



## HISTORIC PRESERVATION COMMISSION

Marc Elrich  
*County Executive*

Sandra I. Heiler  
*Chairman*

Date: September 11, 2020

### MEMORANDUM

TO: Mitra Pedoeem  
Department of Permitting Services

FROM: Dan Bruechert  
Historic Preservation Section  
Maryland-National Capital Park & Planning Commission

SUBJECT: Historic Area Work Permit # 924039 - Solar Installation

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The Montgomery County Historic Preservation Commission (HPC) has reviewed the attached application for a Historic Area Work Permit (HAWP). This application was **approved** at the September 9, 2020 HPC meeting.

The HPC staff has reviewed and stamped the attached construction drawings.

THE BUILDING PERMIT FOR THIS PROJECT SHALL BE ISSUED CONDITIONAL UPON ADHERENCE TO THE ABOVE APPROVED HAWP CONDITIONS AND MAY REQUIRE APPROVAL BY DPS OR ANOTHER LOCAL OFFICE BEFORE WORK CAN BEGIN.

Applicant: George Kohl  
Address: 7000 Westmoreland Ave., Takoma Park

This HAWP approval is subject to the general condition that the applicant will obtain all other applicable Montgomery County or local government agency permits. After the issuance of these permits, the applicant must contact this Historic Preservation Office if any changes to the approved plan are made. Once work is complete the applicant will contact Dan Bruechert at 301.563.3400 or [dan.bruechert@montgomeryplanning.org](mailto:dan.bruechert@montgomeryplanning.org) to schedule a follow-up site visit.



# SOLAR PV PROJECT, KOHL

**REVIEWED**

By Dan.Bruechert at 2:33 pm, Sep 11, 2020



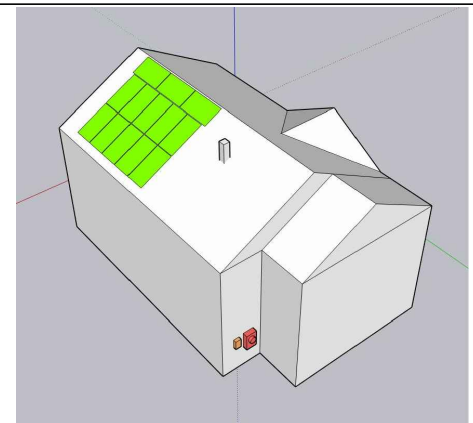

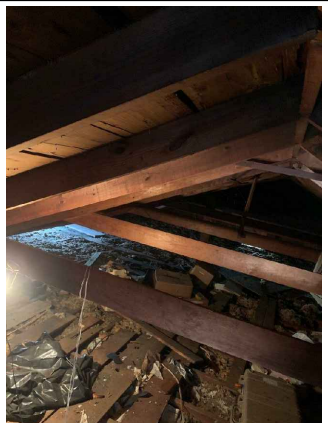
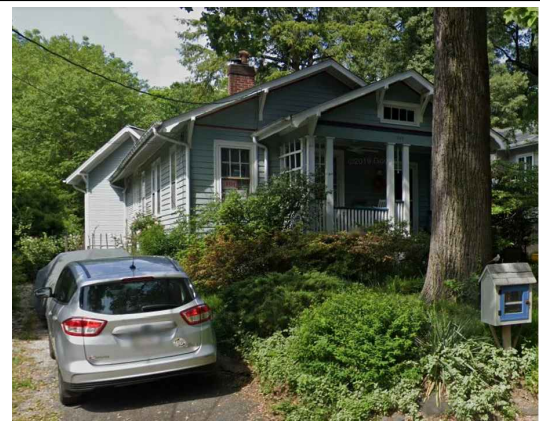
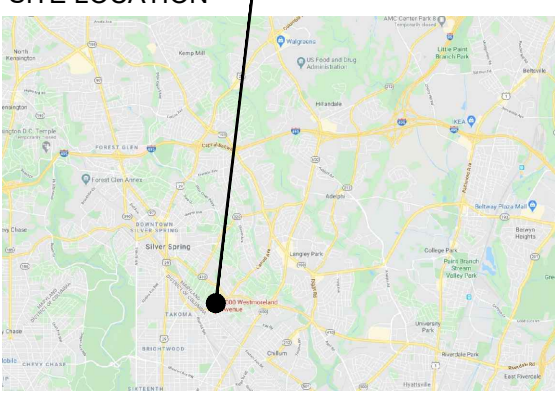
APPROVED  
 Montgomery County  
 Historic Preservation Commission  
*Sandra L. Heiler*

## 7000 WESTMORELAND AVE. TAKOMA PARK, MD 20912

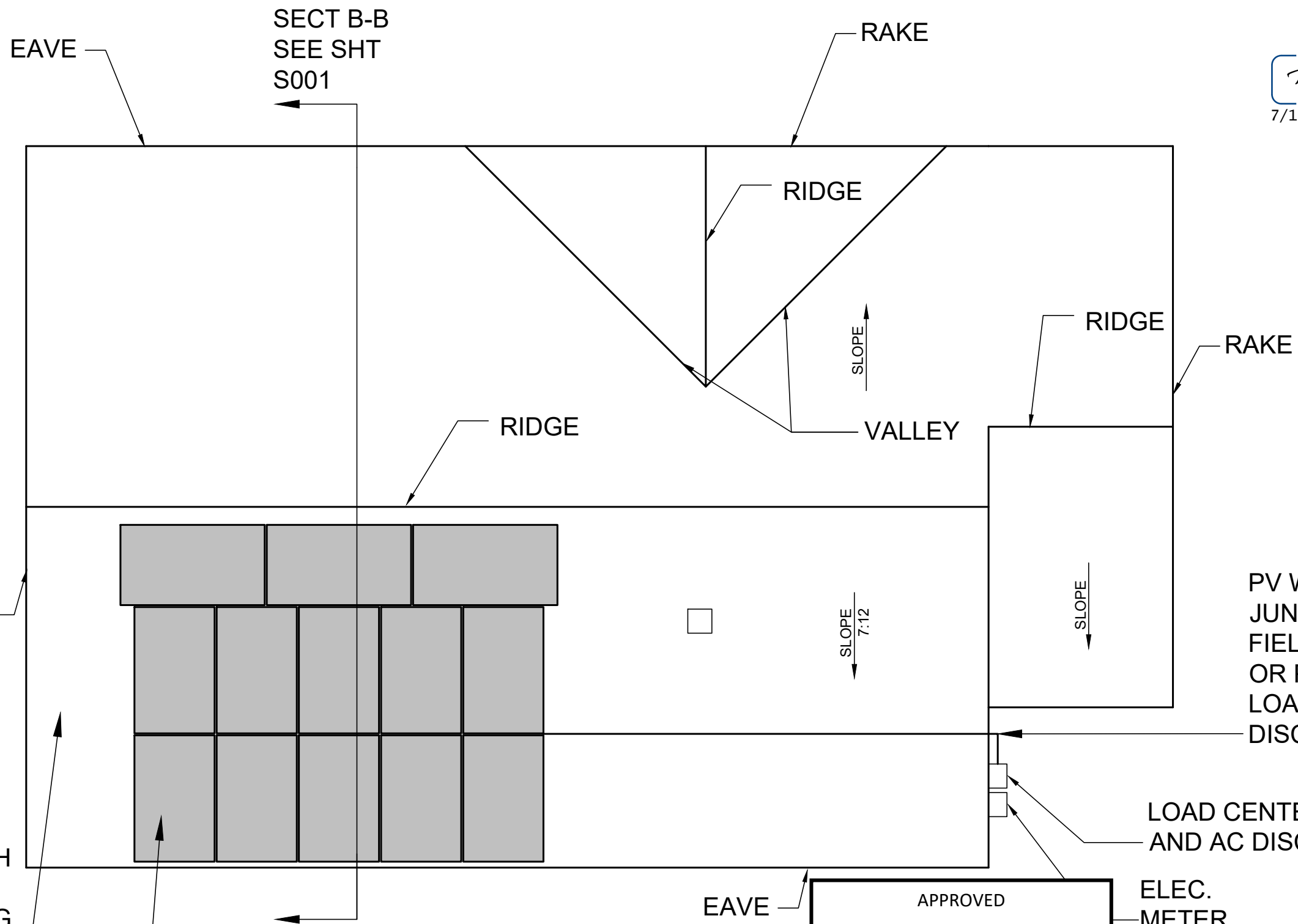
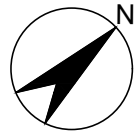
HELIOS SOLAR SYSTEMS, LLC  
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 WWW.HELIOSOLARSYS.COM  
 703 577 2178



KOHL  
 RESIDENCE  
 PV SOLAR INSTALLATION  
 7000 WESTMORELAND AVE.  
 TAKOMA PARK, MD 20912

PV SOLAR SYSTEM NOTES	ABBREVIATIONS & LEGEND	SEAL	PROJECT DATA	DRAWING INDEX
<p>A) SOLAR MODULE INSTALLED IAW SOLAR MODULE MANUFACTURERS INSTRUCTIONS                      B) SOLAR MODULE CLAMPS INSTALLED IAW SOLAR MOUNT INSTALLATION INSTRUCTIONS                      C) EXISTING ROOF, KNOWN BY OWNER AND PRIME CONTRACTOR TO BE IN SOUND CONDITION AND IAW WITH BUILDING CODES                      D) ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2014 NATIONAL ELECTRIC CODE (NEC)                      E) DC CONDUCTORS INSIDE BUILDING SHALL BE IN METALLIC RACEWAY IN ACCORDANCE WITH (IAW) ART 690.3(E).                      F) GROUNDING: ALL EXPOSED METAL PARTS (BOXES AND MOUNTING RAILS) SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS (EGC) AND GROUNDED AT THE MAIN ELECTRICAL PANEL.                      G) PROVIDE A PLACARD ON THE AC CUT OFF SWITCH (SW) WITH THE FOLLOWING INFORMATION IN 1/4" HIGH LETTERING PER NEC 690.54: "CAUTION - POSSIBLE BACKFEED PHOTOVOLTAIC POWER SYSTEM"                      H) RESERVED                      I) PROVIDE A PLACARD ON THE MAIN SERVICE PANEL WITH THE FOLLOWING INFORMATION IN 1/4" HIGH LETTERING PER NEC 690.17: "WARNING: ELECTRICAL SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION"                      GENERAL INSTALLATION NOTES                      1: THE DETAILS AND SPECIFICATIONS CONTAINED IN THESE DRAWINGS ARE CONSIDERED TO BE THE MINIMUM BY THE AHJ AND INSTALLERS.                      2: THIS PLAN SPECIFIES THE STRUCTURAL AND ELECTRICAL REQUIREMENTS FOR INSTALLATION OF SOLAR PHOTOVOLTAICS PANELS ON ROOF SURFACE AS SHOWN.                      3: USE COMMON SENSE AND OSHA REGULATIONS UNTIL INSTALLATION IS COMPLETED.</p>	<p>AHJ AUTHORITY HAVING JURISDICTION                      AC ALTERNATING CURRENT                      CB CIRCUIT BREAKER                      FT FOOT                      JB JUNCTION BOX                      OC ON CENTER                      LBS POUNDS                      FT FOOT                      IAW IN ACCORDANCE WITH                      LBS POUNDS                      MPH MILES PER HOUR                      PSF POUNDS PER SQUARE FOOT</p>	 <p>DocuSigned by  <i>Tim Rumford</i>                      7/18/2020                      E70D81E087D845E...                      I HEREBY CERTIFY THAT THIS DOCUMENT WAS APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, MEMBERS LICENSE NO. 41066, EXPIRATION DATE: 2021-09-08</p>	<p>PROJECT NAME                      SEE TITLE ABOVE</p> <p>SCOPE OF WORK                      SOLAR PV PANELS INSTALLATION ON EXISTING ROOF STRUCTURE BY MANUFACTURER'S SPECIFICATIONS</p>	<p>0001 COVER SHEET                      A001 ARRAY PLAN                      S001 ELEVATION/TRUSS AND FRAMING, STRUCTURAL CALCULATIONS, DETAIL                      S002                      E001 ELECTRICAL SCHEMATIC                      E002 ELECTRICAL CALCULATIONS                      E003 ELECTRICAL MODULE SPECS                      M001 HARDWARE MOUNTING DETAILS/SPEC</p>
		EXISTING SERVICE PANEL	MODEL VIEW	SITE VIEW
				<p>NEW ARRAYS ON SINGLE ROOF</p>  <p>7000 WESTMORELAND AVE                      TAKOMA PARK, MD 20912</p>
		EXISTING ROOF ATTIC	EXISTING EXTERIOR	VICINITY LOCATION
				<p>SITE LOCATION</p> 

PROJECT FILE	20912-01
REVISION LEVEL	DATE
REV-1	
DRAWN BY:	GDC
CHECKED BY:	TR
SCALE	AS NOTED
DRAWING TITLE	COVER SHEET
DRAWING NUMBER	0001
SHEET	1 OF 8



DocuSigned by  
**TIM RUMFORD**  
 PROFESSIONAL ENGINEER  
 No. 41066  
 STATE OF MARYLAND  
 TIMOTHY E RUMFORD  
 E70D81E087D845E...  
 7/18/2020

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REAR

FRONT

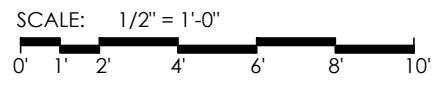
ASPHALT ROOF, WITH  
 5/8" DECKING ON  
 2"X6" WOOD FRAMING  
 @ 24" O.C.

NEW PV 5.395 KW ARRAY.  
 (13) SUNPOWER A-SERIES  
 415 WATT AC PANELS

APPROVED  
 Montgomery County  
 Historic Preservation Commission

**REVIEWED**  
 By Dan.Bruechert at 2:33 pm, Sep 11, 2020

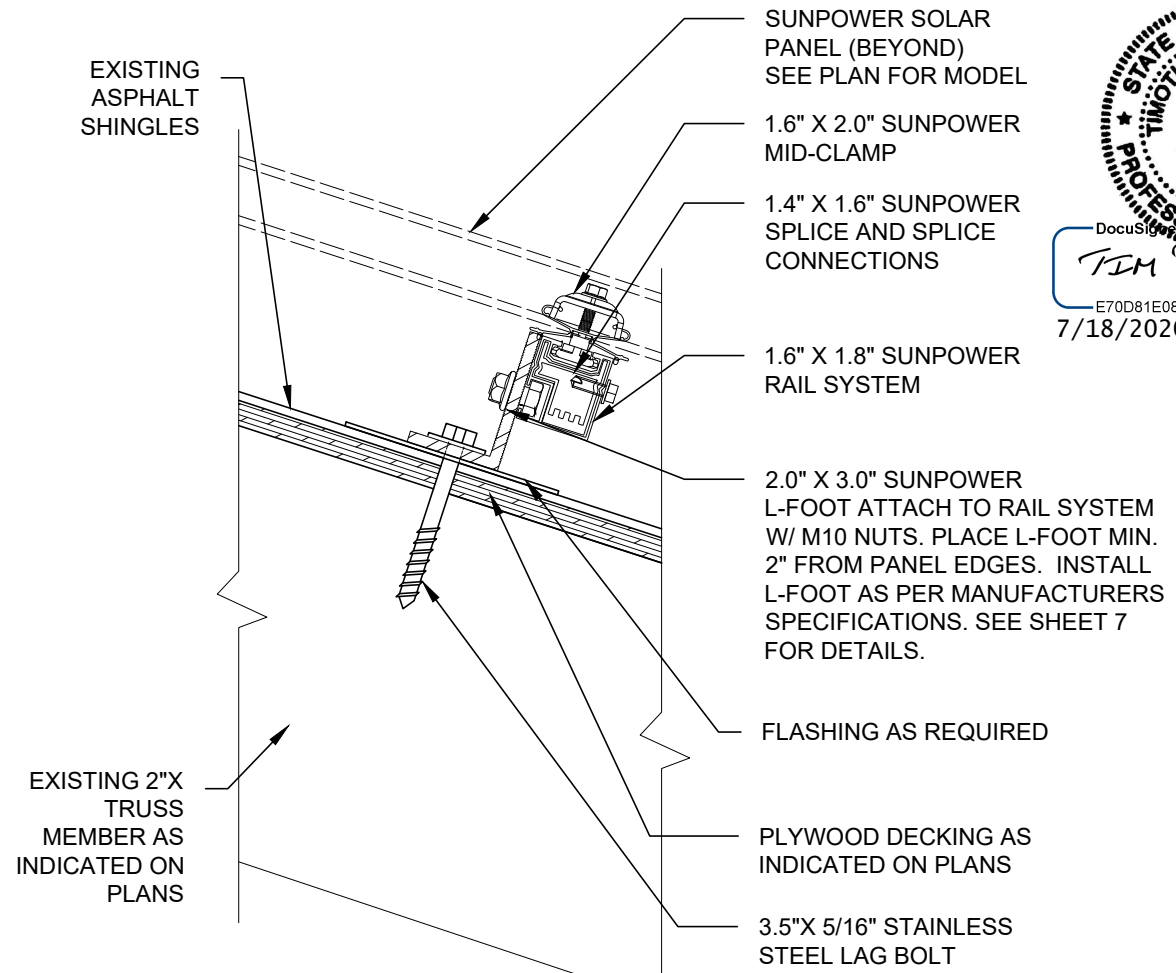
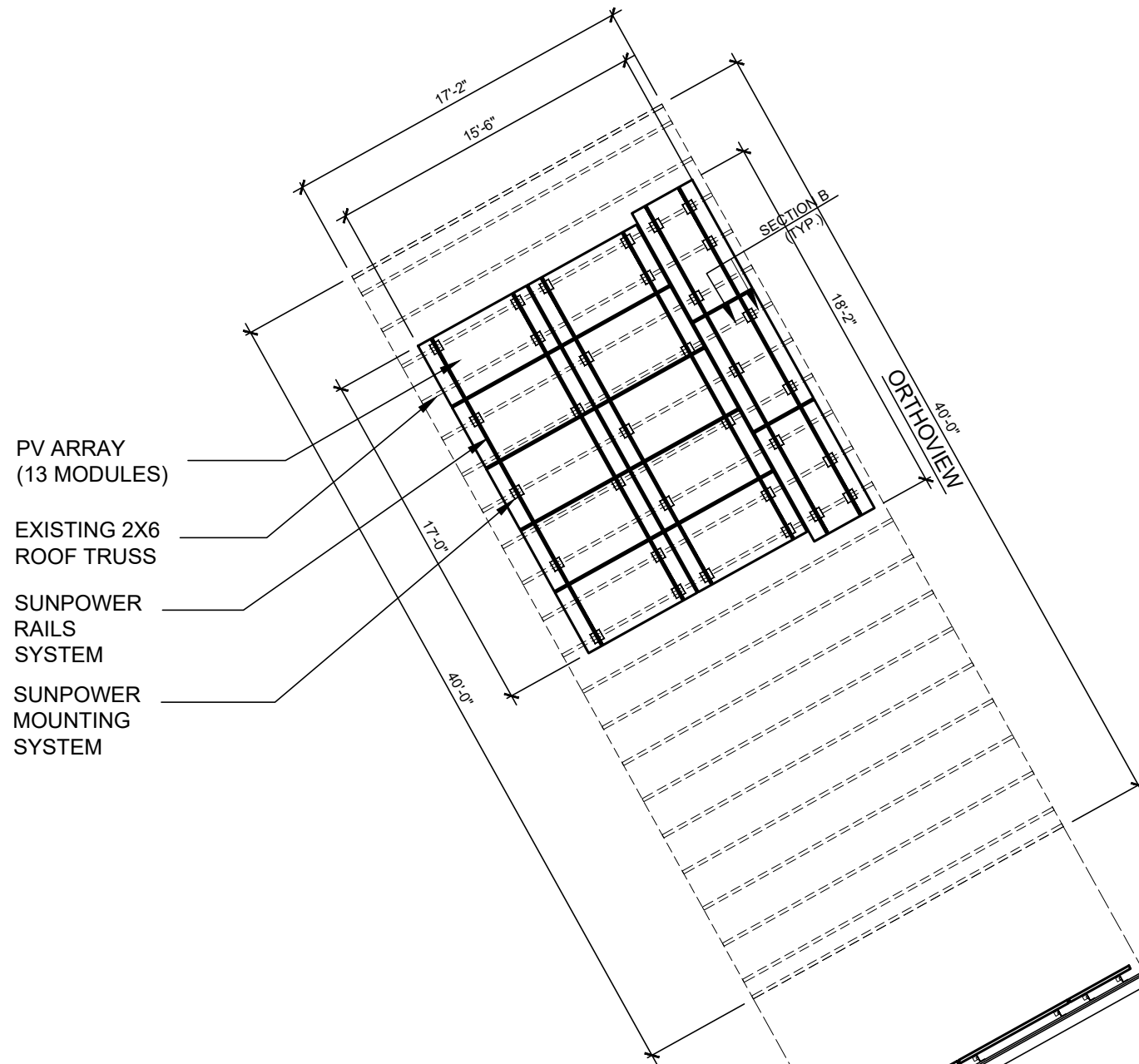
*Sandra L. Heiler*



PV WIRE TO ROOF  
 JUNCTION BOX, THEN  
 FIELD WIRE IN EMT  
 OR PVC TO GROUND  
 LOAD CENTER/AC  
 DISCO NEAR METER

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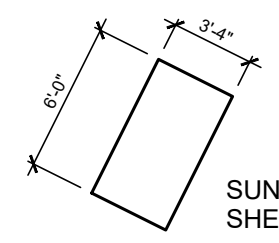
PROJECT FILE	20912-01
REVISION LEVEL	DATE
REV-1	DATE
DRAWN BY:	GDC
CHECKED BY:	TR
SCALE	AS NOTED
DRAWING TITLE	ARRAY MAP
DRAWING NUMBER	A001



**SECTION B**  
SCALE: NTS

**MOUNTING LAYOUT LEGEND**

- EXISTING ROOF TRUSS @ 24" O.C. (2"X6")
- ◊ SUNPOWER L FOOT FOR ASPHALT ROOFS, WEATHER PROOF WITH APPROVED ROOFING METHOD.
- SUNPOWER INVISIMOUNT RAIL, FIELD SPLICE AND TRIM

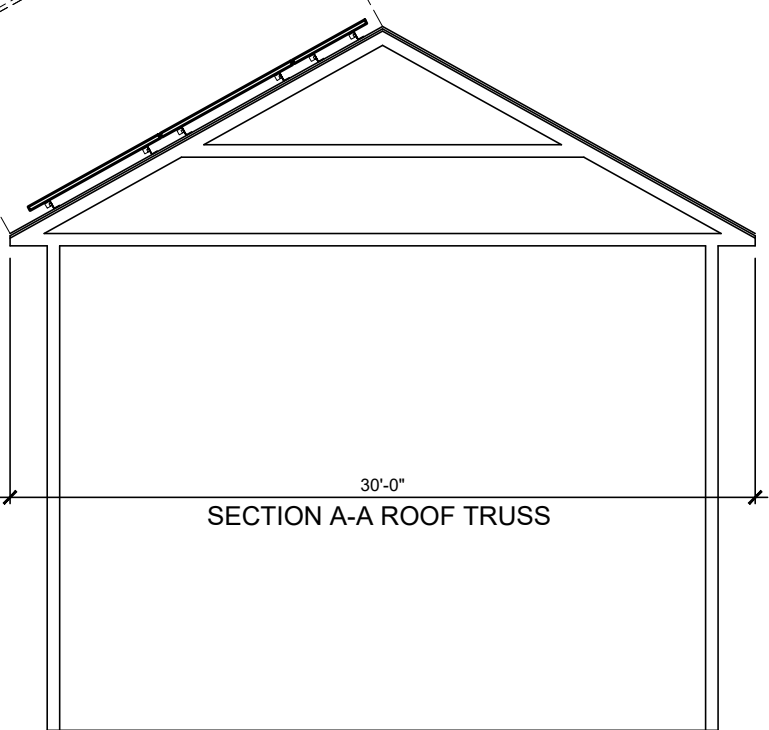


SUNPOWER A-SERIES 415 WATT AC PANELS. SEE SPEC SHEET



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Historic Preservation Commission  
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**REVIEWED**  
By Dan.Bruechert at 2:33 pm, Sep 11, 2020



SECTION A-A ROOF TRUSS

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TAKOMA PARK, MD 20912

PROJECT FILE	20912-01
REVISION LEVEL	DATE
REV-1	DATE
DRAWN BY:	GDC
CHECKED BY:	TR
SCALE	AS NOTED
DRAWING TITLE	ELEVATION/TRUSS AND FRAMING
DRAWING NUMBER	S001

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 Montgomery County  
 Historic Preservation Commission

*Sandra Heiler*

**REVIEWED**  
 By Dan.Bruechert at 2:33 pm, Sep 11, 2020



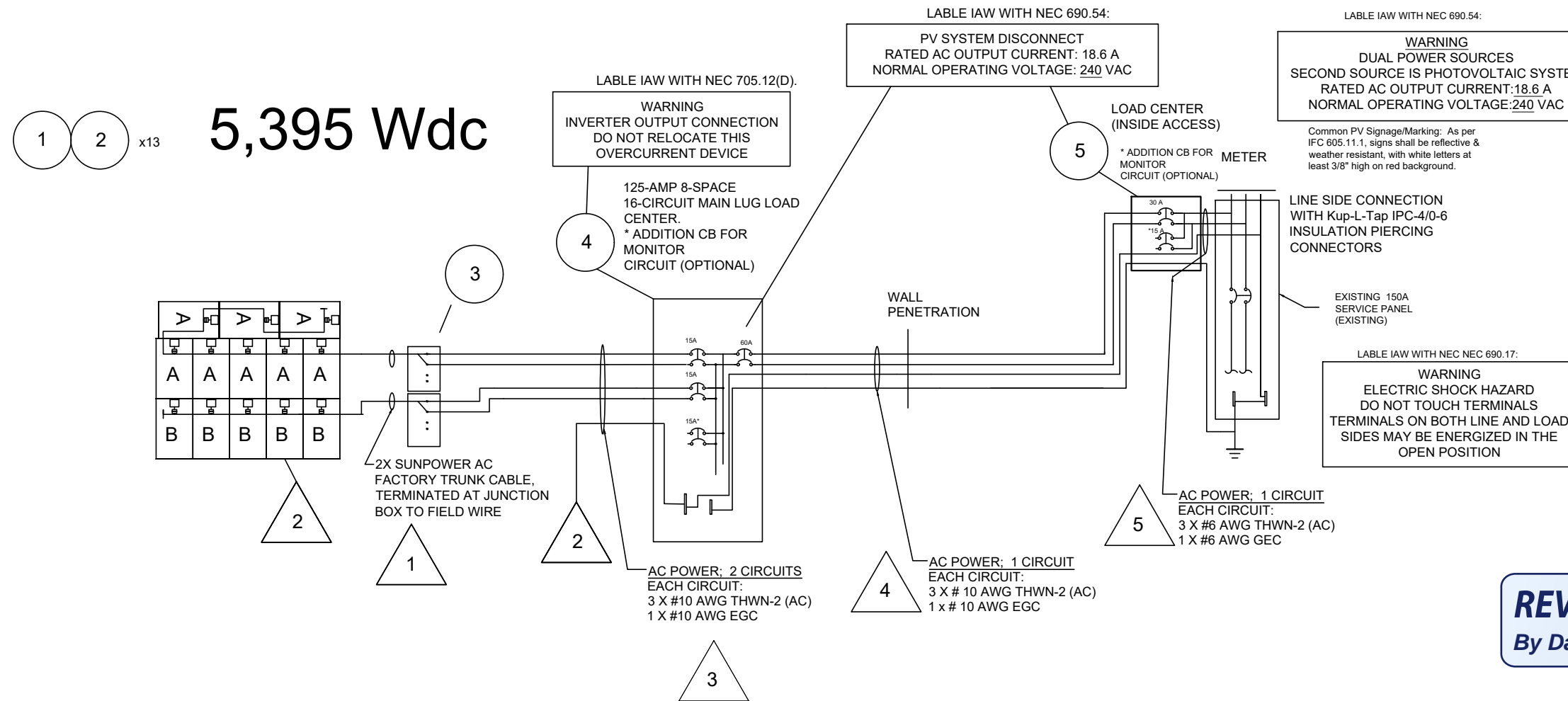
<b>Structural Analysis</b>						
Project Name:		George Kohl - Montgomery County 7000 Westmoreland Ave. Takoma Park, MD, 20912				
Address:						
Description:		Pitched roof, 13 SunPower A-Series 415-watt Type-G AC panels				
Load/Structure Assumptions (1)						
Wind Speed (mph)	Snow load (psf)	Roof Height (ft)	Importance factor	Wind Exposure	Roof Wind Zone	
115	30	<30	II	B	3	
Present Conditions and Structure Info						
Asphalt shingle roof, 2"x6", 24"-OC framing with small collar ties every 4-ft, and large collar ties alternating every 4-ft, 3/4 decking and shingle roof.						
Wind Loading						
Pnet = Net Design Wind Pressure (psf) From ASCE 7-10, 100sf eff wind area, 27 to 45 deg, zone 3						
Down	Up					
19.8	23.8	115 mph				
Module Areas (sf):		20.1				
Wind Force (lbs), Per module:		Pnet * Area=				
Down	Up					
397.1	477.3					
Array number of fasteners		33				
Array Number of Modules:		13				
Number of fasteners per module:		2.5 AVE				
Force per fastener: (lbs)						
Down	Up					
156.4	188.0					
Pull out Force per fastener, lbs (2): 681 5/16" x 3.5" SS Lag. Assumes worst case wood species						
Design Margin (Capability/Exposure). >2 required						
Down	Up					
4.4	3.6	x margin				
OK	OK	>2				
Uplift wind loads well below pull out force on fasteners. Down Force, since modules are flush, array not likely to affect forces compared to existing bare roof deflection. Uplift psf < negative snow load. Side wind loads negligible.						
Snow Load						
OK	Modules are flush and not likely to affect snow drift					
Dead Load						
Module Weight (lbs)		46.5				
		2.3 psf				
OK	(negligible effect)					
Seismic						
Seismic criteria were not considered per provisions of ASCE 7-10 Section 13.1.4						
OK						
NOTES						
(1) ASCE 7-10						
(2) NACBEP Guide on withdrawal loads for lag bolts per inch based on lag bolt size and wood type. Since wood type is not known, used the worst case which is white spruce, 227 lbs per inch for 5/16" lags. 3.5" bolt gives 3 inch penetration. 227 x 3.						

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 TAKOMA PARK, MD 20912

PROJECT FILE	
20912-01	
REVISION LEVEL	DATE
REV-1	DATE
DRAWN BY: GDC	
CHECKED BY: TR	
SCALE	AS NOTED
DRAWING TITLE	
STRUCTURAL CALCULATIONS, DETAIL	
DRAWING NUMBER	
S002	
13	4 OF 8



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**REVIEWED**  
 By Dan.Bruechert at 2:33 pm, Sep 11, 2020

EQUIPMENT SCHEDULE				
TAG	NAME	P/N	QTY	NOTES
1	SOLAR MODULES	SunPower A-Series 415-watt Type-G AC panels	13	2 CIRCUIT
2	MicroInverters	SUNPOWER FACTORY ul	13	Mounted to modules at factory
3	JUNCTION BOX	Field determined	2	JUNCTION BOX, LOCATED ON ROOF
4	LOAD CENTER	125-AMP 8-SPACE 16-CIRCUIT MAIN LUG LOAD CENTER. OR EQUIV	1	Main CB Serves as outside Disco
5	AC Disco	AC LOAD CENTER, TWO SPACE, OUTDOOR RATED, 30A OCPD	1	For INSIDE access. 240VAC, 70A.

WIRE SCHEDULE (EACH CIRCUIT)				
TAG	DESCRIPTION	GAUGE	QTY	CONDUIT, DISTANCE
1	SUNPOWER AC Cable, 1-Ph (3-Wire), CAP UNUSED CONNECTORS, CAP AS SHOWN	#10 (REF)	1	FACTORY CABLE, WITH INTEGRATED CONNECTORS. TIE TO MOUNTING RAILS. LENGTH OF ARRAY
2	CONTINUOUS EGC #10 COPPER RACKING SYSTEM TO EARTH GROUND -	#10	1	ROUTED WITH PV WIRE, THEN IN CONDUIT AFTER JUNCTION BOX
3	AC POWER FROM ROOF JB's TO AC LOAD CENTER THWN-2 (240 VAC) MAX DERATING CURRENT (SEE CALCS PAGE); MAX VOLTAGE (SEE CALCS PAGE)	#10 (L1, L2), #10 (EGC)	3	ROUTES ACROSS ROOF AND DOWN SIDE OF BUILDING TO LOAD CENTER/ SWITCH NEAR METER, IN EMT. APPROX. 100 FEET. IF ROUTED INDOORS, NM CABLE PERMISSIBLE
4	LOAD CENTER TO AC DISCO THWN-2 (240 VAC) MAX DERATING CURRENT (SEE CALCS PAGE); MAX VOLTAGE (SEE CALCS PAGE)	#10 (L1, L2, N), #10 (EGC)	4	ROUTES ACROSS SIDE OF BUILDING TO AC Disco FEET, EMT
5	AC DISCO TO MAIN SERVICE PANEL THWN-2 (240 VAC) MAX DERATING CURRENT (SEE CALCS PAGE); MAX VOLTAGE (SEE CALCS PAGE)	#6 (L1, L2, N), #6 (GEC)	4	ROUTES ACROSS SIDE OF BUILDING TO AC Disco FEET, EMT





DocuSigned by  
*Tim Rufford*  
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 7/18/2020

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 PV SOLAR INSTALLATION  
 7000 WESTMORELAND AVE.  
 TAKOMA PARK, MD 20912

PROJECT FILE	20912-01
REVISION LEVEL	DATE
REV-1	DATE
DRAWN BY:	GDC
CHECKED BY:	TR
SCALE	AS NOTED
DRAWING TITLE	ELECTRICAL SCHEMATIC
DRAWING NUMBER	E001

NOTE NO.	ELECTRICAL NOTES
1	ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2014 NATIONAL ELECTRIC CODE (NEC)
2	DC CONDUCTORS INSIDE BUILDING SHALL BE IN METALLIC RACEWAY IN ACCORDANCE WITH (IAW) ART 690.3(E).
3	GROUNDING: ALL EXPOSED METAL PARTS (BOXES AND MOUNTING RAILS) SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS (EGC) AND GROUNDED AT THE MAIN
4	PROVIDE A PLACARD ON EACH AC CUT OFF SWITCH (SW) WITH THE FOLLOWING INFORMATION IN 1/4" HIGH LETTERING PER NEC 690.54:
	 <p><b>Solar Disconnect</b></p> <p>WARNING - Electric Shock Hazard DO NOT TOUCH TERMINALS Terminals on both Line and Load sides may be energized in the Open Position</p>
5	RESERVED
6	PROVIDE A PLACARD ON THE MAIN SERVICE PANEL WITH THE FOLLOWING INFORMATION IN 1/4" HIGH LETTERING PER NEC 690.17:
	 <p><b>WARNING - DUAL POWER SOURCE SECOND SOURCE IS PV SYSTEM</b></p>

1. Conductor Sizing per Art. 690.8(B)(1)	
a. Conductor must have 30 deg. C ampacity >= 125% of continuous current per Art 215.2(A)(1).	
b. Conductor must have (after corrections for conditions of use) >= continuous current per Table 310.16	
c. Evaluate conductor temperature at termination per Art 110.14(C). Ampacity of wire derated for conditions of termination must be >= continuous current * 1.25. All string terminations are rated at 90 degrees C.	
2. OOP Sizing per Art. 690.8(B)(1)	
a. Round up to next size per Art 240.4(B)	
3. Conductor Sizing per Art. 690.8(B)(1)	
a. Conductor must have 30 deg. C ampacity >= 125% of continuous current per Art 215.2(A)(1).	
b. Conductor must have (after corrections for conditions of use) >= continuous current per Table 310.16	
c. Evaluate conductor temperature at termination per Art 110.14(C). Ampacity of wire derated for conditions of termination must be >= continuous current * 1.25. All string terminations are rated at 75 degrees C min.	
4. OOP Sizing	
a. Round up to next size per Art 240.4(B)	
5. Conductor Sizing per Art. 690.8(B)(1)	
a. Conductor must have 30 deg. C ampacity >= 125% of continuous current per Art 215.2(A)(1).	
b. Conductor must have (after corrections for conditions of use) >= continuous current per Table 310.16	
c. Evaluate conductor temperature at termination per Art 110.14(C). Ampacity of wire derated for conditions of termination must be >= continuous current * 1.25. All inverter output terminations are rated at 75 degrees C min.	
7. Conductor Sizing per Art. 690.8(B)(1)	
a. Conductor must have 30 deg. C ampacity >= 125% of continuous current per Art 215.2(A)(1).	
b. Conductor must have (after corrections for conditions of use) >= continuous current per Table 310.16	
c. Evaluate conductor temperature at termination per Art 110.14(C). Ampacity of wire derated for conditions of termination must be >= continuous current * 1.25. All inverter output terminations are rated at 75 degrees C min.	


ELECTRICAL CALCULATIONS				
George Kohl - Montgomery County				
7000 Westmoreland Ave. Takoma Park, MD, 20912				
Module	13 SunPower A-Series 415-watt Type-G AC panels	415	5395 W	STC
Inverter	13 SUNPOWER FACTORY ul		349 W	max
			4537	
Photovoltaic Module AC Electrical Specifications (REF):				
Pnim (DC)=	415 W			
AC Electrical Data				
Output @ 240 (min/nom/max);	211/240/264 V			
Operating Frequency (min./nom./max.)	59.3/60.0/60.5 Hz			
Output Power Factor (min.)	1			
AC Max. Continuous Output Current @ 240 V	1.49 A			
Inverter Specifications: SUNPOWER FACTORY ul				
Input Recom. (W)	FACTORY	OK	OUTPUT	
Max in DC Voltage	FACTORY	OK	Rated output (W)	349
Max In Current (A)	FACTORY	OK	Peak output (W)	366
			Nom. output Cur (A)	1.45
			max number in series:	11
				ok
Conductor Sizing, Inverter Input				
NA, inverter input wiring is factory cable, designed for the purpose.				
Verify Max numbers of inverters per strings is equal/less than 11				
max string: A	8 ok <=11	and	5 (CIRCUIT B)	
Conductor sizing, Inverter Output (each circuit- -BOUNDING/WORST CASE)				
lcont=	11.60 A	(1.45 A x number of inverters per ckt)	1-way len	100
lcont*1.25+	14.50 A	OCP	15 A	15A FOR CIRC B
Wire	#10 AWG THWN-2	40 A	NEC TABLE 310.16	
Temp derate factor	0.58 unitless	67 C PER NEC TBL 310.15(B)(2)(.c)		
derated:	23.2 A	OK>		14.50
Conductor sizing, Combined Output from Load Center via ac disco/cut off switch				
lcont=	18.85 A	(1.45A x number of inverters)		25.00
lcont*1.25+	23.56 A			
Wire	#10 AWG THWN-2	40 A	NEC TABLE 310.16	
Temp derate factor	0.87 unitless	45 C		
Conduit Fill factor	1 unitless	Table 310.15(B)(20(a))		
Derated	34.8 A	OK>		23.56
	use	OCP	30 A	
Voltage Drop = (Amp*2*ft*ohm/ft)/V				
	Amp	ft	ohm/ft	V
Inverter output=	11.60	100	0.00126	240
Inverter output=			1.22% ok	<3% ok
Load center output=	23.56	25.00	0.00126	240
Load center output=			0.62% ok	<3% ok
				Note
				#10
				#10

APPROVED

Montgomery County  
Historic Preservation Commission

*Sandra L. Heiler*

**REVIEWED**  
By Dan.Bruechert at 2:33 pm, Sep 11, 2020

  
 DocuSign  
*TIM RUMFORD*  
 E70D81E087D845E...  
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PROJECT FILE	20912-01
REVISION LEVEL	DATE
REV-1	DATE
DRAWN BY:	GDC
CHECKED BY:	TR
SCALE	AS NOTED
DRAWING TITLE	ELECTRICAL CALCULATIONS
DRAWING NUMBER	E002

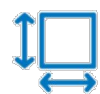


# SUNPOWER®

## 400–425 W Residential AC Module

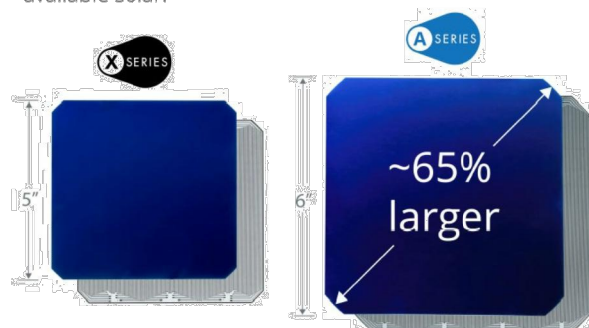
SunPower® Maxeon® Technology

Built specifically for use with the SunPower Equinox™ system, the only fully integrated solution designed, engineered and warranted by one manufacturer.



### Highest Power Density Available.

SunPower's new Maxeon® Gen 5 cell is 65% larger than prior generations, delivering the most powerful cell and highest-efficiency panel in residential solar. The result is more power per square meter than any commercially available solar.



~65% larger

### Fundamentally Different. And Better.



SunPower® Maxeon® Technology

- Most powerful cell in home solar<sup>2</sup>
- Delivers unmatched reliability<sup>3</sup>
- Patented solid metal foundation prevents breakage and corrosion



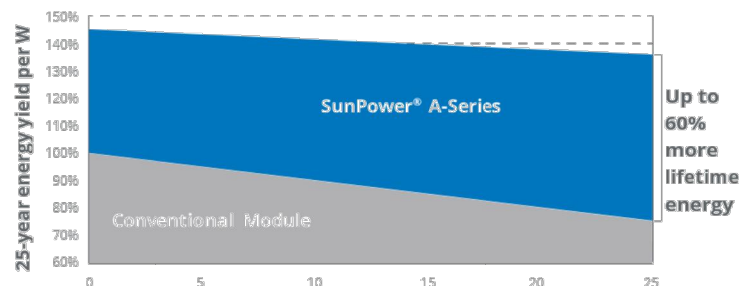
Factory-integrated Microinverter

- Highest-power integrated AC module in solar
- 60% lighter than prior SunPower<sup>1</sup>
- Engineered and calibrated by SunPower for SunPower AC module



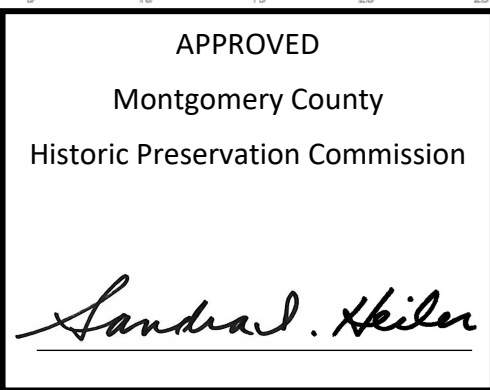
### Highest Lifetime Energy and Savings.

Designed to deliver 60% more energy over 25 years in real-world conditions like partial shade and high temperatures.<sup>1</sup>



### Best Reliability

With more than 25 years of experience, SunPower is why we stand with the industry. Product Warranty in solar.



### A-Series: A425 | A415 | A400 SunPower® Residential AC Module

AC Electrical Data	
Inverter Model: SPWR-A4	@240 VAC
Peak Output Power	366 VA
Max. Continuous Output Power	349 VA
Nom. (L-L) Voltage/Range <sup>2</sup> (V)	240 / 211–264
Max. Continuous Output Current (A)	1.45
Max. Units per 20 A (L-L) Branch Circuit <sup>3</sup>	11
CEC Weighted Efficiency	97.0%
Nom. Frequency	60 Hz
Extended Frequency Range	47–68 Hz
AC Short Circuit Fault Current Over 3 Cycles	5.8 A rms
Overvoltage Class AC Port	III
AC Port Backfeed Current	18 mA
Power Factor Setting	1.0
Power Factor (adjustable)	0.7 lead. / 0.7 lag.

DC Power Data			
	SPR-A425-G-AC	SPR-A415-G-AC	SPR-A400-G-AC
Nom. Power <sup>5</sup> (P <sub>nom</sub> )	425 W	415 W	400 W
Power Tol.	+5/-0%	+5/-0%	+5/-0%
Module Efficiency	22.8	22.3	21.5
Temp. Coef. (Power)	-0.29%/°C		
Shade Tol.	Integrated module-level max. power point tracking		

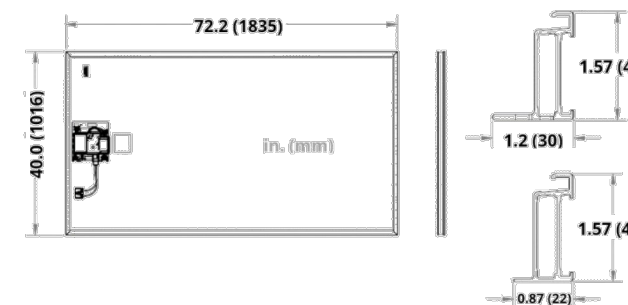
Tested Operating Conditions	
Operating Temp.	-40°F to +140°F (-40°C to +60°C)
Max. Ambient Temp.	122°F (50°C)
Max. Load	Wind: 62 psf, 3000 Pa, 305 kg/m <sup>2</sup> front & back Snow: 125 psf, 6000 Pa, 611 kg/m <sup>2</sup> front
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)

Mechanical Data	
Solar Cells	66 Monocrystalline Maxeon Gen 5
Front Glass	High-transmission tempered glass with anti-reflective coating
Environmental Rating	Outdoor rated
Frame	Class 1 black anodized (highest AAMA rating)
Weight	46.5 lbs (21.1 kg)
Recommended Max. Module Spacing	1.3 in. (33 mm)

1 SunPower 415 W, 22.2% efficient, compared to a Conventional Panel on same-sized arrays (260 W, 16% efficient, approx. 1.6 m<sup>2</sup>), 7.9% more energy per watt (based on PVsyst pan files for avg. US climate), 0.5%/yr slower degradation rate (Jordan, et. al. "Robust PV Degradation Methodology and Application." PVSC 2018).  
 2 Based on search of datasheet values from websites of top 10 manufacturers per IHS, as of January 2019.  
 3 #1 rank in "Fraunhofer PV Durability Initiative for Solar Modules: Part 3," PVTech Power Magazine, 2015. Campeau, Z. et al. "SunPower Module Degradation Rate," SunPower white paper, 2013.  
 4 Factory set to 1547a-2014 default settings. CA Rule 21 default settings profile set during commissioning. See the Equinox Installation Guide #518101 for more information.  
 5 Standard Test Conditions (1000 W/m<sup>2</sup> irradiance, AM 1.5, 25°C). NREL calibration standard: SOMS current, LACS FF and voltage. All DC voltage is fully contained within the module.  
 6 This product is UL Listed as PVRS-E and conforms with NEC 2014 and NEC 2017 690.12; and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors; when installed according to manufacturer's instructions.

See [www.sunpower.com/facts](http://www.sunpower.com/facts) for more reference information. For more details, see extended datasheet [www.sunpower.com/datasheets](http://www.sunpower.com/datasheets) Specifications included in this datasheet are subject to change without notice. ©2019 SunPower Corporation. All Rights Reserved. SUNPOWER, the SUNPOWER logo and MAXEON are registered trademarks of SunPower Corporation in the U.S. and other countries as well. 1-800-SUNPOWER.

Warranties, Certifications, and Compliance	
Warranties	<ul style="list-style-type: none"> <li>• 25-year limited power warranty</li> <li>• 25-year limited product warranty</li> </ul>
Certifications and Compliance	<ul style="list-style-type: none"> <li>• UL 1703</li> <li>• UL 1741 / IEEE-1547</li> <li>• UL 1741 AC Module (Type 2 fire rated)</li> <li>• UL 62109-1 / IEC 62109-2</li> <li>• FCC Part 15 Class B</li> <li>• ICES-0003 Class B</li> <li>• CAN/CSA-C22.2 NO. 107.1-01</li> <li>• CA Rule 21 (UL 1741 SA)<sup>4</sup></li> <li>• (Includes Volt/Var and Reactive Power Priority)</li> <li>• UL Listed PV Rapid Shutdown Equipment<sup>6</sup></li> </ul> <p>Enables installation in accordance with:</p> <ul style="list-style-type: none"> <li>• NEC 690.6 (AC module)</li> <li>• NEC 690.12 Rapid Shutdown (inside and outside the array)</li> <li>• NEC 690.15 AC Connectors, 690.33(A)-(E)(1)</li> </ul> <p>When used with InvisiMount racking and InvisiMount accessories (UL 2703):</p> <ul style="list-style-type: none"> <li>• Module grounding and bonding through InvisiMount</li> <li>• Class A fire rated</li> </ul> <p>When used with AC module Q Cables and accessories (UL 6703 and UL 2238)<sup>6</sup>:</p> <ul style="list-style-type: none"> <li>• Rated for load break disconnect</li> </ul>
PID Test	Potential-induced degradation free



**SUNPOWER®**  
532618 RevA





## SunPower® InvisiMount™ | Residential Mounting System

## SunPower® InvisiMount™ | Residential Mounting System

### Simple and Fast Installation

- Integrated module-to-rail grounding
- Pre-assembled mid and end clamps
- Levitating mid clamp for easy placement
- Mid clamp width facilitates even module spacing
- Simple, pre-drilled rail splice
- UL 2703 Listed integrated grounding

### Flexible Design

- Addresses nearly all sloped residential roofs
- Design in landscape and portrait
- Rails enable easy obstacle management

### Customer-Preferred Aesthetics

- #1 module and #1 mounting aesthetics
- Best-in-class system aesthetics
- Premium, low-profile design
- Black anodized components
- Hidden mid clamps and end clamps hardware, and capped, flush rails

### Part of Superior System

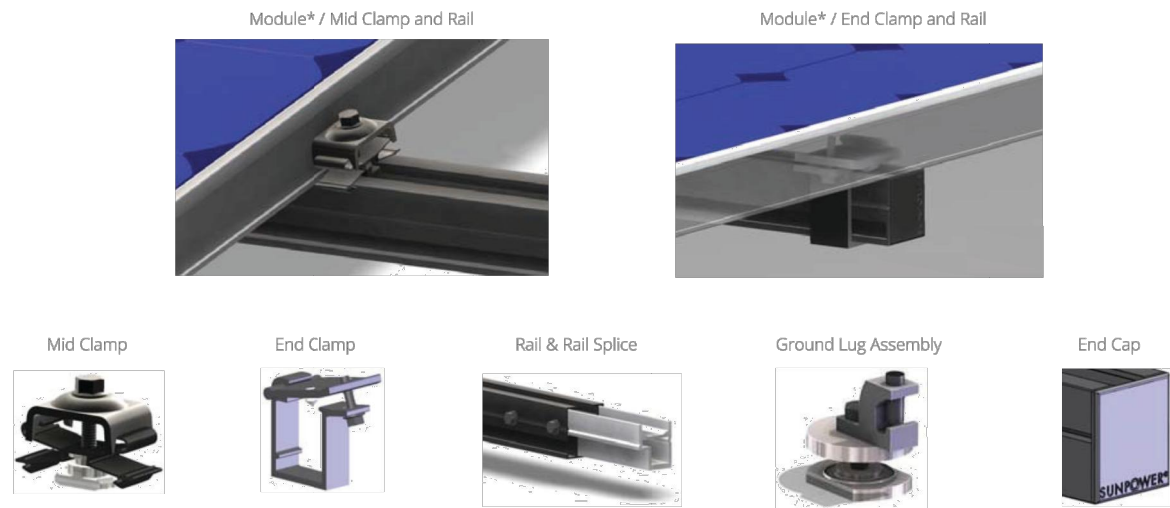
- Built for use with SunPower DC and AC modules
- Best-in-class system reliability and aesthetics
- Combine with SunPower modules and monitoring app



### Elegant Simplicity

SunPower® InvisiMount™ is a SunPower-designed rail-based mounting system. The InvisiMount system addresses residential sloped roofs and combines faster installation time, design flexibility, and superior aesthetics. The InvisiMount product was specifically envisioned and engineered to pair with SunPower modules. The resulting system-level approach will amplify the aesthetic and installation benefits for

### InvisiMount Component Images



InvisiMount Component Details		
Component	Material	Weight
Mid Clamp	Black oxide stainless steel AISI 304	63 g (2.2 oz)
End Clamp	Black anodized aluminum alloy 6063-T6	110 g (3.88 oz)
Rail	Black anodized aluminum alloy 6005-T6	830 g/m (9 oz/ft)
Rail Splice	Aluminum alloy 6005-T5	830 g/m (9 oz/ft)
Ground Lug Assembly	304 stainless (A2-70 bolt; tin-plated copper lug)	106.5 g/m (3.75 oz)
End Cap	Black acetal (POM) copolymer	10.4 g (0.37 oz)

InvisiMount Operating Conditions	
Temperature	-40° C to 90° C (-40° F to 194° F)
Max. Load	2400 Pa uplift 5400 Pa downforce

InvisiMount Warranties And Certifications	
Warranties	25-year product warranty 5-year finish warranty
Certifications	UL 2703 Listed Class A fire rating when distance between roof surface and bottom of SunPower module frame is ≤ 3.5"

Roof Attachment Hardware Supported by InvisiMount System Design Tool	
Application	<ul style="list-style-type: none"> <li>• Composition Shingle Rafter Attachment</li> <li>• Composition Shingle Roof Decking Attachment</li> <li>• Curved and Flat Tile Roof Attachment</li> <li>• Universal Interface for Other Roof Attachments</li> </ul>

Roof Attachment Hardware Warranties	
Refer to roof attachment hardware manufacturer's documentation	

\*Module frame that is compatible with the InvisiMount system required for hardware interoperability.  
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**APPROVED**  
**Montgomery County**  
**Historic Preservation Commission**

*Sandra L. Heiler*

**REVIEWED**  
By Dan.Bruechert at 2:34 pm, Sep 11, 2020

HELIOS SOLAR SYSTEMS, LLC  
ASHBURN VA, USA  
WWW.HELIOSOLARSYS.COM  
703 577 2178



**KOHL**  
**RESIDENCE**  
PV SOLAR INSTALLATION  
7000 WESTMORELAND AVE.  
TAKOMA PARK, MD 20912

PROJECT FILE  
20912-01

REVISION LEVEL DATE  
REV-1 DATE

DRAWN BY:  
GDC  
CHECKED BY:  
TR

SCALE AS NOTED

DRAWING TITLE

HARDWARE  
MOUNTING  
DETAILS, SPEC

DRAWING NUMBER

M001

17  
SHEET 8 OF 8