HISTORIC PRESERVATION COMMISSION STAFF REPORT

Address:	11 Montgomery Ave., Takoma Park	**Meeting Date:**	1/10/18
Resource:	Contributing Resource **Takoma Park Historic District**	**Report Date:**	1/03/18
Review:	HAWP	**Public Notice:**	12/28/17
Case Number:	37/03-18B	**Tax Credit:**	None
Applicant:	Marianna Diggs	**Staff:**	Dan Bruechert
Proposal:	Roof Solar Installation		

STAFF RECOMMENDATION:

Staff recommends that the HPC **approve** the HAWP application.

PROJECT DESCRIPTION

SIGNIFICANCE: Contributing Resource to the Takoma Park Historic District
STYLE: Colonial Revival
DATE: 1923

The subject property is a two-story, Colonial Revival, side gable house, three bays wide, with wood siding, and six-over-one sash windows.

PROPOSAL

The applicant proposes to install 16 solar photovoltaic panels on a racking system on the roof to the rear of the house.

APPLICABLE GUIDELINES:

When reviewing alterations and additions for new construction within the Takoma Park Historic District, decisions are guided by the *Takoma Park Historic District Design Guidelines* (Design Guidelines) and *Montgomery County Code Chapter 24A* (Chapter 24A).

Takoma Park Historic District Design Guidelines

There are two very general, broad planning and design concepts which apply to all categories. These are:

> 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 (it is expected that the majority of new additions will be reviewed for their impact on the overall district), and,
>
> The importance of assuring that additions and other changes to existing structures act to

reinforce and continue existing streetscape, landscape, and building patterns rather than to impair the character of the district.

Contributing Resources should receive a more lenient 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.

Some of the factors to be considered in reviewing HAWPs on Contributing Resources include:

All exterior alterations, including those to architectural features and details, should be generally consistent with the predominant architectural style and period of the resource and should preserve the predominant architectural features of the resource; exact replication of existing details and features is, however, not required,

Minor alterations to areas that do not directly front on a public right-of-way such as vents, metal stovepipes, air conditioners, fences, skylights, etc. – should be allowed as a matter of course; alterations to areas that do not directly front on a public way-of-way which involve the replacement of or damaged to original ornamental or architectural features are discouraged, but may be considered and approved on a case-by-case basis

Alterations to features that are not visible from the public right-of-way should be allowed as a matter of course

Montgomery County Code; Chapter 24A-8(b)

(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

STAFF DISCUSSION

The applicant is proposing to install 16 solar panels on the roof. These photovoltaic panels will be installed on the back side of the gable roof in a single array. The panels all face south.

Because of the placement of these panels at the rear of the house, coupled with the narrow side setback of the neighboring properties, the proposed panels will not be visible from Montgomery Ave. and will have no impact on the streetscape. While Staff and the HPC have shown a preference for flush mounted solar voltaic panes, the *Design Guidelines* state that alterations to features on Contributing Resources that are not visible from the public right-of-way and do not affect the streetscape should be approved as a matter of course. Staff supports approval of this HAWP.

STAFF RECOMMENDATION:

Staff recommends that the Commission **approve** the HAWP application as being consistent with Chapter 24A-8 and the Takoma Park Historic District Design Guidelines;

and with the general condition applicable to all Historic Area Work Permits that **the applicant will present *3 permit sets* of drawings to HPC staff for review and stamping prior to submission for permits (if applicable).** After issuance of the Montgomery County Department of Permitting Services (DPS) permit, the applicant will arrange for a field inspection by calling the DPS Field Services Office at 240-777-6370 prior to commencement of work and not more than two weeks following completion of work.

[redacted]

DPS - #8

HISTORIC PRESERVATION COMMISSION
301/563-3400

APPLICATION FOR HISTORIC AREA WORK PERMIT

Contact Email: projects@kenergysolar.com Contact Person: Antoine Grant
Daytime Phone No.: 202-812-6463

Tax Account No.: _____

Name of Property Owner: Marianna Diggs Daytime Phone No.: 301-891-3861

Address: 11 Montgomery Ave (Street Number) Takoma Park (City) MD (State) 20912 (Zip Code)

Contractor: Kenergy Solar Phone No.: 202-812-6463

Contractor Registration No.: _____

Agent for Owner: Antoine Grant / Kenergy Solar Daytime Phone No.: _____

LOCATION OF BUILDING/PREMISE

House Number: 11 Street: Montgomery Ave

Town/City: Takoma Park Nearest Cross Street: Pine Ave

Lot: 6 Block: 17 Subdivision: 0025

Liber: _____ Folio: _____ Parcel: _____

PART ONE: TYPE OF PERMIT ACTION AND USE

1A. CHECK ALL APPLICABLE:

☐ Construct ☐ Extend ☐ Alter/Renovate
☐ Move ☒ Install ☐ Wreck/Raze
☐ Revision ☐ Repair ☐ Revocable.

CHECK ALL APPLICABLE:

☐ A/C ☐ Slab ☐ Room Addition ☐ Porch ☐ Deck ☐ Shed
☒ Solar ☐ Fireplace ☐ Woodburning Stove ☐ Single Family
☐ Fence/Wall (complete Section 4) ☐ Other: _____

1B. Construction cost estimate: $ $15000

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

PART TWO: COMPLETE FOR NEW CONSTRUCTION AND EXTEND/ADDITIONS

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 *Date*

Approved: _____ *For Chairperson, Historic Preservation Commission*

Disapproved: _____ Signature: _____ Date: _____

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

Edit 6/21/99

SEE REVERSE SIDE FOR INSTRUCTIONS

823015

(4)

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:
   Installation of 16 solar modules mounted to roof in backyard

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.

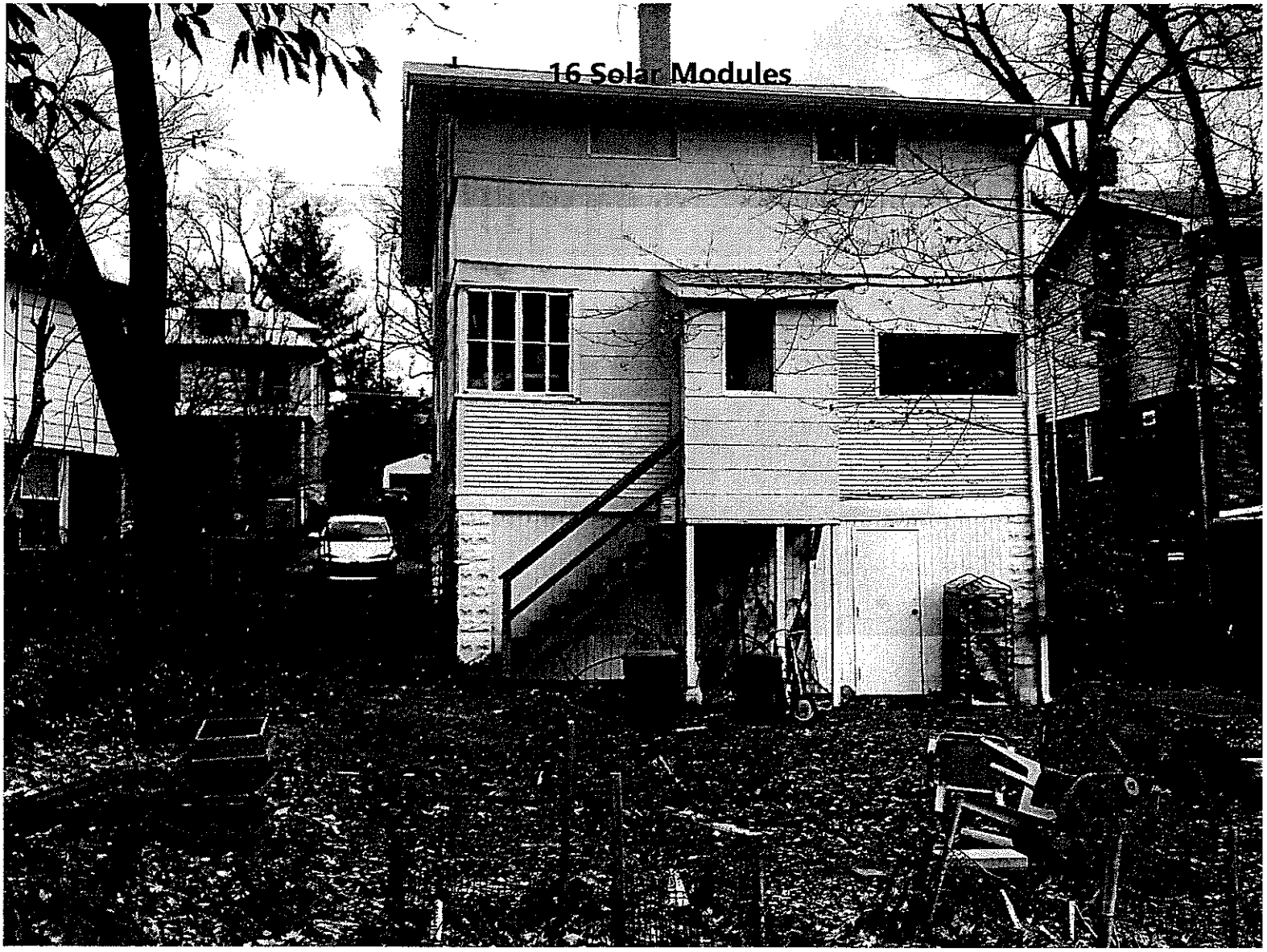
7. **ADDRESSES OF ADJACENT AND CONFRONTING PROPERTY OWNERS**

   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
Marianna Diggs 11 Montgomery Ave Takoma Park, MD 20912	Antoine Grant / Kenergy Solar 401 New York Ave NE Washington, DC 20002
Adjacent and confronting Property Owners mailing addresses	



Rear of Home

Front Left Side of Home

NEW PV SYSTEM: 4.800 kWp

DIGGS RESIDENCE

11 MONTGOMERY AVE
TAKOMA PARK, MD 20912
ASSESSOR'S #: 1301075820

GENERAL NOTES

1.1.1 PROJECT NOTES:
1.1.2 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.
1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
1.1.4 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 & NEC 690.60: 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
1.1.5 NEC 690.35 REFERS SPECIFICALLY TO "UNGROUNDED" PV SYSTEMS. ALSO DESIGNATED AS "TRANSFORMERLESS" BY INVERTER MANUFACTURERS AND "NON-ISOLATED" BY UNDERWRITERS LABORATORY.
1.1.6 INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE LISTED FOR THIS USE [NEC 690.35 (G)].
1.1.7 AS SPECIFIED BY THE AHJ, EQUIPMENT USED IN UNGROUNDED SYSTEMS LABELED ACCORDING TO NEC 690.35 (F).
1.1.8 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
1.1.9 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 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
1.1.10 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.

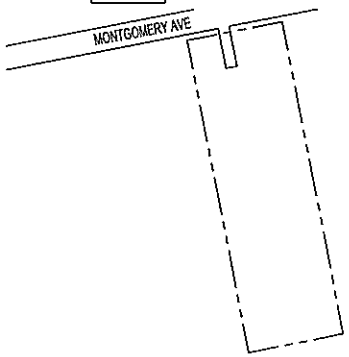
1.2.1 SCOPE OF WORK:
1.2.2 PRIME CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM RETROFIT. PRIME CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTING EXISTING ONSITE REQUIREMENTS TO DESIGN, SPECIFY, AND INSTALL THE EXTERIOR ROOF-MOUNTED PORTION OF THE PHOTOVOLTAIC SYSTEMS DETAILED IN THIS DOCUMENT.

1.3.1 WORK INCLUDES:
1.3.2 PV ROOF ATTACHMENTS - IRONRIDGE FLASHFOOT
1.3.3 PV RACKING SYSTEM INSTALLATION - IRONRIDGE XR100
1.3.4 PV MODULE AND INVERTER INSTALLATION - SILFAB SLA300M/ SOLAR EDGE SE7600A-US (240V)
1.3.5 PV EQUIPMENT GROUNDING
1.3.6 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
1.3.7 PV LOAD CENTERS (IF INCLUDED)
1.3.8 PV METERING/MONITORING (IF INCLUDED)
1.3.9 PV DISCONNECTS
1.3.10 PV FINAL COMMISSIONING
1.3.11 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV
1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

SCOPE OF WORK

SYSTEM SIZE:	STC: 16 x 300W = 4.800kW PTC: 16 x 270.4W = 4.326kW DC (16) SILFAB SLA300M (1) SOLAR EDGE SE7600A-US (240V)
ATTACHMENT TYPE:	IRONRIDGE FLASHFOOT
MSP UPGRADE:	NO

01 AERIAL PHOTO
NOT TO SCALE



02 PLAT MAP
NOT TO SCALE

SHEET LIST TABLE

PROJECT INFORMATION

OWNER
NAME: MARIANNA DIGGS

PROJECT MANAGER
NAME: ANTOINE GRANT
PHONE: 2028126463

CONTRACTOR
NAME: ENERBLU GRID SERVICES
PHONE: 2028126463

AUTHORITIES HAVING JURISDICTION
BUILDING: MONTGOMERY COUNTY
ZONING: MONTGOMERY COUNTY
UTILITY: PEPCO

DESIGN SPECIFICATIONS
OCCUPANCY: II
CONSTRUCTION: SINGLE-FAMILY
ZONING: RESIDENTIAL
GROUND SNOW LOAD: 30 PSF
WIND EXPOSURE: B
WIND SPEED: 115 MPH

APPLICABLE CODES & STANDARDS
BUILDING: IBC 2015 IRC 2015
ELECTRICAL: NEC 2014
FIRE: IFC 2015

EnerBlü GRID SERVICES

CONTRACTOR

ENERBLU GRID SERVICES

PHONE: 2028126463
ADDRESS: 401 NEW YORK AVE NE WASHINGTON DC,DISTRICT OF COLUMBIA 20002

LIC. NO.: MHIC 127519
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 4.800 kWp

DIGGS RESIDENCE

11 MONTGOMERY AVE
TAKOMA PARK, MD 20912
APN: 1301075820

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

COVER PAGE

DATE: 11.1.2017
DESIGN BY: E.N.
CHECKED BY: M.M.

REVISIONS

T-001.00
(SHEET 1)

2.1.1 **SITE NOTES:**

2.1.2 A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.

2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.

2.1.4 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.

2.1.5 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.

2.1.6 ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.

2.2.1 **EQUIPMENT LOCATIONS**

2.2.2 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.

2.2.3 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).

2.2.3 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.

2.2.4 ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.

2.2.5 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.

2.2.6 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

2.3.1 **STRUCTURAL NOTES:**

2.3.2 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAIL MANUFACTURER'S INSTRUCTIONS.

2.3.3 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.

2.3.4 ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.

2.3.5 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.

2.3.6 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

2.4.1 **GROUNDING NOTES:**

2.4.2 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVISES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.

2.4.3 AS IN CONVENTIONAL PV SYSTEMS, UNGROUNDED PV SYSTEMS REQUIRE AN EQUIPMENT GROUNDING CONDUCTOR. ALL METAL ELECTRICAL EQUIPMENT AND STRUCTURAL COMPONENTS BONDED TO GROUND, IN ACCORDANCE WITH 250.134 OR 250.136(A). ONLY THE DC CONDUCTORS ARE UNGROUNDED.

2.4.4 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.

2.4.5 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURE CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).

2.4.6 EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.

2.4.7 THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.

2.4.8 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]

2.4.9 THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.

2.4.10 ACCORDING TO NEC 690.47 (C)(3), UNGROUNDED SYSTEMS INVERTER MAY SIZE DC GEC ACCORDING TO EGC REQUIREMENTS OF NEC 250.122. HOWEVER, DC GEC TO BE UNSPLICED OR IRREVERSIBLY SPLICED.

2.4.11 IN UNGROUNDED INVERTERS, GROUND FAULT PROTECTION IS PROVIDED BY "ISOLATION MONITOR INTERRUPTOR," AND GROUND FAULT DETECTION PERFORMED BY "RESIDUAL-CURRENT DETECTOR."

2.5.1 **INTERCONNECTION NOTES:**

2.5.2 LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 690.64 (B)]

2.5.3 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS INPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(D)(2)(3)].

2.5.4 WHEN SUM OF THE PV SOURCES EQUALS >100% OF BUSBAR RATING, PV DEDICATED BACKFFED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(D)(2)(3)].

2.5.5 AT MULTIPLE INVERTERS OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (D)(2)(3)(C).

2.5.6 FEEDER TAP INTERCONECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (D)(2)(1)

2.5.7 SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42

2.5.8 BACKFEEDING BREAKER FOR UTILITY-INTERACTIVE INVERTER OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (D)(5)].

2.6.1 **DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:**

2.6.2 DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).

2.6.3 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH.

2.6.4 BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED. THEREFORE BOTH MUST OPEN WHERE A DISCONNECT IS REQUIRED, ACCORDING TO NEC 690.13.

2.6.5 DC DISCONNECT INTEGRATED INTO ROOFTOP DC COMBINER OR INSTALLED WITHIN 6 FT, ACCORDING TO NEC 690.15 (C).

2.6.6 RAPID SHUTDOWN OF ENERGIZED CONDUCTORS BEYOND 10 FT OF PV ARRAY OR 5 FT INSIDE A BUILDING WITHIN 10 SECONDS. CONTROLLED CONDUCTORS ≤30V AND ≤240VA [NEC 690.12]. LOCATION OF LABEL ACCORDING TO AHJ.

2.6.7 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.

2.6.8 BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED, THEREFORE BOTH REQUIRE OVER-CURRENT PROTECTION, ACCORDING TO NEC 240.21. (SEE EXCEPTION IN NEC 690.9)

2.6.9 IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.

2.7.1 **WIRING & CONDUIT NOTES:**

2.7.2 ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.

2.7.3 ALL CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.

2.7.4 EXPOSED UNGROUNDED PV SOURCE AND OUTPUT CIRCUITS SHALL USE WIRE LISTED AND IDENTIFIED AS PHOTOVOLTAIC (PV) WIRE [690.35 (D)]. PV MODULES WIRE LEADS SHALL BE LISTED FOR USE WITH UNGROUNDED SYSTEMS, ACCORDING TO NEC 690.35 (D)(3).

2.7.5 PV WIRE BLACK WIRE MAY BE FIELD-MARKED WHITE [NEC 200.6 (A)(6)].

2.7.6 MODULE WIRING SHALL BE LOCATED AND SECURED UNDER THE ARRAY.

2.7.7 ACCORDING TO NEC 200.7, UNGROUNDED SYSTEMS DC CONDUCTORS COLORED OR MARKED AS FOLLOWS:
- DC POSITIVE- RED, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN
- DC NEGATIVE- BLACK, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN

2.7.8 AC CONDUCTORS COLORED OR MARKED AS FOLLOWS:
- PHASE A OR L1- BLACK
- PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE
- PHASE C OR L3- BLUE, YELLOW, ORANGE*, OR OTHER CONVENTION
- NEUTRAL- WHITE OR GREY

* IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

EnerBlü GRID SERVICES

CONTRACTOR

ENERBLU GRID SERVICES

PHONE: 2028126463
ADDRESS: 401 NEW YORK AVE NE WASHINGTON DC,DISTRICT OF COLUMBIA 20002

LIC. NO.: MHIC 127519
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 4.800 kWp

DIGGS RESIDENCE

11 MONTGOMERY AVE
TAKOMA PARK, MD 20912
APN: 1301075820

ENGINEER OF RECORD

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NOTES

DATE: 11.1.2017

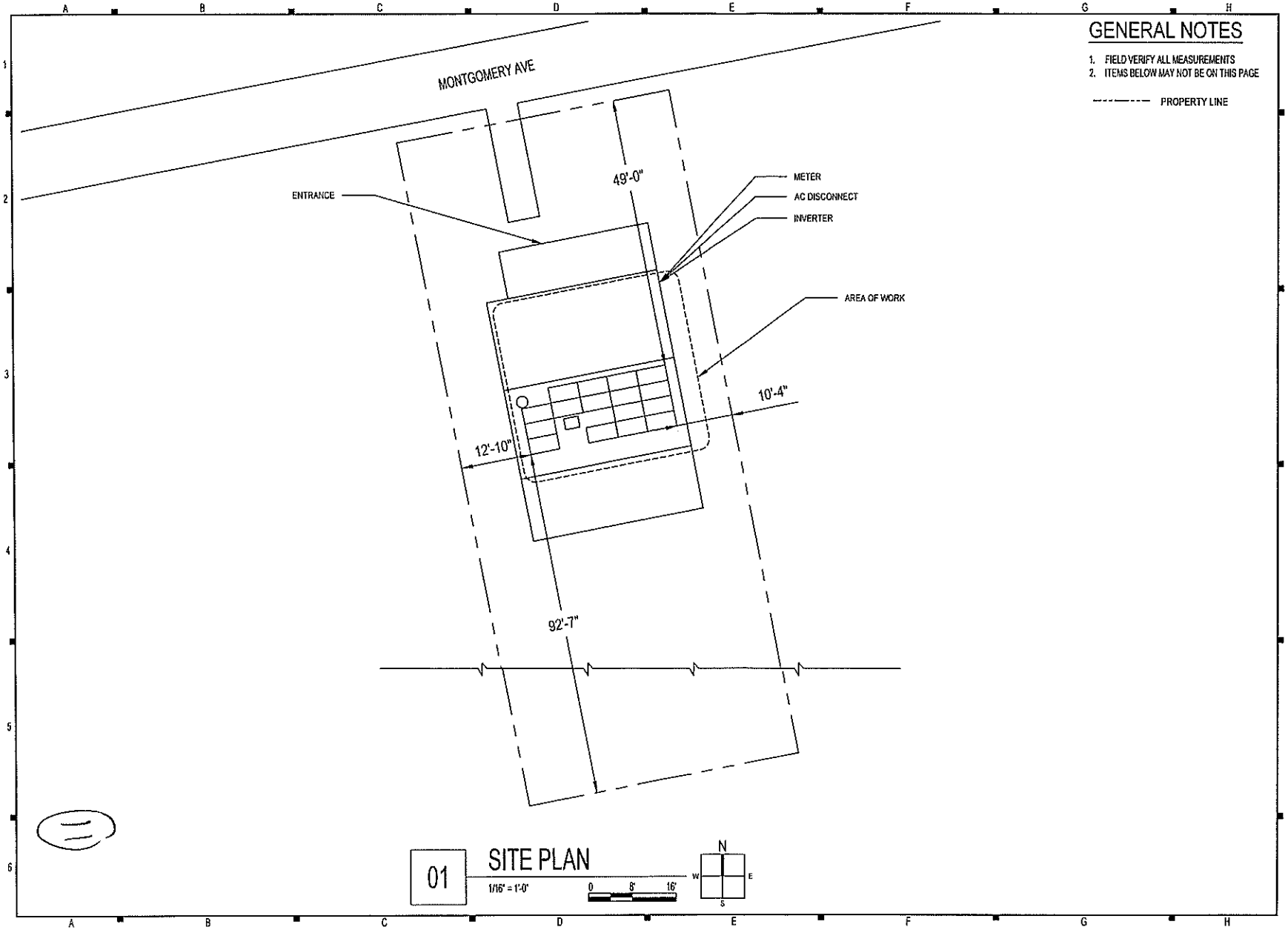
DESIGN BY: E.N.

CHECKED BY: M.M.

REVISIONS

G-001.00

(SHEET 2)



GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

PROPERTY LINE

01 SITE PLAN

1/16" = 1'-0"

0 8' 16'

EnerBlü GRID SERVICES

CONTRACTOR

ENERBLU GRID SERVICES

PHONE: 2028126463
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LIC. NO.: MHIC 127519
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NEW PV SYSTEM: 4.800 kWp

DIGGS RESIDENCE

11 MONTGOMERY AVE
TAKOMA PARK, MD 20912
APN: 1301075820

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

SITE PLAN

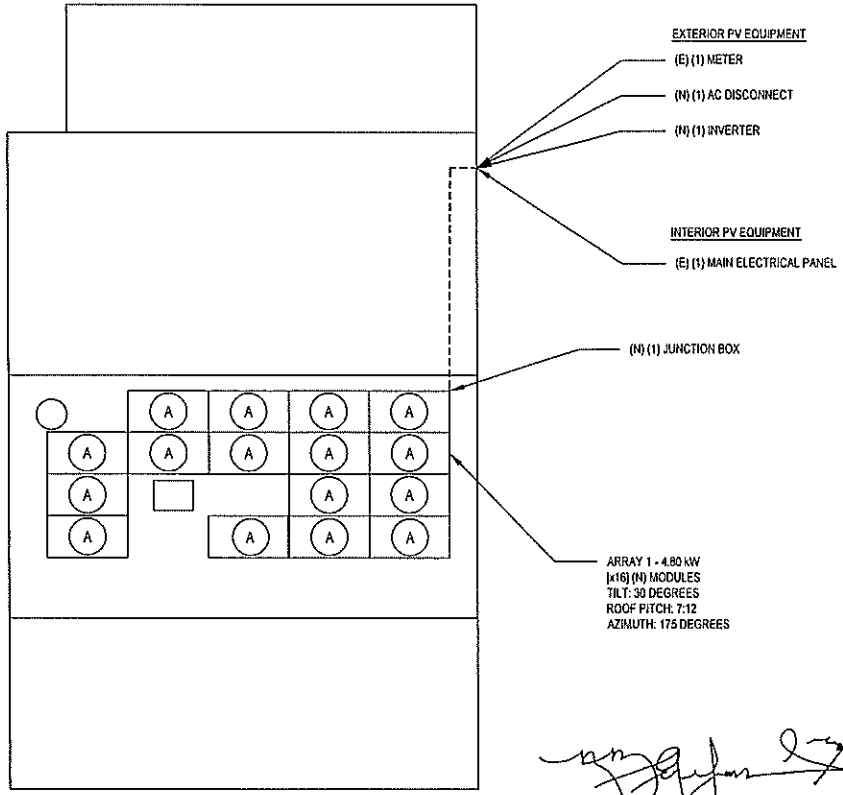
DATE: 11.1.2017
DESIGN BY: E.N.
CHECKED BY: M.M.

REVISIONS

A-101.00
(SHEET 3)

GENERAL NOTES

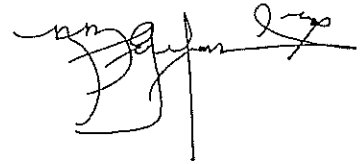
1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

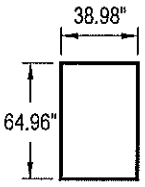


A MODULE STRINGING

CONDUIT

STATE OF MARYLAND
RICHARD BRIAN GORDON
37741
PROFESSIONAL ENGINEER





MODULE:
SILFAB.
SLA300M
300 WATTS

01 ELECTRICAL PLAN

1/8" = 1'

0 4' 8'

N W E S

EnerBlü GRID SERVICES

CONTRACTOR

ENERBLU GRID SERVICES

PHONE: 2028126463
ADDRESS: 401 NEW YORK AVE NE WASHINGTON DC,DISTRICT OF COLUMBIA 20002

LIC. NO.: MHIC 127519
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 4.800 kWp

DIGGS RESIDENCE

11 MONTGOMERY AVE
TAKOMA PARK, MD 20912
APN: 1301075820

ENGINEER OF RECORD

Richard B. Gordon, P.E.
Maryland P.E. License No. 37741
P.E. Lic. Expiration Date 7.9.2019

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ELECTRICAL PLAN

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REVISIONS

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(SHEET 4)

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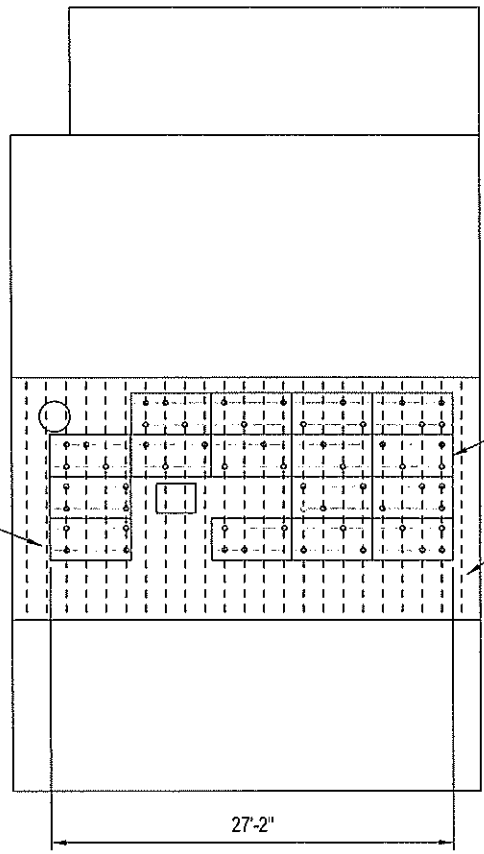
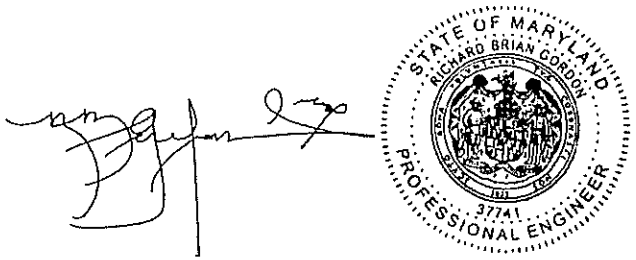
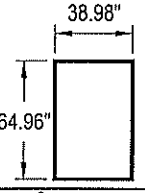
---- ROOF TRUSS







MODULE:
SILFAB.
SLA300M
300 WATTS

01 SOLAR ATTACHMENT PLAN

1/8" = 1'

0 4' 8'

N W E S

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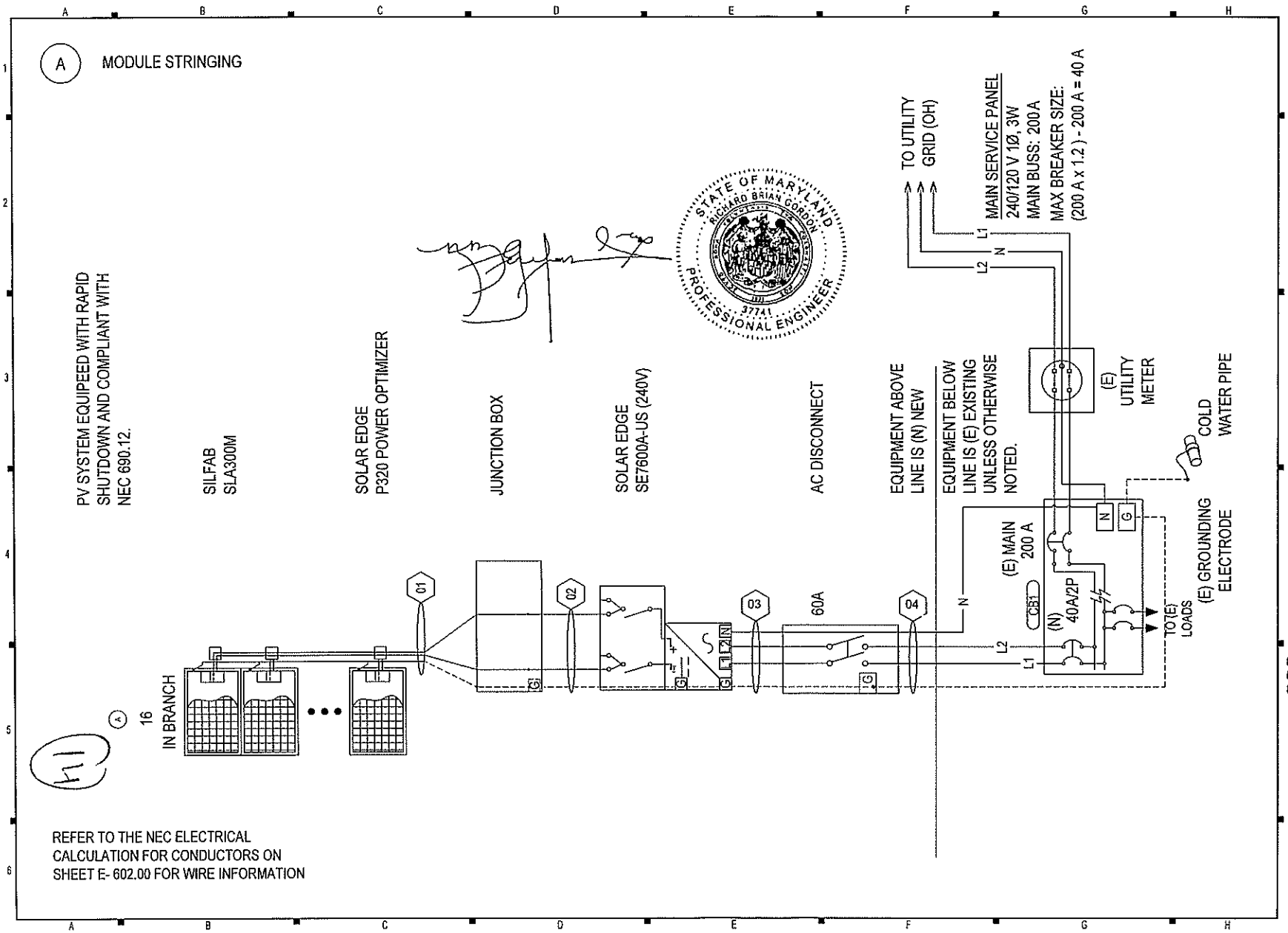

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LINE DIAGRAM

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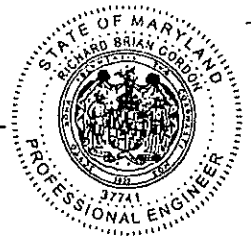

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	TYPICAL	CONDUCTOR	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERMINAL
01	1	10 AWG PV WIRE, COPPER	FREE AIR	2	N/A	6 AWG BARE, COPPER	0.71 (57.2°C)	1	15A	18.75A	55A	39.05A	75°C	50A
02	1	10 AWG THWN-2, COPPER	0.75" DIA EMT	2	N/A	6 AWG THWN-2, COPPER	0.71 (57.2°C)	1	15A	18.75A	40A	28.4A	75°C	35A
03	1	8 AWG THWN-2, COPPER	0.75" DIA FMC	2	N/A	8 AWG THWN-2, COPPER	0.91 (35.2°C)	1	32A	40A	55A	50.05A	75°C	50A
04	1	8 AWG THWN-2, COPPER	0.75" DIA FMC	2	40A	8 AWG THWN-2, COPPER	0.91 (35.2°C)	1	32A	40A	55A	50.05A	75°C	50A

SYSTEM SUMMARY

	STRING #1
POWERBOX MAX OUTPUT CURRENT	15A
OPTIMIZERS IN SERIES	16
NOMINAL STRING VOLTAGE	350V
ARRAY OPERATING CURRENT	13.71A
ARRAY STC POWER	4,800W
ARRAY PTC POWER	4,326W
MAX AC CURRENT	32A
MAX AC POWER	8,350W
DERATED (CEC) AC POWER	4,217W

DESIGN TEMPERATURES

ASHRAE EXTREME LOW	-15°C (5.0°F), SOURCE: WASHINGTONNATIONAL (38.87°; -77.03°)
ASHRAE 2% HIGH	35.2°C (95.4°F), SOURCE: WASHINGTONNATIONAL (38.87°; -77.03°)

MODULES

REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
P1-16	16	SILFAB SLA300M	300W	270.4W	9.76A	9.26A	40.53V	32.9V	-0.122V/°C (-0.3%/°C)	15A

POWER OPTIMIZERS

REF.	QTY.	MODEL	RATED INPUT POWER	MAX OUTPUT CURRENT	MAX INPUT ISC	MAX DC VOLTAGE	WEIGHTED EFFICIENCY
PO1-16	16	SOLAR EDGE P320	320W	15A	11.0A	48V	98.8%

INVERTERS

REF.	QTY	MAKE AND MODEL	AC VOLTAGE	GROUND	OCPD RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1	1	SOLAR EDGE SE7600A-US (240V)	240V	FLOATING	40A	7600W	32A	23A	500V	97.5%

DISCONNECTS

REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	SQUARE D DU222RB OR EQUIV.	60A	240VAC

OCPDS

REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1	1	40A	600VAC

BILL OF MATERIALS

CATEGORY	MAKE	MODEL NUMBER	REF	QTY	UNIT	QTY/UNIT	DESCRIPTION
MODULE	SILFAB	SLA300M	PM1-16	16	PIECES	1	SILFAB SLA300M 300W 60 CELLS, MONOCRYSTALLINE SILICON
INVERTER	SOLAR EDGE	SE7600A-US (240V)	I1	1	PIECE	1	SOLAR EDGE SE7600A-US (240V) 7600W INVERTER
MODULE OPTIMIZER	SOLAR EDGE	P320	PO1-16	16	PIECES	1	SOLAR EDGE P320 OPTIMIZER (REQUIRED PART OF INVERTER'S DISTRIBUTED DC ARCHITECTURE)
DISCONNECT	SQUARE D	DU222RB	SW1	1	PIECE	1	SQUARE D DU222RB, 2-POLE, 60A, 240VAC OR EQUIVALENT
WIRING		GEN-10-AWG-PV-WIRE-CU	WR1	90	FEET	1	10 AWG PV WIRE, COPPER (POSITIVE AND NEGATIVE)
WIRING		GEN-6-AWG-BARE-CU	WR1	45	FEET	1	6 AWG BARE, COPPER (GROUND)
WIRING		GEN-10-AWG-THWN-2-CU-RD	WR2	20	FEET	1	10 AWG THWN-2, COPPER, RED (POSITIVE)
WIRING		GEN-10-AWG-THWN-2-CU-BLK	WR2	20	FEET	1	10 AWG THWN-2, COPPER, BLACK (NEGATIVE)
WIRING		GEN-8-AWG-THWN-2-CU-RD	WR3-4	20	FEET	1	8 AWG THWN-2, COPPER, RED (LINE 1)
WIRING		GEN-8-AWG-THWN-2-CU-BLK	WR3-4	20	FEET	1	8 AWG THWN-2, COPPER, BLACK (LINE 2)
WIRING		GEN-8-AWG-THWN-2-CU-WH	WR3-4	20	FEET	1	8 AWG THWN-2, COPPER, WHITE (NEUTRAL)
WIRING		GEN-8-AWG-THWN-2-CU-GR	WR2-4	40	FEET	1	8 AWG THWN-2, COPPER, GREEN (GROUND)
WIREWAY		GEN-EMT-0.75" DIA	WW2	20	FEET	1	EMT CONDUIT, 0.75" DIA
WIREWAY		GEN-FMC-40-0.75" DIA	WW3-4	20	FEET	1	FMC CONDUIT, 0.75" DIA
OCPD	GENERIC MANUFACTURER	GEN-CB-40A-240VAC	CB1	1	PIECE	1	CIRCUIT BREAKER, 40A, 240VAC
TRANSITION BOX	GENERIC MANUFACTURER	GEN-AWB-TB-4-4X	JB1	1	PIECE	1	TRANSITION/PASS-THROUGH BOX, WITH 4 TERMINAL BLOCKS

EnerBlü GRID SERVICES

CONTRACTOR

ENERBLU GRID SERVICES

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ELE. NO.:

NEW PV SYSTEM: 4.800 kWp

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DESIGN TABLES

DATE: 11.1.2017
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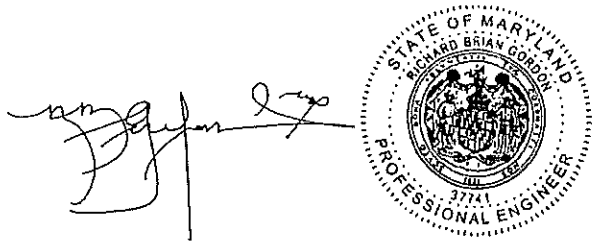
REVISIONS

E-602.00
(SHEET 7)



PLACARD 3
AT EACH JUNCTION, COMBINER, DISCONNECT AND DEVICE WHERE ENERGIZED UNGROUNDED CONDUCTORS MAY BE EXPOSED DURING SERVICE
[NEC 690.35(F)]

LABEL 2
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT
[NEC 690.17]

LABEL 3
OPERATING CURRENT: 13.71 A DC
OPERATING VOLTAGE: 350 V DC
MAX SHORT CURRENT: 15 A DC
MAX VOLTAGE: 500 V DC

AT EACH DC DISCONNECTING MEANS
[NEC 690.53]

LABEL 4
PHOTOVOLTAIC AC DISCONNECT
OPERATING CURRENT: 32 A AC
OPERATING VOLTAGE: 240 V AC

AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS
[NEC 690.54]

LABEL 5

LABEL 6
! CAUTION !
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

PLAQUE
INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED
PHOTOVOLTAIC SYSTEM DISCONNECT LOCATED EAST SIDE OF THE HOUSE

AT POINT OF INTERCONNECTION, LABEL, SUCH AS LABEL 5 OR LABEL 6 MUST IDENTIFY PHOTOVOLTAIC SYSTEM
[NEC 705.12(D)(4)]

DIRECTORY
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION
[NEC 690.56(B)]
WHERE THE INVERTERS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE INSTALLED AT EACH DC PV SYSTEM DISCONNECTING MEANS, AT EACH AC DISCONNECTING MEANS, AND AT THE MAIN SERVICE DISCONNECTING MEANS SHOWING THE LOCATION OF ALL AC AND DC PV SYSTEM DISCONNECTING MEANS IN THE BUILDING.
[NEC 690.4(H)]

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED

LABEL 7
AT UTILITY METER
[NEC 690.56(B)]

PHOTOVOLTAIC DC DISCONNECT

LABEL 8
AT EACH DC DISCONNECTING MEANS
[NEC 690.13(B)]

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL 9
AT RAPID SHUTDOWN SWITCH
[NEC 690.56(B)].
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND, REFLECTIVE
[IFC 605.11.1.1]

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL 10
AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.
[NEC 690.31(G)]
LETTERS AT LEAST 3/8 INCH, WHITE ON RED BACKGROUND; REFLECTIVE
[IFC 605.11.1.1]

PHOTOVOLTAIC AC DISCONNECT

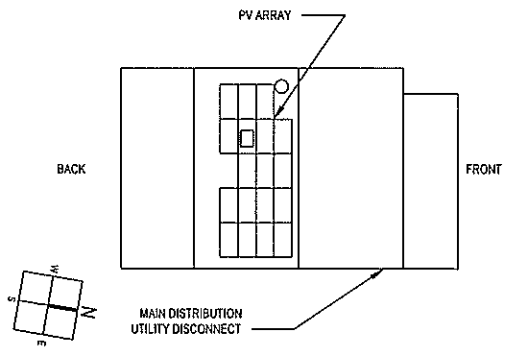
LABEL 11
AT EACH AC DISCONNECTING MEANS
[NEC 690.13(B)]

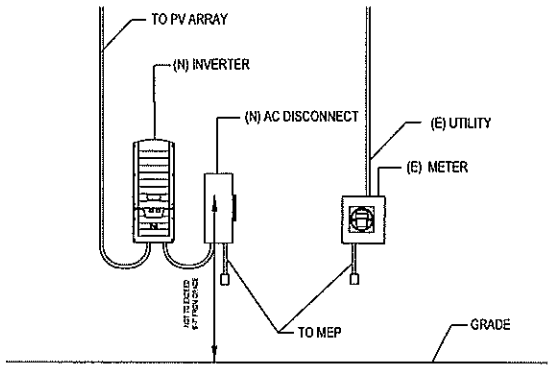
LABEL 12
AT POINT OF INTERCONNECTION
OVERCURRENT DEVICE
[NEC 705.12(D)(7)]

LABELING NOTES
1.1 LABELING REQUIREMENTS BASED ON THE 2014 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]

!CAUTION!

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:





01 EQUIPMENT ELEVATION
NOT TO SCALE

EnerBlü GRID SERVICES

CONTRACTOR

ENERBLU GRID SERVICES

PHONE: 2028125463
ADDRESS: 401 NEW YORK AVE NE WASHINGTON DC,DISTRICT OF COLUMBIA 20002
LIC. NO.: MHIC 127519
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 4.800 kWp

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PLACARDS

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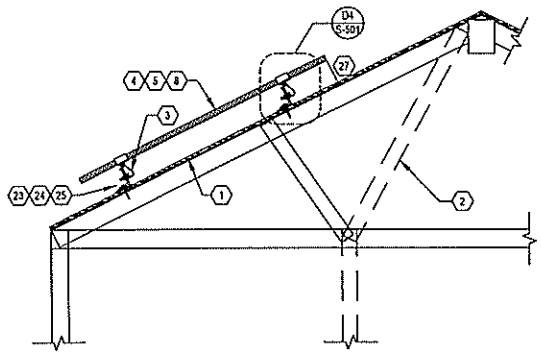
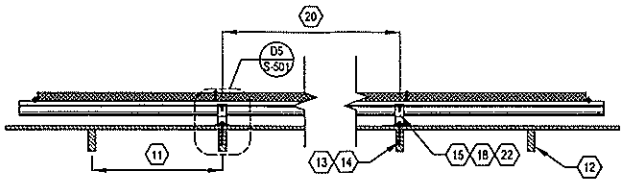


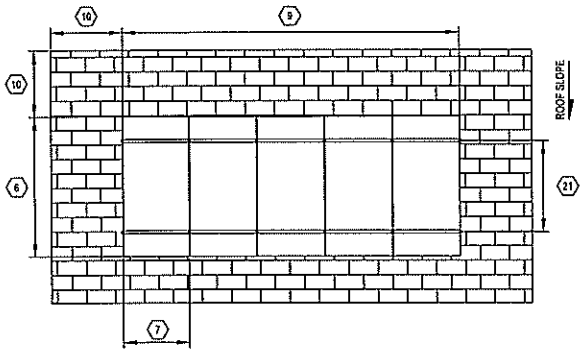
D1 RACKING DETAIL (TRANSVERSE)

NOT TO SCALE



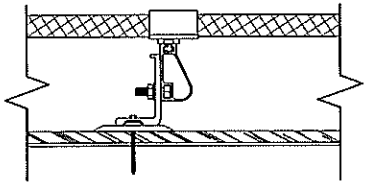
D2 RACKING DETAIL (LONGITUDINAL)

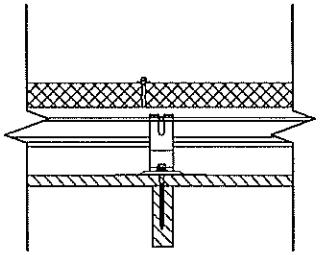
NOT TO SCALE



D3 RACKING DETAIL (TOP)

NOT TO SCALE





D4 DETAIL (TRANSVERSE)

NOT TO SCALE

D5 DETAIL (LONGITUDINAL)

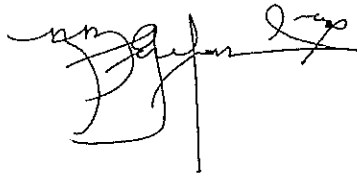
NOT TO SCALE

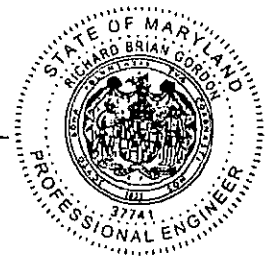
GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS

SHEET KEYNOTES

1. ROOF MATERIAL: ASPHALT SHINGLE
2. ROOF STRUCTURE: TRUSS
3. ATTACHMENT TYPE: IRONRIDGE FLASHFOOT
4. MODULE MANUFACTURER: SILFAB
5. MODULE MODEL: SLA300M
6. MODULE LENGTH: 64.96"
7. MODULE WIDTH: 38.98"
8. MODULE WEIGHT: 41.89 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: NO FIRE CODE ENFORCED
11. TRUSS SPACING: 16 IN. O.C.
12. TRUSS SIZE: 2X6 NOMINAL
13. LAG BOLT DIAMETER: 5/16 IN.
14. LAG BOLT EMBEDMENT: 3-1/2 IN.
15. TOTAL # OF ATTACHMENTS: 57
16. TOTAL AREA: 281.35 SQ. FT.
17. TOTAL WEIGHT: 810.43 LBS.
18. WEIGHT PER ATTACHMENT: 13.74 LBS.
19. DISTRIBUTED LOAD: 2.88 PSF.
20. MAX. HORIZONTAL STANDOFF: 48 IN.
21. MAX. VERTICAL STANDOFF: LANDSCAPE: 26 IN., PORTRAIT: 33 IN.
22. STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER (OR EQUIV.): IRONRIDGE
24. RAIL MODEL (OR EQUIVALENT): XR100
25. RAIL WEIGHT: 0.68 PLF.
26. MAX. TRUSS SPAN: 15 FT.
27. MODULE CLEARANCE: 3 IN. MIN., 6 IN. MAX.





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REVISIONS

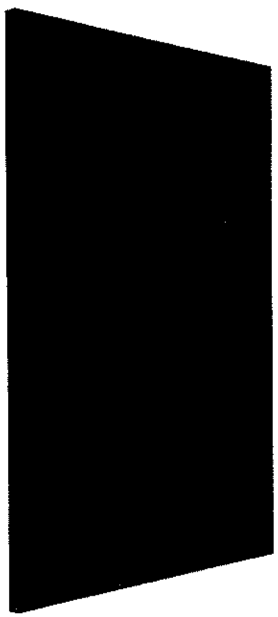
S-501.00
(SHEET 9)

Technical Datasheet

60 cells

SILFAB

SLA-M 280/285/290/295/300



The Silfab SLA-M 60-cell monocrystalline module series is the result of the experience of the Silfab technical team, specialized in the entire photovoltaic value chain, with modules produced and operating for over 33 years.

The SLA-M modules are ideal for ground-mount, roof-top and solar tracking installations where maximum power density is preferred.

Maximum Efficiency
60 of the highest efficiency, best quality monocrystalline cells result in a maximum power rating of up to 300 Wp.

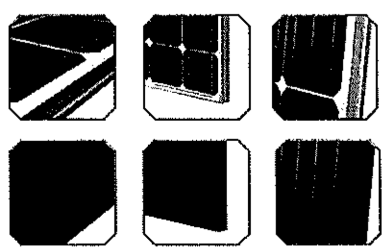
Positive Tolerance
(-0/+5W) module sorting achieves the maximum electrical performance of the PV system.

Industry Experts
Silfab's technical team has specialized experience in the entire photovoltaic value chain, with modules produced and operating for over 33 years.

Highest Automation
Strict quality controls during each step at one of the world's most automated module production facilities.

Increased Quality
Top quality materials and 100% EL testing guarantee a trustworthy 25-year performance warranty.

Reduced Weight
Engineered to accommodate low load bearing structures while maintaining highly durable mechanical characteristics including a maximum loading of 5400 Pa.



Available in Black

Silfab SOLAR

Electrical Specifications - Standard Test Conditions		SLA280M	SLA285M	SLA290M	SLA295M	SLA300M
Module Power (Pmax)	Wp	280	285	290	295	300
Maximum power voltage (Vpmax)	V	31.7	32.0	32.4	32.7	32.9
Maximum power current (Ipmax)	A	8.83	8.91	8.97	9.04	9.26
Open circuit voltage (Voc)	V	38.7	39.1	39.6	40	40.53
Short circuit current (Isc)	A	9.40	9.47	9.54	9.61	9.76
Module efficiency	%	17.1	17.4	17.8	18.06	18.8
Maximum system voltage (VDC)	V			1000		
Series fuse rating	A			15		
Power tolerance	Wp			-0/+5		

Measurement conditions: STC 1000 W/m² • AM 1.5 • Temperature 25 °C • Measurement uncertainty ≤ 3% • Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by -0/+5W.

Temperature Ratings		SILFAB SLA Mono
Temperature Coefficient Isc	%/K	0.03
Temperature Coefficient Voc	%/K	-0.30
Temperature Coefficient Pmax	%/K	-0.38
NOCT (± 2°C)	°C	45
Operating temperature	°C	-40/+85

Mechanical Properties and Components		SILFAB SLA Mono
Module weight (± 1 kg)	kg	19
Dimensions (H x L x D; ± 1mm)	mm	1650 x 990 x 38
Maximum surface load (wind/snow)*	N/m²	5400
Hail impact resistance		ø 25 mm at 83 km/h
Cells		60 - Si monocrystalline - 3 or 4 busbar - 156 x 156 mm
Glass		3.2 mm high transmittance, tempered, antireflective coating
Encapsulant		PID-resistant EVA
Backsheet		Multilayer polyester-based
Frame		Anodized Al
Junction Box		3 diodes-45V/12A, IP67
Cables and connectors*		1200 mm ø 5.7 mm (4 mm²), gzx connector, MC4 comparable

* See Installation manual

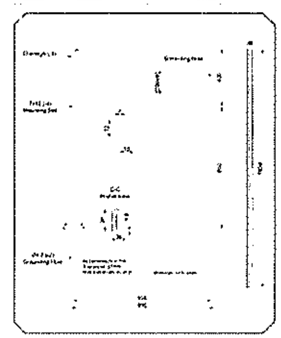
Warranties	SILFAB SLA Mono
Module product warranty	12 years
	25 years
Linear power performance guarantee	≥ 97% end of 1st year ≥ 90% end of 12th year ≥ 82% end of 25th year

Certifications	SILFAB SLA Mono
Product	ULC ORD C1703, UL 1703, IEC 61215, IEC 61730, CEC listed UL Fire Rating: Type 2 (Type 1 on request)
Factory	ISO 9001:2008

Caution: Read the safety and installation manual before using this product.

CE IEC TÜV Fraunhofer

Third-party generated pan files from PV Evolution Labs are available for 280M, 285M, 290M, 295M and 300M.



Silfab SOLAR

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ENERBLÜ GRID SERVICES

CONTRACTOR

ENERBLU GRID SERVICES

PHONE: 2028126463
ADDRESS: 401 NEW YORK AVE NE WASHINGTON DC,DISTRICT OF COLUMBIA 20002

LIC. NO.: MHIC 127519
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 4.800 kWp

DIGGS RESIDENCE

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APN: 1301075820

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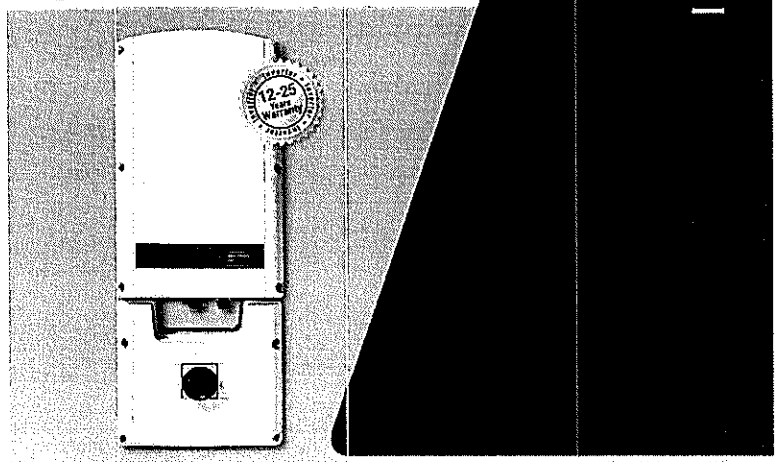
18

solaredge

SolarEdge Single Phase Inverters
For North America

SE3000A-US / SE3800A-US / SE5000A-US / SE6000A-US / SE7600A-US / SE10000A-US / SE11400A-US

INVERTERS



The best choice for SolarEdge enabled systems

- Integrated arc fault protection for NEC 2011 690.11 compliance
- Rapid shutdown for NEC 2014 690.12
- Superior efficiency (98%)
- Small, lightweight and easy to install on provided bracket
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Outdoor and Indoor installation
- Fixed voltage inverter, DC/AC conversion only
- Pre-assembled Safety Switch for faster installation
- Optional – revenue grade data, ANSI C12.20

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Single Phase Inverters for North America

SE 3000A-US / SE3800A-US / SE5000A-US / SE6000A-US / SE7600A-US / SE10000A-US / SE11400A-US

	SE3000A-US	SE3800A-US	SE5000A-US	SE6000A-US	SE7600A-US	SE10000A-US	SE11400A-US	
OUTPUT								
Nominal AC Power Output	3000	3800	5000	6000	7600	9980 @ 208V 10000 @240V	11400	VA
Max. AC Power Output	3300	4150	5400 @ 208V 5450 @240V	6000	8350	10800 @ 208V 10950 @240V	12000	VA
AC Output Voltage Min.-Nom.-Max.[1] (183 - 208 - 229 Vac	-	-	✓	-	-	✓	-	
AC Output Voltage Min.-Nom.-Max.[1] (211 - 240 - 264 Vac	✓	✓	✓	✓	✓	✓	✓	
AC Frequency Min.-Nom.-Max.[1]				59.3 - 60 - 60.5				Hz
Max. Continuous Output Current	12.5	16	24 @ 208V 21 @ 240V	25	32	48 @ 208V 42 @ 240V	47.5	A
GFDI Threshold				1				A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds				Yes				Yes
INPUT								
Maximum DC Power (STC)	4050	5100	6750	8100	10250	13500	15350	W
Transformer less, Ungrounded				Yes				
Max. Input Voltage				500				Vdc
Nom. DC Input Voltage				325 @ 208V / 350 @ 240V				Vdc
Max. Input Current[2]	9.5	13	16.5 @ 208V 15.5 @ 240V	18	23	33 @ 208V 30.5 @ 240V	34.5	Adc
Max. Input Short Circuit Current				45				Adc
Reverse Polarity Protection				Yes				
Ground-Fault Isolation Detection				600kΩ Sensitivity				
Maximum Inverter Efficiency	97.7	98.2	98.3	98.3	98	98	98	%
CEC Weighted Efficiency	97.5	98	97 @ 208V 98 @ 240V	97.5	97.5	97 @ 208V 97.5 @ 240V	97.5	%
Nighttime Power Consumption			< 2.5			< 4		W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, RS232, Ethernet, ZigBee (optional)							
Revenue Grade Data, ANSI C12.20	Optional[3]							
Rapid Shutdown – NEC 2014 690.12	Yes							
STANDARD COMPLIANCE								
Safety	UL1741, UL1741 SA, UL16998, UL1998, CSA 22.2							
Grid Connection Standards	IEEE1547							
Emissions	FCC part15 class B							
INSTALLATION SPECIFICATIONS								
AC output conduit size / AWG range	3/4" minimum / 16-6 AWG					3/4" minimum / 8-3 AWG		
DC input conduit size / # of strings / AWG range	3/4" minimum / 1-2 strings / 16-6 AWG					3/4" minimum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	30.5 x 12.5 x 7.2 / 775 x 315 x 184					30.5 x 12.5 x 10.5 / 775 x 315 x 260		in / mm
Weight with Safety Switch	51.2 / 23.2		54.7 / 24.7			88.4 / 40.1		lb / kg
Cooling	Natural Convection				Natural convection and internal fan (user replaceable)	Fans (user replaceable)		
Noise	< 25					< 50		dBA
Min. Max. Operating Temperature Range	-13 to +140 / -25 to +60 (-40 to +60 version available[4])							°F / °C
Protection Rating	NEMA 3R							

[1] For other regional settings please contact SolarEdge support
[2] A higher current source may be used; the inverter will limit its input current to the values stated
[3] Revenue grade inverter P/N: SExxxxA-US000NNR2 (for 7600W inverter: SE7600A-US000NNR2)
[4] Adjustment P/N: SExxxxA-US000NNU4 (for 7600W inverter: SE7600A-US000NNU4)

RoHS

EnerBLÜ GRID SERVICES

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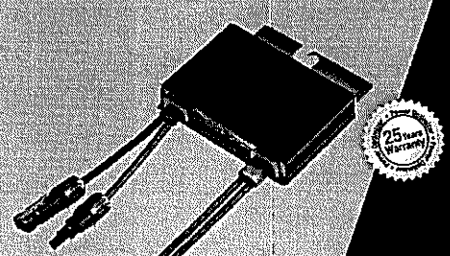
(SHEET 11)

solaredge

SolarEdge Power Optimizer

Module Add-On For North America

P300 / P320 / P370 / P400 / P405



POWER OPTIMIZER

PV power optimization at the module-level

- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety

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solaredge

SolarEdge Power Optimizer

Module Add-On for North America

P300 / P320 / P370 / P400 / P405

	P300 (for 60-cell modules)	P320 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	
INPUT						
Rated Input DC Power[1]	300	320	370	400	405	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125	Vdc
MPPT Operating Range	8 - 48		8 - 60	8 - 80	12.5 - 105	Vdc
Maximum Short Circuit Current (Isc)	10	11		10.1		Adc
Maximum DC Input Current	12.5	13.75		12.63		Adc
Maximum Efficiency	99.5					%
Weighted Efficiency	98.8					%
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)						
Maximum Output Current	15					Adc
Maximum Output Voltage	60				85	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer	1					Vdc
STANDARD COMPLIANCE						
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
Maximum Allowed System Voltage	1000					Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters					
Dimensions (W x L x H)	128 x 152 x 27.5 / 5 x 5.97 x 1.08			128 x 152 x 35 / 5 x 5.97 x 1.37	128 x 152 x 50 / 5 x 5.97 x 1.96	mm / in
Weight (including cables)	630 / 1.4			750 / 1.7	845 / 1.9	gr / lb
Input Connector	MC4 Compatible		MC4 / Amphenol AH4	MC4 Compatible		
Output Wire Type / Connector	Double Insulated; MC4 Compatible		Double Insulated; MC4 / Amphenol AH4	Double Insulated; MC4 Compatible		
Output Wire Length	0.95 / 3.0		1.2 / 3.9			m / ft
Operating Temperature Range	-40 - +85 / -40 - +185					°C / °F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

[1] Rated STC power of the module. Module of up to +5% power tolerance allowed

PV SYSTEM DESIGN USING A SOLAREDGE INVERTER[2][3]	SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE 208V	THREE PHASE 480V	
Minimum String Length (Power Optimizers)	8		10	18	
Maximum String Length (Power Optimizers)	25		25	50	
Maximum Power per String	5700 (6000 with SE7600H-US)	5250	6000	12750	W
Parallel Strings of Different Lengths or Orientations	Yes				

[2] For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf

[3] It is not allowed to mix P405 with P300/P370/P400/P600/P700 in one string

CE

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CONTRACTOR

ENERBLU GRID SERVICES

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20

Tech Brief

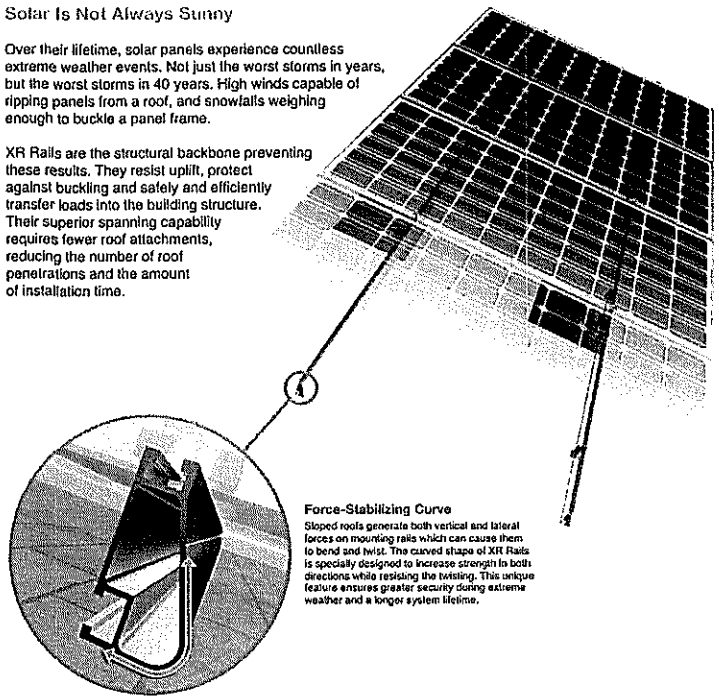
IRONRIDGE

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.

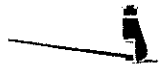
Corrosion-Resistant Materials

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.

Tech Brief

XR Rail Family

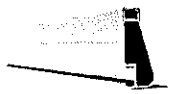
The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



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.

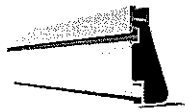
- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



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	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						

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(SHEET 13)

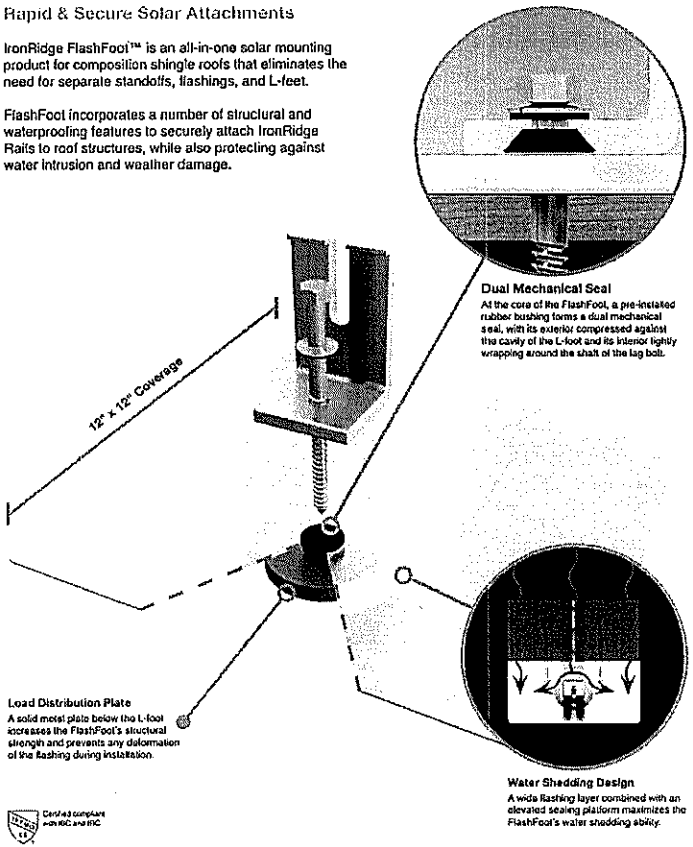
IRONRIDGE

FlashFoot™

Rapid & Secure Solar Attachments

IronRidge FlashFoot™ is an all-in-one solar mounting product for composition shingle roofs that eliminates the need for separate standoffs, flashings, and L-feet.

FlashFoot incorporates a number of structural and waterproofing features to securely attach IronRidge Rails to roof structures, while also protecting against water intrusion and weather damage.



Dual Mechanical Seal
At the core of the FlashFoot, a pre-installed rubber bushing forms a dual mechanical seal, with its exterior compressed against the cavity of the L-foot and its interior tightly wrapping around the shaft of the lag bolt.

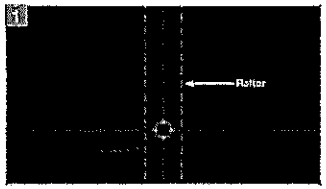
Load Distribution Plate
A solid metal plate below the L-foot increases the FlashFoot's structural strength and prevents any deformation of the flashing during installation.

Water Shedding Design
A wide flashing layer combined with an elevated sealing platform maximizes the FlashFoot's water shedding ability.

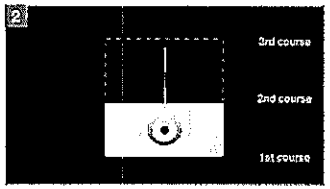
Certified compliant with IBC and IRC

Installation Overview

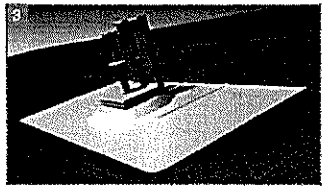
Tools Required: tape measure, chalk line, stud finder, roofing bar, caulking gun with an approved sealant, drill with 1/4" bit and 1/2" socket.



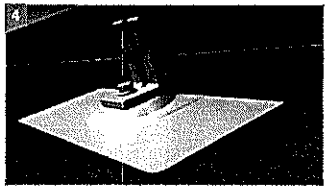
Locate rafters and snap vertical and horizontal lines to mark locations of flashings. Drill 1/4" pilot holes, then backfill with an approved sealant.



Slide flashing, between 1st and 2nd course, so the top is at least 3/4" above the edge of the 3rd course and the bottom is above the edge of the 1st course.



Line up pilot hole with flashing hole and insert lag bolt through bonded washer, L-Foot, and flashing. Tighten lag bolt until fully seated.



The FlashFoot is now installed and ready for IronRidge Rails. With provided L-foot fasteners pre-loaded into rails, drop rails into open L-foot slots.

Testing & Certification

FlashFoot is certified for compliance with the International Building Codes (IBC) & International Residential Codes (IRC) by IAPMO-ES. Mechanical testing conformed to the standard for Testing and Analysis of Joist Hangers and Miscellaneous Connectors (EC002-2011), and rain testing conformed to the Underwriters Laboratory Standard for Gas Vents (UL 441-96 Section 25).

Douglas Fir, Larch	.50	798
Douglas Fir, South	.46	705
Engelmann Spruce, Lodgepole Pine (MSR 1650 f & higher)	.46	705
Hem, Fir	.43	630
Hem, Fir (North)	.46	705
Southern Pine	.55	891
Spruce, Pine, Fir	.42	615
Spruce, Pine, Fir (E of 2 mill psi and higher grades of MSR and MEL)	.50	798

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