10/22/2024

RE: Structural Certification for Installation of Residential Solar
JIM LANCE:321 SW WELL ST, FORT WHITE, FL, 32038

Attn: To Whom It May Concern

This Letter is for the existing roof framing which supports the new PV modules as well as the attachment of the PV system to existing roof framing. From the field observation report, the roof is made of Metal roofing over 1/2 inch plywood supported by 2X6 Rafters at 24 inches .The slope of the roof was approximated to be 10 degrees.

After review of the field observation data and based on our structural capacity calculation, **the existing roof framing has been determined to be adequate to support the imposed loads without structural upgrades.** Contractor shall verify that existing framing is consistent with the described above before install. Should they find any discrepancies, a written approval from SEOR is mandatory before proceeding with install. Capacity calculations were done in accordance with applicable building codes.

Code	2023 Florida Building Code (ASCE 7-22)				
Risk category		II	Wind Load	(component and Cladding)	
Roof Dead Load	Dr	10 psf		V	120 mph
PV Dead Load	DPV	3 psf		Exposure	B
Roof Live Load	Lr	20 psf			
Ground Snow	S	0 psf			

If you have any questions on the above, please do not hesitate to call.

Sincerely,

Vincent Mwumvaneza, P.E
EV Engineering LLC

VINCENT MWUMVANEZA LICENSE No. 86986 STATE OF FLORIDA PROFESSIONAL ENGINEER
Exp:02/28/2025
STRUCTURAL ONLY

This item has been digitally signed and sealed by Vincent Mwumvaneza on the date adjacent to the seal.
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Vincent Mwumvaneza
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http://www.evengineersnet.com

Structural Letter for PV Installation

Date: 10/22/2024
Job Address: **321 SW WELL ST**
FORT WHITE, FL, 32038
Job Name: **JIM LANCE**
Job Number: **102224JL**

Scope of Work

This Letter is for the existing roof framing which supports the new PV modules as well as the attachment of the PV system to existing roof framing. All PV mounting equipment shall be designed and installed per manufacturer's approved installation specifications.

Table of Content

Engineering Calculations Summary

Code	2023 Florida Building Code (ASCE 7-22)		
Risk category		II	
Roof Dead Load	Dr	10	psf
PV Dead Load	DPV	3	psf
Roof Live Load	Lr	20	psf
Ground Snow	S	0	psf
Wind Load	(component and Cladding)		
	V	120	mph
	Exposure	B	

References

NDS for Wood Construction

Sincerely,

Vincent Mwumvaneza, P.E
EV Engineering LLC

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Wind Load Cont.

Risk Category =	II		
V=	**120**	**mph**	**ASCE 7-22 Figure 26.5-1B**
Exposure =	**B**		
K_{Zt} =	1.0		ASCE 7-22 Sec 26.8.2
K_Z =	0.57		ASCE 7-22 Table 26.10-1
K_d =	0.85		ASCE 7-22 Table 26.6-1
K_e =	1.00		ASCE 7-22 Table 26.9-1
$q_h = 0.00256K_zK_{zt}K_eV^2$=	17.82	psf	
Pitch =	10.0	Degrees	
γ_E=	1.0	(1.5 for Exposed Modules)	
γ_a=	0.7	considering 1 module	

	Uplift (W)	**Zone(1)**	**Zone(2)**	**Zone(2)**	**Zone(3)**
Fig. 30-3-2	GC_p=	-1.7	-2.3	-2.3	-3
Eq. 29.4-7	$P=q_hKd(GC_p)(\gamma_E)(\gamma_a)$=	-19.99	-27.04	-27.04	-35.27

	Downpressure (W)	All Zones	
	GC_p=	0.55	Figure 30.3-2
	$P=q_hKd(GC_p)(\gamma_E)(\gamma_a)$=	6.47	Equation 29.4-7

Rafter Attachments: 0.6D+0.6W (CD=1.6)

Connection Check

Attachement max. spacing=	4	ft	(Max)
K2 Splice Foot Rafter Attachment=	700	lbs	Manufacturer Test
Safety Factor	2		
Allowable Capacity=	700	lbs	

Zone	**Average Trib Width**	**Area (ft)**	**Uplift (lbs)**	**Down (lbs)**
Zone(1)	4	10.2	140.7	96.6
Zone(2)	4	10.2	183.9	96.6
Zone(2)	4	10.2	183.9	96.6
Zone(3)	2	5.1	117.1	96.6
	Conservative Max=		183.9	< 700
			CONNECTION IS OK	

1. Pv seismic dead weight is negligible to result in significant seismic uplift, therefore the wind uplift governs

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Vertical Load Resisting System Design

Rafters

Max Length, L =	**10.0** ft	(Beam maximum Allowable Horizontal Span)	
Tributary Width, W_T =	**24** in		
Dr =	**10** psf	20 plf	
L_r =	20 psf		
W_{down}=	6.47 psf	12.9 plf	
Pv=	**3 psf**	6 plf	

Load Case: DL+0.6W (CD=1.6)

Pv max Shear=	96.6 lbs		
Max Moment, M_u =	390 lb-ft	Conservative	
Max Shear, V_u=wL/2+Pv Point Load =	227 lb		

Note: Proposed loading will add less than 5% of the existing loads.

Member Capacity

DF-L No.2

2X6	Design Value	C_L	C_F	C_i	C_r	K_F	ϕ	λ	Adjusted Value
F_b =	900 psi	1.0	1.3	1.0	1.15	2.54	0.85	0.8	1346 psi
F_v =	180 psi	N/A	N/A	1.0	N/A	2.88	0.75	0.8	180 psi
E =	1600000 psi	N/A	N/A	1.0	N/A	N/A	N/A	N/A	psi
E_{min} =	580000 psi	N/A	N/A	1.0	N/A	1.76	0.85	N/A	580000 psi

Depth, d =	5.5 in			
Width, b =	1.5 in			
Cross-Sectonal Area, A =	8.25 in^2			
Moment of Inertia, I_{xx} =	20.7969 in^4			
Section Modulus, S_{xx} =	7.5625 in^3			
Allowable Moment, $M_{all} = F_b'S_{xx}$ =	847.9 lb-ft	$DCR=M_u/M_{all}$ =	0.46 < 1	**Satisfactory**
Allowable Shear, $V_{all} = 2/3F_v'A$ =	990.0 lb	$DCR=V_u/V_{all}$ =	0.23 < 1	**Satisfactory**

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Siesmic Loads Check

Roof Dead Load	10	psf
% or Roof with Pv	44.1%	
Dpv and Racking	3	psf
Average Total Dead Load	11.3	psf
Increase in Dead Load	5.3%	**OK**

The increase in seismic Dead weight as a result of the solar system is less than 10% of the existing structure and therefore no further seismic analysis is required.

Limits of Scope of Work and Liability

We have based our structural capacity determination on information in pictures and a drawing set titled PV plans - JIM LANCE. The analysis was according to applicable building codes, professional engineering and design experience, opinions and judgments. The calculations produced for this structure's assessment are only for the proposed solar panel installation referenced in the stamped plan set and were made according to generally recognized structural analysis standards and procedures.