



HISTORIC PRESERVATION COMMISSION

Marc Elrich
County Executive

Robert Sutton
Chairman

Date: April 23, 2021

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 # 949812 - Solar Installation

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: Larry Himelfarb
Address: 16 Valley View 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 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 J. Brueckert on _____. The approval memo and stamped drawings follow.




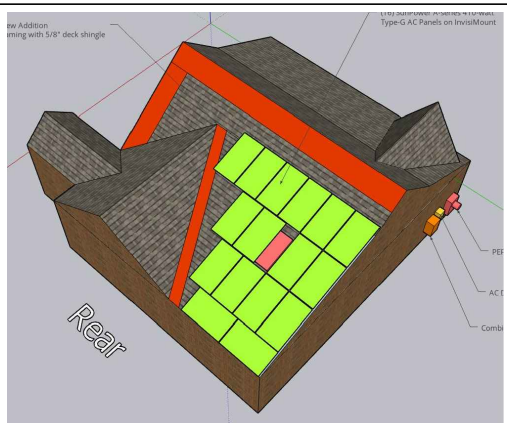

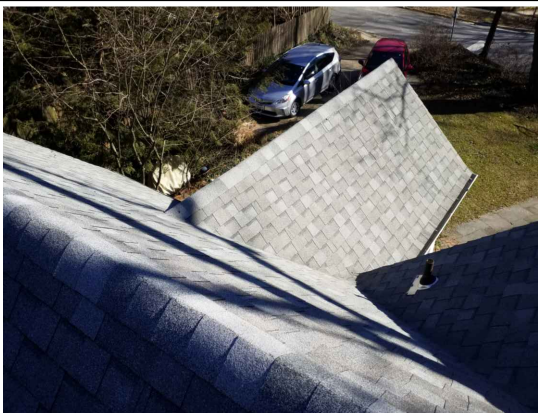
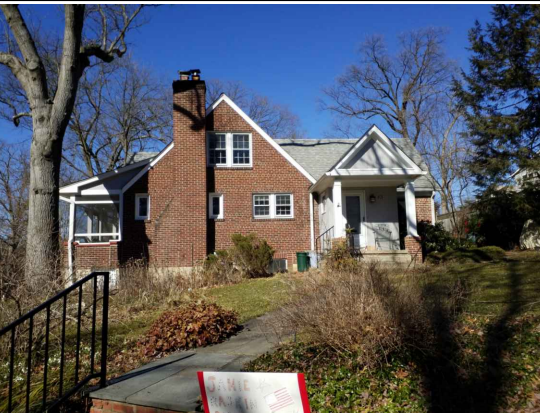
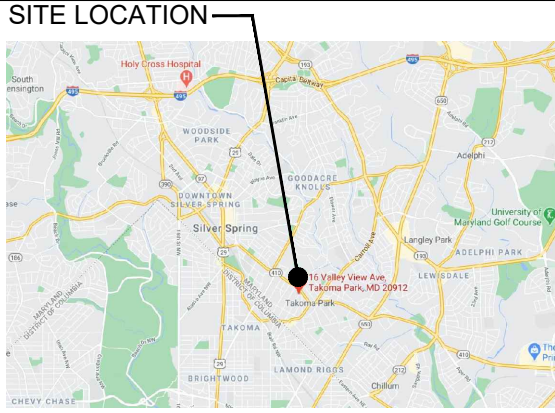
SOLAR PV PROJECT, HIMELFARB

16 VALLEY VIEW AVE. TAKOMA PARK, MD 20912

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



HIMELFARB
 RESIDENCE
 PV SOLAR INSTALLATION
 16 VALLEY VIEW 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: 2018 INTERNATIONAL BUILDING CODE D) ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2017 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> 4/7/2021 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. <u>41066</u>, EXPIRATION DATE: <u>2021-09-08</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 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 style="text-align: center;">APPROVED Montgomery County Historic Preservation Commission</p> 			<p>NEW ARRAYS ON SINGLE ROOF</p>  <p>16 VALLEY VIEW AVE. SILVER SPRING, MD 20912</p>
<p style="text-align: center; border: 1px solid black; padding: 5px;">REVIEWED By Dan.Bruechert at 10:11 am, Apr 23, 2021</p>		EXISTING EXTERIOR	VICINITY LOCATION	SITE LOCATION
				

PROJECT FILE
 20912-01

REVISION LEVEL DATE
 REV-1 TBD

DRAWN BY: GDC
 CHECKED BY: TR

SCALE AS NOTED

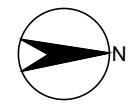
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COVER SHEET

DRAWING NUMBER

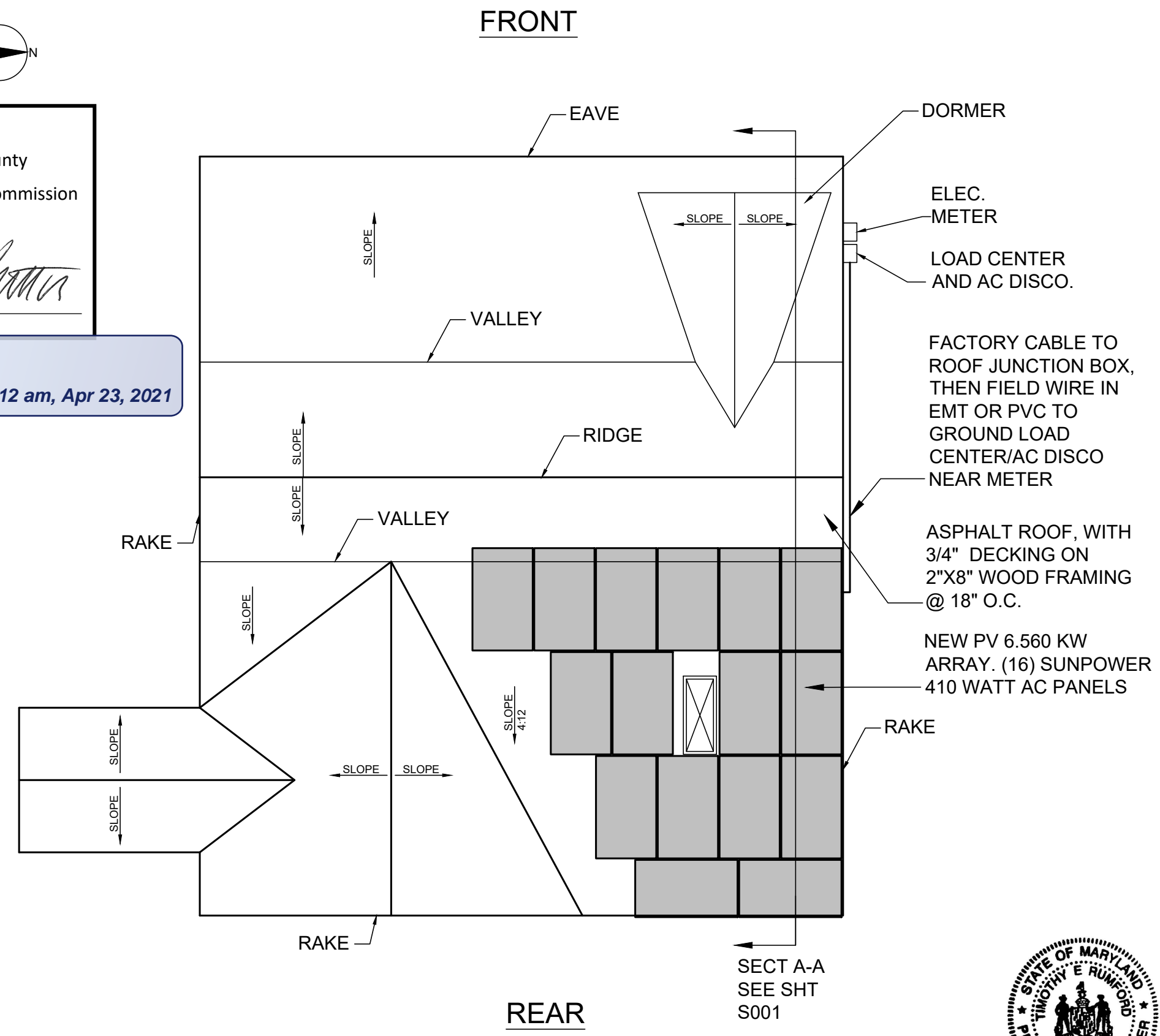
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SHEET 1 OF 8



APPROVED
Montgomery County
Historic Preservation Commission

REVIEWED
By Dan.Bruechert at 10:12 am, Apr 23, 2021

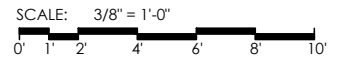


SECT A-A
SEE SHT
S001



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TIM RUMFORD
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4/7/2021



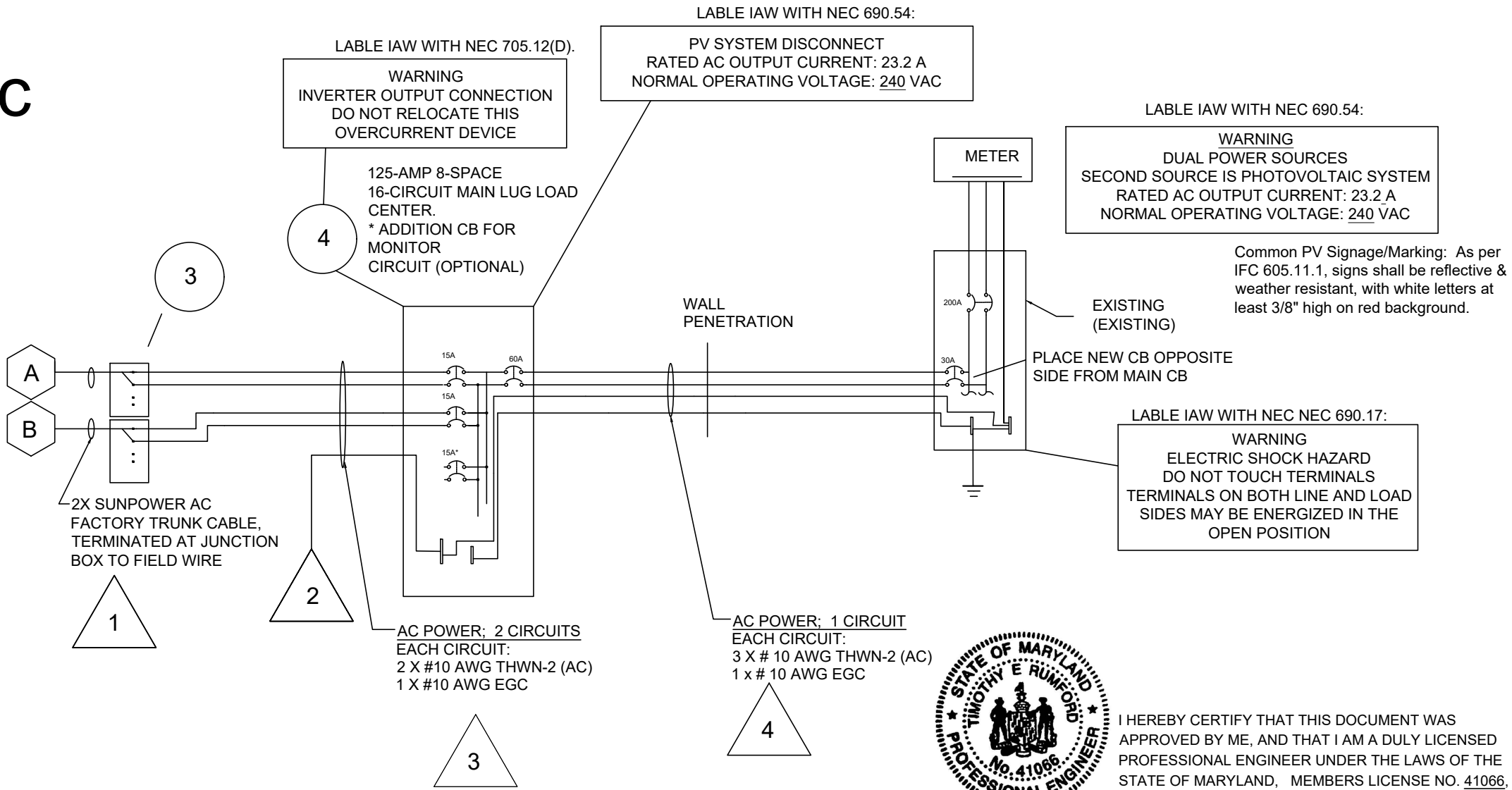
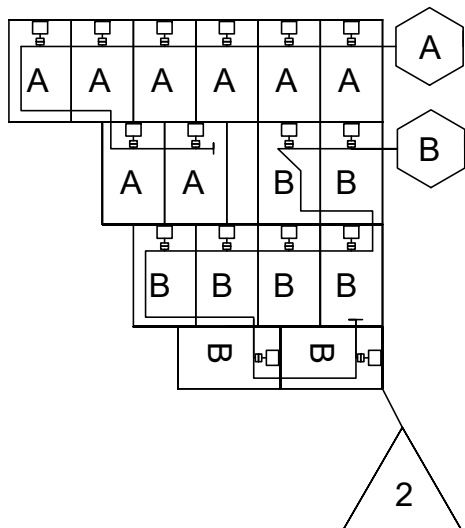
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PROJECT FILE	20912-01
REVISION LEVEL	DATE
REV-1	TBD
DRAWN BY:	GDC
CHECKED BY:	TR
SCALE	AS NOTED
DRAWING TITLE	ARRAY MAP
DRAWING NUMBER	A001
SHEET	2 OF 8

1 2 x16 **6,560 Wdc**



APPROVED
Montgomery County
Historic Preservation Commission

[Signature]

REVIEWED
By Dan.Bruechert at 10:12 am, Apr 23, 2021

EQUIPMENT SCHEDULE

TAG	NAME	P/N	QTY	NOTES
1	SOLAR MODULES	SunPower A-Series 410-watt Type-G AC panels	16	2 CIRCUIT
2	MicroInverters	SUNPOWER FACTORY ul	16	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. With 60 A OCPD serving as main cut off	1	SERVES AS OUTSIDE AC DISCO



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Tim Rumford RB/2021

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 JBs 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 AND TO MAIN SERVICE PANEL 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

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PROJECT FILE	20912-01
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SHEET	5 OF 8



DocuSigned by:
TIM RUMFORD
 PROFESSIONAL ENGINEER
 No. 41066
 7/2021
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APPROVED
 Montgomery County
 Historic Preservation Commission



REVIEWED
 By Dan.Bruechert at 10:12 am, Apr 23, 2021

ELECTRICAL CALCULATIONS					
Larry Himelfarb 16 Valley View Ave. Takoma Park, MD 20912					
1. Conductor Sizing per Art. 690.8(B)(1)	Module	16 SunPower A-Series 410-watt Type-G AC panels	410	6560	W STC
a. Conductor must have 30 deg. C ampacity >= 125% of continuous current per Art 215.2(A)(1).	Inverter	16 SUNPOWER FACTORY ul		349	W max
b. Conductor must have (after corrections for conditions of use) >= continuous current per Table 310.16				5584	
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.	Photovoltaic Module AC Electrical Specifications (REF):				
	Pnim (DC)=	410 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		
2. OOP Sizing per Art. 690.8(B)(1)	AC Max. Continuous Output Current @ 240 V	1.45 A			
a. Round up to next size per Art 240.4(B)	Inverter Specifications:	SUNPOWER FACTORY ul			
3. Conductor Sizing per Art. 690.8(B)(1)	Input Recom. (W)	FACTORY	OK	OUTPUT	
a. Conductor must have 30 deg. C ampacity >= 125% of continuous current per Art 215.2(A)(1).	Max in DC Voltage	FACTORY	OK	Rated output (W)	349
b. Conductor must have (after corrections for conditions of use) >= continuous current per Table 310.16	Max In Current (A)	FACTORY	OK	Peak output (W)	366
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.				Nom. output Cur (A)	1.45
				max number in series:	11
					ok
4. OOP Sizing	Conductor Sizing, Inverter Input		1-way length (ft)		na
a. Round up to next size per Art 240.4(B)	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	8 (CIRCUIT B)	
	Conductor sizing, Inverter Output (each circuit- -BOUNDING/WORST CASE)		1-way leng		100
	Icont=	11.60 A	(1.45 A x number of inverters per ckt)		
	Icont*1.25+	14.50 A	OCP	15 A	15A FOR CIRC B
	Wire	#10 AWG THWN-2	40 A		NEC TABLE 310.16
5. Conductor Sizing per Art. 690.8(B)(1)	Temp derate factor		0.58 unitless	67 C	PER NEC TBL 310.15(B)(2)(.c)
a. Conductor must have 30 deg. C ampacity >= 125% of continuous current per Art 215.2(A)(1).	derated:		23.2 A	OK>	14.50
	Conductor sizing, Combined Output from Load Center via ac disco/cut off switch				25.00
	Icont=	23.20 A	(1.45A x number of inverters)		
	Icont*1.25+	29.00 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>	29.00
	use		OCP	30 A	
7. Conductor Sizing per Art. 690.8(B)(1)	Voltage Drop = (Amp*2*ft*ohm/ft)/V				
a. Conductor must have 30 deg. C ampacity >= 125% of continuous current per Art 215.2(A)(1).	Inverter output=	Amp	ft	ohm/ft	V Note
b. Conductor must have (after corrections for conditions of use) >= continuous current per Table 310.16	Inverter output=	11.60	100	0.00126	240 #10
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.	Load center output=	29.00	25.00	0.00078	240 #8
	Load center output=	0.47%	ok	<3%	ok

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SCALE	AS NOTED
DRAWING TITLE	ELECTRICAL CALCULATIONS
DRAWING NUMBER	E002
SHEET	6 OF 8

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A-Series: A420 | A415 | A410 | A400 | A390 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 ² (V)	240 / 211-264
Max. Continuous Output Current (A)	1.45
Max. Units per 20 A (L-L) Branch Circuit ³	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.

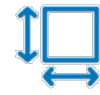


/2021

420-390 W Residential AC Module

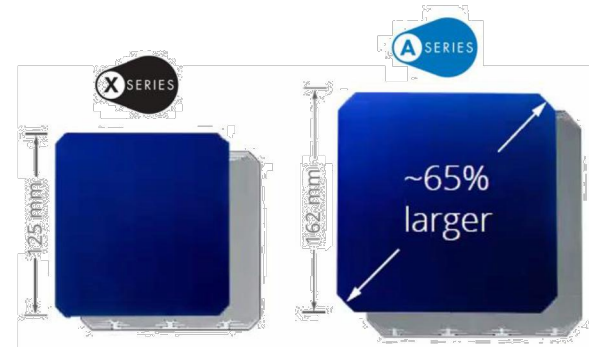
SunPower® Maxeon® Technology

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



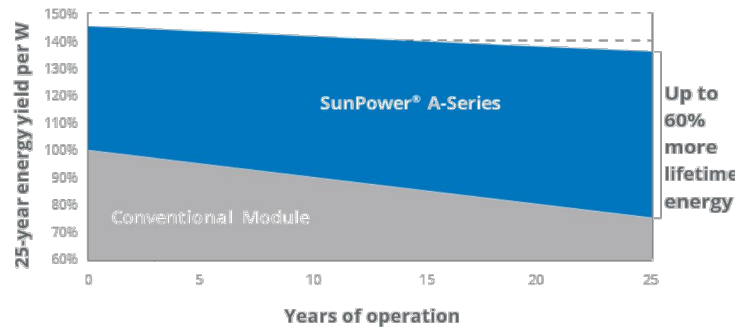
Highest Power Density Available.

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.¹



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.

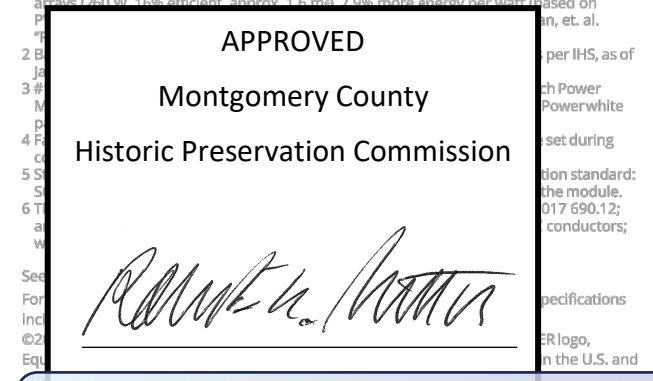


DC Power Data					
	A420-G-AC	A415-G-AC	A410-G-AC	A400-G-AC	A390-G-AC
Nom. Power ⁵ (P _{nom}) W	420	415	410	400	390
Power Tol.	+5/-0%				
Module Efficiency	22.5	22.3	22.0	21.5	20.9
Temp. Coef. (Power)	-0.29%/°C				
Shade Tol.	Integrated module-level max. power point tracking				

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 ² front & back Snow: 125 psf, 6000 Pa, 611 kg/m ² front
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)

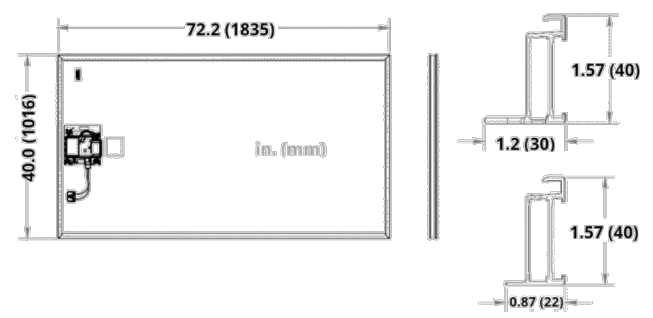
Mechanical Data	
Solar Cells	66 Monocrystalline Maxeon Gen 5
Front Glass	High-transmission tempered glass with anti-reflective coating
Environmental Rating	Outdoor rated
Frame	Class 1 black anodized (highest AAMA rating)
Weight	46.5 lbs (21.1 kg)
Recommended Max. Module Spacing	1.3 in. (33 mm)

1 SunPower 415 W, 22.3% efficient, compared to a Conventional Panel on same-sized array (260 W, 16% efficient) approx. 1.6 m² 7.0% more energy per watt (based on in, et. al.
 2 B...
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REVIEWED
 By Dan.Bruechert at 10:12 am, Apr 23, 2021

Warranties, Certifications, and Compliance	
Warranties	<ul style="list-style-type: none"> 25-year limited power warranty 25-year limited product warranty
Certifications and Compliance	<ul style="list-style-type: none"> UL 1703 UL 1741 / IEEE-1547 UL 1741 AC Module (Type 2 fire rated) UL 62109-1 / IEC 62109-2 FCC Part 15 Class B ICES-0003 Class B CAN/CSA-C22.2 NO. 107,1-01 CA Rule 21 (UL 1741 SA)⁴ (includes Volt/Var and Reactive Power Priority) UL Listed PV Rapid Shutdown Equipment⁶
	Enables installation in accordance with: <ul style="list-style-type: none"> NEC 690.6 (AC module) NEC 690.12 Rapid Shutdown (inside and outside the array) NEC 690.15 AC Connectors, 690.33(A)-(E)(1)
	When used with InvisiMount racking and InvisiMount accessories (UL 2703): <ul style="list-style-type: none"> Module grounding and bonding through InvisiMount Class A fire rated When used with AC module Q Cables and accessories (UL 6703 and UL 2238) ⁶ : <ul style="list-style-type: none"> Rated for load break disconnect
PID Test	Potential-induced degradation free



SUNPOWER®
 534092 RevA



Fundamentally Different. And Better.

SunPower® Maxeon® Technology

- Most powerful cell in home solar²
- Delivers unmatched reliability³
- 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

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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 MODULE SPECS
DRAWING NUMBER	E003
SHEET	7 OF 8



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

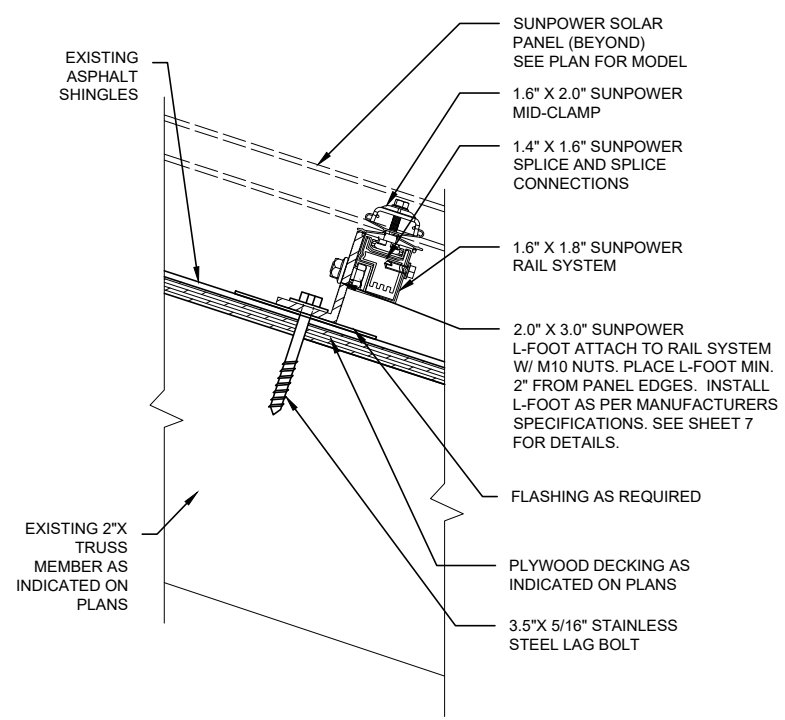
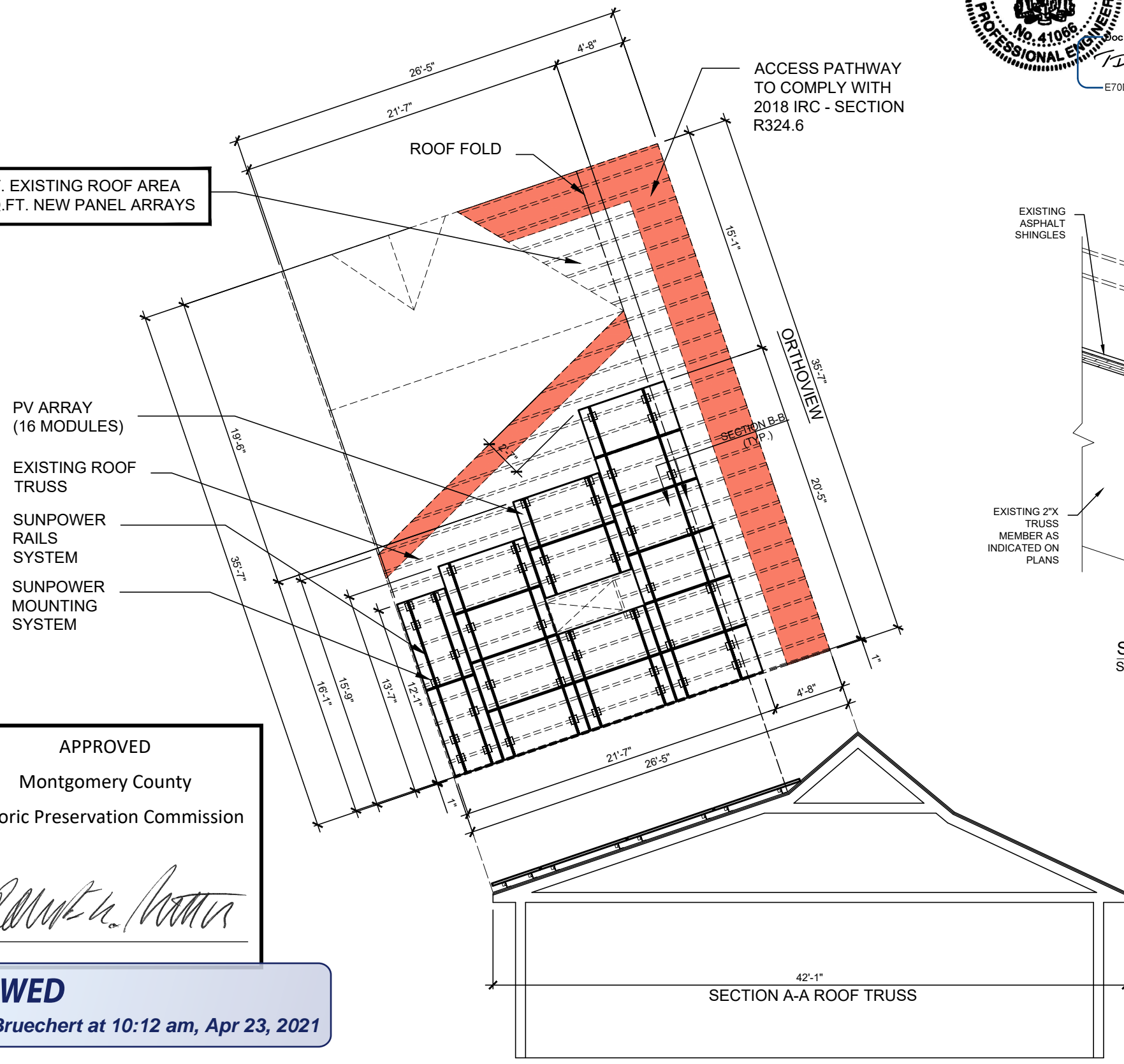
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4/7/2021

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



HIMELFARB
RESIDENCE
PV SOLAR INSTALLATION
16 VALLEY VIEW AVE.
TAKOMA PARK, MD 20912

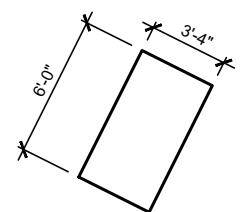
673 SQ.FT. EXISTING ROOF AREA
W/ 328 SQ.FT. NEW PANEL ARRAYS



SECTION B-B
SCALE: NTS

MOUNTING LAYOUT LEGEND

- EXISTING ROOF TRUSS @ 16" O.C. (2"X8")
- ◊ SUNPOWER L FOOT FOR ASPHALT ROOFS, WEATHER PROOF WITH APPROVED ROOFING METHOD.
- SUNPOWER INVISIMOUNT RAIL, FIELD SPLICE AND TRIM



SUNPOWER A SERIES 410-WATT AC PANELS.
SEE SPEC SHEET

APPROVED
Montgomery County
Historic Preservation Commission



REVIEWED
By Dan.Bruechert at 10:12 am, Apr 23, 2021

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

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TIM RUMPF
E70D81E087D845E... 4/7/2021

APPROVED
Montgomery County
Historic Preservation Commission



REVIEWED
By Dan.Bruechert at 10:12 am, Apr 23, 2021

Structural Analysis					
Project Name:		Larry Himelfarb 16 Valley View Ave. Takoma Park, MD 20912			
Address:		Pitched Roof Mounted Solar Panels on house. 16 x SunPower 410w PANELS, Mounted SUNPOWER INVISIMOUNT.			
Description:					
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	1-3
Present Conditions and Structure Info					
Roof is 2x8 16-OC framing with 5/8" deck over a new addition, new shingles. ., 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 3					
Down		Up		zone 3	
9.7		44			
Module Areas (sf):		17.6			
Wind Force (lbs), Per module:				Pnet * Area=	
Down		Up			
170.8		774.6			
Array number of fasteners		43			
Array Number of Modules:		16			
Number of fasteners per module:		2.7			
Force per fastener: (lbs)					
Down		Up			
63.5		288.2			
Pull out Force per fastener, lbs (2): 5/16" x 3.5" SS Lag. Assumes worst case wood 681 species Design Margin (Capability/Exposure). =>2 required					
Down		Up		x margin	
10.7		2.4			
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) 45 2.6 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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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