



## HISTORIC PRESERVATION COMMISSION

Marc Elrich  
*County Executive*

Robert K. Sutton  
*Chairman*

Date: April 20, 2022

### MEMORANDUM

TO: Mitra Pedoeem  
Department of Permitting Services

FROM: Michael Kyne  
Historic Preservation Section  
Maryland-National Capital Park & Planning Commission

SUBJECT: Historic Area Work Permit # 988569: Solar panel 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** by historic preservation staff.

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: Peter Aron (Anthony Colella, Agent)  
Address: 7212 Willow Avenue, 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 Michael Kyne at 301.563.3403 or [michael.kyne@montgomeryplanning.org](mailto:michael.kyne@montgomeryplanning.org) to schedule a follow-up site visit.





## HISTORIC PRESERVATION COMMISSION

HAWP #: \_\_\_\_\_ at: \_\_\_\_\_

submitted on: \_\_\_\_\_

has been reviewed and determined that the proposal fits into the following category/categories:

Repair or replacement of a masonry foundation with new masonry materials that closely match the original in appearance;

Installation of vents or venting pipes in locations not visible from the public right-of-way;

New gutters and downspouts;

Removal of vinyl, aluminum, asbestos, or other artificial siding when the original siding is to be repaired and/or replaced in kind;

Removal of accessory buildings that are not original to the site or non-historic construction;

Repair or replacement of missing or deteriorated architectural details such as trim or other millwork, stairs or stoops, porch decking or ceilings, columns, railings, balusters, brackets shutters, etc., with new materials that match the old in design, texture, visual characteristics, and, where possible materials, so long as the applicant is able to provide one extant example, photographic evidence, or physical evidence that serves as the basis for the work proposed;

Construction of wooden decks that are at the rear of a structure and are not visible from a public right-of-way;

Roof replacement with -compatible roofing materials, or with architectural shingles replacing 3-Tab asphalt shingles;

Installation of storm windows or doors that are compatible with the historic resource or district;

Repair, replacement or installation of foundation-level doors, windows, window wells, and areaways, or foundation vents, venting pipes, or exterior grills that do not alter the character-defining features and/or the historic character of the resource;

Construction of fences that are compatible with the historic site or district in material, height, location, and design;

Fence is lower than 48" in front of rear wall plane;

Construction of walkways, parking pads, patios, driveways, or other paved areas that are not visible from a public right-of-way and measure no more than 150 square feet in size;

Replacement of existing walkways, parking pads, patios, driveways, or other paved areas with materials that are compatible with the visual character of the historic site and district and that are no greater than the dimensions of the existing hardscape;

Construction of small accessory buildings no larger than 250 square feet in size that are not visible from the public right-of-way;

Installations of skylights on the rear of a structure that will not be visible from the public right-of-way, and would not remove or alter character-defining roof materials;

Installation of solar panels and arrays in locations that are not readily visible from the public right-of-way or that are designed so as to have a minimal impact on the historic resource or the historic district (e.g., systems that are ground-mounted in areas other than the front or side yard of a corner lot, located on accessory or outbuildings, on non-historic additions, or on rear facing roof planes);

Installation of car charging stations in any location on a property or in the right-of-way;

Installation of satellite dishes;

Removal of trees greater than 6" in diameter (d.b.h.) that are dead, dying, or present an immediate hazard.

Removal of trees greater than 6" in diameter (d.b.h.) in the rear of the property that will not impact the overall tree canopy of the surrounding district or historic site;

Replacement tree required as a condition; and,

Other minor alterations that may be required by the Department of Permitting Services post-Commission approval that would have no material effect on the historic character of the property.

Staff finds the proposal complies with Chapter 24A, the Secretary of the Interior's Standards for Rehabilitation, and any additional requisite guidance. Under the authority of COMCOR No. 24A.04.01, this HAWP is approved by Michael Ky on \_\_\_\_\_. The approval memo and stamped drawings follow.



APPLICATION FOR HISTORIC AREA WORK PERMIT
HISTORIC PRESERVATION COMMISSION
301.563.3400

FOR STAFF ONLY:
HAWP#
DATE ASSIGNED

APPLICANT:

Name:
Address:
Daytime Phone:
E-mail:
City:
Zip:
Tax Account No.:

AGENT/CONTACT (if applicable):

Name:
Address:
Daytime Phone:
E-mail:
City:
Zip:
Contractor Registration No.:

LOCATION OF BUILDING/PREMISE: MIHP # of Historic Property

Is the Property Located within an Historic District?
Is there an Historic Preservation/Land Trust/Environmental map of the property?
Are other Planning and/or Hearing Examiner Approvals/Resolutions (Conditional Use, Variance, Record Plat, etc.?)



REVIEWED
By Michael Kyne at 1:32 pm, Apr 20, 2022

Building Number:
Street:
Town/City:
Nearest Cross Street:
Lot:
Block:
Subdivision:
Parcel:

TYPE OF WORK PROPOSED: See the checklist on Page 4 to verify that all supporting items for proposed work are submitted with this application. Incomplete Applications will not be accepted for review. Check all that apply:

- New Construction
Addition
Demolition
Grading/Excavation
Deck/Porch
Fence
Hardscape/Landscape
Roof
Shed/Garage/Accessory Structure
Solar
Tree removal/planting
Window/Door
Other:

I hereby certify that I have the authority to make the foregoing application, that the application is correct and accurate and that the construction will comply with plans reviewed and approved by all necessary agencies and hereby acknowledge and accept this to be a condition for the issuance of this permit.

Signature of owner or authorized agent
Date

Description of Property: Please describe the building and surrounding environment. Include information on significant structures, landscape features, or other significant features of the property:

Description of Work Proposed: Please give an overview of the work to be undertaken:

**REVIEWED**

*By Michael Kyne at 1:32 pm, Apr 20, 2022*

APPROVED

Montgomery County

Historic Preservation Commission




Robert H. Butler

Work Item 1: _____	
Description of Current Condition:	Proposed Work:

Work Item 2: _____	
Description of Current Condition:	Proposed Work:

**REVIEWED**  
By Michael Kyne at 1:33 pm, Apr 20, 2022

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Montgomery County  
Historic Preservation Commission



Work Item 3: _____	
Description of Current Condition:	Proposed Work:

**HISTORIC AREA WORK PERMIT  
CHECKLIST OF  
APPLICATION REQUIREMENTS**

	Required Attachments						
Proposed Work	I. Written Description	2. Site Plan	3. Plans/Elevations	4. Material Specifications	5. Photographs	6. Tree Survey	7. Property Owner Addresses
New Construction	*	*	*	*	*	*	*
Additions/Alterations	*	*	*	*	*	*	*
Demolition	*	*	*		*		*
Deck/Porch	*	*	*	*	*	*	*
Fence/Wall	*	*	*	*	*	*	*
Driveway/Parking Area	*	*		*	*	*	*
Grading/Excavation/Landscaping	*	*		*	*	*	*
Tree Removal	*	*		*	*	*	*
Siding/ Roof Changes	*	*	*	*	*		*
Window/ Door Changes	*	*	*	*	*		*
Masonry Repair/ Repoint	*	*	*	*	*		*
Signs	*	*	*	*	*		*

**REVIEWED**

*By Michael Kyne at 1:33 pm, Apr 20, 2022*

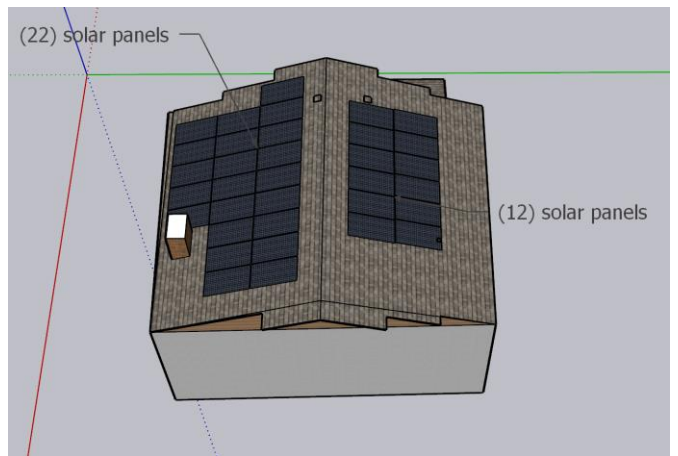
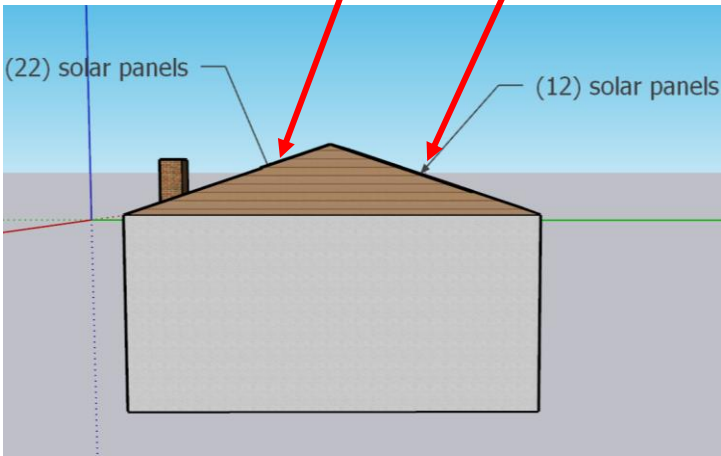
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By Michael Kyne at 1:33 pm, Apr 20, 2022

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# SOLAR PV PROJECT, ARON


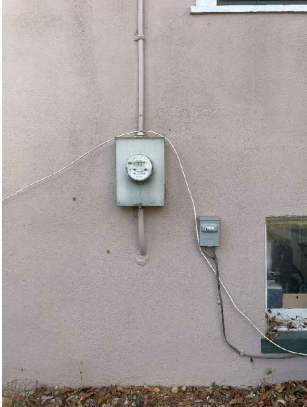

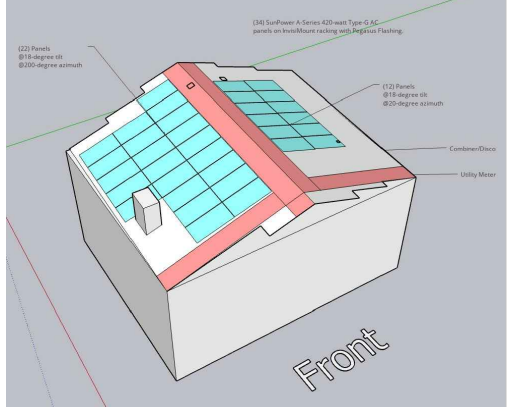


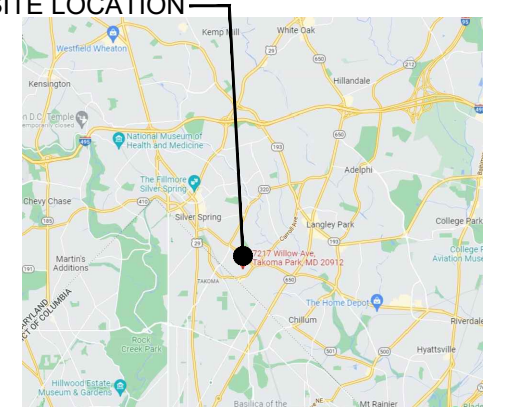
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By Michael Kyne at 1:34 pm, Apr 20, 2022

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

## 7217 WILLOW 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: <b>2018 INTERNATIONAL BUILDING CODE</b>                      D) ALL ELECTRICAL WORK SHALL COMPLY WITH THE <b>2017 NATIONAL ELECTRIC CODE (NEC)</b>                      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"</p> <p>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>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. <u>41066</u>, EXPIRATION DATE: <u>2023-09-08</u></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                      E001 ELECTRICAL SCHEMATIC                      E002 ELECTRICAL CALCULATIONS                      E003 ELECTRICAL MODULE SPECS                      M001 HARDWARE MOUNTING DETAILS/SPEC</p>
		<b>EXISTING METER</b>	<b>EXISTING SERVICE PANEL</b>	<b>MODEL VIEW</b>
				
		<b>EXISTING ROOF ATTIC</b>	<b>EXISTING EXTERIOR</b>	<b>VICINITY LOCATION</b>
				

ARON  
RESIDENCE  
PV SOLAR INSTALLATION  
7217 WILLOW AVE.  
TAKOMA PARK, MD 20912

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



(34) SunPower A-Series 420-watt Type-G AC panels on InvisiMount racking with Pegasus Flashing.

(22) Panels  
@18-degree tilt  
@200-degree azimuth


**REVIEWED**  
By Michael Kyne at 1:34 pm, Apr 20, 2022

(12) Panels  
@18-degree tilt  
@20-degree azimuth

Combiner/Disco  
Utility Meter

Front

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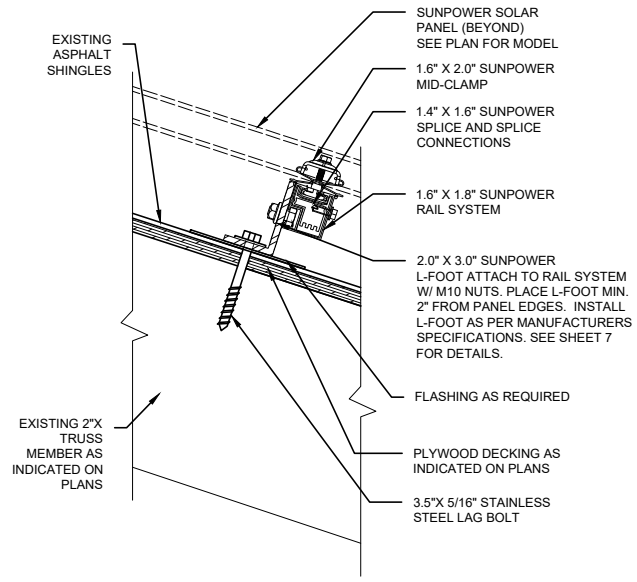


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*TIM RUMFORD*  
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3/29/2022

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PROJECT FILE	20912-01
REVISION LEVEL	DATE
REV-1	DATE
DRAWN BY:	
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CHECKED BY:	
TR	
SCALE	AS NOTED
DRAWING TITLE	
ELEVATION/TRUSS AND FRAMING	
DRAWING NUMBER	
S001	
SHEET	3 OF 8



1 ROOF MOUNTING DETAIL  
SCALE: NTS

MOUNTING LAYOUT LEGEND

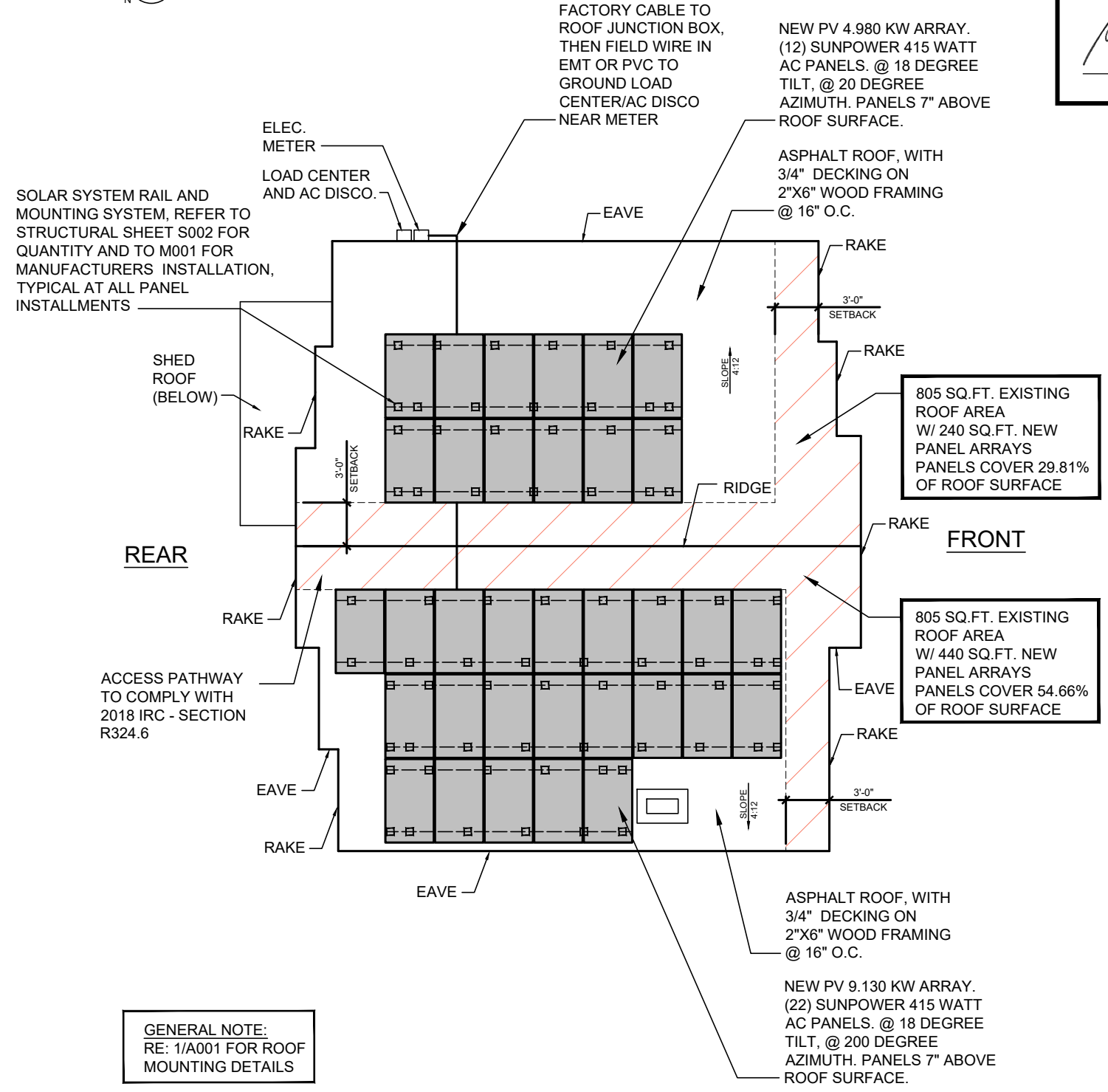
- SUNPOWER L FOOT FOR ASPHALT ROOFS. WEATHER PROOF WITH APPROVED ROOFING METHOD. SEE DETAIL ON M001
- SUNPOWER INVISIMOUNT RAIL, FIELD SPLICE AND TRIM - SEE DETAIL ON M001

**REVIEWED**  
By Michael Kyne at 1:34 pm, Apr 20, 2022

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GENERAL NOTE:  
RE: 1/A001 FOR ROOF MOUNTING DETAILS

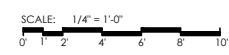


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PROJECT FILE	20912-01
REVISION LEVEL	DATE
REV-1	02-22-2022
DRAWN BY:	GDC
CHECKED BY:	TR
SCALE	AS NOTED
DRAWING TITLE	ARRAY MAP
DRAWING NUMBER	A001
SHEET	2 OF 8







## 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



### Elegant Simplicity

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 Montgomery County  
 Historic Preservation Commission

*[Signature]*

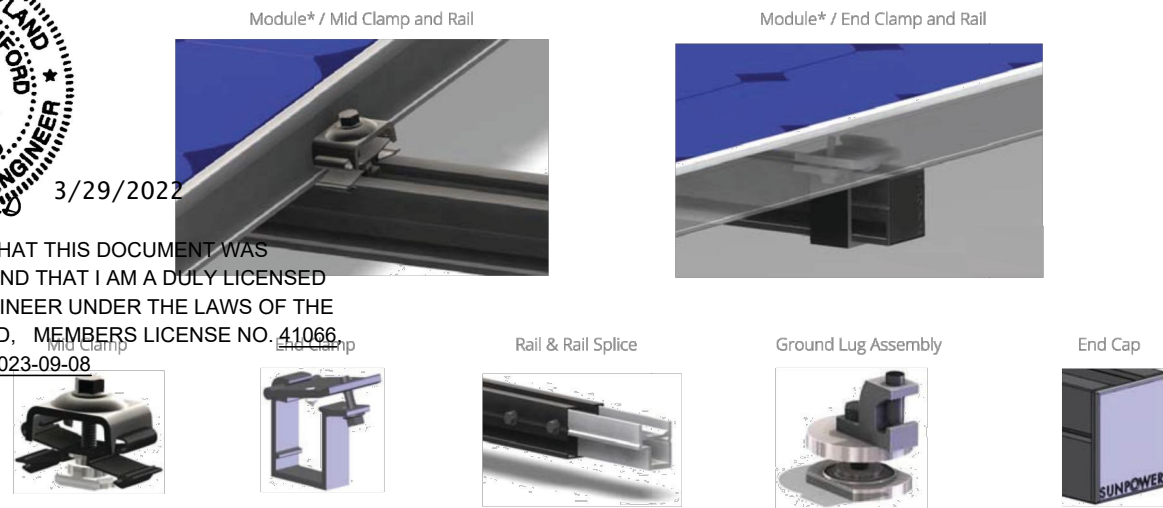
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### InvisiMount Component Images



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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sunpower.com  
 Document #509506 Rev B

**REVIEWED**

By Michael Kyne at 1:34 pm, Apr 20, 2022

### 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



SUNPOWER®

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**Helios**  
 SolarSystems

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PROJECT FILE  
 20912-01

REVISION LEVEL DATE  
 REV-1 DATE

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 GDC  
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SCALE AS NOTED

DRAWING TITLE

HARDWARE  
 MOUNTING  
 DETAILS, SPEC

DRAWING NUMBER

M001

SHEET 8 OF 8

**REVIEWED**

By Michael Kyne at 1:34 pm, Apr 20, 2022

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 Montgomery County  
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### Structural Analysis

**Project Name:** Peter Aron - Montgomery County  
 7212 Willow Ave. Takoma Park, MD 20912

**Address:**  
**Description:** Pitched roofS, 33 SunPower A-series 415-watt AC panels, Multiple surfaces, (1) Low pitch and (2) High pitch, see below.

Load/Structure Assumptions (1)					
Wind Speed (mph)	Snow load (psf)	Roof Height (ft)	Importance factor Cat	Wind Exposure	Roof Wind Zone
115	30	<30	II	B	3

**Present Conditions and Structure Info**

LOW HIGH PITCH ROOFS: ASPHALT ROOF, WITH 5/8" DECKING ON 2"X6" WOOD FRAMING @ 16" O.C., 4:12 PITCH

#### Wind Loading

Pnet = Net Design Wind Pressure (psf)  
 From ASCE 7-10, 100 sf eff wind area, 7 to 27 deg, zone 2

Down	Up
9.7	27.8

Module Areas (sf): 19.5

Wind Force (lbs), Per module: Pnet \* Area=

Down	Up
188.7	540.7

Array number of fasteners: 72  
 Array Number of Modules: 34  
 Number of fasteners per module: 2.1 AVE  
 Force per fastener: (lbs)

Down	Up
89.1	255.3

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
7.6	2.7

OK OK >2 x margin

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): 48  
 2.5 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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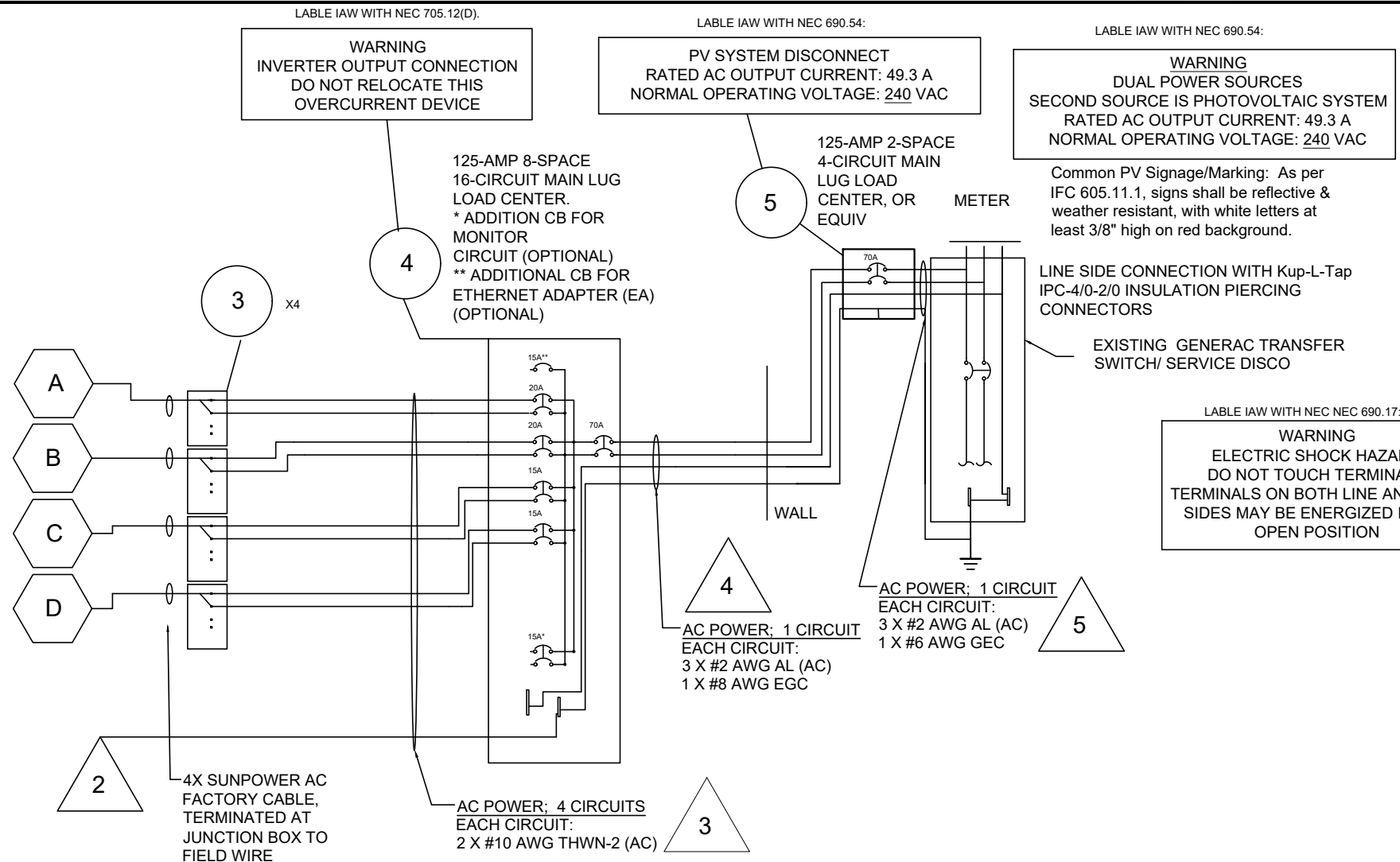
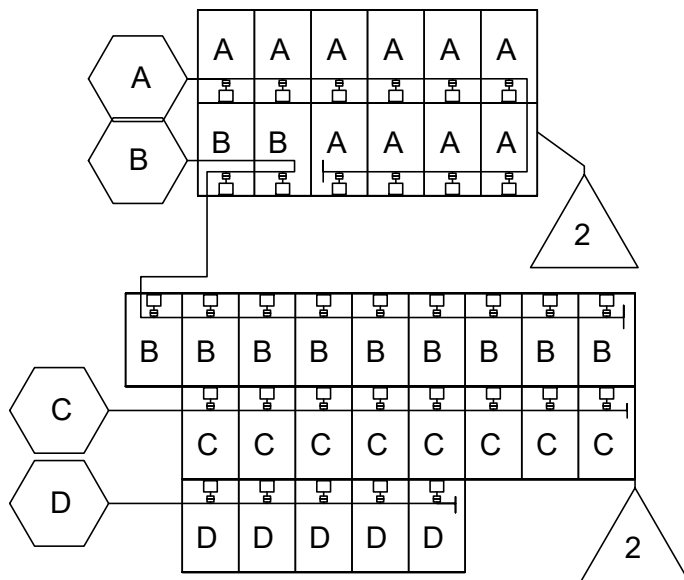
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PROJECT FILE	
20912-01	
REVISION LEVEL	DATE
REV-1	DATE
DRAWN BY: GDC	
CHECKED BY: TR	
SCALE	AS NOTED
DRAWING TITLE	
STRUCTURAL CALCULATIONS, DETAIL	
DRAWING NUMBER	
S002	
SHEET	4 OF 8



# 14,110 Wdc

1+2 X34



WARNING  
INVERTER OUTPUT CONNECTION  
DO NOT RELOCATE THIS  
OVERCURRENT DEVICE

PV SYSTEM DISCONNECT  
RATED AC OUTPUT CURRENT: 49.3 A  
NORMAL OPERATING VOLTAGE: 240 VAC

WARNING  
DUAL POWER SOURCES  
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM  
RATED AC OUTPUT CURRENT: 49.3 A  
NORMAL OPERATING VOLTAGE: 240 VAC

Common PV Signage/Marking: As per IFC 605.11.1, signs shall be reflective & weather resistant, with white letters at least 3/8" high on red background.

LINE SIDE CONNECTION WITH Kup-L-Tap IPC-4/0-2/0 INSULATION PIERCING CONNECTORS

EXISTING GENERAC TRANSFER SWITCH/ SERVICE DISCO

WARNING  
ELECTRIC SHOCK HAZARD  
DO NOT TOUCH TERMINALS  
TERMINALS ON BOTH LINE AND LOAD  
SIDES MAY BE ENERGIZED IN THE  
OPEN POSITION

EQUIPMENT SCHEDULE				
TAG	NAME	P/N	QTY	NOTES
1	SOLAR MODULES	SunPower A-series 415-watt AC panels	34	4 CIRCUIT
2	MicroInverters	SUNPOWER FACTORY ul	34	Mounted to modules at factory
3	JUNCTION BOX	Field determined	4	JUNCTION BOX, LOCATED BEHIND ARRAY OR IN ATTIC
4	LOAD CENTER	125-AMP 8-SPACE 16-CIRCUIT MAIN LUG LOAD CENTER,	1	COMBINES CIRCUITS AND MAIN OCPD SERVES AS AC DISCO
5	LOAD CENTER	125-AMP 2-SPACE 4-CIRCUIT MAIN LUG LOAD CENTER OR EQUIV, 7		

WIRE SCHEDULE (EACH CIRCUIT)				
TAG	DESCRIPTION	GAUGE	QTY	CONDUIT, DISTANCE
1	SUNPOWER AC TRUNK Cable, 1-Ph (2-Wire), CAP UNUSED CONNECTORS	#10 (REF)	AR	FACTORY CABLE, WITH INTEGRATED CONNECTORS. TIE TO MOUNTING RAILS. LENGTH OF ARRAY
2	CONTINUOUS EGC COPPER RACKING SYSTEM TO EARTH GROUND	#6	1	ROUTED WITH PV WIRE, THEN IN CONDUIT AFTER JUNCTION BOX
3	AC POWER FROM ARRAY 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 TO LOAD CENTER, IN EMT. APPROX. 100 FEET.
4	AC LOAD CENTER TO INSIDE DISCO THWN-2 AL (240 VAC) MAX DERATING CURRENT (SEE CALCS PAGE); MAX VOLTAGE (SEE CALCS PAGE)	#2, (L1, L2, N) AL #8 (EGC)	4	ROUTES IN EMT
5	AC LOAD CENTER TO LST AT GENERAC ATS THWN-2 AL (240 VAC) MAX DERATING CURRENT (SEE CALCS PAGE); MAX VOLTAGE (SEE CALCS PAGE)	#2, (L1, L2, N) AL, #6 (GEC)	4	ROUTES IN EMT <10 FEET, EMT

**REVIEWED**  
By Michael Kyne at 1:34 pm, Apr 20, 2022

APPROVED  
Montgomery County  
Historic Preservation Commission




DocuSigned by:  
**TIM RUMFORD** 3/29/2022  
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: 2023-09-08

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



ARON  
RESIDENCE  
PV SOLAR INSTALLATION  
7217 WILLOW AVE.  
TAKOMA PARK, MD 20912

PROJECT FILE	20912-01
REVISION LEVEL	DATE
DRAWN BY:	GDC
CHECKED BY:	TR
SCALE	AS NOTED
DRAWING TITLE	ELECTRICAL SCHEMATIC
DRAWING NUMBER	E001
SHEET	5 OF 8

# ELECTRICAL CALCULATIONS

Peter Aron - Montgomery County  
7212 Willow Ave. Takoma Park, MD 20912

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).

Module	34 SunPower A-series 415-watt AC panels	415	14110 W STC
Inverter	34 SUNPOWER FACTORY ul		320 W max
			10880

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). >= continuous current \* 1.25. All string terminations are rated at 90 degrees C.

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	1.45 A

**REVIEWED**  
By Michael Kyne at 1:34 pm, Apr 20, 2022

APPROVED  
Montgomery County  
Historic Preservation Commission  
*[Signature]*

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).

Inverter Specifications: SUNPOWER FACTORY ul

Input Recom. (W)	FACTORY	OK	OUTPUT	Rated output (W)	349
Max in DC Voltage	FACTORY	OK		Peak output (W)	366
Max In Current (A)	FACTORY	OK		Nom. output Cur (A)	1.45
				max number in series:	11
					ok

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.

NA, inverter input wiring is factory cable, designed for the purpose.

Verify Max numbers of inverters per strings is equal/less than 12

4. OOP Sizing

a. Round up to next size per Art 240.4(B)

max string: B 11 ok <=11 and CIRC A=10, CIRC C = 8, CIRC D =5

Conductor sizing, Inverter Output (each circuit- -BOUNDING/WORST CASE)		1-way length (ft)	100
Icont=	15.95 A	(1.45A x number of inverters per ckt)	
Icont*1.25+	19.94 A	OCP	20 A
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>	19.94
Conductor sizing, Combined Output from Load Center via ac disco/cut off switch		1-way length (ft)	10.00
Icont=	49.30 A	(1.45A x number of inverters)	
Icont*1.25	61.63 A		
Wire	#2 AWG THWN-2 AL (75C)	90 A	NEC TABLE 310.16
Temp derate factor	1 unitless	40 C	
Conduit Fill factor	1 unitless	Table 310.15(B)(20(a)	
Derated	90 A	OK>	61.63
	use	OCP	70 A

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).

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.

Voltage Drop = (Amp\*2\*ft\*ohm/ft)/V

	Amp	ft	ohm/ft	V	Note
Inverter output=	15.95	100	0.00126	240	#10
Inverter output=		1.67%	ok	<3%	ok
Load center output=	49.30	10.00	0.000321	240	#2
Load center output=		0.13%	ok	<3%	ok

DocuSigned by:  
*Tim Rumm*  
E70D81E087D845E...  
3/29/2022

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REV-1	DATE
DRAWN BY:	GDC
CHECKED BY:	TR
SCALE	AS NOTED
DRAWING TITLE	ELECTRICAL CALCULATIONS
DRAWING NUMBER	E002
SHEET	6 OF 8





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DocuSigned by:  
*TIM RUMFORD*

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**SUNPOWER**



3/29/2022

## 420-390 W Residential AC Module

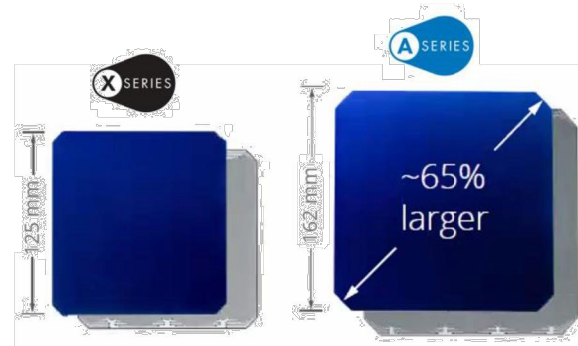
SunPower® Maxeon® Technology

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



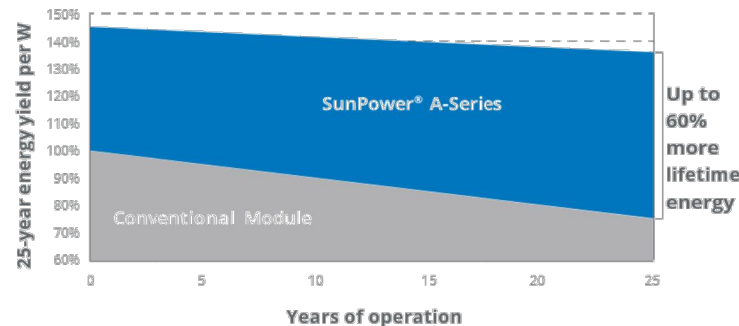
### Highest Power Density Available.

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



### 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. Best Warranty.

With more than 25 million modules deployed around the world, SunPower technology is proven to last. That's why we stand behind our module and microinverter with the industry's best 25-year Combined Power and Product Warranty, including the highest Power Warranty in solar.



### 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 (MI)

- Highest-power integrated AC module in solar
- 60% lighter than prior SunPower MIs
- Engineered and calibrated by SunPower for SunPower AC modules

**REVIEWED**  
By Michael Kyne at 1:34 pm, Apr 20, 2022

DC Power Data	
	A420-G-AC A415-G-AC A410-G-AC A400-G-AC A390-G-AC
Nom. Power <sup>5</sup> (P <sub>nom</sub> ) W	420 415 410 400 390
Power Tol.	+5/-0%
Module Efficiency	22.5 22.3 22.0 21.5 20.9
Temp. Coef. (Power)	-0.29%/°C
Shade Tol.	Integrated module-level max. power point tracking

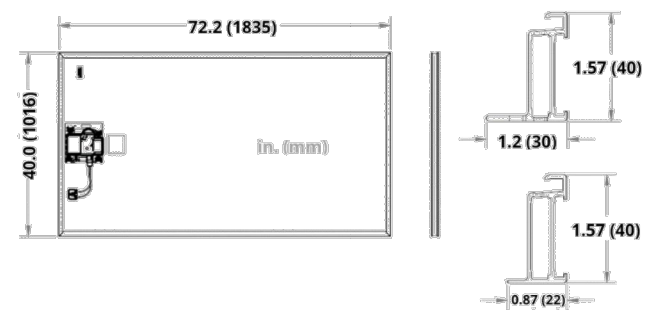
Tested Operating Conditions	
Operating Temp.	-40°F to +185°F (-40°C to +85°C)
Max. Ambient Temp.	122°F (50°C)
Max. Load	Wind: 62 psf, 3000 Pa, 305 kg/m <sup>2</sup> front & back Snow: 125 psf, 6000 Pa, 611 kg/m <sup>2</sup> front
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)

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)

APPROVED  
Montgomery County  
Historic Preservation Commission

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>
	Enables installation in accordance with: <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>
	When used with InvisiMount racking and InvisiMount accessories (UL 2703): <ul style="list-style-type: none"> <li>• Module grounding and bonding through InvisiMount</li> <li>• Class A fire rated</li> </ul> When used with AC module Q Cables and accessories (UL 6703 and UL 2238) <sup>6</sup> : <ul style="list-style-type: none"> <li>• Rated for load break disconnect</li> </ul>
PID Test	Potential-induced degradation free



**SUNPOWER**  
534092 RevA

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DRAWING TITLE	ELECTRICAL MODULE SPECS
DRAWING NUMBER	E003
SHEET	7 OF 8