HISTORIC PRESERVATION COMMISSION STAFF REPORT

Address: 11 Montgomery Ave., Takoma Park  
Meeting Date: 1/10/18

Resource: Contributing Resource  
Report Date: 1/03/18

Takoma Park Historic District

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 panels, 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.
HISTORIC PRESERVATION COMMISSION
301/563-3400
APPLICATION FOR
HISTORIC AREA WORK PERMIT

Contact Email: projects@kenergysolar.com
Contact Person: Antoine Grant
Tax Account No.: 
Name of Property Owner: Marianna Diggins
Daytime Phone No.: 301-891-3861
Address: 11 Montgomery Ave
City: Takoma Park
State: MD
Zip Code: 20912
Street: 
Contractor: Kenergy Solar
Home Number: 11
Street: Montgomery Ave
Town/City: Takoma Park
Nearest Cross Street: Pine Ave
Lot: 6
Block: 17
Subdivision: 0025
Lot: 
Block: 
Subdivision: 

PART I: TYPE OF PERMIT, ACTION AND USE

1A. CHECK ALL APPLICABLE:
- [ ] Construct
- [ ] Extend
- [ ] Alter/Renovate
- [ ] Air
- [ ] Slab
- [ ] Room Addition
- [ ] Porch
- [ ] Deck
- [ ] Shed
- [ ] Move
- [ ] Install
- [ ] Wreck/Remove
- [ ] Solar
- [ ] Fireplace
- [ ] Woodburning Stove
- [ ] Single Family
- [ ] Revision
- [ ] Repair
- [ ] Revocable
- [ ] 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 No.

PART II: COMPLETE FOR NEW CONSTRUCTION AND EXTENSIONS/ADDITIONS

2A. Type of sewage disposal: [ ] WSSC
[ ] Septic
[ ] Other:

2B. Type of water supply: [ ] WSSC
[ ] Well
[ ] Other:

PART III: COMPLETE FOR FENCES/RETAINING WALLS

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/assessment

Therefore, 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: ________________________________ Date:
Application/Permit No.: ________________________________ Date Filed: ________________________________ Date Issued: ________________________________

SEE REVERSE SIDE FOR INSTRUCTIONS
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" copies 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, where 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 5" 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 NOTIFYING
[Owner, Owner's Agent, Adjacent and Confronting Property Owners]

<table>
<thead>
<tr>
<th>Owner's mailing address</th>
<th>Owner's Agent's mailing address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marianna Diggs</td>
<td>Antoine Grant / Kenergy Solar</td>
</tr>
<tr>
<td>11 Montgomery Ave</td>
<td>401 New York Ave NE</td>
</tr>
<tr>
<td>Takoma Park, MD 20912</td>
<td>Washington, DC 20002</td>
</tr>
</tbody>
</table>

### Adjacent and confronting Property Owners mailing addresses

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</table>
Rear of Home
NEW PV SYSTEM: 4.800 kWp
DIGGS RESIDENCE
11 MONTGOMERY AVE
TAKOMA PARK, MD 20912
ASSESSOR'S #: 1301075820

PROJECT INFORMATION
OWNER: MARIAH DIGGS
PROJECT MANAGER: ANTONIO GEERT
PHONE: 2081341343

CONTRACTOR
NAME: ENERBLU GRID SERVICES
PHONE: 2081341343

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

DESIGN SPECIFICATIONS
OCCUPANCY: II
CONSTRUCTION: SINGLE FAMILY
ZONING: RESIDENTIAL
GROUNDS GROUP: 35 PSF
WIND EXPOSURE: B
WIND SPEED: 115 MPH

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

FIGURES
01 AERIAL PHOTO
02 PLAT MAP

EUTOPIS
ARCHITECTS, ENGINEERS, INTEGRATORS
2.1.3 The PV modules are considered non-combustible and this system is a utility-interactive system with storage batteries.

2.1.4 The solar PV installation will not obstruct any plumbing, mechanical, or electrical building services.

2.1.5 Proper access and warning clearance around existing and proposed electrical equipment will be provided as per Section 518.10 of NEC.

2.1.6 Roof coverings shall be designed, installed, and maintained in accordance with this code and the approved manufacturers instructions such that the roof covering serves to protect the building or structure.

2.1.7 Equipment locations:

2.1.7.1 All equipment shall meet minimum setbacks as required by NEC 516.4.

2.1.7.2 Wiring systems installed in direct sunlight must be rated for expected operating temperature as specified by NEC 690.31 (A) and NEC Tables 516.15 (A) and 516.15 (D).

2.1.7.3 Junction and pull boxes permitted installed under PV modules according to NEC 690.34.

2.1.7.4 Additional AC disconnected shall be provided where the inverter is not within sight of the AC servicing disconnect.

2.1.7.5 All equipment shall be installed accessible to qualified persons according to NEC applicable codes.

2.1.7.6 All components are listed for their purpose and rated for outdoor usage when appropriate.

2.3.1 Structural notes:

2.3.1.1 Rack system & PV array will be installed according to code-compliant installation manual. Mounting clamps require a designated space between modules, and rails must also extend a minimum distance beyond either end of the array/module.

2.3.1.2 According to rail manufacturer’s instructions.

2.3.1.3 Junction box will be installed per manufacturer’s specifications. If roof-penetrating type, it shall be flashed and sealed per local requirements.

2.3.2 Roof penetrations for PV raceway will be completed and sealed with approved chemical sealant per code by a licensed contractor.

2.3.3 All PV-related roof attachments to be spaced no greater than the span distance specified by the racking manufacturer.

2.3.4 When possible, all PV-related racking attachments will be decentralized throughout the roof framing members.

2.4.1 Grounding notes:

2.4.1.1 Grounding system components shall be listed for their purpose, and grounding devices exposed to the elements shall be painted for such use.

2.4.1.2 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 250.144 or 250.14A. Only the DC conductors are ungrounded.

2.4.1.3 PV equipment shall be grounded according to NEC 690.43 and minimum NEC Table 250.12.

2.4.1.4 Metal parts of module frames, module racking, and enclosure considered grounded in accordance with 250.134 and 250.13A(4).

2.4.1.5 Each module will be grounded using 4 AWG grounding clips as shown in manufacturer’s documentation and approved by the AH. If these are not listed, module grounding lug must be installed at the specified grounding lug holes for the manufacturer’s installation requirements.

2.4.1.6 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.

2.4.1.7 Grounding and bonding conductors, if insulated, shall be colored green or marked green if 8 AWG or 6 AWG L250 (NEC 250.110).

2.4.1.8 The grounding electrode system complies with NEC 690.47 and NEC 200.96 through 250.60 if existing systems are accessible. If inaccessible, a grounding electrode system provided according to NEC 250, NEC 690.47 and 250.62.

2.4.1.9 According to NEC 690.47, ungrounded systems must have a size of DC grounding according to NEC requirements of NEC 250.121. However, DC GEC is not to be unfused or disconnectable.

2.4.1.10 In ungrounded inverters, ground fault protection is provided by isolated monitor input/outputs and ground fault detection performed by "residual-current detector".

2.4.2 Interconnection notes:

2.4.2.1 Load-side interconnection shall be in accordance with NEC 690.84 (B).

2.4.2.2 The size of the utility GEC and interconnection continuous input may not exceed 100A of Buss bar rating (NEC 705.12)(D)(8).

2.4.2.3 When the PV output is greater than 99% of the Buss bar rating, the PV disconnect shall be placed in accordance with the manufacturer’s instructions.

2.4.2.4 At multiple inverters output combiner panel, total rating of all overcurrent devices shall not exceed 80% of Buss bar rating. However, the combined overcurrent device may be excluded according to NEC 705.12(D)(9)(C).

2.4.2.5 Service entrance conductors in accordance with NEC 230.42.

2.4.2.6 A feed-through breaker for utility-interactive inverter output is exempt from additional fastening per NEC 705.12(F)(10).

2.4.3 Disconnection and over-current protection notes:

2.4.3.1 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). Disconnects are accessible to qualified utility personnel, be lockable, and be a visible switch.

2.4.3.2 Both positive and negative PV conductors are ungrounded. Therefore both must be open where a disconnect is required, according to NEC 690.15.

2.4.3.3 DC disconnect integrated into rooftop DC combiner or installed within 20 ft. according to NEC 690.15(D).

2.4.3.4 Rapid shutdown of energized conductors beyond 20 ft of PV array or 5 ft inside a building within 10 seconds. Controlled conductors described in 250.149A and 250.150 (NEC 690.12). Location of label according to all.

2.4.3.5 All DC panel ratings and types specified according to NEC 690.8, 690.9, and 248.

2.4.3.6 Both positive and negative PV conductors are ungrounded. Therefore both must comply over-current protection, according to NEC 240.21 (see exception in NEC 250.9).

2.4.3.7 If required by all, system will include arc-fault circuit protection according to NEC 690.31 and UL 1995.

2.4.3.8 Wiring & conduit notes:

2.4.3.9 All conduit and wire will be listed and approved for their purpose. Conduit and wire specifications are based on maximum code or manufacturer’s documentation and are not meant to limit upgrades.

2.4.3.10 All conductors sized according to NEC 690.2, NEC 690.9.

2.4.3.11 Exposed ungrounded PV source and output circuits shall use wire marked and identified as photovoltaic (PV) wire (NEC 250.61). PV modules must be listed for use with ungrounded systems according to NEC 690.35(E)(7).

2.4.3.12 PV wire shall be field marked white (NEC 250.8)(B).

2.4.3.13 Module wiring shall be located and secured under the array. According to NEC 200.17, ungrounded systems DC conductors are colored or marked as follows:

- Positive: red, or other color excluding black, green, yellow, and gray
- Negative: black, or other color excluding white, gray, and green

AC conductors colored or marked as follows:

- Phase A: yellow
- Phase B: blue
- Phase C: black
- Neutral: white or gray
- Ground: green or yellow

* In 4-wire Delta connected systems the phase with higher voltage to be marked orange (NEC 110.18)
### System Summary

<table>
<thead>
<tr>
<th>STRING</th>
<th>PANELS</th>
<th>RACKS</th>
<th>RACK CAPACITY</th>
<th>TOTAL RACK POWER</th>
<th>INVERTER</th>
<th>INVERTER TYPE</th>
<th>INVERTER EFFICIENCY</th>
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### Design Temperatures

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<tr>
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<th>MAXIMUM</th>
<th>MINIMUM</th>
<th>DIFFERENCE</th>
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<tr>
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<td>75°F</td>
<td>40°F</td>
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### Bill of Materials

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<th>MAKE</th>
<th>MODEL NUMBER</th>
<th>QTY</th>
<th>UNIT</th>
<th>DESCRIPTION</th>
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<td>MODULES</td>
<td>SOLAR EDGE</td>
<td>GEM-10-002</td>
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<td>120V</td>
<td>10x120V GEM-10-002 MODULES</td>
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<tr>
<td></td>
<td>GENERAL MANUFACTURER</td>
<td>GEN-600-4X4D</td>
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<td>1</td>
<td>1x600W 4x4D GENERAL MANUFACTURER</td>
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### Power Optimizers

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<th>RACK CAPACITY</th>
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<th>INVERTER</th>
<th>INVERTER TYPE</th>
<th>INVERTER EFFICIENCY</th>
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### Disconnects

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### Conductor and Conduit Schedule for Electrical Calculations

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<tr>
<th>TYPE</th>
<th>CONDUCTOR</th>
<th>CONDUIT</th>
<th>CURRENT-CARRYING CONDUCTORS (IN CONDUIT)</th>
<th>CONDUIT SIZE</th>
<th>TEMPERATURE</th>
<th>TEMP. CORR. FACTOR</th>
<th>COEFFICIENT</th>
<th>CURRENT</th>
<th>MAX. CURRENT (25%)</th>
<th>BASE AMP</th>
<th>DERATED AMP</th>
<th>TOTAL TEMP. RATING</th>
<th>AMP @ TERMINAL</th>
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<td>40</td>
<td>10 AWG BARE COPPER</td>
<td>BLANK CONDUIT</td>
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<td>6 AWG BARE COPPER</td>
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<td>0.54</td>
<td>0.54</td>
<td>2</td>
<td>15A</td>
<td>18.75A</td>
<td>55A</td>
<td>79.31A</td>
<td>72°C</td>
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<td>40</td>
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<td>BLANK CONDUIT</td>
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<td>6 AWG THHN-2 COPPER</td>
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<td>BLANK CONDUIT</td>
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<td>18.75A</td>
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<tr>
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<td>0.54</td>
<td>2</td>
<td>15A</td>
<td>18.75A</td>
<td>55A</td>
<td>79.31A</td>
<td>72°C</td>
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</table>
!CAUTION!
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:

PLACARD 3
AT EACH JUNCTION, CONNECTOR, DISCONNECT AND DEVICE WHERE ENERGIZED UNINTERRUPTED CONDITIONS MAY BE EXPOSED DURING SERVICE
[NEC 680.97]

PLACARD 5
AT INTERPOINT OF INTERCONNECTION, LABEL SUCH AS LABEL 5 OR LABEL 4 MUST IDENTIFY PHOTOVOLTAIC SYSTEM
[NEC 740.10(c)]

PLACARD 7
AT EACH DC DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT
[NEC 680.63]

PLACARD 9
INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED
[NEC 740.10(c)]

PLACARD 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 680.33(c)]
LETTERS AT LEAST 3/8 IN. WHITE ON RED BACKGROUND, REFLECTIVE
[NEC 680.13(b)]

PLACARD 11
AT EACH DC DISCONNECTING MEANS
[NEC 680.13(b)]

PLACARD 12
AT POINT OF INTERCONNECTION OR DIRECTIONAL DEVICE
[NEC 680.13(b)]

PLACARD 14
AT EACH AC DISCONNECTING MEANS AT POINT OF INTERCONNECTION MARKED AT DISCONNECTING MEANS
[NEC 690.54]

EQUIPMENT ELEVATION
NOT TO SCALE

01

E-063.00

The 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.

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 of the world's most automated module production facilities.

Increased Quality

Top quality materials and 500X ILL 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.

<table>
<thead>
<tr>
<th>Model Power (Peak)</th>
<th>Module Voltage (Open)</th>
<th>Module Current (Max)</th>
<th>Module Efficiency</th>
<th>Modbus Address</th>
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<tr>
<td>295W</td>
<td>22.9V</td>
<td>14.6A</td>
<td>18.8%</td>
<td>0x130103</td>
</tr>
<tr>
<td>300W</td>
<td>23.0V</td>
<td>14.8A</td>
<td>19.0%</td>
<td>0x130104</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Power (Watt)</th>
<th>Voltage (V)</th>
<th>Current (A)</th>
<th>Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>280</td>
<td>22.6V</td>
<td>13.9A</td>
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<tr>
<td>285</td>
<td>22.7V</td>
<td>14.1A</td>
<td>18.4%</td>
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<tr>
<td>290</td>
<td>22.8V</td>
<td>14.4A</td>
<td>18.6%</td>
</tr>
<tr>
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<td>22.9V</td>
<td>14.6A</td>
<td>18.8%</td>
</tr>
<tr>
<td>300</td>
<td>23.0V</td>
<td>14.8A</td>
<td>19.0%</td>
</tr>
</tbody>
</table>
Solar Is Not Always Sunny

Over their lifetimes, solar panels experience countless extreme weather events. Not just the worst storms in 40 years, but the worst storms in 40 years. High winds capable of tilting 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 capacity requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.

Force-Stabilizing Curve

XR Rails generate multi-directional and linear forces around the roof's perimeter, which can cause the roof to buck and fail. The curved shape of XR Rails is specially designed to distribute stress to the building's structure, allowing the system to move while reducing the loading. The unique force-resistant design provides stability during extreme weather and a longer system lifetime.

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.

XR110
XR100
XR1000

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, Flood Zone, Exposure B, Flood Slope of 7 1/2 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed specs, tables and certifications.

<table>
<thead>
<tr>
<th>Load Level</th>
<th>XR110</th>
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<th>XR1000</th>
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<td>140</td>
<td>160</td>
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</tr>
<tr>
<td>1000</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Compatibility with Flat & Pitched Roofs

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

Corrosion-Resistant Materials

All XR Rails are made of marine-grade stainless steel, providing an aesthetic finish and structural integrity, while also providing a multi-decade appearance.