

Wind Loading

6.5 METHOD 2—ANALYTICAL PROCEDURE
 Occupancy Category II (Table 1.1)
 Surface Roughness "B" (6.5.6.2)
 Exposure Category "B" (6.5.6.3)
 Enclosure classification (6.5.9)

6.1.4.1 Main Wind-Force Resisting System. The wind load to be used in the design of the MWFRS for an enclosed or partially enclosed building or other structure shall not be less than 10 lb/ft²
 $qz = 0.00256 * Kz * Kzt * Kd * V^2 * I$ (lb/ft²)
 $p = q * Gf * Cp - qh * (GCpi)$ (lb/ft²)
 $Kzt = 1$ (6.5.7.2)
 $Gcpi = +/- 0.18$

Basic Wind Vel.	Direct. Factor	Import. Factor	V pres exp.coeff	Topo Factor	Gust Factor	Gust Factor	Int.Pres Coeff.	Ext.Pres Coeff	Velocity Press	Pressure
6.5.4	6.5.4	6.5.5	6.5.6	6.5.7	6.5.8	6.5.8	6.5.11.1	6.5.11.2	6.5.10	
Fig. 6-1	Table 6-4	Table 6-1	Table 6-3				Fig. 6-5	Fig. 6-6/8		

height	V	Kd	I	Kz	Kzt	Gf E-W	Gf N-S	GCpi	Cp	qz	p E-W	p N-S
0-15	140.00	0.85	1.00	0.57	1.00	0.8272	0.8306	-0.18	0.80	24.31	24.99	25.06
20	140.00	0.85	1.00	0.62	1.00	0.8272	0.8306	-0.18	0.80	26.44	26.40	26.48
25	140.00	0.85	1.00	0.66	1.00	0.8272	0.8306	-0.18	0.80	28.15	27.53	27.61
30	140.00	0.85	1.00	0.70	1.00	0.8272	0.8306	-0.18	0.80	29.85	28.66	28.74
40	140.00	0.85	1.00	0.76	1.00	0.8272	0.8306	-0.18	0.80	32.41	30.36	30.44
50	140.00	0.85	1.00	0.81	1.00	0.8272	0.8306	-0.18	0.80	34.55	31.77	31.86
60	140.00	0.85	1.00	0.85	1.00	0.8272	0.8306	-0.18	0.80	36.25	32.90	32.99
70	140.00	0.85	1.00	0.89	1.00	0.8272	0.8306	-0.18	0.80	37.96	34.03	34.13
80	140.00	0.85	1.00	0.93	1.00	0.8272	0.8306	-0.18	0.80	39.66	35.15	35.26
90	140.00	0.85	1.00	0.96	1.00	0.8272	0.8306	-0.18	0.80	40.94	36.00	36.11
100	140.00	0.85	1.00	0.99	1.00	0.8272	0.8306	-0.18	0.80	42.22	36.85	36.96
120	140.00	0.85	1.00	1.04	1.00	0.8272	0.8306	-0.18	0.80	44.36	38.26	38.38
140	140.00	0.85	1.00	1.09	1.00	0.8272	0.8306	-0.18	0.80	46.49	39.67	39.80
160	140.00	0.85	1.00	1.13	1.00	0.8272	0.8306	-0.18	0.80	48.19	40.80	40.93
174.33	140.00	0.85	1.00	1.16	1.00	0.8272	0.8306	-0.18	0.80	49.47	41.65	41.78
Leeward										qh		
174.33	140.00	0.85	1.00	1.16	1.00	0.8272	0.8306	0.18	-0.50	49.47	-29.37	-29.45
Sides										qh		
174.33	140.00	0.85	1.00	1.16	1.00	0.8272	0.8306	0.18	-0.70	49.47	-37.55	-37.67

Gust Factors											
E-W						N-S					
V (mph)	140		α	0.25	Tab 6.2	V (mph)	140		α	0.25	Tab 6.2
B (ft)	137.00		b	0.45	Tab 6.2	B (ft)	115.00		b	0.45	Tab 6.2
L (ft)	115.00		Vz	122.82	Eq 6-14	L (ft)	137.00		Vz	122.82	Eq 6-14
h (ft)	171.67		N1	0.0014	Eq 6.12	h (ft)	171.67		N1	0.0006	Eq 6.12
z	103.00		Rn	0.0107	Eq 6-11	z	103.00		Rn	0.0047	Eq 6-11
ℓ (ft)	320.00		η (Rh)	4.5464		ℓ (ft)	320.00		η (Rh)	2.0074	
ε	0.333		η (RB)	3.6283		ε	0.333		η (RB)	1.3447	
Lz	467.65	Eq 6.7	η (RL)	3.0457		Lz	467.65	Eq 6.7	η (RL)	1.6020	
c	0.300		Rh	0.1958	Eq 6-13a	c	0.300		Rh	0.3763	Eq 6-13a
Iz	0.248	Eq 6.5	RB	0.2377	Eq 6-13a	Iz	0.248	Eq 6.5	RB	0.4859	Eq 6-13a
Q	0.821	Eq 6.6	RL	0.2746	Eq 6-13a	Q	0.827	Eq 6.6	RL	0.4373	Eq 6-13a
n1 (Hz)	0.707		β %	5		n1 (Hz)	0.312		β %	5	
gR	4.11	Eq 6.9	R	0.0081	Eq 6-10	gR	3.90	Eq 6.9	R	0.0113	Eq 6-10
gQ	3.40					gQ	3.40				
gv	3.40		Gf	0.8272	Eq 6-8	gv	3.40		Gf	0.8306	Eq 6-8

Wind Forces	Level	Level Trib. Height ft	E-W X Width ft	N-S Y Width ft	E-W X Area ft ²	N-S Y Area ft ²	E-W Windward Pressure lb/ft ²	N-S Windward Pressure lb/ft ²	Leeward Pressure lb/ft ²	E-W Total Pressure lb/ft ²	N-S Total Pressure lb/ft ²	E-W Story Shear K	N-S Story Shear K	E-W Total Shear K	N-S Total Shear K	E-W Over Turn ft-K	N-S Over Turn ft-K
SW	10.33	10.33	116.0	94.0	1198.67	971.33	41.445	41.474	-29.45	70.90	70.93						
RF*	2.00	9.33	137.0	115.0	1278.67	1073.33	40.972	40.898	-29.45	70.42	70.35	175.0	144.4	175.0	144.4	27478.9	22670.4
12	14.67	14.00	137.0	115.0	1918.00	1610.00	40.211	40.233	-29.45	69.66	69.68	133.6	112.2	308.6	256.6	19729.6	16566.7
11	13.33	13.33	137.0	115.0	1826.67	1533.33	39.247	39.369	-29.45	68.70	68.82	125.5	105.5	434.1	362.1	16773.3	14104.9
10	13.33	13.33	137.0	115.0	1826.67	1533.33	38.196	38.427	-29.45	67.65	67.88	123.6	104.1	557.7	466.2	14869.1	12524.1
9	13.33	13.33	137.0	115.0	1826.67	1533.33	36.898	37.481	-29.45	66.35	66.93	121.2	102.6	678.9	568.8	12967.9	10981.0
8	13.33	13.33	137.0	115.0	1826.67	1533.33	35.978	36.445	-29.45	65.43	65.90	119.5	101.0	798.4	669.9	11194.4	9463.9
7	13.33	13.33	137.0	115.0	1826.67	1533.33	35.126	35.233	-29.45	64.58	64.68	118.0	99.2	916.4	769.1	9475.8	7967.3
6	13.33	13.33	137.0	115.0	1826.67	1533.33	33.727	33.824	-29.45	63.18	63.28	115.4	97.0	1031.8	866.1	7731.8	6500.2
5	13.33	13.33	137.0	115.0	1826.67	1533.33	32.185	32.274	-29.45	61.64	61.73	112.6	94.6	1144.4	960.7	6041.9	5079.0
4	13.33	13.33	137.0	115.0	1826.67	1533.33	30.367	30.451	-29.45	59.82	59.90	109.3	91.9	1253.6	1052.6	4406.8	3704.3
3	13.33	13.33	137.0	115.0	1826.44	1533.14	27.945	28.025	-29.45	57.40	57.48	104.8	88.1	1358.5	1140.7	2830.1	2379.0
2	13.33	13.67	137.0	115.0	1872.11	1571.48	25.770	25.845	-29.45	55.22	55.30	103.4	86.9	1461.9	1227.6	1412.7	1187.5
												Total	Total			Total	Total
												1461.9	1227.6			134912.4	113128.3

*Notes:

Parapet - 2 ft

A screen wall attached to the roof (but not to the Penthouse) adds wind load to the roof level and shields the Penthouse from wind pressures

Area is calculated accordingly.