MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION

STAFF REPORT

Address: 310 Market St., Brookeville  
Meeting Date: 5/10/17

Resource: Outstanding Resource  
Brookeville Historic District  
Report Date: 5/3/17

Applicant: Brent Cotton  
Public Notice: 4/26/17

Review: HAWP  
Tax Credit: N/A

Case Number: 23/65-17B  
Staff: Dan Bruechert

Proposal: Solar Panel Installation

STAFF RECOMMENDATION

Staff recommends that the HPC approve the HAWP application.

PROJECT DESCRIPTION

SIGNIFICANCE: Outstanding Resource in the Brookeville Historic District

STYLE: Gothic Revival

DATE: c. 1865

310 Market Street is a 1 ½ story side-gable, gothic revival style structure with large front and rear facing gable dormers, a central front porch with plain square columns, and a shed roof. There is an arched nine-over-four window in front-facing gable dormer and a decorative bargeboard in the eaves. The roof is covered in asphalt shingles.

The non-historic accessory structure was constructed as a two-car garage with a front gable, board and batten siding, and a 5-V metal roof. In 2005, the HPC approved modifications to the garage including the installation of the windows, doors, and re-siding the exterior to its current appearance.

PROPOSAL

The applicant is proposing to install 41 (forty-one) photovoltaic solar panels on to the house and non-contributing accessory structure. There will be 15 panels installed in three arrays on the rear of the historic house and 26 panels on the accessory structure.

APPLICABLE GUIDELINES

When reviewing alterations and new construction to a property located within a Master Plan historic district several documents are to be utilized as guidelines to assist the Commission in developing their decision. These documents include Montgomery County Code chapter 24A
(Chapter 24A) and the Secretary of the Interior's Standards for Rehabilitation (Standards). The pertinent information in these documents is outlined below.

**Montgomery County Code, Chapter 24A**

(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;

**Secretary of the Interior's Standards for Rehabilitation:**

2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, space and spatial relationships that characterize a property will be avoided.

5. Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.

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 proportions, and massing to protect the integrity of the property and its environment.

10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired

**STAFF DISCUSSION**

The applicant’s proposal to install forty-one (41) photovoltaic panels on the property will have a minimal impact on the historic building or the surrounding district. The panels will be divided between the rear of the historic house and the non-historic accessory structure.

A total of 15 (fifteen) panels will be installed on the historic house. Those panels will be installed in three arrays placed at the rear of the house. Two sets of four panels will be installed on the rear, south-facing, slope of the roof, while another seven panels will be installed on the rear gable dormer facing west. These panels are proposed for a secondary elevation, in a location that is not visible from the public-right-of-way so as not to have a detrimental impact on the surrounding district (24A-b(2)). Additionally, this proposal will not destroy any historic material and is a reversible treatment (Standards 9 & 10).

The remaining 26 solar panels are proposed for almost total coverage to the non-historic accessory structure. The structure is a non-contributing, front gable building placed at the rear of
the lot, accessed by the driveway to the right of the historic house. Only the front gable of the structure is visible from the public right-of-way. The solar panels will be highly visible from the side of the structure; however, those facades are only visible from the rear of 310 and 312 Market St., not from the public right-of-way in the surrounding district.

While it is preferable to place the solar panels on the accessory structure or elsewhere on the site, because of the fortuitous siting of the house, the south facing panels on the historic house will not be visible from the surrounding district. The minimal visibility of the proposed solar panels complies with Chapter 24A and the Secretary for the Interior's Standards for Rehabilitation and should be approved.

**STAFF RECOMMENDATION**
Staff recommends the HPC approve the HAWP application;

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.
APPLICATION FOR
HISTORIC AREA WORK PERMIT

Contact: John Stokes
Name of Property Owner: Steven Kerr
Address: 310 Market St, Brookeville, MD 20833
Contractor: Solar Energy World
Contractor Registration No.: 17-495
Agent for Owner: Brent Cotton

LOCATION OF BUILDING PREMISES
House Number: 310
Town/City: Brookeville
Nearest Cross Street: High St
Lot: Block: Subdivision:
Lib.: Folio: Page:

PART ONE: TYPE OF PROJECT AND USE
1A. CHECK ALL APPLICABLE
☐ Construct ☐ Extend ☐ Alter/Renovate ☐ AC ☐ 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: $ 39,000

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

PART TWO: COMPLETE FOR NEW CONSTRUCTION AND EXTERNAL ADDITION
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/assessment

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: 04-13-17

Approved: __________________________ For Chairperson, Historic Preservation Commission
Disapproved: __________________________ Date:

Application/Permit No.: __________________________ Data Filed: __________________________ Data 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:
      Single family dwelling and a detached shed

   b. General description of project and its effect on the historic resources(s), the environmental setting, and, where applicable, the historic district:
      Install 41 roof mounted solar PV panels.
      1 inverter 60 amp fused line side 10k, 11.48 kw
      0 of ground disturbance

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 façade 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 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>
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<tbody>
<tr>
<td>310 Market St.</td>
<td>5681 Main St.</td>
</tr>
<tr>
<td>Brookville, MD 20833</td>
<td>Elkridge, MD 21075</td>
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### Adjacent and confronting Property Owners mailing addresses

<table>
<thead>
<tr>
<th>Mike Oestreich</th>
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</tr>
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<tr>
<td>306 Market St</td>
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<table>
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<tr>
<th>Joanne Keister</th>
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<td>312 Market St</td>
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<tr>
<td>Brookville, MD 20833</td>
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</tbody>
</table>
THE ALLMAX™ PLUS MODULE

60 CELL
MONOCRYSTALLINE MODULE

270-295W
POWER OUTPUT RANGE

18.0%
MAXIMUM EFFICIENCY

0~±5W
POSITIVE POWER TOLERANCE

Maximize limited space with top-end efficiency
• Up to 180 W/m² power density
• Low thermal coefficients for greater energy production at high operating temperatures

Highly reliable due to stringent quality control
• Over 30 in-house tests (UV, TC, HF, and many more)
• In-house testing goes well beyond certification requirements
• 100% EL double inspection

Certified to withstand challenging environmental conditions
• 2400 Pa wind load
• 5400 Pa snow load
• 35 mm hail stones at 97 km/h

As a leading global manufacturer of next generation photovoltaic products, we believe close cooperation with our partners is critical to success. With local presence around the globe, Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners as the backbone of our shared success in driving Smart Energy Together.

Trina Solar Limited
www.trinasolar.com

Comprehensive products and system certificates

- IEC 61215/ IEC 61730/ UL 1703/ IEC 61701/IEC 62716
- ISO 9001: Quality Management System
- ISO 14001: Environmental Management System
- ISO 14064: Greenhouse Gases Emissions Verification
- OHSAS 18001: Occupation Health and Safety Management System
# Single Phase Inverters for North America


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<td>3800</td>
<td>5000</td>
<td>6000</td>
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<td>5400 @ 208V</td>
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<td>193 - 208 - 229 Vac</td>
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<td>Max. Continuous Output Current</td>
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<td>24 @ 208V</td>
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<td>32</td>
<td>48 @ 208V</td>
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<td>Utility Monitoring, Islanding Protection, Country Configurable Thresholds</td>
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<td>6750</td>
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<td>33@ 208V</td>
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<td>98 @ 208V</td>
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<td>Supported Communication Interfaces</td>
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<td><strong>Installation Specifications</strong></td>
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<td>AC output conduit size / AWG range</td>
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<td>DC input conduit size / # of strings / AWG</td>
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<td>Dimensions with Safety Switch</td>
<td>305 x 125 x 172 / 775 x 315 x 184</td>
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<td>Weight with Safety Switch</td>
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<td>Cooling</td>
<td>Natural Convection</td>
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<td>Min.-Max. Operating Temperature</td>
<td>-20 to +50</td>
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<td>Protection Voltage</td>
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</table>

(1) For other regional single phase contact SolarEdge support.
(2) A higher current source may be used; the inverter will limit its input current to the values stated.
(3) Steve pack inverter in SE2600A-U30000M1W (for 7600W inverter in SE2600A-U50000M1W).
(4) 40 version in SE2600A-U50000M1W (for 7600W inverter in SE2600A-U50000M1W).
SolarEdge Single Phase Inverters
For North America

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 C12.1

USA - GERMANY - ITALY - FRANCE - JAPAN - CHINA - AUSTRALIA - THE NETHERLANDS - UK - ISRAEL

www.solaredge.us
TABLE OF CONTENTS
A - SYSTEM COMPONENTS
B - MODULE COMPATIBILITY
C - SYSTEM LAYOUT
D - FIRE SYSTEM COMPLIANCE NOTES
E - ROOF ATTACHMENT & L-FEET
F - SPLICE & THERMAL BREAK
G - ATTACH RAIL TO L-FEET
H - MICROINVERTER MOUNTING
I - SYSTEM GROUNDING
J - ENDCLAMP, TRIM & FIRST MODULE
K - BONDING MIDCLAMP & TRIM
L - REMAINING MODULES & TRIM
M - BONDING CONNECTION GROUND PATHS
N - BONDING CONNECTION GROUND PATHS - MAINTENANCE
O - TRIM RETROFIT INSTALLATION
**RAIL**: Supports PV modules. Use at least two per row of modules. Aluminum extrusion, available in mill, clear anodized, or dark anodized.

**RAIL SPLICE**: Non-structural splice joins, aligns, and electrically bonds rail sections into single length of rail. Forms either a rigid or thermal expansion joint, 4 inches long, pre-drilled (see page F). Anodized aluminum extrusion available in clear or dark.

**SELF-DRILLING SCREW**: (No. 12 x 14") – Use 4 per rigid splice or 2 per expansion joint. Stainless steel. Supplied with splice. In combination with rigid splice, provides rail to rail bond.

**L-FOOT**: Use to secure rails through roofing material to building structure. Refer to loading tables or U-Builder for spacing.

**L-FOOT T-BOLT**: (3/8" x 14") – Use one per L-foot to secure rail to L-foot. Stainless steel. Supplied with L-foot. In combination with flange nut, provides electrical bond between rail and L-foot.

**SERRATED FLANGE NUT**: (3/8") – Use one per L-foot to secure and bond rail to L-foot. Stainless steel. Supplied with L-foot.

**MODULE ENDCLAMP**: Provides bond from rail to endclamp. Pre-assembled aluminum clamp available in clear or dark finish. Supplied washer keeps clamp and bolt upright for ease of assembly.

**MODULE MIDCLAMP**: Pre-assembled clamp provides module to module and module to rail bond. Stainless steel clamp and T-bolt. Available in clear or dark finish.

**MICROINVERTER MOUNTING BOLT**: Pre-assembled bolt and nut attaches and bonds microinverter to rail. Washer at base keeps bolt upright for ease of assembly.

**NOTE - POSITION INDICATOR**: T-bolts have a slot in the hardware end corresponding to the direction of the T-Head.

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**Wrenches and Torque**

<table>
<thead>
<tr>
<th>Wrench Size</th>
<th>Recommended Torque (In-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot; Hardware</td>
<td>7/16&quot;</td>
</tr>
<tr>
<td>3/8&quot; Hardware</td>
<td>9/16&quot;</td>
</tr>
<tr>
<td>#12 Hardware</td>
<td>5/16&quot;</td>
</tr>
</tbody>
</table>

Torques are not designed for use with wood connectors

**Article Size**

Stainless steel hardware can seize up, a process called galling. To significantly reduce its likelihood:
1. Apply minimal lubricant to bolts, preferably Anti-Seize commonly found at auto parts stores
2. Shade hardware prior to installation, and
3. Avoid spinning stainless nuts onto bolts at high speed.
PLANNING YOUR SOLAR MOUNT INSTALLATIONS
The installation can be laid out with rails parallel to the rafters or perpendicular to the rafters. Note that SOLAR MOUNT rails make excellent straight edges for doing layouts.

Center the installation area over the structural members as much as possible.

Leave enough room to safely move around the array during installation. Some building codes and fire codes require minimum clearances around such installations, and the installer should check local building code requirements for compliance.

The length of the installation area is equal to:
- the total width of the modules,
- plus 14" inch for each space between modules (for mid-clamp),
- plus approximately 5 inches (1 1/2 inches for each Endclamp)

LAYING OUT L-FEET FOR TOP CLAMPS
L-feet, in conjunction with proper flashing equipment and techniques, can be used for attachment through existing roofing material, such as asphalt shingles, sheathing or sheet metal to the building structure.

Locate and mark the position of the L-feet lag screw holes within the installation area as shown below. Follow manufacturer module guide for rail spacing based on appropriate mounting locations.

If multiple rows are to be installed adjacent to one another, it is not likely that each row will be centered above the rafters. Adjust as needed, following the guidelines below as closely as possible.

Refer to Unirac Solar Mount D&E Guide & U-Build for allowable spans and cantilevers.

RAILS MAY BE PLACED PARALLEL OR PERPENDICULAR TO RAFTERS

LAYOUT WITH RAILS PERPENDICULAR TO RAFTERS (RECOMMENDED)

Note: Modules must be centered symmetrically on the rails (1 1/2"").
SYSTEM LEVEL FIRE CLASSIFICATION

The system fire class rating requires installation in the manner specified in the SOLARMOUNT installation guide. SOLARMOUNT has been classified to the system level fire portion of UL 1703. This UL 1703 classification has been incorporated into our UL 2703 product certification. SOLARMOUNT has achieved system level performance for steep sloped roofs. System level fire performance is inherent in the SOLARMOUNT design, and no additional mitigation measures are required. The fire classification rating is only valid on roof pitches greater than 2:12 (slopes ≥ 2 inches per foot, or 9.5 degrees). There is no required minimum or maximum height limitation above the roof deck to maintain the system fire rating for SOLARMOUNT. Module Types & System Level Fire Ratings are listed below:

<table>
<thead>
<tr>
<th>Rail Type</th>
<th>Module Type</th>
<th>System Level Fire Rating</th>
<th>Rail Direction</th>
<th>Module Orientation</th>
<th>Mitigation Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Rail</td>
<td>Type 1, Type 2, Type 3 &amp; Type 10</td>
<td>Class A, Class B &amp; Class C</td>
<td>East-West</td>
<td>Landscape OR Portrait</td>
<td>None Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Landscape OR Portrait</td>
<td>None Required</td>
</tr>
<tr>
<td>Light Rail</td>
<td>Type 1 &amp; Type 2</td>
<td>Class A, Class B &amp; Class C</td>
<td>East-West</td>
<td>Landscape OR Portrait</td>
<td>None Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Landscape OR Portrait</td>
<td>None Required</td>
</tr>
</tbody>
</table>

UL 2703 CERTIFICATION MARKING LABEL

Unirac SOLARMOUNT is listed to UL 2703. Marking Labels are shipped with the Midclamps. After the racking system is fully assembled, a single Marking Label should be applied to the SOLARMOUNT rail at the edge of the array. Note: The sticker label should be placed such that it is visible, but not outward facing.
**ROOF PREPARATION:** Layout and install flashing at rafter locations determined per Design and Engineering Guide.

**DRILL PILOT HOLES:** Center the roof attachment over the rafter and drill a pilot hole(s) for the lag bolt(s).

NOTE: Determine lag bolt size and embedment depth.

Quick Tip: Pre-drill the pilot hole through the flat flashing lag bolt location for easier installation.

**FLAT FLASHING INSTALLATION:** Insert the Flat Flashing so the top part is under the next row of shingles and the hole lines up with the pilot hole.

**INSTALL LAG BOLTS & L-FOOT:** Insert the lag bolt through the L-Foot in the order shown in the illustration. Verify proper orientation before tightening lag bolts.

See Unirac Flat Flashing Manual for Additional Details.

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**2 PIECE ALUMINUM STANDOFF WITH FLASHING & L-FOOT:**
- If necessary cut an opening in the roofing material over a rafter to accommodate the flashing riser.
- Install the standoff, ensuring that both lag bolts are screwed into the rafter.
- Insert the flashing under the shingle above and over the shaft of the standoff (Nu-Calc™ collar does not require seating of the flashing and standoff shaft).
- Add L-Foot to top with bolt that secures the EPDM washer to the top of the standoff. See Standoffs & Flashings Installation Manual 907.2 for Additional Details.

**TOP MOUNT TILE HOOK & L-FOOT:**
- Remove or slide up the roof tile, position the roof hook above the roof rafter
- Place Tile Hook in the middle of the underlying interlocking tile's valley. Drill 3/16 inch pilot holes through the undertaking into the center of the rafters. Securely fasten each tile hook to the rafters with two 5/16" x 3/16" lag screws. Slide down or re-insert the tile.
- Attach L,Foot to tile roof hook.

See Tile Hook Universal Mount Installation Manual for Additional Information.
**SPICE & THERMAL BREAK**

**INSTALLATION GUIDE**

**PAGE**

**SPICE INSTALLATION (IF REQUIRED PER SYSTEM DESIGN)**

If your installation uses SOLARMOUNT splice bars, attach the rails together before mounting to the L-feet/footings. Use splice bars only with flush installations or those that use low-profile tilt legs. A rail should always be supported by more than one footing on both sides of the splice. There should be a gap between rails, up to 3/16" at the splice connections. T-bolts should not be placed less than a distance of 1" from the end of the rail regardless of a splice.

**TORQUE VALUE** (See Note on PG. A)

Hex head socket size 5/16" - Do not exceed 10 ft-lbs. Do not use Anti-Seize.
Max length of spliced rail is 40 ft. An expansion joint is required > 40 ft.

**EXPANSION JOINT USED AS THERMAL BREAK**

Expansion joints prevent buckling of rails due to thermal expansion. Splice bars may be used for thermal expansion joints. To create a thermal expansion joint, slide the splice bar into the footing slots of both rail lengths. Leave approximately 1/2" between the rail segments. Secure the splice bar with two screws on one side only. Footings (such as L-feet or standoffs) should be secured normally on both sides of the splice. No PV module or mounting hardware component should straddle the expansion joint. Modules must clearly end before the joint with mounting hardware (top mount Endclamps) terminating on that rail. T-bolts should not be placed less than a distance of 1" from the end of the rail regardless of a splice. The next set of modules would then start after the splice with mounting hardware beginning on the next rail. A thermal break is required every 40 feet of continuously connected rail. For additional concerns on thermal breaks, in your specific project, please consult a licensed structural engineer. Runs of rail less than 40 feet in length, with more than two pairs spliced together, are an acceptable installation for the SOLARMOUNT systems.

Bonding connection for splice used as a thermal break. Option shown uses two lice lugs (Model No. GBL-4DBT PAI GBL-4DBT - see product data sheet for more details) and solid copper wire.

SECURE T-BOLT: Apply Anti-Seize to bolt. Rotate T-bolt into position.

SM STANDARD RAIL: Use either slot to connect the L-foot to the rail to obtain the desired height and alignment when using SM Standard rail.

SM LIGHT RAIL: For a lower profile array when using SM Light rail, rotate the L-foot to orient the side with only one (1) slot against the rail. Only use the slot location closest to the rail to connect the lag bolt to the flashing/roof on the side with two (2) slots.

NOTE: Use only the top slot to connect the L-foot to the rail to obtain the desired height and alignment when using SM Light rail.

ALIGN RAILS: Align one pair of rail ends to the edge of the installation area. The opposite pair of rail ends will overhang installation area. Do not trim them off until the installation is complete. If the rails are perpendicular to the rafters, either end of the rails can be aligned, but the first module must be installed at the aligned end.

If the rails are parallel to the rafters, the aligned end of the rails must face the lower edge of the roof. Securely tighten all hardware after alignment is complete.

Mount modules to the rails as soon as possible. Large temperature changes may bow the rails within a few hours if module placement is delayed.

ALIGN POSITION INDICATOR: Hand tighten nut until rail alignment is complete. Verify that position indicator on bolt is vertical (perpendicular to rail)

TORQUE VALUE (See Note on PG. A) 3/8" nut to 30 ft-lbs
INSTALL MICROINVERTER MOUNT T-BOLT: Apply Anti-Seize and install pre-assembled 1/4" dia. bonding T-bolts into top 1/4" rail slot at microinverter locations. Rotate bolts into position.

INSTALL MICROINVERTER: Install microinverter on to rail. Engage with bolt.

INSTALL MICROINVERTER:
TORQUE VALUE (See Note on PG. A) 1/4" nut to 10 ft-lbs w/Anti-Seize

ALIGN POSITION INDICATOR: Verify that position indicator on bolt is perpendicular to rail.
SM EQUIPMENT GROUNDING THROUGH ENPHASE MICROINVERTERS

The Enphase M215 and M250 microinverters have integrated grounding capabilities built in. In this case, the DC circuit is isolated from the AC circuit, and the AC equipment grounding conductor (EGC) is built into the Enphase Engage integrated grounding (IG) cabling.

In order to ground the SOLARMOUNT racking system through the Enphase microinverter and Engage cable assembly, there must be a minimum of three PV modules connected to the same trunk cable within a continuous row. Continuous row is defined as a grouping of modules installed and bonded per the requirements of this installation guide sharing the same two rails. The microinverters are bonded to the SOLARMOUNT rail via the mounting hardware. Complete equipment grounding is achieved through the Enphase Engage cabling with integrated grounding (IG). No additional EGC grounding cables are required, as all fault current is carried to ground through the Engage cable.

SOLARMOUNT INTEGRATED BONDING ADVANTAGE

LOSE ALL THE COPPER & LUGS
**NOTE:** The above images are sample configurations to illustrate the requirements for SM System grounding through Enphase microinverters described on page 1-2
STANDARD SYSTEM GROUNDING
INSTALLATION GUIDE

ONLY ONE LUG PER ROW OF MODULES:
Only one lug per row of modules is required.
See Page F for additional lugs required for expansion joints.

GROUNDING LUG MOUNTING DETAILS:
Details are provided for both the WEEBLug and Ilsco products. The WEEBLug has a grounding symbol located on the lug assembly. The Ilsco lug has a green colored set screw for grounding indication purposes. Installation must be in accordance with NFPA NEC 70, however the electrical designer of record should refer to the latest revision of NEC for actual grounding conductor cable size.
Required if not using approved integrated grounding microinverters.

<table>
<thead>
<tr>
<th>GROUND LUG</th>
<th>BOLT SIZE</th>
<th>DRILL SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEEBLug</td>
<td>1/4&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>Ilsco Lug</td>
<td>#10-32</td>
<td>7/32&quot;</td>
</tr>
</tbody>
</table>

- Torque value depends on conductor size.
- See product data sheet for torque value.

WEEBLUG CONDUCTOR - UNIRAC P/N 0080025:
Apply Anti Seize and insert a bolt in the aluminum rail and through the clearance hole in the stainless steel flat washer. Place the stainless steel flat washer on the bolt, oriented so the dimples will contact the aluminum rail. Place the lug portion on the bolt and stainless steel flat washer. Install stainless steel flat washer, lock washer and nut. Tighten the nut until the dimples are completely embedded into the rail and lug. TORQUE VALUE 10 ft lbs. (See Note on PG. A) See product data sheet for more details, Model No. WEEBLUG-6.7

ILSCO LAY-IN LUG CONDUCTOR - UNIRAC P/N 003009P: Alternate Grounding Lug - Drill, deburr hole and bolt thru both rail walls per table. TORQUE VALUE 5 ft lbs. (See Note on PG. A) See ILSCO product data sheet for more details, Model No. 6BL-4DBT.

NOTE: ISOLATE COPPER FROM ALUMINUM CONTACT TO PREVENT CORROSION.
INSTALL MODULE ENDCLAMPS: The Endclamp is supplied as an assembly with a T-bolt, serrated flange nut, and washer. The washer retains the clamp at the top of the assembly. This will enable the clamp to remain upright for module installation.

INSERT ENDCLAMP T-BOLT: Insert 1/4" T-bolt into rail.

ROTATE ENDCLAMP T-BOLT: Rotate T-bolt into position. Verify that the position indicator & T-bolt shaft are angled in the correct position.
End clamps are positioned on rails prior to the first end module and installed after the last end module.

INSTALL FIRST MODULE: Install the first end module onto rails. Engage module frame with Endclamps. Verify that the position indicator & T-bolt shaft are angled in the correct position.
TORQUE VALUE (See Note on PG. A) 1/4" nuts to 10 ft-lbs w/Anti Seize

POSITION INDICATOR - SERRATED T-BOLT: Verify the T-bolt position indicator is perpendicular to the rail.

TRIM INSTALLATION INSTRUCTIONS

TRIM ENDCLAMPS: Install Endclamps on Trim in like manner to module endclamps per install instructions above.
TORQUE VALUE (See Note on PG. 1) 1/4" nuts to 10 ft-lbs w/Anti Seize
INSTALL MIDCLAMPS: Midclamp is supplied as an assembly with a T-bolt for module installation. Clamp assemblies may be positioned in rail near point of use prior to module placement.

INSERT MIDCLAMP T-BOLT: Apply Anti-Seize and insert 1/4" T-bolt into rail.

ROTATE MIDCLAMP T-BOLT: Rotate bolt into position and slide until bolt and clamp are against module frame. Do not tighten nut until next module is in position. Verify that the position indicator & T-bolt shaft are aligned in the correct position.

TRIM INSTALLATION INSTRUCTIONS

POSITION INDICATOR - SERRATED T-BOLT: Verify the T-bolt position indicator is perpendicular to the rail.

TRIM MIDCLAMPS: Ensure Trim tip is in contact with module face and verify alignment marks on T-bolts are in proper position, tighten midclamp on Trim, repeat at each gap between modules.

TORQUE VALUE (See Note on PG. 1)
1/4" nuts to 10 ft-lbs w/ Anti-Seize
INSTALL REMAINING MID-CLAMPS:
Proceed with module installation. Engage each module with previously positioned Midclamp assemblies.

NOTE: Apply Anti-Seize to each Mid Clamp prior to installation.

POSITION T-BOLT ALIGNMENT MARKS:
Verify that the position indicator(s) & T-bolt shaft(s) are angled in the correct position.

TORQUE VALUE (See Note on PG.A) 1/4" nuts to 10 ft-lbs. w/Anti-Seize

FINISH MODULE INSTALLATION: Proceed with module installation. Engage each module with the previously positioned clamp assembly:
- Install second module
- Install remaining Midclamps & modules & position alignment marks
- Install Endclamps & position alignment marks
- Cut rail to desired length

INSTALL ENDCLAMPS: Apply Anti-Seize and install final Endclamps in same manner as first Endclamps. Slide clamps against module.

TORQUE VALUE (See Note on PG.A) 1/4" nuts to 10 ft-lbs. w/Anti-Seize

POSITION T-BOLT ALIGNMENT MARKS & CUT RAIL: Verify that the position indicator(s) & T-bolt shaft(s) are angled in the correct position. Trim off any excess rail, being careful not to cut into the roof. Allow 1/2" between the Endclamp and the end of the rail.

TORQUE VALUE (See Note on PG.1) 1/4" nuts to 10 ft-lbs w/Anti-Seize

FINISH TRIM INSTALLATION, INSTALL ENDCLAMP & CUT EXCESS RAIL: Install final endclamp & Cut away excess Trim at end of array or where required for proper cantilevers. See D&E Guide or U-Build for allowable cantilevers.

TORQUE VALUE (See Note on PG.1) 1/4" nuts to 10 ft-lbs w/Anti-Seize
**TEMPORARY BONDING CONNECTION DURING ARRAY MAINTENANCE**

When removing modules for replacement or system maintenance, any module left in place that is secured with a bonding Midclump will be properly grounded. If a module adjacent to the end module of a row is removed or if any other maintenance condition leaves a module without a bonding mid clamp, a temporary bonding connection must be installed as shown:

- Attach Ilsco 56B4 to wall of rail
- Attach Ilsco 56B4 to module frame
- Install solid copper wire jumper to Ilsco lugs

**ELECTRICAL CONSIDERATIONS**

SOLARMOUNT is intended to be used with PV modules that have a system voltage less than or equal to 1000 VDC. For standard system grounding a minimum 10AWG, 105°C copper grounding conductor should be used to ground a 1000 VDC system, according to the National Electric Code (NEC). It is the installer's responsibility to check local codes, which may vary. See below for interconnection information.

**INTERCONNECTION INFORMATION**

There is no size limit on how many SOLARMOUNT & PV modules can be mechanically interconnected for any given configuration, provided that the installation meets the requirements of applicable building and fire codes.

**GROUNDING NOTES**

The installation must be conducted in accordance with the National Electric Code (NEC) and the authority having jurisdiction. Please refer to these resources in your location for required grounding lug quantities specific to your project.

The grounding/bonding components may overhang parts of the array so care must be made when walking around the array to avoid damage.

Conductor fastener torque values depend on conductor size. See product data sheets for correct torque values.
PREPARATION: At front edge of array, ensure at least 3.25 inches of space between modules and roof surface and that modules are aligned to within 3/8". Plan for trim length so that endclamps can be properly installed.

1ST MIDLCLAMP: Position trim in front of array. Insert midsclamp into the trim slot, aligned with the gap between the 1st two modules at either end of array. NOTE: Apply Anti-Seize to each midclamp prior to installation.

MOUNT TRIM: Position trim beneath modules by sliding T-bolt into gap between modules and tighten. Midsclamp should stay in position and support trim. Tighten snugly enough so that trim is held firmly in place. TORQUE VALUE: Do not exceed specified torque value (10 ft-lbs).

CLEAR T-BOLTSLOT: Rotate unattached end of trim out and away from array so T-bolt slot (at next T-bolt insertion point) is clear of modules. This may require force to deflect the trim slightly. Deflect only enough to insert T-bolt.

INSERT MIDLCLAMPS: Insert T-bolt into slot and slide clamp (rotating trim) into position between modules and leave loose. Continue to work down array, inserting midsclamps and positioning in gaps between modules.

FASTEN MIDLCLAMPS: Return to each inserted midsclamp. Ensuring trim lip is in contact with module face and verifying alignment marks on T-bolts are in proper position, tighten clamp. TORQUE VALUE (See Note on PG. 1)

ENDCLAMPS: Install Endclamps per previous Endclamp install instructions. TORQUE VALUE (See Note on PG. 1)

1/4" nuts to 10 ft-lbs w/Anti-Seize

CUT EXCESS TRIM: Mark excess trim and cut at end of array or where required for proper cantilevers.
NOTES:
1. ALL WORK SHALL COMPLY WITH REQUIREMENTS OF INTERNATIONAL RESIDENTIAL CODE (IRC 2015) AND LOCAL REQUIREMENTS.
2. LOAD CRITERIA PER:
   - EXPOSURE CATEGORY "B"
   - GROUND SNOW LOAD, P = 30 PSF
   - LATERAL LOAD EXCCESS = 154"
   - ULTIMATE DESIGN WIND SPEED = 110 MPH
3. SOLAR PANELS AND RACKING SYSTEMS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
4. FOLLOW ALL LOCAL AND FEDERAL SAFETY REQUIREMENTS.
NOTES:
1. ALL WORK SHALL COMPLY WITH REQUIREMENTS OF INTERNATIONAL RESIDENTIAL CODE (IRC 2018), LOCAL CODE (ASCE 7-16), WOOD DESIGN COLUMNS 2015, AND LOCAL REQUIREMENTS.
2. LOAD CRITERIA PER:
   - EXPOSURE CATEGORY "G" 
   - GROUND SNOW LOAD, P30 H30 PSF  
   - LATERAL LOAD RISK CATEGORY "G"  
   - ULTIMATE DESIGN WIND SPEED: 115 MPH
3. SOLAR PANELS AND BACKING SYSTEMS SHALL BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS. 
4. FOLLOW ALL LOCAL AND FEDERAL SAFETY REQUIREMENTS.
NOTES:
1. THE SYSTEM SHALL INCLUDE (41) TRINA SOLAR TSM-320-020A-05 (S) MODULES
   (DIMENSIONS: 59.5" (L) x 24.1"(W) x 1.38" (H)) AND WEIGHING 41.0 LBS (PANEL LOAD = 2.33"(H))
2. UNIVAC SOLAR MOUNT RAIL WILL BE INSTALLED IN ACCORDANCE WITH UNIVAR INSTALLATION MANUAL 1.07.3.
3. DIMENSIONS MARKED (") ARE ALONG ROOF SURFACE.
4. REFER TO STRUCTURAL DRAWING FOR SECTIONS MARKED AND ADDITIONAL NOTES.