

**MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION**  
**STAFF REPORT**

<b>Address:</b>	10007 Leafy Ave., Silver Spring	<b>Meeting Date:</b>	2/12/2020
<b>Resource:</b>	Non-Contributing Resource (Spatial) <b>Capitol View Park Historic District</b>	<b>Report Date:</b>	2/5/2020
<b>Applicant:</b>	Laure Kouyoudjian	<b>Public Notice:</b>	1/29/2020
<b>Review:</b>	HAWP	<b>Tax Credit:</b>	n/a
<b>Case Number:</b>	31/07-20A	<b>Staff:</b>	Dan Bruechert
<b>PROPOSAL:</b>	Solar Panels		

---

**STAFF RECOMMENDATION**

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

**ARCHITECTURAL DESCRIPTION**

**SIGNIFICANCE:** Non-Contributing Resource within the Capitol View Park Historic District  
**STYLE:** Traditional  
**DATE:** 1994



*Figure 1:* 10007 Leafy Ave. is on a block of out-of-period infill houses in the historic district. The district terminates at the eastern property boundary.

## **PROPOSAL**

The applicant proposes to install 24 roof-mounted solar panels.

## **APPLICABLE GUIDELINES**

When reviewing alterations and new construction within the Capitol View Park Historic District several documents are to be utilized as guidelines to assist the Commission in developing their decision. These documents include the *Approved & Adopted Sector Plan for Capitol View & Vicinity (Sector Plan)*, *Montgomery County Code Chapter 24A (Chapter 24A)*, and the *Secretary of the Interior's Standards for Rehabilitation (Standards)*. The pertinent information in these documents is outlined below.

***Spatial:*** Spatial resources are unimproved parcels of land which visually and aesthetically contribute to the setting of the historic district, and which can be regarded as extensions of the environmental settings of the significant historic resources.

***Nominal (1936-1981):*** These houses themselves are of no architectural of [sic] historical significance, but through their contiguity to the significant resources have some interest to the historic district.

### ***Montgomery County Code; Chapter 24A-8***

- (b) The commission shall instruct the director to issue a permit, or issue a permit subject to such conditions as are found to be necessary to insure conformity with the purposes and requirements of this chapter, if it finds that:
  - (1) The proposal will not substantially alter the exterior features of an historic site or historic resource within an historic district; or
  - (2) The proposal is compatible in character and nature with the historical, archeological, architectural or cultural features of the historic site or the historic district in which an historic resource is located and would not be detrimental thereto or to the achievement of the purposes of this chapter; or
- (d) In the case of an application for work on an historic resource located within an historic district, the commission shall be lenient in its judgment of plans for structures of little historical or design significance or for plans involving new construction, unless such plans would seriously impair the historic or architectural value of surrounding historic resources or would impair the character of the historic district.

### ***Secretary of Interior's Standards for Rehabilitation***

- 2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.
- 9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.
- 10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

## **STAFF DISCUSSION**

The applicant proposes installing 24 (twenty-four) solar panels in four arrays on the east (rear) and west (front) roof slopes and the western, rear-facing gable. The panels will be all black and flush-mounted to the roof surface. Staff finds that the proposal will have a limited impact on the resource and surrounding district and recommends the approval of this HAWP.

The c.1981 survey of the Capitol View Park Historic District identified this property and all of the others on this block of Leafy Ave. as ‘Spatial’ as they were undeveloped. Between 1990 and 1994 eight houses were constructed on this block. All of the infill houses are generally consistent in design, size, setback, materials, and style.

Three of the four arrays will be installed to the rear of the side gable roof and will not be visible from the public right-of-way. Because the historic district terminates to the east of the subject property, these three arrays will only be visible from outside of the historic district and will not impact the surrounding streetscape. These arrays should be approved due to their limited visual impact on the resource or the surrounding historic district (24A-8(b)(1) and (d)).

The remaining array, consisting of seven solar panels, is proposed for the west (front-facing) roof slope. Current HPC interpretation of *Chapter 24A* and the *Standards* generally disfavors solar panels on the front roof slope due to their higher visibility. However, there is an exception for out-of-period and non-contributing resources, because 24A-8(d) states the HPC is to be lenient for alterations to these resources unless the change would impair the character of the district. As there are no historic resources in the immediate area, Staff finds that the proposal will not impact the character of the district and recommends approval of this HAWP under 24A-8(d). Additionally, Staff finds that the *Standards* are of limited assistance because of their focus on “historic character” and “historic materials.” This house was constructed in 1994 and under National Register guidance will not be eligible for consideration as a historic resource until 2044. Even so, the solar panels will be installed flush against the roof to minimize the alteration of the roof slope, will be readily visible as a contemporary feature, and are easily removed in the future with little-to-no damage to the roof, per Standards 2, 9, and 10.

## **STAFF RECOMMENDATION**

Staff recommends that the Commission **approve** the HAWP application; under the Criteria for Issuance in Chapter 24A-8(d) and the *Capitol View Park Historic District Design Guidelines*; having found that the proposal will not substantially alter the exterior features of the historic resource and is compatible in character with the district and the purposes of *Chapter 24A*; the *Design Guidelines*; and with the *Secretary of the Interior’s Standards for Rehabilitation* #2, 9 and #10,

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

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

and with the general condition that the applicant shall notify the Historic Preservation Staff if they propose to make **any alterations** to the approved plans. Once the work is completed the applicant will

contact the staff person assigned to this application at 301-563-3400 or [dan.bruechert@montgomeryplanning.org](mailto:dan.bruechert@montgomeryplanning.org) to schedule a follow-up site visit.



HISTORIC PRESERVATION COMMISSION  
301/563-3400

DPS - #8

## APPLICATION FOR HISTORIC AREA WORK PERMIT

Contact Email: lvallandingham@tesla.com Contact Person: Beth Vallandingham  
Tax Account No.: 00994736 Daytime Phone No.: 240-917-9885  
Name of Property Owner: LAURE KOUYOUDJIAN Daytime Phone No.: (301) 830-3813  
Address: 10007 LEAFY AVE, SILVER SPRING MD, 20910  
Street Number City State Zip Code  
Contractor: Tesla Energy Operations, Inc. Phone No.: 888-765-2489  
Contractor Registration No.: 128948 (MHIC)  
Agent for Owner: Beth Vallandingham Daytime Phone No.: 240-917-9885

### LOCATION OF BUILDING/PREMISE

House Number: 10007 Street: Leafy Ave  
Town/City: Silver Spring Nearest Cross Street: Barker St  
Lot: 10 Block: 34 Subdivision: 0005  
Liber: 48796 Folio: 00103 Parcel: 0000

### PART ONE: TYPE OF PROJECT/ACTION AND USE

#### 1A. CHECK ALL APPLICABLE:

- ☐ Construct ☐ Extend ☐ Alter/Renovate  
☐ Move ☒ Install ☐ Wreck/Reze  
☐ Revision ☐ Repair ☐ Revocable

#### CHECK ALL APPLICABLE:

- ☐ A/C ☐ Slab ☐ Room Addition ☐ Porch ☐ Deck ☐ Shed  
☒ Solar ☐ Fireplace ☐ Woodburning Stove ☐ Single Family  
☐ Fence/Wall (complete Section 4) ☐ Other: \_\_\_\_\_

1B. Construction cost estimate: \$ \$ 9,526

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.

ZBN

Signature of owner or authorized agent

1/21/2020

Date

Approved: 902829 For Chairperson, Historic Preservation Commission

Disapproved: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Application/Permit No.: \_\_\_\_\_ Date Filed: \_\_\_\_\_ Date Issued: \_\_\_\_\_

Edit 6/21/99

**SEE REVERSE SIDE FOR INSTRUCTIONS**

**THE FOLLOWING ITEMS MUST BE COMPLETED AND THE  
REQUIRED DOCUMENTS MUST ACCOMPANY THIS APPLICATION.**

**1. WRITTEN DESCRIPTION OF PROJECT**

- a. Description of existing structure(s) and environmental setting, including their historical features and significance:

2,544 SF, 2 story residential suburban single family dwelling, built in  
1994

property area of 8,037 SF

- b. General description of project and its effect on the historic resource(s), the environmental setting, and, where applicable, the historic district:  
Installing 24 solar panels mount flush to existing roof.

**2. SITE PLAN**

Site and environmental setting, drawn to scale. You may use your plot. 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.

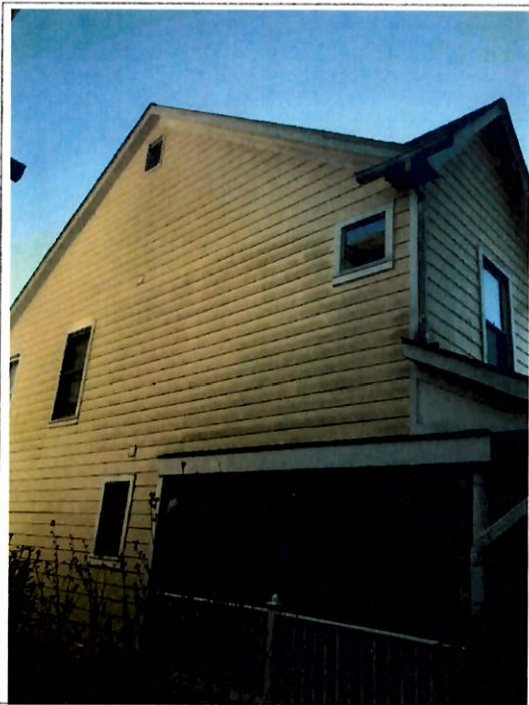
**HAWP APPLICATION: MAILING ADDRESSES FOR NOTIFYING**  
[Owner, Owner's Agent, Adjacent and Confronting Property Owners]

<b>Owner's mailing address</b> LAURE KOUYOU DJIAN  10007 LEAFY AVE SILVER SPRING 20910-1021	<b>Owner's Agent's mailing address</b> TESLA ENERGY OPS, INC.  9000 VIRGINIA MANOR RD, SUITE 250, BETLSVILLE MD, 20705
<b>Adjacent and confronting Property Owners mailing addresses</b>	
FRANK SHEWMAKER  10015 MENLO AVE SILVER SPRING MD, 20910	EMMA GOODMAN O'ROURKE  10009 LEAFY AVE SILVER SPRING MD, 20910
FOSTER STUART T REV TRUST  10005 LEAFY AVE SILVER SPRING MD, 20910	

**Existing Property Condition Photographs** (duplicate as needed)



Detail: Front of house



Detail: Left side of house

Applicant: Beth Vallandingham

Page: 1



**Existing Property Condition Photographs (duplicate as needed)**



Detail: Back of house



Detail: Right side of house

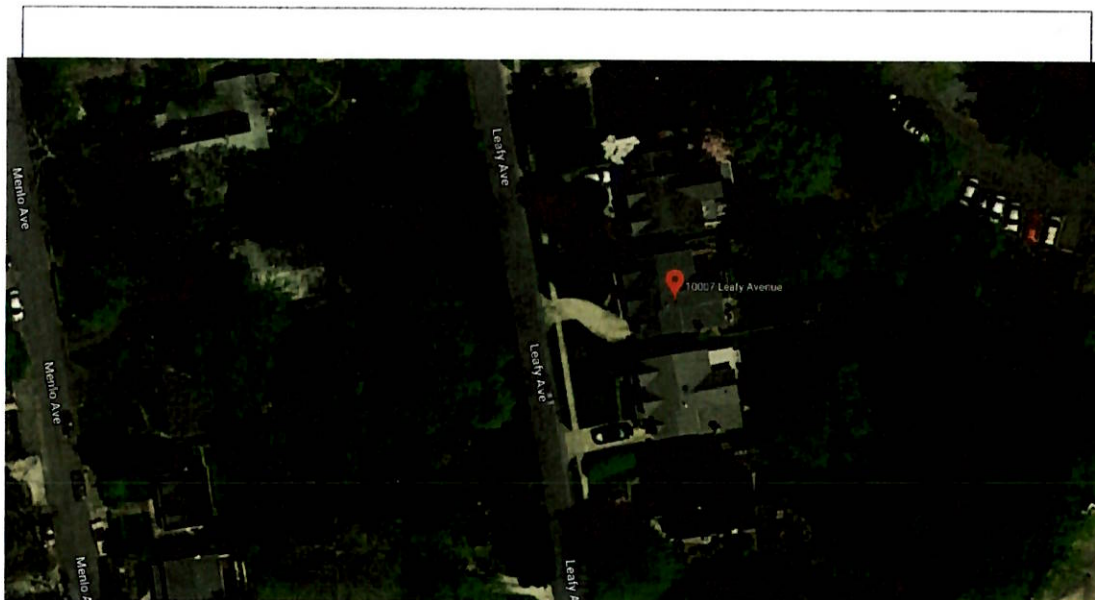
Applicant: Beth Vallandingham

Page: 2

**Existing Property Condition Photographs** (duplicate as needed)



Detail: Existing equipment on right side of house (behind trees)



Detail: Map view

Applicant: Beth Vallandingham

Page: 3



Version #80.6 - 3

01/06/2020

PIL

December 23, 2019

RE: CERTIFICATION LETTER

Project/Job # JB-2094562-00

Project Address: Kouyoudjian Residence  
10007 Leafy Ave  
Silver Spring, MD 20910

AHJ Montgomery County  
SC Office Beltsville



**STRUCTURAL ONLY**

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 Pre-Fab Truss @ 24" OC, Comp Roof, Roof DL = 6.5 psf, Roof LL/SL = 16 psf (Non-PV), Roof LL/SL = 8.7 psf (PV)
- MP2: 2x4 Pre-Fab Truss @ 24" OC, Comp Roof, Roof DL = 6.5 psf, Roof LL/SL = 16 psf (Non-PV), Roof LL/SL = 8.7 psf (PV)
- MP3: 2x4 Pre-Fab Truss @ 24" OC, Comp Roof, Roof DL = 6.5 psf, Roof LL/SL = 20.8 psf (Non-PV), Roof LL/SL = 12.5 psf (PV)
- MP4: 2x4 Pre-Fab Truss @ 24" OC, Comp Roof, Roof DL = 6.5 psf, Roof LL/SL = 20.8 psf (Non-PV), Roof LL/SL = 12.5 psf (PV)

Note: Per IBC 1613.1; Seismic check is not required because  $S_s = 0.119 < 0.4g$  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.

Digitally signed by Jason Toman

Date: 2020.01.06 16:49:32 -07'00'





## 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"	39"	NA	Staggered	51.0%
MP2	72"	24"	39"	NA	Staggered	51.0%
MP3	72"	24"	39"	NA	Staggered	50.2%
MP4	72"	24"	39"	NA	Staggered	50.2%

Portrait Hardware	Hardware - Portrait Modules' Standoff Specifications					
	X-X Spacing	X-X Cantilever	Y-Y Spacing	Y-Y Cantilever	Configuration	Uplift DCR
MP1	48"	20"	66"	NA	Staggered	57.3%
MP2	48"	20"	66"	NA	Staggered	57.3%
MP3	48"	20"	66"	NA	Staggered	56.4%
MP4	48"	20"	66"	NA	Staggered	56.4%

Mounting Plane	Structure Information			Qualification Results
	Type	Pitch	Spacing	Member Evaluation Results
MP1	Pre-Fab Truss	45°	24" O.C.	Member Impact Check OK
MP2	Pre-Fab Truss	45°	24" O.C.	Member Impact Check OK
MP3	Pre-Fab Truss	34°	24" O.C.	Member Impact Check OK
MP4	Pre-Fab Truss	34°	24" O.C.	Member Impact Check OK

## STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP1

Member Properties Summary					
MP1		Horizontal Member Spans		Rafter Properties	
		Overhang	0.95 ft	Actual W	1.50"
Roof System Properties		Span 1	2.67 ft	Actual D	3.50"
Number of Spans (w/o Overhang)	2	Span 2	4.38 ft	Nominal	Yes
Roofing Material	Comp Roof	Span 3		A (in^2)	5.25
Re-Roof	No	Span 4		Sx (in.^3)	3.06
Plywood Sheathing	Yes	Span 5		Ix (in^4)	5.36
Board Sheathing	None	Total Rake Span	11.31 ft	TL Defl'n Limit	120
Vaulted Ceiling	No	PV 1 Start	2.00 ft	Wood Species	SPF
Ceiling Finish	1/2" Gypsum Board	PV 1 End	6.83 ft	Wood Grade	#2
Rafter Slope	45°	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	12/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	6.5 psf	x 1.41	9.2 psf	9.2 psf
PV Dead Load	PV-DL	3.0 psf	x 1.41		4.2 psf
Roof Live Load	RLL	20.0 psf	x 0.60	12.0 psf	
Live/Snow Load	LL/SL <sup>1,2</sup>	30.0 psf	x 0.53   x 0.29	16.0 psf	8.7 psf
Total Load (Governing LC)	TL			25.2 psf	22.1 psf

Notes: 1. ps = Cs\*pf; Cs -roof, Cs -pv per ASCE 7 [Figure 7-2] 2. pf = 0.7 (Ce) (Ct) (Is) pg ; Ce=0.9, Ct=1.1, Is=1.0

Member Analysis Results Summary					
Governing Analysis	Pre-PV	Load (psf)	Post-PV	Net Impact	Result
Gravity Loading Check	25.2		22.1	-12%	Pass



## ZEP HARDWARE DESIGN CALCULATIONS - MP1

Mounting Plane Information			
Roofing Material		Comp Roof	
Roof Slope		45°	
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/Hip 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)	$GC_p$ (Up)	-0.95	Fig. 30.4-2A/B/C-5A/B
Ext. Pressure Coefficient (Down)	$GC_p$ (Down)	0.87	Fig. 30.4-2A/B/C-5A/B
Design Wind Pressure	p	$p = q_h (GC_p)$	Equation 30.4-1
Wind Pressure Up (Design   Ult)	$P_{(up)}$	-15.5   -25.8 psf	
Wind Pressure Down (Design   Ult)	$P_{(down)}$	14.3   23.8 psf	

## ALLOWABLE STANDOFF SPACINGS

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Landscape	72"	39"
Max Allowable Cantilever	Landscape	24"	NA
Standoff Configuration	Landscape	Staggered	
Max Standoff Tributary Area	Trib	20 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-280 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	51.0%	

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Portrait	48"	66"
Max Allowable Cantilever	Portrait	20"	NA
Standoff Configuration	Portrait	Staggered	
Max Standoff Tributary Area	Trib	22 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-314 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	57.3%	

## STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP2

Member Properties Summary					
MP2		Horizontal Member Spans		Rafter Properties	
		Overhang	1.20 ft	Actual W	1.50"
Roof System Properties		Span 1	2.46 ft	Actual D	3.50"
Number of Spans (w/o Overhang)	2	Span 2	4.34 ft	Nominal	Yes
Roofing Material	Comp Roof	Span 3		A (in.^2)	5.25
Re-Roof	No	Span 4		Sx (in.^3)	3.06
Plywood Sheathing	Yes	Span 5		Ix (in.^4)	5.36
Board Sheathing	None	Total Rake Span	11.31 ft	TL Defl'n Limit	120
Vaulted Ceiling	No	PV 1 Start	1.75 ft	Wood Species	SPF
Ceiling Finish	1/2" Gypsum Board	PV 1 End	6.58 ft	Wood Grade	#2
Rafter Slope	45°	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	12/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	6.5 psf	x 1.41	9.2 psf	9.2 psf
PV Dead Load	PV-DL	3.0 psf	x 1.41		4.2 psf
Roof Live Load	RLL	20.0 psf	x 0.60	12.0 psf	
Live/Snow Load	LL/SL <sup>1,2</sup>	30.0 psf	x 0.53   x 0.29	16.0 psf	8.7 psf
Total Load (Governing LC)	TL			25.2 psf	22.1 psf

Notes: 1. ps = Cs\*pf; Cs -roof, Cs -pv per ASCE 7 [Figure 7-2] 2. pf = 0.7 (Ce) (Ct) (Is) pg ; Ce=0.9, Ct=1.1, Is=1.0

Member Analysis Results Summary					
Governing Analysis	Pre-PV	Load (psf)	Post-PV	Net Impact	Result
Gravity Loading Check	25.2		22.1	-12%	Pass



## ZEP HARDWARE DESIGN CALCULATIONS - MP2

Mounting Plane Information			
Roofing Material		Comp Roof	
Roof Slope		45°	
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/Hip 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)	$GC_p$ (Up)	-0.95	Fig. 30.4-2A/B/C-5A/B
Ext. Pressure Coefficient (Down)	$GC_p$ (Down)	0.87	Fig. 30.4-2A/B/C-5A/B
Design Wind Pressure	p	$p = q_h (GC_p)$	Equation 30.4-1
Wind Pressure Up (Design   Ult)	$P_{(up)}$	-15.5   -25.8 psf	
Wind Pressure Down (Design   Ult)	$P_{(down)}$	14.3   23.8 psf	

## ALLOWABLE STANDOFF SPACINGS

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Landscape	72"	39"
Max Allowable Cantilever	Landscape	24"	NA
Standoff Configuration	Landscape	Staggered	
Max Standoff Tributary Area	Trib	20 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-280 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	51.0%	

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Portrait	48"	66"
Max Allowable Cantilever	Portrait	20"	NA
Standoff Configuration	Portrait	Staggered	
Max Standoff Tributary Area	Trib	22 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-314 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	57.3%	



## STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP3

Member Properties Summary					
MP3		Horizontal Member Spans		Rafter Properties	
		Overhang		Actual W	1.50"
Roof System Properties		Span 1	5.79 ft	Actual D	3.50"
Number of Spans (w/o Overhang)	3	Span 2	5.24 ft	Nominal	Yes
Roofing Material	Comp Roof	Span 3	5.67 ft	A (in^2)	5.25
Re-Roof	No	Span 4		Sx (in.^3)	3.06
Plywood Sheathing	Yes	Span 5		Ix (in.^4)	5.36
Board Sheathing	None	Total Rake Span	21.60 ft	TL Defl'n Limit	120
Vaulted Ceiling	No	PV 1 Start	1.92 ft	Wood Species	SPF
Ceiling Finish	1/2" Gypsum Board	PV 1 End	15.83 ft	Wood Grade	#2
Rafter Slope	34°	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	8/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	6.5 psf	x 1.21	7.8 psf	7.8 psf
PV Dead Load	PV-DL	3.0 psf	x 1.21		3.6 psf
Roof Live Load	RLL	20.0 psf	x 0.80	16.0 psf	
Live/Snow Load	LL/SL <sup>1,2</sup>	30.0 psf	x 0.69   x 0.42	20.8 psf	12.5 psf
Total Load (Governing LC)	TL			28.6 psf	24.0 psf

Notes: 1. ps = Cs\*pf; Cs -roof, Cs -pv per ASCE 7 [Figure 7-2] 2. pf = 0.7 (Ce) (Ct) (Is) pg ; Ce=0.9, Ct=1.1, Is=1.0

Member Analysis Results Summary					
Governing Analysis	Pre-PV	Load (psf)	Post-PV	Net Impact	Result
Gravity Loading Check	28.6		24.0	-16%	Pass

## ZEP HARDWARE DESIGN CALCULATIONS - MP3

### Mounting Plane Information

Roofing Material		Comp Roof	
Roof Slope		34°	
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/Hip 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)	$GC_p$ (Up)	-0.95	Fig. 30.4-2A/B/C-5A/B
Ext. Pressure Coefficient (Down)	$GC_p$ (Down)	0.87	Fig. 30.4-2A/B/C-5A/B
Design Wind Pressure	p	$p = q_h (GC_p)$	Equation 30.4-1
Wind Pressure Up (Design   Ult)	$P_{(up)}$	-15.5   -25.8 psf	
Wind Pressure Down (Design   Ult)	$P_{(down)}$	14.3   23.8 psf	

## ALLOWABLE STANDOFF SPACINGS

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Landscape	72"	39"
Max Allowable Cantilever	Landscape	24"	NA
Standoff Configuration	Landscape	Staggered	
Max Standoff Tributary Area	Trib	20 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-275 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	50.2%	

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Portrait	48"	66"
Max Allowable Cantilever	Portrait	20"	NA
Standoff Configuration	Portrait	Staggered	
Max Standoff Tributary Area	Trib	22 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-309 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	56.4%	



## STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP4

Member Properties Summary					
MP4		Horizontal Member Spans		Rafter Properties	
		Overhang		Actual W	1.50"
Roof System Properties		Span 1	5.80 ft	Actual D	3.50"
Number of Spans (w/o Overhang)	3	Span 2	4.99 ft	Nominal	Yes
Roofing Material	Comp Roof	Span 3	5.91 ft	A (in.^2)	5.25
Re-Roof	No	Span 4		Sx (in.^3)	3.06
Plywood Sheathing	Yes	Span 5		Ix (in.^4)	5.36
Board Sheathing	None	Total Rake Span	21.60 ft	TL Defl'n Limit	120
Vaulted Ceiling	No	PV 1 Start	7.42 ft	Wood Species	SPF
Ceiling Finish	1/2" Gypsum Board	PV 1 End	15.75 ft	Wood Grade	#2
Rafter Slope	34°	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	8/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	6.5 psf	x 1.21	7.8 psf	7.8 psf
PV Dead Load	PV-DL	3.0 psf	x 1.21		3.6 psf
Roof Live Load	RLL	20.0 psf	x 0.80	16.0 psf	
Live/Snow Load	LL/SL <sup>1,2</sup>	30.0 psf	x 0.69   x 0.42	20.8 psf	12.5 psf
Total Load (Governing LC)	TL			28.6 psf	24.0 psf

Notes: 1. ps = Cs\*pf; Cs -roof, Cs -pv per ASCE 7 [Figure 7-2] 2. pf = 0.7 (Ce) (Ct) (Is) pg ; Ce=0.9, Ct=1.1, Is=1.0

Member Analysis Results Summary					
Governing Analysis	Pre-PV	Load (psf)	Post-PV	Net Impact	Result
Gravity Loading Check	28.6		24.0	-16%	Pass

## ZEP HARDWARE DESIGN CALCULATIONS - MP4

Mounting Plane Information			
Roofing Material		Comp Roof	
Roof Slope		34°	
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/Hip 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

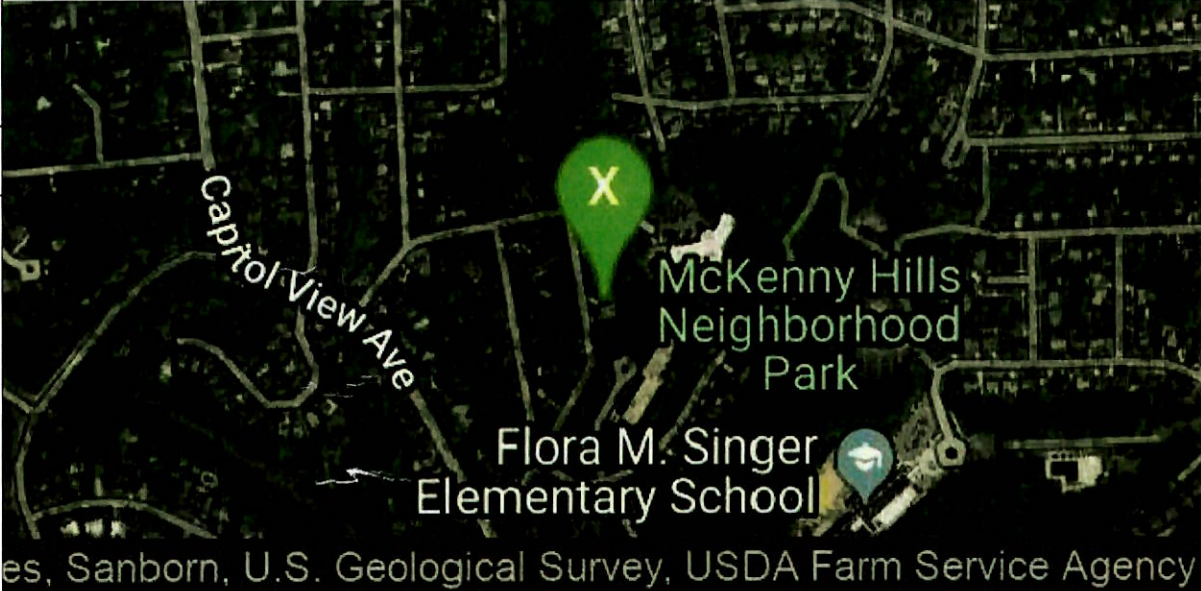
Wind Pressure			
Ext. Pressure Coefficient (Up)	$GC_p$ (Up)	-0.95	Fig. 30.4-2A/B/C-5A/B
Ext. Pressure Coefficient (Down)	$GC_p$ (Down)	0.87	Fig. 30.4-2A/B/C-5A/B
Design Wind Pressure	p	$p = q_h (GC_p)$	Equation 30.4-1
Wind Pressure Up (Design   Ult)	$P_{(up)}$	-15.5   -25.8 psf	
Wind Pressure Down (Design   Ult)	$P_{(down)}$	14.3   23.8 psf	

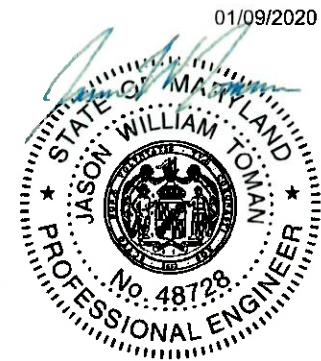
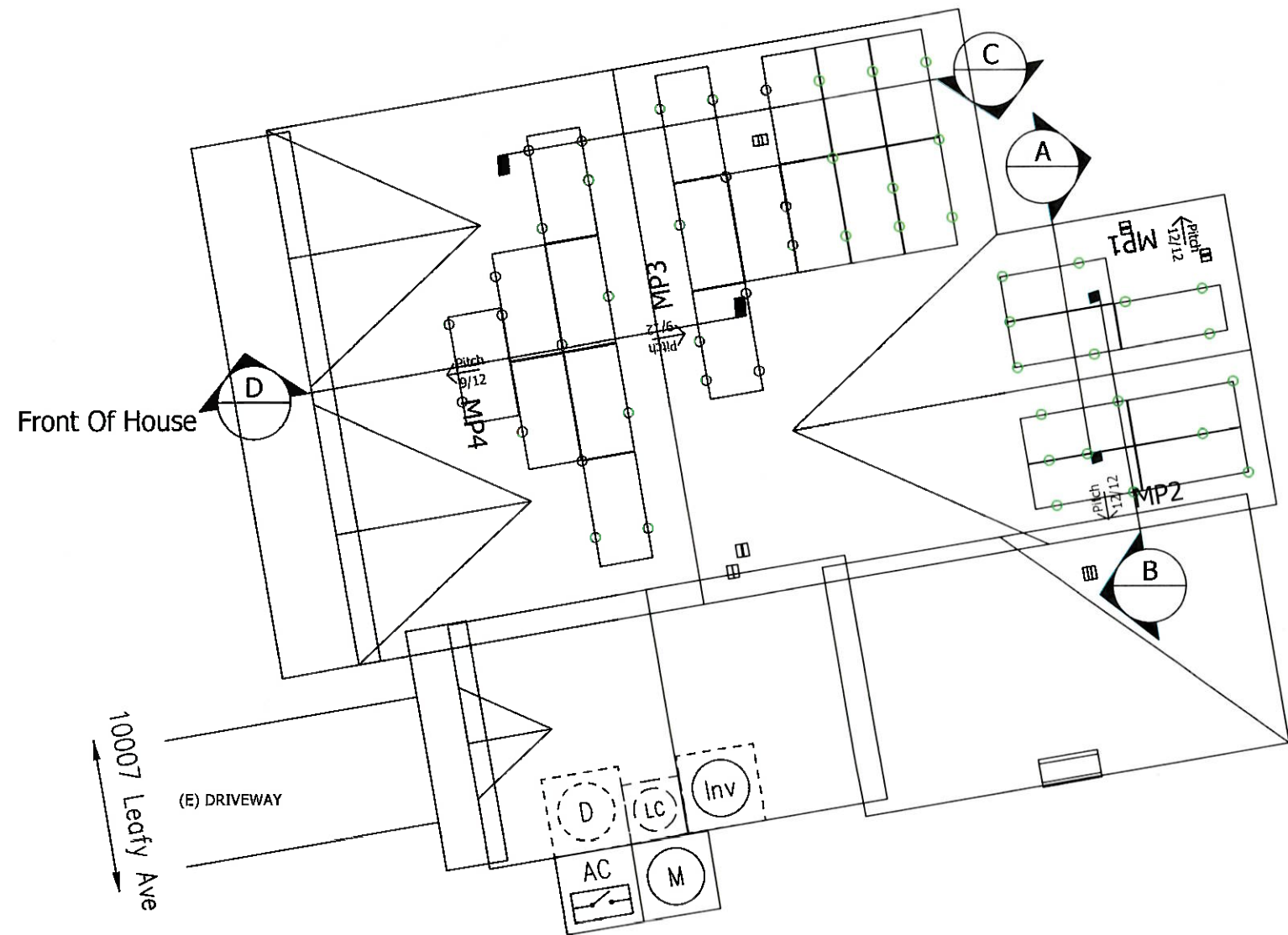
## ALLOWABLE STANDOFF SPACINGS

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Landscape	72"	39"
Max Allowable Cantilever	Landscape	24"	NA
Standoff Configuration	Landscape	Staggered	
Max Standoff Tributary Area	Trib	20 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-275 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	50.2%	

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Portrait	48"	66"
Max Allowable Cantilever	Portrait	20"	NA
Standoff Configuration	Portrait	Staggered	
Max Standoff Tributary Area	Trib	22 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-309 lbs	
Uplift Capacity of Standoff	T-allow	548 lbs	
Standoff Demand/Capacity	DCR	56.4%	



<div>ABBREVIATIONS</div> <div>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 WATT 3R NEMA 3R, RAIN TIGHT</div>		<div>ELECTRICAL NOTES</div> <div>1. THIS SYSTEM IS GRID-INTERTIED 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 MULTI-WIRE 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.</div>		<div>JURISDICTION NOTES</div> <div>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.</div>																										
<div>LICENSE</div> <div>#11805 MASTER ELECTRICIAN Nicholaus Meyers</div> <div>MODULE GROUNDING METHOD: ZEP SOLAR</div> <div>AHJ: Montgomery County</div> <div>UTILITY: PEPCO (MD)</div>		<div>GENERAL NOTES</div> <div>1. ALL WORK SHALL COMPLY WITH THE 2015 IBC AND 2015 IRC. 2. ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2014 NATIONAL ELECTRIC CODE.</div>		<div>VICINITY MAP</div> <div></div>		<div>INDEX</div> <div>Sheet 1 COVER SHEET Sheet 2 SITE PLAN Sheet 3 STRUCTURAL VIEWS Sheet 4 STRUCTURAL VIEWS 2 Sheet 5 UPLIFT CALCULATIONS Sheet 6 THREE LINE DIAGRAM Cutsheets Attached</div> <table><thead><tr><th>REV</th><th>BY</th><th>DATE</th><th>COMMENTS</th></tr></thead><tbody><tr><td>REV A</td><td>NAME</td><td>DATE</td><td>COMMENTS</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td></tr></tbody></table>	REV	BY	DATE	COMMENTS	REV A	NAME	DATE	COMMENTS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
REV	BY	DATE	COMMENTS																											
REV A	NAME	DATE	COMMENTS																											
*	*	*	*																											
*	*	*	*																											
*	*	*	*																											
*	*	*	*																											
<div>CONFIDENTIAL - THE INFORMATION HEREIN CONTAINED SHALL NOT BE USED FOR THE BENEFIT OF ANYONE EXCEPT TESLA INC., NOR SHALL IT BE DISCLOSED IN WHOLE OR IN PART TO OTHERS OUTSIDE THE RECIPIENT'S ORGANIZATION, EXCEPT IN CONNECTION WITH THE SALE AND USE OF THE RESPECTIVE TESLA EQUIPMENT, WITHOUT THE WRITTEN PERMISSION OF TESLA INC.</div>		<div>JOB NUMBER: JB-2094562 00</div> <div>MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert</div> <div>MODULES: (24) Hanwha Q CELLS # Q.PEAK DUO BLK-G5/SC315</div> <div>INVERTER: SolarEdge Technologies Ltd. # SE7600H-US [240V]</div>	<div>CUSTOMER: Laure kouyoudjian 10007 Leafy Ave Silver Spring, MD 20910</div> <div>3018303813</div>	<div>DESCRIPTION: 7.56 KW PV ARRAY</div> <div>PAGE NAME: COVER SHEET</div>	<div>DESIGN: Carlos Gonzalez Bravo</div> <div>SHEET: 1 REV: DATE: 12/20/2019</div> <div>TESLA</div>																									



**STRUCTURAL ONLY**  
Digitally signed by Jason Toman  
Date: 2020.01.09 08:29:28 -07'00'

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

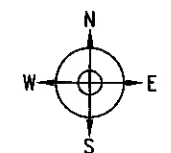
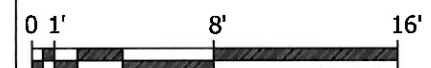
MP1	PITCH: 45 AZIMUTH: 350 MATERIAL: Comp Shingle	ARRAY PITCH: 45 ARRAY AZIMUTH: 350 STORY: 2 Stories
MP2	PITCH: 45 AZIMUTH: 170 MATERIAL: Comp Shingle	ARRAY PITCH: 45 ARRAY AZIMUTH: 170 STORY: 2 Stories
MP3	PITCH: 34 AZIMUTH: 80 MATERIAL: Comp Shingle	ARRAY PITCH: 34 ARRAY AZIMUTH: 80 STORY: 2 Stories
MP4	PITCH: 34 AZIMUTH: 260 MATERIAL: Comp Shingle	ARRAY PITCH: 34 ARRAY AZIMUTH: 260 STORY: 2 Stories

## LEGEND

- (M) (E) UTILITY METER & WARNING LABEL
- (Inv) INVERTER W/ INTEGRATED DC DISCO & WARNING LABELS
- (DC) DC DISCONNECT & WARNING LABELS
- (AC) AC DISCONNECT & WARNING LABELS
- (B) DC JUNCTION/COMBINER BOX & LABELS
- (D) DISTRIBUTION PANEL & LABELS
- (LC) LOAD CENTER & WARNING LABELS
- (M) DEDICATED PV SYSTEM METER
- (RSD) 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: 1/8" = 1'



CONFIDENTIAL - THE INFORMATION HEREIN  
CONTAINED SHALL NOT BE USED FOR THE  
BENEFIT OF ANYONE EXCEPT TESLA INC., NOR  
SHALL IT BE DISCLOSED IN WHOLE OR IN  
PART TO OTHERS OUTSIDE THE RECIPIENT'S  
ORGANIZATION, EXCEPT IN CONNECTION WITH  
THE SALE AND USE OF THE RESPECTIVE  
TESLA EQUIPMENT, WITHOUT THE WRITTEN  
PERMISSION OF TESLA INC.

JOB NUMBER: JB-2094562 00

MOUNTING SYSTEM:  
ZS Comp V4 w Flashing-Insert

MODULES:  
(24) Hanwha Q CELLS # Q.PEAK DUO BLK-G5/SC315

INVERTER:  
SolarEdge Technologies Ltd. # SE7600H-US [240V]

CUSTOMER:  
Laure kouyoudjian  
10007 Leafy Ave  
Silver Spring, MD 20910

3018303813

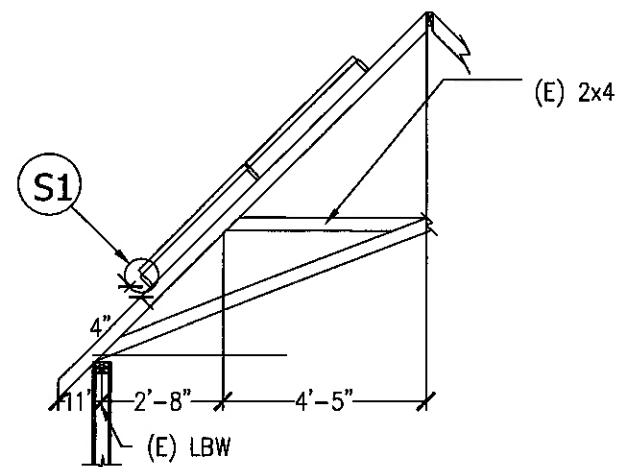
DESCRIPTION:  
7.56 KW PV ARRAY

PAGE NAME:  
SITE PLAN

DESIGN:  
Carlos Gonzalez Bravo

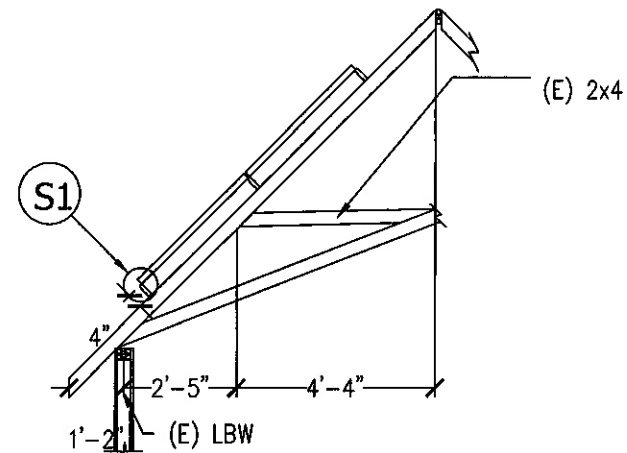
SHEET: 2 REV: DATE:  
12/20/2019

TESLA



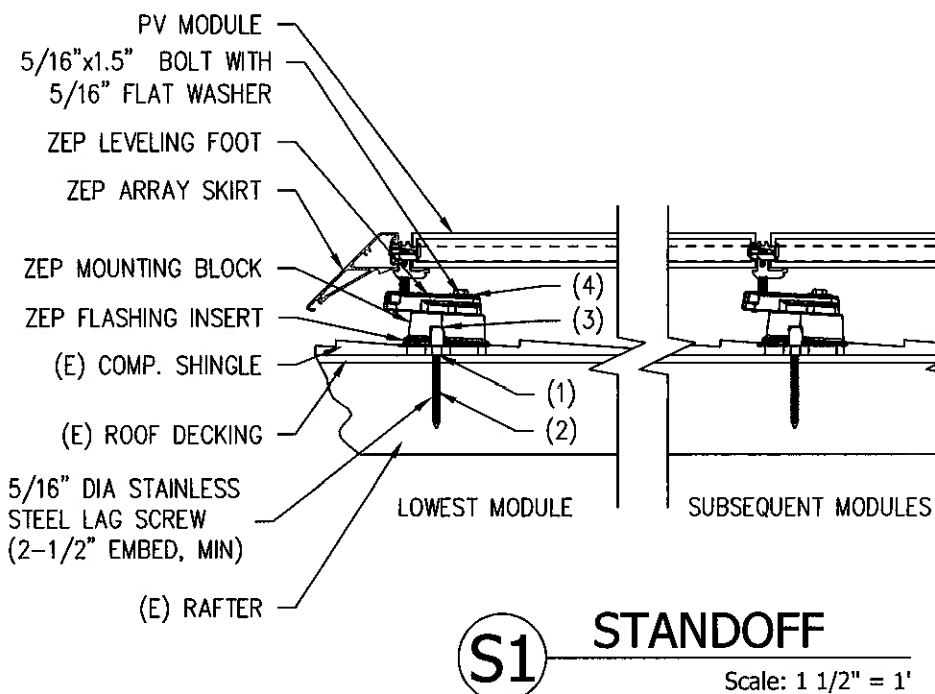
**A** SIDE VIEW OF MP1 NTS

MP1	X-SPACING	X-CANTILEVER	Y-SPACING	Y-CANTILEVER	NOTES
LANDSCAPE	72"	24"	39"	0"	STAGGERED
PORTRAIT	48"	19"	66"	0"	
TOP CHORD 2x4 @ 24" OC			ROOF AZI 350 PITCH 45		STORIES: 2
BOT CHORD 2x4 @24" OC			ARRAY AZI 350 PITCH 45		
			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.					



**B** SIDE VIEW OF MP2 NTS

MP2	X-SPACING	X-CANTILEVER	Y-SPACING	Y-CANTILEVER	NOTES
LANDSCAPE	72"	24"	39"	0"	STAGGERED
PORTRAIT	48"	19"	66"	0"	
TOP CHORD 2x4 @ 24" OC			ROOF AZI 170	PITCH 45	STORIES: 2
BOT CHORD 2x4 @24" OC			ARRAY AZI 170	PITCH 45	
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.

Digitally signed by Jason Toman  
Date: 2020.01.06 16:51:14 -07'00'



**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

CONFIDENTIAL – THE INFORMATION HEREIN CONTAINED SHALL NOT BE USED FOR THE BENEFIT OF ANYONE EXCEPT TESLA INC., NOR SHALL IT BE DISCLOSED IN WHOLE OR IN PART TO OTHERS OUTSIDE THE RECIPIENT'S ORGANIZATION, EXCEPT IN CONNECTION WITH THE SALE AND USE OF THE RESPECTIVE TESLA EQUIPMENT, WITHOUT THE WRITTEN PERMISSION OF TESLA INC.

JOB NUMBER: JB-2094562 00  
MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert  
MODULES: (24) Hanwha Q CELLS # Q.PEAK DUO BLK-G5/SC315  
INVERTER: SolarEdge Technologies Ltd. # SE7600H-US [240V]

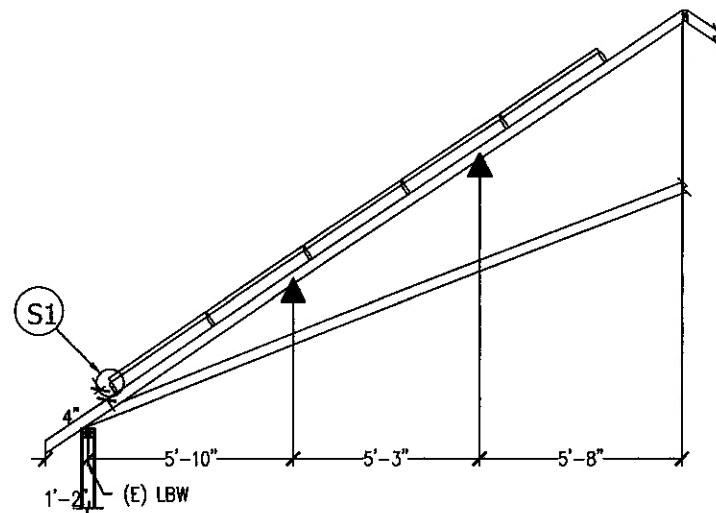
CUSTOMER: Laure kouyoudjian  
10007 Leafy Ave  
Silver Spring, MD 20910  
3018303813

DESCRIPTION: 7.56 KW PV ARRAY  
PAGE NAME: STRUCTURAL VIEWS

DESIGN: Carlos Gonzalez Bravo  
SHEET: 3 REV: DATE: 12/20/2019

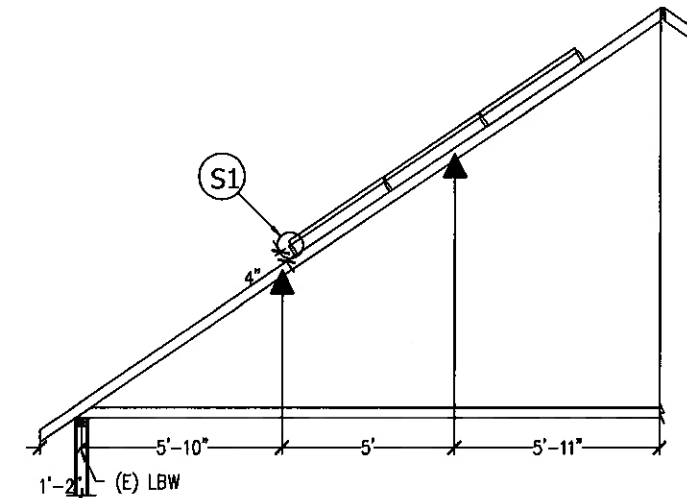
**TESLA**





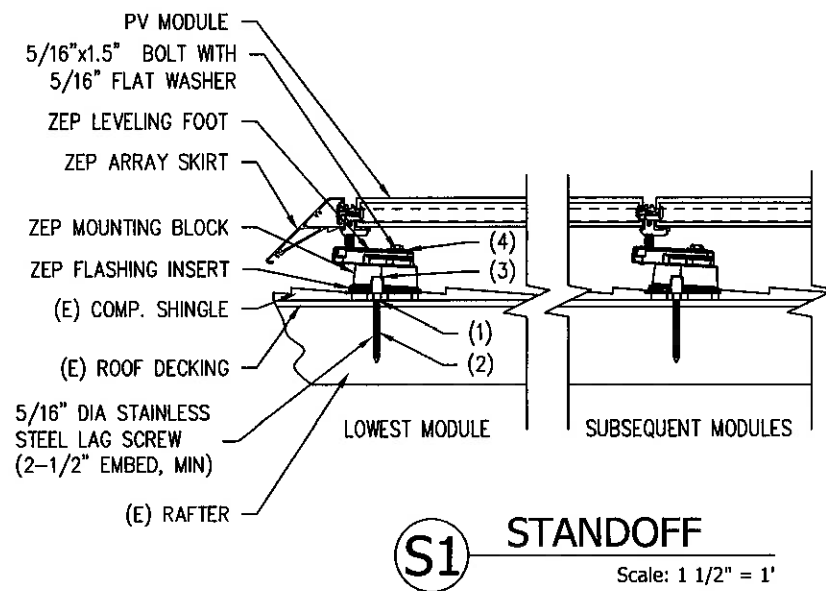
**C** SIDE VIEW OF MP3 NTS

MP3	X-SPACING	X-CANTILEVER	Y-SPACING	Y-CANTILEVER	NOTES	
LANDSCAPE	72"	24"	39"	0"	STAGGERED	
PORTRAIT	48"	19"	66"	0"		
TOP CHORD 2x4 @ 24" OC			ROOF AZ1	80	PITCH 34	STORIES: 2
BOT CHORD 2x4 @24" OC			ARRAY AZ1	80	PITCH 34	
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.						



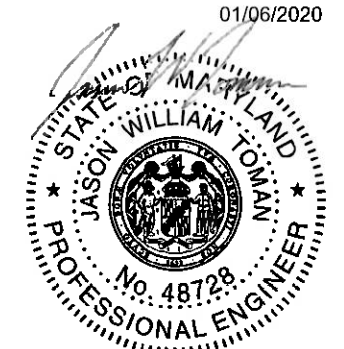
**D** SIDE VIEW OF MP4 NTS

MP4	X-SPACING	X-CANTILEVER	Y-SPACING	Y-CANTILEVER	NOTES
LANDSCAPE	72"	24"	39"	0"	STAGGERED
PORTRAIT	48"	19"	66"	0"	
TOP CHORD 2x4 @ 24" OC			ROOF AZI 260	PITCH 34	STORIES: 2
BOT CHORD 2x4 @24" OC			ARRAY AZI 260	PITCH 34	
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**
- LOCATE RAFTER, MARK HOLE LOCATION, AND DRILL PILOT HOLE.
  - ATTACH FLASHING INSERT TO MOUNTING BLOCK AND ATTACH TO RAFTER USING LAG SCREW.
  - INJECT SEALANT INTO FLASHING INSERT PORT, WHICH SPREADS SEALANT EVENLY OVER THE ROOF PENETRATION.
  - INSTALL LEVELING FOOT ON TOP OF MOUNTING BLOCK & SECURELY FASTEN WITH BOLT.

Digitally signed by Jason Toman  
Date: 2020.01.06 16:51:37 -07'00'



**STRUCTURAL ONLY**

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

CONFIDENTIAL — THE INFORMATION HEREIN CONTAINED SHALL NOT BE USED FOR THE BENEFIT OF ANYONE EXCEPT TESLA INC., NOR SHALL IT BE DISCLOSED IN WHOLE OR IN PART TO OTHERS OUTSIDE THE RECIPIENT'S ORGANIZATION, EXCEPT IN CONNECTION WITH THE SALE AND USE OF THE RESPECTIVE TESLA EQUIPMENT, WITHOUT THE WRITTEN PERMISSION OF TESLA INC.

JOB NUMBER: JB-2094562 00  
MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert  
MODULES: (24) Hanwha Q CELLS # Q.PEAK DUO BLK-G5/SC315  
INVERTER: SolarEdge Technologies Ltd. # SE7600H-US [240V]

CUSTOMER: Laure kouyoudjian  
10007 Leafy Ave  
Silver Spring, MD 20910  
3018303813

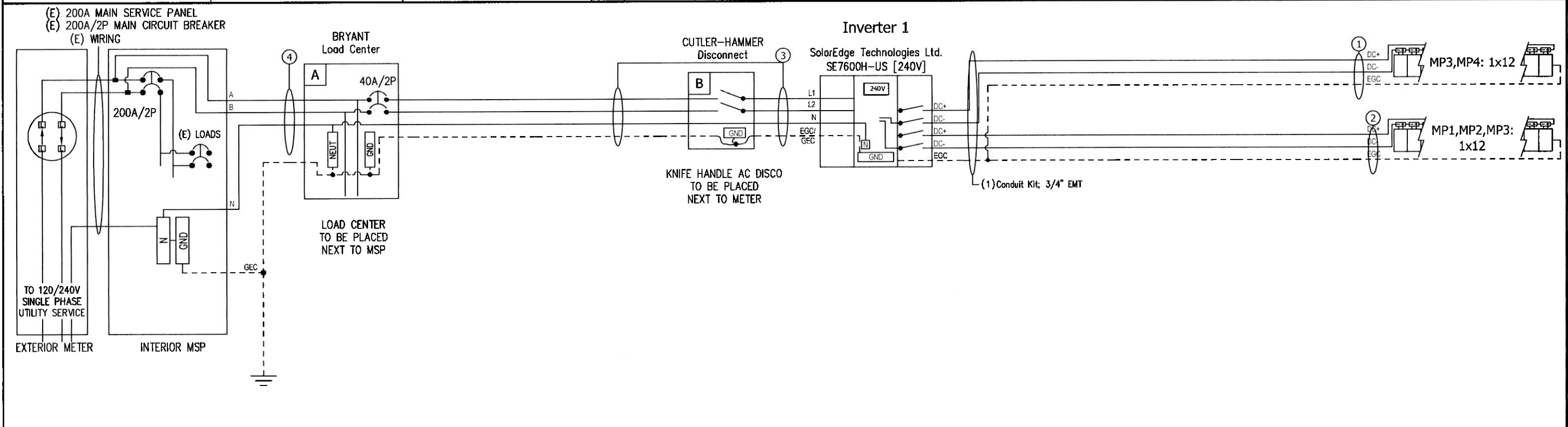
DESCRIPTION: 7.56 KW PV ARRAY  
PAGE NAME: STRUCTURAL VIEWS 2

DESIGN: Carlos Gonzalez Bravo  
SHEET: 4 REV: DATE: 12/20/2019

**TESLA**



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: SB20(30-40)CT Meter Number: NXA113571969 Underground Service Entrance	Inv 1: DC Ungrounded Tie-In: Supply Side Connection	INV 1 INV 2 INV 3 (1) SolarEdge Technologies Ltd. # SE7600H-US [240V] Inverter; 7600W, 240V/208V, 99% HD Wave w/Unified Disco and ZB, AFCI	(24) Hanwha Q CELLS # Q.PEAK DUO BLK-G5/SC315 PV Module; 315W, 292.2 PTC, 40MM, Black Frame, MC4, ZEP, 1000V  Voc: 40.29 Vpmax: 33.46 Isc AND Imp ARE SHOWN IN THE DC STRINGS IDENTIFIER	#11805 MASTER ELECTRICIAN Nicholaus Meyers



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

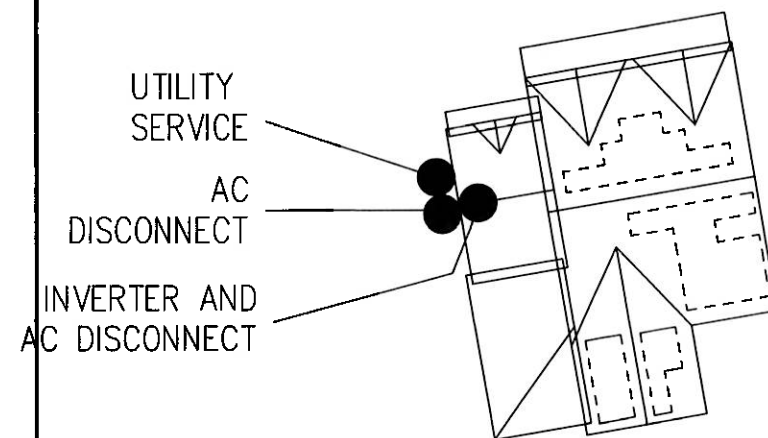
POI (1) Ground Rod 5/8" x 8', Copper (2) ILSCO # IPC 4/0-#6 Insulation Piercing Connector; Main 4/0-4, Tap 6-14	A (1) CUTLER-HAMMER # BR240 Breaker; 40A/2P, 2 Spaces (1) EATON # BR24L125FP Load Center; 125A, 120/240V, NEMA 1, Main Lug, 1 a, 2 Spaces, 4 Circuits, Fish Mt	AC	PV (24) SOLAREEDGE # P400-5NM4M2M PowerBox Optimizer; 400W, ZEP	DC
SSC SUPPLY SIDE CONNECTION. DISCONNECTING MEANS SHALL BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED PER NEC.	B (1) CUTLER-HAMMER # DG322UGB Disconnect; 60A, 240Vac, Non-Fusible, NEMA 1 (1) CUTLER-HAMMER # DG100NB Ground/Neutral Kit; 60-100A, General Duty (DG)			
4 (1) AWG #6, THWN-2, Black (1) AWG #6, THWN-2, Red (1) AWG #6, THWN-2, White NEUTRAL Vmp = 240 VAC Imp = 32 AAC (1) AWG #6, Solid Bare Copper, GEC	3 (1) AWG #8, THWN-2, Black (1) AWG #8, THWN-2, Red (1) AWG #10, THWN-2, White NEUTRAL Vmp = 240 VAC Imp = 32 AAC (1) AWG #8, THWN-2, Green EGC/GEC (1) Conduit Kit; 3/4" EMT		1 (2) AWG #10, PV Wire, 600V, Black Voc* = 500 VDC Isc = 15 ADC (1) AWG #10, THHN/THWN-2, Green EGC Vmp = 350 VDC Imp = 10.66 ADC (1) Conduit Kit; 3/4" EMT 2 (2) AWG #10, PV Wire, 600V, Black Voc* = 500 VDC Isc = 15 ADC (1) AWG #10, THHN/THWN-2, Green EGC Vmp = 350 VDC Imp = 10.66 ADC (1) Conduit Kit; 3/4" EMT	

CONFIDENTIAL - THE INFORMATION HEREIN CONTAINED SHALL NOT BE USED FOR THE BENEFIT OF ANYONE EXCEPT TESLA INC., NOR SHALL IT BE DISCLOSED IN WHOLE OR IN PART TO OTHERS OUTSIDE THE RECIPIENT'S ORGANIZATION, EXCEPT IN CONNECTION WITH THE SALE AND USE OF THE RESPECTIVE TESLA EQUIPMENT, WITHOUT THE WRITTEN PERMISSION OF TESLA INC.	JOB NUMBER: JB-2094562 00 MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert MODULES: (24) Hanwha Q CELLS # Q.PEAK DUO BLK-G5/SC315 INVERTER: SolarEdge Technologies Ltd. # SE7600H-US [240V]	CUSTOMER: Laure kouyoudjian 10007 Leafy Ave Silver Spring, MD 20910 3018303813	DESCRIPTION: 7.56 KW PV ARRAY  PAGE NAME: THREE LINE DIAGRAM	DESIGN: Carlos Gonzalez Bravo  SHEET: 6 REV: DATE: 12/20/2019	TESLA
---	---	---	--	---	-------

# CAUTION

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

- Address: 10007 Leafy Ave



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

OPERATING VOLTAGE = 240V

JB-2094562-00

CONFIDENTIAL - THE INFORMATION HEREIN  
CONTAINED SHALL NOT BE USED FOR THE  
BENEFIT OF ANYONE EXCEPT TESLA INC., NOR  
SHALL IT BE DISCLOSED IN WHOLE OR IN  
PART TO OTHERS OUTSIDE THE RECIPIENT'S  
ORGANIZATION, EXCEPT IN CONNECTION WITH  
THE SALE AND USE OF THE RESPECTIVE  
TESLA EQUIPMENT, WITHOUT THE WRITTEN  
PERMISSION OF TESLA INC.

JOB NUMBER: JB-2094562 00

MOUNTING SYSTEM:  
ZS Comp V4 w Flashing-Insert

MODULES:  
(24) Hanwha Q CELLS # Q.PEAK DUO BLK-G5/SC315

INVERTER:  
SolarEdge Technologies Ltd. # SE7600H-US [240V]

CUSTOMER:  
Laure kouyoudjian  
10007 Leafy Ave  
Silver Spring, MD 20910

3018303813

DESCRIPTION:  
7.56 KW PV ARRAY

PAGE NAME:  
SITE PLAN PLACARD

DESIGN:  
Carlos Gonzalez Bravo

SHEET: 7 REV: DATE: 12/20/2019

TESLA

**WARNING: PHOTOVOLTAIC POWER SOURCE**

Label Location:  
(C)(CB)(JB)  
Per Code:  
NEC 690.31.G.3

## PHOTOVOLTAIC DC DISCONNECT

**Label Location:**  
**(DC) (INV)**  
**Per Code:**  
**NEC 690.14.C.2**

MAXIMUM POWER-POINT CURRENT ( $I_{mp}$ )		A
MAXIMUM POWER-POINT VOLTAGE ( $V_{mp}$ )		V
MAXIMUM SYSTEM VOLTAGE ( $V_{oc}$ )		V
SHORT-CIRCUIT CURRENT ( $I_{sc}$ )		A

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

## WARNING

**ELECTRIC SHOCK HAZARD  
DO NOT TOUCH TERMINALS  
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  
UNGROUNDING AND  
MAY BE ENERGIZED**

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

## PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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

## WARNING

INVERTER OUTPUT  
CONNECTION  
DO NOT RELOCATE  
THIS OVERCURRENT  
DEVICE

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

## WARNING

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

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

## 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  
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

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	<input type="text"/>	A
MAXIMUM AC OPERATING VOLTAGE	<input type="text"/>	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 OPERATING CURRENT  A

MAXIMUM AC OPERATING VOLTAGE  V

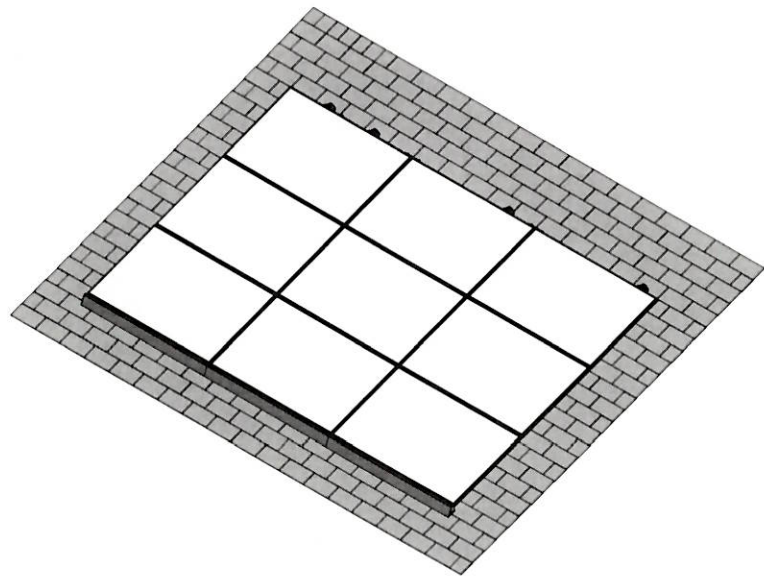
Label Location:  
(POI)  
Per Code:  
NEC 690.17.4; NEC 690.54

- (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

### Label Set



**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

zepsolar.com

This document does not create any express warranty by Zep Solar or about its products or services. Zep Solar's sole warranty is contained in the written product warranty for each product. The end-user documentation shipped with Zep Solar's products constitutes the sole specifications referred to in the product warranty. The customer is solely responsible for verifying the suitability of ZepSolar's products for each use. Specifications are subject to change without notice. Patents and Apps zspats.com.

**Components**



**Mounting Block**

Part No. 850-1633  
Listed to UL 2703



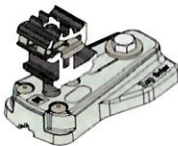
**Flashing Insert**

Part No. 850-1628  
Listed to UL 2703



**Captured Washer Lag**

Part No. 850-1631-001  
850-1631-002  
850-1631-003  
850-1631-004



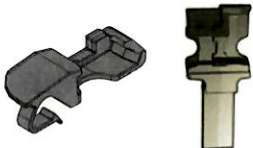
**Leveling Foot**

Part No. 850-1397  
Listed to UL 2703



**Array Skirt**

Part No. 850-1608 or 500-0113  
Listed to UL 2703



**Grip**

Part No. 850-1606 or 850-1421  
Listed to UL 2703



**End Cap**

Part No.  
(L) 850-1586 or 850-1460  
(R) 850-1588 or 850-1467



**Interlock**

Part No. 850-1388 or 850-1613  
Listed to UL 2703



**Ground Zep V2**

Part No. 850-1511  
Listed to UL 467 and UL 2703



**DC Wire Clip**

Part No. 850-1509  
Listed to UL 1565

zepsolar.com

This document does not create any express warranty by Zep Solar or about its products or services. Zep Solar's sole warranty is contained in the written product warranty for each product. The end-user documentation shipped with Zep Solar's products constitutes the sole specifications referred to in the product warranty. The customer is solely responsible for verifying the suitability of ZepSolar's products for each use. Specifications are subject to change without notice. Patents and Apps zspats.com.



SolarEdge Power Optimizer -  
Zep Compatible™ Module Add-On  
For North America P300-ZEP, P400-ZEP



Compatible with Zep Groove framed modules

- Certified Zep Compatible™ bracket
- Attaches to module frame without screws - reduces on-roof labor and mounting costs
- Power optimizer equipment grounded through the bracket
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Next generation maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety

USA - CANADA - GERMANY - ITALY - FRANCE - JAPAN - CHINA - AUSTRALIA - THE NETHERLANDS - UK - ISRAEL - TURKEY - HUNGARY - BELGIUM - ROMANIA - BULGARIA

www.solaredge.us



SolarEdge Power Optimizer - Zep Compatible™  
Module Add-On For North America P400-ZEP

P300-ZEP (for 60-cell PV modules)				P400-ZEP (for 72 & 96-cell modules)			
INPUT							
Rated Input DC power <sup>(1)</sup>		300		400		W	
Absolute Maximum Input Voltage (Voc at lowest temperature)		48		80		Vdc	
MPPT Operating Range		8 - 48		8-80		Vdc	
Maximum Short Circuit Current (Isc)		10		10.1		Adc	
Maximum DC Input Current		12.5		12.63		Adc	
Maximum Efficiency				99.5		%	
Weighted Efficiency				98.8		%	
Overvoltage Category				II			
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING INVERTER)							
Maximum Output Current				15		Adc	
Maximum Output Voltage				60		Vdc	
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)							
Safety Output Voltage per Power Optimizer				1		Vdc	
STANDARD COMPLIANCE							
EMC		FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3					
Safety		IEC62109-1 (class II safety), UL1741					
RoHS		Yes					
INSTALLATION SPECIFICATIONS							
Maximum Allowed System Voltage		1000				Vdc	
Dimensions including mounting bracket (WxLxH)		128 x 196 x 27.5 / 5 x 7.71 x 1.08		128 x 196 x 35 / 5 x 7.71 x 1.37		mm / in	
Dimensions excluding mounting bracket (WxLxH)		128 x 152 x 27.5 / 5 x 5.97 x 1.08		128 x 152 x 35 / 5 x 5.97 x 1.37		mm / in	
Weight (including cables and mounting bracket)		720 / 1.6		840 / 1.9		kg / lb	
Input Connector		MC4 Compatible					
Output Connector		Double Insulated; MC4 Compatible					
Output Wire Length		0.95 / 3.0		1.2 / 3.9		m / ft	
Operating Temperature Range		-40 - +85 / -40 - +185				°C / °F	
Protection Rating		IP68 / NEMA 6P					
Relative Humidity		0 - 100				%	

<sup>(1)</sup> Rated STC power of the module. Module of up to +5% power tolerance allowed.

PV SYSTEM DESIGN USING A SOLAREGE INVERTER <sup>(2)</sup>	SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE 208V	THREE PHASE 480V	
Minimum String Length (Power Optimizers)	8		10	18	
Maximum String Length (Power Optimizers)	25		25	50	
Maximum Power per String	5700 (6000 with SE7600H-US)	5250	6000	12750	W
Parallel Strings of Different Lengths or Orientations	Yes				

<sup>(2)</sup> For detailed string sizing information refer to [http://www.solaredge.com/sites/default/files/string\\_sizing\\_na.pdf](http://www.solaredge.com/sites/default/files/string_sizing_na.pdf)



© SolarEdge Technologies, Inc. All rights reserved. SOLAREGE, the SolarEdge logo, OPTIMIZED BY SOLAREGE are trademarks or registered trademarks of SolarEdge Technologies, Inc. All other trademarks mentioned herein are trademarks of their respective owners. Date: 03/2017, V01, Subject to change without notice.





SolarEdge Single Phase Inverters  
for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US /  
SE7600H-US / SE10000H-US / SE11400H-US



Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- High reliability without any electrolytic capacitors
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)
- Simple configuration and commissioning with smartphone app and built in Wi-Fi (SE10000H-US, SE11400H-US)



INVERTERS



Single Phase Inverters for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/ SE7600H-US /  
SE10000H-US / SE11400H-US

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
OUTPUT								
Rated AC Power Output	3000	3800 @240V 3300 @208V	5000	6000	7600	10000	11400	VA
Max. AC Power Output	3000	3800 @240V 3300 @208V	5000	6000	7600	10000	11400	VA
AC Output Voltage Min.-Nom.- Max. (183 - 208 - 229)	-	✓	✓	-	-	-	-	Vac
AC Output Voltage Min.-Nom.- Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5 <sup>(1)</sup>							Hz
Maximum Continuous Output Current 208V	-	16	24	-	-	-	-	A
Maximum Continuous Output Current 240V	12.5	16	21	25	32	42	47.5	A
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power	4650	5900	7750	9300	11800	15500	17670	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380						400	Vdc
Maximum Input Current 208V	-	9	13.5	-	-	-	-	Adc
Maximum Input Current 240V	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600k $\Omega$ Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99							%
Nighttime Power Consumption	< 2.5							W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Data, ANSI C12.20	Optional <sup>(2)</sup>							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect							
STANDARD COMPLIANCE								
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCEI according to T.I.L. M-07							
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)							
Emissions	FCC Part 15 Class B							
INSTALLATION SPECIFICATIONS								
AC Output Conduit Size / AWG Range	3/4" minimum / 20-4 AWG							
DC Input Conduit Size / # of Strings / AWG Range	3/4" minimum / 1-2 strings / 14-6 AWG					3/4" minimum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174					21.3 x 14.6 x 7.7 / 540 x 370 x 195	21.3 x 14.6 x 7.3 / 540 x 370 x 185	in / mm
Weight with Safety Switch	22 / 10	25.1 / 11.4		26.2 / 11.9		38.8 / 17.6	40.1 / 18.2	lb / kg
Noise	< 25				<50			dBA
Cooling	Natural Convection				Natural convection and internal fan (user replaceable)			
Operating Temperature Range	-13 to +140 / -25 to +60 <sup>(4)</sup> (-40°F / -40°C option) <sup>(3)</sup>							°F / °C
Protection Rating	NEMA 3R (Inverter with Safety Switch)							

<sup>(1)</sup> For other regional settings please contact SolarEdge support

<sup>(2)</sup> Revenue grade inverter P/N: SExxxxH-US000NNC2

<sup>(3)</sup> For power de-rating information refer to <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

<sup>(4)</sup> -40 version P/N: SExxxxH-US000NNU4



© SolarEdge Technologies, Inc. All rights reserved. SOLAREGE, the SolarEdge logo, OPTIMIZED BY SOLAREGE are trademarks or registered trademarks of SolarEdge Technologies, Inc. All other trademarks mentioned herein are trademarks of their respective owners. Date: 11/2017/V01/ENG NAM. Subject to change without notice.





The new **Q.PEAK DUO BLK-G5/SC** solar module from Q CELLS impresses thanks to innovative **Q.ANTUM DUO** Technology, which enables particularly high performance on a small surface, and a black Zep Compatible™ frame design for improved aesthetics, easy installation and increased safety. **Q.ANTUM**'s world-record-holding cell concept has now been combined with state-of-the-art circuitry half cells and a six-busbar design, thus achieving outstanding performance under real conditions - both with low-intensity solar radiation as well as on hot, clear summer days.



**Q.ANTUM TECHNOLOGY: LOW LEVELIZED COST OF ELECTRICITY**  
Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 19.3%.



**INNOVATIVE ALL-WEATHER TECHNOLOGY**  
Optimal yields, whatever the weather with excellent low-light and temperature behavior.



**ENDURING HIGH PERFORMANCE**  
Long-term yield security with Anti LID and Anti PID Technology<sup>1</sup>, Hot-Spot Protect and Traceable Quality Tra.Q™.



**EXTREME WEATHER RATING**  
High-tech aluminum alloy frame, certified for high snow (5400Pa) and wind loads (4000Pa) regarding IEC.

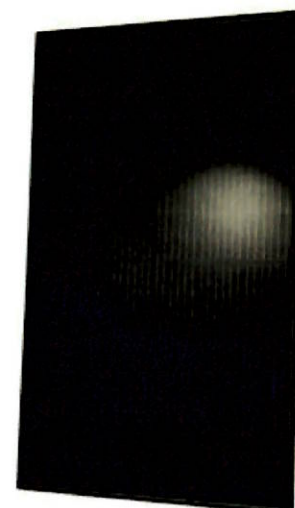


**A RELIABLE INVESTMENT**  
Inclusive 12-year product warranty and 25-year linear performance guarantee<sup>2</sup>.



**STATE OF THE ART MODULE TECHNOLOGY**  
**Q.ANTUM DUO** combines cutting edge cell separation and innovative wiring with **Q.ANTUM** Technology.

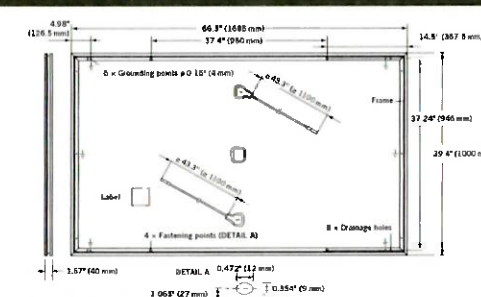
### THE IDEAL SOLUTION FOR:



<sup>1</sup> APT test conditions according to IEC/TS 62804-1:2015, method B (-1500V, 168h)  
<sup>2</sup> See data sheet on rear for further information.

### MECHANICAL SPECIFICATION

Format	66.3 in × 39.4 in × 1.57 in (including frame) (1685 mm × 1000 mm × 40 mm)
Weight	44.5 lbs (20.2 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 20 monocrystalline Q.ANTUM solar half-cells
Junction box	2.76-3.35 in × 1.97-2.76 in × 0.51-0.83 in (70-85 mm × 50-70 mm × 13-21 mm), decentralized, IP67
Cable	4 mm <sup>2</sup> Solar cable; (+) ≥ 43.3 in (1100 mm), (-) ≥ 43.3 in (1100 mm)
Connector	Multi-Contact MC4, IP68

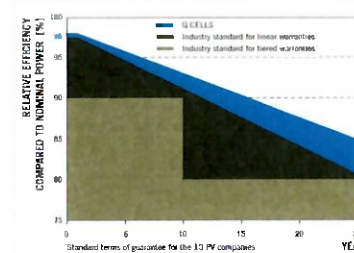


### ELECTRICAL CHARACTERISTICS

POWER CLASS				310	315	320
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC <sup>1</sup> (POWER TOLERANCE +5W / -0W)						
Minimum	Power at MPP <sup>2</sup>	P <sub>MPP</sub>	[W]	310	315	320
	Short Circuit Current <sup>3</sup>	I <sub>SC</sub>	[A]	9.83	9.89	9.94
	Open Circuit Voltage <sup>3</sup>	V <sub>OC</sub>	[V]	40.02	40.29	40.56
	Current at MPP <sup>3</sup>	I <sub>MPP</sub>	[A]	9.36	9.41	9.47
	Voltage at MPP <sup>3</sup>	V <sub>MPP</sub>	[V]	33.12	33.46	33.80
	Efficiency <sup>2</sup>	η	[%]	≥ 18.4	≥ 18.7	≥ 19.0
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NOC <sup>3</sup>						
Minimum	Power at MPP <sup>2</sup>	P <sub>MPP</sub>	[W]	229.7	233.5	237.2
	Short Circuit Current <sup>3</sup>	I <sub>SC</sub>	[A]	7.93	7.97	8.02
	Open Circuit Voltage <sup>3</sup>	V <sub>OC</sub>	[V]	37.43	37.69	37.94
	Current at MPP <sup>3</sup>	I <sub>MPP</sub>	[A]	7.36	7.41	7.45
	Voltage at MPP <sup>3</sup>	V <sub>MPP</sub>	[V]	31.20	31.52	31.84

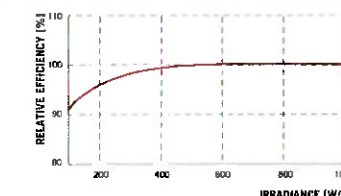
<sup>1</sup> 1000 W/m<sup>2</sup>, 25 °C, spectrum AM 1.5 G <sup>2</sup> Measurement tolerances STC ± 3%; NOC ± 5% <sup>3</sup> 800 W/m<sup>2</sup>, NOCT, spectrum AM 1.5 G \* typical values, actual values may differ

### Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.54% degradation per year.  
At least 93.1% of nominal power up to 10 years.  
At least 85% of nominal power up to 25 years.  
All data within measurement tolerances.  
Full warranties in accordance with the warranty terms of the Q CELLS sales organization of your respective country.

### PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m<sup>2</sup>).

### TEMPERATURE COEFFICIENTS

Temperature Coefficient of I <sub>SC</sub>	α	[%/K]	+0.04	Temperature Coefficient of V <sub>OC</sub>	β	[%/K]	-0.28
Temperature Coefficient of P <sub>MPP</sub>	γ	[%/K]	-0.37	Normal Operating Cell Temperature	NOCT	[°F]	113 ± 5.4 (45 ± 3 °C)

### PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V <sub>sys</sub>	[V]	1000 (IEC) / 1000 (UL)	Safety Class	II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating	C (IEC) / TYPE 1 (UL)
Design load, push (UL) <sup>2</sup>	[lbs/ft <sup>2</sup> ]	50 (2400 Pa)	Permitted module temperature on continuous duty	-40 °F up to +185 °F (-40 °C up to +85 °C)
Design load, pull (UL) <sup>2</sup>	[lbs/ft <sup>2</sup> ]	50 (2400 Pa)	<sup>2</sup> see installation manual	

### QUALIFICATIONS AND CERTIFICATES

UL 1703, CE-compliant, IEC 61215 (Ed. 2), IEC 61730 (Ed. 1), application class A



### PACKAGING INFORMATION

Number of Modules per Pallet	26
Number of Pallets per 53' Trailer	32
Number of Pallets per 40' High Cube Container	26
Pallet Dimensions (L × W × H)	69.3 in × 45.3 in × 46.9 in (1760 mm × 1150 mm × 1190 mm)
Pallet Weight	1268 lbs (575 kg)

**NOTE:** Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.  
300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us-q-cells.com | WEB www.q-cells.us

Specification subject to technical changes © Hanwha Q CELLS Q.PEAK DUO BLK G5/SC 310-320 2018-09 Rev01\_NA

Engineered in Germany

