

Friday, August 29, 2025

Contractor  
MJAK COMPANY  
8416 Us Hwy 158,  
Stokesdale, NC 27357

RE: Roof mounted PV system  
Felix Mejia Residence  
91 Fields Way, Coats, North Carolina 27521

To Whom It May Concern,

**Structural Engineering Certification**

Upon reviewing the as-built conditions provided by the contractor, I, Ermocrates Castillo PE #50478 an engineer licensed pursuant to General Statute 89c, certify that the installation of the modules is in compliance with International Building Code 2018, Chapter 3 and that the building structure will safely accommodate wind, lateral and uplift forces, and equipment dead loads. The member forces in the area of the solar panels are not increased by more than 5%; thus, the stresses of the structural elements are not increased by more than 5%. Therefore, the requirements of section 806.2 of the IEBC, 2018 are met and the structure is permitted to remain unaltered. The solar array will be flush-mounted and parallel to the roof surface. Thus, it is concluded 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. Because the increase in lateral forces is less than 10%, this addition meets the requirements of the exception in 806.3 of the IEBC, 2018. Thus the existing lateral force resisting system is permitted to remain unaltered.

After adequate review, the existing roof framing has been determined to be adequate to support the imposed loads without any additional structural upgrades.

**A. Site Visit, Documentation and Existing Site Conditions**

Roof Style	Gable	Truss Type	Spruce-Pine-Fir
Roof Type	Asphalt Shingle	Truss Size	2x4 in
Roof Height	15 ft	Truss Spacing	24 in
Roof Slope	6/12 (26.57 deg)	Module Count	26 modules

A site visit was performed by the contractor to identify the size and spacing of the existing roof’s framing structure. The roof is evaluated for a module count of 26 modules.

**B. Governing Codes**

- International Residential Code 2018
- International Building Code 2018
- International Plumbing Code 2018
- International Mechanical Code 2018
- International Fire Code 2018
- All Local City and County Ordinances,
- National Electrical Code 2023 (NEC)
- ASCE 7-16



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SUITE 270, MAITLAND, FL 32751

C. Design Criteria

Wind Speed (ult):	119 mph
Wind Speed (asd):	92 mph
Exposure:	B
Risk Category:	II
Ground Snow Load:	27.00 psf
Sloped Roof Snow Load:	18.04 psf

D. Factors Considered

Exposure Factor (Ce)	1.000	Effective Wind Area Of Module	20.00	ft
Temperature Factor (Ct)	1.000	Component Amplification (ap)	1.00	
Component Response Factor	1.500	Component Operating Weight	50.00	lbs
Spectral Acceleration (Sds)	0.136	Total Modules In The Array	26.00	Nos
Importance Factor (Is)	1.000	Dead Load	3.00	psf
Slope Factor (Cs)	0.668	Ground Elevation	246.00	ft
KD	0.850	Zone width "A"	4.00	ft
KZT	1.000	Array Edge Factor	1.50	
Ke	0.991	Solar Panel Equalization Factor	0.680	
Kz	0.575	HVHZ	NO	

E. Design Calculations

Velocity Pressure (ASD) =	.00256*KEKzKzTKD <sup>2</sup>
Velocity Pressure (ASD) =	10.53156 psf

External Pressure Coefficients

Zones	Positive Pressure		Negative Pressure		
	Positive Pressure Coefficient	Positive Design Pressure (psf)	Negative Pressure Coefficient	Negative Design Pressure (Non-Exposed) (psf)	Negative Design Pressure (Exposed) (psf)
Zone 1	0.4646	16.00	-1.5000	-16.00	-16.10
Zone 1'	X	X	X	X	X
Zone 2e	0.4646	16.00	-1.5000	-16.00	-16.10
Zone 2n	0.4646	16.00	-2.1673	-16.00	-23.27
Zone 2r	0.4646	16.00	-2.1673	-16.00	-23.27
Zone 3e	0.4646	16.00	-2.1673	-16.00	-23.27
Zone 3r	0.4646	16.00	-2.4530	-17.56	-26.33

Maximum Seismic Load Calculation		
Horizontal Force	176.48	lbs
Vertical Force	1.36	lbs
Total Seismic Load (1.2D + Ev + Eh+ .2S)	185.04	lbs

Structural Attachment Strength Calculation

Specific Gravity of Spruce-Pine-Fir	0.42	Screw Diameter	5/16"
Attachment Strength of Instaflash 2		495	lbs
For Two 5-16" Lag Screw with 2.5" Minimum Embedment into Structural Member per NDS 2018			

Roof Zone	Non-Exposed		Exposed		Down
	Number of rails		Number of rails		
	2		2		
	Spans (in)	Point Load (lbs)	Spans (in)	Point Load (lbs)	Point Load (lbs)
1	48	213.33	48	214.71	213.33
1'	X	X	X	X	X
2e	48	213.33	48	214.71	213.33
2n	48	213.33	48	310.23	213.33
2r	48	213.33	48	310.23	213.33
3e	48	213.33	48	310.23	213.33
3r	48	234.09	48	351.13	213.33

#### *F. Attachment Spans*

The solar panels shall be mounted in accordance with the most recent installation manual. Considering the wind speed, risk category, exposure, roof slopes, snow load, seismic load, size and spacing of framing members, and condition of the roof, the span tables provided by the manufacturer is not applicable and so the contractor what install the mounting system no greater than the below attachment spans:

	Non Exposed Modules	Cantilever	Exposed Modules	Cantilever	
Zone 1	Attachments at 48 in O.C. with 2 rails	16 in	Attachments at 48 in O.C. with 2 rails	16 in	Zone 1
Zone 1'	Zone not applicable in Gable roofs	-	Zone not applicable in Gable roofs	-	Zone 1'
Zone 2e	Attachments at 48 in O.C. with 2 rails	16 in	Attachments at 48 in O.C. with 2 rails	16 in	Zone 2e
Zone 2n	Attachments at 48 in O.C. with 2 rails	16 in	Attachments at 48 in O.C. with 2 rails	16 in	Zone 2n
Zone 2r	Attachments at 48 in O.C. with 2 rails	16 in	Attachments at 48 in O.C. with 2 rails	16 in	Zone 2r
Zone 3e	Attachments at 48 in O.C. with 2 rails	16 in	Attachments at 48 in O.C. with 2 rails	16 in	Zone 3e
Zone 3r	Attachments at 48 in O.C. with 2 rails	16 in	Attachments at 48 in O.C. with 2 rails	16 in	Zone 3r

#### *G. Limitations*

Castillo Engineering Services, LLC takes no responsibility for the installation of the system. The contractor has supplied the as-built conditions and shall cease construction and notify Castillo should any discrepancies between the provided as-built conditions and the condition described in this letter be found. The design and engineering of the racking, mounting, waterproofing, fire pathways and setbacks, electrical system and system labels are the responsibility of others. The contractor must adhere to the spans provided within this letter and all connections to the existing roof must adhere to industry standard and per manufacturer's most recent installation instructions.

#### PE Certification: