

MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION
STAFF REPORT

Address:	9805 Hollow Glen Pl., Silver Spring	Meeting Date:	9/19/18
Resource:	Non-Contributing Resource Forest Glen Historic District	Report Date:	9/12/18
Applicant:	David Cunningham	Public Notice:	9/5/18
Review:	HAWP	Tax Credit:	n/a
Case Number:	31/08-18A	Staff:	Dan Bruechert
Proposal:	Roof Solar Panel Installation		

STAFF RECOMMENDATION:

Staff recommends the HPC **approve** the HAWP application.

PROJECT DESCRIPTION

SIGNIFICANCE: Non-Contributing Resource to the Forest Glen Historic District
STYLE: Queen Anne
DATE: 2000

The subject property is a two-and-a-half-story, front gable house, with a full width front porch. The house was constructed c.2000 and was built using contemporary materials, i.e. Hardi siding and asphalt shingles.



Figure 1: 9805 Hollow Glen Pl. is identified with a star in a row of largely non-contributing buildings.



Figure 2: 9805 Hollow Glen Pl., is on the left, adjacent to another non-contributing building.

PROPOSAL

The applicant proposes to install 17 solar panels, mounted flush to the roof surface.

APPLICABLE GUIDELINES:

When reviewing alterations and additions for new construction within the Forest Glen Historic District several documents are to be utilized as guidelines to assist the Commission in developing their decision. These documents include the historic preservation review guidelines in the approved and adopted amendment for the Forest Glen Historic District (*Design Guidelines*) and Montgomery County Code Chapter 24A (*Chapter 24A*), and the Secretary of the Interior's Standards for Rehabilitation (*Standards*).

Forest Glen Historic District Guidelines

The *Guidelines* that pertain to this project are as follows:

- Non-Contributing Resources – should be given the most lenient level of scrutiny in reviewing proposed alterations and may be considered for demolition if requested by the owner.

Montgomery County Code; Chapter 24A-8(b)

(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; or

Secretary of the Interior's Standards for Rehabilitation

2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, space and spatial relationships that characterize a property will be avoided
5. Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportions, and massing to protect the integrity of the property and its environment.

STAFF DISCUSSION

The applicant proposes to install 17 solar panels in two arrays in the southeast corner of the house. The inverter will be placed on the north side of the house, two bays back from the front wall plane.

The HPC typically request that solar panels be installed to the rear of historic buildings to minimize the visual impact on the surrounding historic district. In this instance, the house has a front gable roof, so there isn't a 'rear' for the panels to be installed on. Staff finds, however, that the proposal will not have a significant impact on the surrounding historic for several reasons and supports approval of this HAWP.

First, the identified resource is non-contributing to the historic and has non-contributing resources to both the north and south. The housing development across Hollow Glen Place from the subject property is outside of the historic district. Staff finds that the proposed work will not have a direct visual impact on any of the district's historic resources and that the *Guidelines* state, non-contributing resources are to be given the "most lenient level of scrutiny in reviewing proposed alterations."

Second, the proposed solar panels are to be flush mounted. The solar panels will project only 4" (four inches) above the roof surface. This small amount will lessen the solar panels' impact on the roof massing compared to some other solar systems that can project up to twice as much. Staff finds that the alteration to the roof massing will not be significant.

Third, due to the significant grade change, the house sits very high above the street level. This lessens the visibility of the roof from the public right of way (see *Fig. 3*, below), so that any alterations to the roof will not have a significant impact on the surrounding streetscape.

Finally, the two arrays are placed as far toward from the street as practicable. This placement will further lessen the visual impact the solar panels have on the subject property and surrounding district when viewed from the public right-of-way.

Staff finds that the proposal comports with Chapter 24A-8(b)(1), finding that the "proposal will not substantially alter the exterior features of an historic site or historic resource within an historic district," and supports approval of this HAWP.



Figure 3: The subject property, center, is flanked by non-contributing resources.

STAFF RECOMMENDATION

Staff recommends the HPC **approve** the HAWP application; and with the general condition applicable to all Historic Area Work Permits that **the applicant will present 3 permit sets of drawings to HPC staff for review and stamping prior to submission for permits (if applicable)**. After issuance of the Montgomery County Department of Permitting Services (DPS) permit, the applicant will arrange for a field inspection by calling the DPS Field Services Office at 240-777-6370 prior to commencement of work and not more than two weeks following completion of work.



HISTORIC PRESERVATION COMMISSION
301/563-3400

850172

APPLICATION FOR
HISTORIC AREA WORK PERMIT

Contact Email: Jendavis@tesla.com Contact Person: Jennifer Davis
Daytime Phone No.: 410-718-8970
Tax Account No.: 13-03286066
Name of Property Owner: David Cunningham Daytime Phone No.: 240-393-2199
Address: 9805 Hollow Glen Pl. Silver Spring MD 20910
Street Number City State Zip Code
Contractor: Tesla Energy Operations, Inc. Phone No.: 410-718-8970
Contractor Registration No.: EB6889 - MHIC 128948
Agent for Owner: Jennifer Davis Daytime Phone No.: 410-718-8970

LOCATION OF BUILDING/PREMISE

House Number: 9805 Street: Hollow Glen Place
Town/City: Silver Spring Nearest Cross Street: Holman Avenue
Lot: 26 Block: 17 Subdivision: 0008
Liber: 54477 Folio: 425 Parcel: 0000

PART ONE: TYPE OF PERMIT/ACTIVITY AND USE

1A. CHECK ALL APPLICABLE: Construct Extend Alter/Renovate A/C Slab Room Addition Porch Deck Shed
 Move Install Wreck/Raze Solar Fireplace Woodburning Stove Single Family
 Revision Repair Revocable Fence/Wall (complete Section 4) Other: _____

1B. Construction cost estimate: \$ \$6,747.30

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] Signature of owner or authorized agent 8/28/2018 Date

Approved: _____ For Chairperson, Historic Preservation Commission
Disapproved: _____ Signature: _____ Date: _____
Application/Permit No.: _____ Date Filed: _____ Date Issued: _____

**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:

.02 acre property w/ composite shingle
single family dwelling

SFD: 2 stories, 2,694 sq. ft.

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

Installation of 17 solar panels mount flush
to roof

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.

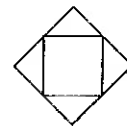
PLEASE STAY WITHIN THE GUIDES OF THE TEMPLATE, AS THIS WILL BE PHOTOCOPIED DIRECTLY ONTO MAILING LABELS

HAWP APPLICATION: MAILING ADDRESSES FOR NOTIFYING
[Owner, Owner's Agent, Adjacent and Confronting Property Owners]

Owner's mailing address	Owner's Agent's mailing address
9805 Hollow Glen Pl. Silver Spring, MD 20910	9000 Virginia Manor Rd. Ste. 250 Beltsville, MD 20705
Adjacent and confronting Property Owners mailing addresses	
9807 Hollow Glen Pl. Silver Spring, MD 20910	9803 Hollow Glen Pl. Silver Spring, MD 20910
2517 Hollow Glen Pl. Silver Spring, MD 20910	2519 Hollow Glen Pl. Silver Spring, MD 20910

Site Plan

See sheet 2 of attached plans for site plan.



Shade portion to indicate North

Applicant: Jennifer Davis

Existing Property Condition Photographs (duplicate as needed)



Detail: Front of house, across the street

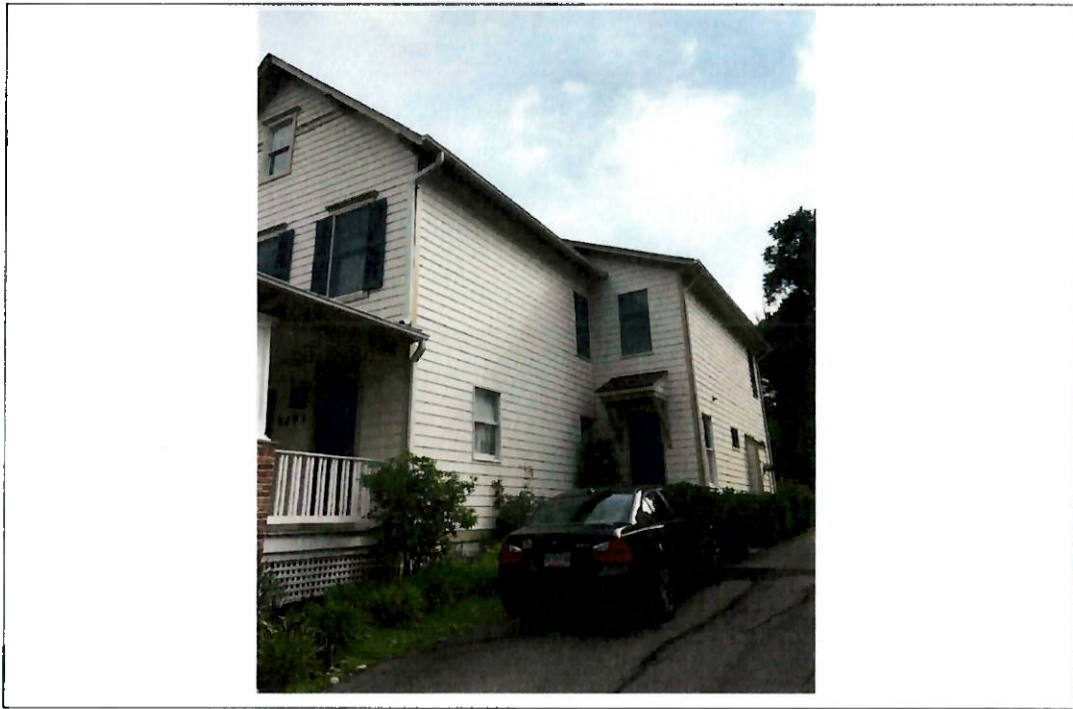


Detail: Side view, across the street

Applicant: Jennifer Davis

Page: 2

Existing Property Condition Photographs (duplicate as needed)



Detail: Corner view, sidewalk



Detail: side view, sidewalk

Applicant: Jennifer Davis

Page: 3

Existing Property Condition Photographs (duplicate as needed)

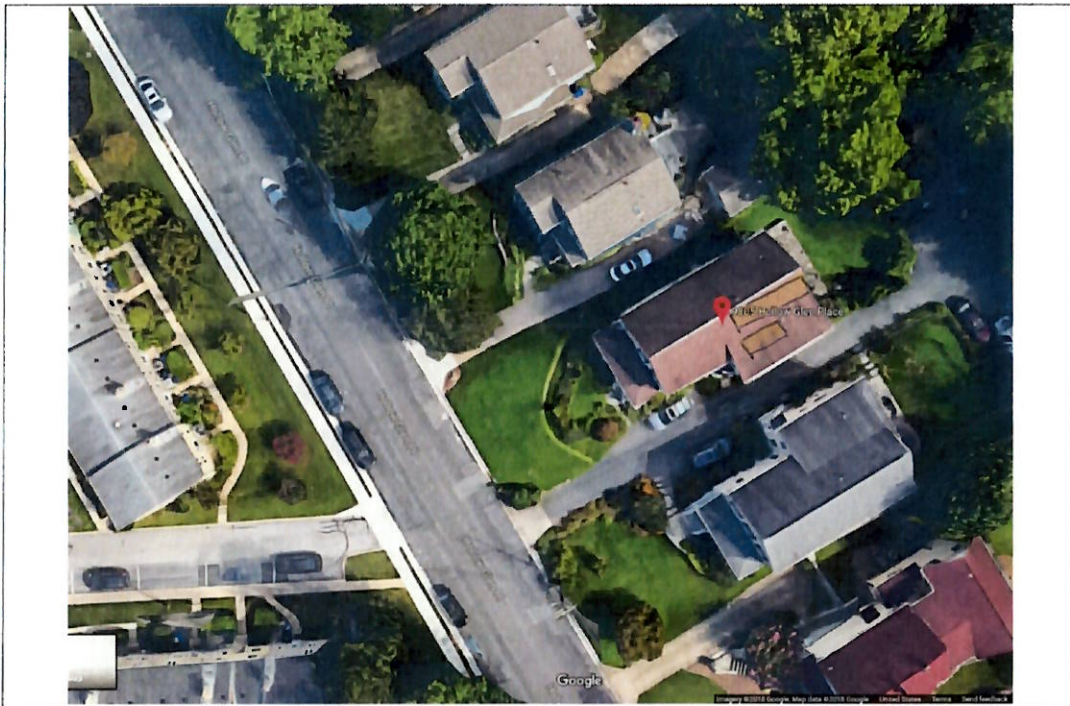


Detail: on mounting plane MP1, facing rear of home
MP2B

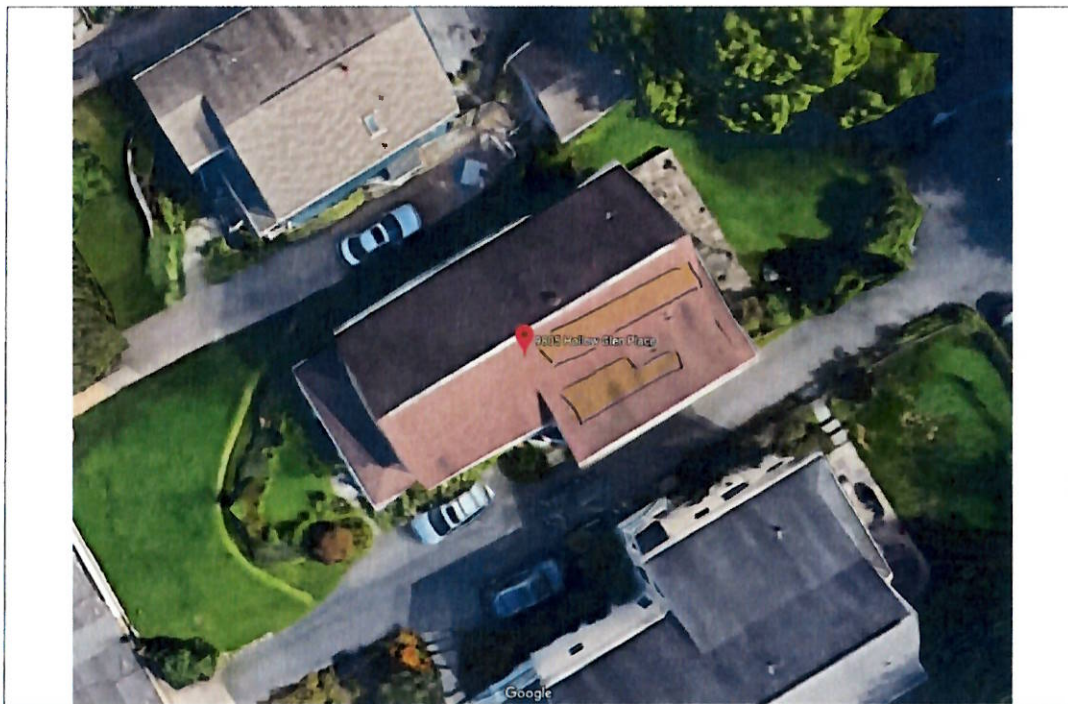


Detail: MP1, facing neighbor

Existing Property Condition Photographs (duplicate as needed)



Detail: Eagle view; array area highlighted



Detail: Eagle view, zoom; array area highlighted

Applicant: Jennifer Davis

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August 27, 2018

RE: CERTIFICATION LETTER

Project/Job # 2094282
Project Address:

Cunningham Residence
9805 Hollow Glen Pl
Silver spring, MD 20910

AHJ
SC Office

Montgomery County
Beltsville



PROFESSIONAL CERTIFICATION. 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. 48728 EXPIRATION DATE: 2-16-2020

Design Criteria:

- Applicable Codes = 2015 IEBC/IBC, 2015 IRC, ASCE 7-10, and 2015 NDS
- Risk Category = II
- Wind Speed = 115 mph, Exposure Category C, Partially/Fully Enclosed Method
- Ground Snow Load = 30 psf
- MP1: 2x4 @ 24" OC, Roof DL = 6.5 psf, Roof LL/SL = 21 psf (Non-PV), Roof LL/SL = 21 psf (PV)
- MP2B: 2x4 @ 24" OC, Roof DL = 6.5 psf, Roof LL/SL = 19.41 psf (Non-PV), Roof LL/SL = 19.41 psf (PV)

Note: Per IBC 1613.1; Seismic check is not required because $S_s = 0.1552 < 0.4g$ and Seismic Design Category (SDC) = B < D

To Whom It May Concern,

[√] 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 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 prepared or approved the construction documents for the mounting equipment, rack system, roof structure for this project.



HARDWARE DESIGN AND STRUCTURAL ANALYSIS RESULTS SUMMARY TABLES

Landscape Hardware	Hardware - Landscape Modules' Standoff Specifications					
	X-X Spacing	X-X Cantilever	Y-Y Spacing	Y-Y Cantilever	Configuration	Uplift DCR
MP1	72"	24"	41"	NA	Staggered	47.2%
MP2B	72"	24"	41"	NA	Staggered	52.9%

Portrait Hardware	Hardware - Portrait Modules' Standoff Specifications					
	X-X Spacing	X-X Cantilever	Y-Y Spacing	Y-Y Cantilever	Configuration	Uplift DCR
MP1	48"	19"	62"	NA	Staggered	47.6%
MP2B	48"	20"	62"	NA	Staggered	53.3%

Mounting Plane	Structure Information			Qualification Results
	Type	Pitch	Spacing	Member Evaluation Results
MP1	Pre-Fab Truss	22°	24" O.C.	Member Analysis OK
MP2B	Pre-Fab Truss	40°	24" O.C.	Member Analysis OK

STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP1

Member Properties Summary					
MP1		Horizontal Member Spans		Rafter Properties	
Roof System Properties		Overhang	1.66 ft	Actual W	1.50"
Number of Spans (w/o Overhang)		Span 1	6.87 ft	Actual D	3.50"
Roofing Material		Span 2	5.33 ft	Nominal	Yes
Re-Roof		Span 3		A (in ²)	5.25
Plywood Sheathing		Span 4		Sx (in. ³)	3.06
Board Sheathing		Span 5		Ix (in ⁴)	5.36
Vaulted Ceiling		Total Rake Span	14.95 ft	TL Defl'n Limit	120
Ceiling Finish		PV 1 Start	5.33 ft	Wood Species	SPF
Rafter Slope		PV 1 End	11.92 ft	Wood Grade	#2
Rafter Spacing		PV 2 Start		Fb (psi)	875
Top Lat Bracing		PV 2 End		Fv (psi)	135
Bot Lat Bracing		PV 3 Start		E (psi)	1,400,000
		PV 3 End		E-min (psi)	510,000

Member Loading Summary					
Roof Pitch	5/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	6.5 psf	x 1.08	7.0 psf	7.0 psf
PV Dead Load	PV-DL	3.0 psf	x 1.08		3.2 psf
Roof Live Load	RLL	20.0 psf	x 0.95	19.0 psf	
Live/Snow Load	LL/SL ^{1,2}	30.0 psf	x 0.7 x 0.7	21.0 psf	21.0 psf
Total Load (Governing LC)				28.0 psf	31.2 psf

Notes: 1. ps = Cs*pf; Cs -roof, Cs -pv per ASCE 7 [Figure 7-2] 2. pf = 0.7 (C_a) (C_i) (I_s) p_g; C_a=0.9, C_i=1.1, I_s=1.0

Member Analysis Results Summary					
Governing Analysis	Max Moment	@ Location	Capacity	DCR	Result
(-) Bending Stress (psi)	-1,055.4	8.5 ft	-1,626.7	65%	Pass

ZEP HARDWARE DESIGN CALCULATIONS - MP1

Mounting Plane Information			
Roofing Material		Comp Roof	
Roof Slope		22°	
Framing Type / Direction		Y-Y Rafters	
PV System Type		SolarCity SleekMount™	
Zep System Type		ZS Comp	
Standoff (Attachment Hardware)		Comp Mount SRV	
Spanning Vents		No	

Wind Design Criteria			
Design Code	IBC 2015	ASCE 7-10	
Wind Design Method		Partially/Fully Enclosed Method	
Ultimate Wind Speed	V-Ult	115 mph	Fig. 1609A
Exposure Category		C	Section 26.7
Roof Style		Gable Roof	Fig. 30.4-2A/B/C-5A/B
Mean Roof Height	h	25 ft	Section 26.2

Wind Pressure Calculation Coefficients			
Wind Pressure Exposure	K_z	0.95	Table 30.3-1
Topographic Factor	K_{zt}	1.00	Section 26.8
Wind Directionality Factor	K_d	0.85	Section 26.6-1
Importance Factor	I	NA	
Velocity Pressure	q_h	$q_h = 0.00256 (K_z) (K_{zt}) (K_d) (V^2)$ 27.2 psf	Equation 30.3-1

		Wind Pressure	
Ext. Pressure Coefficient (Up)	$G_{Cp} (Up)$	-0.88	Fig. 30.4-2A/B/C-5A/B
Ext. Pressure Coefficient (Down)	$G_{Cp} (Down)$	0.45	Fig. 30.4-2A/B/C-5A/B
Design Wind Pressure	p	$p = q_h (G_{Cp})$	Equation 30.4-1
Wind Pressure Up	$p_{(up)}$	-23.8 psf	
Wind Pressure Down	$p_{(down)}$	16.0 psf	

ALLOWABLE STANDOFF SPACINGS

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Landscape	72"	41"
Max Allowable Cantilever	Landscape	24"	NA
Standoff Configuration	Landscape	Staggered	
Max Standoff Tributary Area	Trib	21 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-259 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	47.2%	

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Portrait	48"	62"
Max Allowable Cantilever	Portrait	19"	NA
Standoff Configuration	Portrait	Staggered	
Max Standoff Tributary Area	Trib	21 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-261 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	47.6%	

STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP2B

Member Properties Summary					
MP2B		Horizontal Member Spans		Rafter Properties	
		Overhang	0.32 ft	Actual W	1.50"
Roof System Properties		Span 1	7.07 ft	Actual D	3.50"
Number of Spans (w/o Overhang)	1	Span 2		Nominal	Yes
Roofing Material	Comp Roof	Span 3		A (in²)	5.25
Re-Roof	No	Span 4		Sx (in.³)	3.06
Plywood Sheathing	Yes	Span 5		Ix (in⁴)	5.36
Board Sheathing	None	Total Rake Span	9.65 ft	TL Def'n Limit	120
Vaulted Ceiling	No	PV 1 Start	1.25 ft	Wood Species	SPF
Ceiling Finish	1/2" Gypsum Board	PV 1 End	6.75 ft	Wood Grade	#2
Rafter Slope	40°	PV 2 Start		Fb (psi)	875
Rafter Spacing	24" O.C.	PV 2 End		Fv (psi)	135
Top Lat Bracing	Full	PV 3 Start		E (psi)	1,400,000
Bot Lat Bracing	At Supports	PV 3 End		E-min (psi)	510,000

Member Loading Summary					
Roof Pitch	10/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	6.5 psf	x 1.31	8.5 psf	8.5 psf
PV Dead Load	PV-DL	3.0 psf	x 1.31		3.9 psf
Roof Live Load	RLL	20.0 psf	x 0.70	14.0 psf	
Live/Snow Load	LL/SL ^{1,2}	30.0 psf	x 0.65 x 0.65	19.4 psf	19.4 psf
Total Load (Governing LC)	TL			27.9 psf	31.8 psf

Notes: 1. ps = Cs*pf; Cs -roof, Cs -pv per ASCE 7 [Figure 7-2] 2. pf = 0.7 (C_s) (C_t) (I_s) p_g; C_s=0.9, C_t=1.1, I_s=1.0

Member Analysis Results Summary					
Governing Analysis	Max Moment	@ Location	Capacity	DCR	Result
(+) Bending Stress (psi)	1,541.4	3.9 ft	1,735.8	89%	Pass

ZEP HARDWARE DESIGN CALCULATIONS - MP2B

Mounting Plane Information			
Roofing Material		Comp Roof	
Roof Slope		40°	
Framing Type / Direction		Y-Y Rafter	
PV System Type		SolarCity SleekMount™	
Zep System Type		ZS Comp	
Standoff (Attachment Hardware)		Comp Mount SRV	
Spanning Vents		No	

Wind Design Criteria			
Design Code	IBC 2015	ASCE 7-10	
Wind Design Method		Partially/Fully Enclosed Method	
Ultimate Wind Speed	V-Ult	115 mph	Fig. 1609A
Exposure Category		C	Section 26.7
Roof Style		Gable Roof	Fig. 30.4-2A/B/C-5A/B
Mean Roof Height	h	25 ft	Section 26.2

Wind Pressure Calculation Coefficients			
Wind Pressure Exposure	K_z	0.95	Table 30.3-1
Topographic Factor	K_{zt}	1.00	Section 26.8
Wind Directionality Factor	K_d	0.85	Section 26.6-1
Importance Factor	I	NA	
Velocity Pressure	q_h	$q_h = 0.00256 (K_z) (K_{zt}) (K_d) (V^2)$ 27.2 psf	Equation 30.3-1

Wind Pressure			
Ext. Pressure Coefficient (Up)	$G_{Cp} (Up)$	-0.95	Fig. 30.4-2A/B/C-5A/B
Ext. Pressure Coefficient (Down)	$G_{Cp} (Down)$	0.88	Fig. 30.4-2A/B/C-5A/B
Design Wind Pressure	p	$p = q_h (G_{Cp})$	Equation 30.4-1
Wind Pressure Up	$P_{(up)}$	-25.9 psf	
Wind Pressure Down	$P_{(down)}$	23.8 psf	

ALLOWABLE STANDOFF SPACINGS

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Landscape	72"	41"
Max Allowable Cantilever	Landscape	24"	NA
Standoff Configuration	Landscape	Staggered	
Max Standoff Tributary Area	Trib	21 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-290 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	52.9%	

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Portrait	48"	62"
Max Allowable Cantilever	Portrait	20"	NA
Standoff Configuration	Portrait	Staggered	
Max Standoff Tributary Area	Trib	21 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-292 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	53.3%	

ABBREVIATIONS

A AMPERE
 AC ALTERNATING CURRENT
 BLDG BUILDING
 CONC CONCRETE
 DC DIRECT CURRENT
 EGC EQUIPMENT GROUNDING CONDUCTOR
 (E) EXISTING
 EMT ELECTRICAL METALLIC TUBING
 FSB FIRE SET-BACK
 GALV GALVANIZED
 GEC GROUNDING ELECTRODE CONDUCTOR
 GND GROUND
 HDG HOT DIPPED GALVANIZED
 I CURRENT
 Imp CURRENT AT MAX POWER
 Isc SHORT CIRCUIT CURRENT
 kVA KILOVOLT AMPERE
 kW KILOWATT
 LBW LOAD BEARING WALL
 MIN MINIMUM
 (N) NEW
 NEUT NEUTRAL
 NTS NOT TO SCALE
 OC ON CENTER
 PL PROPERTY LINE
 POI POINT OF INTERCONNECTION
 PV PHOTOVOLTAIC
 SCH SCHEDULE
 S STAINLESS STEEL
 STC STANDARD TESTING CONDITIONS
 TYP TYPICAL
 UPS UNINTERRUPTIBLE POWER SUPPLY
 V VOLT
 Vmp VOLTAGE AT MAX POWER
 Voc VOLTAGE AT OPEN CIRCUIT
 W WAIT
 3R NEMA 3R, RAIN/TIGHT

ELECTRICAL NOTES

1. THIS SYSTEM IS GRID-INTERTED VIA A UL-LISTED POWER-CONDITIONING INVERTER.
2. THIS SYSTEM HAS NO BATTERIES, NO UPS.
3. A NATIONALLY-RECOGNIZED TESTING LABORATORY SHALL LIST ALL EQUIPMENT IN COMPLIANCE WITH ART. 110.3.
4. WHERE ALL TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION, A SIGN WILL BE PROVIDED WARNING OF THE HAZARDS PER ART. 690.17.
5. EACH UNGROUNDED CONDUCTOR OF THE MULTIWIRE BRANCH CIRCUIT WILL BE IDENTIFIED BY PHASE AND SYSTEM PER ART. 210.5.
6. CIRCUITS OVER 250V TO GROUND SHALL COMPLY WITH ART. 250.97, 250.92(B).
7. DC CONDUCTORS EITHER DO NOT ENTER BUILDING OR ARE RUN IN METALLIC RACEWAYS OR ENCLOSURES TO THE FIRST ACCESSIBLE DC DISCONNECTING MEANS PER ART. 690.31(E).
8. ALL WIRES SHALL BE PROVIDED WITH STRAIN RELIEF AT ALL ENTRY INTO BOXES AS REQUIRED BY UL LISTING.
9. MODULE FRAMES SHALL BE GROUNDED AT THE UL-LISTED LOCATION PROVIDED BY THE MANUFACTURER USING UL LISTED GROUNDING HARDWARE.
10. MODULE FRAMES, RAIL, AND POSTS SHALL BE BONDED WITH EQUIPMENT GROUND CONDUCTORS.

JURISDICTION NOTES

STRUCTURAL DESIGN FOR THE SUPPORTING STRUCTURE OF THE HOUSE WAS PERFORMED IN ACCORDANCE WITH IRC/IBC 2015 - STRUCTURAL DESIGN FOR THE RACK SYSTEM AND MOUNTING HARDWARE WAS PERFORMED IN ACCORDANCE WITH IRC/IBC 2015.

LICENSE

#11805 MASTER ELECTRICIAN
 Nicholas Meyers

GENERAL NOTES

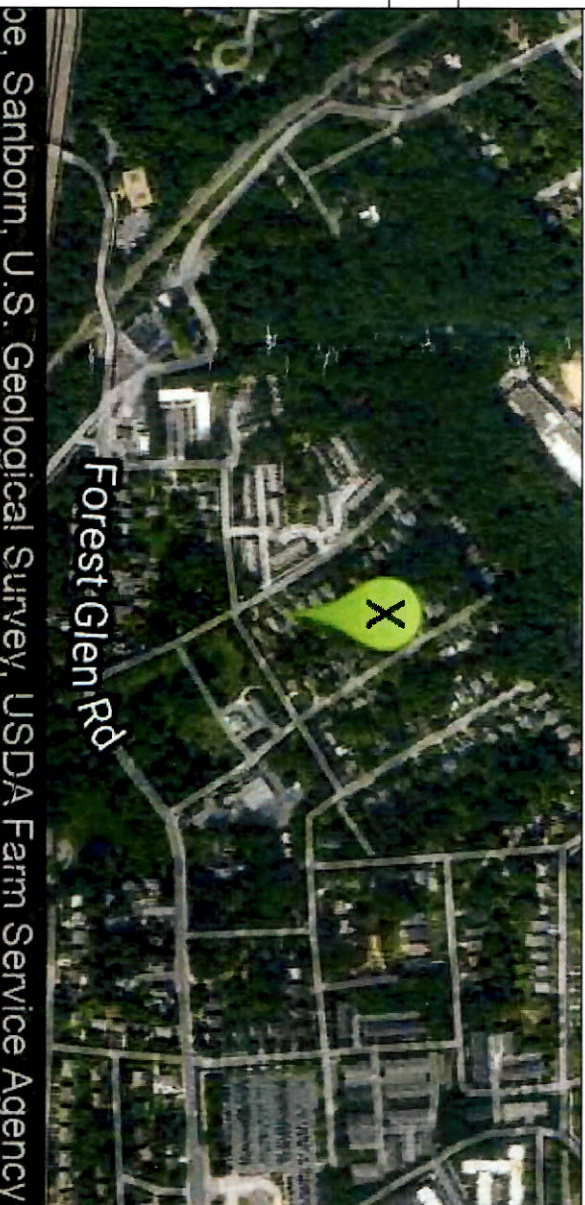
1. ALL WORK SHALL COMPLY WITH THE 2015 IBC AND 2015 IRC.
2. ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2014 NATIONAL ELECTRIC CODE.

MODULE GROUNDING METHOD: ZEP SOLAR

AHJ: Montgomery County

UTILITY: PEPco (MD)

VICINITY MAP



INDEX

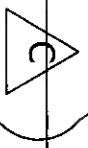
- Sheet 1 COVER SHEET
 - Sheet 2 SITE PLAN
 - Sheet 3 STRUCTURAL VIEWS
 - Sheet 4 UPLIFT CALCULATIONS
 - Sheet 5 THREE LINE DIAGRAM
- Cutsheets Attached

REV BY DATE COMMENTS

REV	BY	DATE	COMMENTS
REV A	Andrew	06/28/18	Removed one module and adjusted layout.
REV B	BPAZ	7/18/2018	MOD SWAP TO 315s
REV D	MH	8/26/2018	RELOCATED MODULES - HISTORIC DISTRICT

JOB NUMBER: JB-2094282 00

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CUSTOMER:

DAVID CUNNINGHAM
 9805 HOLLOW GLEN PL
 SILVER SPRING, MD 20910

DESCRIPTION:
 5.355 KW PV ARRAY



PAGE NAME:
 COVER SHEET

DESIGNER:
 Collin Jacobs

SHEET: 1
 REV. DATE: d 8/26/2018

TESLA

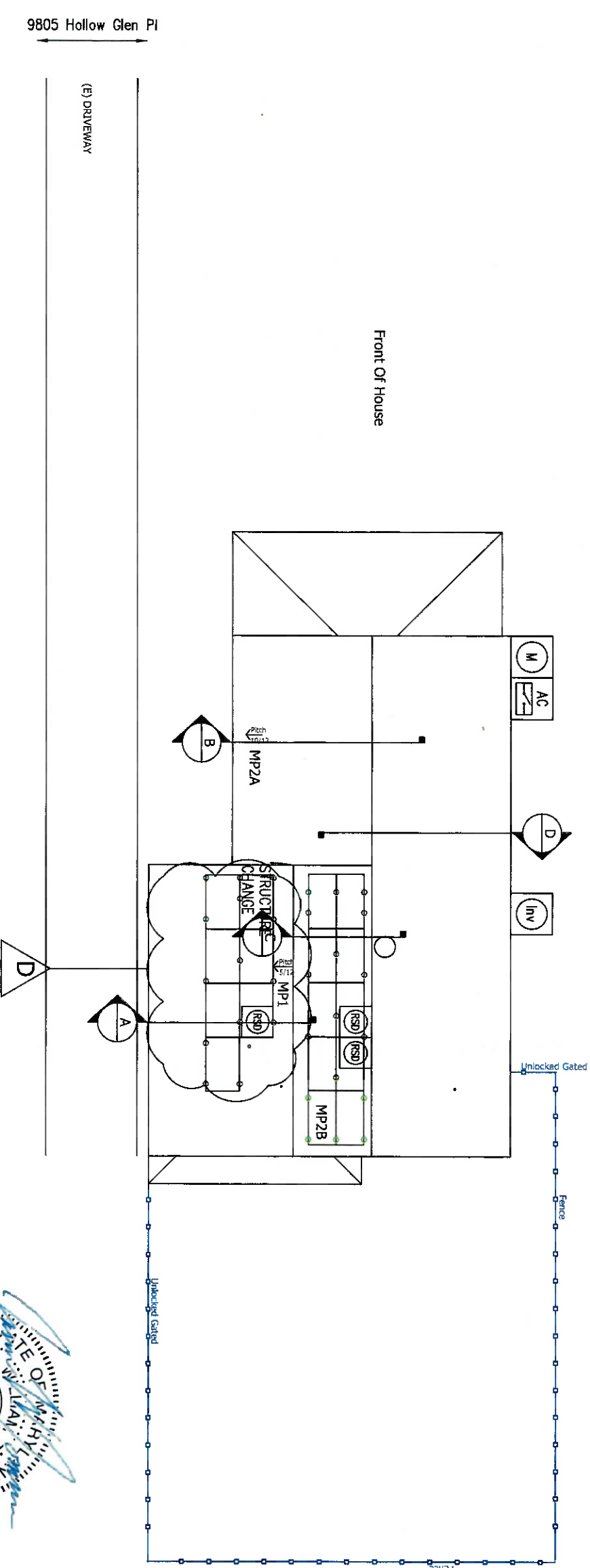
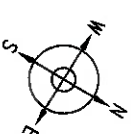
MP1	PITCH: 22	ARRAY PITCH: 22
	AZIMUTH: 149	ARRAY AZIMUTH: 149
	MATERIAL: Comp Shingle	STORY: 2 Stories
MP2	PITCH: 40	ARRAY PITCH: 40
	AZIMUTH: 149	ARRAY AZIMUTH: 149
	MATERIAL: Comp Shingle	STORY: 2 Stories

LEGEND

- (E) UTILITY METER & WARNING LABEL
- INVERTER W/ INTEGRATED DC DISCO & WARNING LABELS
- DC DISCONNECT & WARNING LABELS
- AC DISCONNECT & WARNING LABELS
- DC JUNCTION/COMBINER BOX & LABELS
- DISTRIBUTION PANEL & LABELS
- LOAD CENTER & WARNING LABELS
- DEDICATED PV SYSTEM METER
- RAPID SHUTDOWN
- STANDOFF LOCATIONS
- CONDUIT RUN ON EXTERIOR
- CONDUIT RUN ON INTERIOR
- GATE/FENCE
- HEAT PRODUCING VENTS ARE RED
- INTERIOR EQUIPMENT IS DASHED

SITE PLAN

Scale: 1/16" = 1'



PROFESSIONAL CERTIFICATION, 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. 48728, EXPIRATION DATE: 2-16-2020

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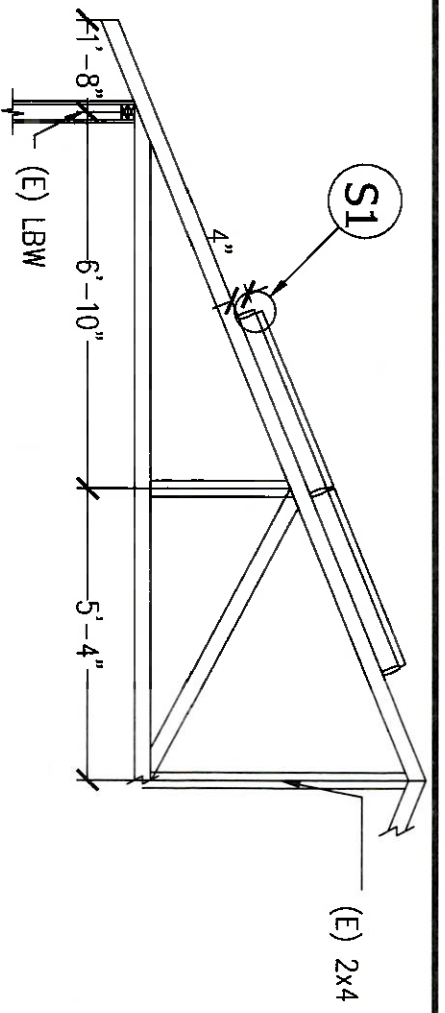
JOB NUMBER: JB-2094282 00
 MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert
 MODULES: (17) SC Std SC315B2
 INVERTER: Delta # Solivia 5.2 TL

CUSTOMER: DAVID CUNNINGHAM
 9805 HOLLOW GLEN PL
 SILVER SPRING, MD 20910

DESCRIPTION: 5.355 KW PV ARRAY
 PAGE NAME: SITE PLAN

DESIGN: Collin Jacobs
 SHEET: 2
 REV: d
 DATE: 8/26/2018

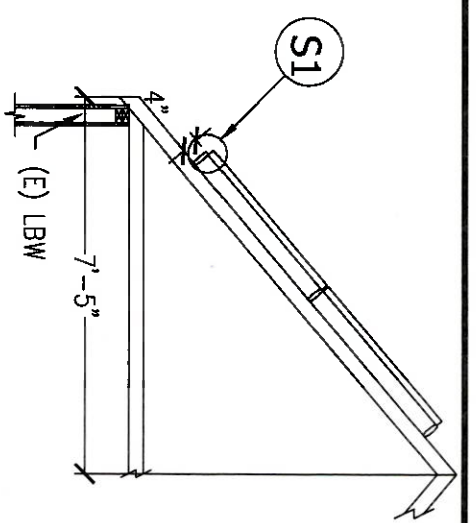




A SIDE VIEW OF MP1 NTS

MP1	X-SPACING	X-CANTILEVER	Y-SPACING	Y-CANTILEVER	NOTES
LANDSCAPE	72"	24"	41"	0"	STAGGERED
PORTRAIT	48"	19"	62"	0"	
TOP CHORD 2x4 @ 24" OC			ROOF AZI 149	PITCH 22	STORIES: 2
BOT CHORD 2x4 @ 24" OC			ARRAY AZI 149	PITCH 22	Comp Shingle

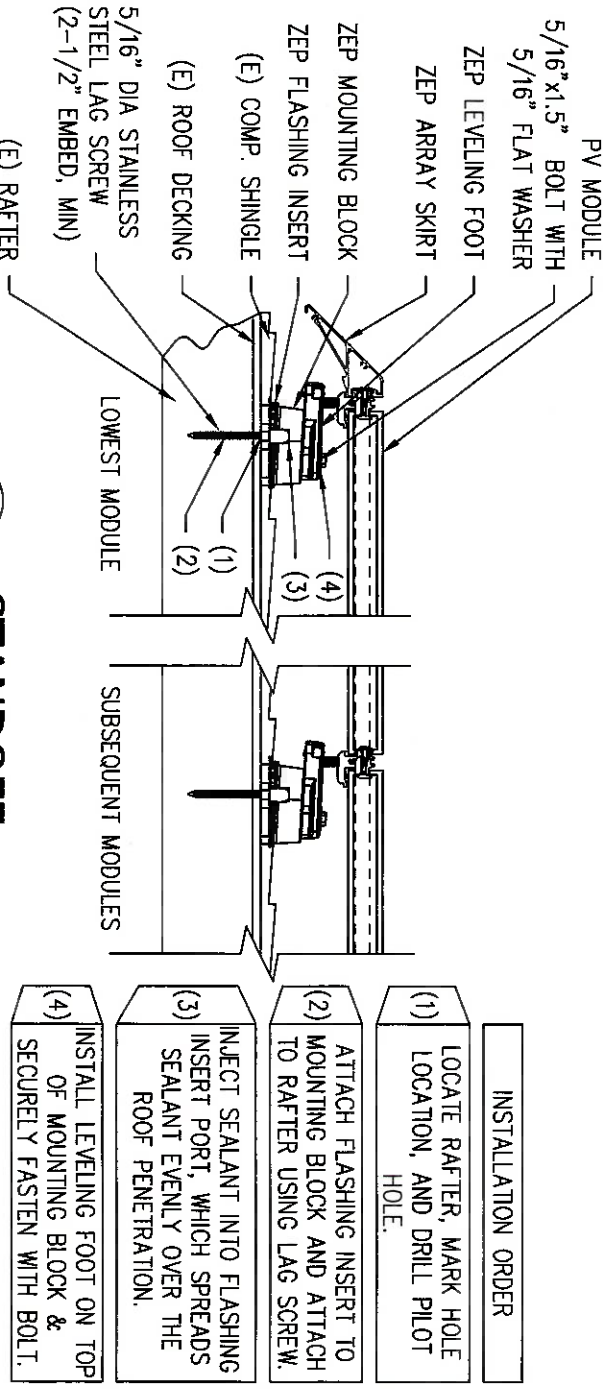
X AND Y ARE ALWAYS RELATIVE TO THE STRUCTURE FRAMING THAT SUPPORTS THE PV.
X IS ACROSS RAFTERS AND Y IS ALONG RAFTERS.



C SIDE VIEW OF MP2B NTS

MP2B	X-SPACING	X-CANTILEVER	Y-SPACING	Y-CANTILEVER	NOTES
LANDSCAPE	72"	24"	41"	0"	STAGGERED
PORTRAIT	48"	20"	62"	0"	
TOP CHORD 2x4 @ 24" OC			ROOF AZI 149	PITCH 40	STORIES: 2
BOT CHORD 2x4 @ 24" OC			ARRAY AZI 149	PITCH 40	Comp Shingle

X AND Y ARE ALWAYS RELATIVE TO THE STRUCTURE FRAMING THAT SUPPORTS THE PV.
X IS ACROSS RAFTERS AND Y IS ALONG RAFTERS.



INSTALLATION ORDER

- (1) LOCATE RAFTER, MARK HOLE LOCATION, AND DRILL PILOT HOLE.
- (2) ATTACH FLASHING INSERT TO MOUNTING BLOCK AND ATTACH TO RAFTER USING LAG SCREW.
- (3) INJECT SEALANT INTO FLASHING INSERT PORT, WHICH SPREADS SEALANT EVENLY OVER THE ROOF PENETRATION.
- (4) INSTALL LEVELING FOOT ON TOP OF MOUNTING BLOCK & SECURELY FASTEN WITH BOLT.

S1 STANDOFF
Scale: 1 1/2" = 1'

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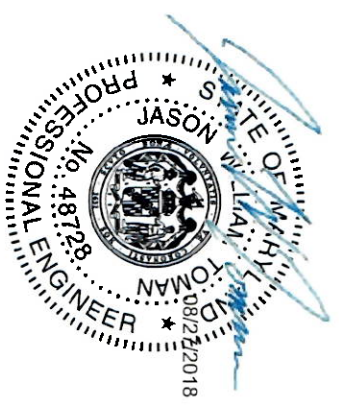
JOB NUMBER:	JB-2094282	00
MOUNTING SYSTEM:	ZS Comp V4 w Flashing-Insert	
MODULES:	(17) SC Std SC315B2	
INVERTER:	Delta # Solivia 5.2 TL	

CUSTOMER:
DAVID CUNNINGHAM
9805 HOLLOW GLEN PL
SILVER SPRING, MD 20910

DESCRIPTION:
5.355 KW PV ARRAY

PAGE NAME:
STRUCTURAL VIEWS

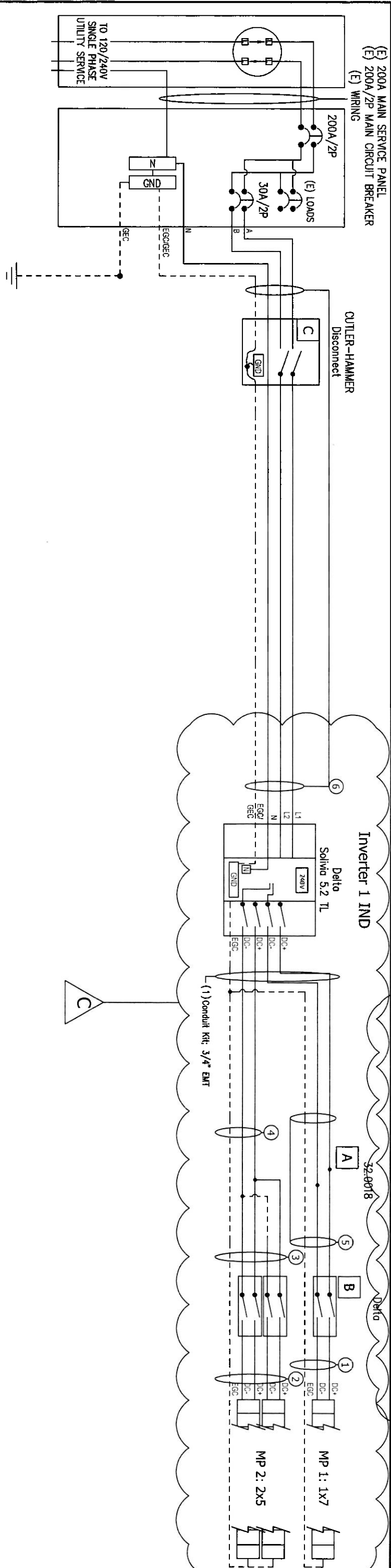
DESIGNER:	Collin Jacobs
SHEET:	3
REV. DATE:	d 8/26/2018



PROFESSIONAL CERTIFICATION. 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. 48728. EXPIRATION DATE: 2-16-2020



GROUND SPECS	MAIN PANEL SPECS	GENERAL NOTES	INVERTER SPECS	MODULE SPECS	LICENSE
BOND (N) #8 GEC TO (N) GROUND ROD AT PANEL WITH IRREVERSIBLE CRIMP	Panel Number: NoLabel Meter Number: NXA112093085 Underground Service Entrance	Inv 1: DC Ungrounded	INV 1 - (1) Delta # Soliwa 5.2 TL LABEL: A INV 2 - Inverter: 5200W, 240V, 97.5% Zigbee, PLC INV 3	-(17) SC Std SC315B2 PV Module: 315W, 294.4 PTC, 40MM, Blk Backsheet w/ Blk Interconnects, MC4, 6000Hz Mevys Voc: 70.2 Vmp: 58.4 Voc AND Imp ARE SHOWN IN THE DC STRINGS IDENTIFIER	#1805 MASTER ELECTRICIAN 6000Hz Mevys



CONDUIT RUNS MAY BE CONDENSED DUE TO SITE CONDITIONS AND/OR INSTALLATION EASE. ALL CONDUIT FILL DERATES AND PROPER CALCULATIONS HAVE BEEN COMPLETED PER NEC CHAPTER 9, TABLE 4

Voc* = MAX VOC AT MIN TEMP

POI	(1) CUTLER-HAMMER # BR230 PV BACKFEED BREAKER Breaker: 30A/2P, Z Spaces -(1) Ground Rod 5/8" x 8', Copper	C	(1) CUTLER-HAMMER # DG221URB Disconnect: 30A, 240Vac, Non-Fusible, NEMA 3R (1) CUTLER-HAMMER # DG030NB Ground/Neutral Kit: 30A, General Duty (06)	AC	(3) Delta # Soliwa Smart RSS Rapid Shutdown, 600V, 20A, NEMA 4X, MC4	A	(1) MULTI-CONTACT PV-AZB4 32.0018; Branch Socket: MC4 U-Joint Connector, Female (1) MULTI-CONTACT PV-AZS4 32.0019; Branch Plug: MC4 U-Joint Connector, Male
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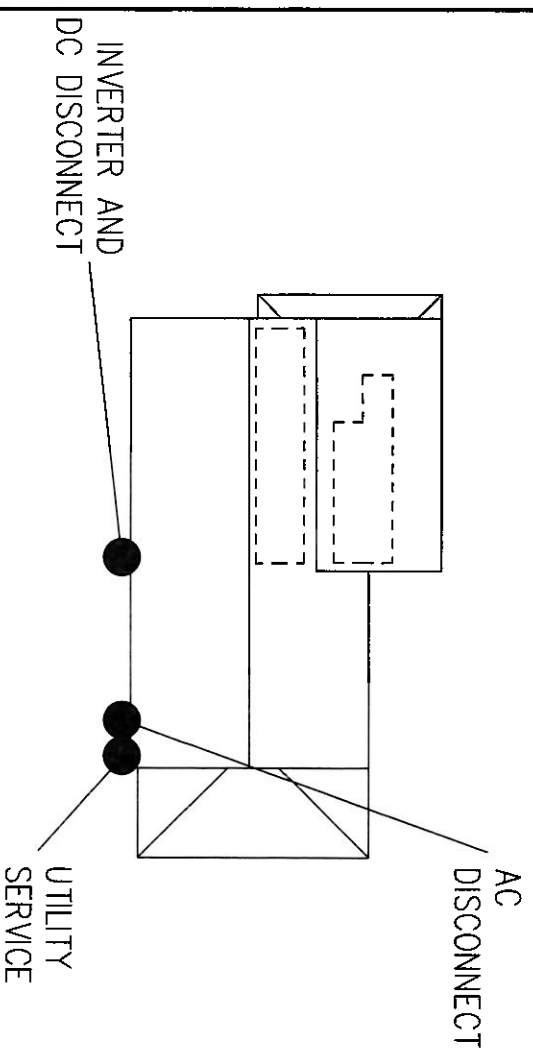
6	(1) AWG #10, THHN-2, Black (1) AWG #10, THHN-2, Red (1) AWG #10, THHN-2, White -(1) AWG #8, THHN-2, Green	NEUTRAL Vmp = 240 VAC Imp = 21.6 AAC EGC/EGC - (1) Conduit Kit: 3/4" EMT	3	(4) AWG #10, PV Wire, 600V, Black (1) AWG #10, THHN-2, Green (1) Conduit Kit: 3/4" EMT	Voc* = 394.88 VDC Vmp = 292 VDC Isc = 11.66 ADC Imp = 10.8 ADC	1	(2) AWG #10, PV Wire, 600V, Black (1) AWG #10, THHN-2, Green (1) Conduit Kit: 3/4" EMT	Voc* = 552.82 VDC Vmp = 408.8 VDC Isc = 5.83 ADC Imp = 5.4 ADC
4	(1) AWG #10, THHN-2, Green (1) Conduit Kit: 3/4" EMT	Voc* = 394.88 VDC Vmp = 292 VDC Isc = 11.66 ADC Imp = 10.8 ADC	5	(1) AWG #10, PV Wire, 600V, Black (2) AWG #10, PV Wire, 600V, Green (1) Conduit Kit: 3/4" EMT	Voc* = 552.82 VDC Vmp = 408.8 VDC Isc = 5.83 ADC Imp = 5.4 ADC	2	(1) AWG #10, THHN-2, Green (1) Conduit Kit: 3/4" EMT	Voc* = 292 VDC Vmp = 292 VDC Isc = 5.83 ADC Imp = 5.4 ADC

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POI	MODULES: (17) SC Std SC315B2	PAGE NAME: THREE LINE DIAGRAM	SHEET: 5	REV. DATE: d 8/26/2018	

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN:

- Address: 9805 Hollow Glen Pl



PHOTOVOLTAIC BACK-FED CIRCUIT BREAKER IN MAIN ELECTRICAL PANEL IS AN A/C DISCONNECT PER NEC 690.17

OPERATING VOLTAGE = 240V

JB-2094282-00

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JOB NUMBER: JB-2094282 00
 MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert
 MODULES: (17) SC Std SC315B2
 INVERTER: Delta # Solivida 5.2 TL

CUSTOMER: DAVID CUNNINGHAM
 9805 HOLLOW GLEN PL
 SILVER SPRING, MD 20910

DESCRIPTION: 5.355 KW PV ARRAY
 PAGE NAME: SITE PLAN PLACARD

DESIGN: Collin Jacobs
 SHEET: 6 REV: d DATE: 8/26/2018



WARNING: PHOTOVOLTAIC POWER SOURCE

Label Location:
(C)(CB)(JB)
Per Code:
NEC 690.31.G.3
Label Location:
(DC) (INV)
Per Code:
NEC 690.14.C.2

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

Label Location:
(AC)(POI)
Per Code:
NEC 690.17.E

WARNING
ELECTRIC SHOCK HAZARD
THE DC CONDUCTORS OF THIS
PHOTOVOLTAIC SYSTEM ARE
UNGROUND AND
MAY BE ENERGIZED

Label Location:
(DC) (INV)
Per Code:
NEC 690.35(F)
TO BE USED WHEN
INVERTER IS
UNGROUND

(AC): AC Disconnect
(C): Conduit
(CB): Combiner Box
(D): Distribution Panel
(DC): DC Disconnect
(IC): Interior Run Conduit
(INV): Inverter With Integrated DC Disconnect
(LC): Load Center
(M): Utility Meter
(POI): Point of Interconnection

MAXIMUM POWER-
POINT CURRENT (Imp) [] A
MAXIMUM POWER-
POINT VOLTAGE (Vmp) [] V
MAXIMUM SYSTEM
VOLTAGE (Voc) [] V
SHORT-CIRCUIT
CURRENT (Isc) [] A

Label Location:
(DC) (INV)
Per Code:
NEC 690.53

PHOTOVOLTAIC SYSTEM
EQUIPPED WITH RAPID
SHUTDOWN

Label Location:
(INV)
Per Code:
CEC 690.56(C)

WARNING
ELECTRIC SHOCK HAZARD
IF A GROUND FAULT IS INDICATED
NORMALLY GROUNDED
CONDUCTORS MAY BE
UNGROUND AND ENERGIZED

Label Location:
(DC) (INV)
Per Code:
NEC 690.5(C)

WARNING
INVERTER OUTPUT
CONNECTION
DO NOT RELOCATE
THIS OVERCURRENT
DEVICE

Label Location:
(POI)
Per Code:
NEC 690.64.B.7

CAUTION
PHOTOVOLTAIC SYSTEM
CIRCUIT IS BACKFED

Label Location:
(D) (POI)
Per Code:
NEC 690.64.B.4

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
DC VOLTAGE IS
ALWAYS PRESENT WHEN
SOLAR MODULES ARE
EXPOSED TO SUNLIGHT

Label Location:
(DC) (CB)
Per Code:
NEC 690.17(4)

CAUTION
DUAL POWER SOURCE
SECOND SOURCE IS
PHOTOVOLTAIC SYSTEM

Label Location:
(POI)
Per Code:
NEC 690.64.B.4

PHOTOVOLTAIC AC
DISCONNECT

Label Location:
(AC) (POI)
Per Code:
NEC 690.14.C.2

MAXIMUM AC
OPERATING CURRENT [] A
MAXIMUM AC
OPERATING VOLTAGE [] V

Label Location:
(AC) (POI)
Per Code:
NEC 690.54

PHOTOVOLTAIC POINT OF
INTERCONNECTION
**WARNING: ELECTRIC SHOCK
HAZARD. DO NOT TOUCH
TERMINALS. TERMINALS ON
BOTH THE LINE AND LOAD SIDE
MAY BE ENERGIZED IN THE OPEN
POSITION. FOR SERVICE
DE-ENERGIZE BOTH SOURCE
AND MAIN BREAKER
PV/POWER SOURCE**
MAXIMUM AC [] A
OPERATING CURRENT [] A
MAXIMUM AC [] V
OPERATING VOLTAGE [] V

Label Location:
(POI)
Per Code:
NEC 690.17.4; NEC 690.54

Label Set



Rapid Shutdown Device for Delta 3.0~7.6 TL Inverters

Delta's Rapid Shutdown Devices provide an automatic disconnect of 600VDC residential or small commercial PV array system, fully compliant with the Rapid Shutdown requirements of NEC 2014 article 690.12. It is compatible with Delta's single-phase residential inverters.

KEY FEATURES

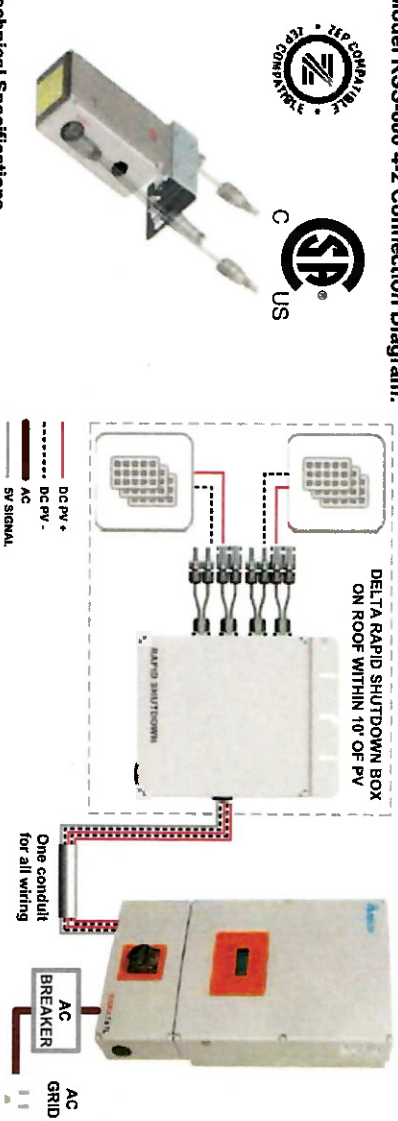
- NEMA 4X Protection
- Compact and Lightweight
- Rack Mount Installation
- Fast Connect with PV Connectors
- Compliant with NEC 2014 article 690.12
- PLC Communication (Model RSS-600 1-1 only)



www.delta-americas.com



Model RSS-600 4-2 Connection Diagram:



Technical Specifications

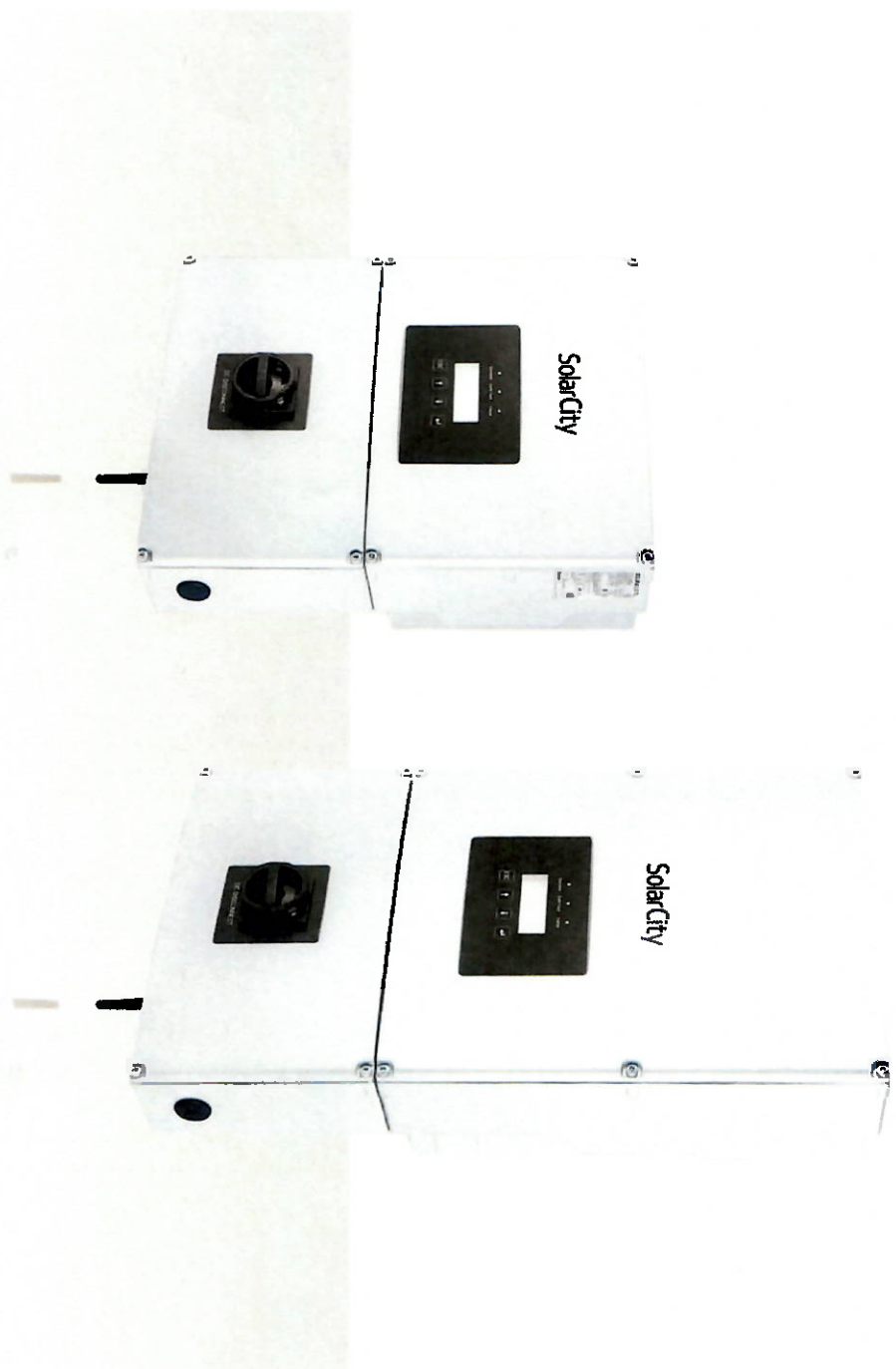
Input Ratings	RSS-600 1-1	RSS-600 4-2
Max. System Voltage	600V DC	600V DC
Max. Number of Input Circuit	1	4
Rated Input Current Per String	20A	10A
Fuse Rating	N/A	15A
Output Ratings		
Max. Number of Output Circuit	1	2
Rated Output Current Per Circuit	20A	20A
Maximum Current Controlled Conductor	25A	25A
Output Terminal Wire Size	10 AWG	12-6 AWG
Output Conduit Size	N/A	3/4" (two holes)
Control Signal Method	PLC Signal	5V Signal Wire
5V Signal Wire Voltage Rating	N/A	600V
5V Signal Wire Size Range	N/A	24-14 AWG
General Data		
Enclosure Size in Inches L x W x D (mm)	7.87 x 5.91 x 2.09 (200 x 150 x 53)	12.44 x 10.04 x 2.16 (316 x 255 x 55)
Weight	2.86lbs (1.3kg)	6.6lbs (3.0kg)
Input Connectors	MC-4 PV Connector or Amphenol H4 PV Connector	MC-4 PV Connector or Amphenol H4 PV Connector
Output Connectors	MC-4 PV Connector or Amphenol H4 PV Connector	Screw Terminal Blocks
Operating Temperature	-40 ~ 158°F (-40 ~ 70°C)	-40 ~ 158°F (-40 ~ 70°C)
Storage Temperature	-40 ~ 185°F (-40 ~ 85°C)	-40 ~ 185°F (-40 ~ 85°C)
Humidity	0 ~ 100%	0 ~ 100%
Max. Operating Altitude	2000m above sea level	2000m above sea level
Warranty	10 Years	10 Years
Standard Compliance		
Enclosure Protection Rating	NEMA 4X	NEMA 4X
Safety	UL 1741, CSA 22.2 107-1	UL 1741, CSA 22.2 107-1
NEC Code	NEC 2014 Article 690.12	NEC 2014 Article 690.12

Delta Products Corporation, Inc.

46101 Fremont Blvd.
Fremont, CA 94538
Sales Email: Inverter.Sales@delta-corp.com
Support Email: Inverter.Support@delta-corp.com
Sales Hotline: +1-877-440-5851 or +1-626-369-8021
Support Hotline: +1-877-442-4832
Support (Intl.): +1-626-369-8019
Monday to Friday from 7am to 5pm PST (apart from holidays)
www.delta-americas.com/solarinverters



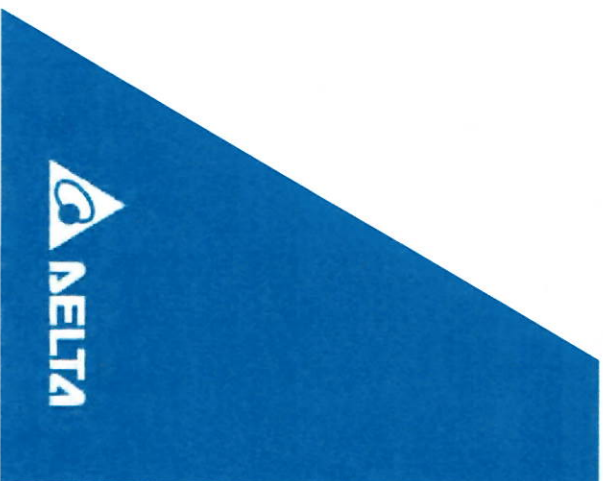
Delta Solar Inverters Datasheet for SolarCity



Solar Inverters

Transformerless (TL): 3.8 kW, 5.2 kW, 6.6 kW, 7.6 kW

- Wide Operating Voltage Range: 85 ~ 550V
- Wide Operating Temperature Range: -13 ~ 158°F (-25 ~ 70°C)
- High CEC Efficiency: 97.5%
- Integrated AFCI (Arc Fault Circuit Interruption)
- NEMA 4X plus Salt Mist Corrosion Protection
- Natural Convection Cooling
- Dual MPPT (5.2kW / 6.6kW / 7.6kW)
- Compact and Lightweight
- UL 1741 / IEEE 1547 / IEEE 1547.1 / CEC
- Listed /UL 1699B(Type 1) / NEC 690.11

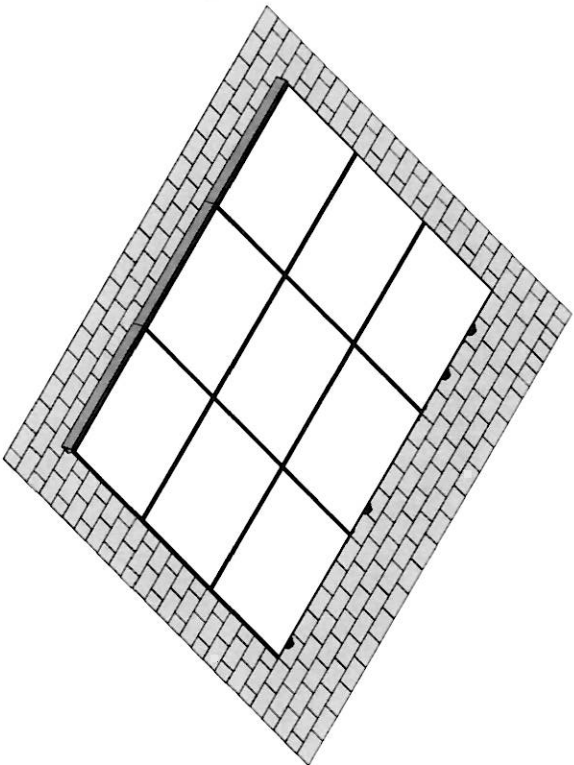


	SOLVIA 3.0 TL	SOLVIA 3.8 TL	SOLVIA 5.2 TL	SOLVIA 6.6 TL	SOLVIA 7.6 TL
INPUT (DC)					
Max System Voltage	600 V	600 V	600 W	600 W	7600 W
Nominal Voltage	380 V	380 V	5200 W @ 208 V / 6800 W @ 240 V	6800 W @ 240 V	6800 W @ 240 V / 7600 W @ 240 V
Operating Voltage Range	85 ~ 550 V	85 ~ 550 V	5200 W @ 240 V	6800 W @ 240 V	6800 W @ 240 V
Full Power MPPT Range	200 ~ 500 V	200 ~ 500 V	183 ~ 228 V @ 208 V / 211 ~ 264 V @ 240 V	240 V @ 208 V / 21.8 A @ 240 V	31.7 A @ 208 V / 27.5 A @ 240 V
Max Usable Current	18.0 A	20.0 A	15.8 A @ 208 V / 15.8 A @ 240 V	21.8 A @ 208 V / 21.8 A @ 240 V	31.7 A @ 208 V / 31.7 A @ 240 V
Max Short Circuit Current @ STC					
Max Allowable Imbalance Power		25.0 A per MPPT tracker			
Allowed DC Loading Ratio		4200 W		5000 W	5600 W
DC Disconnect		1.5		Internal	
MPPT Tracker	1				
Total Input Strings Available	2			2	4
OUTPUT (AC)					
Nominal Power	3000 W	3800 W	5200 W	6600 W	7600 W
Max. Continuous Power	3000 W @ 208 V / 3000 W @ 240 V	3300 W @ 208 V / 3900 W @ 240 V	5200 W @ 208 V / 5200 W @ 240 V	6800 W @ 208 V / 6800 W @ 240 V	6800 W @ 208 V / 7600 W @ 240 V
Voltage Range					
Nominal Current	14.4 A @ 208 V / 12.5 A @ 240 V	15.8 A @ 208 V / 15.8 A @ 240 V	24.0 A @ 208 V / 21.8 A @ 240 V	31.7 A @ 208 V / 27.5 A @ 240 V	31.7 A @ 208 V / 31.7 A @ 240 V
Nominal Frequency			60 Hz		
Adjustable Frequency Range			59.3 ~ 60.5 Hz		
Night Consumption			57.0 ~ 63.0 Hz		
Total Harmonic Distortion @ Nominal Power			< 1.5 W		
Power Factor @ Nominal Power			< 3%		
Adjustable Power Factor Range			> 0.99		
Acoustic Noise Emission			0.85l ~ 0.85c		
GENERAL SPECIFICATION					
Max. Efficiency			98%		
CEC Efficiency			97.5% @ 208V / 97.5% @ 240V		
Operating Temperature Range			-13 ~ 158°F (-25~70°C) derating above 122°F (50°C)		
Storage Temperature Range			-40 ~ 185°F (-40 ~ 85°C)		
Humidity			0 ~ 100%		
Max. Operating Altitude			2000m above sea level		
MECHANICAL DESIGN					
Size L x W x D inches (L x W x D mm)	19.5 x 15.8 x 9.5 in (495 x 401 x 216 mm)		26.8 x 15.8 x 8.5 in (680 x 401 x 216 mm)		
Weight	43.0 lbs (19.5 kg)		65.0 lbs (29.5 kg)		
Cooling			Natural Convection		
AC Connectors			Spring terminals in connection box		
Compatible Wiring Gauge in AC			AWG 12 ~ AWG 6 Copper (According to NEC 310.15)		
DC Connections			4 pairs of spring terminals in connection box		
Compatible Wiring Gauge in DC			AWG 12 ~ AWG 8 Copper (According to NEC 800.8)		
Communication Interface			ZigBee		
Display			3 LEDs, 4-Line LCD		
Enclosure Material			Diecast Aluminum		
STANDARDS / DIRECTIVES					
Enclosure Protection Rating			NEMA 4X, IEC 60086-2-11 Salt mist		
Safety			UL 1741 Second Edition, CSA C22.2 No.107.1-01		
SW Approval			UL 1998		
Ground Fault Protection			NEC 690.35, UL 1741 GRD		
Anti-Islanding Protection			IEEE 1547, IEEE 1547.1		
EMC			FCC part 15 Class B		
AFCI			UL 1699B (Type 1), NEC 690.11		
PV Rapid Shutdown			UL 1741 CRD PVRSS, NEC 690.12 (with SMART RSS)		
Integrated Meter			ANSI C12.1 (meet 1% Accuracy)		
Regulation of Grid Support			California Rule 21, HECG Compliant, IEEE1547		
WARRANTY					
Standard Warranty			10 years		

Delta Products Corporation, Inc.
 46101 Fremont Blvd.
 Fremont, CA 94538
 Sales Email: inverter.sales@delatw.com
 Support Email: inverter.support@delatw.com
 Sales Hotline +1 877-440-5951 or +1-426-366-8021
 Support Hotline +1 877-442-4832
 Support (ind): +1-626-366-8019
 Monday to Friday from 7 am to 5 pm PST (apart from Holidays)



ZS Comp
for composition shingle roofs



Description

- PV mounting solution for composition shingle roofs
- Works with all Zep Compatible Modules
- Auto bonding UL-listed hardware creates structural and electrical bond
- ZS Comp has a UL 1703 Class "A" Fire Rating when installed using modules from any manufacturer certified as "Type 1" or "Type 2"

Specifications

- Designed for pitched roofs
- Installs in portrait and landscape orientations
- ZS Comp supports module wind uplift and snow load pressures to 50 psf per UL 2703
- Wind tunnel report to ASCE 7-05 and 7-10 standards
- ZS Comp grounding products are UL listed to UL 2703 and UL 467
- ZS Comp bonding products are UL listed to UL 2703
- Engineered for spans up to 72" and cantilevers up to 24"
- Zep wire management products listed to UL 1565 for wire positioning devices

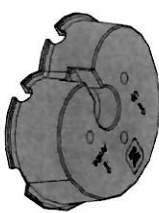

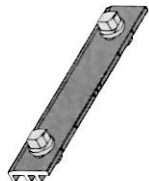

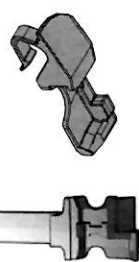

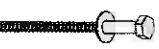
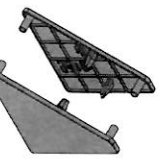


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Components

 <p>Mounting Block Part No. 850-1633 Listed to UL 2703</p>	 <p>Array Skirt Part No. 850-1608 or 850-0113 Listed to UL 2703</p>	 <p>Interlock Part No. 850-1388 or 850-1613 Listed to UL 2703</p>
 <p>Flashing Insert Part No. 850-1628 Listed to UL 2703</p>	 <p>Grip Part No. 850-1606 or 850-1421 Listed to UL 2703</p>	 <p>Ground Zep V2 Part No. 850-1511 Listed to UL 467 and UL 2703</p>
 <p>Captured Washer Lag Part No. 850-1631-001 850-1631-002 850-1631-003 850-1631-004</p>	 <p>End Cap Part No. (L) 850-1586 or 850-1460 (R) 850-1588 or 850-1467</p>	 <p>DC Wire Clip Part No. 850-1509 Listed to UL 1565</p>
 <p>Leveling Foot Part No. 850-1397 Listed to UL 2703</p>		

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SC-B2 SERIES MODULE



MODULE SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

Model	SC315B2	SC310B2
Max Power (W)	315	310
Max Power Voltage, V_{MP} (V)	58.4	58.1
Max Power Current, I_{MP} (A)	5.40	5.34
Open Circuit Voltage, V_{OC} (V)	70.2	69.9
Short Circuit Current, I_{SC} (A)	5.83	5.78
System Voltage (V)	600	600
Max Series Fuse Rating (A)	15	15
Solar Module Efficiency (%)	18.8	18.5
Power Tolerance (%)	+5 / -0	+5 / -0

TEMPERATURE CORRECTION

NOCT (°C)	49
P_{MAX} (%/°C)	-0.29
V_{OC} (%/°C)	-0.25
I_{SC} (%/°C)	0.03

Electrical characteristics are within -5/+10% of the indicated values of I_{MP} , V_{OC} and P_{MAX} under standard test conditions (irradiance of 100 mW/cm, AM 1.5 spectrum, and a cell temperature of 25 degrees Celsius or 77 degrees Fahrenheit).

AT NOCT (NORMAL OPERATING CONDITIONS)

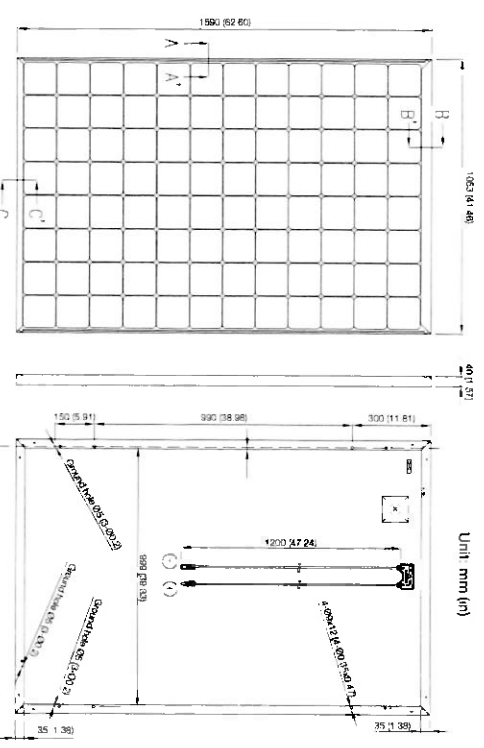
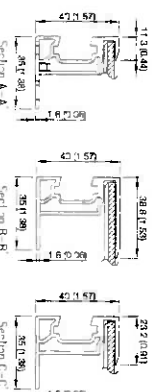
Model	SC315B2	SC310B2
Max Power (W)	234.6	230.7
Max Power Voltage, V_{MP} (V)	53.6	53.3
Max Power Current, I_{MP} (A)	4.37	4.33
Open Circuit Voltage, V_{OC} (V)	65.7	65.4
Short Circuit Current, I_{SC} (A)	4.70	4.66

AT LOW IRRADIANCE (20%)

Model	SC315B2	SC310B2
Max Power (W)	59.7	58.6
Max Power Voltage, V_{MP} (V)	55.7	55.2
Max Power Current, I_{MP} (A)	1.07	1.06
Open Circuit Voltage, V_{OC} (V)	65.4	65.0
Short Circuit Current, I_{SC} (A)	1.17	1.16

MECHANICAL DATA

Weight	19.5kg (42.99 lbs)
Dimensions	1590 mm (62.60") / 1053 mm (41.46") / 40 mm (1.57")
Connector	MC4
Frame Color	Black
Wind and Snow Load	2400 Pa (60 lbs/ft ²)
Fire Type	UL 1703 Type 2



MORE POWER, FEWER MODULES

With a sunlight to electricity conversion efficiency of over 18.8%, the module ranks amongst the highest in the industry. That means our modules can harvest more energy from the sun, which means it takes fewer of our modules to power your home. Plus, they generate more power output during the hottest times of the day, even in warmer climates.

LIMITED WARRANTY

Power Output
Workmanship

MATERIALS

Cell Material
Glass Material
Frame Materials

CAUTION

Please read the installation manual carefully before using the product.

Modules are manufactured by Panasonic to the specification of SolarCity. Modules are only warranted by Panasonic if the modules are included in a PV system sold by SolarCity or Tesla SolarCity and Tesla make no warranties related to the modules, which are sold as-is. SolarCity will handle any warranty claims on behalf of any purchaser.

SOLE ARCTIV

1146037-00-A

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SOLE ARCTIV

1146037-00-A

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