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Example 1.2 - 15' Building w/ Flat Roof (ASCE 7-05 Method 1 - Simplified)

In order to use the simplified procedure the following criteria must be met:

- 1) The building is a simple diaphragm building (Section 6.2)
- 2) The building is a low rise building
 - a) Mean roof height less than or equal to 60 ft
 - b) Mean roof height does not exceed least horizontal Dimension
- 3) The building is enclosed and conforms to wind-borne debris provisions of Sec 6.5.9.3
- 4) The building is a regular shaped building (Sec 6.2)
- 5) The building is not classified as a flexible building (Sec 6.2)
- 6) The building is not sensitive to vortex shedding, galloping, flutter or instability. Also the site does not have channeling effects, buffeting or any other special circumstances.
- 7) The building is symmetrical in each direction, and has either a flat roof, gable or hip roof with a slope ≤ 10 Deg.
- 8) The building is exempt from torsional load cases

The simplified procedure (Method 1) is based upon looking up values from tables with minimal calculations. The simplified method does not produce the same pressures as would be determined by the detailed method (Method 2), they are two different methods.

Fig 6-2 - Determine Adjustment Factor based upon Building Height and Exposure (H = 15 ft, Exp = C)

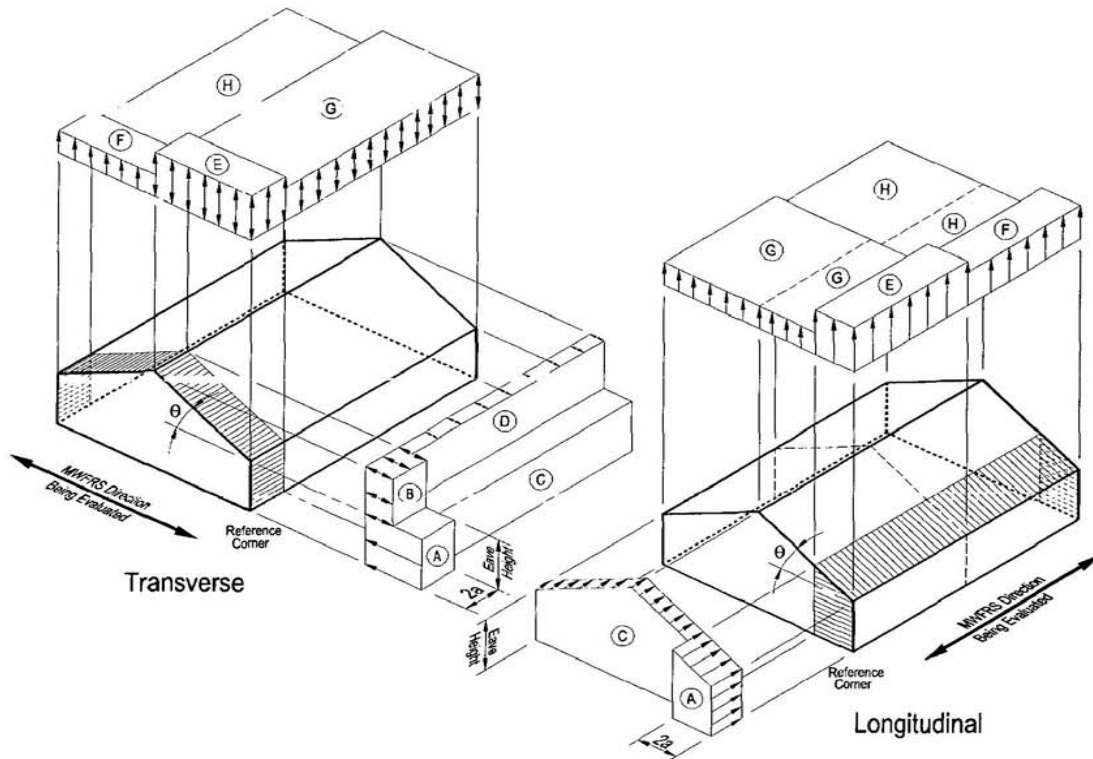
Adjustment Factor for Building Height and Exposure, λ			
Mean roof height (ft)	Exposure		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61

Main Wind Force Resisting System (MWFRS):

Fig 6-2 - Determine the pressures for each zone based upon wind speed (130 mph) and roof angle (0°)

Simplified Design Wind Pressure, p_{s30} (psf) (Exposure B at $h = 30$ ft., $K_{zt} = 1.0$, with $l = 1.0$)

Basic Wind Speed (mph)	Roof Angle (degrees)	Load Case	Zones									
			Horizontal Pressures				Vertical Pressures				Overhangs	
			A	B	C	D	E	F	G	H	EOH	GOH
125	0 to 5°	1	24.7	-12.9	16.4	-7.6	-29.7	-16.9	-20.7	-13.1	-41.7	-32.7
	10°	1	28.0	-11.6	18.6	-6.7	-29.7	-18.2	-20.7	-14.0	-41.7	-32.7
	15°	1	31.1	-10.3	20.7	-5.9	-29.7	-19.4	-20.7	-14.9	-41.7	-32.7
	20°	1	34.3	-9.0	22.9	-5.0	-29.7	-20.7	-20.7	-15.7	-41.7	-32.7
	25°	1	31.0	5.0	22.5	5.1	-13.8	-18.8	-10.0	-15.1	-25.7	-21.9
		2	-----	-----	-----	-----	-5.2	-10.2	-1.4	-6.5	-----	-----
	30 to 45	1	27.9	19.1	22.1	15.2	2.2	-16.9	0.8	-14.5	-9.8	-11.2
		2	27.9	19.1	22.1	15.2	10.7	-8.4	9.3	-6.0	-9.8	-11.2
130	0 to 5°	1	26.8	-13.9	17.8	-8.2	-32.2	-18.3	-22.4	-14.2	-45.1	-35.3
	10°	1	30.2	-12.5	20.1	-7.3	-32.2	-19.7	-22.4	-15.1	-45.1	-35.3
	15°	1	33.7	-11.2	22.4	-6.4	-32.2	-21.0	-22.4	-16.1	-45.1	-35.3
	20°	1	37.1	-9.8	24.7	-5.4	-32.2	-22.4	-22.4	-17.0	-45.1	-35.3
	25°	1	33.6	5.4	24.3	5.5	-14.9	-20.4	-10.8	-16.4	-27.8	-23.7



Description	A	B	C	D	E	F	G	H	EOH	GOH
Pressures (psf)										
ps30 ⁽¹⁾	26.8	-13.9	17.8	-8.2	-32.2	-18.3	-22.4	-14.2	-45.1	-35.3
ps ⁽²⁾	32.43	-16.82	21.54	-9.92	-38.96	-22.14	-27.10	-17.18	-54.57	-42.71
Pressures (Pa)										
ps30 ⁽¹⁾	1,283	-666	852	-393	-1,542	-876	-1,073	-680	-2,159	-1,690
ps ⁽²⁾	1,553	-805	1,031	-475	-1,866	-1,060	-1,298	-823	-2,613	-2,045

(1) ps30 values are those taken directly from the table, based upon Exp B, I = 1.0 and H = 30 ft

(2) Eqn 6-1: $p = \lambda * kzt * I * ps30$, where

λ =	Adjustment Factor =	1.21
kzt =	Terrain Factor =	1.00
I =	Importance Factor =	1.00
ps30 =	Values taken from table	

Determine a:

a1:	10% of least horizontal dim	3.500 ft	1.067 m
a2:	0.4 * h	6.000 ft	1.829 m
a:	Smaller of a1 or a2	3.500 ft	1.067 m
2a:	Reference dim for MWFRS	7.000 ft	2.134 m

Components and Cladding (C&C):

Net Design Wind Pressure, p_{net30} (psf) (Exposure B at $h = 30$ ft. with $I = 1.0$ and $K_{zt} = 1.0$)

	Zone	Effective wind area (sf)	Basic Wind Speed V (mph)											
			125		130		140		145		150		170	
Roof 0 to 7 degrees	1	10	11.4	-28.1	12.4	-30.4	14.3	-35.3	15.4	-37.8	16.5	-40.5	21.1	-52.0
	1	20	10.7	-27.4	11.6	-29.6	13.4	-34.4	14.4	-36.9	15.4	-39.4	19.8	-50.7
	1	50	9.8	-26.4	10.6	-28.6	12.3	-33.2	13.1	-35.6	14.1	-38.1	18.1	-48.9
	1	100	9.1	-25.7	9.8	-27.8	11.4	-32.3	12.2	-34.6	13.0	-37.0	16.7	-47.6
	2	10	11.4	-47.2	12.4	-51.0	14.3	-59.2	15.4	-63.5	16.5	-67.9	21.1	-87.2
	2	20	10.7	-42.1	11.6	-45.6	13.4	-52.9	14.4	-56.7	15.4	-60.7	19.8	-78.0
	2	50	9.8	-35.5	10.6	-38.4	12.3	-44.5	13.1	-47.8	14.1	-51.1	18.1	-65.7
	2	100	9.1	-30.5	9.8	-33.0	11.4	-38.2	12.2	-41.0	13.0	-43.9	16.7	-56.4
	3	10	11.4	-71.0	12.4	-76.8	14.3	-89.0	15.4	-95.5	16.5	-102.2	21.1	-131.3
	3	20	10.7	-58.5	11.6	-63.6	13.4	-73.8	14.4	-79.1	15.4	-84.7	19.8	-108.7
	3	50	9.8	-42.7	10.6	-46.2	12.3	-53.5	13.1	-57.4	14.1	-61.5	18.1	-78.9
	3	100	9.1	-30.5	9.8	-33.0	11.4	-38.2	12.2	-41.0	13.0	-43.9	16.7	-56.4
Wall	4	10	28.1	-30.5	30.4	-33.0	35.3	-38.2	37.8	-41.0	40.5	-43.9	52.0	-56.4
	4	20	26.8	-29.2	29.0	-31.6	33.7	-36.7	36.1	-39.3	38.7	-42.1	49.6	-54.1
	4	50	25.2	-27.5	27.2	-29.8	31.6	-34.6	33.9	-37.1	36.2	-39.7	46.6	-51.0
	4	100	23.9	-26.3	25.9	-28.4	30.0	-33.0	32.2	-35.4	34.4	-37.8	44.2	-48.6
	4	500	21.0	-23.3	22.7	-25.2	26.3	-29.3	28.2	-31.4	30.2	-33.6	38.8	-43.2
	5	10	28.1	-37.6	30.4	-40.7	35.3	-47.2	37.8	-50.6	40.5	-54.2	52.0	-69.6
	5	20	26.8	-35.1	29.0	-38.0	33.7	-44.0	36.1	-47.2	38.7	-50.5	49.6	-64.9
	5	50	25.2	-31.8	27.2	-34.3	31.6	-39.8	33.9	-42.7	36.2	-45.7	46.6	-58.7
	5	100	23.9	-29.2	25.9	-31.6	30.0	-36.7	32.2	-39.3	34.4	-42.1	44.2	-54.1
	5	500	21.0	-23.2	22.7	-25.2	26.3	-29.3	28.2	-31.1	30.2	-33.6	38.8	-43.2

Description	Zone	Area	$p_{net30}^{(1)}$		$p_{net}^{(1)}$			
			Max (psf)	Min (psf)	Max (psf)	Max (Pa)	Min (psf)	Min (Pa)
CMU Walls (Interior)	4	75	26.55	-29.10	32.13	1,538	-35.21	-1,686
CMU Walls (Corner)	5	75	26.55	-32.95	32.13	1,538	-39.87	-1,909
Roof Joists (Interior)	1	408.3	9.80	-27.80	11.86	568	-33.64	-1,611
Roof Joists (Eaves)	2	408.3	9.80	-33.00	11.86	568	-39.93	-1,912
Roof Joists (Corners)	3	408.3	9.80	-33.00	11.86	568	-39.93	-1,912
Roof Panels (Interior)	1	10	12.4	-30.40	15.00	718	-36.78	-1,761
Roof Panels (Eaves)	2	10	12.4	-51.00	15.00	718	-61.71	-2,955
Roof Panels (Corners)	3	10	12.40	-76.80	15.00	718	-92.93	-4,449

(1) p_{net30} values are those interpolated from the table, based upon Exp B, $I = 1.0$ and $H = 30$ ft

(2) Eqn 6-1: $p_{net} = \lambda * k_{zt} * I * p_{net30}$