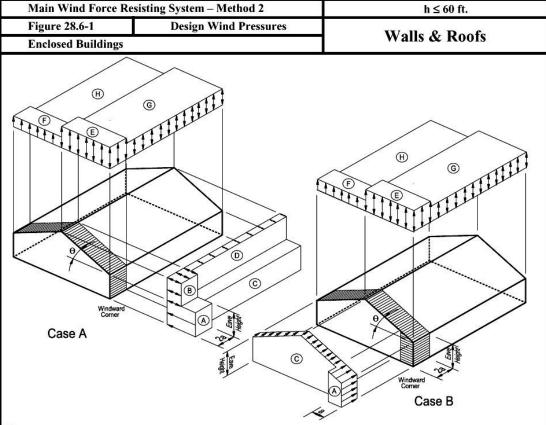
# Design Wind Pressures – Envelope Procedure SEI/ASCE 7-10:

Velocity pressure, p, irrespective of terrain and height above ground or recurrence probability is related to the wind speed, V, by  $p = 0.00256V^2$ . Wind codes also consider the effect of the geometry of the building and location on the surface, wind gusts or turbulence, the local terrain, and annual probability of exceeding the design wind speed.



#### Notes

- Pressures shown are applied to the horizontal and vertical projections, for exposure B, at h=30 ft (9.1m). Adjust to other exposures and heights with adjustment factor λ.
- 2. The load patterns shown shall be applied to each corner of the building in turn as the reference corner. (See Figure 28.4-1)
- 3. For Case B use  $\theta = 0^{\circ}$ .
- 4. Load cases 1 and 2 must be checked for  $25^{\circ} < \theta \le 45^{\circ}$ . Load case 2 at  $25^{\circ}$  is provided only for interpolation between  $25^{\circ}$  and  $30^{\circ}$ .
- 5. Plus and minus signs signify pressures acting toward and away from the projected surfaces, respectively.
- For roof slopes other than those shown, linear interpolation is permitted.
- 7. The total horizontal load shall not be less than that determined by assuming  $p_S = 0$  in zones B & D.
- Where zone E or G falls on a roof overhang on the windward side of the building, use E<sub>OH</sub> and G<sub>OH</sub> for the pressure on the horizontal projection of the overhang. Overhangs on the leeward and side edges shall have the basic zone pressure applied.
- Notation:
  - 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 ft (0.9 m).
  - h: Mean roof height, in feet (meters), except that eave height shall be used for roof angles  $\leq 10^{\circ}$ .
  - $\theta$ : Angle of plane of roof from horizontal, in degrees.

Main Wind Force Resi	sting System – Method 2	h ≤ 60 ft.			
Figure 28.6-1 (cont'd)	Design Wind Pressures	Walls & Doofs			
<b>Enclosed Buildings</b>		Walls & Roofs			

# Simplified Design Wind Pressure , $p_{S30}$ (psf) (Exposure B at h = 30 ft. with I = 1.0)

	Dest	Case	Zones									
Basic Wind Speed	Roof Angle	Ca	Horizontal Pressures Vertical Pressures							Overhangs		
(mph)	(degrees)	Load	Α	В	С	D	E	F	G	Н	Еон	Gон
	0 to 5°	1	19.2	-10.0	12.7	-5.9	-23.1	-13.1	-16.0	-10.1	-32.3	-25.3
	10°	1	21.6	-9.0	14.4	-5.2	-23.1	-14.1	-16.0	-10.8	-32.3	-25.3
	15°	1	24.1	-8.0	16.0	-4.6	-23.1	-15.1	-16.0	-11.5	-32.3	-25.3
110	20°	1	26.6	-7.0	17.7	-3.9	-23.1	-16.0	-16.0	-12.2	-32.3	-25.3
110	25°	1	24.1	3.9	17.4	4.0	-10.7	-14.6	-7.7	-11.7	-19.9	-17.0
		2					-4.1	-7.9	-1.1	-5.1		
	30 to 45	1 2	21.6 21.6	14.8 14.8	17.2 17.2	11.8 11.8	1.7 8.3	-13.1 -6.5	0.6 7.2	-11.3 -4.6	-7.6 -7.6	-8.7 -8.7
10	0 to 5°	1	21.0	-10.9	13.9	-6.5	-25.2	-14.3	-17.5	-11.1	-35.3	-27.6
	10°	1	23.7	-9.8	15.7	-5.7	-25.2	-15.4	-17.5	-11.8	-35.3	-27.6
	15°	1	26.3	-8.7	17.5	-5.0	-25.2	-16.5	-17.5	-12.6	-35.3	-27.6
115	20°	1	29.0	-7.7	19.4	-4.2	-25.2	-17.5	-17.5	-13.3	-35.3	-27.6
115	25°	1	26.3	4.2	19.1	4.3	-11.7	-15.9	-8.5	-12.8	-21.8	-18.5
		2					-4.4	-8.7	-1.2	-5.5		
	30 to 45	1	23.6	16.1	18.8	12.9	1.8	-14.3	0.6	-12.3	-8.3	-9.5
		2	23.6	16.1	18.8	12.9	9.1	-7.1	7.9	-5.0	-8.3	-9.5
	0 to 5°	1	22.8	-11.9	15.1	-7.0	-27.4	-15.6	-19.1	-12.1	-38.4	-30.1
	10°	1	25.8	-10.7	17.1	-6.2	-27.4	-16.8	-19.1	-12.9	-38.4	-30.1
	15°	1	28.7	-9.5	19.1	-5.4	-27.4	-17.9	-19.1	-13.7	-38.4	-30.
120	20°	1	31.6	-8.3	21.1	-4.6	-27.4	-19.1	-19.1	-14.5	-38.4	-30.
120	25°	1	28.6	4.6	20.7	4.7	-12.7	-17.3	-9.2	-13.9	-23.7	-20.2
		2					-4.8	-9.4	-1.3	-6.0		
	30 to 45	1 2	25.7	17.6	20.4 20.4	14.0	2.0 9.9	-15.6 -7.7	0.7	-13.4 -5.5	-9.0	-10.3
		207.51	25.7	17.6	0890000	14.0	67(65)	307.0	8.6	1/07/07/0	-9.0	-10.3
	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° 15°	1	30.2 33.7	-12.5 -11.2	20.1	-7.3 -6.4	-32.2 -32.2	-19.7 -21.0	-22.4 -22.4	-15.1 -16.1	-45.1 -45.1	-35.3 -35.3
	1000	100	- 5000	2262	200000	15000	000000	2000000	75350203	200000	0.073335	1000000
130	20°	1	37.1	-9.8	24.7	-5.4	-32.2	-22.4	-22.4	-17.0	-45.1	-35.3
	25°	1 2	33.6	5.4	24.3	5.5	-14.9	-20.4	-10.8	-16.4	-27.8	-23.
	20 4- 45	1	30.1	20.0	24.0	40.5	-5.7 2.3	-11.1 -18.3	-1.5 0.8	-7.1 -15.7	-10.6	-12.1
	30 to 45	2	30.1	20.6 20.6	24.0	16.5 16.5	11.6	-9.0	10.0	-6.4	-10.6	-12.
_	0 to 5°	1	31.1	-16.1	20.6	-9.6	-37.3	-21.2	-26.0	-16.4	-52.3	-40.9
	10°	1	35.1	-14.5	23.3	-8.5	-37.3	-22.8	-26.0	-17.5	-52.3	-40.9
	15°	1	39.0	-12.9	26.0	-7.4	-37.3	-24.4	-26.0	-18.6	-52.3	-40.9
440	20°	1	43.0	-11.4	28.7	-6.3	-37.3	-26.0	-26.0	-19.7	-52.3	-40.
140	25°	1	39.0	6.3	28.2	6.4	-17.3	-23.6	-12.5	-19.0	-32.3	-27.
		2					-6.6	-12.8	-1.8	-8.2		
	30 to 45	1	35.0	23.9	27.8	19.1	2.7	-21.2	0.9	-18.2	-12.3	-14.0
		2	35.0	23.9	27.8	19.1	13.4	-10.5	11.7	-7.5	-12.3	-14.0
	0 to 5°	1	35.7	-18.5	23.7	-11.0	-42.9	-24.4	-29.8	-18.9	-60.0	-47.0
	10°	1	40.2	-16.7	26.8	-9.7	-42.9	-26.2	-29.8	-20.1	-60.0	-47.0
	15°	1	44.8	-14.9	29.8	-8.5	-42.9	-28.0	-29.8	-21.4	-60.0	-47.0
450	20°	1	49.4	-13.0	32.9	-7.2	-42.9	-29.8	-29.8	-22.6	-60.0	-47.
150	25°	1	44.8	7.2	32.4	7.4	-19.9	-27.1	-14.4	-21.8	-37.0	-31.6
	9000000	2					-7.5	-14.7	-2.1	-9.4		
	30 to 45	1	40.1	27.4	31.9	22.0	3.1	-24.4	1.0	-20.9	-14.1	-16.1
		2	40.1	27.4	31.9	22.0	15.4	-12.0	13.4	-8.6	-14.1	-16.1

Unit Conversions – 1.0 ft = 0.3048 m; 1.0 psf =  $0.0479 \text{ kN/m}^2$ 

Main Wind Force Re	sisting System – Method 2	h ≤ 60 ft.		
Figure 28.6-1 (cont'd)	Design Wind Pressures	Walls & Doofs		
Enclosed Buildings		Walls & Roofs		

## Simplified Design Wind Pressure , $p_{s30}$ (psf) (Exposure B at h = 30 ft.)

Basic Wind Speed (mph)	Roof Angle (degrees)	Case	Zones									
		Load Ca	Horizontal Pressures			Vertical Pressures				Overhangs		
			Α	В	С	D	Е	F	G	Н	Еон	Gон
160	0 to 5°	1	40.6	-21.1	26.9	-12.5	-48.8	-27.7	-34.0	-21.5	-68.3	-53.5
	10°	1	45.8	-19.0	30.4	-11.1	-48.8	-29.8	-34.0	-22.9	-68.3	-53.5
	15°	1	51.0	-16.9	34.0	-9.6	-48.8	-31.9	-34.0	-24.3	-68.3	-53.5
	20°	1	56.2	-14.8	37.5	-8.2	-48.8	-34.0	-34.0	-25.8	-68.3	-53.5
	25°	1	50.9	8.2	36.9	8.4	-22.6	-30.8	-16.4	-24.8	-42.1	-35.9
		2					-8.6	-16.8	-2.3	-10.7		
	30 to 45	1	45.7	31.2	36.3	25.0	3.5	-27.7	1.2	-23.8	-16.0	-18.3
		2	45.7	31.2	36.3	25.0	17.6	-13.7	15.2	-9.8	-16.0	-18.3
180	0 to 5°	1	51.4	-26.7	34.1	-15.8	-61.7	-35.1	-43.0	-27.2	-86.4	-67.7
	10°	1	58.0	-24.0	38.5	-14.0	-61.7	-37.7	-43.0	-29.0	-86.4	-67.7
	15°	1	64.5	-21.4	43.0	-12.2	-61.7	-40.3	-43.0	-30.8	-86.4	-67.
	20°	1	71.1	-18.8	47.4	-10.4	-61.7	-43.0	-43.0	-32.6	-86.4	-67.
	25°	1	64.5	10.4	46.7	10.6	-28.6	-39.0	-20.7	-31.4	-53.3	-45.4
		2					-10.9	-21.2	-3.0	-13.6		
	30 to 45	1	57.8	39.5	45.9	31.6	4.4	-35.1	1.5	-30.1	-20.3	-23.2
		2	57.8	39.5	45.9	31.6	22.2	-17.3	19.3	-12.3	-20.3	-23.2
	0 to 5°	1	63.4	-32.9	42.1	-19.5	-76.2	-43.3	-53.1	-33.5	-106.7	-83.5
200	10°	1	71.5	-29.7	47.6	-17.3	-76.2	-46.5	-53.1	-35.8	-106.7	-83.5
	15°	1	79.7	-26.4	53.1	-15.0	-76.2	-49.8	-53.1	-38.0	-106.7	-83.5
	20°	1	87.8	-23.2	58.5	-12.8	-76.2	-53.1	-53.1	-40.2	-106.7	-83.5
	25°	1	79.6	12.8	57.6	13.1	-35.4	-48.2	-25.6	-38.7	-65.9	-56.1
		2					-13.4	-26.2	-3.7	-16.8		
	30 to 45	1	71.3	48.8	56.7	39.0	5.5	-43.3	1.8	-37.2	-25.0	-28.7
		2	71.3	48.8	56.7	39.0	27.4	-21.3	23.8	-15.2	-25.0	-28.7

### **Adjustment Factor**

for Building Height and Exposure, λ

Mean roof	Exposure						
height (ft)	В	С	D				
15	1.00	1.21	1.47				
20	1.00	1.29	1.55				
25	1.00	1.35	1.61				
30	1.00	1.40	1.66				
35	1.05	1.45	1.70				
40	1.09	1.49	1.74				
45	1.12	1.53	1.78				
50	1.16	1.56	1.81				
55	1.19	1.59	1.84				
60	1.22	1.62	1.87				

Unit Conversions – 1.0 ft = 0.3048 m; 1.0 psf =  $0.0479 \text{ kN/m}^2$ 

Table 1.5-1 Risk Category of Buildings and Other Structures for Flood, Wind, Snow, Earthquake, and Ice Loads

Use or Occupancy of Buildings and Structures	Risk Category
Buildings and other structures that represent a low risk to human life in the event of failure	I
All buildings and other structures except those listed in Risk Categories I, III, and IV	II
Buildings and other structures, the failure of which could pose a substantial risk to human life.	III
Buildings and other structures, not included in Risk Category IV, with potential to cause a substantial economic impact and/or mass disruption of day-to-day civilian life in the event of failure.	
Buildings and other structures not included in Risk Category IV (including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, hazardous waste, or explosives) containing toxic or explosive substances where their quantity exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released.	
Buildings and other structures designated as essential facilities.	IV
Buildings and other structures, the failure of which could pose a substantial hazard to the community.	
Buildings and other structures (including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, or hazardous waste) containing sufficient quantities of highly toxic substances where the quantity exceeds a threshold quantity established by the authority having jurisdiction to be dangerous to the public if released and is sufficient to pose a threat to the public if released. <sup>a</sup>	
Buildings and other structures required to maintain the functionality of other Risk Category IV structures.	

<sup>&</sup>lt;sup>a</sup>Buildings and other structures containing toxic, highly toxic, or explosive substances shall be eligible for classification to a lower Risk Category if it can be demonstrated to the satisfaction of the authority having jurisdiction by a hazard assessment as described in Section 1.5.2 that a

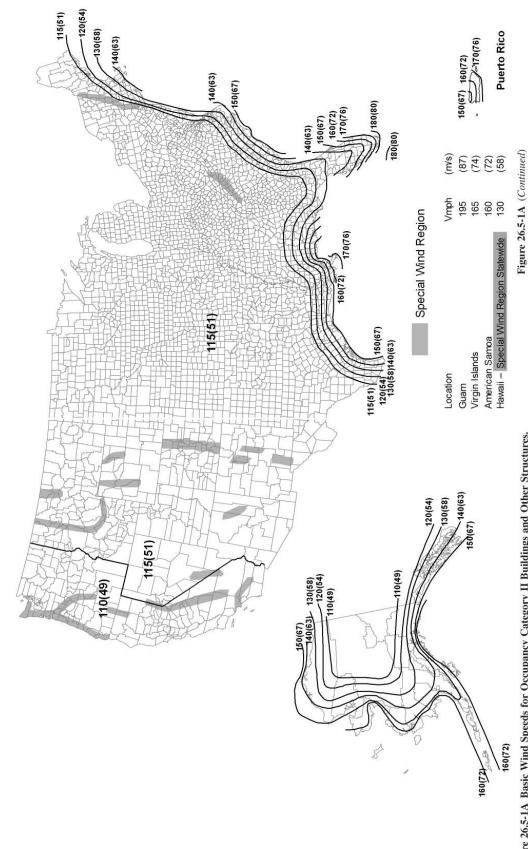


Figure 26.5-1A Basic Wind Speeds for Occupancy Category II Buildings and Other Structures.

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.

<sup>2.</sup> Linear interpolation between contours is permitted.

Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

<sup>5.</sup> Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).