Wind Load Report - 45Thurston Ave

1. Site & Building Data

Roof Type:	Gable
Wind Speed (ult):	115 mph
Exposure Category:	B
Enclosure Class:	Enclosed
Building Width (W):	22 ft.
Building Length (L):	30 ft.
Eave Height (h_e):	10 ft.
Foundation Height (h_f):	2 ft.
Roof Pitch:	6 /12
Eave Overhang (OH_e):	1 ft.
Gable Overhang (OH_g):	1 ft.

2. Parameters & Coefficients

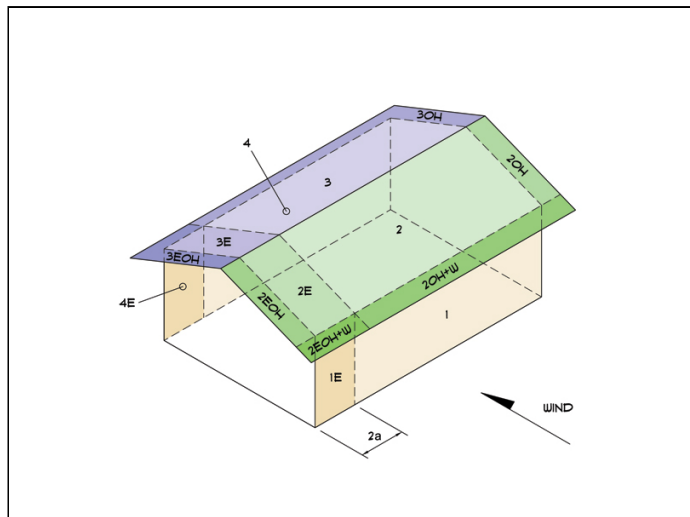|	
Topographic Factor (K_{zt}):	1.0
Directionality Factor (K_d):	.85
Roof Angle (θ):	26.57 deg.
Mean Roof Height (h):	12.75 ft.
Ridge Height (h_r):	15.50 ft.
Pos. Internal Pressure (+GCpi):	+0.18
Neg. Internal Pressure (-GCpi):	-0.18
Velocity Pressure Exp. Coeff. (K_h):	0.70 @ z=h
Velocity Pressure (q_h):	20.16 psf
End Zone Width (a):	3.00 ft.
Zone 2/2E Dist.:	11.00 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:	16 in. o/c

4. Design Wind Pressures: MWFRS Envelope Procedure

Load Case A: Transverse Direction			
Surface	GCpf	Design Pressure (psf)	
		(w/ +GCpi)	(w/ -GCpi)
1	0.55	7.45	14.71
2	-0.10	-5.63	1.63
3	-0.45	-12.64	-5.39
4	-0.39	-11.50	-4.25
1E	0.73	11.04	18.30
2E	-0.19	-7.47	-0.21
3E	-0.58	-15.42	-8.16
4E	-0.53	-14.41	-7.16
2OH	-0.10	-2.00	
2EOH	-0.19	-3.84	
3OH	-0.45	-9.02	
3EOH	-0.58	-11.79	
2OH+W	-0.10/-0.7	-16.11	
2EOH+W	-0.19/-0.7	-17.95	

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	-12.70	-5.44
2	-0.69	-17.54	-10.28
3	-0.37	-11.09	-3.83
4	-0.45	-12.70	-5.44
5	0.40	4.44	11.69
6	-0.29	-9.48	-2.22
1E	-0.48	-13.31	-6.05
2E	-1.07	-25.20	-17.94
3E	-0.53	-14.31	-7.06
4E	-0.48	-13.31	-6.05
5E	0.61	8.67	15.93
6E	-0.43	-12.30	-5.04
2OH	-0.69	-13.91	
2EOH	-1.07	-21.57	
3OH	-0.37	-7.46	
3EOH	-0.53	-10.69	
2EOH+W	-1.07/-0.7	-35.69	
3EOH+W	-0.53/-0.7	-24.80	

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

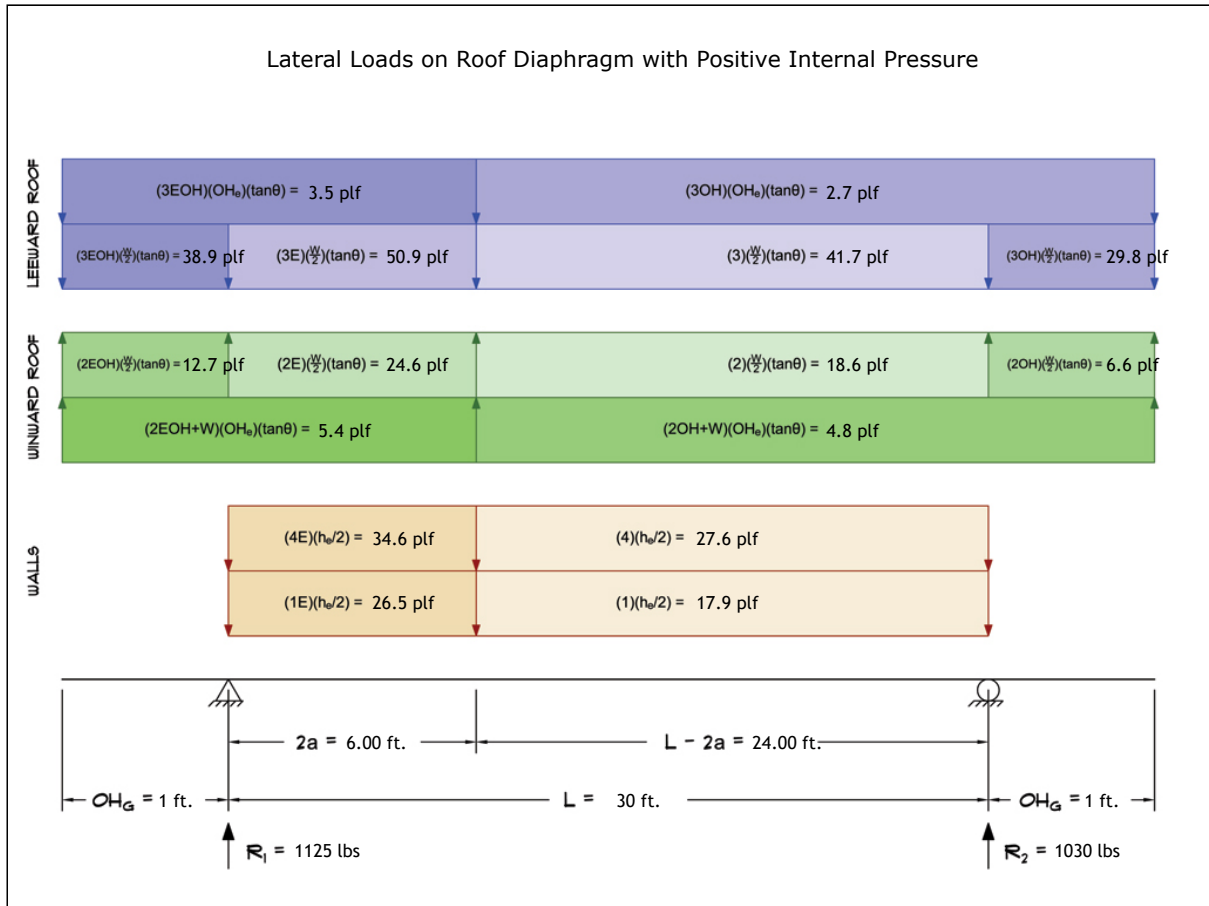| Surface	Load Case	GCpf	Design Pressure (psf)	
			(w/ +GCpi)	(w/ -GCpi)
1T	A	-	1.86	3.68
2T	A	-	-1.41	0.41
3T	A	-	-3.16	-1.35
4T	A	-	-2.88	-1.06
5T	B	-	1.11	2.92
6T	B	-	-2.37	-0.55

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

Subject	Customer	Location		Job No.
Wind Loads				2025D29

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5. Wind Load Calculations

1.) Lateral Loads - Transverse Direction:

Lateral Loads on Roof Diaphragm with Positive Internal Pressure
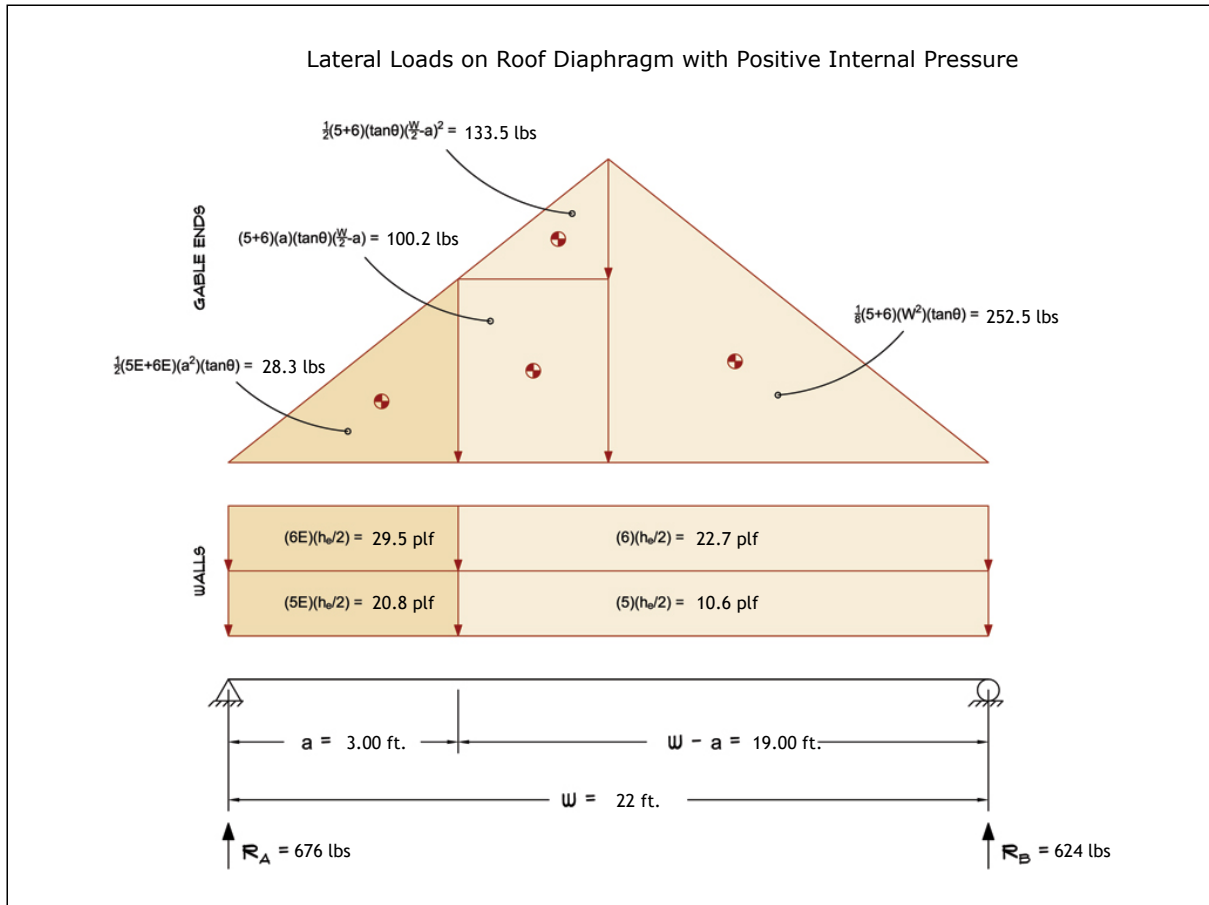
a) (-) signs signify wind lateral forces acting opposite to the direction of the arrows shown.
b) Strength design values multiplied by 0.6 to obtain ASD values.

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	1459	713	-17	2155	1125	1030
Negative Internal Pressure	1459	713	-17	2155	1125	1030
Roof Pressure = 0	1459	0	0	1459	767	692
Min. Pressures (8 psf, 16 psf)	1152	792	130	2074	1037	1037

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

$\frac{1}{2}(5+6)(\tan\theta)(\frac{W}{2}-a)^2 = 133.5$ lbs

$(5+6)(a)(\tan\theta)(\frac{W}{2}-a) = 100.2$ lbs

$\frac{1}{8}(5+6)(W^2)(\tan\theta) = 252.5$ lbs

$\frac{1}{2}(5E+6E)(a^2)(\tan\theta) = 28.3$ lbs

GABLE ENDS

WALLS

(6E)(h$_e$/2) = 29.5 plf

(6)(h$_e$/2) = 22.7 plf

(5E)(h$_e$/2) = 20.8 plf

(5)(h$_e$/2) = 10.6 plf

a = 3.00 ft.

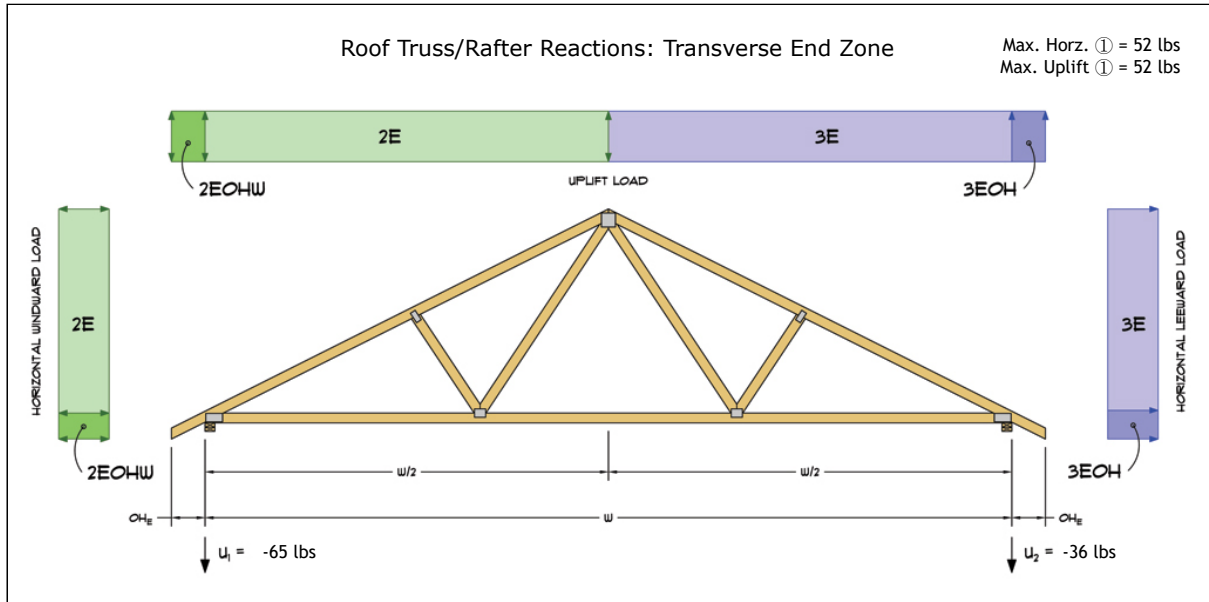W – a = 19.00 ft.

W = 22 ft.

R$_A$ = 676 lbs

R$_B$ = 624 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	785	515	0	1300	676	624
Negative Internal Pressure	785	515	0	1300	676	624
Roof Pressure = 0	785	515	0	1300	676	624
Min. Pressures (8 psf, 16 psf)	845	581	0	1426	713	713

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 = 52 lbs
Max. Uplift ① = 52 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	-28	181	-145	-85	-60
Transverse End Zone	-33	225	-101	-65	-36
Longitudinal Int. Zone	31	269	-57	-12	-46
Longitudinal End Zone	52	374	47	52	-5

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 16" 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				2025D29

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