Basic wind speeds for Hawaii, US Virgin Islands, and Puerto Rico shall be determined by using the ASCE Wind Design Geodatabase.

The ASCE Wind Design Geodatabase is available at the ASCE 7 Hazard Tool (https://asce7hazardtool.online), or approved equivalent.

The wind shall be assumed to come from any horizontal direction. The basic wind speed shall be increased where records or experience indicate that the wind speeds are higher than those reflected in Figure 26.5-1.

26.5.2 Special Wind Regions Mountainous terrain, gorges, and special wind regions shown in Figure 26.5-1 shall be examined for unusual wind conditions. The Authority Having Jurisdiction shall, if necessary, adjust the values given in Figure 26.5-1 to account for higher local wind speeds. Such adjustment shall be based on meteorological information and an estimate of the basic wind speed obtained in accordance with the provisions of Section 26.5.3.

Site-specific values for select special wind regions in the contiguous United States have been included in the ASCE 7 Wind Design Geodatabase. It shall be permitted to use the wind speed values for Special Wind Regions from the ASCE 7 Wind Design Geodatabase (https://asce7hazardtool.online/).

26.5.3 Estimation of Basic Wind Speeds from Regional Climatic Data In areas outside hurricane-prone regions, regional climatic data shall only be used in lieu of the basic wind speeds given in Figure 26.5-1 when (1) approved extreme-value statistical analysis procedures have been used in reducing the data, and (2) the length of record, sampling error, averaging time, anemometer height, data quality, and terrain exposure of the anemometer have been taken into account. Reduction in basic wind speed below that of Figure 26.5-1 shall be permitted.

In hurricane-prone regions, wind speeds derived from simulation techniques shall only be used in lieu of the basic wind speeds given in Figure 26.5-1 when approved simulation and extreme-value statistical analysis procedures are used. The use of regional wind-speed data obtained from anemometers is not permitted to define the hurricane wind-speed risk along the Gulf and Atlantic coasts, the Caribbean, or Hawaii.

When the basic wind speed is estimated from regional climatic data or simulation, the estimate shall correspond to the applicable mean recurrence interval, and the estimate shall be adjusted for equivalence to a 3 s gust wind speed at 33 ft (10 m) above ground in Exposure C.

26.6 WIND DIRECTIONALITY FACTOR

The wind directionality factor, K_d, shall be determined from Table 26.6-1 and shall be included in the wind loads calculated in Chapters 27 through 30. The effect of wind directionality in determining wind loads in accordance with Chapter 31 shall be based on a rational analysis of the wind speeds conforming to the requirements of Section 26.5.3 and of Section 31.4.3.

26.7 EXPOSURE

For each wind direction considered, the upwind exposure shall be based on ground surface roughness that is determined from natural topography, vegetation, and constructed facilities.

26.7.1 Wind Directions and Sectors For each selected wind direction at which the wind loads are to be determined, the exposure of the building or structure shall be determined for the two upwind sectors extending 45 degrees on either side of the selected wind direction. The exposure in these two sectors shall be determined in accordance with Sections 26.7.2 and 26.7.3, and the exposure the use of which would result in the highest wind loads shall be used to represent the winds from that direction.

Table 26.6-1. Wind Directionality Factor, K_d.

Structure Type	Directionality Factor K_d
Buildings	
Main wind force resisting system	0.85
Components and cladding	0.85
Arched roofs	0.85
Circular domes	1.0*
Chimneys, tanks, and similar structures	
Square	0.90
Hexagonal	0.95
Octagonal	1.0*
Round	1.0*
Solid freestanding walls, roof top equipment, and solid freestanding and attached signs	0.85
Open signs and single-plane open frames	0.85
Trussed towers	
Triangular, square, or rectangular	0.85
All other cross sections	0.95

*Directionality factor $K_d = 0.95$ shall be permitted for round or octagonal structures with nonaxisymmetric structural systems.

26.7.2 Surface Roughness Categories A ground surface roughness within each 45 degree sector shall be determined for a distance upwind of the site, as defined in Section 26.7.3, from the categories defined in the following text, for the purpose of assigning an exposure category as defined in Section 26.7.3.

Surface Roughness B. Urban and suburban areas, wooded areas, or other terrain with numerous, closely spaced obstructions that have the size of single-family dwellings or larger.

Surface Roughness C. Open terrain with scattered obstructions that have heights generally less than 30 ft (9.1 m). This category includes flat, open country and grasslands.

Surface Roughness D. Flat, unobstructed areas and water surfaces. This category includes smooth mud flats, salt flats, and unbroken ice.

26.7.3 Exposure Categories

Exposure B. For buildings or other structures with a mean roof height less than or equal to 30 ft (9.1 m), Exposure B shall apply where the ground surface roughness, as defined by Surface Roughness B, prevails in the upwind direction for a distance greater than 1,500 ft (457 m). For buildings or other structures with a mean roof height greater than 30 ft (9.1 m), Exposure B shall apply where Surface Roughness B prevails in the upwind direction for a distance greater than 2,600 ft (792 m) or 20 times the height of the building or structure, whichever is greater.

Exposure C. Exposure C shall apply for all cases where Exposure B or D does not apply.

Exposure D. Exposure D shall apply where the ground surface roughness, as defined by Surface Roughness D, prevails in the upwind direction for a distance greater than 5,000 ft (1,524 m) or 20 times the building or structure height, whichever is greater. Exposure D shall also apply where the ground surface roughness immediately upwind of the site is B or C, and the building or structure is within a distance of 600 ft (183 m) or 20 times the building or structure height, whichever is greater, from an Exposure D condition as defined in the previous sentence.

For a building or structure located in the transition zone between exposure categories, the category resulting in the largest wind forces shall be used.

EXCEPTION: An intermediate exposure between the preceding categories is permitted in a transition zone, provided it is determined by a rational analysis method defined in the recognized literature.

26.7.4 Exposure Requirements

26.7.4.1 Directional Procedure (Chapter 27) For each wind direction considered, wind loads for the design of the MWFRS of enclosed and partially enclosed buildings using the Directional Procedure of Chapter 27 shall be based on the exposures as defined in Section 26.7.3. Wind loads for the design of open buildings with monoslope, pitched, or troughed free roofs shall be based on the exposures, as defined in Section 26.7.3, resulting in the highest wind loads for any wind direction at the site.

26.7.4.2 Envelope Procedure (Chapter 28) Wind loads for the design of the MWFRS for all low-rise buildings designed using the Envelope Procedure of Chapter 28 shall be based on the exposure category resulting in the highest wind loads for any wind direction at the site.

26.7.4.3 Directional Procedure for Building Appurtenances and Other Structures (Chapter 29) Wind loads for the design of building appurtenances (such as rooftop structures and equipment) and other structures (such as solid freestanding walls and freestanding signs, chimneys, tanks, open signs, single-plane open frames, and trussed towers) as specified in Chapter 29 shall be based on the appropriate exposure for each wind direction considered.

26.7.4.4 Components and Cladding (Chapter 30) Design wind pressures for C&C shall be based on the exposure category resulting in the highest wind loads for any wind direction at the site.

26.8 TOPOGRAPHIC EFFECTS

26.8.1 Wind Speed-Up over Hills, Ridges, and Escarpments Wind speed-up effects at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, shall be included in the determination of the wind loads when site conditions and locations of buildings and other structures meet all the following conditions:

1. The building or other structure is located as shown in Figure 26.8-1 in the upper one-half of a hill or ridge or near the crest of an escarpment.
2. $H/L_h \geq 0.2$.
3. H is greater than or equal to 15 ft (4.5 m) for Exposures C and D and 60 ft (18 m) for Exposures B.

26.8.2 Topographic Factor The wind speed-up effect shall be included in the calculation of design wind loads by using the factor K_{zt}:

$$K_{zt} = (1 + K_1 K_2 K_3)^2 \qquad (26.8\text{-}1)$$

where K_1, K_2, and K_3 are given in Figure 26.8-1. The values for K_2 and K_3 shall not be less than 0. The equations for K_1, K_2, and K_3 may be used instead of using the tabular values when increased accuracy in determining K_{zt} is required. For $H/L_h > 0.5$, assume that $H/L_h = 0.5$ for evaluating K_1 and substitute $2H$ for L_h for evaluating K_2 and K_3.

If site conditions and locations of buildings and other structures do not meet all the conditions specified in Section 26.8.1, then $K_{zt} = 1.0$.

26.9 GROUND ELEVATION FACTOR

The ground elevation factor to adjust for air density, K_e, shall be determined in accordance with Table 26.9-1. It is permitted to take $K_e = 1$ for all elevations.

Table 26.9-1. Ground Elevation Factor, K_e.

Ground Elevation above Sea Level		
ft	m	Ground Elevation Factor, K_e
<0	<0	See note 2
0	0	1.00
1,000	305	0.96
2,000	610	0.93
3,000	914	0.90
4,000	1,219	0.86
5,000	1,524	0.83
6,000	1,829	0.80
>6,000	>1,829	See note 2

Notes:

1. Conservative approximation $K_e = 1.00$ is permitted in all cases.
2. Factor K_e shall be determined from Table 26.9-1 using interpolation or from the following formula for all elevations: $K_e = e^{-0.0000362 z_e}$ (z_e = ground elevation above sea level, ft); or $K_e = e^{-0.000119 z_e}$ (z_e = ground elevation above sea level, m).
3. K_e is permitted to be taken as 1.00 in all cases.

26.10 VELOCITY PRESSURE

26.10.1 Velocity Pressure Exposure Coefficient Based on the exposure category determined in Section 26.7.3, a velocity pressure exposure coefficient, K_z or K_h, as applicable, shall be determined from Table 26.10-1. For a site located in a transition zone between exposure categories that is near to a change in ground surface roughness, intermediate values of K_z or K_h, between those shown in Table 26.10-1 are permitted provided they are determined by a rational analysis method defined in the recognized literature.

26.10.2 Velocity Pressure Velocity pressure, q_z, evaluated at height z above ground shall be calculated by the following equation: