HISTORIC PRESERVATION COMMISSION

Isiah Leggett
County Executive

William Kirwan
Chairman

Date: October 24, 2014

MEMORANDUM

TO: Diane Schwartz Jones
Department of Permitting Services
FROM: Matt Bowling, Senior Planner
Historic Preservation Office
Maryland-National Capital Park & Planning Commission
SUBJECT: Historic Area Work Permit #689642: Solar panel installation at 6 Hickory Avenue

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The Montgomery County Historic Preservation Commission (HPC) has reviewed the attached application for a Historic Area Work Permit (HAWP). This application was **Approved** at the October 22, 2014 Historic Preservation Commission meeting.

Staff has reviewed and stamped the attached construction drawings.
THE BUILDING PERMIT FOR THIS PROJECT SHALL BE ISSUED CONDITIONAL UPON ADHERENCE TO THE ABOVE APPROVED HAWP CONDITIONS AND MAY REQUIRE APPROVAL BY DPS OR ANOTHER LOCAL OFFICE BEFORE WORK CAN BEGIN.

Applicant: Laurence Fischel
Address: 6 Hickory Avenue, Takoma Park

This HAWP approval is subject to the general condition that the applicant will obtain all other applicable Montgomery County or local government agency permits. After the issuance of these permits, the applicant must contact this Historic Preservation Office if any changes to the approved plan are made. Once work is complete the applicant will contact Matt Bowling at 301.563.3408 or matt.bowling@montgomeryplanning.org to schedule a follow-up site visit.

MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION
STAFF REPORT

Address:	6 Hickory Avenue, Takoma Park	**Meeting Date:**	10/22/2014
Resource:	Contributing Resource Takoma Park Historic District	**Report Date:**	10/09/2014
		Public Notice:	10/08/2014
Applicant:	Laurence Fischel (Zayn Bradley, Agent)	**Tax Credit:**	Not Eligible
Review:	HAWP	**Staff:**	Matt Bowling
Case Number:	37/03-14RR		
PROPOSAL:	Solar panel installation at 6 Hickory Avenue.		

STAFF RECOMMENDATION

Staff recommends that the HPC **approve** this HAWP application:

ARCHITECTURAL DESCRIPTION

SIGNIFICANCE: Contributing Resource within the Takoma Park Historic District
STYLE/FORM: Craftsman Style, Two-Story
DATE: Circa 1910

PROPOSAL

The applicants are proposing to undertake one (1) work item on the building's gabled roof (second-story, south elevation) and the gabled roof of the building's one-story rear addition (south elevation):

South Elevation (work will be visible from public right-of-way/Hickory Avenue when viewing the building at an angle on Hickory Avenue):

1. Install photovoltaic system on south elevation of second-story roof. Install photovoltaic system on the building's one-story rear addition. Photovoltaic panel arrays will be mounted flush to existing roof.

APPLICABLE GUIDELINES

In accordance with section 1.5 of the Historic Preservation Commission Rules, Guidelines, and Procedures (Regulation No. 27-97) ("Regulations"), the Commission in developing its decision when reviewing a Historic Area Work Permit Application for an undertaking at a resource in the Takoma Park Historic District uses section 24A-8 of the Montgomery County Code ("Chapter 24A"), the *Secretary of the Interior's Standards and Guidelines for Rehabilitation* (*Standards*), and pertinent guidance in applicable master plans. [Note: where guidance in an applicable master plan is inconsistent with the Standards, the master plan guidance shall take precedence (section 1.5(b) of the Regulations).] The pertinent information in these documents, incorporated in their entirety by reference herein, is outlined below.

Takoma Park Historic District Guidelines

The *Takoma Park Guidelines* specify that Contributing Resources "should receive a more lenient level of design review than those structures that have been classified as Outstanding. This design review should emphasize the importance of the resource to the overall streetscape and its compatibility with existing patterns rather than focusing on a close scrutiny of architectural detailing. In general, however, changes to Contributing Resources should respect the predominant architectural style of the resource. As stated above, the design review emphasis will be restricted to changes that are at all visible from the public right-of-way, irrespective of landscaping or vegetation."

Montgomery County Code; Chapter 24A-8

(a) The commission shall instruct the director to deny a permit if it finds, based on the evidence and information presented to or before the commission that the alteration for which the permit is sought would be inappropriate, inconsistent with or detrimental to the preservation, enhancement or ultimate protection of the historic site or historic resource within an historic district, and to the purposes of this chapter.

(b) The commission shall instruct the director to issue a permit, or issue a permit subject to such conditions as are found to be necessary to insure conformity with the purposes and requirements of this chapter, if it finds that:

(1) The proposal will not substantially alter the exterior features of an historic site or historic resource within an historic district; or

(2) The proposal is compatible in character and nature with the historical, archeological, architectural or cultural features of the historic site or the historic district in which an historic resource is located and would not be detrimental thereto or to the achievement of the purposes of this chapter; or

(3) The proposal would enhance or aid in the protection, preservation and public or private utilization of the historic site or historic resource located within an historic district in a manner compatible with the historical, archeological, architectural or cultural value of the historic site or historic district in which an historic resource is located; or

(4) The proposal is necessary in order that unsafe conditions or health hazards be remedied; or

(5) The proposal is necessary in order that the owner of the subject property not be deprived of reasonable use of the property or suffer undue hardship; or

(6) In balancing the interests of the public in preserving the historic site or historic resource located within an historic district, with the interests of the public from the use and benefit of the alternative proposal, the general public welfare is better served by granting the permit.

(c) It is not the intent of this chapter to limit new construction, alteration or repairs to any one period or architectural style.

(d) In the case of an application for work on an historic resource located within an historic district, the commission shall be lenient in its judgment of plans for structures of little historical or design

significance or for plans involving new construction, unless such plans would seriously impair the historic or architectural value of surrounding historic resources or would impair the character of the historic district. (Ord. No. 9-4, § 1; Ord. No. 11-59.)

Secretary of the Interior's Standards for Rehabilitation:

#9 New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.

STAFF DISCUSSION

All of the proposed work will occur within the boundaries of the Takoma Park Historic District. The work will alter a Contributing Resource. The alteration will be visible from the public right-of-way on Hickory Avenue when viewing the building at an angle. The photovoltaic system will be mounted in two locations: flush on the second-story of the building's gabled roof and flush on the gabled roof of the one-story addition located on the rear of the building. If the alteration was to be removed in the future, the essential form and integrity of the building would be unimpaired. The proposed work will not destroy the historic materials, features, or spatial relationships that characterize the property and will not be detrimental to the existing streetscape and is compatible with existing patterns of alterations within the Takoma Park Historic District.

Based on the information included in the record, staff, respectfully makes the following findings of fact:

- The subject property is a Contributing Resource in the Takoma Park Historic District, constructed circa 1910 in the Craftsman style.

- As proposed, the photovoltaic system will be visible from the public right-of-way on Hickory Avenue when viewing the building at an angle.

- The *Takoma Park Guidelines* specify that Contributing Resources "should receive a more lenient level of design review than those structures that have been classified as Outstanding. This design review should emphasize the importance of the resource to the overall streetscape and its compatibility with existing patterns rather than focusing on a close scrutiny of architectural detailing. "

  The proposed work will not be detrimental to the existing streetscape and is compatible with existing patterns of alterations within the Takoma Park Historic District (i.e. photovoltaic systems have been installed on contributing resources within the Takoma Park Historic District).

- The *Takoma Park Guidelines* also specify that "in general, however, changes to Contributing Resources should respect the predominant architectural style of the resource. As stated above, the design review emphasis will be restricted to changes that are at all visible from the public right-of-way, irrespective of landscaping or vegetation."

  The proposed work will not be detrimental to the predominant architectural style of the resource. If the photovoltaic system were to be removed in the future, the essential form and integrity of the building would remain unimpaired.

STAFF RECOMMENDATION

Staff recommends that the Commission **approve** the Historic Area Work Permit Application under the Criteria for Issuance in Chapter 24A-8 §§ (b)(1) and (b)(2), having found the proposed work is consistent with:

1. Chapter 24A-8 of the Montgomery County Code; and

2. The *Takoma Park Guidelines*; and

3. The *Secretary of the Interior's Standards for Rehabilitation #9*;

Finding that the proposed work:

1. Install photovoltaic system on south elevation of second-story roof. Install photovoltaic system on the building's one-story rear addition. Photovoltaic panel arrays will be mounted flush to existing roof.

Will not be detrimental to the existing streetscape and is compatible with existing patterns of alterations within the Takoma Park Historic District and can be removed in the future without impairing the essential form of the subject property or the integrity of the historic district, and is consistent with the *Takoma Park Guideline* for contributing resources.

And with the general condition that the applicant shall present **three (3) permit sets of drawings, if applicable to Historic Preservation Commission (HPC) staff for review and stamping** prior to submission for the Montgomery County Department of Permitting Services (DPS) building permits;

And with the general condition that the applicant shall notify HPC staff if they propose to make **any alterations** to the approved plans. Once the work is completed the applicant will contact the Matt Bowling at 301-563-3400 or matt.bowling@mongtomeryplanning.org to schedule a follow-up site visit.

DPS - #8

HISTORIC PRESERVATION COMMISSION
301/563-3400

APPLICATION FOR HISTORIC AREA WORK PERMIT

Contact Email: zayn@sustainableenergysystems.net Contact Person: Zayn Bradley
Daytime Phone No.: 240-439-0502

Tax Account No.: 01079133

Name of Property Owner: Laurence Fischel Daytime Phone No.: 301-270-3145

Address: 6 Hickory Ave. Takoma Park, MD 20912
Street Number City State Zip Code

Contractor: Sustainable Energy Systems Phone No.: 301-708-4003

Contractor Registration No.: ME 203185, MHIC 98120

Agent for Owner: Zayn Bradley Daytime Phone No.: 240-439-0502

LOCATION OF BUILDING/PREMISE

House Number: 6 Street: Hickory Ave

Town/City: Takoma Park Nearest Cross Street:

Lot: P1 Block: 20 Subdivision: 0025

Liber: Folio: Parcel: 0000

PART ONE: TYPE OF PERMIT ACTION AND USE

1A. CHECK ALL APPLICABLE:

CHECK ALL APPLICABLE:

☑ Construct ☐ Extend ☐ Alter/Renovate ☐ A/C ☐ Slab ☐ Room Addition ☐ Porch ☐ Deck ☐ Shed

☐ Move ☐ Install ☐ Wreck/Raze ☑ Solar ☐ Fireplace ☐ Woodburning Stove ☐ Single Family

☐ Revision ☐ Repair ☐ Revocable ☐ Fence/Wall (complete Section 4) ☐ Other:

1B. Construction cost estimate: $ $21,000.00

1C. If this is a revision of a previously approved active permit, see Permit #

PART TWO: COMPLETE FOR NEW CONSTRUCTION AND EXTENSIONS

2A. Type of sewage disposal: 01 ☑ WSSC 02 ☐ Septic 03 ☐ Other:

2B. Type of water supply: 01 ☑ WSSC 02 ☐ Well 03 ☐ Other:

PART THREE: COMPLETE ONLY FOR FENCE/RETAINING WALL

3A. Height feet inches

3B. Indicate whether the fence or retaining wall is to be constructed on one of the following locations:

☐ On party line/property line ☐ Entirely on land of owner ☐ On public right of way/easement

I hereby certify that I have the authority to make the foregoing application, that the application is correct, and that the construction will comply with plans approved by all agencies listed and I hereby acknowledge and accept this to be a condition for the issuance of this permit.

Signature of owner or authorized agent

9-24-14
Date

Approved: For Chairperson, Historic Preservation Commission

Disapproved: Signature: Date:

Application/Permit No.: 689642 Date Filed: Date Issued:

Edit 6/21/99

SEE REVERSE SIDE FOR INSTRUCTIONS

6

THE FOLLOWING ITEMS MUST BE COMPLETED AND THE REQUIRED DOCUMENTS MUST ACCOMPANY THIS APPLICATION.

1. WRITTEN DESCRIPTION OF PROJECT

   a. Description of existing structure(s) and environmental setting, including their historical features and significance:

   b. General description of project and its effect on the historic resource(s), the environmental setting, and, where applicable, the historic district:

   This project is to install 29 solar modules on the South Facing roof. This roof does not face the street.

2. SITE PLAN

   Site and environmental setting, drawn to scale. You may use your plat. Your site plan must include:

   a. the scale, north arrow, and date;

   b. dimensions of all existing and proposed structures; and

   c. site features such as walkways, driveways, fences, ponds, streams, trash dumpsters, mechanical equipment, and landscaping.

3. PLANS AND ELEVATIONS

   You must submit 2 copies of plans and elevations in a format no larger than 11" x 17". Plans on 8 1/2" x 11" paper are preferred.

   a. ***Schematic construction plans***, with marked dimensions, indicating location, size and general type of walls, window and door openings, and other fixed features of both the existing resource(s) and the proposed work.

   b. Elevations (facades), with marked dimensions, clearly indicating proposed work in relation to existing construction and, when appropriate, context. All materials and fixtures proposed for the exterior must be noted on the elevations drawings. An existing and a proposed elevation drawing of each facade affected by the proposed work is required.

4. MATERIALS SPECIFICATIONS

   General description of materials and manufactured items proposed for incorporation in the work of the project. This information may be included on your design drawings.

5. PHOTOGRAPHS

   a. Clearly labeled photographic prints of each facade of existing resource, including details of the affected portions. All labels should be placed on the front of photographs.

   b. Clearly label photographic prints of the resource as viewed from the public right-of-way and of the adjoining properties. All labels should be placed on the front of photographs.

6. TREE SURVEY

   If you are proposing construction adjacent to or within the dripline of any tree 6" or larger in diameter (at approximately 4 feet above the ground), you must file an accurate tree survey identifying the size, location, and species of each tree of at least that dimension.

7. ADDRESSES OF ADJACENT AND CONFRONTING PROPERTY OWNERS

   For ALL projects, provide an accurate list of adjacent and confronting property owners (not tenants), including names, addresses, and zip codes. This list should include the owners of all lots or parcels which adjoin the parcel in question, as well as the owner(s) of lot(s) or parcel(s) which lie directly across the street/highway from the parcel in question.

PLEASE PRINT (IN BLUE OR BLACK INK) OR TYPE THIS INFORMATION ON THE FOLLOWING PAGE.
PLEASE STAY WITHIN THE GUIDES OF THE TEMPLATE, AS THIS WILL BE PHOTOCOPIED DIRECTLY ONTO MAILING LABELS.

HAWP APPLICATION: MAILING ADDRESSES FOR NOTIFING
[Owner, Owner's Agent, Adjacent and Confronting Property Owners]

Owner's mailing address	Owner's Agent's mailing address
6 Hickory Ave Takoma Park, MD 20912	PO Box 1340 Frederick, MD 21702
Adjacent and confronting Property Owners mailing addresses	
4 Hickory Ave Takoma Park, MD 20912	8 Hickory Ave Takoma Park, MD 20912
1 Hickory Ave Takoma Park, MD 20912	

City of Takoma Park

Housing & Community Development

Telephone: (301) 891-7119
Fax: (301) 270-4568

7500 Maple Avenue
Takoma Park, MD 20912

September 29, 2014

Department of Permitting Services
255 Rockville Pike, 2nd Floor
Rockville, Maryland 20850-4166
Fax 240-777-6398

PERMIT LETTER VALID FOR ONE YEAR FROM DATE OF ISSUE

Property Owner Name:	Larry Fischel
Property Owner's Representative:	Sustainable Energy Systems (Zayn Bradley)
Email or FAX	zayn@sustainableenergysystems.net
Location of Requested Permit:	6 Hickory Avenue Takoma Park, MD 20912
Proposed Scope of Work:	Installing roof-mounted (7.8 kW) array

To the Department of Permitting Services:

The above property owner or owner's representative has notified the City of Takoma Park of plans to apply for building permit(s) for the above summarized construction project. The property owner or representative has been informed that the City of Takoma Park has regulations and city permit requirements that may apply to their project. The applicant has been advised that failure to comply with the City's permitting requirements could result in the issuance of a Municipal Infraction Citation and other administrative actions within the provisions of the law.

The issuance of this letter does not indicate approval of the project. The City retains the right to review and comment on project plans during the Montgomery County review process.

Sincerely,

Erkin Ozberk
Planner

Real Property Data Search (w4)

Guide to searching the database

Search Result for MONTGOMERY COUNTY

View Map | View GroundRent Redemption | View GroundRent Registration

Account Identifier: District - 13 Account Number - 01079133

Owner Information

Owner Name:	FISCHEL LAURENCE R &	**Use:**	RESIDENTIAL
		Principal Residence:	YES
Mailing Address:	LORRAINE S GILBERT 6 HICKORY AVE TAKOMA PARK MD 20912	**Deed Reference:**	/07321/ 00141

Location & Structure Information

Premises Address:	6 HICKORY AVE TAKOMA PARK 20912-0000	**Legal Description:**	PT 2 B F G

Map:	Grid:	Parcel:	Sub District:	Subdivision:	Section:	Block:	Lot:	Assessment Year:	Plat No:
JN51	0000	0000		0025		20	P1	2013	Plat Ref:

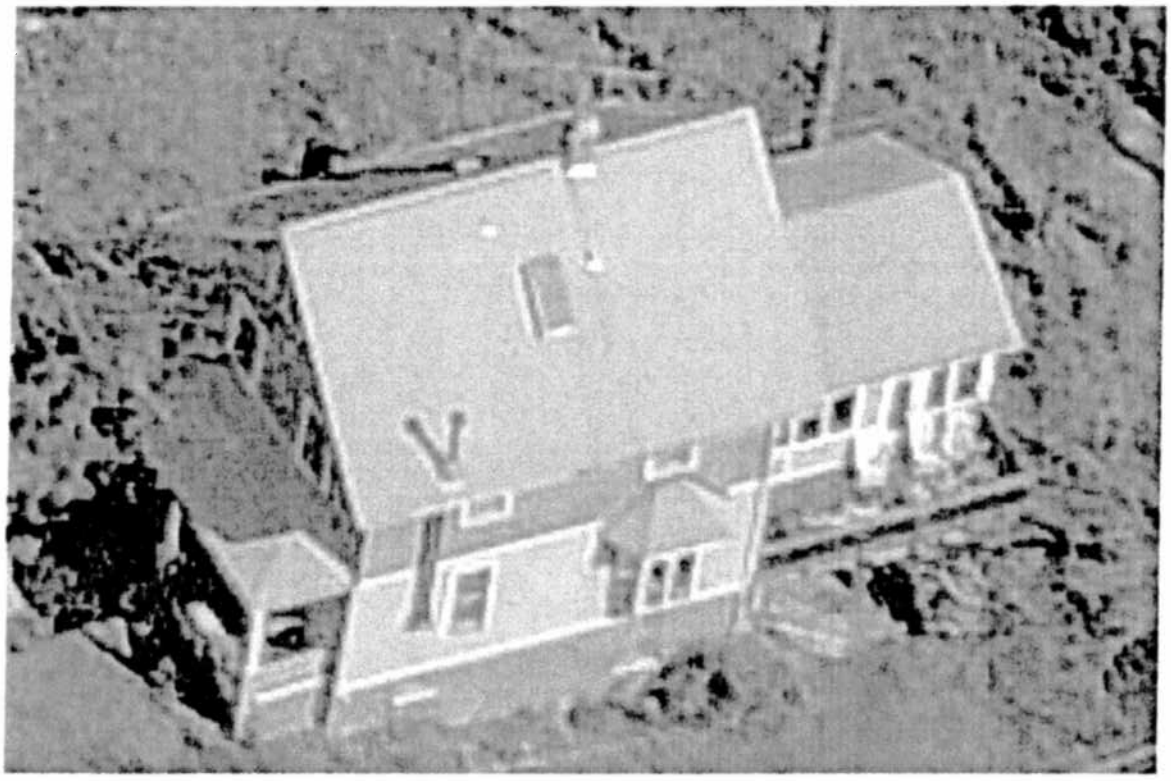
Special Tax Areas:		**Town:**	TAKOMA PARK
		Ad Valorem:	
		Tax Class:	74

Primary Structure Built	Above Grade Enclosed Area	Finished Basement Area	Property Land Area	County Use
1918	1,816 SF		6,250 SF	111

Stories	Basement	Type	Exterior	Full/Half Bath	Garage	Last Major Renovation
2	YES	STANDARD UNIT	FRAME	1 full	1 Attached	

Value Information

	Base Value	Value As of 01/01/2013	Phase-in Assessments As of 07/01/2014	As of 07/01/2015



SUSTAINABLE ENERGY SYSTEMS LLC

SOLAR ENERGY DESIGN - INSTALLATION - SERVICE

WWW.SUSTAINABLEENERGYSYSTEMS.NET

Location: 6 Hickory Ave, Tacoma MD.

Array Size: 8.7 kW

Azimuth: 155°

Pitch: 35°

Estimated Production Year 1: 9,347 kWh

REMARKS	DATE	REV. NO.

SUSTAINABLE ENERGY SYSTEMS

DRAWN BY: RJB DATE:	DRAWING TITLE	
VERSION:	MODEL	SHEET NO.

LARRY FISCHEL
6 HICKORY AVE.
TAKOMA PARK, MD 20912
301-270-3145

X SITE PLAN

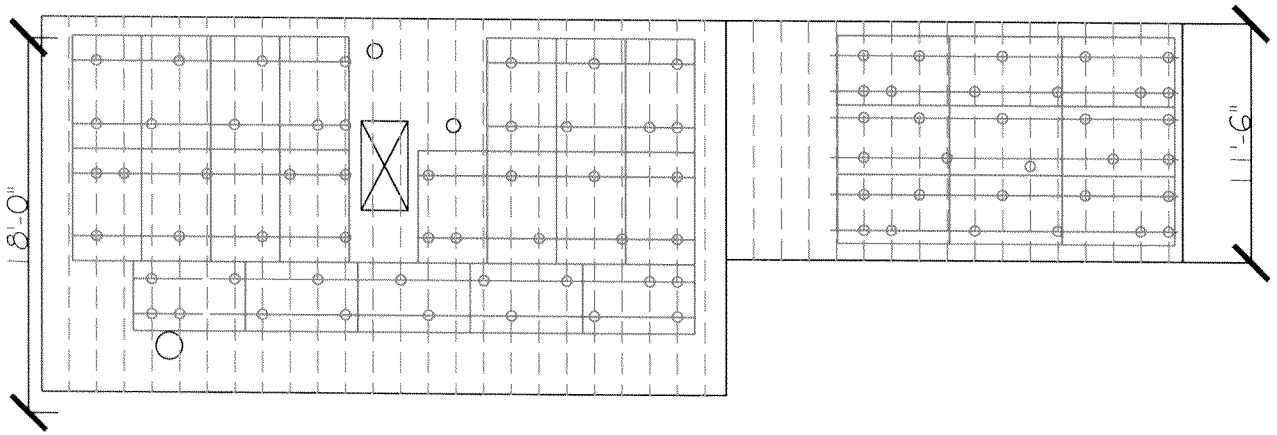
HICKORY AVE

L-foot Penetration

Solar Module

Rafter

Rail



ROOF 2 SPECS

RAFTER: 2 x 8 RAFTER
RAFTER SPAN: 11'6"'
RAFTER SPACING: 16"
ROOF MATERIAL: Asphalt

ARRAY 2 SPECS

NUMBER OF MODULES: 6
TOTAL MODULE WEIGHT: 285.6 LBS
RACKING WEIGHT: 45.70 LBS
ARRAY WEIGHT: 331.30 LBS
ARRAY AREA: 109.98 SQFT
ARRAY DEAD LOAD: 3.01 LBS/SQFT
NUMBER OF MOUNTS: 16
LOAD PER MOUNT: 20.70 LBS
ROOF PITCH: 35 degrees
NUMER OF FLOORS: 2

ROOF 1 SPECS

RAFTER: 2 x 8 RAFTER
RAFTER SPAN: 18'
RAFTER SPACING: 16"
ROOF MATERIAL: Asphalt

ARRAY 1 SPECS

NUMBER OF MODULES: 23
TOTAL MODULE WEIGHT: 1094.8 LBS
RACKING WEIGHT: 175.16 LBS
ARRAY WEIGHT: 1269.97 LBS
ARRAY AREA: 421.59 SQFT
ARRAY DEAD LOAD: 3.01 LBS/SQFT
NUMBER OF MOUNTS: 52
LOAD PER MOUNT: 24.42 LBS
ROOF PITCH: 35 degrees
NUMER OF FLOORS: 2

STRUCTURAL NOTES:

1. MOUNTS ARE APPROXIMATE LOCATION BUT ACCURATELY SPACED

2. MOUNTS SHOULD BE STAGGERED WHEN POSSIBLE TO EVENLY DISTRIBUTE LOAD AMONGST RAFTERS

3. DO NOT SPLICE RAILS IN MIDDLE 50% OF SPAN BETWEEN TWO MOUNTS

4. ON TRUSS ROOF SYSTEMS, KEEP ATTACHMENTS 6" MIN. FROM NAIL PLATES

MODULE SPECS

(29) Silevo 300 watt
MODULE WEIGHT: 41.88 LBS
MODULE LENGTH: 65.94"
MODULE WIDTH: 62.44"

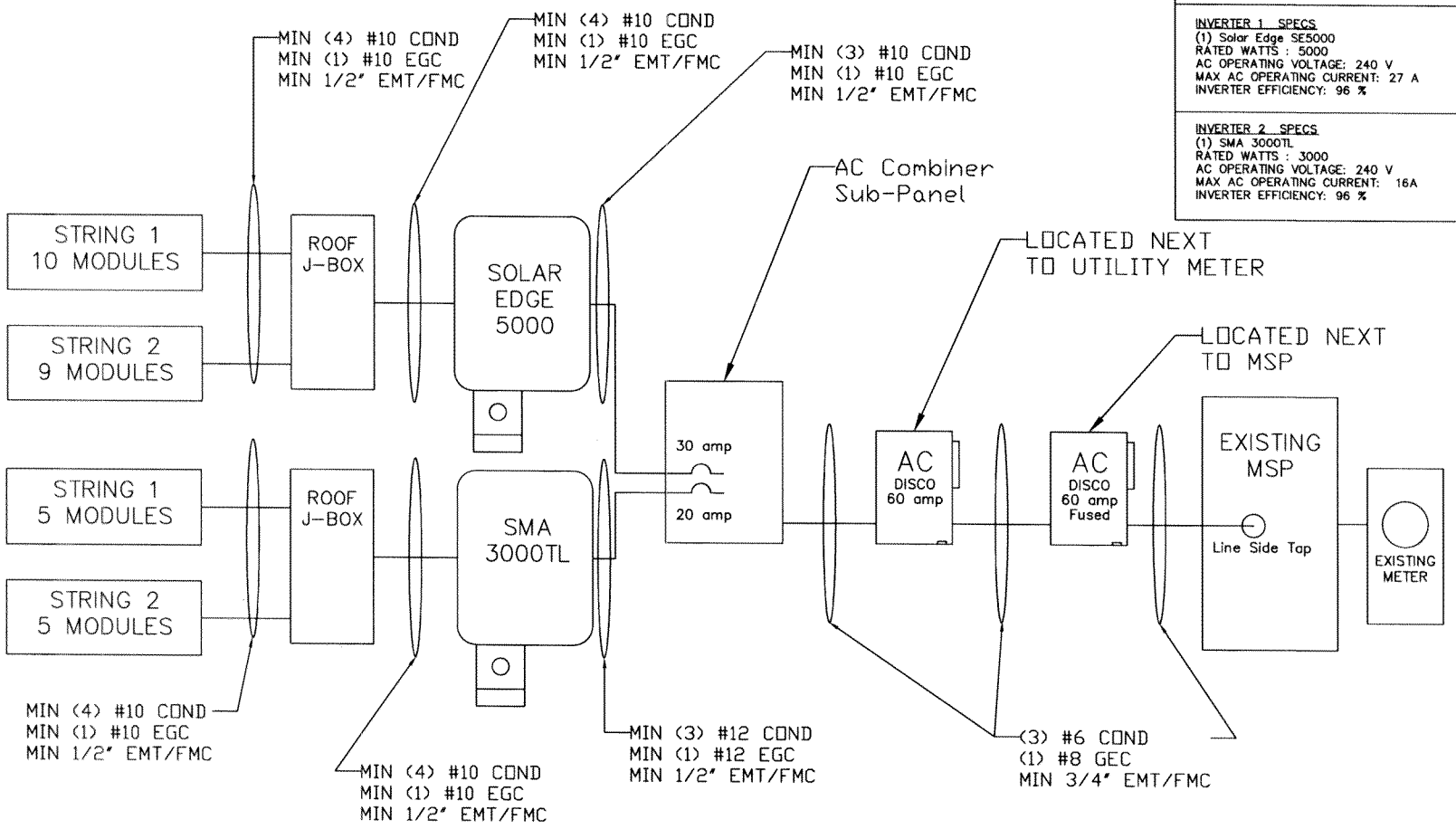
LARRY FISCHEL
6 Hickory Ave.
Takoma Park, MD 20912
301 270 3145

X ARRAY LAYOUT
SCALE: 1/4" = 1'-0"

REMARKS | DATE | REV. NO.

SUSTAINABLE ENERGY SYSTEMS

SHEET NO. | MODEL | VERSION: | DRAWN BY: RJB | DATE: | DRAWING TITLE



MODULE ELECTRICAL SPECS
(29) SILEVO 300 WATT
SHORT CIRCUIT CURRENT (Isc): 4.52 A
OPEN CIRCUIT VOLTAGE (Voc): 64.5 V
OPERATING CURRENT (IMP): 4.16 A
OPERATING VOLTAGE (VMP): 52.7 V

INVERTER 1 SPECS
(1) Solar Edge SE5000
RATED WATTS : 5000
AC OPERATING VOLTAGE: 240 V
MAX AC OPERATING CURRENT: 27 A
INVERTER EFFICIENCY: 96 %

INVERTER 2 SPECS
(1) SMA 3000TL
RATED WATTS : 3000
AC OPERATING VOLTAGE: 240 V
MAX AC OPERATING CURRENT: 16A
INVERTER EFFICIENCY: 96 %

ELECTRICAL NOTES:
1. ALL EQUIPMENT IS LISTED FOR USE.
2. INSTALLER TO FOLLOW NEC AND LOCAL JURISDICTION GUIDELINES.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV).
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATION.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LINE SIDE AND THE AC UTILITY WIRES ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 600VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED WITH TIN PLATED DIRECT BURIAL RATED LAY IN LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE CONDITIONS.

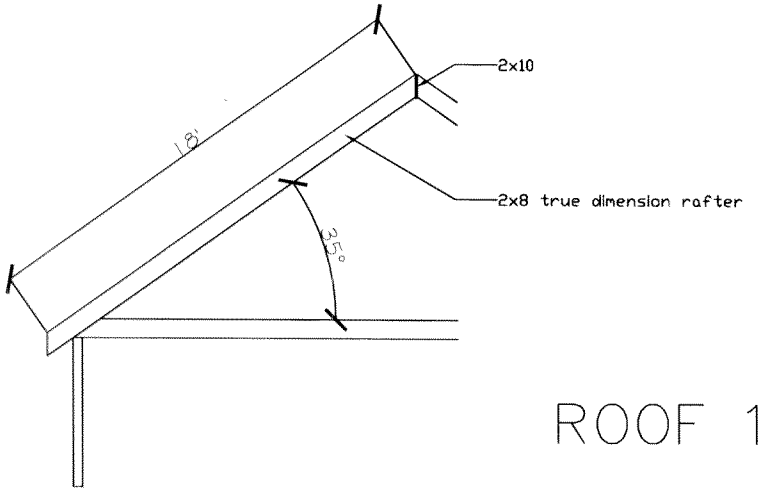
LARRY FISCHEL
6 Hickory Ave.
Takoma Park, MD 20912
301 270 3145

REMARKS | REV. NO. | DATE

SUSTAINABLE ENERGY SYSTEMS

VERSION:
DRAWN BY: RJB
DATE:
MODEL
DRAWING TITLE
SHEET NO.

15



ROOF 1

X SECTION

SCALE: 3/8" = 1'-0"

ROOF 2 SPECS

RAFTER: 2 x 8 RAFTER
RAFTER SPAN: 11'6"'
RAFTER SPACING: 16"
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ARRAY 2 SPECS

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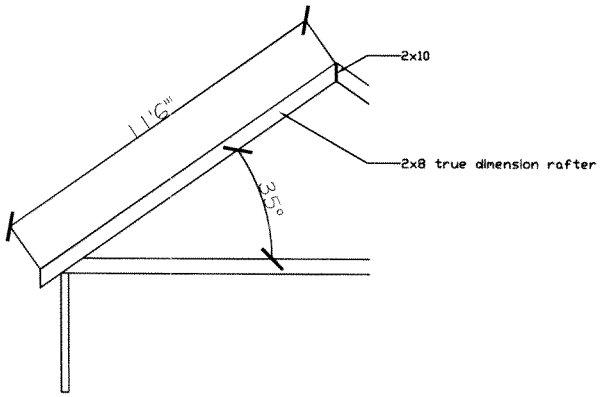

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SUSTAINABLE ENERGY SYSTEMS

VERSION:
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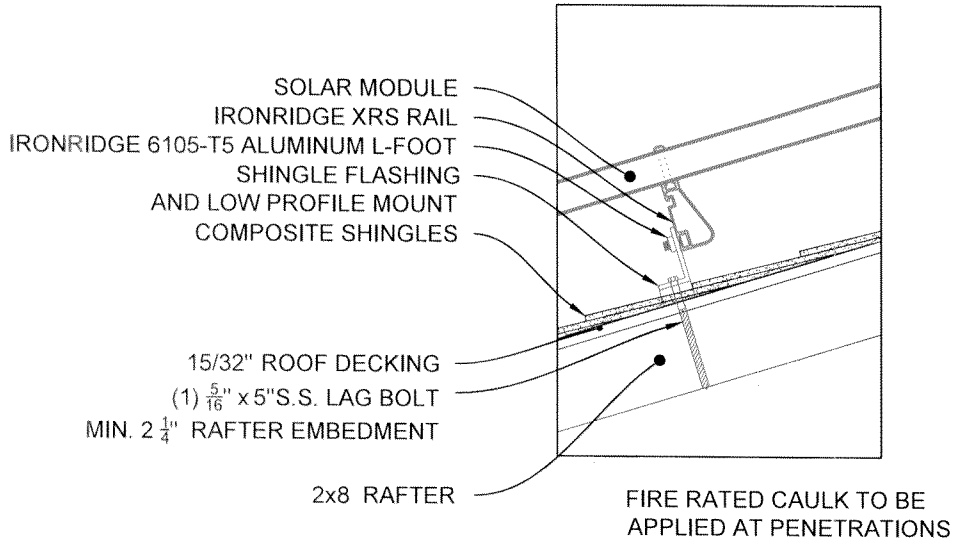
DRAWING TITLE
SHEET NO.

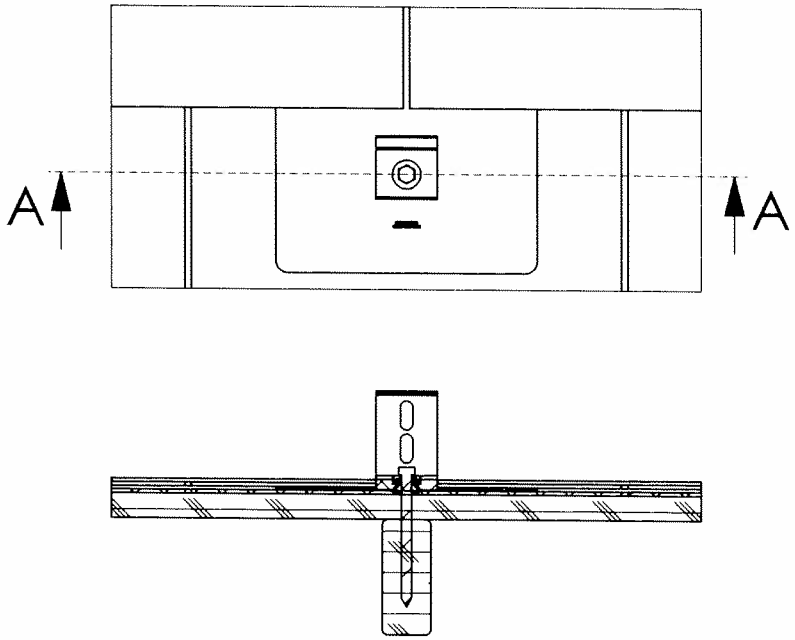
61

REFER TO ARRAY SPECS FOR ROOF PITCH

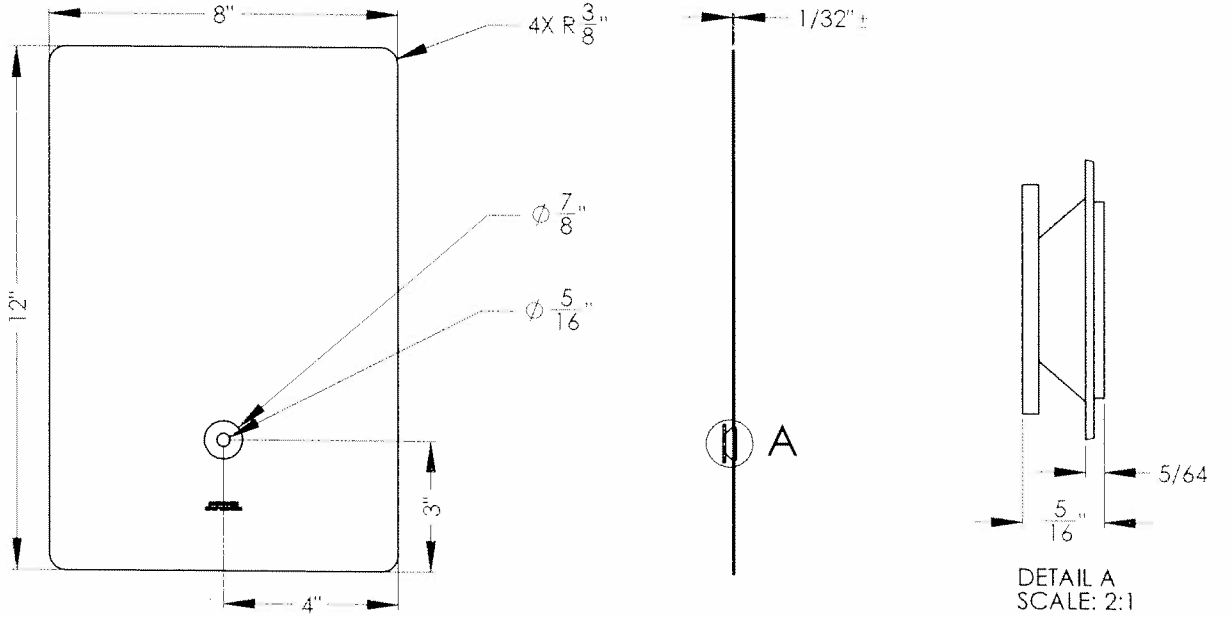


FIRE RATED CAULK TO BE
APPLIED AT PENETRATIONS

EcoFasten Solar

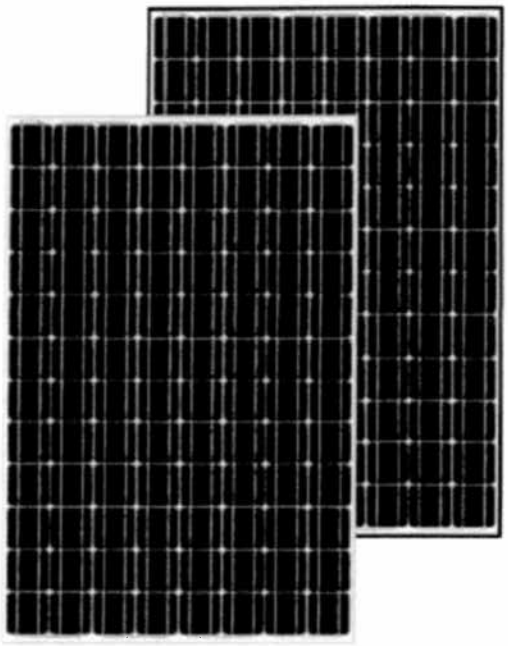


SECTION A-A



Finish Options
BLK = Matte Black
MLL = Mill Finish

Silevo's proprietary hybrid tunneling junction cell technology combines **High Efficiency**, **Exceptional Energy Harvest**, and **Manufacturing Excellence** to deliver maximum return for your solar investment.



18.3% = Superior Efficiency

With efficiencies up to 18.3%, Silevo's Triex solar modules are amongst the highest in the industry. Higher efficiency delivers more power in less space.

-0.27%/°C + ARC = More Energy Output

Triex solar modules can generate up to 12% more energy than conventional solar modules due to their low temperature coefficient which aids performance in warm weather, and anti-reflective glass which boosts performance in low-light conditions.

6 Steps | Cu = Manufacturing Excellence

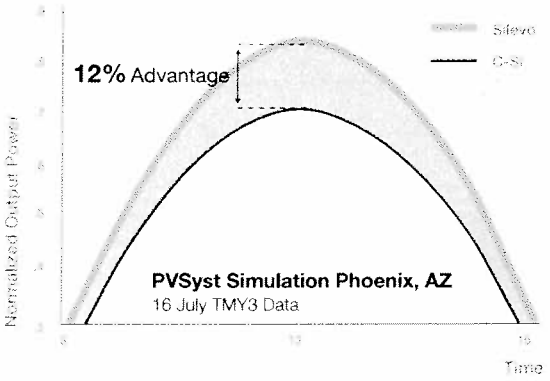
Silevo's Triex technology incorporates premium materials with 6 core automated manufacturing steps to deliver value and performance. Triex modules are virtually LID & PID-free.

TRIEX U 305 WATT 18.3%

25 year linear power warranty &
10 year product warranty

ISO 9001 & 14001 certified production facility.
IEC 61215, IEC 61730 & UL 1703 certified.
Salt Mist test severity Level 1 certified.

DAILY POWER ADVANTAGE



Silevo's Triex U-Series solar modules incorporate 96 individual hybrid tunneling-junction solar cells which deliver high performance and reliability. Designed to meet the demanding requirements of commercial and utility-scale solar projects, U-Series modules can also be used in high performance residential applications. Available with either silver or black frame option.

Triex™ U305 Watt, 18.3% Module

Electrical Data (at STC)

Note: STC: Air Mass 1.5, Irradiance 1000W/m2, cell temperature 25C

	U290	U295	U300	U305
Maximum Power (Pmax) [W]	290	295	300	305
Max Power Voltage (Vmp) [V]	56.2	56.6	57.0	57.5
Max Power Current (Imp) [A]	5.19	5.23	5.27	5.32
Open Circuit Voltage (Voc) [V]	68.9	69.2	69.5	69.8
Short Circuit Current (Isc) [A]	5.59	5.62	5.65	5.68
Output Power Tolerance [Wp]	0/+5	0/+5	0/+5	0/+5
Total Area Module Efficiency	17.4%	17.7%	17.9%	18.3%

Electrical Data (at NOTC)

Note: NOTC: Air Mass 1.5, Irradiance 800W/m2, Air temperature 20C, Wind speed 1m/ss

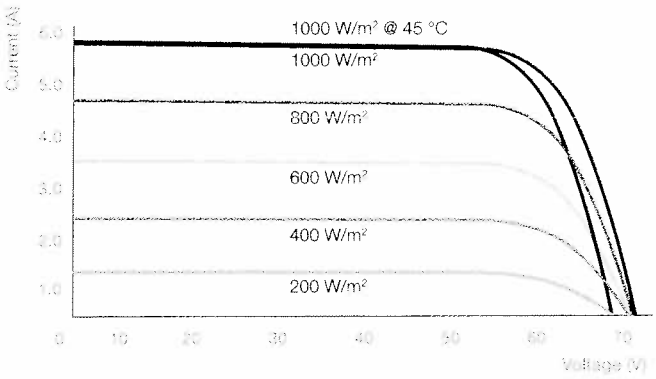
Maximum Power (Pmax) [W]	213.1	216.3	219.5	223.6
Max Power Voltage (Vmp) [V]	52.0	52.4	52.7	53.2
Max Power Current (Imp) [A]	4.10	4.13	4.16	4.20
Open Circuit Voltage (Voc) [V]	64.0	64.3	64.5	64.8
Short Circuit Current (Isc) [A]	4.47	4.50	4.52	4.55

Electrical Data (at Low Irradiance)

Note: Low irradiance: Air Mass 1.5, Irradiance 200W/m2, cell temperature 25C

Maximum Power (Pmax) [W]	56.6	57.2	57.8	58.3
Max Power Voltage (Vmp) [V]	53.4	53.7	53.9	54.1
Max Power Current (Imp) [A]	1.06	1.07	1.07	1.08
Open Circuit Voltage (Voc) [V]	64.8	65.0	65.3	65.6
Short Circuit Current (Isc) [A]	1.14	1.15	1.15	1.16

I-V Curve U305



Certifications

Fire Safety Classification	Class C
Certifications	UL 1703, CEC, IEC61215, IEC61730

Warranty

Warranty	10 Year Limited Product Warranty
Performance Guarantee	25 Year linear (please refer to warranty for details)

Temperature Ratings

Temperature (NOCT) [C]	46+/-2
Temperature Coefficient Pmax [%/°C]	-0.27
Temperature Coefficient Voc [%/°C]	-0.262
Temperature Coefficient Isc [%/°C]	0.04

Maximum Ratings

Maximum System Voltage [V]	1000V DC (IEC) / 600V DC (UL)
Maximum Fuse Rating	12A
Temperature	Negative 40°C to Positive 85°C

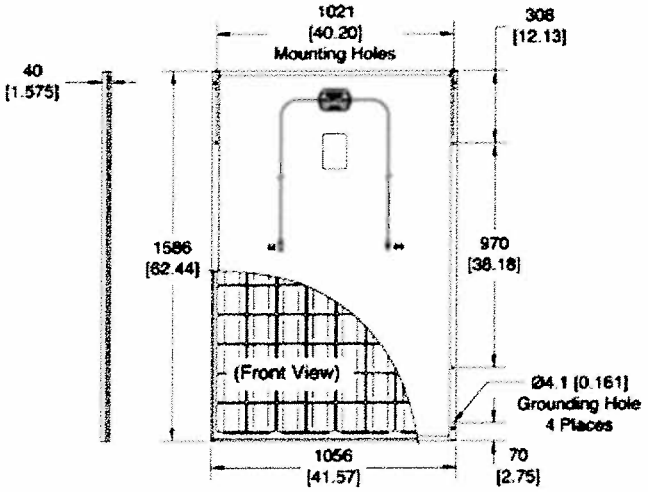
Mechanical Data

Solar Cells	96 Triex 125mm x 125mm cells
Dimensions	1586mm x 1056mm x 40mm
Weight	19 kgs
Front Glass	ARC 3.2mm High Transmission Tempered
Front Load Test (Snow)	5400 Pa
Rear Static Load Test (Wind)	2400 Pa
Junction Box	IP65 rated with 4 bypass diodes
Output Cables	1000mm / MC4 Connectors
Frame	Black Aluminum (Silver option)

Packaging Data

Modules per Pallet	25
Modules per 40' GP Container	350
Modules per 40' HQ Container	700

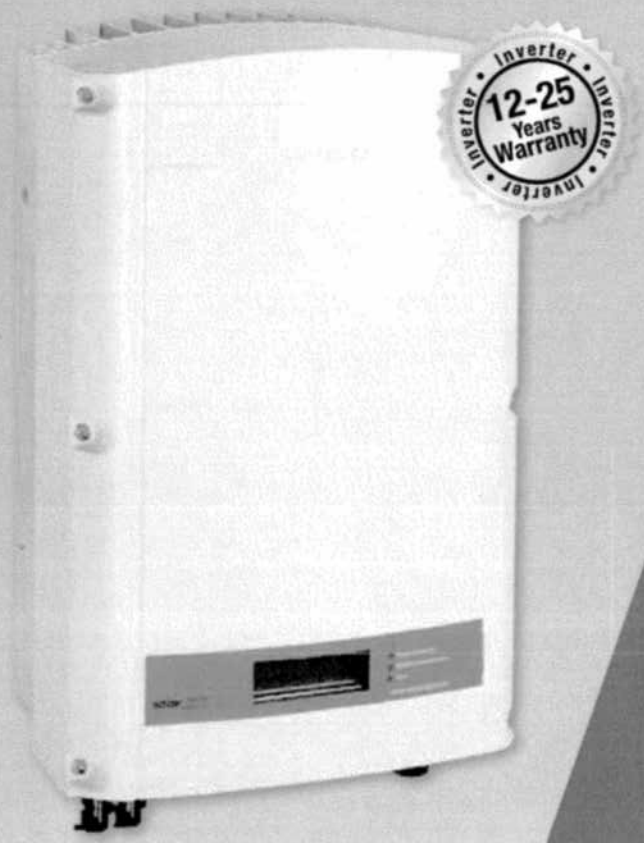
Dimensions



solaredge

SolarEdge Single Phase Inverters

SE2200 - SE6000



Specifically designed to work with power optimizers

- Superior efficiency (97.6%)
- Small, lightweight and easy to install
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- IP65 – Outdoor and indoor installation
- Fixed voltage inverter, DC/AC conversion only

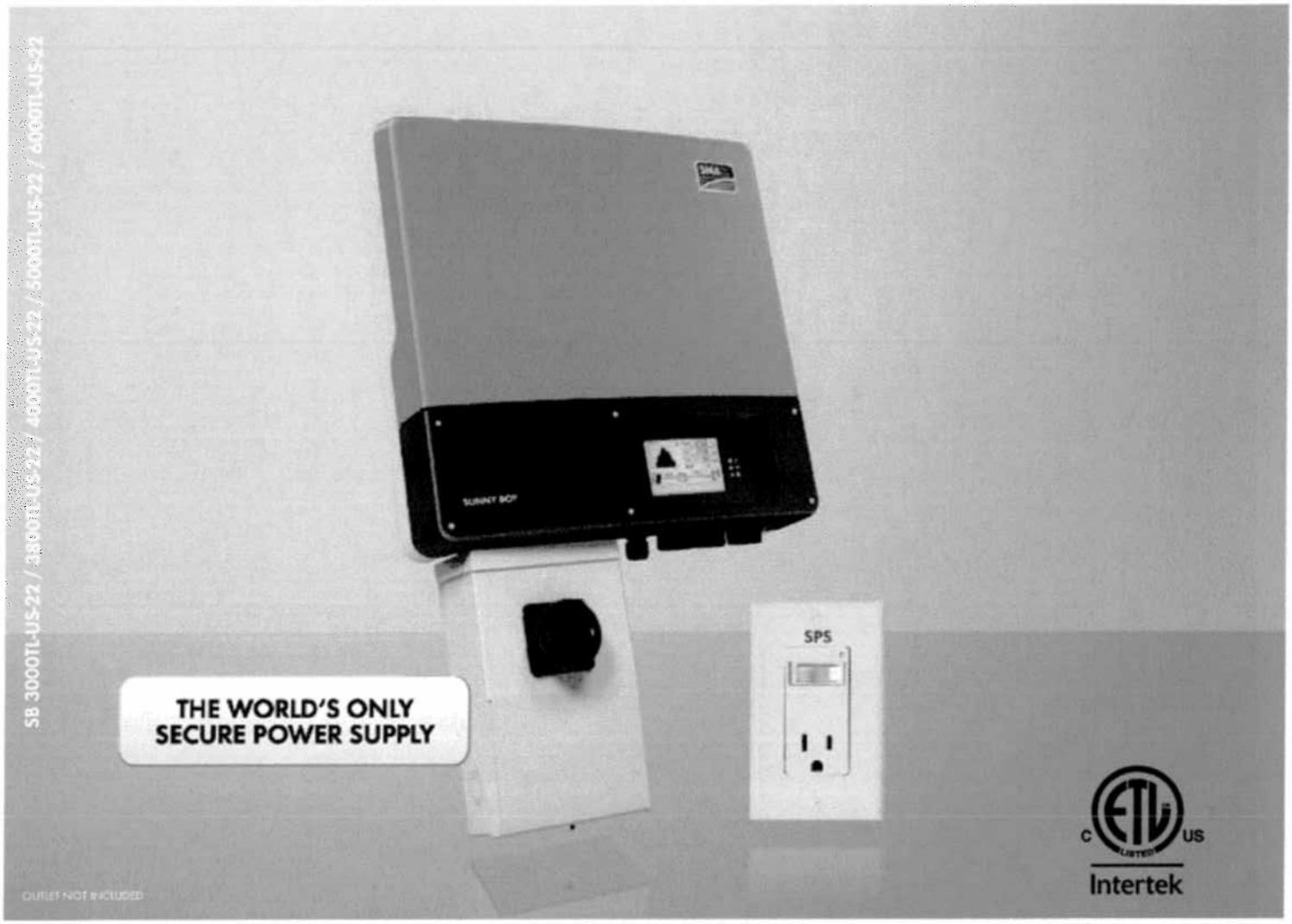
Single Phase Inverters

SE2200 - SE6000

	SE2200	SE3000	SE3500	SE4000	SE5000	SE6000	
OUTPUT							
Rated AC Power Output	2200	3000	3500	4000	5000	6000	VA
Maximum AC Power Output	2200	3000	3500	4000	5000	6000	VA
AC Output Voltage (Nominal)	220 /230						Vac
AC Output Voltage Range	184 - 264.5						Vac
AC Frequency (Nominal)	50 / 60 ± 5						Hz
Maximum Continuous Output Current	12	16.5*	19.5*	22*	27	27	A
Residual Current Detector / Residual Current Step Detector	300 / 30						mA
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes						
INPUT							
Recommended Maximum DC Power** (Module STC)	3000	3750	4350	5000	6250	7500	W
Transformer-less, Ungrounded	Yes						
Maximum Input Voltage	500						Vdc
Nominal DC Input Voltage	350						Vdc
Maximum Input Current	8.5	11.5	13.5	15.5	19.5	23	Adc
Reverse-Polarity Protection	Yes						
Ground-Fault Isolation Detection	600kΩ Sensitivity						
Maximum Inverter Efficiency	97.6						%
European Weighted Efficiency	97.6	97.6	97.5	97.5	97.4	97.4	%
Nighttime Power Consumption	< 2.5						W
ADDITIONAL FEATURES							
Supported Communication Interfaces	RS485, RS232, Ethernet, Zigbee (optional)						
STANDARD COMPLIANCE							
Safety	IEC-62103 (EN50178), IEC-62109						
Grid Connection Standards	VDE 0126-1-1, VDE-AR-N-4105, AS-4777, RD-1663 , DK 5940						
Emissions	IEC61000-6-2, IEC61000-6-3, IEC61000-3-11, IEC61000-3-12, FCC part15 class B						
RoHS	Yes						
INSTALLATION SPECIFICATIONS							
AC Output	Cable Gland - diameter 9-16						mm
DC Input	1 MC4 pair			2 MC4 pairs			
Dimensions (HxWxD)	540 x 315 x 172			540 x 315 x 191			mm
Weight	20.2			21.7			kg
Cooling	Natural Convection						
Noise	< 50						dBA
Operating Temperature Range	-20 - +50 (M40 version -40 - +50)						˚C
Protection Rating	IP65 - Outdoor and Indoor						
Bracket Mounted (Bracket Provided)							

* For inverters with an AC current limit of 16A please refer to the "SE3000-4000-16A inverter" datasheet.

** Limited to 125% for locations where the yearly average high temperature is above 25˚C and to 135% for locations where it is below 25˚C. For detailed information, refer to http://www.solaredge.us/files/pdfs/inverter_dc_oversizing_guide.pdf



Certified
- UL 1741 and 1699B compliant
- Integrated AFCI meets the requirements of NEC 2011 690.11

Innovative
- Secure Power Supply provides daytime power during grid outages

Powerful
- 97.6% maximum efficiency
- Wide input voltage range
- Shade management with OptiTrac Global Peak MPP tracking

Flexible
- Two MPP trackers provide numerous design options
- Extended operating temperature range

SUNNY BOY 3000TL-US / 3800TL-US / 4000TL-US / 5000TL-US / 6000TL-US

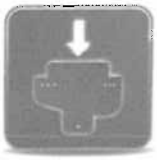
Setting new heights in residential inverter performance

The Sunny Boy 3000TL-US/3800TL-US/4000TL-US/5000TL-US/6000TL-US represents the next step in performance for UL certified inverters. Its transformerless design means high efficiency and reduced weight. Maximum power production is derived from wide input voltage and operating temperature ranges. Multiple MPP trackers and OptiTrac™ Global Peak mitigate the effect of shade and allow for installation at challenging sites. The unique Secure Power Supply feature provides daytime power in the event of a grid outage. High performance, flexible design and innovative features make the Sunny Boy TL-US series the first choice among solar professionals.

MADE IN THE USA OF U.S. AND IMPORTED PARTS

More efficient

Shade management



Easier

Broad temperature range

Secure Power Supply

Flexible communications

Technical data	Sunny Boy 3000TL-US		Sunny Boy 3800TL-US	
	208 V AC	240 V AC	208 V AC	240 V AC
Input (DC)				
Max. usable DC power (@ cos φ = 1)	3200 W		4200 W	
Max. DC voltage	600 V		600 V	
Rated MPPT voltage range	175 - 480 V		175 - 480 V	
MPPT operating voltage range	125 V - 500 V		125 V - 500 V	
Min. DC voltage / start voltage	125 V / 150 V		125 V / 150 V	
Max. input current / per MPP tracker	18 A / 15 A		24 A / 15 A	
Number of MPP trackers / strings per MPP tracker	2 / 2			
Output (AC)				
AC nominal power	3000 W		3330 W	3840 W
Max. AC apparent power	3000 VA		3330 VA	3840 VA
Nominal AC voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●
AC voltage range	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V
AC grid frequency; range	60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz	
Max. output current	15 A		16 A	
Power factor (cos φ)	1		1	
Output phases / line connections	1 / 2		1 / 2	
Harmonics	< 4%		< 4%	
Efficiency				
Max. efficiency	97.2%	97.6%	97.2%	97.5%
CEC efficiency	96.5%	96.5%	96.5%	97.0%
Protection devices				
DC disconnection device	●			
DC reverse-polarity protection	●			
Ground fault monitoring / Grid monitoring	● / ●			
AC short circuit protection	●			
All-pole sensitive residual current monitoring unit	●			
Arc fault circuit interrupter (AFCI) compliant to UL 1699B	●			
Protection class / overvoltage category	I / IV			
General data				
Dimensions (W / H / D) in mm (in)	490 / 519 / 185 (19.3 / 20.5 / 7.3)			
DC Disconnect dimensions (W / H / D) in mm (in)	187 / 297 / 190 (7.4 / 11.7 / 7.5)			
Packing dimensions (W / H / D) in mm (in)	617 / 597 / 266 (24.3 / 23.5 / 10.5)			
DC Disconnect packing dimensions (W / H / D) in mm (in)	370 / 240 / 280 (14.6 / 9.4 / 11.0)			
Weight / DC Disconnect weight	24 kg (53 lb) / 3.5 kg (8 lb)			
Packing weight / DC Disconnect packing weight	27 kg (60 lb) / 3.5 kg (8 lb)			
Operating temperature range	-40 °C ... +60 °C (-40 °F ... +140 °F)			
Noise emission (typical)	≤ 25 dB(A)		< 25 dB(A)	
Internal consumption at night	< 1 W		< 1 W	
Topology	Transformerless		Transformerless	
Cooling concept	Convection		Convection	
Electronics protection rating	NEMA 3R		NEMA 3R	
Features				
Secure Power Supply	●		●	
Display: graphic	●		●	
Interfaces: RS485 / Speedwire/Webconnect	o/o		o/o	
Warranty: 10 / 15 / 20 years	●/o/o		●/o/o	
Certificates and permits (more available on request)	UL 1741, UL 1998, UL 1699B, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA C22.2 107.1-1			
NOTE: US inverters ship with gray lids				
Type designation	SB 3000TL-US-22		SB 3800TL-US-22	

Technical data continued on back

Introduction

IronRidge provides a comprehensive platform for designing a wide variety of photovoltaic systems for roof mounting applications. Due to its modular architecture, it can handle nearly all commercially available PV modules and layout designs. The IronRidge Roof Mount provides an all-in-one mounting solution, with the roof attachment FlashFoot, XR rails, and integrated grounding. IronRidge products are engineered to last in the most extreme weather conditions and have been installed in every continent in the world.

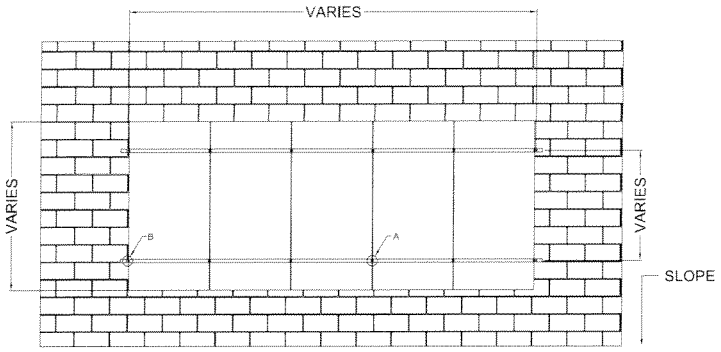
Technical Specifications

Below is a brief summary of the technical specifications of the IronRidge Roof Mount platform. More detail will be provided in the following pages. If there is additional information you require that is not listed in this Engineering Design Guide, please do not hesitate to contact us at support@ironridge.com.

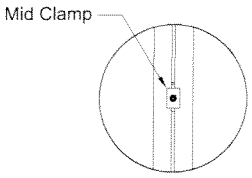
Allowable Roof Slope	0 to 45 Degrees	**Warranty**	20 Year
Span Lengths	Up to 12'	**Tilt Legs**	Yes (10" to 40")
Rail Lengths	Standard & Custom	**Adjustable Tilt Legs**	Up to 45 Degrees
Rail Finish	Clear, Black	**Adjustable L Feet**	1-1/8" vertical adjustability
Building Height	Certified to 60'	**Splices**	Patent-pending internal
Max Wind Speed	170 Mph (for 7-10)	**Stand-offs**	Yes (3", 4", 6", 7")
Module Orientation	Landscape & Portrait	**Tilt Stand-offs**	Yes (3.75", 6", 9")
Wind Exposure	Category B, C & D	**Flashing**	FlashFoot (All-in-One Attachment)
Cantilever	40% of Maximum Span	**T-bolts**	Multiple Sizes
Max Ground Snow Load	90 psf	**Wire Clips**	Black Polycarbonate
Component Materials	Aluminum and Stainless Steel	**End Caps**	Black Polycarbonate
Hardware	Stainless Steel Fasteners	**Engineering Support**	Yes (P.E. Certified)

Assembly CAD Details

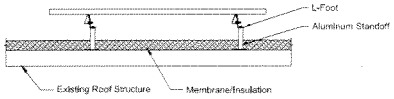
Download AutoCAD File | Download PDF



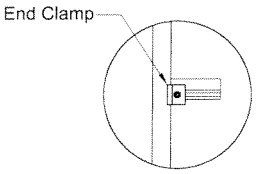
Typical Flush Mount Array - Plan View
1/2" = 1' -0"



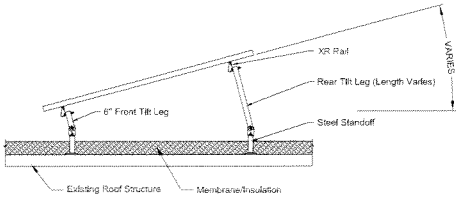
Detail A - Mid Clamp to Rail - Plan
3" = 1' -0"



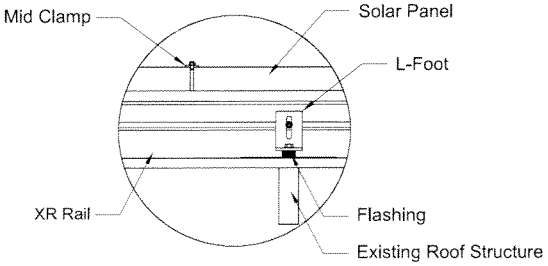
Section - Flush Mount - Flat Roof
3/4" = 1' -0"



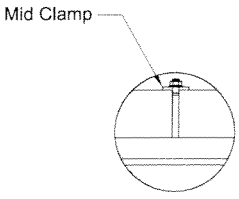
Detail B - End Clamp to Rail - Plan
3" = 1' -0"



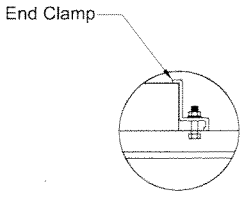
Section - Tilt Mount - Flat Roof
3/4" = 1' -0"



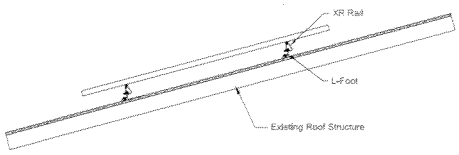
Detail C - Typical Roof Connection
3" = 1' -0"



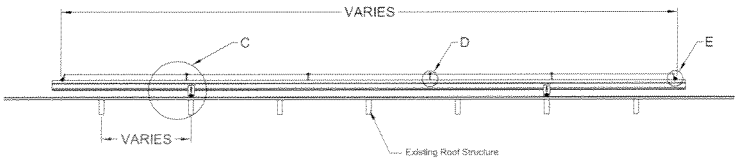
Detail D - Mid Clamp to Rail - Elevation
6" = 1' -0"



Detail E - End Clamp to Rail - Elev.
6" = 1' -0"



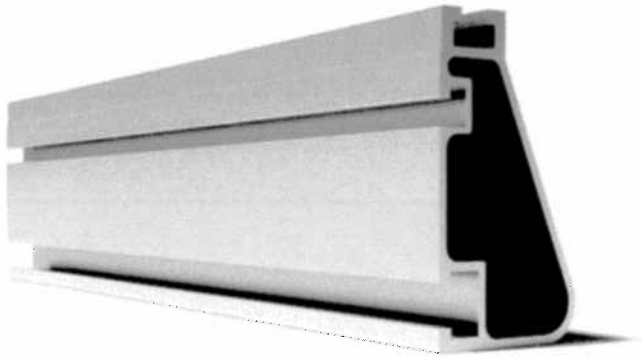
Section - Flush Mount - Sloped Roof
3/4" = 1' -0"



Typical Flush Mount Array - Elevation
3/4" = 1' -0"

XR1000 Rail

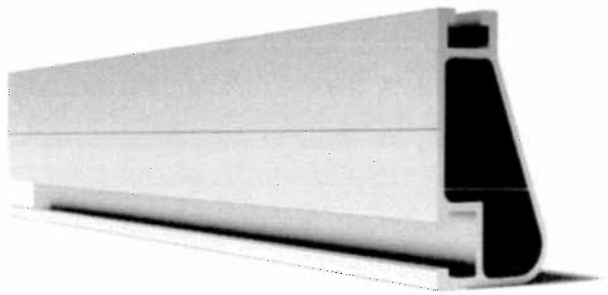
XR1000 is a heavyweight among solar mounting rails, built to handle extreme climates and spans 12 feet or more for commercial applications.



Property	Value
Material	6000 Series Aluminum
Finish	Clear Anodized
Beam Height	3.00"
Weight / Linear Foot	0.945 Lbs
Total Cross-Sectional Area	0.807 In^2
Section Modulus (X-axis)	0.530 In^3
Moment of Inertia (X-axis)	0.843 In^4
Moment of Inertia (Y-axis)	0.182 In^4
Torsional Constant	0.436 In^3
Polar Moment of Inertia	0.3299 In^4

XR100 Rail

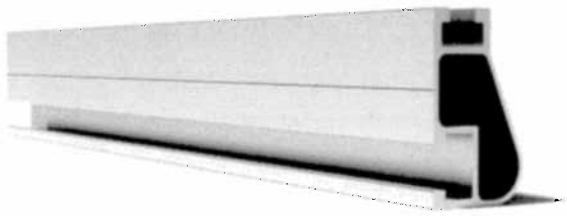
XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans.



Property	Value
Material	6000 Series Aluminum
Finish	Clear & Black Anodized
Beam Height	2.44"
Weight / Linear Foot	0.68 Lbs
Total Cross-Sectional Area	0.582 In^2
Section Modulus (X-axis)	0.297 In^3
Moment of Inertia (X-axis)	0.390 In^4
Moment of Inertia (Y-axis)	0.085 In^4
Torsional Constant	0.214 In^3
Polar Moment of Inertia	0.126 In^4

XR10 Rail

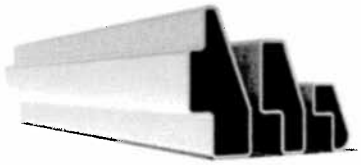
XR10 is a low-profile mounting rail, perfectly matched to regions without snow. It achieves 6 foot spans, while staying light and economical.



Property	Value
Material	6000 Series Aluminum
Finish	Clear Anodized
Beam Height	1.75"
Weight / Linear Foot	0.36 Lbs
Total Cross-Sectional Area	0.363 In^2
Section Modulus (X-axis)	0.136 In^3
Moment of Inertia (X-axis)	0.124 In^4
Moment of Inertia (Y-axis)	0.032 In^4
Torsional Constant	0.076 In^3
Polar Moment of Inertia	0.033 In^4

Internal Splice

IronRidge Rails are easy to extend with our patent-pending Internal Splices.



Property	Value
Material	6000 Series Aluminum
Finish	Mill
Length	12"
Hardware	2 SS Self-tapping Screws

End Clamp

IronRidge End Clamps secure PV modules to XR Rails using the top slot, independent upon the module's mounting holes.

Property	Value
Material	5000 & 6000 Series Aluminum
Finish	Mill & Black
Height	Varies depending on Module
Width	1.5"
Depth	1.5"
Weight	0.2 Lbs
Hardware	¼"-20 SS Nut and Bolt

Mid Clamp

IronRidge Mid Clamps secure PV modules to the rail when there are multiple modules in a row.

Property	Value
Material	5000 Series Aluminum
Finish	Mill & Black
Spacing between Modules	¼"
Width	1"
Depth	1.5"
Weight	0.2 Lbs
Hardware	¼"-20 SS Nut and Bolt

Grounding Mid Clamp

Grounding Mid Clamps pierce through anodized coatings to ground array, being ETL listed to UL 2703.

Property	Value
Material	304 Stainless Steel
Finish	Mill & Black
Spacing between Modules	¼"
Width	1"
Depth	1.2"
Weight	0.3 Lbs
Hardware	¼"-20 SS Nut and Bolt