



October 16, 2023

RE: CERTIFICATION LETTER

Project Address: MCLAUGHLIN RESIDENCE
412 N MIDLAND AVE
NYACK, NY, 10960

Design Criteria:

- Applicable Codes = 2020 NYSRC, 2018 IRC/IBC/IEBC, ASCE 7-16 and 2018 NDS
- Risk Category = II
- Wind Speed = 114 mph, Exposure Category B, Partially/Fully Enclosed Method
- Ground Snow Load = 30 psf
- ROOF AR-01 : 2 x 6 @ 24" OC, Roof DL = 7 psf, Roof LL/SL = 23 psf (Non-PV), Roof LL/SL = 15 psf (PV)

To Whom It May Concern,

A structural evaluation of loading was conducted for the above address based on the design criteria listed above.

Existing roof structural framing has been reviewed for additional loading due to installation of PV Solar System on the roof. The structural review applies to the sections of roof that is directly supporting the solar PV system.

Based on this evaluation, I certify that the alteration to the existing structure by installation of the PV system meets the prescriptive compliance requirements of the applicable existing building and/or new building provisions adopted/referenced above.

Additionally, the PV module assembly including attachment hardware has been reviewed to be in accordance with the manufacturer's specifications and to meet and/or exceed the requirements set forth by the referenced codes.

Sincerely,

MOUNTING PLANE STRUCTURAL EVALUATION			
MOUNTING PLANE	ROOF PITCH (deg.)	RESULT	GOVERNING ANALYSIS
ROOF AR-01	31°	OK	IEBC IMPACT CHECK

Limits of Scope of Work and Liability:

The existing structure has been reviewed based on the assumption that it has been originally designed and constructed per appropriate codes. The structural analysis of the subject property is based on the provided site survey data. The calculations produced for this structure's assessment are only for the roof framing supporting the proposed PV installation referenced in the stamped planset and were made according to generally recognized structural analysis standards and procedures. All PV modules, racking and attachment components shall be designed and installed per manufacturer's approved guidelines and specifications. These plans are not stamped for water leakage or existing damage to the structural component that was not accessed during the site survey. Prior to commencement of work, the PV system installer should verify that the existing roof and connections are in suitable condition and inspect framing noted on the certification letter and inform the Engineer of Record of any discrepancies prior to installation. The installer should also check for any damages such as water damage, cracked framing, etc. and inform the Engineer of Record of existing deficiencies which are unknown and/or were not observable during the time of survey and have not been included in this scope of work. Any change in the scope of the work shall not be accepted unless such change, addition, or deletion is approved in advance and in writing by the Engineer of Record.



LOAD CALCULATION

ROOF AR-01

MCLAUGHLIN RESIDENCE, 412 N MIDLAND AVE, NYACK, NY, 10960

PV SYSTEM DEAD LOAD (PV-DL)

PV Module Weight	= 2.50 psf
Hardware Assembly Weight	= 0.50 psf
Total PV System Dead Load	PV-DL = 3.00 psf

ROOF DEAD LOAD (R-DL)

Existing Roofing Material Weight	Composite Shingle Roof 1 Layer(s)	= 2.50 psf
Underlayment Weight		= 0.50 psf
Plywood/OSB Sheathing Weight		= 1.50 psf
Framing Weight	2 x 6 @ 24 in. O.C.	= 1.15 psf
No Vaulted Ceiling		= 0.00 psf
Miscellaneous		= 1.50 psf
Total Roof Dead Load		R-DL = 7.10 psf

REDUCED ROOF LIVE LOAD (L_r)

Roof Live Load	L _o = 20.00 psf
Member Tributary Area	A _t < 200 ft ²
ROOF AR-01 Pitch	31° or 7/12
Tributary Area Reduction Factor	R ₁ = 1.00
Roof Slope Reduction Factor	R ₂ = 0.85
Reduced Roof Live Load, L_r = L_o (R₁) (R₂)	L_r = 17.00 psf

SNOW LOAD


Ground Snow Load	p _g = 30.00 psf
Effective Roof Slope	31°
Snow Importance Factor	I _s = 1.00
Snow Exposure Factor	C _e = 1.00
Snow Thermal Factor	C _t = 1.10
Minimum Flat Roof Snow Load	p _{f-min} = 20.00 psf
Flat Roof Snow Load	p_f = 23.10 psf

SLOPED ROOF SNOW LOAD ON ROOF (Non-Slippery Surfaces)

Roof Slope Factor	C _{s-roof} = 1.00
Sloped Roof Snow Load on Roof	p_{s-roof} = 23.10 psf

SLOPED ROOF SNOW LOAD ON PV PANEL (Unobstructed Slippery Surfaces)

Roof Slope Factor	C _{s-pv} = 0.65
Sloped Roof Snow Load on PV Panel	p_{s-pv} = 15.00 psf

	IEBC IMPACT CHECK	
	ROOF AR-01	
MCLAUGHLIN RESIDENCE, 412 N MIDLAND AVE, NYACK, NY, 10960		

	EXISTING	WITH PV PANEL	
Roof Dead Load (DL) =	7.10	10.10	psf
Roof Live Load (Lr) =	17.00	0.00	psf
Roof Snow Load (SL) =	23.10	15.00	psf

	EXISTING	WITH PV PANEL	
(DL + Lr)/Cd =	19.28	11.22	psf
(DL + SL)/Cd =	26.26	21.83	psf
Maximum Gravity Load =	26.26	21.83	psf

Load Increase (%) =	-16.89%	OK
IEBC Provision :	2018	

The requirements of section 806.2 of 2018 IEBC are met and the structure is permitted to remain unaltered.

WIND UPLIFT CALCULATION

ROOF AR-01

MCLAUGHLIN RESIDENCE, 412 N MIDLAND AVE, NYACK, NY, 10960

SITE INFORMATION

Ultimate Wind Speed (mph) =	114.00 mph	Roof Pitch (deg.) =	31°
Risk Category =	II	Roof Type =	Hip
Exposure Category =	B	K_d =	0.85
Mean Roof Height =	23.00 ft	K_{zt} =	1
Solar Array Dead Load =	3.00 psf	K_z =	0.65

DESIGN CALCULATIONS

Wind Velocity Press. (qh) = $0.00256 * K_z * K_{zt} * K_d * K_e * V^2$ =	18.36 psf		
a (ft) =	4.50		
Array Edge Factor (γ_E) =	1.50		
Solar Array Pressure Eq. Factor (γ_a) =	0.60		
Hardware Type :	RL UNIVERSAL		
Allowable Load =	655.00 lbs	SPF, 2.5" lag embedment	
Max. X - Spacing (Zone 1)	6.00 ft	Effective Wind Area 20.52 ft ²	
Max. Y - Spacing (Zone 1)	3.42 ft		
Max. X - Spacing (Zone 2e & 2r)	6.00 ft	Effective Wind Area 20.52 ft ²	
Max. Y - Spacing (Zone 2e & 2r)	3.42 ft		
Max. X - Spacing (Zone 3)	6.00 ft	Effective Wind Area 20.52 ft ²	
Max. Y - Spacing (Zone 3)	3.42 ft		
ROOF ZONE	GCp (-) UPLIFT	UPLIFT PRESSURE	PULLOUT FORCE
1	-1.06	-9.01 psf	184.80 lbs
2e & 2r	-1.88	-17.07 psf	350.28 lbs
3	-1.42	-12.59 psf	258.25 lbs

NOTE:

- Wind calculation is based on ASCE 7-16, 29.4 - C&C, LC #7 : $0.6D + 0.6W$ is used.