EXPEDITED HISTORIC PRESERVATION COMMISSION STAFF REPORT

Address: 106 Water St., Brookeville Meeting Date: 10/9/2019

Resource: Secondary Resource **Report Date:** 10/2/2019

Brookeville Historic District

Applicant: Jeffery Johnson **Public Notice:** 9/25/2019

Review: HAWP **Tax Credit:** n/a

Case Number: 23/65-19E Staff: Dan Bruechert

Proposal: Solar Panel Installation

STAFF RECOMMENDATION:

Approve

Approve with conditions

PROJECT DESCRIPTION

SIGNIFICANCE: Secondary Resource within the Brookeville Historic District

STYLE: Colonial Revival

DATE: 2003



Figure 1: 106 Water St. has an existing solar array on the principle rear gable.

PROPOSAL

The applicant proposes to install 12 (twelve) roof-mounted solar panels on the western side of the house's metal-roofed, rear gable roofs at 106 Water St. The current proposal is an expansion of an existing 14 (fourteen) panel roof-mounted array reviewed and approved by the HPC in 2014. Staff finds that the use of solar panels is appropriate as it is on the rear of a non-historic house and will not be visible from Market St. to the south. Staff recommends approval of the HAWP.

APPLICABLE GUIDELINES

The use of the expedited review form is supported by one category of work on the Policy on Use of Expedited Staff Reports for Simple HAWP Cases:

2. Modifications to a property, which do not significantly alter its visual character.

Brookeville Historic District Master Plan Amendment

The *Brookeville Historic District Master Plan Amendment* (#23/65) identifies Primary Resources, Secondary Resources, and Spatial Resources. 106 Water St. is a Secondary Resource.

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;
- (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. (Ord. No. 9-4, § 1; Ord. No. 11-59.)

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.

STAFF RECOMMENDATION

Staff recommends that the Commission <u>approve</u> the HAWP application under the Criteria for Issuance in *Chapter 24A-8(b)(1),(2), and (d)* 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*; and with the *Secretary of the Interior's Standards for Rehabilitation* #2,

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 to schedule a follow-up site visit.



Edit 6/21/99

HISTORIC PRESERVATION COMMISSION 301/563-3400

APPLICATION FOR HISTORIC AREA WORK PERMIT

Daytime Phone No.:	410-718-8970	
		
		
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טועו כ		20833
		Zip Code
Phone Ne.:		
Destina Stana Ma	410-718-8970	
Dayone From Re		
Water St		
Market Ct		
Market St.		
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APPLICABLE		
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Mail (complete Section 4)	□ Other:	
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03 □ Other: 03 □ Other: collowing locations: □ On public right at w supplication is correct, and to condition for the issuance of	that the construction of this parmit.	vill comply with plans
	Water St. Market St. APPLICABLE: Sieb	Market St. APPLICABLE: Slab

306688

SEE REVERSE SIDE FOR INSTRUCTIONS

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

Owner's mailing address	Owner's Agent's mailing address					
Jeffrey Johnson	Tesla Energy Operations					
106 Water St	9000 Virginia Manor Rd.					
Brookeville, MD 20833	Ste. 250					
	Beltsville, MD 20705					
Adjacent and confronting Property Owners mailing addresses						
Nicholas Roy 108 Water St. Brookeville, MD 20833	Garrett Anderson 104 Water St. Brookeville, MD 20833					

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

1. WRITTEN DESCRIPTION OF PROJECT

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.

c. site features such as walkways, driveways, fences, ponds, streams, trash dumpsters, mechanical equipment, and landscaping.

- 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 menufactured items proposed for incorporation in the work of the project. This information may be included on your design drawings.

5. PHOTOGRAPHS

- 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.
- 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

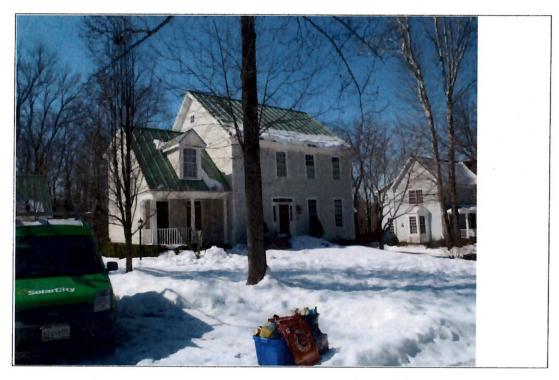
If you are proposing construction adjacent to or within the dripline of any tree 5" or larger in diameter (at approximately 4 feet above the ground), you must file an accurate tree survey identifying the size, location, and species of each tree of at least that dimension.

7. ADDRESSES OF ADJACENT AND CONFRONTING PROPERTY OWNERS

For <u>ALL</u>, 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 IMIC) 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.

Existing Property Condition Photographs (duplicate as needed)



Detail: Front of house



Detail: NW side of house

Existing Property Condition Photographs (duplicate as needed)



Detail: NW side of house with existing PV equipment



Detail: SE side of house

Existing Property Condition Photographs (duplicate as needed)



Detail: Back of house



Detail: Map view



Version #78.2 - 3

September 13, 2019

RE:

CERTIFICATION LETTER

Project/Job # JB-2089978-00

Project Address:

Johnson Residence 106 Water St Brookeville, MD 20833

AHJ SC Office

Montgomery County Beltsville

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
- MP2: 2x4 @ 24" OC, Roof DL = 5.5 psf, Roof LL/SL = 16 psf (Non-PV), Roof LL/SL = 12.5 psf (PV)
- MP5: 2x4 @ 24" OC, Roof DL = 5.5 psf, Roof LL/SL = 20.8 psf (Non-PV), Roof LL/SL = 18.1 psf (PV)



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

Note: Per IBC 1613.1; Seismic check is not required because Ss = 0.122 < 0.4g and Seismic Design Category (SDC) = B < D

To Whom It May Concern,

- [v] 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.
- $[\sqrt{}]$ 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.
- [v] 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.
- [v] I prepared or approved the construction documents for the mounting equipment, rack system, roof structure for this project.

Digitally signed by Jason Toman Date: 2019.09.16 18:39:13 -07'00'



HARDWARE DESIGN AND STRUCTURAL ANALYSIS RESULTS SUMMARY TABLES

Landscape	Hardware - Landscape Modules' Standoff Specifications						
Hardware	X-X Spacing	X-X Cantilever	Y-Y Spacing	Y-Y Cantilever	Configuration	Uplift DCR	
MP2	21"	12"	41"	NA	Staggered	60.4%	
MP5	42"	15"	41"	NA	Staggered	95.9%	

Portrait	Hardware - Portrait Modules' Standoff Specifications						
Hardware	X-X Spacing	X-X Cantilever	Y-Y Spacing	Y-Y Cantilever	Configuration	Uplift DCR	
MP2	21"	8"	63"	NA	Staggered	91.3%	
MP5	21"	10"	63"	NA	Staggered	72.4%	

Structure Information		Qualification Results	
Туре	Pitch	Spacing	Member Evaluation Results
Pre-Fab Truss	34°	24" O.C.	Member Impact Check OK
Pre-Fab Truss	18°	24" O.C.	Member Impact Check OK
	Type Pre-Fab Truss	Type Pitch Pre-Fab Truss 34°	Type Pitch Spacing Pre-Fab Truss 34° 24" O.C.

STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP2

Member Properties Summary						
MP2 Horizontal Member Spans Rafter Properties						
Roof System Properties		Overhang	1.20 ft	Actual W	1.50"	
		Span 1	5.48 ft	Actual D	3.50"	
Number of Spans (w/o Overhang)	2	Span 2	4.94 ft	Nominal	Yes	
Roofing Material	Standing Seam Roof	Span 3		A (in^2)	5.25	
Re-Roof	No	Span 4		Sx (in.^3)	3.06	
Plywood Sheathing	Yes	Span 5		lx (in^4)	5.36	
Board Sheathing	None	Total Rake Span	14.02 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	10.83 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	5.5 psf	x 1.21	6.6 psf	6.6 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 ^{1,2}	30.0 psf	x 0.42 1x 0.42	12.5 psf	12.5 psf
Total Load (Governing LC)	TL			22.6 psf	22.8 psf

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

	Member Analysis Results Summary					
Governing Analysis	Pre-PV	Load (psf)	Post-PV	Net Impact	Result	
Gravity Loading Check	22.6		22.8	, 1%	Pass	

ZEP HARDWARE DESIGN CALCULATIONS - MP2

Roofing Material	Standing Seam Roof	To E Life Live
Roof Slope	34°	
Framing Type / Direction	Y-Y Rafters	TO SELVEN
PV System Type	SolarCity SleekMount™	
Zep System Type	ZS Seam	
Standoff (Attachment Hardware)	S-5 Clamp	
Standing Seam/Trap Spacing	21	
Module Assembly has Interlocks?	Yes	

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

Velocity Pressure	q _h	qh = 0.00256 (Kz) (Kzt) (Kd) (V^2) 27.2 psf	Equation 30,3-1
Importance Factor	1	NA NA	
Wind Directionality Factor	K _d	0.85	Section 26.6-1
Topographic Factor	K _{zt}	1.00	Section 26.8
Wind Pressure Exposure	K _z	0.95	Table 30.3-1

		Wind Pressure	
Ext. Pressure Coefficient (Up)	GCp (Up)	-0.95	Fig. 30.4-2A/B/C-5A/B
Ext. Pressure Coefficient (Down)	GCp (Down)	0.87	Fig. 30.4-2A/B/C-5A/B
Design Wind Pressure	р	p = qh (GCp)	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	21"	41"
Max Allowable Cantilever	Landscape	12"	NA NA
Standoff Configuration	Landscape	Staggered	
Max Standoff Tributary Area	Trib	6 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-85 lbs	
Uplift Capacity of Standoff	T-allow	140 lbs	
Standoff Demand/Capacity	DCR	60.4%	HANNEY SERVICE SERVICES

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Portrait	21"	63"
Max Allowable Cantilever	Portrait	8"	NA NA
Standoff Configuration	Portrait	Staggered	
Max Standoff Tributary Area	Trib	9 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-128 lbs	
Uplift Capacity of Standoff	T-allow	140 lbs	
Standoff Demand/Capacity	DCR	91.3%	

STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP5

	Memb	er Properties Sum	mary	是"是不是"和"是"	TO BE A STATE OF
MP5 Roof System Properties		Horizontal Member Spans		Rafter Properties	
		Overhang	1.20 ft	Actual W	1.50"
		Span 1	6.63 ft	Actual D	3.50"
Number of Spans (w/o Overhang)	2	Span 2	4.62 ft	Nominal	Yes
Roofing Material	Standing Seam Roof	Span 3	TO COLUMN THE REAL PROPERTY.	A (in^2)	5.25
Re-Roof	No	Span 4		Sx (in.^3)	3.06
Plywood Sheathing	Yes	Span 5		lx (in^4)	5.36
Board Sheathing	None	Total Rake Span	13.08 ft	TL Defl'n Limit	120
Vaulted Ceiling	No	PV 1 Start	1.33 ft	Wood Species	SPF
Ceiling Finish	1/2" Gypsum Board	PV 1 End	11.50 ft	Wood Grade	#2
Rafter Slope	18°	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	4/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	5.5 psf	x 1.05	5.8 psf	5.8 psf
PV Dead Load	PV-DL	3.0 psf	x 1.05		3.2 psf
Roof Live Load	RLL	20.0 psf	x 1.00	20.0 psf	
Live/Snow Load	LL/SL ^{1,2}	30.0 psf	x 0.69 1x 0.6	20.8 psf	18.1 psf
Total Load (Governing LC)	TL			26.6 psf	27.0 psf

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

	Member	Analysis Results	Summary	BOOK AND DAY	Establish States	
Governing Analysis	Pre-PV	Load (psf)	Post-PV	Net Impact	Result	
Gravity Loading Check 26.6 27.0 2% Pass						

ZEP HARDWARE DESIGN CALCULATIONS - MP5

Roofing Material	Standing Seam Roof	
Roof Slope	18°	
Framing Type / Direction	Y-Y Rafters	THE REAL PROPERTY.
PV System Type	SolarCity SleekMount™	
Zep System Type	ZS Seam	
Standoff (Attachment Hardware)	S-5 Clamp	
Standing Seam/Trap Spacing	21	
Module Assembly has Interlocks?	Yes	

Wind Design Criteria			
Design Code	IBC 2015	ASCE 7-10	
Wind Design Method		Partially/Fully Enclosed Method	ALS SHOULD BE SEEN AS A SHOULD BE SEEN
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	15 ft	Section 26.2

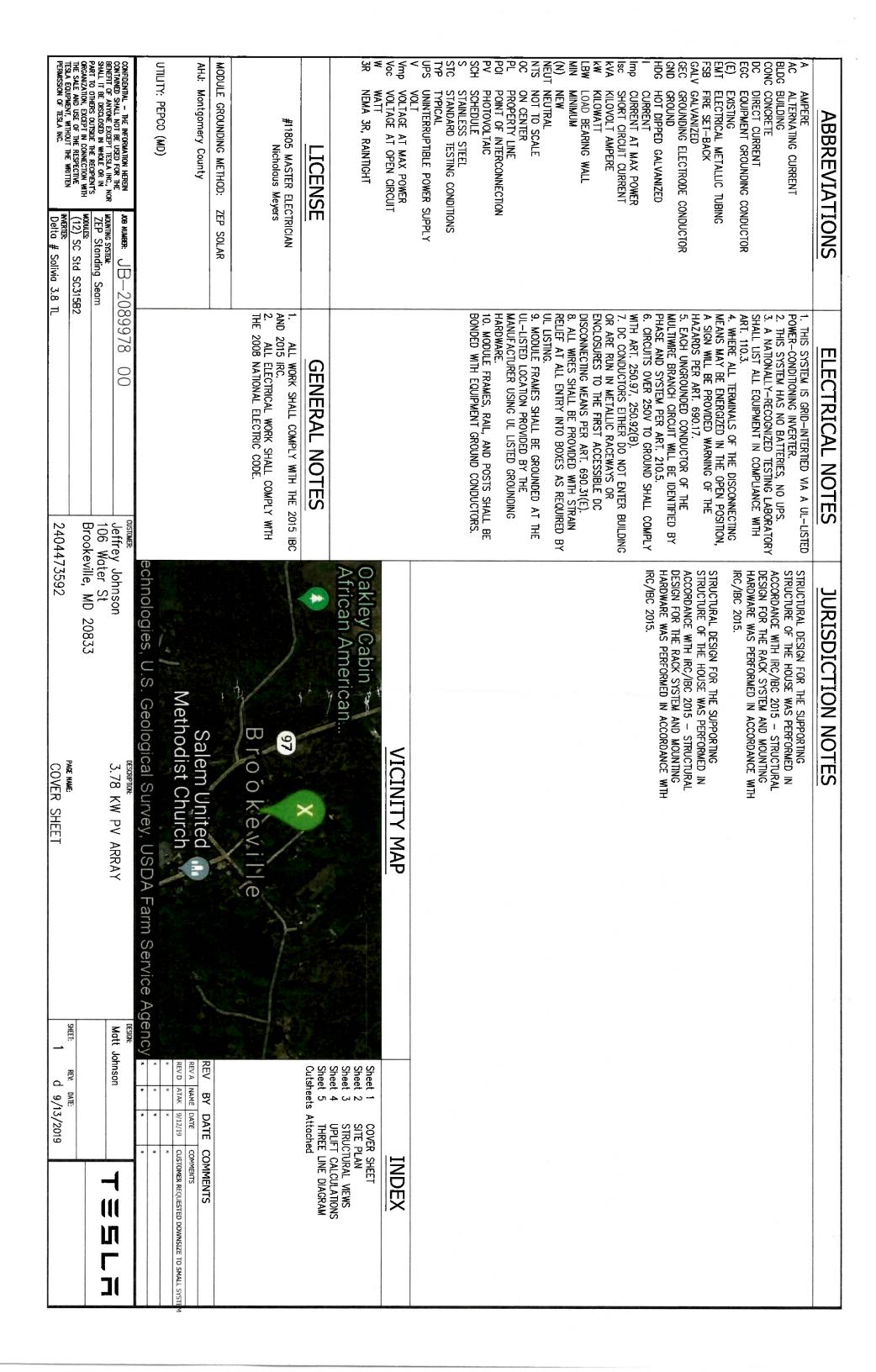
Velocity Pressure	q _h	qh = 0.00256 (Kz) (Kzt) (Kd) (V^2) 24.4 psf	Equation 30.3-1
Importance Factor		NA	
Wind Directionality Factor	K _d	0.85	Section 26.6-1
Topographic Factor	K _{zt}	1.00	Section 26.8
Wind Pressure Exposure	K _z	0.85	Table 30.3-1

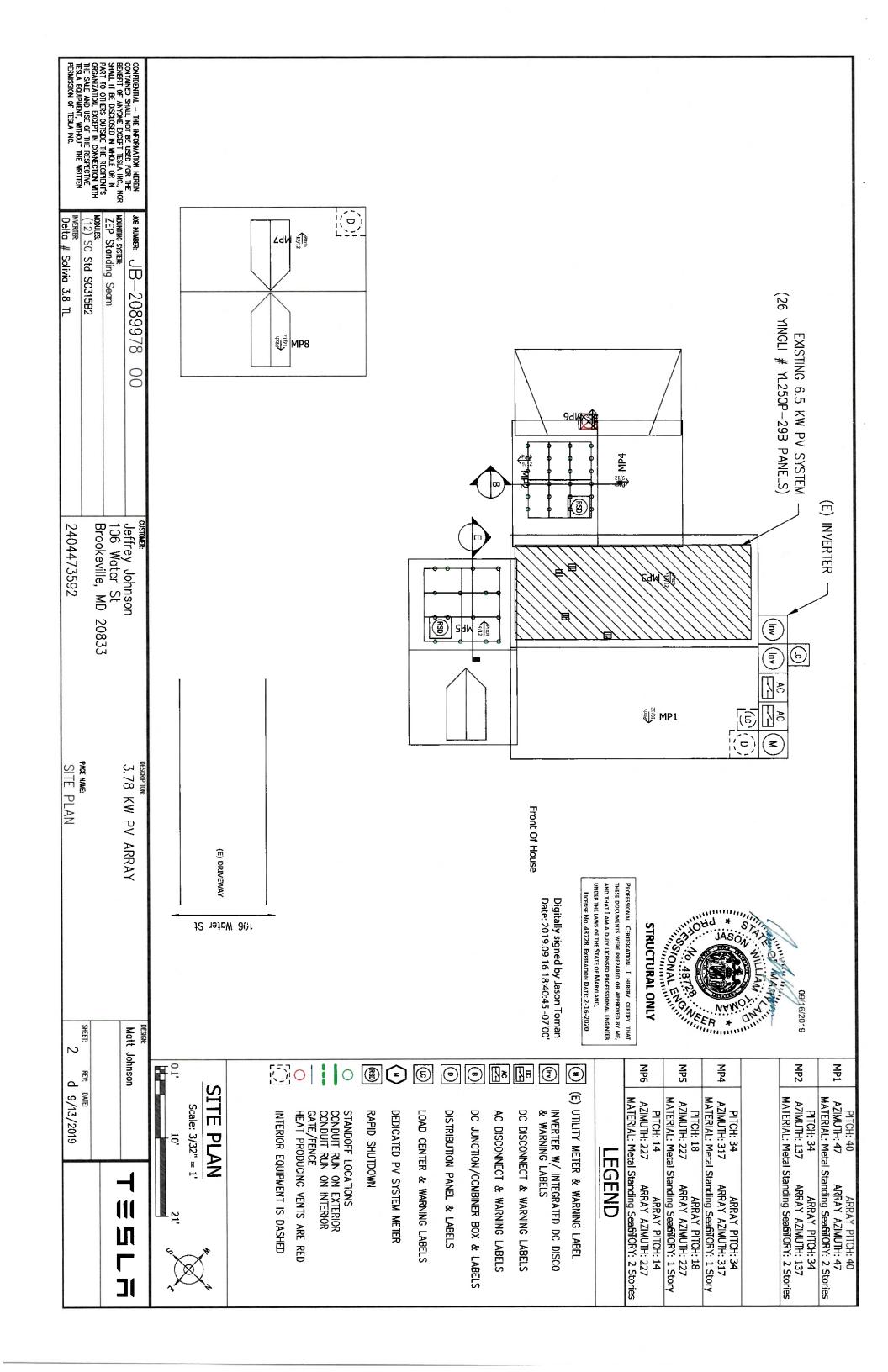
		Wind Pressure	
Ext. Pressure Coefficient (Up)	GCp (Up)	-0.87	Fig. 30.4-2A/B/C-5A/B
Ext. Pressure Coefficient (Down)	GCp (Down)	0.45	Fig. 30.4-2A/B/C-5A/B
Design Wind Pressure	р	p = qh (GCp)	Equation 30.4-1
Wind Pressure Up (Design Ult)	P(up)	-12.8 -21.4 psf	
Wind Pressure Down (Design Ult)	p _(down)	9.6 16 psf	

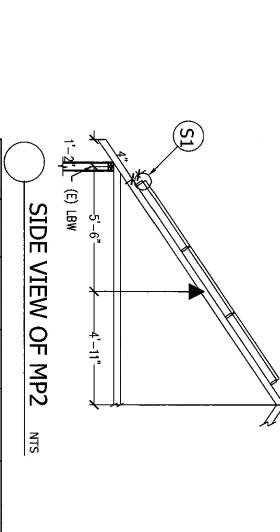
ALLOWABLE STANDOFF SPACINGS

		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Landscape	42"	41"
Max Allowable Cantilever	Landscape	15"	NA NA
Standoff Configuration	Landscape	Staggered	
Max Standoff Tributary Area	Trib	12 sf	All Carlos Associations
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-134 lbs	THE CONTRACT WHEN THE PARTY HAVE BEEN ADDRESSED.
Uplift Capacity of Standoff	T-allow	140 lbs	
Standoff Demand/Capacity	DCR	95.9%	

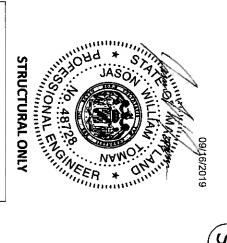
		X-Direction	Y-Direction
Max Allowable Standoff Spacing	Portrait	21"	63"
Max Allowable Cantilever	Portrait	10"	NA NA
Standoff Configuration	Portrait	Staggered	
Max Standoff Tributary Area	Trib	9 sf	
PV Assembly Dead Load	W-PV	3.0 psf	
Net Wind Uplift at Standoff	T-actual	-101 lbs	THE RESERVE OF THE PERSONS ASSESSED.
Uplift Capacity of Standoff	T-allow	140 lbs	
Standoff Demand/Capacity	DCR	72.4%	







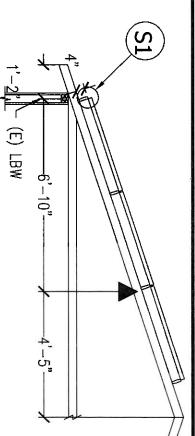
X AND Y ARE ALWAYS RELATIVE TO THE STRUCTURE FRAMING THAT SUPPORTS THE PV. X IS ACROSS RAFTERS AND Y IS ALONG RAFTERS	RAMING THAT SL	TRUCTURE F	X AND Y ARE ALWAYS RELATIVE TO THE STRUCTL X IS ACROSS RAFTERS AND Y IS ALONG RAFTERS	RAFTERS AN	X AND Y ARE
Seam	Metal Standing Seam) 	BOT CHORD 2x4 @24" OC	BOT CHORD
STORIES: 2	ROOF AZI 137 PITCH 34 ARRAY AZI 137 PITCH 34	ROOF AZI ARRAY AZI	OC	TOP CHORD 2x4 @ 24" OC	TOP CHORD
	0 ⁿ	62"	7 ⁿ	21 ⁿ	PORTRAIT
STAGGERED	0"	41"	11"	21"	LANDSCAPE
NOTES	Y-CANTILEVER	Y-SPACING	X-SPACING X-CANTILEVER Y-SPACING Y-CANTILEVER	X-SPACING	MP2



AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, PROFESSIONAL CERTIFICATION, I HEREBY CERTIFY THAT LICENSE No. 48728. EXPIRATION DATE: 2-16-2020

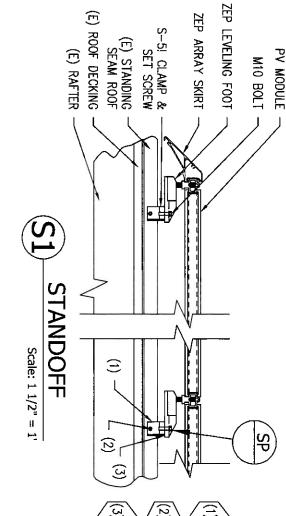
Date: 2019.09.16 18:41:40 -07'00'

Digitally signed by Jason Toman



SIDE VIEW OF MP5 SLN

MP5	X-SPACING	X-SPACING X-CANTILEVER Y-SPACING Y-CANTILEVER	Y-SPACING	Y-CANTILEVER	NOTES
LANDSCAPE	42"	14"	41"	0"	STAGGERED
PORTRAIT	21"	9"	62"	0"	
TOP CHORD 2x4 @ 24" OC	2x4 @ 24" (OC	ROOF AZI ARRAY AZI	ROOF AZI 227 PITCH 18 ARRAY AZI 227 PITCH 18	18 18 STORIES: 1
BOT CHORD	BOT CHORD 2x4 @24" OC	C		Metal Standing Seam	Seam
X AND Y ARE	ALWAYS REL	ATIVE TO THE S	TRUCTURE FI	RAMING THAT SI	X AND Y ARE ALWAYS RELATIVE TO THE STRUCTURE FRAMING THAT SUPPORTS THE PV.
X IS ACROSS	RAFTERS AN	X IS ACROSS RAFTERS AND Y IS ALONG RAFTERS.	AFTERS.		



LOCATE SEAM, MARK
LOCATION, AND PLACE
S-5! ON SEAM. TIGHTEN SET SCREW(S)
ON S-5! CLAMP. INSTALLATION ORDER

INSTALL LEVELING FOOT ONTO S-5! CLAMP WITH BOLT & WASHERS.

7	(2	(E) ROOF DECKING	S-5	M10-1.5	PV
	S-5 DETAIL SHOWING SEAM PROFILI	OF DECKING —	& SET SCREW	M10-1.5 X 20MM BOLT	
Scale: 3"=1'-0"	M PROFILE		SEAM ROOF	OOT STANDING	LEVELING

(V)

INSTALL INSTRUCTIONS: CLAMPS ARE MADE FOR TYP. STANDING SEAM PROFILES. WHEN ATTACHING THE MACHINE FOLDED SEAMS CLAMPS ARE DESIGNED TO ENGAGE THE SEAM. FOR HORIZONTAL SEAM APPLICATIONS THE SETSCREW MUST BE ACCESSIBLE FROM THE TOP FOR TIGHTENING.

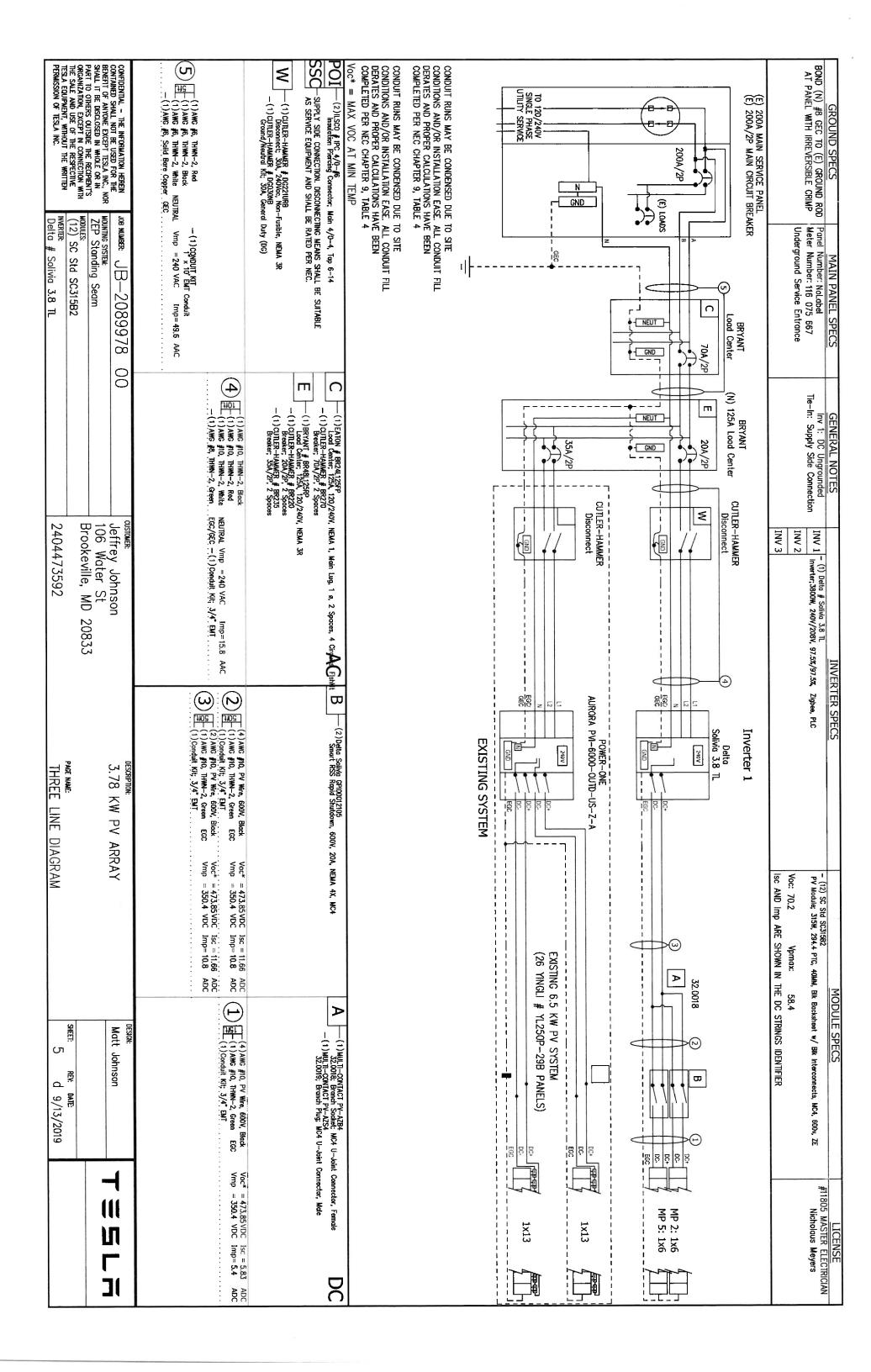
ON MANY SNAP-TOGETHER TYPE SEAMS, THE SETSCREWS ARE OPPOSITE THE OPEN OR OVERLAP SIDE OF THE SEAM. ON SOME SEAMS THIS ASPECT OF THE CLAMP ORIENTATION IS NOT CRITICAL.

INSTALL WITH A SCREW GUN AND INCLUDED SCREW GUN BIT TIP. FOR OPTIMAL HOLDING STRENGTH. SETSCREWS SHOULD BE TENSIONED AND RE-TENSIONED AS THE SEAM MATERIAL COMPRESSES. SCREWS SHOULD BE TENSIONED TO 130 INCH POUNDS USING A CALIBRATED TORQUE WRENCH. THE S-5 HAS FOUR SETSCREWS LOCATIONS TO MAKE THE CLAMP MORE VERSATILE, HOWEVER ONLY TWO SETSCREWS ARE USED PER CLAMP. THE SETSCREWS SHOULD ALWAYS BE PLACED ON THE SAME SIDE OF THE CLAMP.

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

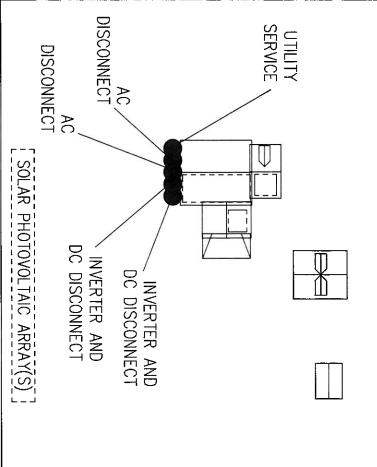
SION OF TESLA INC.	_ ₹		VED SHALL NOT BE USED FOR THE	
NVERTER: Delta # Solivia 3.8 TL	(12) SC Std SC315B2	ZEP Standing Seam	TOTAL TOTAL CONTRACT OF THE PROPERTY OF THE PR	1D 2080078 00
2404473592	Brookeville, MD 20000	ŞŞ	Jeffrey Johnson	CUSTOMER:
STRUCTURAL VIEWS	PAGE MANE.		3.78 KW PV ARRAY	DESCRIPTION:
3	SHEET: REV: DATE:		Matt Johnson	DESIGN:
		-	1 11	



POWER TO THIS BUILDING IS ALSO SLIPPI TEN EROM THE

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

- Address: 106 Water St



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

OPERATING VOLTAGE = 240V

JB-2089978-00

PERMISSION OF TESLA INC.	ORGANIZATION, EXCEPT IN CONNECTION WITH THE SALE AND USE OF THE RESPECTIVE		
INVERTER: Delta # Solivia 3.8 TL	(12) SC Std SC315B2	ZEP Standing Searn	JB—20899/8 00
2404473592	Brookeville, MD 20000	106 Water St	Jeffrey Johnson
SITE PLAN PLACARD	PACE NAME:		3.78 KW PV ARRAY
p 9	SHEET: REV. DATE:		Matt Johnson
		- 	

][



PHOTOVOLTAIC DC DISCONNECT

Label Location:
(C)(CB)(JB)
Per Code: Label Location: (DC) (INV)
Per Code: NEC 690,14,C,2 NEC 690.31.G.3

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

LECTRIC SHOCK HAZARD
DC CONDUCTORS OF THIS
OTOVOLTAIC SYSTEM ARE
UNGROUNDED AND
MAY BE ENERGIZED WARNING

UNGROUNDED

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

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

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

(Z S Per Code: Label Location:

CEC 690.56(C)

WARNING

NEC 690.64.B.7 Per Code:

WARNING

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

NEC 690.5(C)

(PO) Label Location:

CAUTION
PHOTOVOLTAIC SYSTEM
CIRCUIT IS BACKFED

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

CAUTION DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

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

WARNING

Label Location: (DC) (CB)
Per Code:

NEC 690.17(4)

DC VOLTAGE IS
ALWAYS PRESENT WHEN
SOLAR MODULES ARE
EXPOSED TO SUNLIGHT

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

(POI) Per Code: Label Location:

MAXIMUM AC
OPERATING CURRENT
MAXIMUM AC
OPERATING VOLTAGE 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 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

(POI): Point of Interconnection (M): Utility Meter

Label Set

MAXIMUM AC
OPERATING CURRENT
MAXIMUM AC
OPERATING VOLTAGE

(AC) (POI) Per Code: NEC 690.54

Label Location:

PHOTOVOLTAIC AC DISCONNECT

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

S-5! Attachment Hardware

Modern standing seam roofing systems boast that by design, fastening through the weathering membrane is greatly reduced or eliminated. Unfortunately, when it becomes necessary to attach something to the roof, there has never been a way to do it without compromising roof integrity and voiding system warranties. Such attachments have in the past been the source of leaks, panel corrosion and repeated maintenance problems.

Look at all the things you don't get with S-5!

- no panel damage
 no wood blocking
 no violation of thermal movement
 no warranty violation

no leaksno corrosion

no holes

no caulking

no hasslesno caltbacks NO PROBLEMS

no maintenance

rooftop accessories, including HYAC equipment, signage, solar panels, snow retention hardware, gas ping and conduit, rooftop lighting, fascias, equipment screens, parapet bracing, condensate lines, stack and flue bracing, antennae, roof walkways and more. The S-5! clamp systems now offer a complete solution to the attachment of a wide variety of ancillary

A variety of S-5! clamp styles are available:



- The <u>S-5-U</u> will fit most "structural" and "architectural" panel seam styles.
 The <u>S-5-Z</u> is specially designed to fit ZipRib, Kal-Zip and similar profiles.
- The S-5-B is a brass clamp, designed for use on double-folded standing seam or traditional batten seam
- The S-5-E is an aluminum clamp designed to fit traditional double-folded standing seam profiles.

about special requirements. Metal Roof Innovations, Ltd., also develops custom clamps. We invite you to Contact Us with inquiries

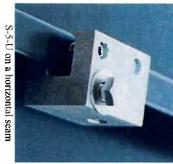
Aluminum clamps are metallurgically compatible with bare or painted galvanized, Galvalume, Aluminized and Galfan coated steel, as well as bare or painted aluminum, stainless and zinc sheet products. In most applications, the clamp should be installed at a location on the seam that avoids the panel's attachment clip location. S-5! clamps may also be used at a clip location, provided the clip is an expansion (dualcomponent) clip. All aluminum clamps are furnished with a stainless steel bolt and washer (3/8" diameter x 5/8" length; bolt head size is 9/16").

For more detailed installation instructions, see the Installation section.

S-5! clamps attach to the panel seam by the tightening of two "bullet-nosed" stainless steel set screws

against the seam material (this is usually done with an industrial grade screwgun). The set screws compress the seam material against the opposite wall of the clamp. They will "dimple" the seam material, but will not penetrate it. Threaded holes in the clamp (and stainless hardware provided) enable the easy attachment of various ancillary items to the clamps.





E





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for Delta 3.0~7.6 TL Inverters Rapid Shutdown Device

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

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

O NELTA

Model RSS-600 4-2 Connection Diagram:

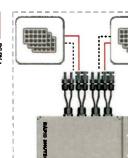




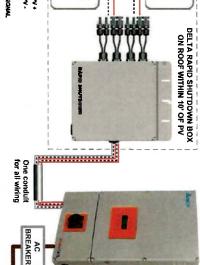












Technical Specifications

Input Ratings

Rated Input Current Per String	Max. Number of Input Circuit	Max. System Voltage

600V DC

600V DC 4 10A 15A

NA AN

5V Signal Wire Size Range	5V Signal Wire Voltage Rating	Control Signal Method	Output Conduit Size	Output Terminal Wire Size	Maximum Current Controlled Conductor	Rated Output Current Per Circuit	Max. Number of Output Circuit	

20A 25A 10 AWG N/A PLC Signal N/A

2 20A 25A 25A 12-6 AWG 3/4" (two hotes) 5V Signal Wire 600V 24-14 AWG

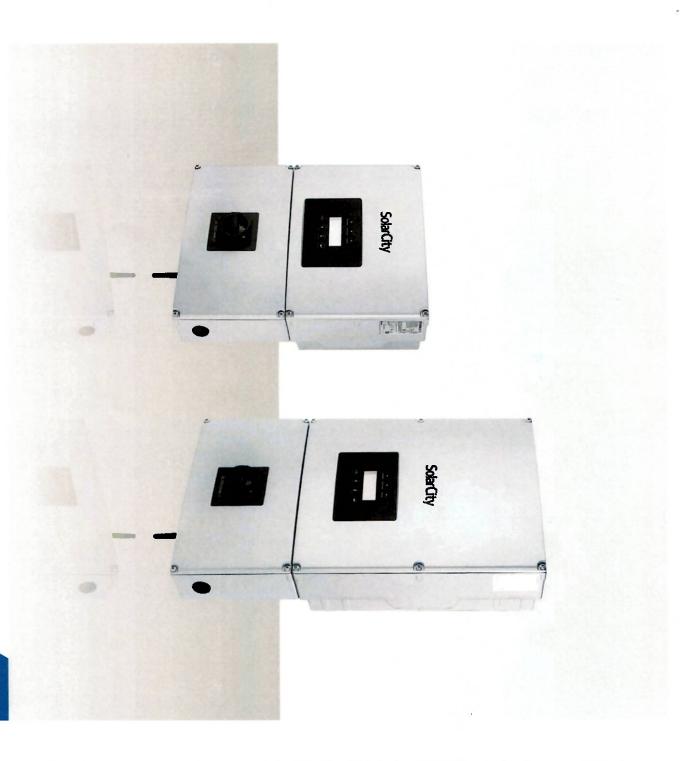
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eral Data		
osure Size in Inches L x W x D (mm)	7.87 x 5.91 x 2.09 (200 x 150 x 53)	12.44 x 10.04 x 2.16 (316 x 255 x 55)
ht	2.86lbs (1.3kg)	6.6lbs (3.0kg)
Connectors	MC-4 PV Connector or Amphenol H4 PV Connector MC-4 PV Connector or Amphenol H4 PV Connector	MC-4 PV Connector or Amphenoi H4 PV Conn
ut Connectors	MC-4 PV Connector or Amphenol H4 PV Connector	Screw Terminal Blocks
ating Temperature	40 ~ 158°F (40 ~ 70°C)	-40 ~ 158°F (-40 ~ 70°C)
ge Temperature	-40 ~ 185°F (-40 ~ 85°C)	-40 ~ 185°F (-40 ~ 85°C)
dity	0~100%	0 - 100%
Operating Altitude	2000m above sea level	2000m above sea level
anty	10 Years	10 Years
dard Compliance		
sure Protection Rating	NEMA 4X	NEMA 4X
У	UL 1741, CSA 22.2 107-1	UL 1741, CSA22.2 107-1
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
Sales Hotline: +1-877-440-5851 or
+1-626-369-8021
Support (Intl.): +1-626-369-8019
Monday to Friday from 7am to 5pm PST (apant from Holidays)

www.delta-americas.com/solarinverters





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 \sim 158°F (-25 \sim 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





Delta Solar Inverters Datasheet for SolarCity

0.86i - 0.85c -50 ab(A) @ Im 98% 97.5% @ 208V 197.5% @ 240V -13 ~ 158°F (-25-70°C) dereiting above 122°F (50°C) -40 - 186°F (-40 ~ 85°C) 0 ~ 100% 2000m above seatlevel 2000m above seatlevel 2000m sove seatlevel 2000m sove seatlevel 26.8 x 15.8 x 8.5 in (680 x 401 x 216 mm) 8pring farminelle in connection box Apring farminelle in connection box AWG 12 ~ AWG 6 Copper (According to NEC 310.15) A pairs of spring terminals in connection box AWG 12 ~ AWG 6 Copper (According to NEC 690.8) 2/gBee 3 LEDs, 4-Line LCD Decest Aluminum NEMA 4X, IEC 69068-2-11 Saft mist UL 1741 Second Edition, CSA CZ2 Z No.107.1-01 UL 1741 Second Edition, CSA CZ2 Z No.107.1-01 FCC part 15 Class B UL 1698 (Type 1), NIEC 690.11 UL 1741 CRD PYRSS, NEC 690.12 (with SMART RSS)		0.85 - 0.05c	19,5 x 15,8 x 8,5 in , 43,0 lb 2 pairs of spring tern	atalité Power Factor Range statuté Power Series NERAL SPECIFICATION L'Efficiency Territory Tarating Temperature Range rate Temperature Range rate Temperature Range rate Temperature Range (L'XW x D inches (L'XW x D mm) The Temperature Range Tempe
	59.3 ~ 60.5 Hz 57.0 ~ 63.0 Hz < 1.5 W < 1.5 W < 2% > 0.99			uency Aurige uency Range A Consumption I Harmonic Distortion (2) Nominal Power
6400 W @ 240 V 7600 W @ 240 V £ 240 V 31.7 A @ 208 V 1 27.5 A @ 240 V 31.7 A @ 240 V	8 V 5200 W @ 240 V 600 40 V 5200 W @ 240 V 600 183 - 228 V @ 208 V / 211 - 264 V @ 240 V 8 V 24,0 A @ 208 V / 31,7 10 V 21,6 A @ 240 V 27,6 10 C 21,6 A @ 240 V 27,6	3500 W @ 240 V 3600 W @ 240 V 183 -: 15.8 A @ 208 V 1 15.8 A @ 240 V	3000 W @ 216 V / 3000 W @ 240 V 14.4 A @ 208 V / 12.5 A @ 240 V	Continuous Fower age Kangs unal Current
2 4 4 6500 W 7800 W 8600 W 6 200 V / 8600 W 6 20	5200 W 5200 W @ 208 V I	1 2 3800 W 3300 W @ 208 V /	3000 W @ 206 V I	Tracker Tracker I Input Strings Available TPUT (AC) Inical Power
20.0 A per MPP tracker 5000 W 5600 W	380 V 380 V 85 - 550 V 200 - 500 V 25.0 A per MPP tracker 4200 W 1.5 Internal	- 2000 A	18.0 A	Dynam vollage inal Vollage aling Vollage Range Power MPPT Range Unitle Current Short Croul Current @ STC Allowable imbalance Power ved DC Loading Ratio

Delta Products Corporation, Inc.
48/101 Fremont Blvd.
Fremont, CA 94538
Sales Ermail inverter sales@deltoww com
Support Ermail inverter support@deltoww com
Sales Heltine +1-8/7-440-2851 or +1-8/2-389-8021
Support Hotine +1-8/7-440-2810
Support Hotine +1-8/7-462-389-8019
Monday to Friday from 7 am to 5 pm PST (apart from Holidays)



SC-B2 SERIES MODULE



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

MORE POWER, FEWER MODULES

LIMITED WARRANTY	Power Output	10 years (90% of P _{MIN})
		25 years (80% of P _{MIN})
	Workmanship	15 years
MATERIALS	Cell Material	5 inch photovoltaic cells
	Glass Material	AR coated tempered glas
	Frame Materials	Black anodized aluminum
CAUTION	Please read the installation manual carefully before using the product.	ng 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 Tesia. SolarCity and Tesia make no warranties related to the modules, which are sold as-is. SolarCity will handle any warranty claims on behalf of any purchaser.

SOLARCITY 1146037-00-A

For use in residential and commercial PV installations Zep Compatible 96-Cell Black-on-Black PV Module

MORE POWER PER MODULE

Our 315W module generates 16% more power than a standard 270 W

Short Circuit Current, I_{sc} (A)

5.83 70.2

5.78 69.9

600

600 5

Open Circuit Voltage, Voc (V) Max Power Current, I (A) Max Power Voltage, V_{MP} (V)

MORE ENERGY EVERY YEAR

better in the heat.

on top of high efficiency crystalline silicon. Heterojunction cell technology, which adds a layer of thin film silicon Manufactured by Panasonic for SolarCity, the module uses

mandated, these modules far exceed industry standards.

LEADING WARRANTY

workmanship that extends to 15 years.

Charles in control RoHS

\mathcal{L}

MODULE SPECIFICATIONS

SC315B2 AND SC310B2 BLACK MODULE

Max Power (W)

More yearly energy (kWh) compared to other modules as they perform

MORE LAYERS, MORE POWER

OUTSTANDING DURABILITY

With more than 20 additional tests performed beyond what is currently

Our modules rank among the best in warranty coverage, with

MECHANICAL DATA

Open Circuit Voltage, Voc (V)

Max Power Current, I_{NP} (A)

4.37 53.6

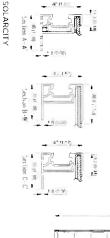
65.7

Short Circuit Current, I_{sc} (A)

Max Power Voltage, V_{MP} (V)

Max Power (W)

Fire Type	Wind and Snow Load	Frame Color	Connector		Dimensions	Weight
UL 1703 Type 2	2400 Pa (50 lbs/ft")	Black	MC4	1053 mm (41.46") / 40 mm (1.57")	1590 mm (62.60") /	19.5kg (42.99 lbs)
,	1590	(52.50)				-
						E PORT



Unit. mm (in)

1146037-00-A

TEMPERATURE CORRECTION

ELECTRICAL CHARACTERISTICS

SC315B2

SC310B2

58.4

315

310B2	NOCT (°C)	49
310	P _{uox} (%/°C)	-0.29
58.1	V _{oc} (%/°C)	-0.25
5.34	I _{SC} (%/°C)	0.03

Electrical characteristics are within -5/+10% of the indicated values of $\frac{1}{k_{\rm CP}}$ and $P_{\rm Max}$ under standard test conditions (irradiance of 100 mW/cm, Af 1,5 spectrum, and a cell temperature of 25 degrees Celsius or 77 degrees Fahrenheit). racteristics are within -5/+10% of the indicated values of ${\rm t}_{\rm sc}$. under standard test conditions (irradiance of 100 mW/cm, AM

AT LOW IRRADIANCE (20%)

AT NOCT (NORMAL OPERATING CONDITIONS)

SC315B2

234.6

Power Tolerance (%) Solar Module Efficiency (%) Max Series Fuse Rating (A) System Voltage (V)

18.8

18.5

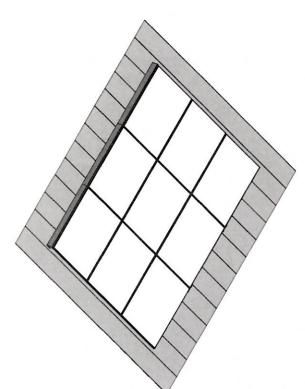
+5/-0

4.66	65,4	4.33	53.3	230.7	SC310B2	
Short Circuit Current, I _{sc} (A)	Open Circuit Voltage, $V_{\rm oc}$ (V)	Max Power Current, I,,, (A)	Max Power Voltage, V _{NP} (V)	Max Power (W)	Model	
1.17	65.4	1.07	55.7	59.7	SC315B2	
1,16	65.0	1.06	55.2	58.6	SC310B2	



ZS Seam

for standing seam metal roofs





- PV mounting solution for standing seam metal roofs
 Works with all Zep Compatible Modules
 Auto bonding UL-listed hardware creates structural and electrical bond

Specifications

(I) Ustra

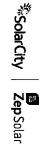
- Designed for pitched roofs
 Installs in portrait and landscape orientations
 ZS Seam grounding products are UL listed to UL 2703 and UL 467
 ZS Seam bonding products are UL listed to UL 2703
 Engineered for spans up to 72" and cantilevers up to 24"
 Zep wire management products listed to UL 1565 for wire positioning devices

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.

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Next-Level PV Mounting Technology



Components



Seam Mount S-5-U, S or N

유



Ace Clamp A-2 Seam Mount

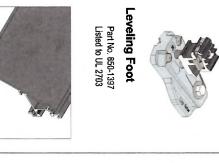


Part No. 850-1606 or 850-1421 Listed to UL 2703



End Cap

Part No. (L) 850-1586 or 850-1460 (R) 850-1588 or 850-1467 Listed to UL 2703



interlock

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



Ground Zep V2

Array Skirt

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



DC Wire Clip

Part No. 850-1509 Listed to UL 1565

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: Zapats.com.

zepsolar.com

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