EXPEDITED
HISTORIC PRESERVATION COMMISSION STAFF REPORT

Address:	25 Holt Place, Takoma Park	**Meeting Date:**	11/13/2019
Resource:	Outstanding Resource **Takoma Park Historic District**	**Report Date:**	11/6/2019
Applicant:	Andrew Partan	**Public Notice:**	10/30/2019
Review:	HAWP	**Tax Credit:**	n/a
Case Number:	37/03-19ZZ	**Staff:**	Dan Bruechert
PROPOSAL:	Roof Solar Panels		

STAFF RECOMMENDATION:

☑ **Approve**
☐ **Approve with conditions**

PROJECT DESCRIPTION

SIGNIFICANCE: Outstanding Resource within the Takoma Park Historic District
STYLE: Italiante/Ecclectic
DATE: 1878

Figure 1: 25 Holt Place is at the intersection of Holt Place and Crescent Place.

PROPOSAL

The applicant proposes to install 23 photovoltaic solar panels on the rear slope of the side gable roof. This proposal will only be minimally visible when viewed from Philadelphia Ave., approximately 200'

(two hundred feet) from the house. Staff finds that this installation will not have a significant visual impact on the historic character of the house or surrounding district and recommends approval.

APPLICABLE GUIDELINES

The use of the expedited review form is supported by one category of work on the Policy on Use of Expedited Staff Reports for Simple HAWP Cases:

2. Modifications to a property, which do not significantly alter its visual character; and
11. Construction or replacement of walkways, parking areas, patios, driveways or other paved areas that are not readily visible from a public right-of-way and/or are compatible in material, location, and design with the visual character of the historic site or district.

Montgomery County Code; Chapter 24A-8

(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;

(d) In the case of an application for work on an historic resource located within an historic district, the commission shall be lenient in its judgment of plans for structures of little historical or design significance or for plans involving new construction, unless such plans would seriously impair the historic or architectural value of surrounding historic resources or would impair the character of the historic district. (Ord. No. 9-4, § 1; Ord. No. 11-59.)

Secretary of the Interior's Standards for Rehabilitation

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.

STAFF RECOMMENDATION

Staff recommends that the Commission **approve** the HAWP application under the Criteria for Issuance in *Chapter 24A-8(b)(1)* and*(2)* having found that the proposal will not substantially alter the exterior features of the historic resource and is compatible in character with the district and the purposes of *Chapter 24A*; and with the *Secretary of the Interior's Standards for Rehabilitation #2,*

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

and with the general condition that final project design details, not specifically delineated by the Commission, shall be approved by HPC staff or brought back to the Commission as a revised HAWP application at staff's discretion;

and with the general condition that the applicant shall notify the Historic Preservation Staff if they propose to make **any alterations** to the approved plans. Once the work is completed the applicant will contact the staff person assigned to this application at 301-563-3400 or dan.bruechert@montgomeryplanning.org to schedule a follow-up site visit.

[redacted]

DPS - #8

HISTORIC PRESERVATION COMMISSION
301/563-3400

APPLICATION FOR HISTORIC AREA WORK PERMIT

Contact Email: Zneubauer@solarenergyworld.com Contact Person: Zach Neubauer
Daytime Phone No.: 410 579 5172

Tax Account No.: _____

Name of Property Owner: Andrew Partan Daytime Phone No.: 301 270 4173

Address: 25 Holt Place (Street Number) Takoma Park (City) MD (State) 20912 (Zip Code)

Contractor: Solar Energy World Phone No.: 410 579 5172

Contractor Registration No.: 127353

Agent for Owner: Zach Neubauer Daytime Phone No.: 410 579 5172

LOCATION OF BUILDING/PREMISE

House Number: 25 Street: Holt Place

Town/City: Takoma Park Nearest Cross Street: Crescent Place

Lot: _____ Block: _____ Subdivision: _____

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: $ 28,000.00

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: 10/18/19

Approved: _____ For Chairperson, Historic Preservation Commission

Disapproved: _____ Signature: _____ Date: _____

Application/Permit No.: 893683 Date Filed: _____ Date Issued: _____

Edit 6/21/99

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

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

   Instsall 33 roof mounted solar panels

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.

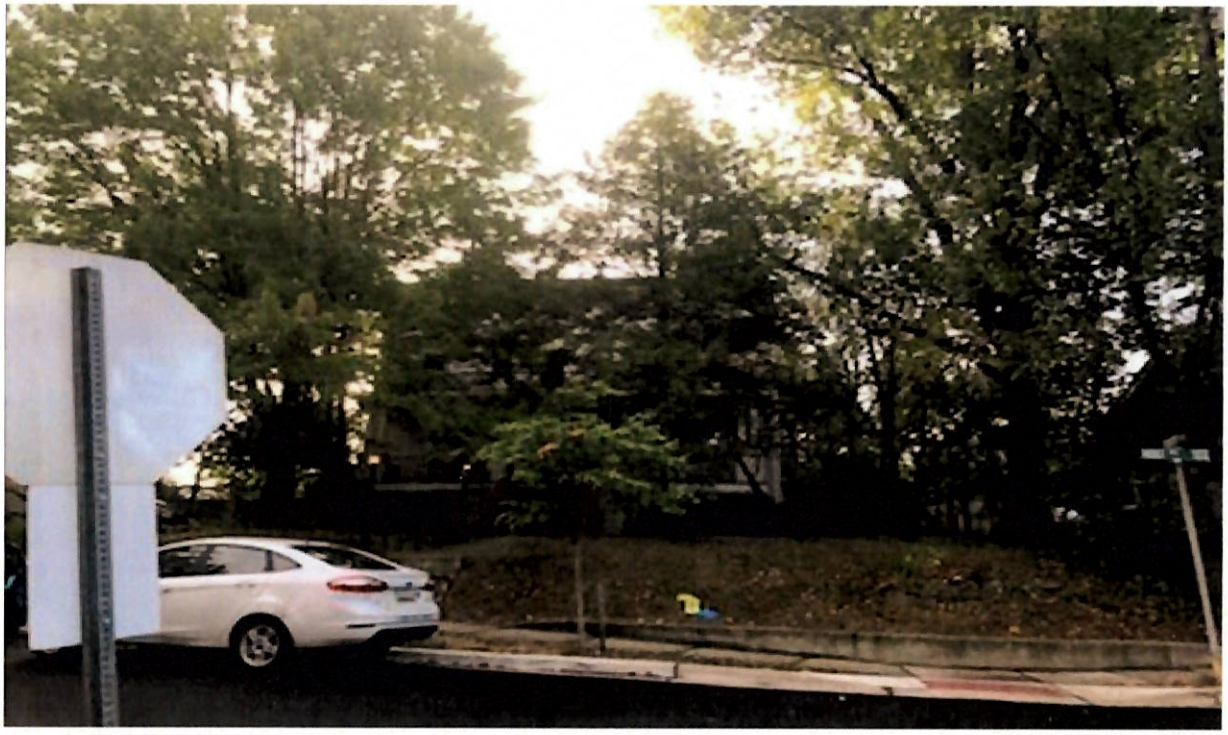
PLEASE PRINT (IN BLUE OR BLACK INK) OR TYPE THIS INFORMATION ON THE FOLLOWING PAGE.
PLEASE STAY WITHIN THE GUIDES OF THE TEMPLATE, AS THIS WILL BE PHOTOCOPIED DIRECTLY ONTO MAILING LABELS!

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
25 Holt Place Takoma Park, MD 20912	5681 Main Street Elkridge, MD 21075
Adjacent and confronting Property Owners mailing addresses	
Lot 18, Block 2 Adjacent	Michael & Mary Wagner 29 Holt Place Takoma Park, MD 20912
Lot 21, Block 2 Adjacent	Geoffrey Maxson & Melissa Lindon 8 Crescent Place Takoma Park, MD 20912
Lot 11, Block 4 Confronting	David Hauck 24 Holt Place Takoma Park, MD 20912

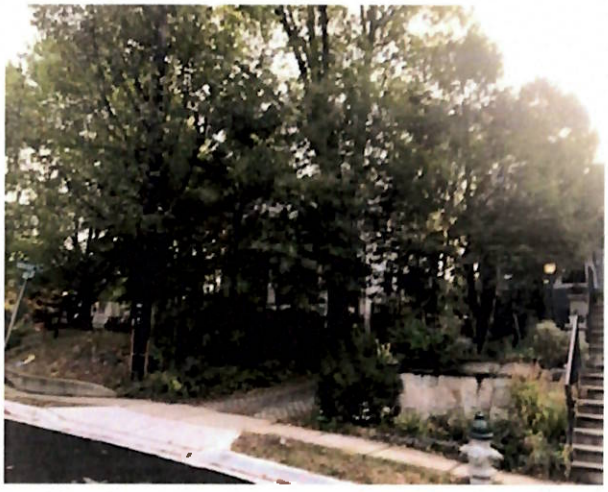
Historic Area Work Permit Application for a Solar Electric System
on the home of
Andrew Partan, 25 Holt Place, Takoma Park, MD 20912

Existing Property Condition Photographs



Front view

East view



West view

Historic Area Work Permit Application for a Solar Electric System
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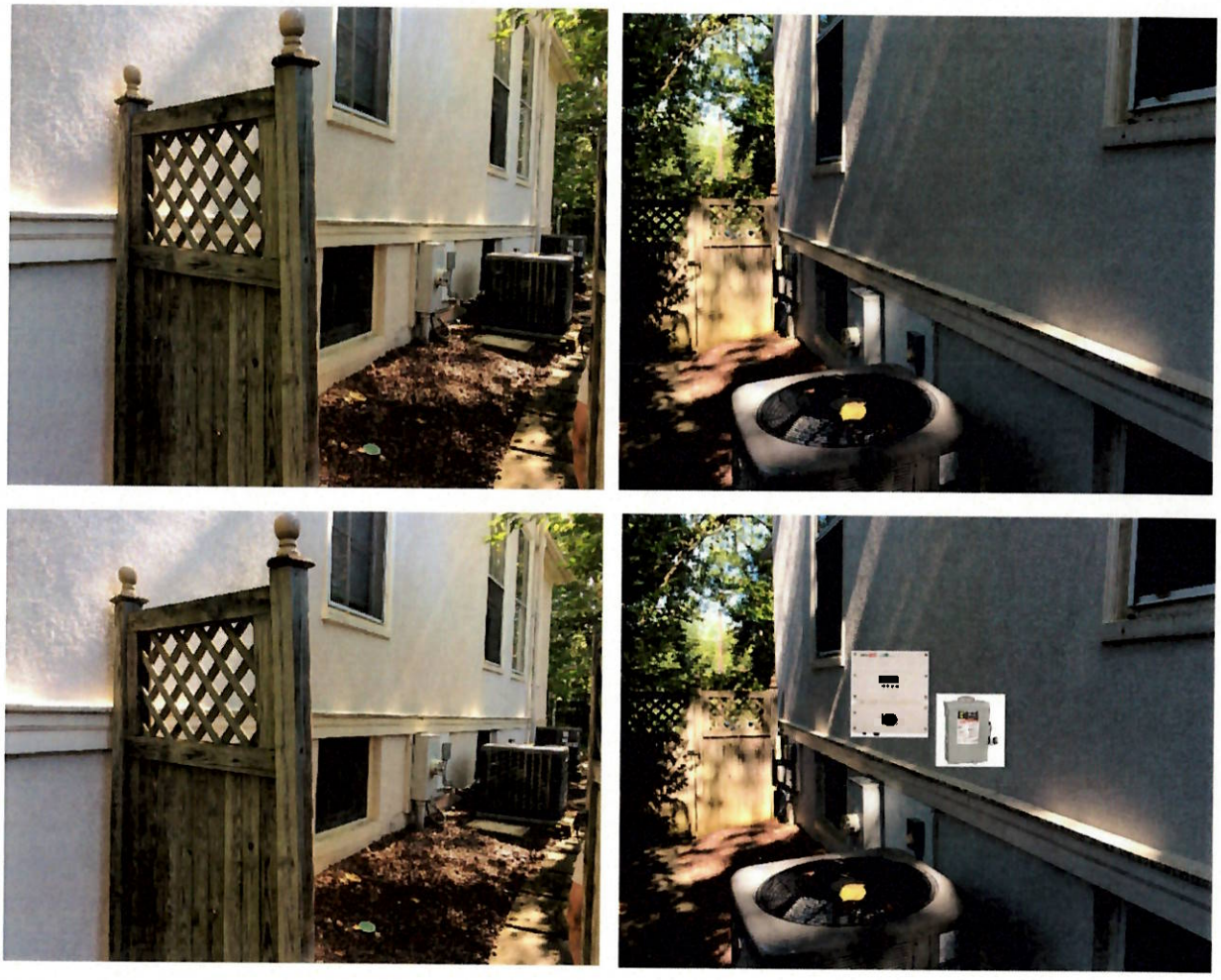
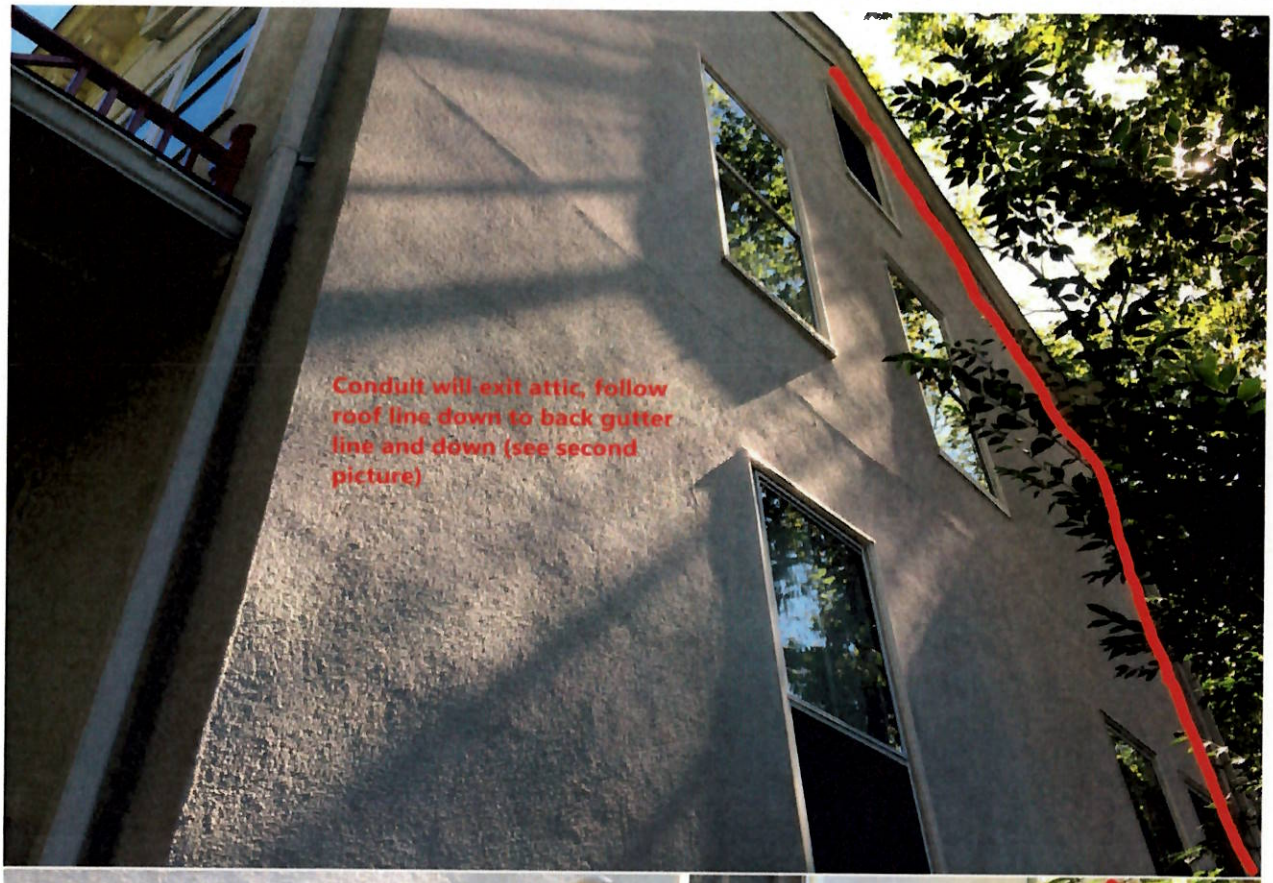


Equipment Location, Before and After Installation

Historic Area Work Permit Application for a Solar Electric System

on the home of

Andrew Partan, 25 Holt Place, Takoma Park, MD 20912



Proposed Conduit Locations

ARC DESIGN

409 N. MAIN STREET
ELMER, NJ 08318
(856) 712-2166 FAX: (856) 358-1511

Date: **September 27, 2019**

Re: **Structural Roof Certification**

Subj: **Partan Residence, 25 Holt Pl., Takoma Park, MD 20912**

We have provided a review of the house roof construction of the above named property in regards to verifying the capacity of the existing roof for installation of a new Solar Panel Array.

We have found the residence to be of wood frame construction bearing walls with a rafter framed roof system. The roof is of 2x8 rafters @ 24" o.c. supported with 2x4 knee walls and 2x4 collar ties @ 24" and is sheathed with 1/2" ext-ply sheathing and a single layer of composite shingles roofing.

The wood framed roof structure bears directly upon the framed exterior wall system. The existing rafters as installed meet the required IRC-2015 design span ratings with sufficient capacity to carry the 3#/sf additional load imposed by the proposed solar array per the details below.

Installation of solar rack systems shall be as follows:

Each panel row shall be supported upon 2 mounting rails. Rails shall be screw anchored through roof and directly to rafters or purlins below. Rail attachment points to rafters shall be staggered each row with exception to the first fastener row from the gable end which is attached to two adjacent rafters/trusses with Stainless Steel fasteners.
Rail attachment to roof shall be fastened 16-32"o.c. at corners and 48" o.c. through the field.
Rails are to be placed at 24-48" o.c. on the roof.

When installed per the above specifications the system shall meet the required 115 MPH wind load and 30 PSF ground snow load requirements.

Should you have any further question or comment please feel free to contact our office.

Respectfully,

James A. Clancy
Professional Engineer
MD License # 31585
License expiration date: 7/18/2021

DocuSigned by:
74454BC12527459...

STATE OF MARYLAND
JAMES A. CLANCY
No. 31585
PROFESSIONAL ENGINEER

James A. Clancy
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE

893683

Project: Partan Residence

Property Owner: Andrew Partan

Address: 25 Holt Pl., Takoma Park, MD 20912

☒ I reviewed the design of the photovoltaic (PV) system, as designed by the manufacturer, and the design criteria utilized for the mounting equipment and panel mounting assembly (rack system) for the installation of 33 panels supported by the rack system, as shown on the drawings prepared for the above referenced address. I certify that the configurations and design criteria meet the standards and requirements of the International Residential Code (IRC) and International Existing Building Code (IEBC) adopted by Montgomery County in COMCOR 08.00.02.

☒ The attachment of the rack system to the building at the above address, including the location, number, and type of attachment points; the number of fasteners per attachment point; and the specific type of fasteners (size, diameter, length, minimum embedment into structural framing, etc.) meets the standards and requirements of the IRC and IEBC adopted by Montgomery County in COMCOR 08.00.02.

☒ I evaluated the existing roof structure of the building at the above address and analyzed its capacity to support the additional loads imposed by the PV system. I certify that no structural modifications of the existing roof structure are required. The existing roof structure meets the standards and requirements of the IRC and IEBC, adopted by Montgomery County in COMCOR 08.00.02, necessary to support the PV system.

☐ I evaluated the existing roof structure of the building at the above address and analyzed its capacity to support the additional loads imposed by the PV system. Structural modifications of the existing roof structure are required. I certify that the roof structure, as modified on the drawings for this project, will support the additional loads imposed by the PV system. I further certify that design of the modified roof structure meets the standards and requirements of the IRC and IEBC, adopted by Montgomery County in COMCOR 08.00.02.

☒ I approved the construction documents for the mounting equipment, rack system, roof structure for this project.

Maryland PE License Number:

Date: 9.27.19 DocuSigned by: Seal:

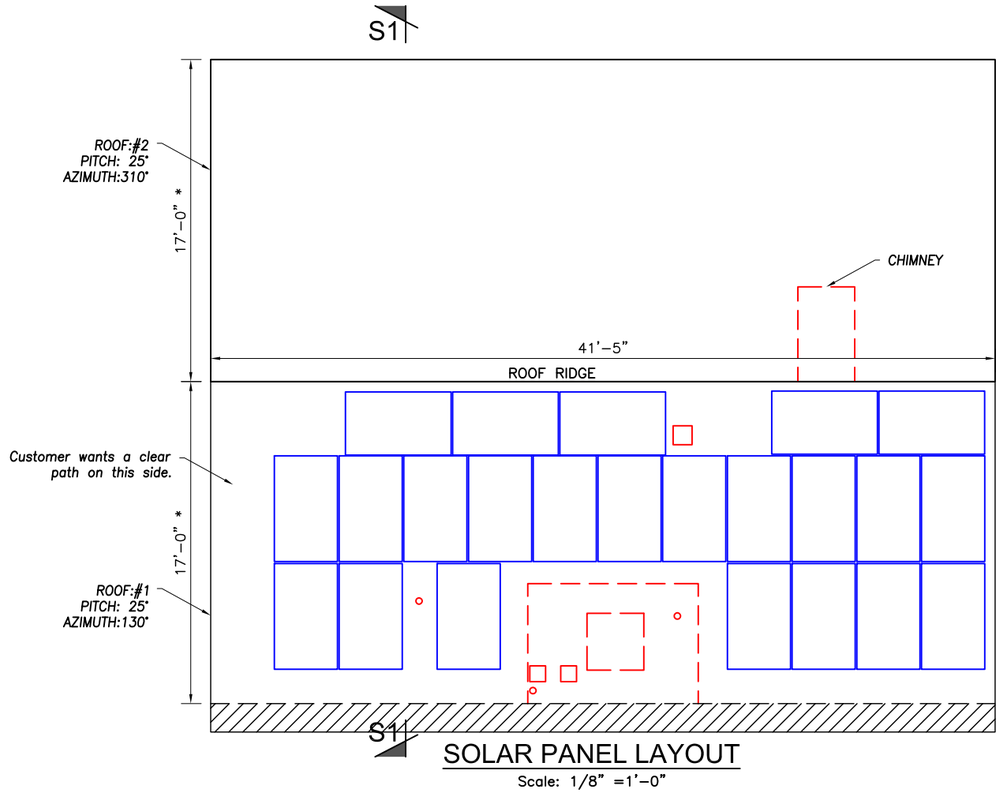
Signature

74454BC12527459...

James A. Clancy

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE

Critter Guard

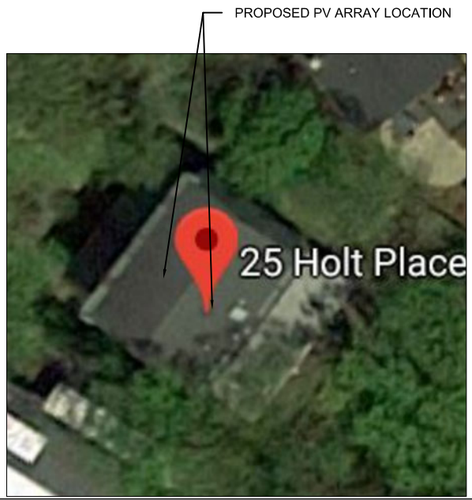


SOLAR PANEL LAYOUT

Scale: 1/8" =1'-0"

NOTES:

1. THE SYSTEM SHALL INCLUDE [23] LG ELECTRONICS LG365Q1C-A5 MODULES.
2. SNAPNRACK SOLAR MOUNT RAIL WILL BE INSTALLED IN ACCORDANCE WITH SNAPNRACK INSTALLATION MANUAL.
3. DIMENSIONS MARKED (*) ARE ALONG ROOF SLOPE.
4. REFER STRUCTURAL DRAWING FOR SECTIONS MARKED AND ADDITIONAL NOTES.



SolarEnergyWorld
Because Tomorrow Matters
Solar Energy World LLC.
5681 Main Street
Elkridge, MD 21075
(888) 497-3233

Stamp

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 31585, EXPIRATION DATE: JULY 18, 2021.
*STAMPED AND SIGNED FOR STRUCTURES ONLY

Revisions

REV	DESCRIPTIONS	BY	DATE
01	Made E001, S001 and S002	JMP	9/25/2019
01	REMOVED PANELS FROM FRONT OF HOUSE	TML	4-NOV-19

Project Name and Address

Andrew Partan
25 Holt Pl,
Takoma Park, MD 20912
8.395 kW

Drawn by: DTK	Sheet: A001
Date: 25-SEPT-2019	
Scale: AS NOTED	

Plotted by: Tom Lamprea on 11/4/2019 6:08 PM

LG NeON® R

LG365Q1C-A5 | LG360Q1C-A5 | LG355Q1C-A5 | LG350Q1C-A5

Mechanical Properties

Cells	6 x 10
Cell Vendor	LG
Cell Type	Monocrystalline / N-type
Cell Dimensions	161.7 x 161.7 mm / 6 inches
Dimensions (L x W x H)	1,700 x 1,016 x 40 mm
	66.93 x 40.0 x 1.57 in
Front Load	6,000Pa / 125 psf
Rear Load	5,400Pa / 113 psf
Weight	18.5 kg / 40.79 lb
Connector Type	MC4 (MC), 05-8 (Renhe)
Junction Box	IP68 with 3 Bypass Diodes
Cables	1,000 mm x 2 ea / 39.37 in x 2 ea
Glass	High Transmission Tempered Glass
Frame	Anodized Aluminum

Certifications and Warranty

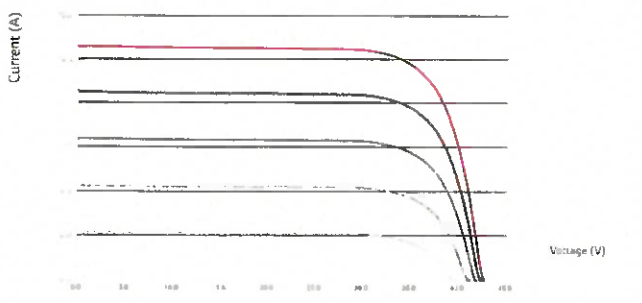
Certifications	IEC 61215, IEC 61730-1/-2
	UL 1703
	IEC 61701 (Salt mist corrosion test)
	IEC 62716 (Ammonia corrosion test)
	ISO 9001
Module Fire Performance	Type 1 (UL 1703)
Fire Rating	Class C(ULC/ORD C1703, IEC 61730)
Product Warranty	25 years
Output Warranty of Pmax	Linear Warranty*

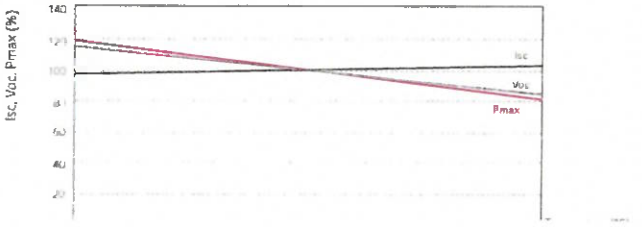
* 1) First 5 years 95%, 2) After 5th year 0.4%p annual degradation, 3) 25 years 87.0%

Temperature Characteristics

NOCT*	[°C]	44 ± 3
Pmax	[%/°C]	-0.300
Voc	[%/°C]	-0.240
Isc	[%/°C]	0.037

Characteristic Curves





Electrical Properties (STC*)

Model		LG365Q1C-A5	LG360Q1C-A5	LG355Q1C-A5	LG350Q1C-A5
Maximum Power (Pmax)	[W]	365	360	355	350
MPP Voltage (Vmpp)	[V]	36.7	36.5	36.3	36.1
MPP Current (Impp)	[A]	9.95	9.87	9.79	9.70
Open Circuit Voltage (Voc)	[V]	42.8	42.7	42.7	42.7
Short Circuit Current (Isc)	[A]	10.80	10.79	10.78	10.77
Module Efficiency	[%]	21.1	20.8	20.6	20.3
Operating Temperature	[°C]	-40 ~ +90			
Maximum System Voltage	[V]	1,000 (UL / IEC)			
Maximum Series Fuse Rating	[A]	20			
Power Tolerance	[%]	0 ~ +3			

The nameplate power output is measured and determined by LG Electronics at its sole and absolute discretion

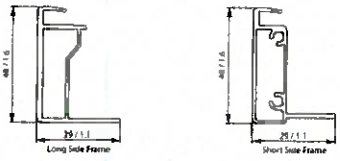
* STC (Standard Test Condition) Irradiance 1000 W/m², Cell Temperature 25 °C, AM 1.5

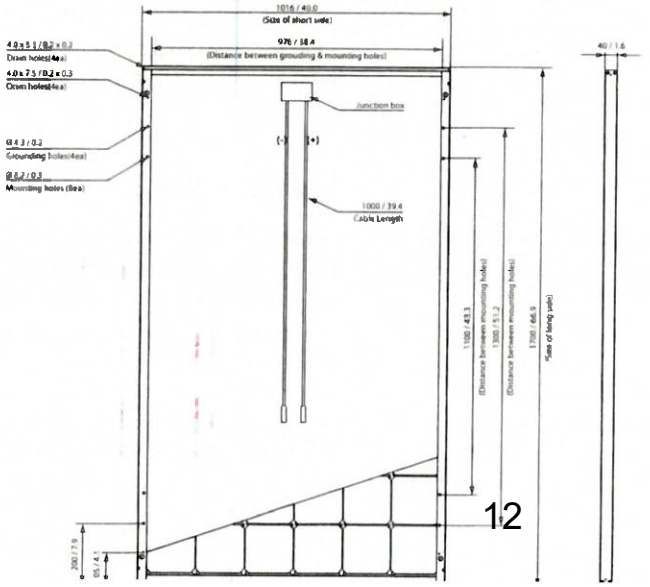
Electrical Properties (NOCT)

Model		LG365Q1C-A5	LG360Q1C-A5	LG355Q1C-A5	LG350Q1C-A5
Maximum Power (Pmax)	[W]	275	271	267	264
MPP Voltage (Vmpp)	[V]	36.6	36.4	36.2	36.0
MPP Current (Impp)	[A]	7.51	7.45	7.39	7.32
Open Circuit Voltage (Voc)	[V]	40.2	40.2	40.2	40.1
Short Circuit Current (Isc)	[A]	8.70	8.69	8.68	8.67

* NOCT (Nominal Operating Cell Temperature) Irradiance 800 W/m², ambient temperature 20 °C, wind speed 1 m/s

Dimensions (mm / inch)



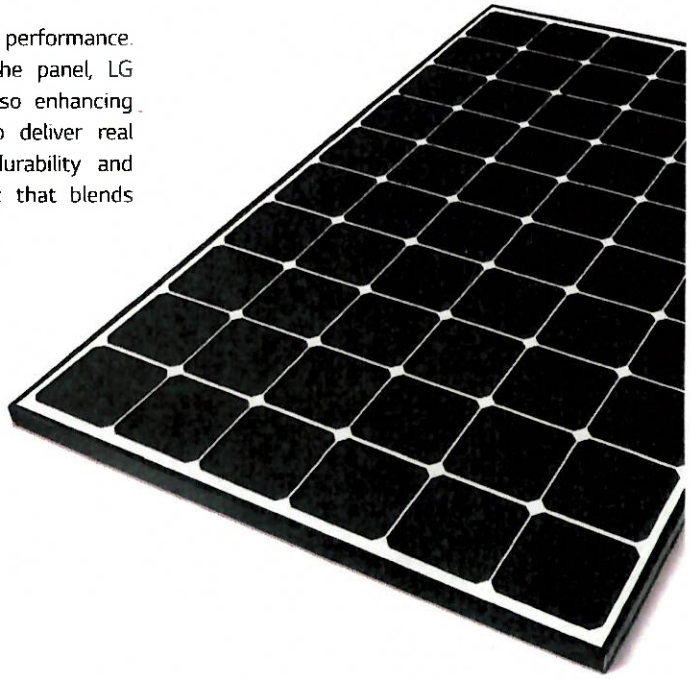


LG NeON® R

LG365Q1C-A5 | LG360Q1C-A5 | LG355Q1C-A5 | LG350Q1C-A5

365W | 360W | 355W | 350W

LG NeON® R is powerful new solar product with world-class performance. Employing a new electrode-free cell structure on the front of the panel, LG NeON® R maximizes the utilization of the available light while also enhancing reliability. LG NeON® R demonstrates LG's ongoing dedication to deliver real value: It combines an industry-leading warranty with superior durability and performance under real-world conditions, plus a modern aesthetic that blends seamlessly with virtually any roof.



Features

25-Year Warranty

LG offers the longest warranty in the industry, covering the NeON® R for 25 years. At that time, the panel is guaranteed to deliver at least 87% of its original performance.

High Power Output

Expertly engineered for enhanced power output, the LG NeON® R assures exceptional results even in more compact installations with reduced surface area.

Roof-Friendly Design

LG NeON® R has been designed with curb appeal in mind. By removing the electrodes from the visible side, LG has created a cleaner look that won't detract from the beauty of your home.

Outstanding Durability

With its newly reinforced frame, LG NeON® R can handle an impressive front load of up to 6,000 Pa and a rear load up to 5,400 Pa.

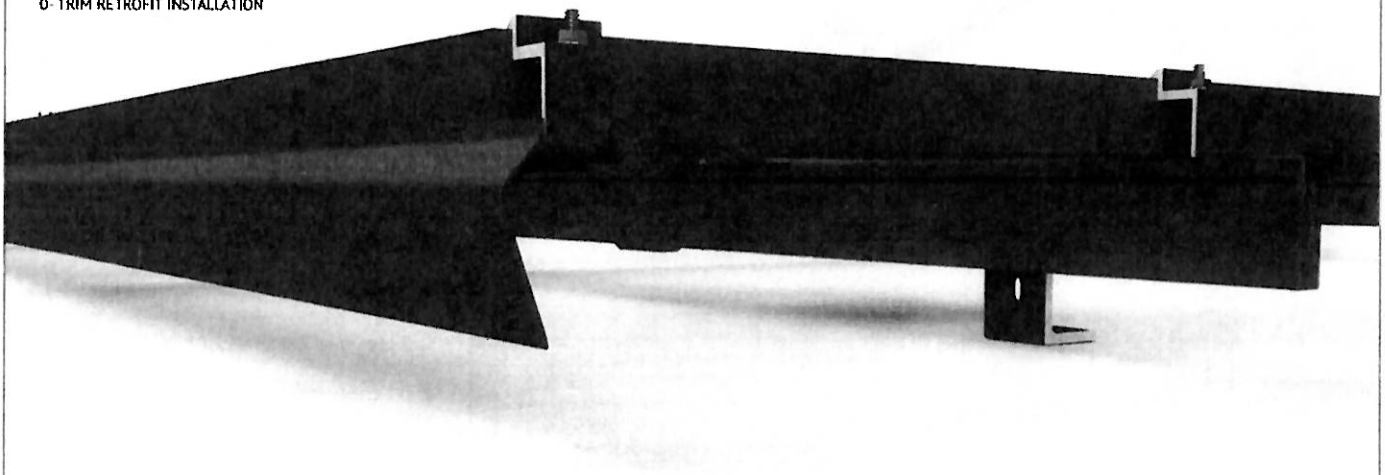
Better Performance on Sunny Days

The panel now offers an improved temperature coefficient, so it works more efficiently than before even on hot, sunny days.

SM SOLAR MOUNT

INSTALLATION GUIDE

TABLE OF CONTENTS



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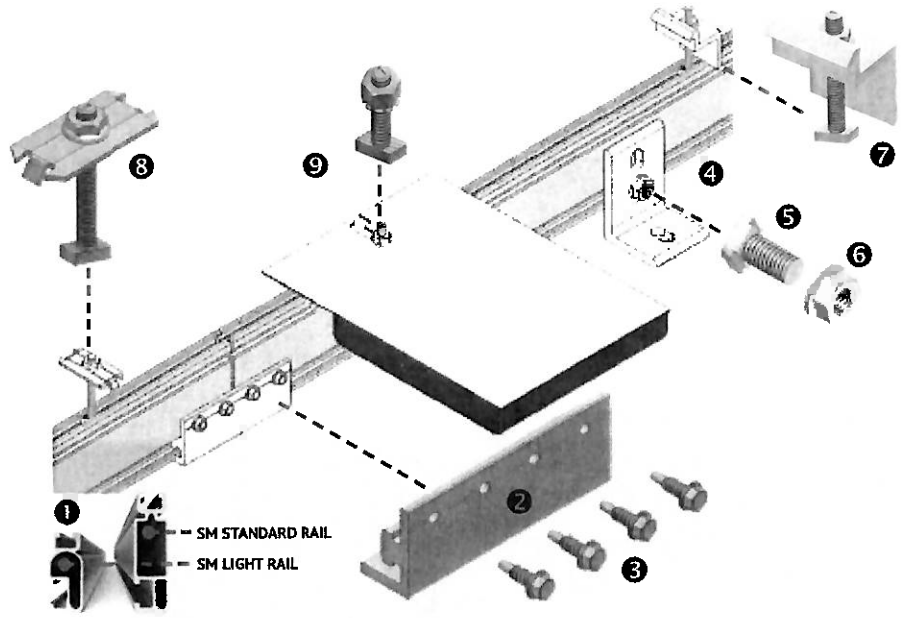


Wrenches and Torque

	Wrench Size	Recommended Torque (ft-lbs)
1/4" Hardware ❷❸❾	7/16"	*10
3/8" Hardware ❸	9/16"	*30
#12 Hardware ❸	5/16"	10

Torques are not designed for use with wood connectors
*w/Anti-Seize

Anti-Seize*

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

❶**RAIL:** Supports PV modules. Use at least two per row of modules. Aluminum extrusion, available in mill, clear anodized, or dark anodized.

❷**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.

❸**SELF-DRILLING SCREW:** (No. 12 x ¾") – 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.

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

❺**L-FOOT T- BOLT:** (3/8" x ¾") – 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.

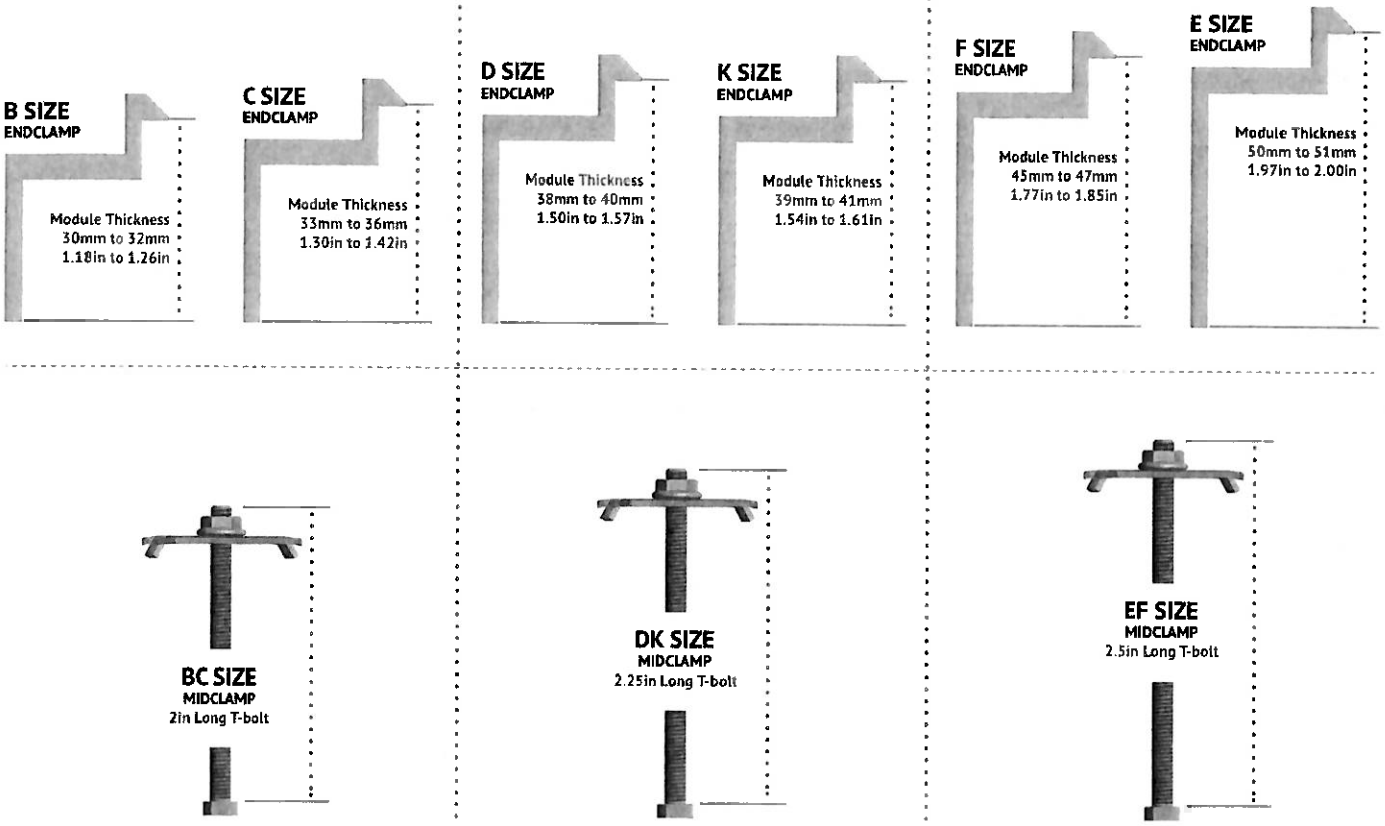
❻**SERRATED FLANGE NUT (3/8"):** Use one per L-foot to secure and bond rail to L-foot. Stainless steel. Supplied with L-foot.

❼**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.

❽**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.

❾**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.


B SIZE
ENDCLAMP
Module Thickness
30mm to 32mm
1.18in to 1.26in
C SIZE
ENDCLAMP
Module Thickness
33mm to 36mm
1.30in to 1.42in
D SIZE
ENDCLAMP
Module Thickness
38mm to 40mm
1.50in to 1.57in
K SIZE
ENDCLAMP
Module Thickness
39mm to 41mm
1.54in to 1.61in
F SIZE
ENDCLAMP
Module Thickness
45mm to 47mm
1.77in to 1.85in
E SIZE
ENDCLAMP
Module Thickness
50mm to 51mm
1.97in to 2.00in
BC SIZE
MIDCLAMP
2in Long T-bolt
DK SIZE
MIDCLAMP
2.25in Long T-bolt
EF SIZE
MIDCLAMP
2.5in Long T-bolt

PLANNING YOUR SOLARMOUNT INSTALLATIONS

The installation can be laid out with rails parallel to the rafters or perpendicular to the rafters. Note that SOLARMOUNT 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 ¼" inch for each space between modules (for mid- clamp),
- plus approximately 3 inches (1½ inches for each Endclamp)

LAYING OUT L-FEET FOR TOP CLAMPS

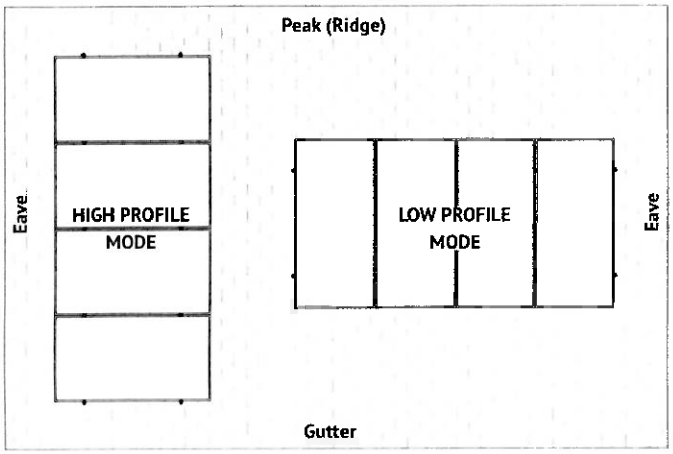
L-feet, in conjunction with proper flashing equipment and techniques, can be used for attachment through existing roofing material, such as asphalt shingles, sheathing or sheet metal to the building structure.

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.

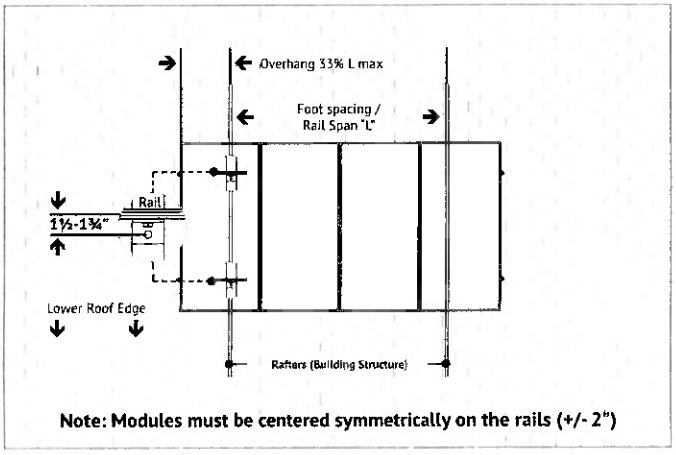
If multiple rows are to be installed adjacent to one another, it is not likely that each row will be centered above the rafters. Adjust as needed, following the guidelines below as closely as possible.

Refer to Unirac Solarmount D&E Guide & U-Builder 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 (+/- 2")

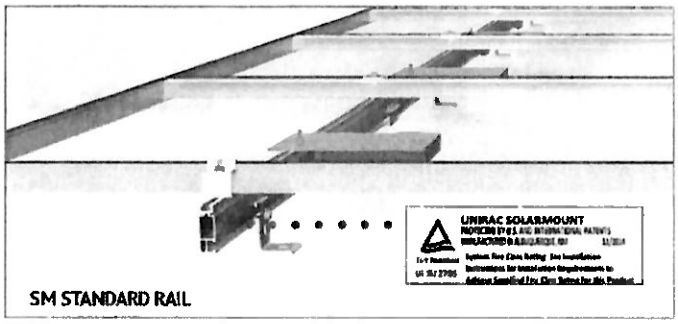
SYSTEM LEVEL FIRE CLASSIFICATION

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:

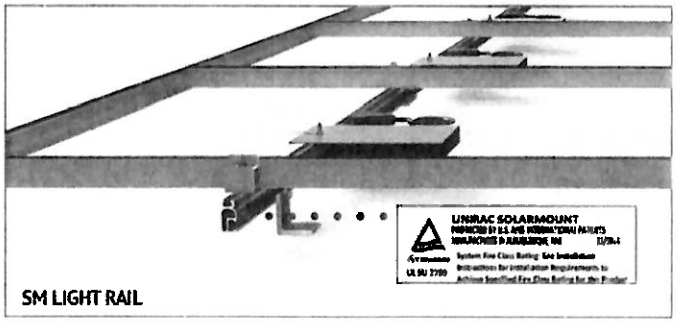
Rail Type	Module Type	System Level Fire Rating	Rail Direction	Module Orientation	Mitigation Required
Standard Rail	Type 1, Type 2, Type 3 & Type 10	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required
Light Rail	Type 1 & Type 2	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required

UL2703 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.



SM STANDARD RAIL



SM LIGHT RAIL

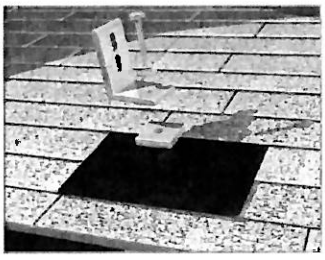
ROOF PREPARATION: Layout and install flashing at rafter locations determined per Design and Engineering Guide.

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.

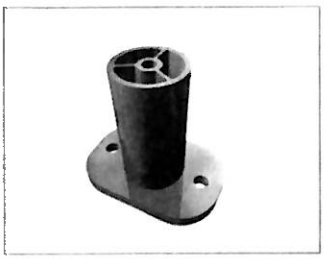
Quick Tip: Pre-drill the pilot hole through the flat flashing lag bolt location for easier installation

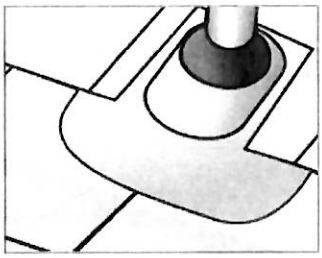
FLAT FLASHING INSTALLATION: Insert the Flat Flashing so the top part is under the next row of shingles and the hole lines up with the pilot hole.



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.





2 PIECE ALUMINUM STANDOFF WITH FLASHING & L-FOOT:

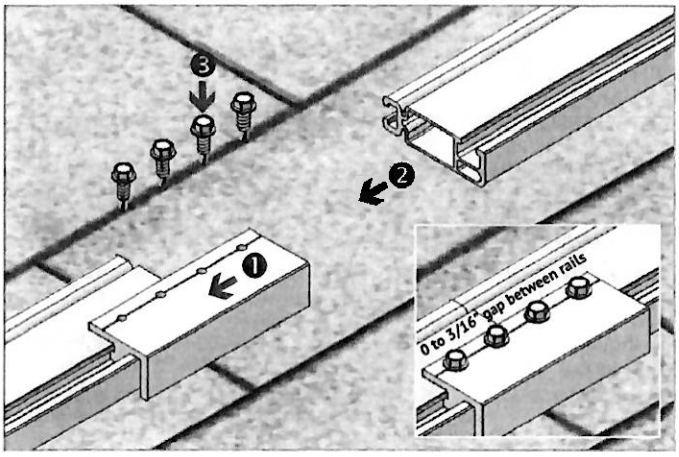
- If necessary cut an opening in the roofing material over a rafter to accommodate the flashing riser.
- Install the standoff, ensuring that both lag bolts are screwed into the rafter.
- Insert the flashing under the shingle above and over the shaft of the standoff. (No-Calk™ collar does not require sealing 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 underlayment into the center of the rafters. Securely fasten each tile hook to the rafters with two 5/16" x 3½" 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.



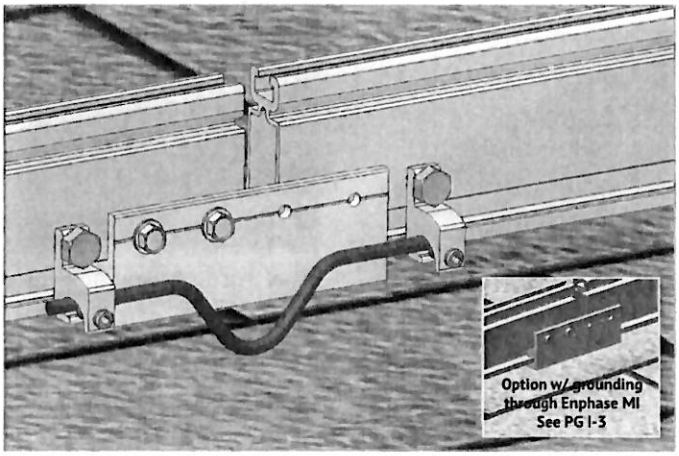
SPLICE INSTALLATION (IF REQUIRED PER SYSTEM DESIGN)

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.

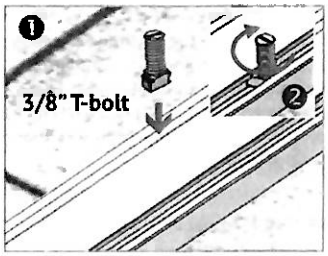
Max length of spliced rail is 40 ft An expansion joint is required > 40 ft.



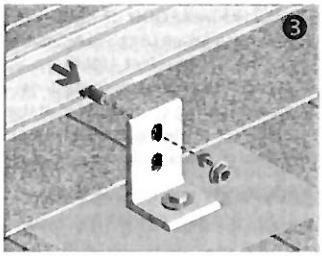
EXPANSION JOINT USED AS THERMAL BREAK

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 ½" 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 Ilsco lugs (Model No. GBL-4DBT P/N GBL-4DBT - see product data sheet for more details) and solid copper wire.



PLACE T-BOLT INTO RAIL & SECURE BOLT: Insert 3/8" T-bolt into rail at L-foot locations. Apply Anti-Seize to bolt. Rotate T-bolt into position.



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

Note:
Allowable L-foot slot locations for SM Standard & Light Rail.

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.

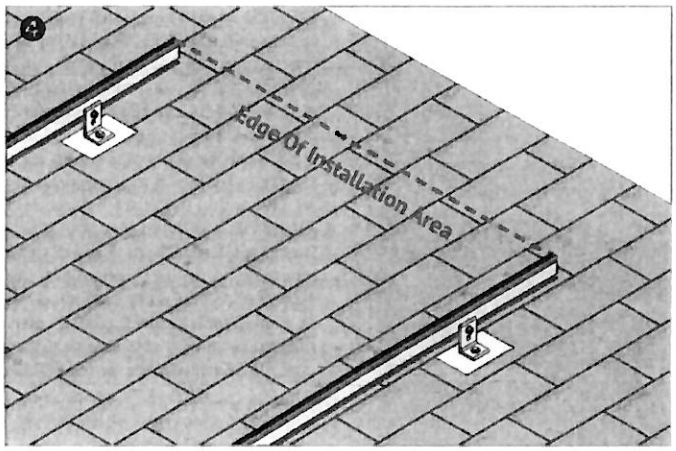
SM LIGHT RAIL: For a lower profile array when using SM Light rail, rotate the L-foot to orient the side with only one (1) slot against the rail. **Only use the slot location closet to the rail to connect the lag bolt to the flashing / roof on the side with two (2) slots.**

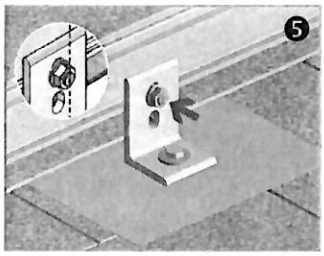
NOTE: Use only the top slot to connect the L-foot to the rail to obtain the desired height and alignment when using SM Light rail.

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.

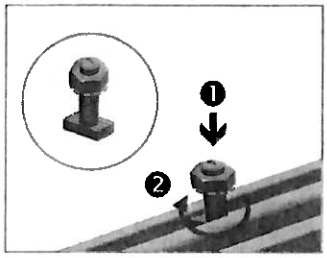
Mount modules to the rails as soon as possible. Large temperature changes may bow the rails within a few hours if module placement is delayed.



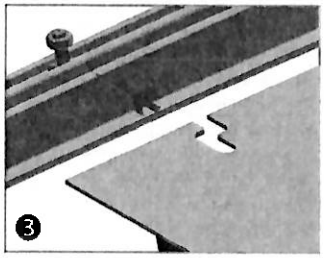


ALIGN POSITION INDICATOR: Hand tighten nut until rail alignment is complete. Verify that position indicator on bolt is vertical (perpendicular to rail)

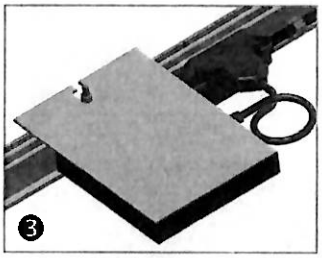
TORQUE VALUE (See Note on PG. A)
3/8" nut to 30 ft-lbs



INSTALL MICROINVERTER MOUNT T-BOLT: Apply Anti-Seize and install pre-assembled ¼" dia. bonding T-bolts into top ¼" rail slot at microinverter locations. Rotate bolts into position.

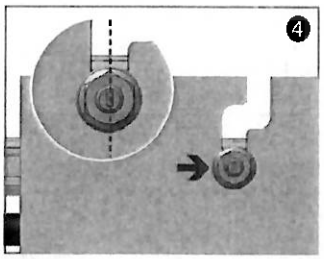


INSTALL MICROINVERTER: Install microinverter on to rail. Engage with bolt.

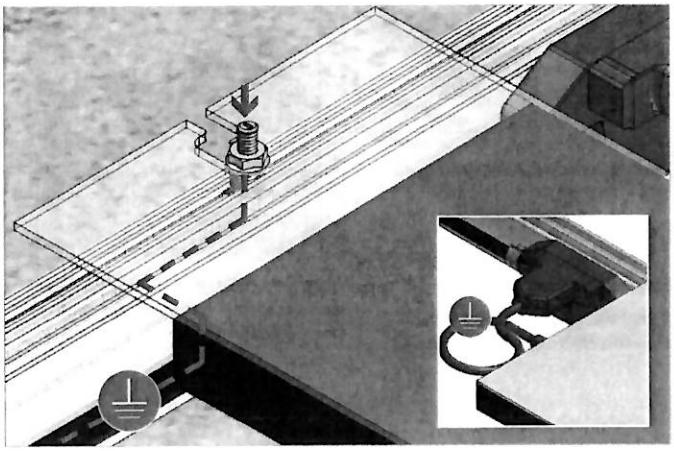


INSTALL MICROINVERTER:

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

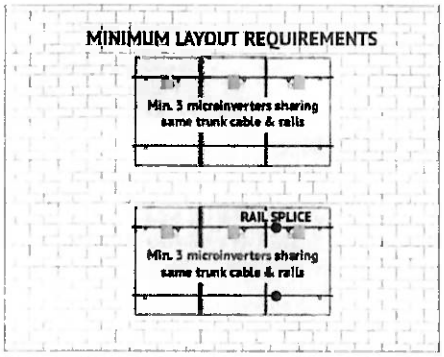
The Enphase M215 and M250 microinverters have integrated grounding capabilities built in. In this case, the DC circuit is isolated from the AC circuit, and the AC equipment grounding conductor (EGC) is built into the Enphase Engage integrated grounding (IG) cabling.

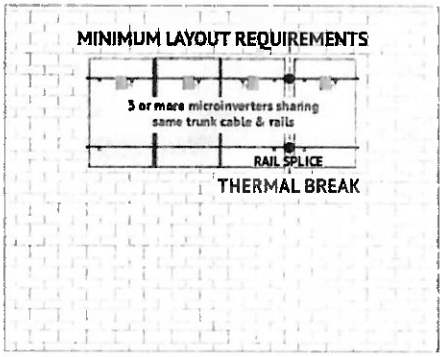
In order to ground the SOLARMOUNT racking system through the Enphase microinverter and Engage cable assembly, there must be a minimum of three PV modules connected to the same trunk cable within a continuous row. Continuous row is defined as a grouping of modules installed and bonded per the requirements 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.

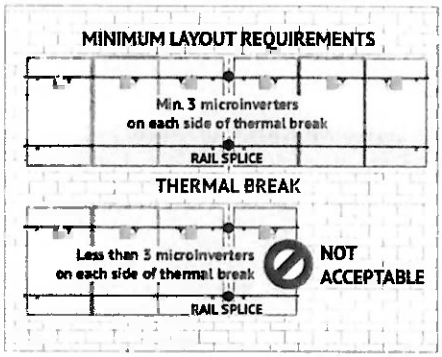
SOLARMOUNT INTEGRATED BONDING ADVANTAGE

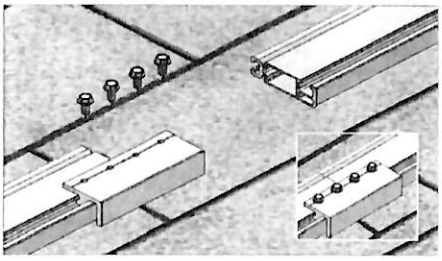
LOSE ALL THE COPPER & LUGS

CONTINUOUS RAIL & ELECTRICAL BONDING SPLICE	EXPANSION JOINT W/GROUNDING LUGS & COPPER JUMPER	EXPANSION JOINT W/O ELECTRICAL BONDING CONNECTION
Enphase Microinverter (MI) Requirements (Model No. M215 & M250)	**Enphase Microinverter (MI) Requirements (Model No. M215 & M250)**	**Enphase Microinverter (MI) Requirements (Model No. M215 & M250)**
3 Microinverters sharing same trunk cable & rails	3 or more Microinverters sharing same trunk cable & rails	Min. 3 Microinverters on each side of thermal break

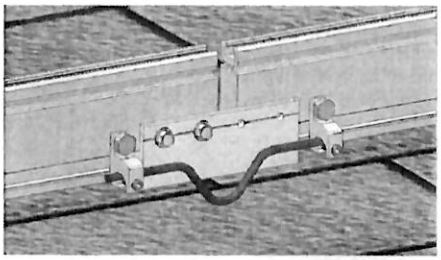




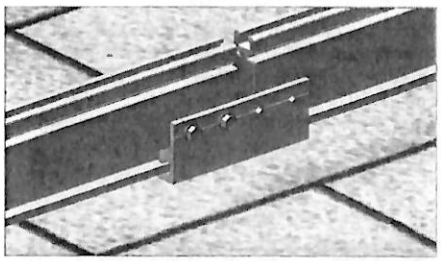




ELECTRICAL BONDING SPLICE

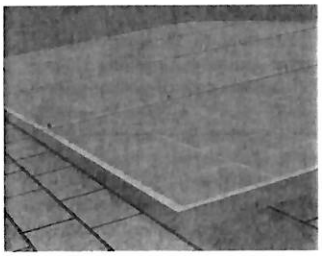


EXPANSION JOINT USED AS THERMAL BREAK W/ GROUNDING LUGS & COPPER JUMPER

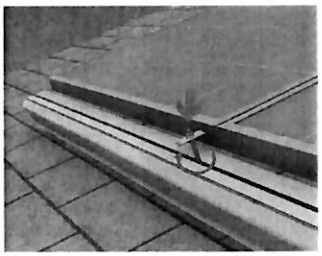


EXPANSION JOINT USED AS THERMAL BREAK W/O ELECTRICAL BONDING CONNECTION

NOTE: THE ABOVE IMAGES ARE SAMPLE CONFIGURATIONS TO ILLUSTRATE THE REQUIREMENTS FOR SM SYSTEM GROUNDING THROUGH ENPHASE MICROINVERTERS DESCRIBED ON PAGE I-2

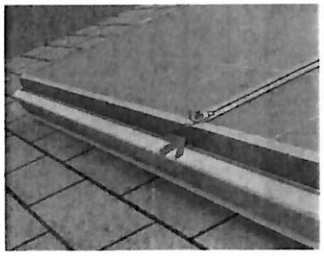


PREPARATION: At front edge of array, ensure at least 3.25 inches of space between modules and roof surface and that modules are aligned to within 3/8". Plan for Trim length so that Endclamps can be properly installed.



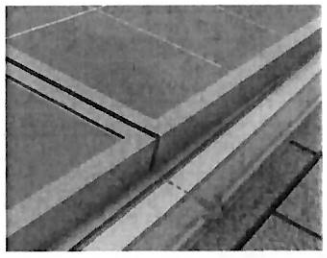
1ST MIDCLAMP: Position Trim in front of array. Insert Midclamp into the Trim slot, aligned with the gap between the 1st two modules at either end of array.

NOTE: Apply Anti-Seize to Each Mid-Clamp prior to installation

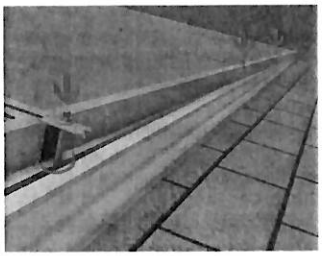


MOUNT TRIM: Position Trim beneath modules by sliding T-bolt into gap between modules and tighten. Midclamp should stay in position and support Trim. Tighten snugly enough so that Trim is held firmly in place.

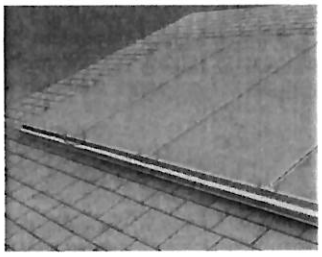
TORQUE VALUE: Do not exceed specified torque value (10 ft-lbs)



CLEAR T-BOLT SLOT: 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.

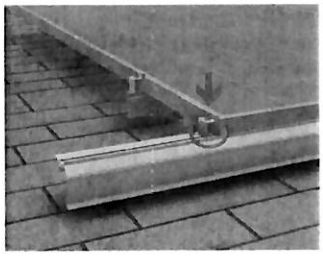


INSERT MIDCLAMPS: Insert T-bolt into slot and slide clamp (rotating Trim) into position between modules and leave loose. Continue to work down array, inserting Midclamps and positioning in gaps between modules.



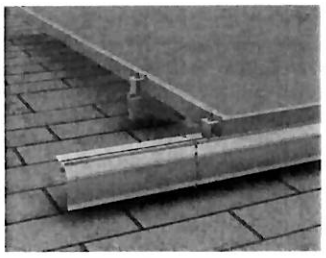
FASTEN MIDCLAMPS: Return to each inserted Midclamp. Ensuring Trim lip is in contact with module face and verifying alignment marks on T-bolts are in proper position, tighten clamp.

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



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.

Mangal Maharjan

From: Wyatt Everhart
Sent: Friday, September 20, 2019 4:04 PM
To: Design Group
Subject: Design Approved: Andrew Partan job
Attachments: Andrew Partan A001-Solar Panel Layout 9-19.pdf

Design Approved:

SEW Design Approval Submission

Customer Name: Andrew Partan
Rep Name: Wyatt Everhart
Date: 9-20-19

All Projects:
Latest / approved CAD design attached? Yes
Does CAD design clearly show "stamp" for additional racking requirments? Yes ("Critter Guards")
Did the customer review the design? Yes
Did the customer review the production? Yes
Were any system size/panel count changes discussed with the customer? No
Did your customer seem concerned about anything regarding the design? Yes
If so, what were the concerns? Customer wanted to ensure we avoided the most highly shaded corner of the southeast roof plane, as well as ensuring he would have good access in and out of the roof hatch, and, a lane or two to go "up and over" the roof when needed. Our revised / 2nd design nailed this combination of a factors.

Sunrun Projects:
What proposal ID are you approving? N/A
Did you modify the proposal? No
If so, what did you change (be specific)? N/A
Do you approve the pricing for the approved proposal?
Is the customer cutting any trees down before installation?
Has the customer signed the Change Order for the new proposal?

Ground Mount Systems:
Did the customer approve the location of the ground mount as shown on the Site Plan? N/A

Wyatt Everhart
Solar Analyst
NWAS Meteorologist
SolarEnergyWorld
5681 Main St, Elkridge, MD 21075
Cell (443) 791-7823 | Office (410) 579-2009
www.SolarEnergyWorld.com

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Clickable links:

From: Mangal Maharjan <MMaharjan@solarenergyworld.com>
Sent: Thursday, September 19, 2019 6:06 PM
To: Wyatt Everhart <weverhart@solarenergyworld.com>
Cc: Design Group <designapprovalgroup@solarenergyworld.com>
Subject: Andrew Parton revision

As per your request, here is the revised layout and solmetric report.

893 683

Mangal D. Maharjan
Solar PV Design Manager
410-579-5170
410-579-2222 Fax
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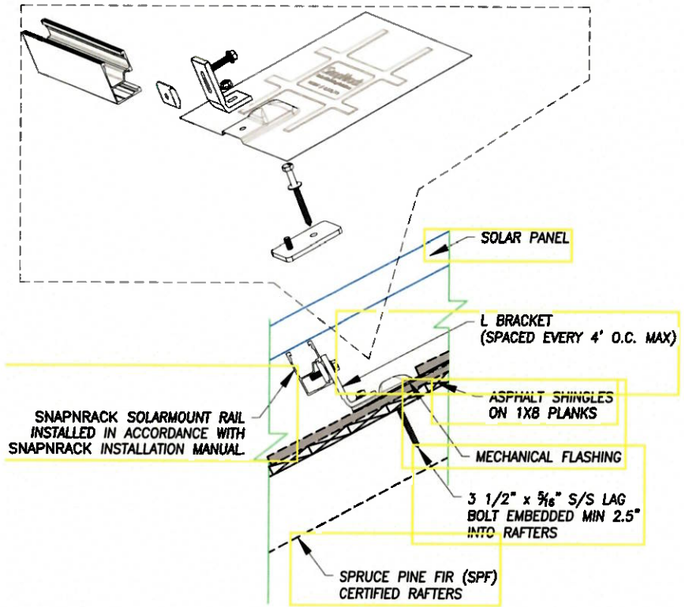
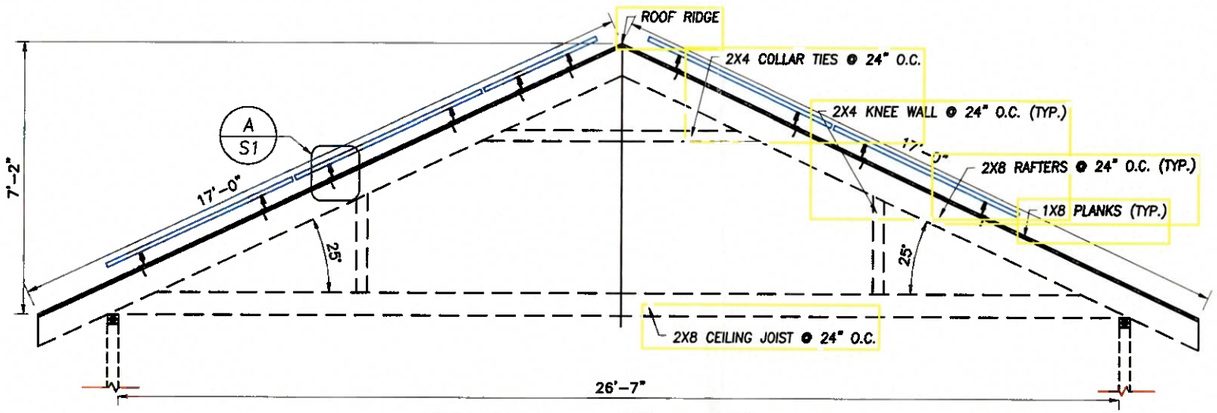


DETAIL A
Scale: NTS
S001



STRUCTURAL SECTION S1
Scale: 1/4" =1'-0"

NOTES:

1. ALL WORK SHALL COMPLY WITH REQUIREMENTS OF INTERNATIONAL RESIDENTIAL CODE (IRC 2015), LOADING CODE (ASCE 7-10), WOOD DESIGN CODE(NDS 2015) AND LOCAL REQUIREMENTS.
2. LOAD CRITERIA PER :
   - EXPOSURE CATEGORY "B"
   - GROUND SNOW LOAD, Pg = 30 PSF
   - LATERAL LOAD RISK CATEGORY "II"
   - ULTIMATE DESIGN WIND SPEED = 115 MPH
3. SOLAR PANELS AND RACKING SYSTEMS SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATION.
4. FOLLOW ALL LOCAL AND FEDERAL SAFETY REQUIREMENTS.

SolarEnergyWorld
Because Tomorrow Matters
Solar Energy World LLC.
5681 Main Street
Elkridge, MD 21075
(888) 497-3233

Stamp

STATE OF MARYLAND
JAMES A. CLANCY
No. 31585
PROFESSIONAL ENGINEER

Docusigned by:
[redacted]
C45BBC42527459...

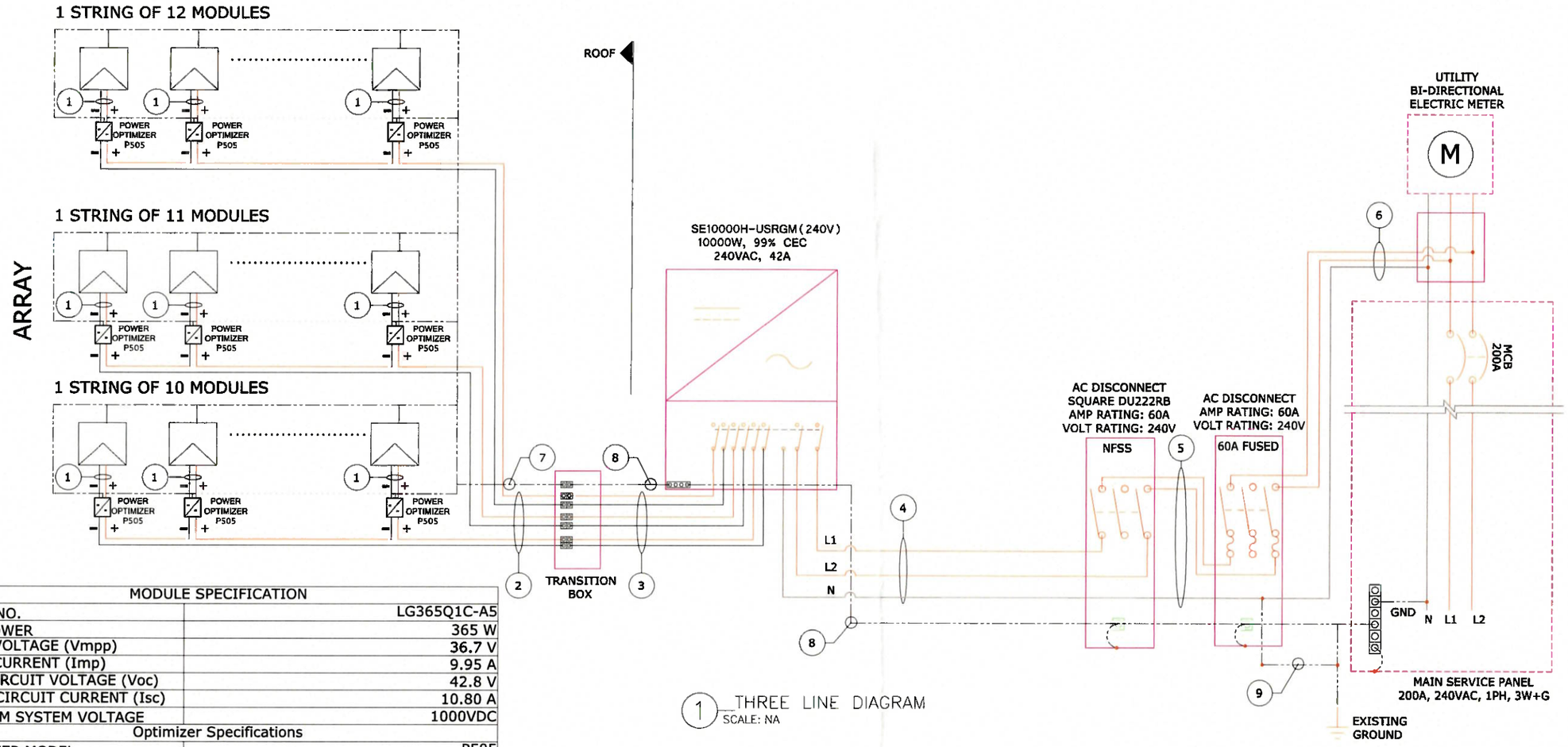
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 31585, EXPIRATION DATE: JULY 18, 2021.
*STAMPED AND SIGNED FOR STRUCTURES ONLY

Revisions

REV	DESCRIPTIONS	BY	DATE

Project Name and Address
Andrew Partan
25 Holt Pl,
Takoma Park, MD 20912
12.045 kW

Drawn by: DTK
Date: 25-SEPT-2019
Scale: AS NOTED
Sheet: S001



1 THREE LINE DIAGRAM
SCALE: NA

MODULE SPECIFICATION			
MODEL NO.			LG365Q1C-A5
PEAK POWER			365 W
RATED VOLTAGE (Vmpp)			36.7 V
RATED CURRENT (Imp)			9.95 A
OPEN CIRCUIT VOLTAGE (Voc)			42.8 V
SHORT CIRCUIT CURRENT (Isc)			10.80 A
MAXIMUM SYSTEM VOLTAGE			1000VDC
Optimizer Specifications			
OPTIMIZER MODEL			P505
MAXIMUM DC VOLTAGE			83 V
MAXIMUM POWER OUTPUT			505 W
MAXIMUM DC CURRENT OUTPUT			15 A
MAXIMUM DC CURRENT INPUT			17.50 A
Inverter Specifications			
INVERTER MODEL			SE10000H-USRGM
MAXIMUM DC VOLTAGE			480 V
MAXIMUM POWER OUTPUT			10000 W
NOMINAL AC VOLTAGE			240 VAC
MAXIMUM AC CURRENT			42 A
ARRAY DETAILS			
NO. OF MODULES PER STRINGS	12	11	10
NO. OF STRINGS	1	1	1
ARRAY WATTS AT STC	4380	4015	3650
MAX. VOLTAGE	480	480	480
690.53 Label Info.			
RATED VOLTAGE	400 V	400 V	400 V
RATED CURRENT	10.95A	10.04A	9.13A
MAX. SYSTEM VOLTAGE	480 V	480 V	480 V
SHORT CIRCUIT CURRENT	15 A	15 A	15 A

WIRE/CONDUIT SCHEDULE ARRAY			
TAG	DESCRIPTION	WIRE SIZE/TYPE	NOTES
1	Panel to Optimizer	#10 PV WIRE 2KV RATED	Integrated
2	Optimizer to Transition Box	#10 PV WIRE	
3	Transition Box to DC Disconnect	#10 THHN/THWN-2	
	DC Disconnect to Inverter	NA	Integrated
4	Inverter to AC disconnect	#6 Cu THHN/THWN-2	
5	AC disconnect to AC disconnect	#6 Cu THHN/THWN-2	
6	AC disconnect to Interconnection Point	#6 Cu THHN/THWN-2	
7	Equipment Grounding Conductor	#8 Cu Bare Copper Wire	
8	Equipment Grounding Conductor	#8 Cu THHN/THWN-2	
9	Grounding Electrode Conductor	#8 Cu	

GENERAL ELECTRICAL NOTES: NEC2014

1. EQUIPMENT USED SHALL BE NEW, UNLESS OTHERWISE NOTED.
2. EQUIPMENT USED SHALL BE UL LISTED, UNLESS OTHERWISE NOTED.
3. EQUIPMENT SHALL BE INSTALLED PROVIDING ADEQUATE PHYSICAL WORKING SPACE AROUND THE EQUIPMENT AND SHALL COMPLY WITH NEC.
4. COPPER CONDUCTORS SHALL BE USED AND SHALL HAVE INSULATION RATING 600V, 90°C, UNLESS OTHERWISE NOTED.
5. CONDUCTORS SHALL BE SIZED IN ACCORDANCE TO NEC. CONDUCTORS AMPACITY SHALL BE DE-RATED FOR TEMPERATURE INCREASE, CONDUIT FILL AND VOLTAGE DROP.
6. ALL CONDUCTORS, EXCEPT PV WIRE, SHALL BE INSTALLED IN APPROVED CONDUITS OR RACEWAY. CONDUITS SHALL BE ADEQUATELY SUPPORTED AS PER NEC.
7. AC DISCONNECT SHOWN IS REQUIRED IF THE UTILITY REQUIRES VISIBLE-BLADE SWITCH.
8. EXPOSED NON-CURRENT CARRYING METAL PARTS SHALL BE GROUNDED AS PER NEC.
9. LINE SIDE INTER-CONNECTION SHALL COMPLY WITH NEC
10. SMS MONITORING SYSTEM AND IT'S CONNECTION SHOWN IS OPTIONAL. IF USED, REFER TO SMS INSTALLATION MANUAL FOR WIRING METHODS AND OPERATION PROCEDURE.
11. ASHRAE FUNDAMENTAL OUTDOOR DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE U.S. (PHOENIX, AZ or PALM SPRINGS, CA)
12. FOR LESS THAN 9 CURRENT-CARRYING CONDUCTORS IN ROOF MOUNTED SUNLIGHT CONDUIT USING THE OUTDOOR TEMPERATURE OF 47°C
    12.1. 10AWG CONDUCTOR ARE GENERALLY ACCEPTABLE FOR MODULES WITH AN Isc OF 9.6 AMPS WITH A 15 AMP FUSE.

Wire sizing for OCPD
Ex(Isc*(1.25)(1.25)(# of strings in parallel)= wire ampacity or using NEC table 690.8

SOLAR ENERGY WORLD LLC.
5681 Main Street
Elkridge, MD 21075
888-497-3233
301-497-3251:F

ENGINEER'S STAMP

Andrew Parfan
12.045 kW
25 Holt Pl,
Takoma Park, MD 20912

Three Line Electrical Drawing

REVISIONS					
REV	QUOTE #	DESCRIPTION	DATE	DB	CB
**		02			

OPPORTUNITY	
PROJECT	
DATE DRAWN	09/30/19
DRAWN BY	DTK
DWG #:	REV. **

SHEET
E1