of the system.

System Diagram



○ UFO ◐ Stopper Sleeve ● Grounding Lug □ BOSS™ Splice — Ground Wire

⚡ Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

UL Certification

The IronRidge® Flush Mount®, Tilt Mount®, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

 [Go to IronRidge.com/UFO](https://www.ironridge.com/UFO)

Cross-System Compatibility

Feature	Flush Mount	Tilt Mount	Ground Mount
XR Rails®	✓	✓	XR100 & XR1000
UFO®/Stopper	✓	✓	✓
BOSS® Splice	✓	✓	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Compatible with most MLPE manufacturers. Refer to system installation manual.		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules. Refer to installation manuals for a detailed list.		

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1536 AVON STREET EXT,
CHARLOTTESVILLE,
VA 22902, USA

SYSTEM SIZE

DC SIZE: 8.260 KW DC-(STC)
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DATE 8/2/2025

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RESOURCE
DOCUMENT

The right way to attach almost anything to metal roofs!

S-5![®]

The Right Way!

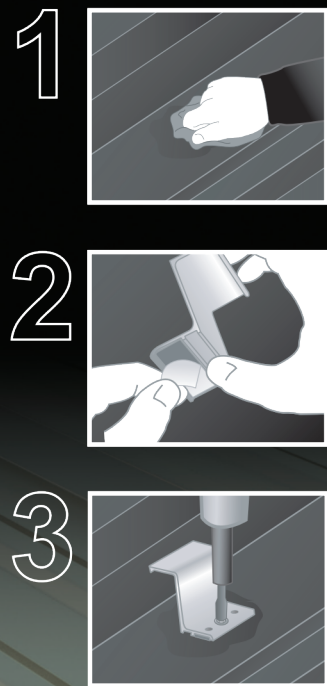
VersaBracket[™]

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

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

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

S-5![®] VersaBracket[™] is the right way to attach almost anything to exposed-fastened roof profiles; including PV through DirectAttach[™] or Rail methods.



VersaBracket[™]

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

S-5![®]

The Right Way!

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

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

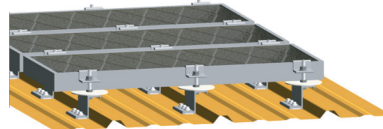
The VersaBracket has been tested for load-to-failure results on wood decking, metal and wood purlins. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5! holding strength is unmatched in the industry.

Example Profile

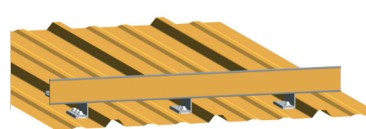


Example Uses

S-5-PV Kit (DirectAttach or Rail)



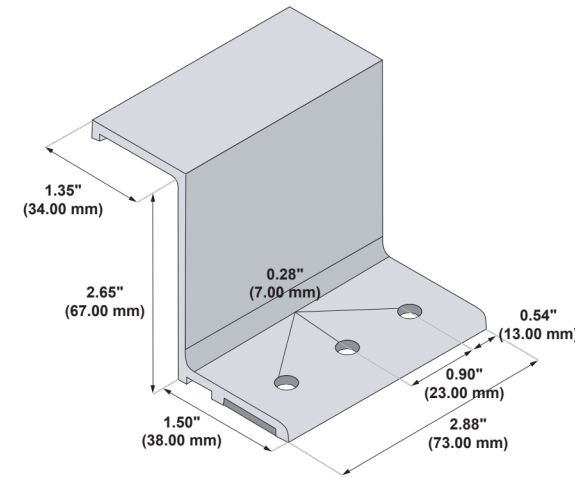
ColorGard



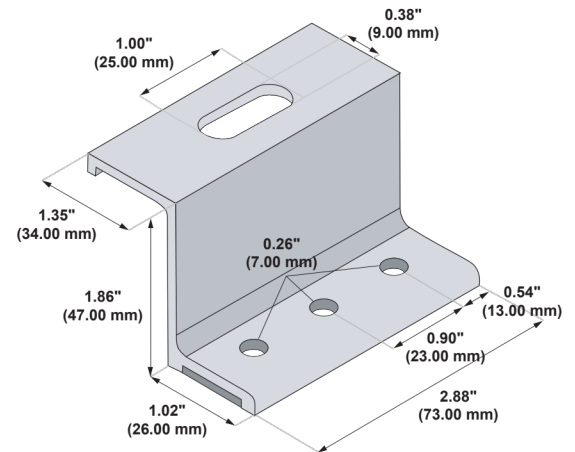
S-5! Warning! Please use this product responsibly!
Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents and trademarks visit the S-5! website at www.S-5.com.
Copyright 2011, Metal Roof Innovations, Ltd. S-5! products are patent protected.
S-5! aggressively protects its patents, trademarks and copyrights.

Distributed by

VersaBracket-67[™]



VersaBracket-47[™]



3 holes are provided for versatility. Some installations require only 2 fasteners. See the load table on the S-5! website and the installation instructions for more details.
Due to varied applications, mounting hardware is not furnished with part.
Please note: All measurements are rounded to the second decimal place.

CONTRACTOR



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