



Building and Safety Division • Public Information

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WIND LOAD DETERMINATION

Codes: CBC 2007, Section 1609 and ASCE 7-05, Chapter 6.

- Assumptions:**
1. Simplified Procedure Method-I.
 2. Wind Speed 85 mph 3 second gust.
 3. Wind Exposure C; $K_{zt} = 1$; $I = 1$.
 4. Building having no unusual geometrical irregularity in spatial form.
 5. A simple diaphragm building with mean roof height $h \leq 50$ feet, and also $h \leq$ least horizontal dimension.

Wind Load Formula: $= \Sigma [(\text{Projected Area}) \times (\text{Ps value from Table A})]$

How to calculate wind loads in each direction:

General:

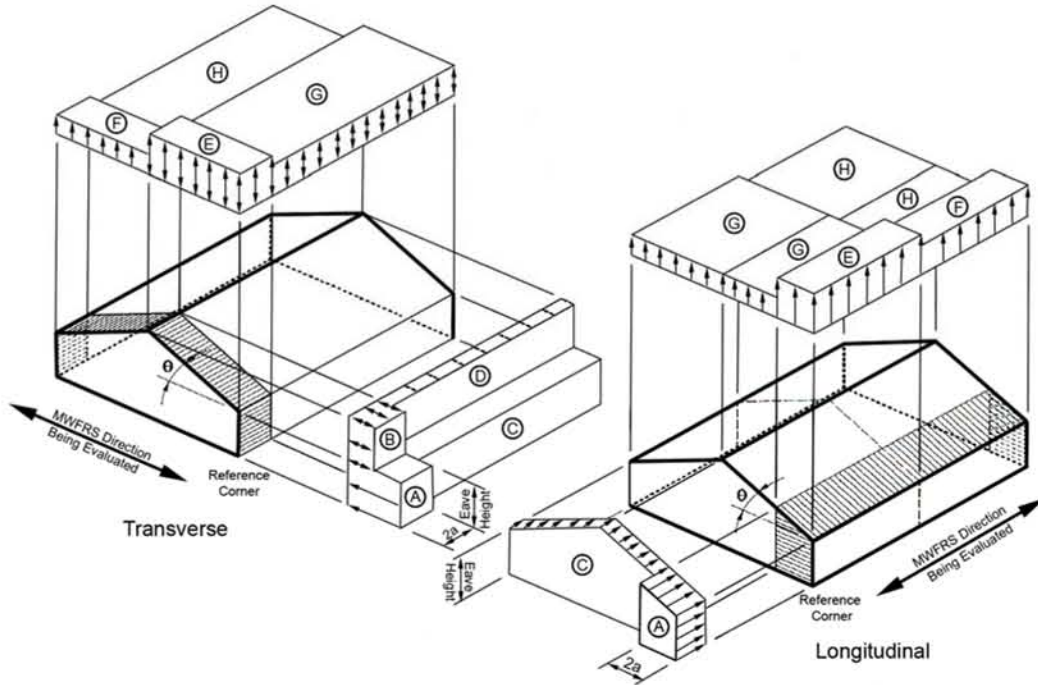
- 1- Calculate the roof horizontal angle (θ) between the roof rafters and ceiling joists.
- 2- Calculate the height of the Building from grade to top of the ridge. For intermediate heights, use the values for the next highest height.
- 3- Create horizontal and vertical wind zones, A, B, C, D, E, F, G, and H in Longitudinal and Transverse directions as shown in "Wind zone Pressure diagram". Please use the notations below for creating Zones.

Wind Force by zone method:

Longitudinal Direction = $\{[(\text{Area of zone A}) \times (\text{corresponding Ps value})] + [(\text{Area of zone C}) \times (\text{corresponding Ps value})]\}$
 Transverse Direction = $\{[(\text{Area of zone A}) \times (\text{corresponding Ps value})] + [(\text{Area of zone B}) \times (\text{corresponding Ps value})] + [(\text{Area of zone C}) \times (\text{corresponding Ps value})] + [(\text{Area of zone D}) \times (\text{corresponding Ps value})]\}$

Wind Force without zone method:

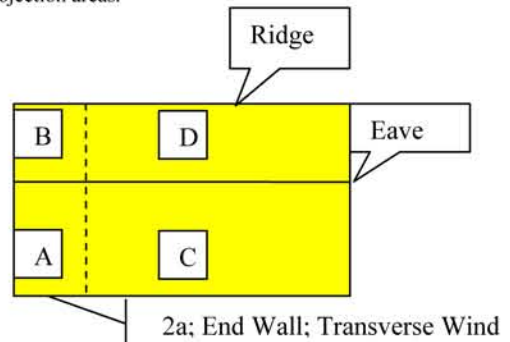
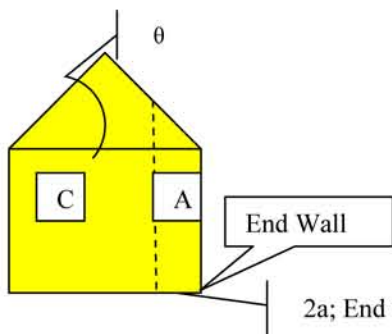
Longitudinal Direction = (Total Projected Areas) x (highest corresponding Ps value from Table A).
 Transverse Direction = (Total Projected Areas) x (highest corresponding Ps value from Table A).



WIND ZONE PRESSURE DIAGRAM

Notations:

- θ : Angle of plane of roof from horizontal, in degrees.
- h : Mean roof height, in feet, except that eave height shall be used for roof angles $< 10^\circ$.
- a : 10 percent of least horizontal dimension or $0.4h$, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 feet.
- E_{oh} : For the end zone pressure on the horizontal projection of the roof overhangs on the windward side of the building; for other overhangs on the leeward and side edges shall have the basic zone pressure applied.
- G_{oh} : For the interior zone pressure on the horizontal projection of the roof overhangs on the windward side of the building; for other overhangs on the leeward and side edges shall have the basic zone pressure applied.
- PLUS (+) and MINUS (-) signs signify pressures acting toward and away from the projected surfaces, respectively.
- W : The width of the gable end wall.
- L : The length of the gable roofed building measured parallel to the ridge.
- λ : Adjustment factor for building height and exposure.
- For the design of the longitudinal MWFRS use $\theta = 0^\circ$, and locate the zone E/F, G/H boundary at the mid-length of the building.
- Load cases 1 and 2 must be checked for $25^\circ < \theta \leq 45^\circ$; load case 2 at 25° is provided only for interpolation between 25° to 30° .
- A, B, C, D are vertical projection areas; E, F, G, H are horizontal projection areas.



$a \equiv$ Largest of $\{ \blacksquare 3 \text{ feet}; \blacksquare 4\% \text{ of Least } [W \text{ or } L]; \blacksquare \text{Least of } [0.4h \text{ or } 10\% \text{ of Least } (W \text{ or } L)] \}$.

DESIGN WIND PRESSURES FOR MAIN WIND FORCE RESISTING SYSTEM
TO A REGULAR-SHAPED BUILDING COMPOSED OF FLAT, HIP AND GABLE ROOF

T A B L E -A (Ps VALUE)

for Building Height	Roof Angle, θ (degrees)	Load Case	Z O N E S									
			Horizontal Pressures P_s , (psf) $p_s = (\lambda * K_{zt} * I * p_{s30})$				Vertical Pressures P_s , (psf) $p_s = (\lambda * K_{zt} * I * p_{s30})$				Overhangs P_s , (psf) $p_s = (\lambda * K_{zt} * I * p_{s30})$	
			A	B	C	D	E	F	G	H	E_{OH}	G_{OH}
H=15ft	0 to 5 ⁰	1	13.9	-7.1	9.2	-4.2	-16.7	-9.4	-11.6	-7.4	-23.4	-18.3
		2	-	-	-	-	-2.9	-5.7	-0.8	-3.6	-	-
	10	1	15.6	-6.5	10.4	-3.8	-16.7	-10.2	-11.6	-7.9	-23.4	-18.3
		2	-	-	-	-	-	-	-	-	-	-
	15	1	17.4	-5.8	11.6	-3.3	-16.7	-10.9	-11.6	-8.3	-23.4	-18.3
		2	-	-	-	-	-	-	-	-	-	-
H=20ft	0 to 5 ⁰	1	14.8	-7.6	9.8	-4.5	-17.8	-10.1	-12.4	-7.9	-24.9	-19.5
		2	-	-	-	-	-3.1	-6.1	-0.9	-3.9	-	-
	10	1	16.6	-7.0	11.1	-4.0	-17.8	-10.8	-12.4	-8.4	-24.9	-19.5
		2	-	-	-	-	-	-	-	-	-	-
	15	1	18.6	-6.2	12.4	-3.5	-17.8	-11.6	-12.4	-8.9	-24.9	-19.5
		2	-	-	-	-	-	-	-	-	-	-
H=25ft	0 to 5 ⁰	1	15.5	-8.0	10.3	-4.7	-18.6	-10.5	-13.0	-8.2	-26.1	-20.4
		2	-	-	-	-	-3.2	-6.3	-0.9	-4.1	-	-
	10	1	17.4	-7.3	11.6	-4.2	-18.6	-11.3	-13.0	-8.8	-26.1	-20.4
		2	-	-	-	-	-	-	-	-	-	-
	15	1	19.4	-6.5	13.0	-3.6	-18.6	-12.2	-13.0	-9.3	-26.1	-20.4
		2	-	-	-	-	-	-	-	-	-	-
H=30ft	0 to 5 ⁰	1	16.1	-8.3	10.6	-4.9	-19.3	-10.9	-13.4	-8.5	-27.0	-21.1
		2	-	-	-	-	-3.4	-6.6	-1.0	-4.2	-	-
	10	1	18.1	-7.6	12.0	-4.3	-19.3	-11.8	-13.4	-9.1	-27.0	-21.1
		2	-	-	-	-	-	-	-	-	-	-
	15	1	20.2	-6.7	13.4	-3.8	-19.3	-12.6	-13.4	-9.7	-27.0	-21.1
		2	-	-	-	-	-	-	-	-	-	-
H=35ft	0 to 5 ⁰	1	16.7	-8.6	11.0	-5.1	-20.0	-11.3	-13.9	-8.8	-28.0	-21.9
		2	-	-	-	-	-3.5	-6.8	-1.0	-4.4	-	-
	10	1	18.7	-7.8	12.5	-4.5	-20.0	-12.2	-13.9	-9.4	-28.0	-21.9
		2	-	-	-	-	-	-	-	-	-	-
	15	1	20.9	-7.0	13.9	-3.9	-20.0	-13.1	-13.9	-10.0	-28.0	-21.9
		2	-	-	-	-	-	-	-	-	-	-
H=40ft	0 to 5 ⁰	1	17.1	-8.8	11.3	-5.2	-20.6	-11.6	-14.3	-9.1	-28.8	-22.5
		2	-	-	-	-	-3.6	-7.0	-1.0	-4.5	-	-
	10	1	19.2	-8.0	12.8	-4.6	-20.6	-12.5	-14.3	-9.7	-28.8	-22.5
		2	-	-	-	-	-	-	-	-	-	-
	15	1	21.5	-7.2	14.3	-4.0	-20.6	-13.4	-14.3	-10.3	-28.8	-22.5
		2	-	-	-	-	-	-	-	-	-	-
H=45ft	0 to 5 ⁰	1	17.6	-9.0	11.6	-5.4	-21.1	-11.9	-14.7	-9.3	-29.5	-23.1
		2	-	-	-	-	-3.7	-7.2	-1.1	-4.6	-	-
	10	1	19.7	-8.3	13.2	-4.7	-21.1	-12.9	-14.7	-9.9	-29.5	-23.1
		2	-	-	-	-	-	-	-	-	-	-
	15	1	22.0	-7.3	14.7	-4.1	-21.1	-13.8	-14.7	-10.6	-29.5	-23.1
		2	-	-	-	-	-	-	-	-	-	-
H=50ft	0 to 5 ⁰	1	17.9	-9.2	11.9	-5.5	-21.5	-12.2	-15.0	-9.5	-30.1	-23.6
		2	-	-	-	-	-3.7	-7.3	-1.1	-4.7	-	-
	10	1	20.1	-8.4	13.4	-4.8	-21.5	-13.1	-15.0	-10.1	-30.1	-23.6
		2	-	-	-	-	-	-	-	-	-	-
	15	1	22.5	-7.5	15.0	-4.2	-21.5	-14.0	-15.0	-10.8	-30.1	-23.6
		2	-	-	-	-	-	-	-	-	-	-