

Detailed (Method 2) Calculations for Wind02

4/18/2004

WIND02 v1-01

Detailed Wind Load Design (Method 2) per ASCE 7-02

Description: Demo for Method 2 Detailed Worksheet

Analysis by: CR

User Input Data		
Structure Type	Building	
Basic Wind Speed (V)	130	mph
Struc Category (I, II, III, or IV)	II	
Exposure (B, C, or D)	C	
Struc Nat Frequency (n1)	1	Hz
Slope of Roof (Theta)	0	Deg
Type of Roof	Monoslope	
Kd (Directionality Factor)	0.85	
Eave Height (Eht)	15.00	ft
Ridge Height (RHt)	15.00	ft
Mean Roof Height (Ht)	15.00	ft
Width Perp. To Wind Dir (B)	60.00	ft
Width Paral. To Wind Dir (L)	30.00	ft
Damping Ratio (beta)	0.01	

Red values should be changed only through "Main Menu"

Calculated Parameters	
Type of Structure	
Height/Least Horizontal Dim	0.50
Flexible Structure	No

Calculated Parameters		
Importance Factor	1	
<i>Hurricane Prone Region (V>100 mph)</i>		
Table 6-2 Values		
Alpha =	9.500	
zg =	900.000	
At =	0.105	
Bt =	1.000	
Am =	0.154	
Bm =	0.650	
Cc =	0.200	
l =	500.00	ft
Epsilon =	0.200	
Zmin =	15.00	ft

Gust Factor Category I: Rigid Structures - Simplified Method		
Gust1	For rigid structures (Nat Freq > 1 Hz) use 0.85	0.85
Gust Factor Category II: Rigid Structures - Complete Analysis		
Zm	Zmin	15.00 ft
lzm	$Cc * (33/z)^{0.167}$	0.2281
Lzm	$l * (zm/33)^{Epsilon}$	427.06 ft
Q	$(1/(1+0.63*((Min(B,L)+Ht)/Lzm)^{0.63}))^{0.5}$	0.9314
Gust2	$0.925 * ((1+1.7 * lzm * 3.4 * Q) / (1+1.7 * 3.4 * lzm))$	0.8889
Gust Factor Summary		
G	Since this is not a flexible structure the lessor of Gust1 or Gust2 are used	0.85

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6.5.12.2.1 Design Wind Pressure - Buildings of All Heights

Elev ft	Kz	Kzt	qz lb/ft ²	Pressure (lb/ft ²) Windward Wall*	
				+GCpi	-GCpi
15	0.85	1.00	31.22	15.61	26.85

Fig 6-5 Internal Pressure Coefficients for Buildings, Gcpi

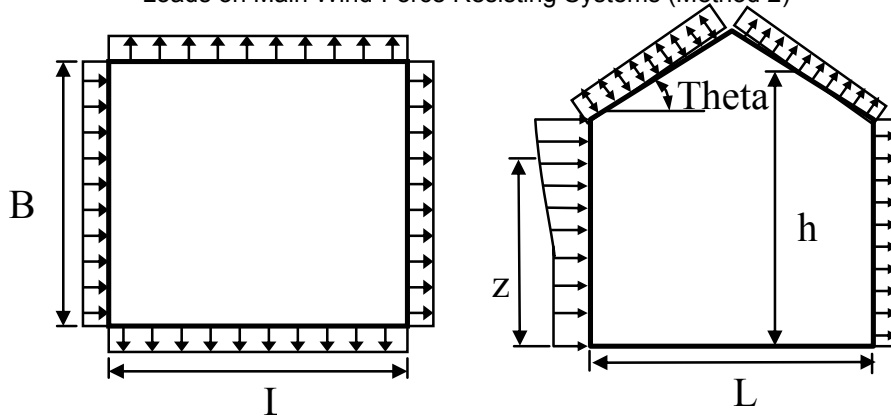
Condition	Gcpi	
	Max +	Max -
Open Buildings	0.00	0.00
Partially Enclosed Buildings	0.55	-0.55
Enclosed Buildings	0.18	-0.18
Enclosed Buildings	0.18	-0.18

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Figure 6-6 - External Pressure Coefficients, Cp

Loads on Main Wind-Force Resisting Systems (Method 2)



Variable	Formula	Value	Units
Kh	$2.01 \cdot (Ht/zg)^{2/\text{Alpha}}$	0.85	
Kht	Topographic factor (Fig 6-4)	1.00	
Qh	$.00256 \cdot (V)^2 \cdot I \cdot Kh \cdot Kht \cdot Kd$	31.22	psf
Khcc	Comp & Clad: Table 6-3 Case 1	0.85	
Qhcc	$.00256 \cdot V^2 \cdot I \cdot Khcc \cdot Kht \cdot Kd$	31.22	psf

Wall Pressure Coefficients, Cp	
Surface	Cp
Windward Wall (See Figure 6.5.12.2.1 for Pressures)	0.8

Roof Pressure Coefficients, Cp	
Roof Area (sq. ft.)	1,800
Reduction Factor	0.80

Calculations for Wind Normal to 60 ft Face	Cp	Pressure (psf)	
<i>Additional Runs may be req'd for other wind directions</i>		+GCpi	-GCpi
Leeward Walls (Wind Dir Normal to 60 ft wall)	-0.50	-18.89	-7.65
Leeward Walls (Wind Dir Normal to 30 ft wall)	-0.30	-13.58	-2.34
Side Walls	-0.70	-24.19	-12.96
Overhang Bottom (Applicable on Windward only)	0.80	21.23	21.23
Roof - Wind Normal to Ridge (Theta<10) - for Wind Normal to 60 ft face			
Dist from Windward Edge: 0 ft to 30 ft - Max Cp	-0.18	-10.40	0.84
Dist from Windward Edge: 0 ft to 7.5 ft - Min Cp	-0.90	-29.50	-18.26
Dist from Windward Edge: 7.5 ft to 15 ft - Min Cp	-0.90	-29.50	-18.26
Dist from Windward Edge: 15 ft to 30 ft - Min Cp	-0.50	-18.89	-7.65
Roof - Wind Parallel to Ridge (All Theta) - for Wind Normal to 30 ft face			
Dist from Windward Edge: 0 ft to 30 ft - Max Cp	-0.18	-10.40	0.84
Dist from Windward Edge: 0 ft to 7.5 ft - Min Cp	-0.90	-29.50	-18.26
Dist from Windward Edge: 7.5 ft to 15 ft - Min Cp	-0.90	-29.50	-18.26
Dist from Windward Edge: 15 ft to 30 ft - Min Cp	-0.50	-18.89	-7.65
Dist from Windward Edge: > 30 ft	-0.30	-13.58	-2.34

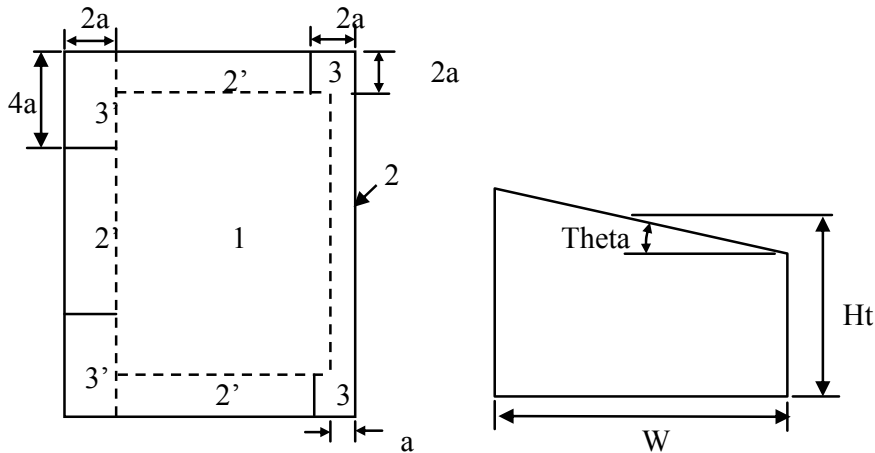
* Horizontal distance from windward edge

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Figure 6-11 - External Pressure Coefficients, GCp

Loads on Components and Cladding for Buildings w/ Ht <= 60 ft



Note: The image shows a Gabled roof, but Fig 6-11 also applies to some monoslope cases

a = 3 ==> 3.00 ft

Component	Width (ft)	Span (ft)	Area (ft ²)	Zone	GCp		Wind Press (lb/ft ²)	
					Max	Min	Max	Min
CMU Walls	15	5	75.00	5	0.76	-0.98	29.37	-36.27
CMU Walls	15	5	75.00	4	0.76	-0.85	29.37	-32.18
Roof Joists	5	30	300.00	1	0.20	-0.90	11.86	-33.71
Roof Joists	5	30	300.00	2	0.20	-1.10	11.86	-39.96
Roof Panel	2	5	10.00	1	0.30	-1.00	14.98	-36.84
Roof Panel	2	5	10.00	2	0.30	-1.80	14.98	-61.81
Roof Panel	2	5	10.00	3	0.30	-2.80	14.98	-93.03
			0.00					
			0.00					
			0.00					

Note: * Enter Zone 1 through 5, or 1H through 3H for overhangs.

Simplified (Method 1) Calculations for Wind02

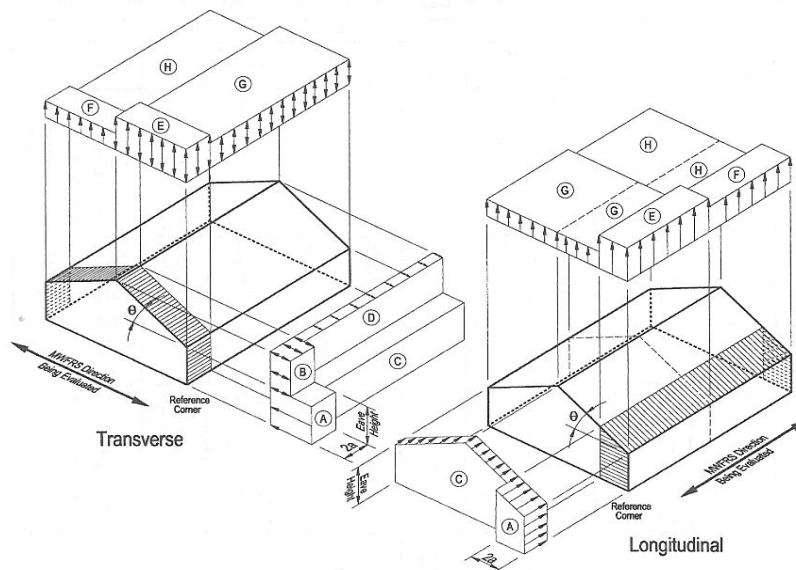
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Simplified Wind Load Design (Method 1) per ASCE 7-02

Description: Demo for Simplified (Method 1) Worksheet

Analysis by: CR

V	Basic Wind Speed	130 mph
Cat	Structural Category (I, II, III, and IV)	II
Exp	Exposure Category (B, C, or D)	C
RHt	Ridge Height	15 ft
Eht	Eave Height	15 ft
Ht	Mean Roof Height of Building	15.00 ft
Theta	Roof Angle	0.00 Deg
L	Length of Building (If Gabled roof, along Ridge)	30 ft
B	Width of Building (Perpendicular to Ridge)	60 ft
Lambda	Adjustment Factor for Building Height and Exposure	1.21
I	Importance Factor	1.00
a	10% of Least Horiz Dim or 0.4h, whichever is less	3.00 ft
2a	Length over which Zone A acts on Each Corner	6.00 ft



Wind Pressure ps (psf) on Main Wind Force Resisting System (MWFRS)										
Load Case	Zones									
	Horizontal Pressures				Vertical Pressures				Overhangs	
	A	B	C	D	E	F	G	H	EOH	GOH
1	32.43	-16.82	21.54	-9.92	-38.96	-22.14	-27.10	-17.18	-54.57	-42.71
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes:

* ps = Lambda * I * ps30

