

## WIND LOADING ANALYSIS - Main Wind-Force Resisting System

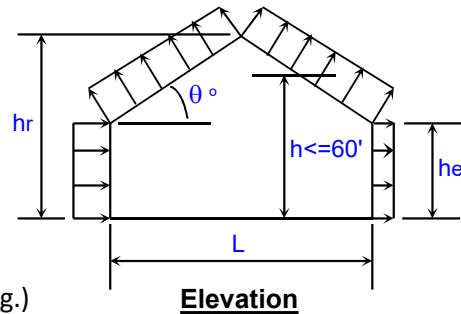
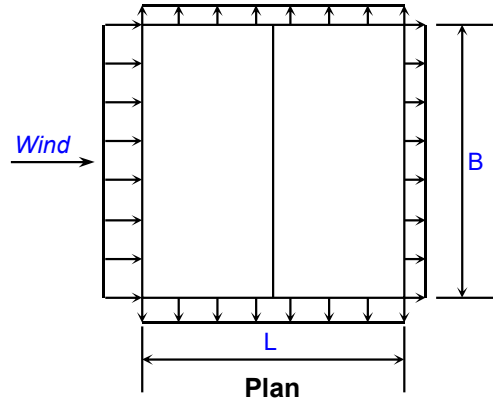
Per ASCE 7-98 Code for Enclosed or Partially Enclosed Buildings

Using Method 2: Analytical Procedure (Section 6.5) for Low-Rise Buildings

Job Name:		Subject:	
Job Number:		Originator:	Checker:

### Input Data:

Wind Speed, V =	120	mph (Wind Map, Fig. 6-1)
Bldg. Classification =	II	(Table 1-1)
Exposure Category =	C	(Sect. 6.5.6)
Ridge Height, hr =	53.33	ft. (hr >= he)
Eave Height, he =	20.00	ft. (he <= hr)
Building Width =	200.00	ft. (Normal to Building Ridge)
Building Length =	250.00	ft. (Parallel to Building Ridge)
Roof Type =	Gable	(Gable or Monoslope)
Topo. Factor, Kzt =	1.00	(Sect. 6.5.7)
Direct. Factor, Kd =	0.85	(Table 6-6)
Enclosed? (Y/N)	Y	(Sect. 6.2 & Table 6-7)



### Resulting Parameters and Coefficients:

Roof Angle, $\theta$ =	18.43	deg.
Mean Roof Ht., h =	36.67	ft. (h = (hr+he)/2, for angle >10 deg.)

Check Criteria for a Low-Rise Building:

1. Is h <= 60' ? Yes, O.K.      2. Is h <= Lesser of L or B? Yes, O.K.

External Pressure Coeff's., GCpf (Fig. 6-4):

(For values, see following wind load tabulations.)

Positive & Negative Internal Pressure Coefficients, GCpi (Table 6-7):

+GCpi Coef. =	0.18	(positive internal pressure)
-GCpi Coef. =	-0.18	(negative internal pressure)

If h < 15 then:  $K_h = 2.01 \cdot (15/z_g)^{2/\alpha}$  (Table 6-5, Case 1b)

If h >= 15 then:  $K_h = 2.01 \cdot (z/z_g)^{2/\alpha}$  (Table 6-5, Case 1b)

$\alpha$ =	9.50	(Table 6-4)
$z_g$ =	900	(Table 6-4)
$K_h$ =	1.02	( $K_h = K_z$ evaluated at z = h)
I =	1.00	(Table 6-1) (Importance factor)

Velocity Pressure:  $q_z = 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$  (Sect. 6.5.10, Eq. 6-13)

$q_h =$  32.11 psf       $q_h = 0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$  ( $q_z$  evaluated at z = h)

Design Net External Wind Pressures (Sect. 6.5.12.2.2):

$p = q_h \cdot [(GCpf) - (+/-GCpi)]$  (psf, Eq. 6-16)

Wall and Roof End Zone Widths 'a' and '2\*a' (Fig. 6-4):

$$a = 14.67 \text{ ft.}$$

$$2*a = 29.33 \text{ ft.}$$

MWFRS Wind Load Tabulation for Case 'A'				Case 'A' Rotated (Corner II)			
Surface	GCpf	p = Net Pressures (psf)		Surface	*GCpf	p = Net Pressures (psf)	
		(w/ +GCpi)	(w/ -GCpi)			(w/ +GCpi)	(w/ -GCpi)
Zone 1	0.52	10.80	22.36	Zone 1	0.40	7.06	18.62
Zone 2	-0.69	-27.93	-16.37	Zone 2	-0.69	-27.93	-16.37
Zone 3	-0.47	-20.82	-9.26	Zone 3	-0.37	-17.66	-6.10
Zone 4	-0.42	-19.12	-7.56	Zone 4	-0.29	-15.09	-3.53
Zone 1E	0.78	19.27	30.83	Zone 1E	0.61	13.81	25.36
Zone 2E	-1.07	-40.13	-28.57	Zone 2E	-1.07	-40.13	-28.57
Zone 3E	-0.67	-27.40	-15.84	Zone 3E	-0.53	-22.80	-11.24
Zone 4E	-0.62	-25.62	-14.06	Zone 4E	-0.43	-19.58	-8.03

\*Note: Use roof angle  $\theta = 0$  degrees for Case 'A' rotated.

For Case 'A' when GCpf is neg. in Zone 2:

$$\text{Zone 2 distance} = 91.66 \text{ ft.}$$

For Case 'A' rot. when GCpf is neg. in Zone 2:

$$\text{Zone 2 distance} = 91.66 \text{ ft.}$$

Remainder of roof Zone 2 to have roof Zone 3 pressures.

MWFRS Wind Load Tabulation for Case 'B'				Case 'B' Rotated (Corner II)			
Surface	GCpf	p = Net Pressure (psf)		Surface	GCpf	p = Net Pressure (psf)	
		(w/ +GCpi)	(w/ -GCpi)			(w/ +GCpi)	(w/ -GCpi)
Zone 1	-0.45	-20.23	-8.67	Zone 1	-0.45	-20.23	-8.67
Zone 2	-0.69	-27.93	-16.37	Zone 2	-0.69	-27.93	-16.37
Zone 3	-0.37	-17.66	-6.10	Zone 3	-0.37	-17.66	-6.10
Zone 4	-0.45	-20.23	-8.67	Zone 4	-0.45	-20.23	-8.67
Zone 5	0.40	7.06	18.62	Zone 5	0.40	7.06	18.62
Zone 6	-0.29	-15.09	-3.53	Zone 6	-0.29	-15.09	-3.53
Zone 1E	-0.48	-21.19	-9.63	Zone 1E	-0.48	-21.19	-9.63
Zone 2E	-1.07	-40.13	-28.57	Zone 2E	-1.07	-40.13	-28.57
Zone 3E	-0.53	-22.80	-11.24	Zone 3E	-0.53	-22.80	-11.24
Zone 4E	-0.48	-21.19	-9.63	Zone 4E	-0.48	-21.19	-9.63
Zone 5E	0.61	13.81	25.36	Zone 5E	0.61	13.81	25.36
Zone 6E	-0.43	-19.58	-8.03	Zone 6E	-0.43	-19.58	-8.03

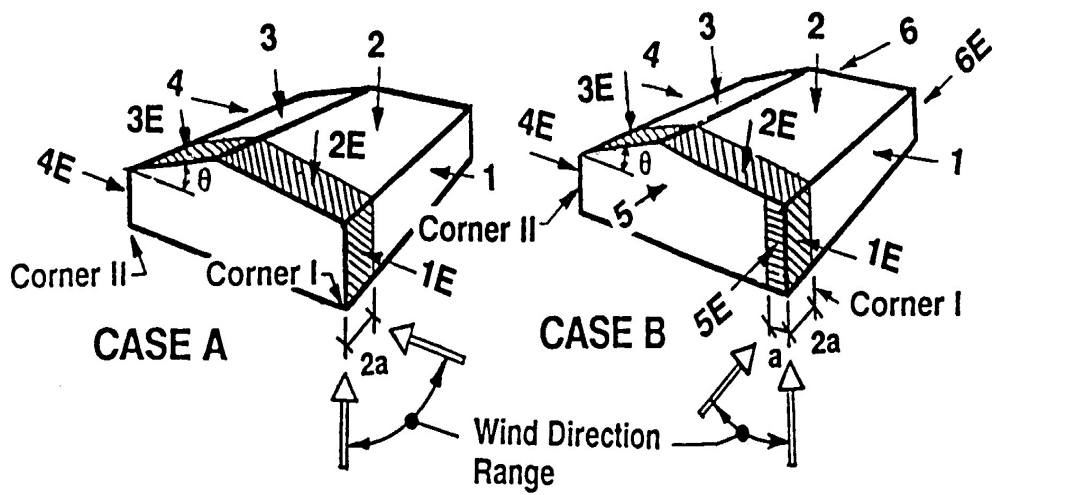
Notes: 1. For Case 'A', Case 'A' Rotated (90 deg.), Case 'B', and Case 'B' Rotated (90 deg.):

- |  |  |
|--|--|
| Zone 1 is windward wall for interior zone. | Zone 1E is windward wall for end zone. |
| Zone 2 is windward roof for interior zone. | Zone 2E is windward roof for end zone. |
| Zone 3 is leeward roof for interior zone.  | Zone 3E is leeward roof for end zone.  |
| Zone 4 is leeward wall for interior zone.  | Zone 4E is leeward wall for end zone.  |
| Zone 5 is sidewall for interior zone.      | Zone 5E is sidewall for end zone.      |
| Zone 6 is sidewall for interior zone.      | Zone 6E is sidewall for end zone.      |

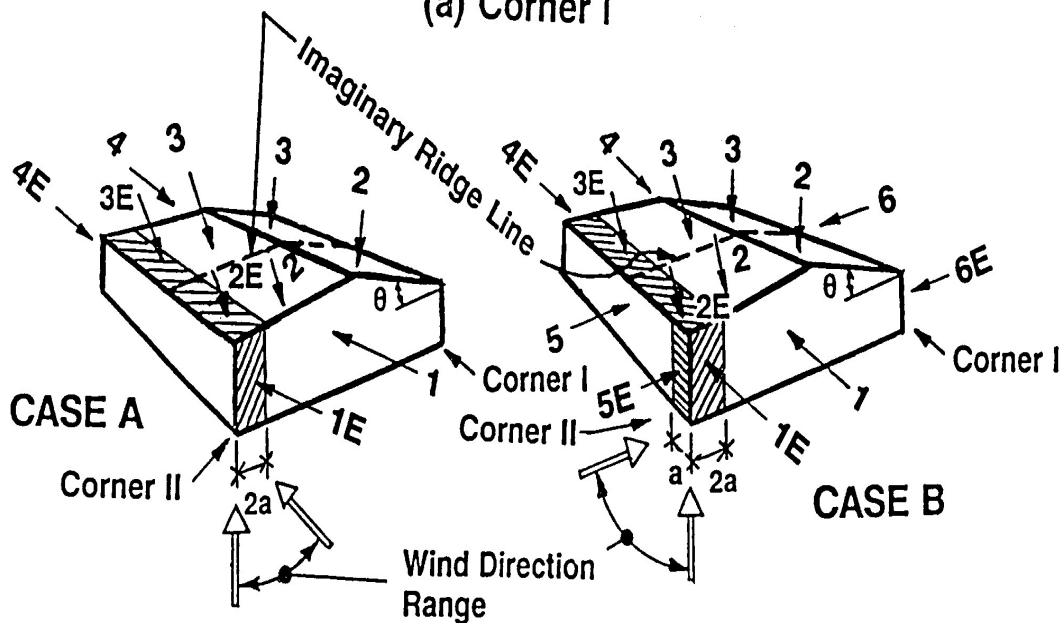
2. (+) and (-) signs signify wind pressures acting toward & away from respective surfaces.

3. Per Code Section 6.1.4.1, the minimum wind load for MWFRS shall not be less than 10 psf.
4. References : a. ASCE 7-98, "Minimum Design Loads for Buildings and Other Structures".  
 b. "Guide to the Use of the Wind Load Provisions of ASCE 7-98"  
 by: Kishor C. Mehta and Dale C. Perry (2002).

**MWFRS Zones and Load Cases for Low-Rise Buildings:**



(a) Corner I



**(b) Corner II (assume  $\theta = 0^\circ$ )**

**FIGURE C6-2. Application of Load Cases for Two Windward Corners**

