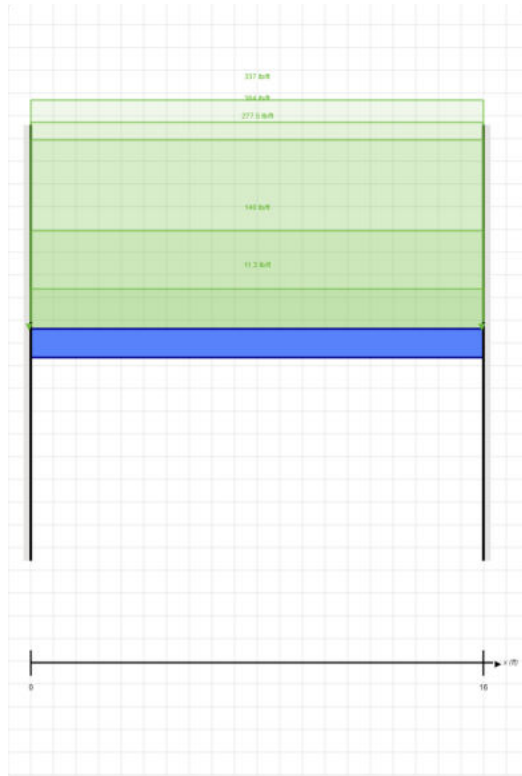


SKYCIV BEAM ANALYSIS REPORT

Load Combination: Envelope Absolute Max



Software: SkyCiv Beam v3.2.2
Mon Nov 20 2023 08:30:48 GMT-0300 (hora estándar de Uruguay)

Project Info

File Name: 846 Rackley Rd - LVL Beam #1

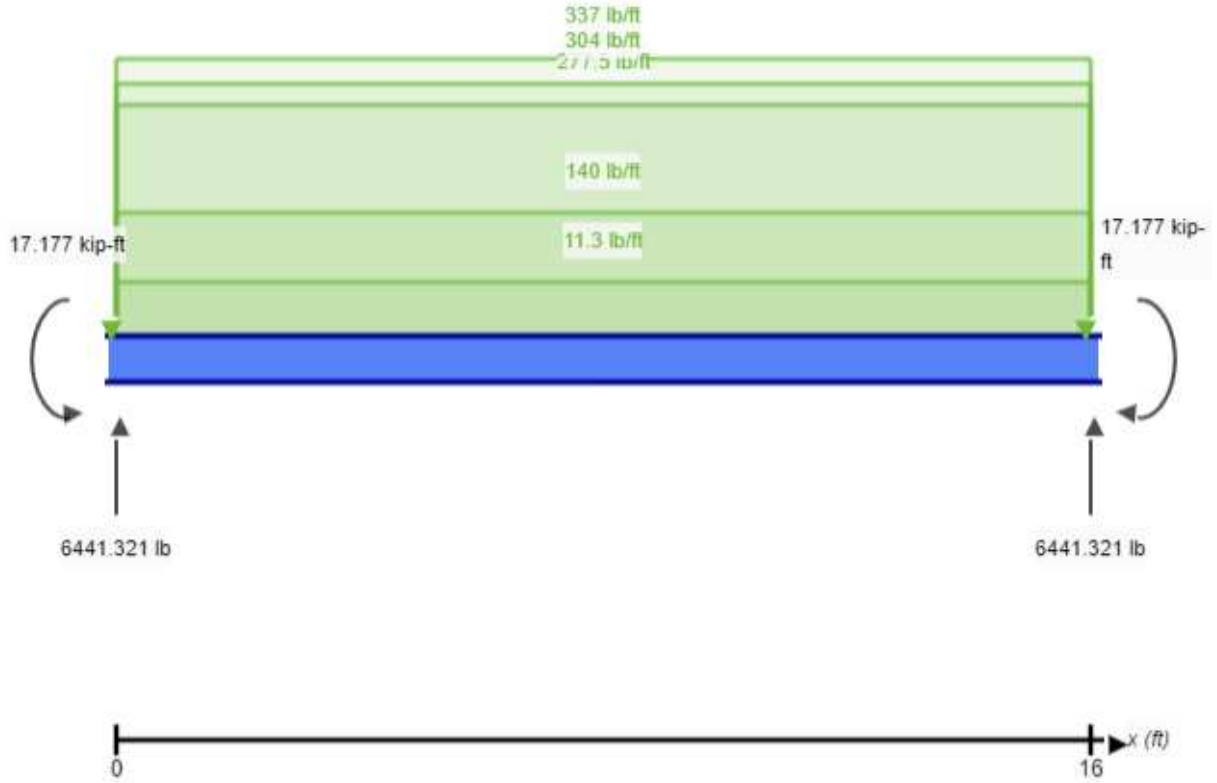
Engineer: Edgardo Mejia

Project Notes: Kitchen-Living Room LVL

Included in this Report:

- Free Body Diagram (FBD)
- Analysis Summary
- Analysis Results
- Bending Moment Diagram (BMD)
- Shear Force Diagram (SFD)
- Deflection Results
- Stress Results
- Beam Section

FREE BODY DIAGRAM



RESULT SUMMARY

Check	Status	Limit	Ratio	Max
Deflection	PASS	L/480	0.236	L/2038
Custom Stress Limit	PASS	31 ksi	0.039	1.202 ksi

ANALYSIS RESULTS

Reactions

Support at	X	Y	Mx
0	0 lb	6441.321 lb	17.177 kip-ft
16	0 lb	6441.321 lb	-17.177 kip-ft

Force Extremes

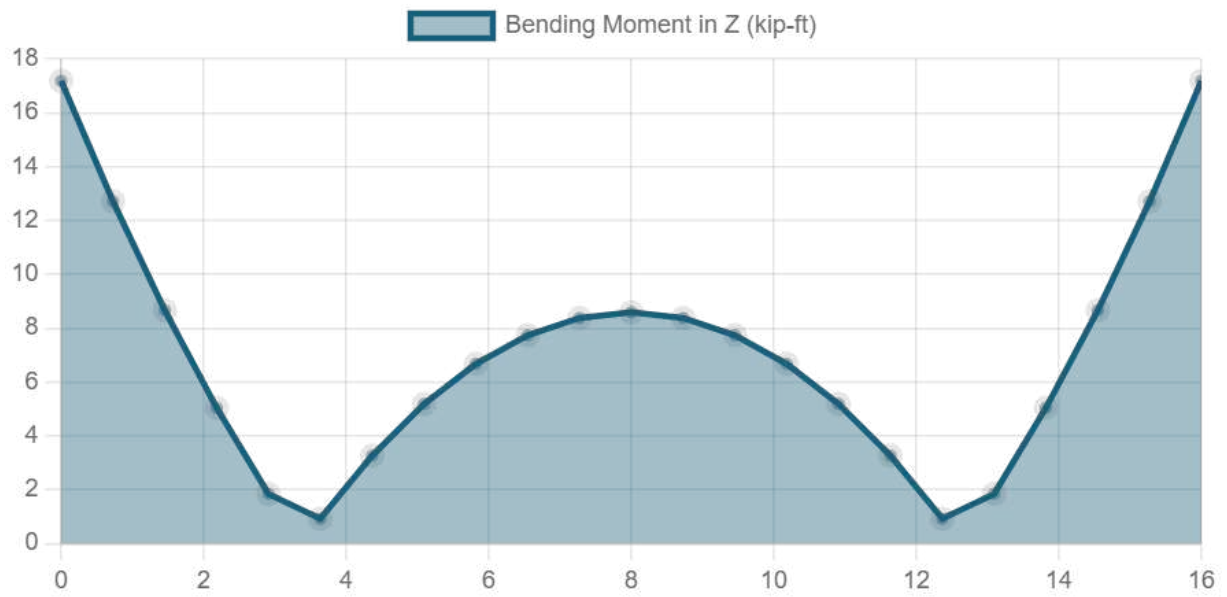
Result	Max	Min
Bending Moment	17.177 kip-ft	0.923 kip-ft
Shear	6441.321 lb	0 lb
Displacement	0.094 in	0 in

Stress Extremes

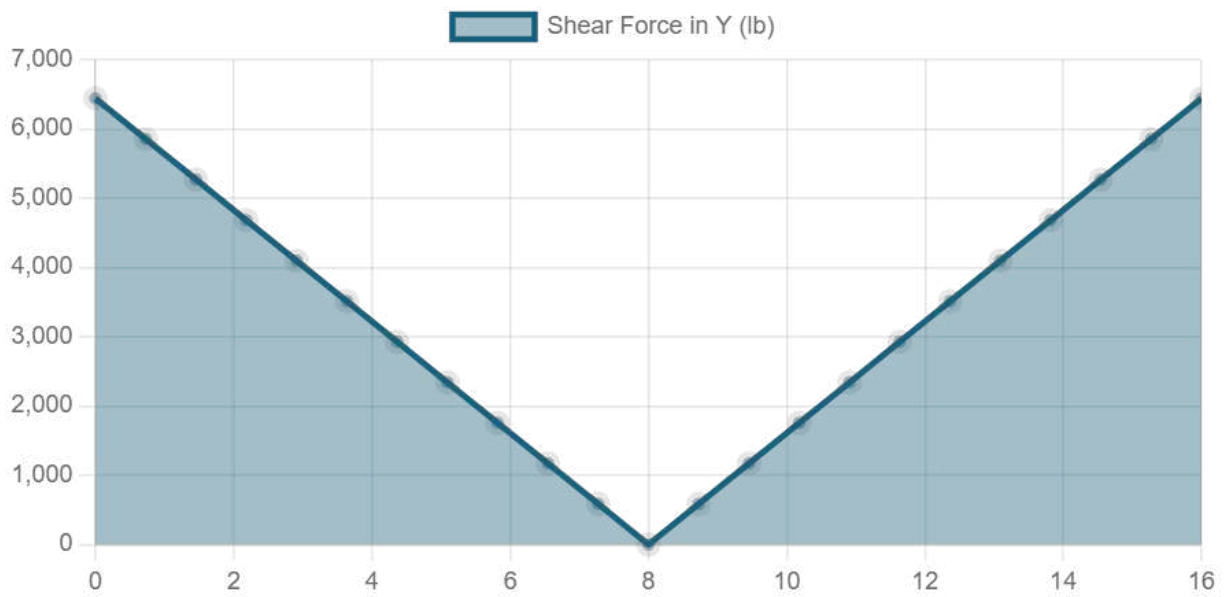
Result	Max	Min
Bending Stress	1.202 ksi	0.065 ksi
Shear Stress Total	0.132 ksi	0 ksi
Max Combined Normal Stress	1.202 ksi	0.065 ksi
Min Combined Normal Stress	1.202 ksi	0.065 ksi

DIAGRAMS

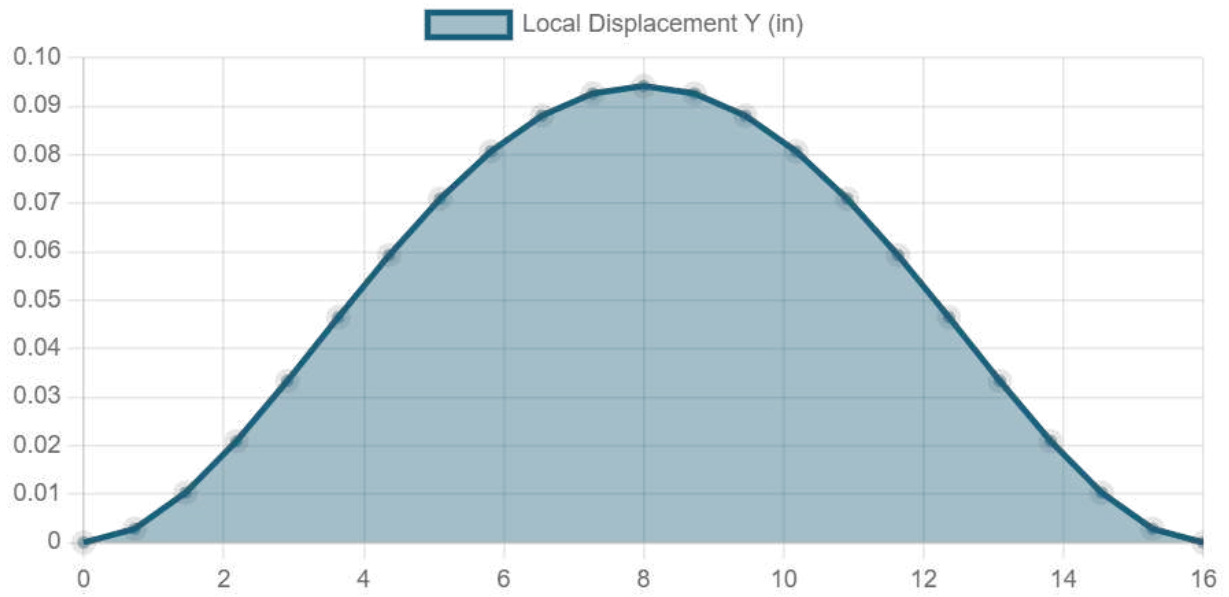
Bending Moment Diagram



Shear Force Diagram



Displacement



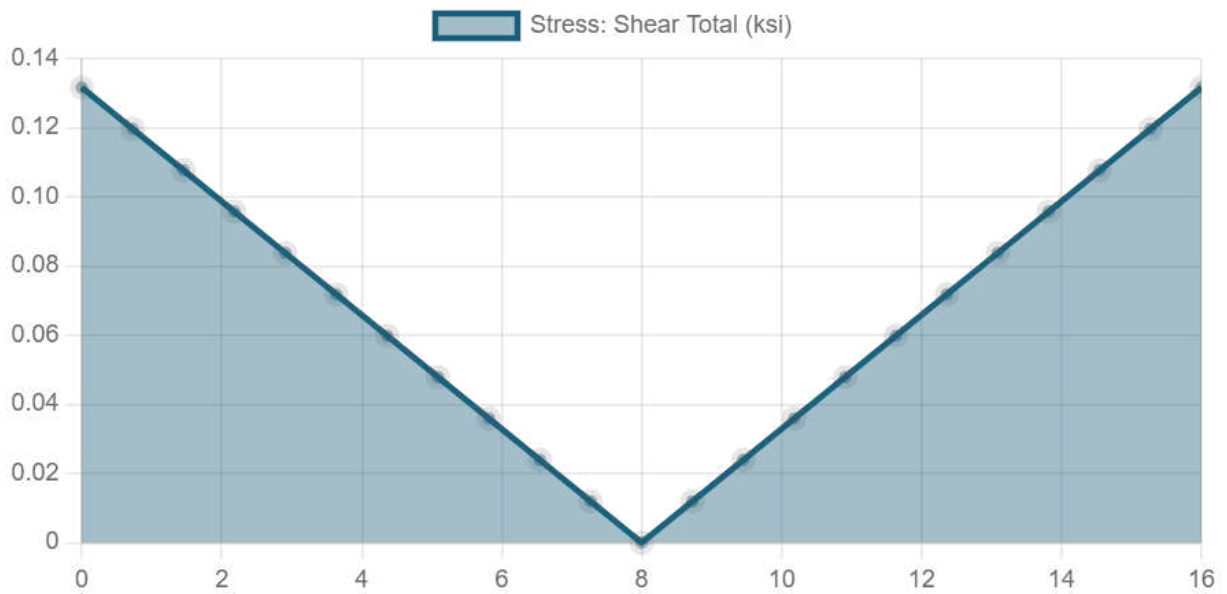
Location (ft)	Total Deflection (in)	Span ⓘ
0	0 in	-
8	0.094 in	L/2038
16	0 in	-

ⓘ The Deflection/Span results are calculated using the analysis results and the Deflection Limit of L/480 set in the model settings.

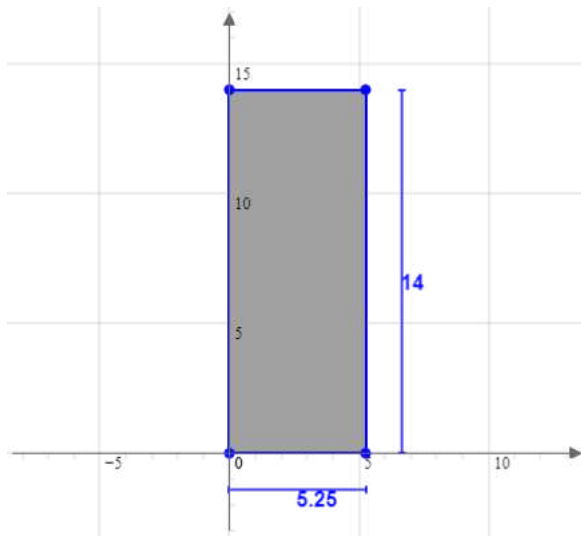
Bending Stress



Shear Stress



Beam Section



Geometric Properties		
A	73.5	in ²
C _z	2.625	in
C _y	7	in

Bending Properties		
I _z	1200.5	in ⁴
I _y	168.82	in ⁴

Shear Properties		
A _z	61.253	in ²
A _y	61.25	in ²

Torsion Properties		
J	515.786	in ⁴
r	5.12	in

Shape	Material	E (ksi)	v	ρ (lb/ft ³)
Rectangular	NDS - US East 2.1 Versa-Lam - Versa-Lam LVL Beams 2.1E 3100	2100	0.4	35.73568

Beam #1 Kitchen & Living Room Area (ASCE 7-16)

Beam Span	17 ft
Tributary width of Roof Construction	16.5 ft
Tributary width of Floor Construction	7.5 ft
Tributary area of Roof Construction	33.5 ft-sq
Tributary area of Floor Construction	127.5 ft-sq
Wall Height	10 ft
Roof Height	18 ft

Dead Load

Roof Construction (light Frame)	15 lb-sf
Floor Construction (with wood flooring)	12 lb-sf
Roof Dead Load on Beam	247.5 lb-lf
Floor Dead Load on Beam	90 lb-lf
Total Dead Load on Beam	337.5 lb-lf

Live Load

Roof Sloped/Pitched	20 lb-sf
Habitable Sleeping Area	30 lb-sf
Roof Dead Load on Beam	165 lb-lf
Floor Dead Load on Beam	112.5 lb-lf
Dead Load on Beam	277.5 lb-lf

Live Load Reduced (Sec. 4.7.2)

10 lb-sf
15 lb-sf
165 lb-lf
112.5 lb-lf
277.5 lb-lf

Snow Load

Sloped Roof Snow Load	8.47 lb-sf
Total Beam Roof Snow Load	139.755 lb-lf

Wind Load

Wind Speed	136 mph
Min. Design Pressure at Wall Height	16 lb-sf
Min. Design Pressure at Roof Mean Height	8 lb-sf
Wind Pressure on Beam - Wall	160 lb-lf
Wind Pressure on Beam - Roof	144 lb-lf
Total Wind Pressure on Beam	304 lb-lf

Seismic Load

Weight (Dead Load)	5737.5
Seismic Base Shear	0.192 kip
Shear Load on Beam	11.294118 lb-lf

One Side -Uniform Load for Top-Loaded Applications

Span	17 ft	
P1	10,455.00 lb	
L1	2.625 in	
P2	5,227.50 lb	
L2	5.25 in	
Actual Uniform Side Load	307.50 lb-ft	< 450 lb-ft OK!

SKYCIV LOAD CALCULATION REPORT

PROJECT DETAILS

Project Name:	846 Rackley Rd. LVL Beam #1 Kitchen/Living Room
Project Units:	Imperial
Project ID:	
Company:	MAE Design
Designer:	Edgardo Mejia
Client:	Nelly Gutierrez
Project Notes:	Beam #1 Kitchen/Living Room

SITE DETAILS

Parameter	Value
Code Selected	ASCE 7-16
Unit System	Imperial
Site Address	846 Rackley Rd, Clinton, NC 28328, USA
Site Elevation	154.86 ft

SITE WIND DATA

Parameter	Value
Risk Category	Risk Category III
Basic Wind Speed	136.00mph

Triangular Interpolation Network (TIN) was used to interpolate the wind speed values between ASCE 7 wind contour with known values. The discrepancy from the code is subject to the discretion of the user.

SITE SNOW DATA

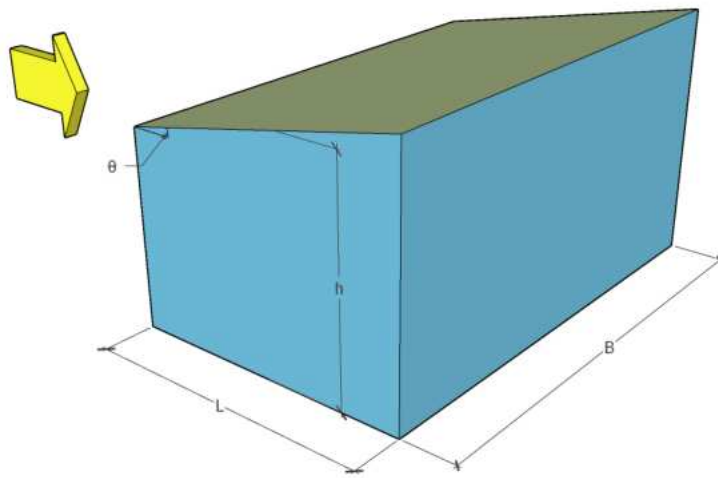
Parameter	Value
Risk Category	Risk Category III
Ground Snow Load	10.00psf

SITE SEISMIC DATA

Parameter	Value
Site Class	E - Soft clay soil
T_L	8 s
S_{DS}	0.218
S_{D1}	0.178
S_1	0.063
T_0	0.163

STRUCTURE DATA

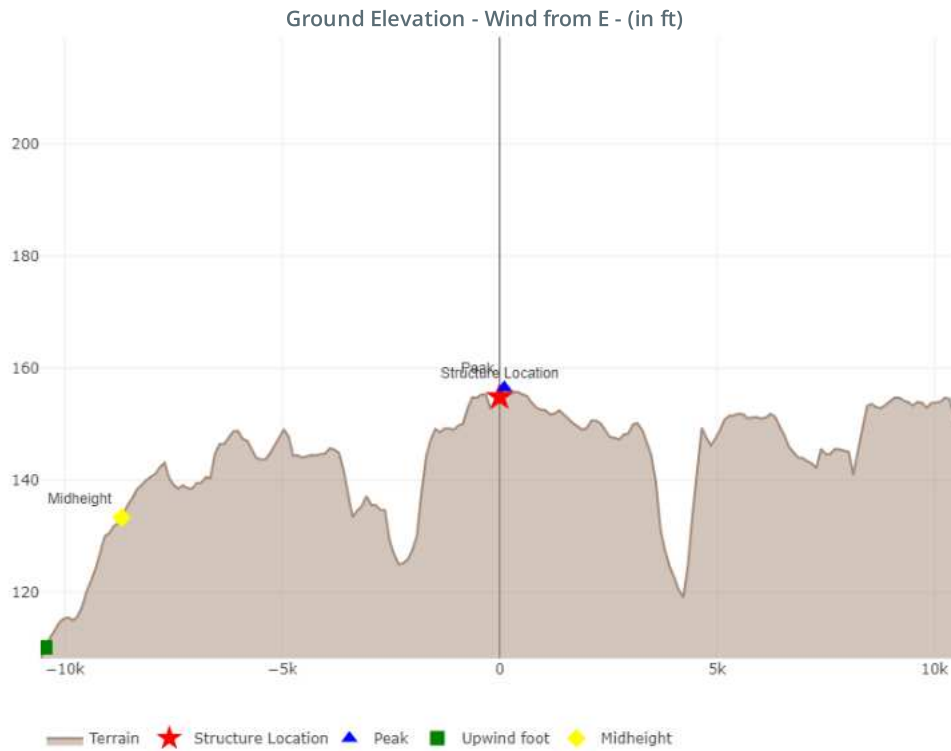
Parameter	Value
Structure	Building
Roof Profile	Monoslope/MonopitchPREMIUM
Building Length	40.00ft
Building Width	22.00ft
Roof Pitch Angle	26.60°
Mean Roof Height	19.00ft



Monoslope Roof

TOPOGRAPHY

Parameter	Value
Exposure Category	B
Wind Source Direction	E
Type of Terrain	Flat



The following topography factors have been calculated based on the wind direction coming from E. Terrain has been detected and classified as Flat.

Parameter	Value
K_{zt}	1.000
Slope	0.003
Loc. of crest/peak	105.60 ft
Elev. of crest/peak	156.49 ft
Loc. of foot	-10454.24 ft
Elev. of foot	110.17 ft
H	46.32 ft
x	-105.60 ft
Loc. of H/2	-8695.47 ft
L_h	8801.07 ft
Terrain Detected	Flat

WIND INPUT PARAMETERS

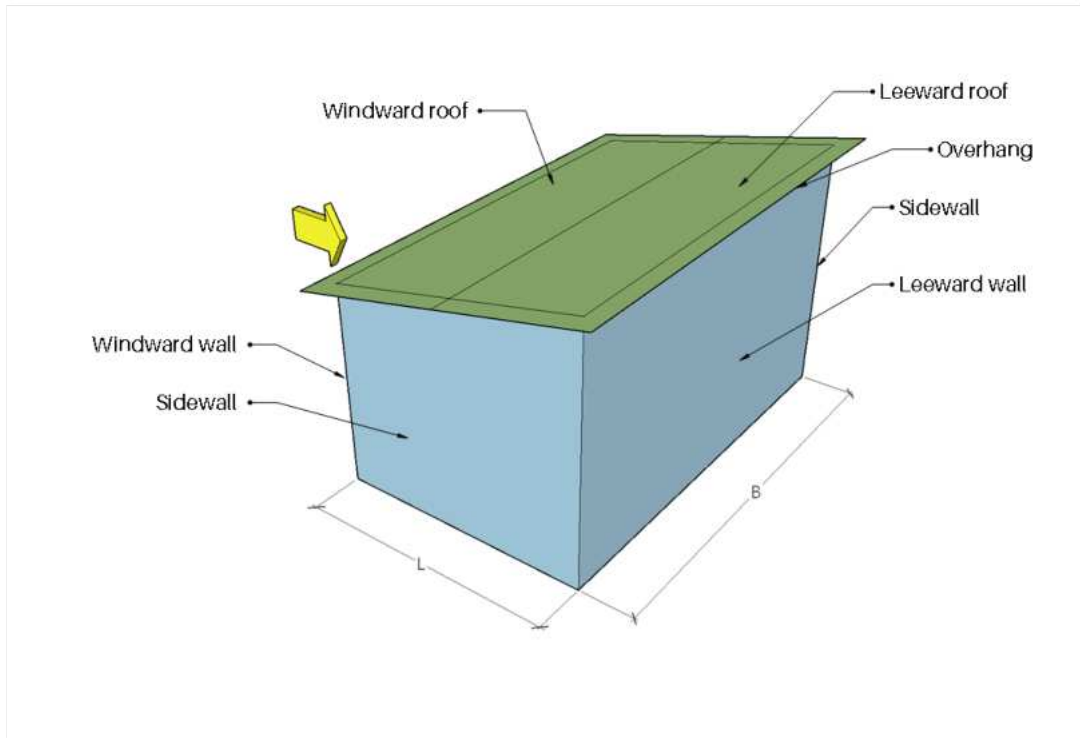
Parameter	Value
Structure Type	ASCE 7-16 - Buildings - Main Wind Force Resisting System
Enclosure Classification	Enclosed Buildings
Gust-effect Factor, G	0.850
Calculate Gust-effect Factor?	Assumed rigid (G = 0.85)
Height to Top of Parapet h_p	19.000ft

FLOOR ELEVATION DATA

Level	Elevation ft
1	11

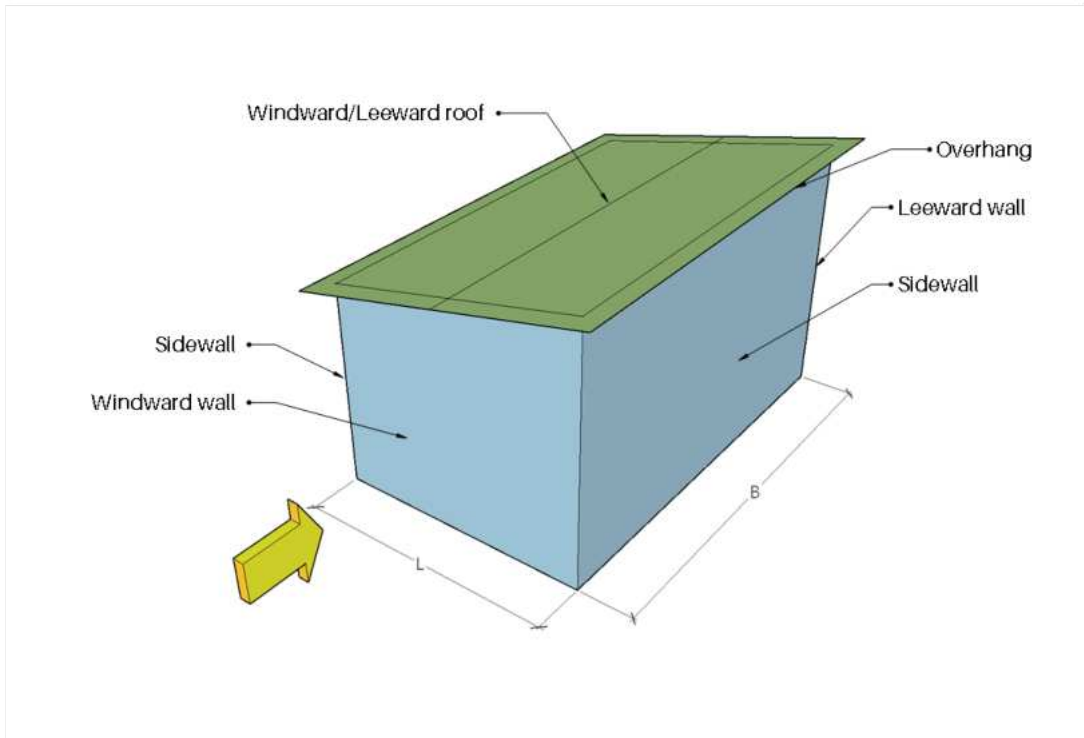
WIND PRESSURE ALONG L

Surface	Level/Location	Elevation ft	$p_{min} = qG(+C_p) - q_i(+GC_{pi})$ psf	$p_{max} = qG(-C_p) - q_i(-GC_{pi})$ psf
Windward wall	1	11.000	9.885	18.744
	Mean Roof Height, h	19.000	12.304	21.164
Leeward wall	All Levels	0 to 19	-11.465	-2.606
Sidewall			-19.072	-10.213
Windward Roof	Mean Roof Height h	19.000	-9.894	-1.034
Leeward Roof			-0.037	8.823
			-16.980	-8.121



WIND PRESSURE ALONG B

Surface	Level/Location	Elevation ft	$p_{min} = qG(+C_p) - q_i(+GC_{pi})$ psf	$p_{max} = qG(-C_p) - q_i(-GC_{pi})$ psf
Windward wall	1	11.000	9.885	18.744
	Mean Roof Height, h	19.000	12.304	21.164
Leeward wall	All Levels	0 to 19	-14.888	-6.029
Sidewall			-19.072	-10.213
Flat Roof	0 to h/2	19.000	-29.341 -8.195	-20.481 0.665
	h/2 to h		-20.213 -8.195	-11.353 0.665
	h to 2h		-17.931 -8.195	-9.071 0.665
	> 2h		-16.790 -8.195	-7.930 0.665



Minimum design wind pressure for walls = 16.000 psf
Minimum design wind pressure for roof = 8.000 psf

SNOW INPUT PARAMETERS

Parameter	Value
Terrain Category	B
Exposure Condition of Roof	Partially Exposed
Thermal Condition	Structures kept just above freezing and others with cold, ventilated roofs in which the thermal resistance (R-value) between the ventilated space and the heated space exceeds $25 \text{ }^\circ\text{F} \times \text{h} \times \text{ft}^2/\text{Btu}$ ($4.4 \text{ K} \times \text{m}^2/\text{W}$).
Sloped Roof Condition	Other
Consider Unbalanced/Drifted Snow Load?	No

SNOW PARAMETERS AND BALANCED ROOF SNOW LOAD

Parameter	Value
Exposure Factor, C_e	1.00
Thermal Factor, C_t	1.10
Importance Factor, I_s	1.10
Ground Snow Load, p_g	10.00 psf
Flat Roof Snow Load, p_f	8.47 psf
Rain-on-snow Surcharge Load, p_r	0.00 psf
Slope Factor, C_s	1.00
Sloped Roof Snow Load, p_s	8.47 psf
Min. Snow Load, p_m	11.00 psf
Snow Unit Weight, pcf	15.30

SEISMIC INPUT PARAMETERS

Parameter	Value
Structure system (for determining C_t and α)	All other structural systems - $C_t = 0.02$; $\alpha = 0.75$
Response Modification factor, R	8.5
Redundancy factor, ρ	1.0
Fundamental Period of the structure, T	0.182

SEISMIC WEIGHTS

Level	Elevation ft	Weight kip
2	18	6

SEISMIC RESULTS

Parameter	Value
Importance Factor, I_e	1.25
Seismic Weight, W	6.00 kip
Response Modification Factor, R	8.50
Redundancy Factor, ρ	1.00
Seismic Height, $h_n = h$	19.00 ft
Long-period transition period, T_L	8.000 s
Design spectral response acceleration parameter at 1s period, S_{D1}	0.178
Design spectral response acceleration parameter at short periods, S_{D5}	0.218
Mapped max. considered earthquake spectral response acceleration parameter, S_1	0.063
$T_0 = 0.2S_{D1}/S_{D5}$	0.163
C_t	0.02
x	0.750
Fundamental Period of the structure, T	0.182 s
C_s	0.032
k	1.000
Seismic Base Shear, V	0.192 kip

VERTICAL DISTRIBUTION OF SEISMIC FORCES

Level	W_x kip	h_x ft	$W_x h_x^k$	C_{vx}	F_x kip
2	6	18	108	1	0.192

DIAPHRAGM DESIGN FORCES

Level	$w_{px} = w_i$ kip	Σw_i kip	F_i kip	ΣF_i kip	$F_{px,min}$ kip	$F_{px,max}$ kip	F_{px} kip	$\rho F_{px,max}$ kip	$F_{px}(\text{design})$ kip
2	6	6	0.192	0.192	0.327	0.654	0.192	0.192	0.327

DESIGN RESPONSE SPECTRUM

Period, T (sec)	S _a (g)
0	0.0872
0.163	0.218
0.49	0.218
0.817	0.218
0.98	0.18167
1	0.178
1.408	0.1264
1.817	0.09799
2.225	0.08001
2.633	0.0676
3.041	0.05853
3.45	0.0516
3.858	0.04614
4	0.0445
4.817	0.03696
5.633	0.0316
6.45	0.0276
7.266	0.0245
8	0.02225
8.817	0.01832
9.633	0.01535
10.45	0.01304
11.266	0.01122
12.083	0.00975
12.899	0.00856
13.716	0.00757
14.532	0.00674
15.349	0.00604
16.165	0.00545
16.982	0.00494
17.798	0.0045
18.615	0.00411
19.431	0.00377

