

#### 8/14/2024

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

Job Number:464215Project Name:Terri BoydProject Address:197 Blue Aspen Drive, Fuquay-Varina, NC

#### **Design Criteria:**

Applicable Code =	ASCE 7-16		
Design Wind Speed =	130 mph (3 Second Gust)		
Exposure Category =	В		
Ground Snow Load =	15 psf	Roof Snow Load=	11.55 psf
Module Type =	SILFAB SOLAR: SIL-430 QD		
Module Quantity =	20		

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 without structural modifications.

Mounting Plane	1	2	3	4	5	6	7	8	9	10
Roof Type	Comp Shingle									
Framing Type	Truss									
Framing Size	2x4 @ 24									
Upgrade Size	NA									
Attachment Type	Ecofasten RockIt Smart Slide									
Lag Count	2									
Embedment Depth	2									

Sincerely,

Taqi Khawaja, PE Freedom Forever LLC



## Wind Calculations

Pressures based on Section 29.4.4  $p = q_h(GC_p)(\gamma_E)(\gamma_a)$   $q_h = .00256 * K_z * K_{zt} * K_d * V^2$   $K_z = 0.70$   $K_{zt} = 1.0$   $K_d = 0.85$  ASCE7 Table 26.6-1  $q_z = 25.8$  psf

Mounting Plan	0		1		2		3		4		5
Woulding Flair	e	GC	Wind	GC	Wind	GC	Wind	GC	Wind	GC	Wind
	1	-1.49	-38.32								
	2e	-1.49	-38.32								
	2r	-2.14	-55.23								
Zone	2n	-2.14	-55.23								
	3r	-2.42	-62.30								
	3e	-2.14	-55.23								
	Down	0.46	11.94								

Mounting Plan	0		6		7		8		9	-	10
would find Fian	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 (psf)	Cs	Snow	Cs	Snow	C <sub>s</sub>	Snow	Cs	Snow	Cs	Snow
	0.75	8.66								

Mounting Plane		6		7		8		9		10
Roof Snow Load (psf)	Cs	Snow	Cs	Snow	C <sub>s</sub>	Snow	Cs	Snow	C <sub>s</sub>	Snow

## Load Combinations

Dead	d Load =	3	psf		EM = Edg	ge Modu	le	IM = Int	erior Moo	dule	
Uplift	$\gamma_{\rm E}$ =	1.5		$\gamma_{a}$ =	0.55	per Figu	ire 29.4-8				
Mounting Plane	е		1		2		3		4		5
0.6D + 0.6W (psf)		EM	IM	EM	IM	EM	IM	EM	IM	EM	IM
	1	-17.21	-10.87								
	2e	-17.21	-10.87								
Zone	2r	-25.59	-16.46								
20112	2n	-25.59	-16.46								
	3r	-29.10	-18.80								
	3e	-25.59	-16.46								
Mounting Plane	e		6		7		8		9	-	LO
0.6D + 0.6W (psf)		EM	IM	EM	IM	EM	IM	EM	IM	EM	IM
	1										
	2e										
Zone	2r										
20118	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)	9.83	9.83								
D+06W (psf)	8.64	6.67								

Mounting Plane		6		7		8		9	1	L0
Module Location	EM	IM								
D+S (psf)										
D+06W (psf)										

#### Lateral Parallel to Roof

Mounting Plane	1	2	3	4	5
D+S (psf)	4.59				

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 Type	Truss				
Framing Size	2x4				
Framing Spacing (in)	24				
Span (ft)	7.16				
Moment (lb-ft)	216				
Shear (lbs)	121				
Upgrade Size	NA				

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



## **Array Attachment Spacing**

## Module = SILFAB SOLAR: SIL-430 QD

Mounting Plane	1	2	3	4	5
Roofing Material	Comp Shingle				
Attachment Type	Ecofasten Rocklt Smart Slide				
Lag Count Per Attachment	2				
Min Lag Embedment (in)	2				
Landscape	72				
Portrait	48				
Mounting Plane	6	7	8	9	10
Roofing Material					
Attachment Type					
Lag Count Per Attachment					
Min Lag Embedment (in)					
Landscape					
Portrait					