VSE Project Number: U3996.0007.221

April 20, 2022

Georgia Solar Pros
ATTENTION: Jacob Hall
1775 Pine Park Road
Cairo, GA 39827

REFERENCE: 382 SW Dusk Gl. Lake City Residence: 382 SW Dusk Glen, Lake City, FL 32024
Solar Array Installation

To Whom It May Concern:

Per your request, we have reviewed the existing structure at the above referenced site. The purpose of our review was to determine the adequacy of the existing structure to support the proposed installation of solar panels on the roof as shown on the panel layout plan.

Based upon our review, we conclude that the existing structure is adequate to support the proposed solar panel installation.

Design Parameters

Code: 2020 Florida Building Code - Residential, 7th Edition (2018 IRC)
Risk Category: I
Design wind speed, Vult: 108 mph (3-sec gust)
Wind exposure category: C

Existing Roof Structure

Roof structure: Aluminum Frame @ 48" o.c.
Roofing material: metal corrugated
Roof slope: 26°

Connection to Roof

Mounting connection: (1) S-5! ProteaBracket (Alum) to min. 26 ga steel roofing w/ (4) 6mm self-piercing screws at max. 43" o.c. along rails
Install (2) rails per row of panels, evenly spaced; panel length perpendicular to the rails shall not exceed 68.5 in
Rail cantilever shall not exceed 33% of connection spacing

Note: See the attached detail for the requirements for attaching the metal roofing to the structural framing.

Note: Contractor shall verify min. metal gauge prior to installation of the solar panels.

Conclusions

Based upon our review, we conclude that the existing structure is adequate to support the proposed solar panel installation. In the area of the solar array, other live loads will not be present or will be greatly reduced (2020 FBC - Residential, Section R324.4.1.1). The gravity loads, and thus the stresses of the structural elements, in the area of the solar array are either decreased or increased by no more than 5%. Therefore, the requirements of Section 807.5 of the 2020 FBC - Existing Building are met and the structure is permitted to remain unaltered.

The solar array will be flush-mounted (no more than 10" above the roof surface) and parallel to the roof surface. Thus, we conclude that any additional wind loading on the structure related to the addition of the proposed solar array is negligible. The attached calculations verify the capacity of the connections of the solar array to the existing roof against wind (uplift), the governing load case. Increases in lateral forces less than 10% are considered acceptable. Thus the existing lateral force resisting system is permitted to remain unaltered.

Limitations

Installation of the solar panels must be performed in accordance with manufacturer recommendations. All work performed must be in accordance with accepted industry-wide methods and applicable safety standards. The contractor must notify Vector Structural Engineering, LLC should any damage, deterioration or discrepancies between the as-built condition of the structure and the condition described in this letter be found. Connections to existing roof framing must be staggered, except at array ends, so as not to overload any existing structural member. The use of solar panel support span tables provided by others is allowed only where the building type, site conditions, site-specific design parameters, and solar panel configuration match the description of the span tables. The design of the solar panel racking (mounts, rails, etc.) and electrical engineering is the responsibility of others. Waterproofing around the roof penetrations is the responsibility of others. Vector Structural Engineering assumes no responsibility for improper installation of the solar array. Vector Structural Engineering shall be notified of any changes from the approved layout prior to installation.

VECTOR STRUCTURAL ENGINEERING, LLC
FL Firm License: COA 26626

Jacob S Proctor

Digitally signed by Jacob S Proctor
Date: 2022.04.21 08:50:46 -06'00'

04/20/2022

Jacob Proctor, PE
FL License: 74277 - Expires: 02/28/2023
Project Engineer

This item has been digitally signed and sealed by Jacob Proct on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

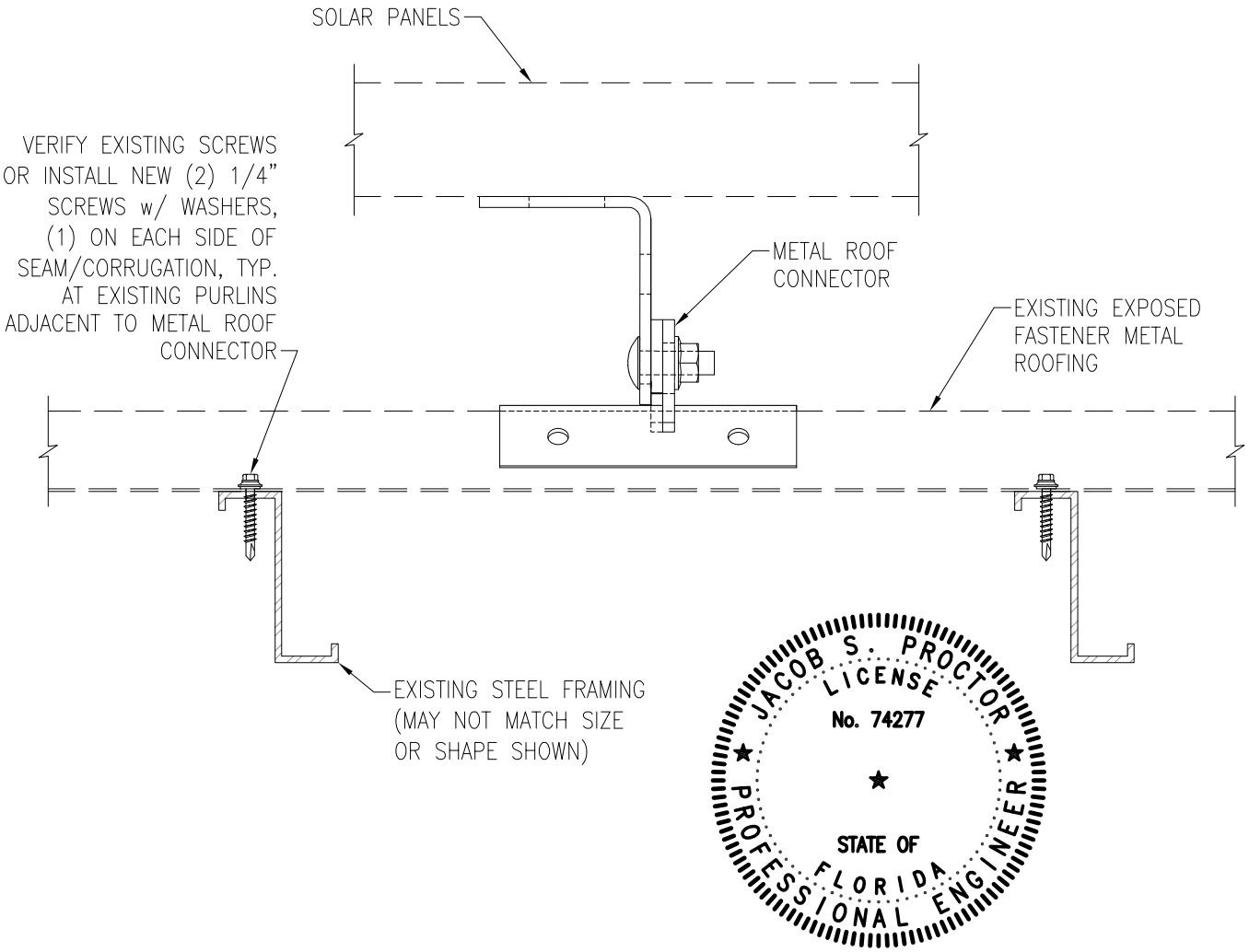
Enclosures

JSP/ryl

VECTOR ENGINEERS
DRAPER, UTAH
(801) 990-1775
WWW.VECTORSOLAR.COM

SUBJECT TYPICAL MOUNT ATTACHMENT

NOTE:
WATERPROOFING BY CONTRACTOR REQUIRED AT ALL ROOF PENETRATIONS.



JACOB S. PROCTOR
LICENSE
No. 74277
STATE OF FLORIDA
PROFESSIONAL ENGINEER

04/20/2022

NOTES:
1. CONTRACTOR TO INSTALL METAL ROOF CONNECTOR PER MANUFACTURER SPECIFICATIONS.
2. VERIFY EXISTING CONDITIONS ARE AS DEPICTED ABOVE.

This item has been digitally signed and sealed by Jacob S. Proctor on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

JOB NO.: U3996.0007.221
SUBJECT: WIND PRESSURE

PROJECT: 382 Sw Dusk Gl. Lake City Residence

Components and Cladding Wind Calculations

Label: Solar Panel Array Note: Calculations per ASCE 7-16

SITE-SPECIFIC WIND PARAMETERS:

Basic Wind Speed [mph]:	108
Exposure Category:	C
Risk Category:	I

Notes:

ADDITIONAL INPUT & CALCULATIONS:

Height of Roof, h [ft]:	15	(Approximate)			
Comp/Cladding Location:	Gable Roofs 20° < θ ≤ 27°				
Enclosure Classification:	Enclosed Buildings				
Zone 1, 2e GCp:	1.50	Figure 30.3-2C (negative coeff.)	Zone 1, 2e γ_a:	0.80	Fig. 29.4-8
Zone 2n, 2r, 3e GCp:	2.49		Zone 2n, 2r, 3e γ_a:	0.80	
Zone 3r GCp:	3.60		Zone 3r γ_a:	0.80	

α:	9.5	Table 26.11-1
z_g [ft]:	900	Table 26.11-1
K_h:	0.85	Table 26.10-1
K_e:	1.00	Table 26.9-1
K_{zt}:	1	Equation 26.8-1
K_d:	0.85	Table 26.6-1
Velocity Pressure, q_h [psf]:	21.5	Equation 26.10-1
γ_E:	1.50	Section 29.4.4

WIND PRESSURES:

Equation 29.4-7 $p = q_h (GC_p)(\gamma_E)(\gamma_a)$

Zone 1, 2e, p [psf]:	38.4	psf (1.0 W)
Zone 2n, 2r, 3e, p [psf]:	63.8	psf (1.0 W)
Zone 3r, p [psf]:	92.7	psf (1.0 W)

(a = 3 ft)

JOB NO.: U3996.0007.221
SUBJECT: CONNECTION

PROJECT: 382 Sw Dusk Gl. Lake City Residence

Calculate Uplift Forces on Connection

	Pressure (0.6 Dead -0.6 Wind) (psf)	Max Trib. Width[1] (ft)	Max Trib. Area[2] (ft^2)	Max Uplift Force (lbs)
Zone 1, 2e	21.3	3.6	10.2	217
Zone 2n, 2r, 3e	36.5	3.6	10.2	373
Zone 3r	0.0	NA	0.0	0

Calculate Connection Capacity

Roof Connector:	S-5! ProteaBracket (Alum)
Additional Connection Info:	to min. 26 ga steel roofing w/ (4) 6mm self-piercing screws
Ultimate Capacity[3] [lbs/in]:	1254
Factor of Safety:	3
Qty. of Connectors:	1
Prying Coefficient:	1
Total Capacity [lbs]:	418

Determine Result

Maximum Demand:	373
Connection Capacity:	418

Result: **Capacity > Demand, Connection is adequate.**

Notes

1. 'Max Trib. Width' is the width along the rails tributary to the connection.
2. 'Max Trib Area' is the product of the 'Max. Trib Width' and 1/2 the panel width/height perpendicular to the rails. (2) rails per row of panels. Length of panels perpendicular to the rails shall not exceed 69".
3. Ultimate capacity values are from manufacturer testing. Metal gauge is unknown. A conservative thickness has been used. Metal gauge shall be verified in field prior to installation of solar panels.
4. Install metal roof connector per manufacturer's written instructions with recommended fasteners when indicated.
5. See attached detail for additional information for connection of metal roof deck to framing.

JOB NO.: U3996.0007.221
SUBJECT: GRAVITY LOADS

PROJECT: 382 Sw Dusk Gl. Lake City Residence

GRAVITY LOADS

Roof Pitch: 5.9 :12

ROOF DEAD LOAD (D)	Design material weight [psf]	Increase due to pitch	Material weight [psf]
Metal Corrugated	3.3	1.11	3.0
1/2" Plywood	1.1	1.11	1.0
Framing	3.0		3.0
Insulation	0.5		0.5
1/2" Gypsum Clg.	2.2	1.11	2.0
M, E & Misc	1.5		1.5
Total Existing Roof DL	11.7		
PV Array DL	3.3	1.11	3

ROOF LIVE LOAD (Lr)

Existing Design Roof Live Load [psf]	20	ASCE 7-16 Table 4.3-1
Roof Live Load With PV Array [psf]	0	2020 FBC - Residential, Section R324.4.1.1

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SUBJECT: LOAD COMPARISON

PROJECT: 382 Sw Dusk Gl. Lake City Residence

Summary of Loads

	Existing	With PV Array
D [psf]	12	15
Lr [psf]	20	0
S [psf]	0	0

Maximum Gravity Loads:

	Existing	With PV Array	
D + Lr [psf]	32	15	ASCE 7-16, Section 2.4.1
D + S [psf]	12	15	ASCE 7-16, Section 2.4.1

Maximum Gravity Load [psf]:	32	15

Ratio Proposed Loading to Current Loading: **47%** **OK**

The gravity loads, and thus the stresses of the structural elements, in the area of the solar array are either decreased or increased by no more than 5%. Therefore, the requirements of Section 807.5 of the 2020 FBC - Existing Building are met and the structure is permitted to remain unaltered.