Wind Load Report

1. Site & Building Data

Roof Type:	Gable
Wind Speed (ult):	115 mph
Exposure Category:	C
Enclosure Class:	Enclosed
Building Width (W):	32 ft.
Building Length (L):	40 ft.
Eave Height (h_e):	16 ft.
Foundation Height (h_f):	0 ft.
Roof Pitch:	3 /12
Eave Overhang (OH_e):	1 ft.
Gable Overhang (OH_g):	1 ft.

2. Parameters & Coefficients

Topographic Factor (K_{zt}):	1.0
Directionality Factor (K_d):	.85
Roof Angle (θ):	14.04 deg.
Mean Roof Height (h):	18.00 ft.
Ridge Height (h_r):	20.00 ft.
Pos. Internal Pressure (+GCpi):	+0.18
Neg. Internal Pressure (-GCpi):	-0.18
Velocity Pressure Exp. Coeff. (K_h):	0.88 @ z=h
Velocity Pressure (q_h):	25.38 psf
End Zone Width (a):	3.00 ft.
Zone 2/2E Dist.:	16.00 ft.

3. Design Assumptions and Notes

Code Standard:	ASCE 7-10
Geometry:	Regular-Shaped Bldg.
Height Class:	Low-Rise Building
Notes:	

4. Design Loads

Top Chord Dead Load:	7 psf
Bottom Chord Dead Load:	10 psf
Truss/Rafter Spacing:	24 in. o/c

4. Design Wind Pressures: MWFRS Envelope Procedure

Load Case A: Transverse Direction

Surface	GCpf	Design Pressure (psf) (w/ +GCpi)	Design Pressure (psf) (w/ -GCpi)
1	0.48	7.57	16.71
2	-0.69	-22.08	-12.95
3	-0.44	-15.64	-6.51
4	-0.37	-14.07	-4.93
1E	0.72	13.82	22.96
2E	-1.07	-31.73	-22.59
3E	-0.63	-20.47	-11.33
4E	-0.56	-18.70	-9.56
2OH	-0.69	-17.52	
2EOH	-1.07	-27.16	
3OH	-0.44	-11.07	
3EOH	-0.63	-15.90	
2OH+W	-0.69/-0.7	-34.85	
2EOH+W	-1.07/-0.7	-44.50	

a) (+) and (-) signs signify wind pressures acting toward & away from surfaces.
b) External Pressure Coefficients linearly interpolated from Fig. 28.4-1 ASCE 7-10.
c) Design building for all wind directions, 4 load patterns per load case.
d) Total horizontal shear shall not be less than that by neglecting roof wind forces.
e) Min. wind load for enclosed or partially enclosed bldg.: 16 psf wall, 8 psf roof.
f) Design pressures are for strength design, multiply by 0.6 for ASD.

Load Case B: Longitudinal Direction

Surface	GCpf	Design Pressure (psf)	
		(w/ +GCpi)	(w/ -GCpi)
1	-0.45	-15.99	-6.85
2	-0.69	-22.08	-12.95
3	-0.37	-13.96	-4.82
4	-0.45	-15.99	-6.85
5	0.40	5.58	14.72
6	-0.29	-11.93	-2.79
1E	-0.48	-16.75	-7.62
2E	-1.07	-31.73	-22.59
3E	-0.53	-18.02	-8.88
4E	-0.48	-16.75	-7.62
5E	0.61	10.92	20.05
6E	-0.43	-15.48	-6.35
2OH	-0.69	-17.52	
2EOH	-1.07	-27.16	
3OH	-0.37	-9.39	
3EOH	-0.53	-13.45	
2EOH+W	-1.07/-0.7	-44.93	
3EOH+W	-0.53/-0.7	-31.22	

a) (+) and (-) signs signify wind pressures acting toward & away from surfaces.
b) External Pressure Coefficients linearly interpolated from Fig. 28.4-1 ASCE 7-10.
c) Design building for all wind directions, 4 load patterns per load case.
d) Total horizontal shear shall not be less than that by neglecting roof wind forces.
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Torsional Load Cases

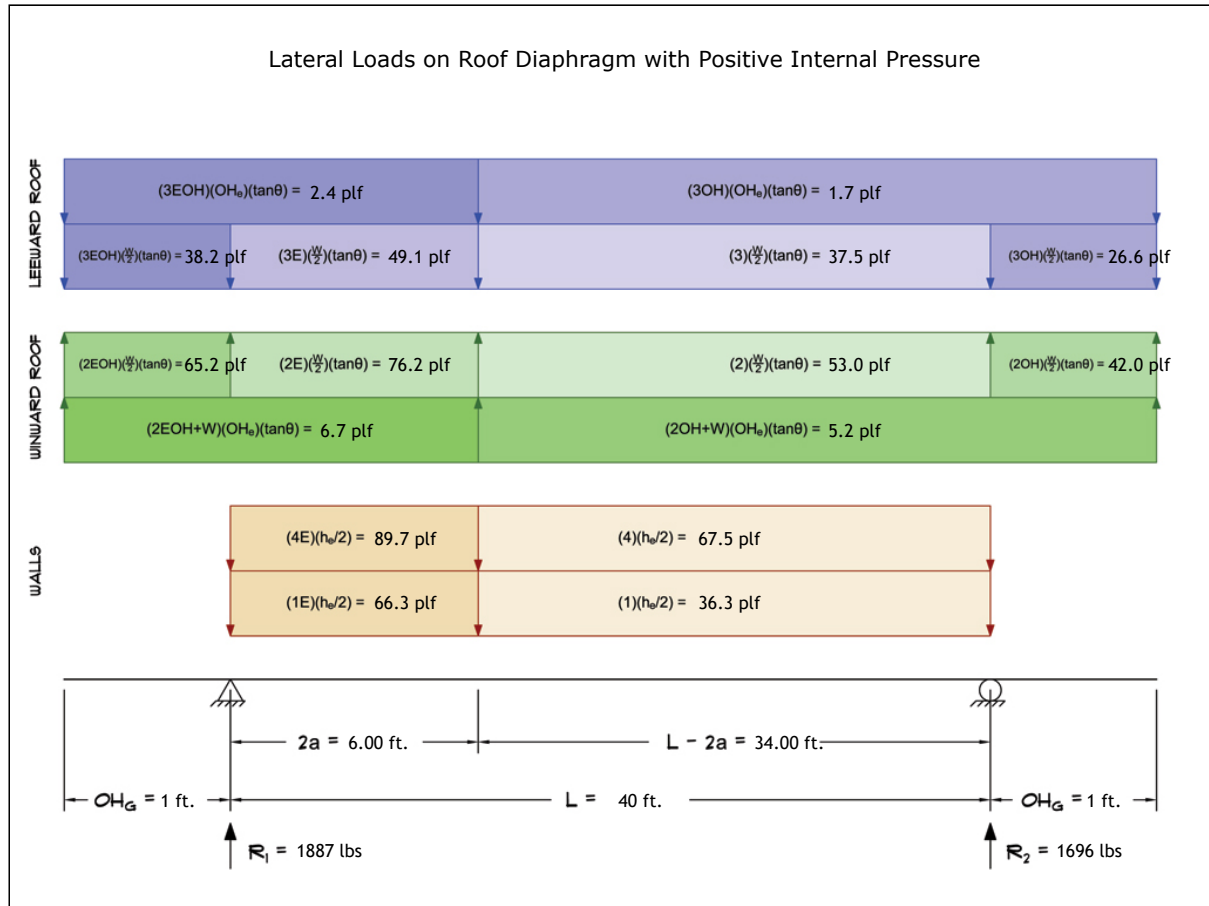| Surface	Load Case	GCpf	Design Pressure (psf)	
			(w/ +GCpi)	(w/ -GCpi)
1T	A	-	1.89	4.18
2T	A	-	-5.52	-3.24
3T	A	-	-3.91	-1.63
4T	A	-	-3.52	-1.23
5T	B	-	1.40	3.68
6T	B	-	-2.98	-0.70
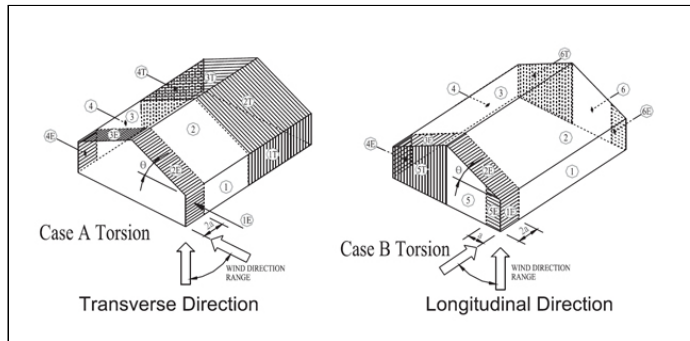
a) (+) and (-) signs signify wind pressures acting toward & away from surfaces.
b) Pressures designated with a "T" are 25% of full design wind pressures.
c) Torsional loading shall apply to all 8 load patterns using the figures shown.
d) Design pressures are for strength design, multiply by 0.6 for ASD.
e) Torsional Design Exceptions: One story bldg. with h ≤ 30 ft,
   Two stories or less framed with light frame construction,
   Two stories or less with flexible diaphragms.

Case A Torsion — Transverse Direction
Case B Torsion — Longitudinal Direction

5. Wind Load Calculations

1.) Lateral Loads - Transverse Direction:

Lateral Loads on Roof Diaphragm with Positive Internal Pressure

LEEWARD ROOF

$(3EOH)(OH_e)(\tan\theta) = $ 2.4 plf $\qquad$ $(3OH)(OH_e)(\tan\theta) = $ 1.7 plf

$(3EOH)(\frac{W}{2})(\tan\theta) = $ 38.2 plf $\quad$ $(3E)(\frac{W}{2})(\tan\theta) = $ 49.1 plf $\quad$ $(3)(\frac{W}{2})(\tan\theta) = $ 37.5 plf $\quad$ $(3OH)(\frac{W}{2})(\tan\theta) = $ 26.6 plf

WINWARD ROOF

$(2EOH)(\frac{W}{2})(\tan\theta) = $ 65.2 plf $\quad$ $(2E)(\frac{W}{2})(\tan\theta) = $ 76.2 plf $\quad$ $(2)(\frac{W}{2})(\tan\theta) = $ 53.0 plf $\quad$ $(2OH)(\frac{W}{2})(\tan\theta) = $ 42.0 plf

$(2EOH+W)(OH_e)(\tan\theta) = $ 6.7 plf $\qquad$ $(2OH+W)(OH_e)(\tan\theta) = $ 5.2 plf

WALLS

$(4E)(h_e/2) = $ 89.7 plf $\qquad$ $(4)(h_e/2) = $ 67.5 plf

$(1E)(h_e/2) = $ 66.3 plf $\qquad$ $(1)(h_e/2) = $ 36.3 plf

2a = 6.00 ft. $\qquad$ L − 2a = 34.00 ft.

OH$_G$ = 1 ft. $\qquad$ L = 40 ft. $\qquad$ OH$_G$ = 1 ft.

R_1 = 1887 lbs $\qquad$ R_2 = 1696 lbs

a) (-) signs signify wind lateral forces acting opposite to the direction of the arrows shown.
b) Strength design values multiplied by 0.6 to obtain ASD values.

Wind Base Shear (ASD)
Load Case A: Transverse Direction

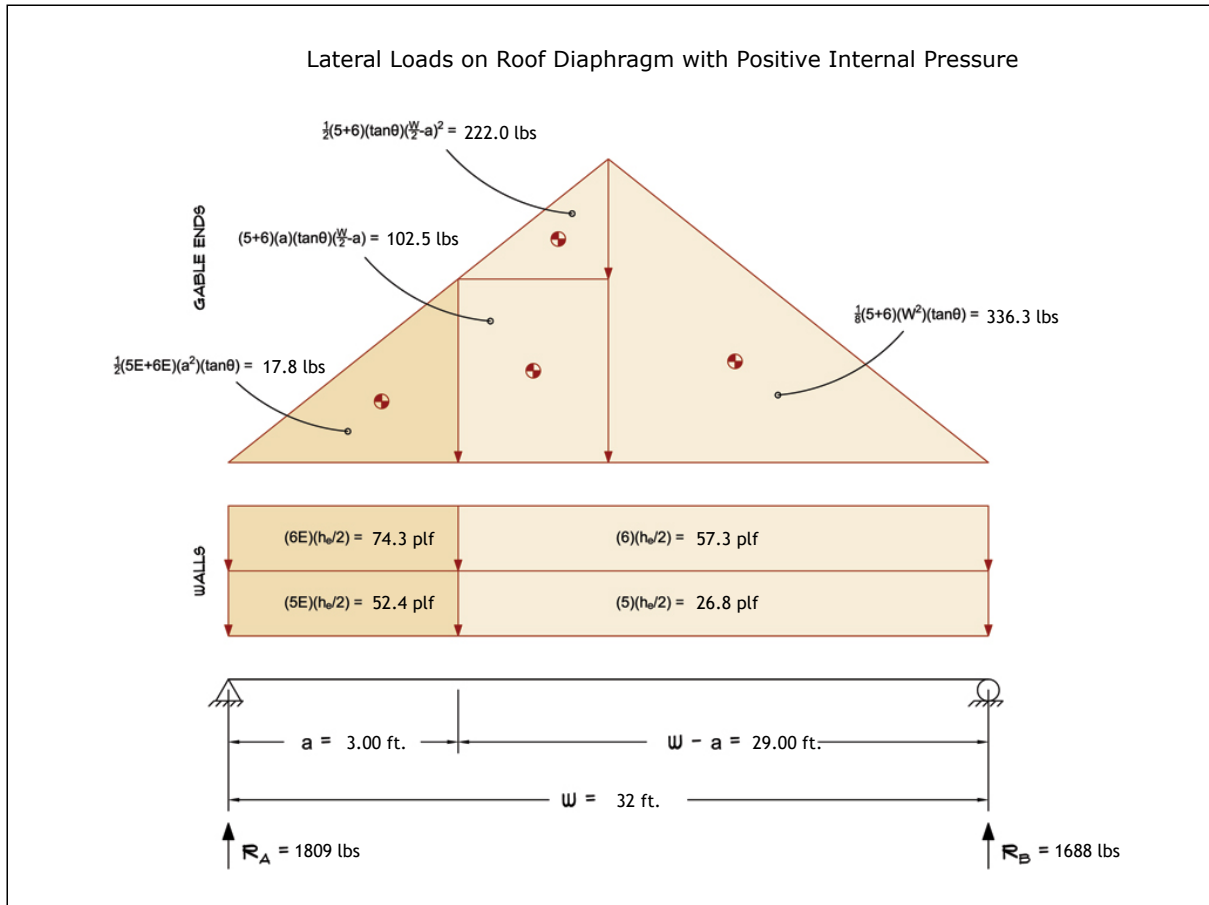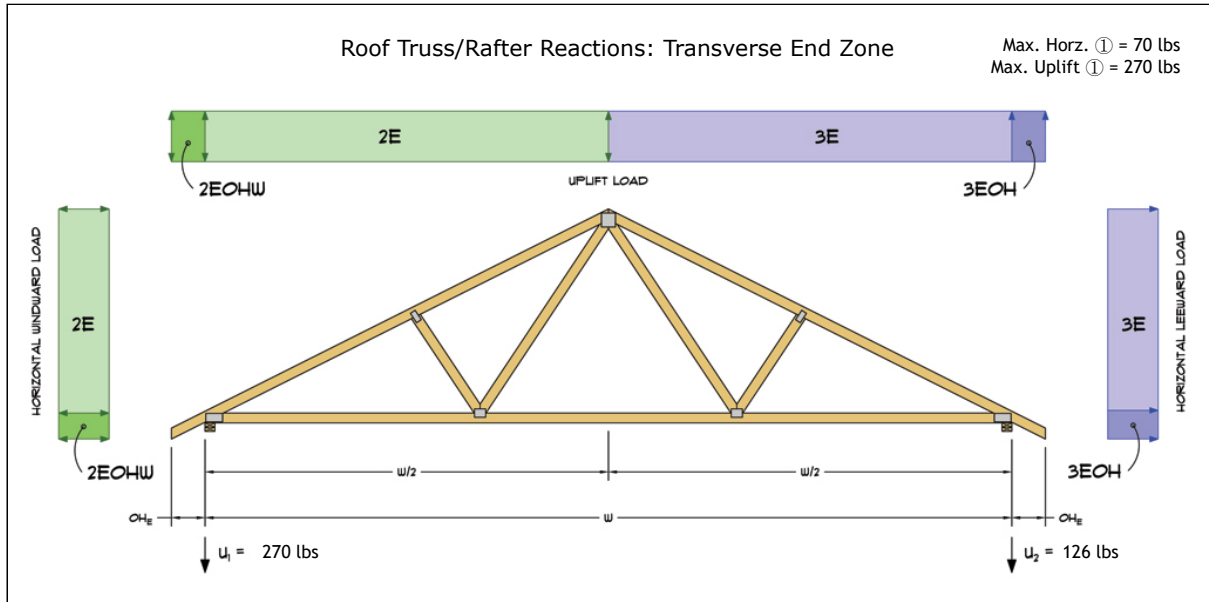| Load Case	Walls (lbs)	Roof (lbs)	Roof Overhangs (lbs)	Total Lateral Load (lbs)	R_1 (lbs)	R_2 (lbs)
Positive Internal Pressure	4469	-688	-197	3584	1887	1696
Negative Internal Pressure	4469	-688	-197	3584	1887	1696
Roof Pressure = 0	4469	0	0	4469	2368	2101
Min. Pressures (8 psf, 16 psf)	3072	768	89	3929	1964	1964

a) Bottom half of wall neglected in tributary area calculations.
b) Strength design values multiplied by 0.6 to obtain ASD values.

2.) Lateral Loads - Longitudinal Direction:

Lateral Loads on Roof Diaphragm with Positive Internal Pressure

$\frac{1}{2}(5+6)(\tan\theta)(\frac{W}{2}-a)^2 = 222.0$ lbs

$(5+6)(a)(\tan\theta)(\frac{W}{2}-a) = 102.5$ lbs

$\frac{1}{8}(5+6)(W^2)(\tan\theta) = 336.3$ lbs

$\frac{1}{2}(5E+6E)(a^2)(\tan\theta) = 17.8$ lbs

GABLE ENDS

WALLS

$(6E)(h_e/2) = 74.3$ plf

$(6)(h_e/2) = 57.3$ plf

$(5E)(h_e/2) = 52.4$ plf

$(5)(h_e/2) = 26.8$ plf

$a = 3.00$ ft.

$W - a = 29.00$ ft.

$W = 32$ ft.

$R_A = 1809$ lbs

$R_B = 1688$ lbs

a) (-) signs signify wind lateral forces acting opposite to the direction of the arrows shown.
b) Strength design values multiplied by 0.6 to obtain ASD values.
c) Where the length of building (L) exceeds 4X the mean roof height (h), wind drag forces should additionally be considered.

Wind Base Shear (ASD)						
Load Case B: Longitudinal Direction						
Load Case	Walls (lbs)	Gable Ends (lbs)	Roof (lbs)	Total Lateral Load (lbs)	R_A (lbs)	R_B (lbs)
Positive Internal Pressure	2818	679	0	3497	1809	1688
Negative Internal Pressure	2818	679	0	3497	1809	1688
Roof Pressure = 0	2818	679	0	3497	1809	1688
Min. Pressures (8 psf, 16 psf)	2458	614	0	3072	1536	1536

a) Bottom half of wall neglected in tributary area calculations.
b) Strength design values multiplied by 0.6 to obtain ASD values.

3.) Roof Truss Reactions:

Roof Truss/Rafter Reactions: Transverse End Zone

Max. Horz. ① = 70 lbs
Max. Uplift ① = 270 lbs

a) Strength design values multiplied by 0.6 to obtain ASD values.
b) Windward loads may be positive or negative depending on pitch of roof.

Roof Truss/Rafter Reactions (ASD)					
w/ Positive Internal Pressure					
Load Case	Horizontal Load (lbs)	Gross Uplift (lbs)	Net Uplift (lbs)	U_1 (lbs)	U_2 (lbs)
Transverse Int. Zone	38	779	101	96	5
Transverse End Zone	63	1075	396	270	126
Longitudinal Int. Zone	41	724	46	67	-21
Longitudinal End Zone	70	1004	326	237	89

a) Gross Uplift calculations do not include any counteracting roof dead loads.
b) Net Uplift calculations include counteracting roof dead loads multiplied by 0.6 per load case (7) ASCE 7-10.
c) Strength design values multiplied by 0.6 to obtain ASD values for wind loads.
d) Loads based on truss spacing calculated at 24" o/c.
e) Negative values for horizontal load indicate load acting in windward direction (tranverse load cases).
f) Negative values for uplift indicate net downward force (zero uplift).

Subject	Customer	Location		Job No.
Wind Loads				MARK

Engr.				Rev.
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