

7/22/2024

Freedom Forever LLC 43445 Buisiness Park Dr., Suite 110 Temecula, CA 92590

Job Number:	441414
Project Name:	Brian Samuels
Project Address:	59 Bark Way
City:	Angier
State:	NC

Design Criteria:

Applicable Code =	ASCE 7-16
Design Wind Speed =	117 mph (3 Second Gust)
Exposure Category =	С
Ground Snow Load =	15 psf
Module Type =	JINKO SOLAR: JKM390M-72HBL-V
Module Quantity =	10

To whom is may concern,

The above mentioned residential rooftop solar project has been designed to the specifications shown above. The team at Freedom Forever LLC has visited the site to observe the roof and its framing as well as gather other required information for the project. During this observation they did not see any signs of damage or distress to the roof structure which would preclude solar from being installed. Based on that review and the information provided, the calculations on the following pages were completed to determine the adequacy of the roof framing as well as the allowable attachment spacing for the PV panels. The calculations show that the roof can support the proposed PV system.

Sincerely,

Taqi Khawaja, PE Freedom Forever LLC



Wind Calculations

Pressures based on Section 29.4.4 $p = q_h(GC_p)(\gamma_E)(\gamma_a)$ $q_h = .00256 * K_z * K_{zt} * K_d * V^2$ $K_z = 0.98$ $K_{zt} = 1.0$ $K_d = 0.85$ ASCE7 Table 26.6-1 $q_z = 29.3$ psf

Mounting Plan	0		1		2		3		4		5
Woulding Plan	e	GC	Wind	GC	Wind	GC	Wind	GC	Wind	GC	Wind
	1	-1.48	-43.29								
	2e	-1.48	-43.29								
	2r	-2.13	-62.30								
Zone	2n	-2.13	-62.30								
	3r	-2.40	-70.12								
	3e	-2.13	-62.30								
	Down	0.46	13.47								

Mounting Plan	0		6		7		8		9		10
Woulding Plan	e	GC	Wind								
	1										
	2e										
	2r										
Zone	2n										
	3r										
	3e										
	Down										



Snow Load Calculations

Flat Roof Snow Load based on Section 7.3

 $p_f = 0.7C_eC_tI_sp_g$

 $p_g = 15$ $p_f = 11.55$ $C_e = 1.00$ $C_t = 1.10$ $I_s = 1.0$

Mounting Plane		1		2		3		4		5
Roof Snow Load (nsf)	Cs	Snow	Cs	Snow	Cs	Snow	C _s	Snow	Cs	Snow
Roof Snow Load (psf)	0.78	9.05								

Mounting Plane		6		7		8		9	í í	10
Roof Snow Load (psf)	C _s	Snow	Cs	Snow	C _s	Snow	C _s	Snow	Cs	Snow

Load Combinations

Dead	l Load =	3	psf		EM = Edg	ge Modu	le	IM = Int	erior Moo	dule	
Uplift	$\gamma_{\rm E}$ =	1.5		γ_{a} =	0.55	per Figu	ıre 29.4-8				
Mounting Plane	2		1		2		3		4		5
0.6D + 0.6W (psf)		EM	IM	EM	IM	EM	IM	EM	IM	EM	IM
	1	-19.56	-12.44								
	2e	-19.56	-12.44								
Zone	2r	-28.94	-18.69								
2011e	2n	-28.94	-18.69								
	3r	-32.80	-21.27								
	3e	-28.94	-18.69								
Mounting Plane	5		6		7		8		9	-	LO
0.6D + 0.6W (psf)		EM	IM	EM	IM	EM	IM	EM	IM	EM	IM
	1										
	2e										
7000	2r										
Zone	2n										
	3r										
	3e										



Down Force

Mounting Plane		1		2		3		4		5
Module Location	EM	IM	EM	IM	EM	IM	EM	IM	EM	IM
D+S (psf)	10.43	10.43								
D+06W (psf)	9.41	7.19								

Mounting Plane		6		7		8		9	, -	LO
Module Location	EM	IM	EM	IM	EM	IM	EM	IM	EM	IM
D+S (psf)										
D+06W (psf)										

Lateral Parallel to Roof

Mounting Plane	1	2	3	4	5
D+S (psf)	4.43				

Mounting Plane	6	7	8	9	10
D+S (psf)					

Framing Check

Lumber Species: DF

PV Load = 3 psf

Mounting Plane	1	2	3	4	5
Framing Size	2x4				
Framing Spacing (in)	24				
Span (ft)	6				
Moment (lb-ft)	157				
Shear (lbs)	105				
% Stressed	34%				
Upgrade Size	NA				
New % Stressed	NA				

Mounting Plane	6	7	8	9	10
Framing Size					
Framing Spacing (in)					
Span (ft)					
Moment (lb-ft)					
Shear (lbs)					
% Stressed					
Upgrade Size					
New % Stressed					



Array Attachment Spacing

Module Model = JINKO SOLAR: JKM390M-72HBL-V Module Quantity = 10

Mounting Plane	1	2	3	4	5
Attachment Type	Ecofasten RockIt Smart Slide				
Lag Count Per Attachment	2				
Min Lag Embedment (in)	2				
Landscape Max Spacing (in)	72				
Portrait Max Spacing (in)	48				

Mounting Plane	6	7	8	9	10
Attachment Type					
Lag Count Per Attachment					
Min Lag Embedment (in)					
Landscape Max Spacing (in)					
Portrait Max Spacing (in)					