2021 Virginia Construction Code

CHAPTER 16 STRUCTURAL DESIGN

SECTION 1609
WIND LOADS

1609.1 Applications.

Buildings, structures and parts thereof shall be designed to withstand the minimum wind *loads* prescribed herein. Decreases in wind *loads* shall not be made for the effect of shielding by *other structures*.

1609.1.1 Determination of wind loads.

Wind *loads* on every building or structure shall be determined in accordance with Chapters 26 to 30 of ASCE 7. The type of opening protection required, the basic design *wind speed*, *V*, and the exposure category for a site is permitted to be determined in accordance with Section 1609 or ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

Exceptions:

1. Subject to the limitations of Section 1609.1.1.1, the provisions of ICC 600 shall be permitted for applicable Group R-2 and R-3 buildings.
2. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of AWC WFCM.
3. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of AISI S230.
4. Designs using NAAMM FP 1001.
5. Designs using TIA-222 for antenna-supporting structures and antennas, provided that the horizontal extent of Topographic Category 2 escarpments in Section 2.6.6.2 of TIA-222 shall be 16 times the height of the escarpment.
6. Wind tunnel tests in accordance with ASCE 49 and Sections 31.4 and 31.5 of ASCE 7.

The wind speeds in Figures 1609.3(1) through 1609.3(12) are basic design wind speeds, *V*, and shall be converted in accordance with Section 1609.3.1 to allowable stress design wind speeds, V_{asd}, when the provisions of the standards referenced in Exceptions 4 and 5 are used.

1609.1.1.1 Applicability.

The provisions of ICC 600 are applicable only to buildings located within Exposure B or C as defined in Section 1609.4. The provisions of ICC 600, AWC WFCM and AISI S230 shall not apply to buildings sited on the upper half of an isolated hill, ridge or escarpment meeting all of the following conditions:

1. The hill, ridge or escarpment is 60 feet (18 288 mm) or higher if located in Exposure B or 30 feet (9144 mm) or higher if located in Exposure C.
2. The maximum average slope of the hill exceeds 10 percent.
3. The hill, ridge or escarpment is unobstructed upwind by other such topographic features for a distance from the high point of 50 times the height of the hill or 2 miles (3.22 km), whichever is greater.

1609.2 Protection of openings.

In *windborne debris regions*, glazing in buildings shall be impact resistant or protected with an impact-resistant covering meeting the requirements of an *approved* impact-resistant standard or ASTM E1996 referenced herein as follows:

1. Glazed openings located within 30 feet (9144 mm) of grade shall meet the requirements of the large missile test of ASTM E1996.
2. Glazed openings located more than 30 feet (9144 mm) above grade shall meet the provisions of the small missile test of ASTM E1996.

Exceptions:

1. *Wood structural panels* with a minimum thickness of $^{7}/_{16}$ inch (11.1 mm) and maximum panel span of 8 feet (2438 mm) shall be permitted for opening protection in buildings with a mean roof height of 33 feet (10 058 mm) or less that are classified as a Group R-3 or R-4 occupancy. Panels shall be precut so that they shall be attached to the framing surrounding the opening containing the product with the glazed opening. Panels shall be predrilled as required for the anchorage method and shall be secured with the attachment hardware provided. Attachments shall be designed to resist the components and cladding *loads* determined in accordance with the provisions of ASCE 7, with corrosion-resistant attachment hardware provided and anchors permanently installed on the building. Attachment in accordance with Table 1609.2 with corrosion-resistant attachment hardware provided and anchors permanently installed on the building is permitted for buildings with a mean roof height of 45 feet (13 716 mm) or less where V_{asd} determined in accordance with Section 1609.3.1 does not exceed 140 mph (63 m/s).

2. Glazing in *Risk Category* I buildings, including *greenhouses* that are occupied for growing plants on a production or research basis, without public access shall be permitted to be unprotected.

3. Glazing in *Risk Category* II, III or IV buildings located over 60 feet (18 288 mm) above the ground and over 30 feet (9144 mm) above *aggregate* surface roofs located within 1,500 feet (458 m) of the building shall be permitted to be unprotected.

TABLE 1609.2
WINDBORNE DEBRIS PROTECTION FASTENING SCHEDULE FOR WOOD STRUCTURAL PANELS[a, b, c, d]

FASTENER TYPE	FASTENER SPACING (inches)		
	Panel Span ≤ 4 feet	4 feet < Panel Span ≤ 6 feet	6 feet < Panel Span ≤ 8 feet
No. 8 wood-screw-based anchor with 2-inch embedment length	16	10	8
No. 10 wood-screw-based anchor with 2-inch embedment length	16	12	9
$^1/_4$-inch diameter lag-screw-based anchor with 2-inch embedment length	16	16	16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.448 N, 1 mile per hour = 0.447 m/s.

a. This table is based on 140 mph wind speeds and a 45-foot mean roof height.

b. Fasteners shall be installed at opposing ends of the wood structural panel. Fasteners shall be located not less than 1 inch from the edge of the panel.

c. Anchors shall penetrate through the exterior wall covering with an embedment length of 2 inches minimum into the building frame. Fasteners shall be located not less than $2^1/_2$ inches from the edge of concrete block or concrete.

d. Where panels are attached to masonry or masonry/stucco, they shall be attached using vibration-resistant anchors having a minimum ultimate withdrawal capacity of 1,500 pounds.

1609.2.1 Louvers.
Louvers protecting intake and exhaust ventilation ducts not assumed to be open that are located within 30 feet (9144 mm) of grade shall meet the requirements of AMCA 540.

1609.2.2 Application of ASTM E1996.
The text of Section 6.2.2 of ASTM E1996 shall be substituted as follows:

6.2.2 Unless otherwise specified, select the wind zone based on the basic design *wind speed*, *V*, as follows:

6.2.2.1 *Wind Zone 1*—130 mph ≤ basic design *wind speed*, *V* < 140 mph.

6.2.2.2 *Wind Zone 2*—140 mph ≤ basic design *wind speed*, *V* < 150 mph at greater than one mile (1.6 km) from the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.3 *Wind Zone 3*—150 mph (67 m/s) ≤ basic design *wind speed*, *V* ≤ 160 mph (72 m/s), or 140 mph (63 m/s) ≤ basic design *wind speed*, *V* ≤ 160 mph (72 m/s) and within one mile (1.6 km) of the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.4 *Wind Zone 4*— basic design *wind speed*, *V* > 160 mph (72 m/s).

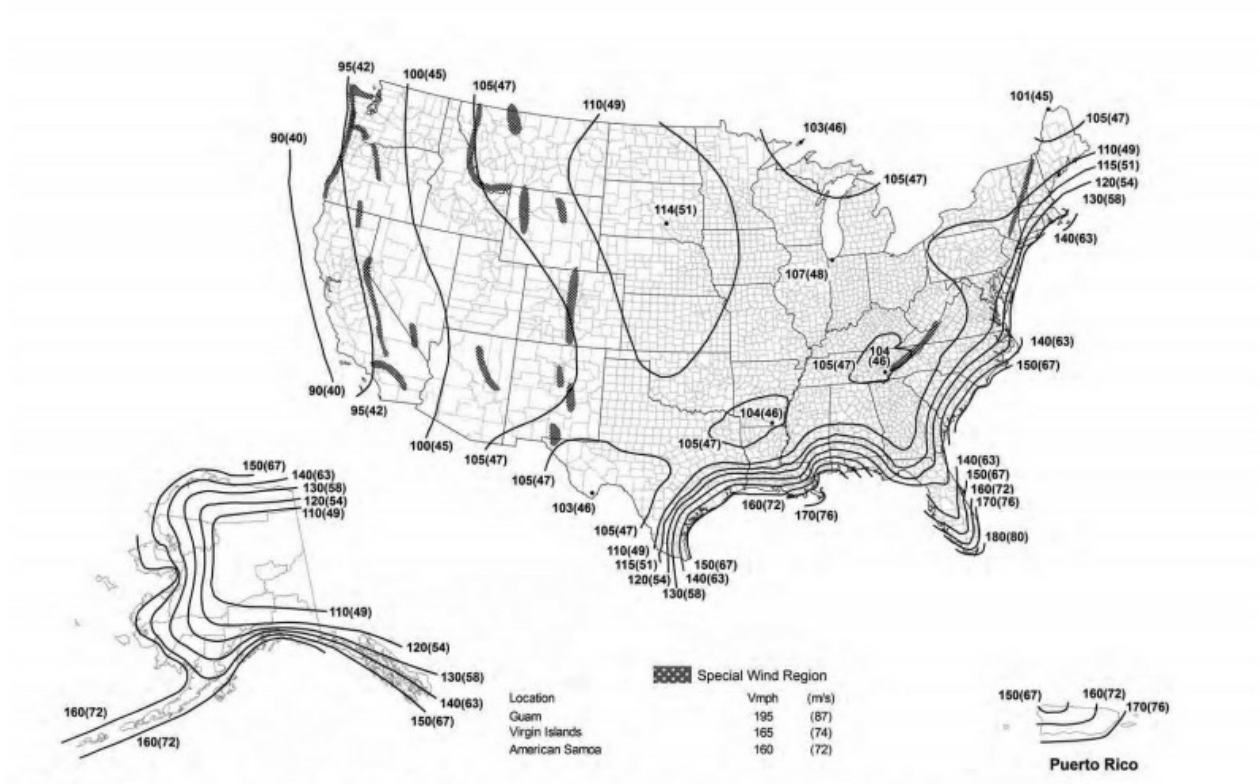
1609.2.3 Garage doors.
Garage door glazed opening protection for windborne debris shall meet the requirements of an *approved* impact-resisting

standard or ANSI/DASMA 115.

1609.3 Basic wind speed.

The basic design wind speed, *V*, in miles per hour (mph), for the determination of the wind loads shall be determined by Figures 1609.3(1), 1609.3(2), 1609.3(3), and 1609.3(4). The basic design wind speed, *V*, for use in the design of *Risk Category* II buildings and structures shall be obtained from Figure 1609.3(1). The basic design wind speed, *V*, for use in the design of Risk Categories III and IV buildings and structures shall be obtained from Figures 1609.3(2) and 1609.3(3), respectively. The basic design wind speed, *V*, for use in the design of *Risk Category* I buildings and structures shall be obtained from Figure 1609.3(4). The basic design wind speeds for localities in special wind regions, near mountainous terrains, and near gorges shall be based on elevation. Areas at 4,000 feet (1220 m) in elevation or higher shall use 142 V mph (62.3 m/s) and areas under 4,000 feet (1220 m) in elevation shall use 116 *V* mph (52 m/s). Gorge areas shall be based on the highest recorded speed per *locality* or in accordance with local jurisdiction requirements determined in accordance with Section 26.5.1 of ASCE 7.

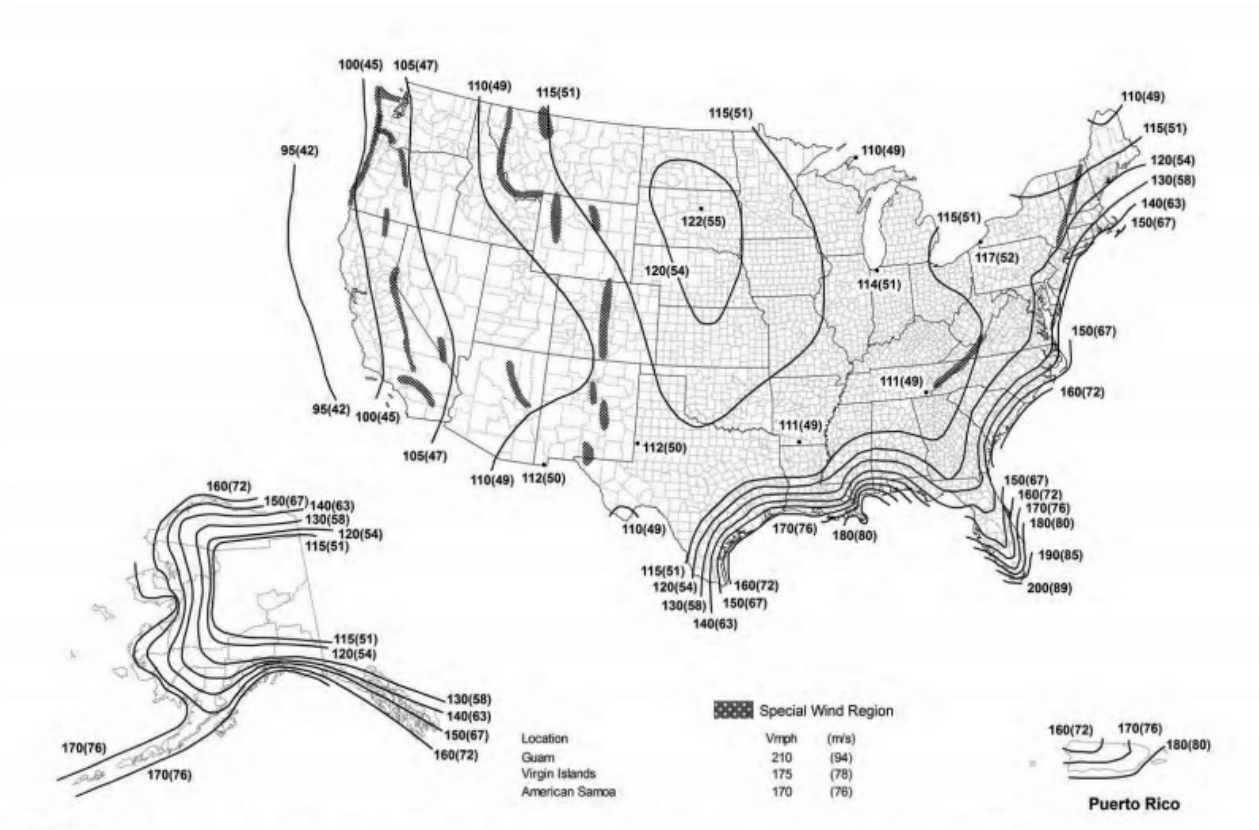
In nonhurricane-prone regions, when the basic design wind speed, *V*, is estimated from regional climatic data, the basic design wind speed, *V*, shall be determined in accordance with Section 26.5.3 of ASCE 7.



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure C Category.
2. Linear interpolation between contours. Point values are provided to aid with interpolation.
3. Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).
6. Location-specific basic wind speeds shall be permitted to be determined using www.atcouncil.org/windspeed

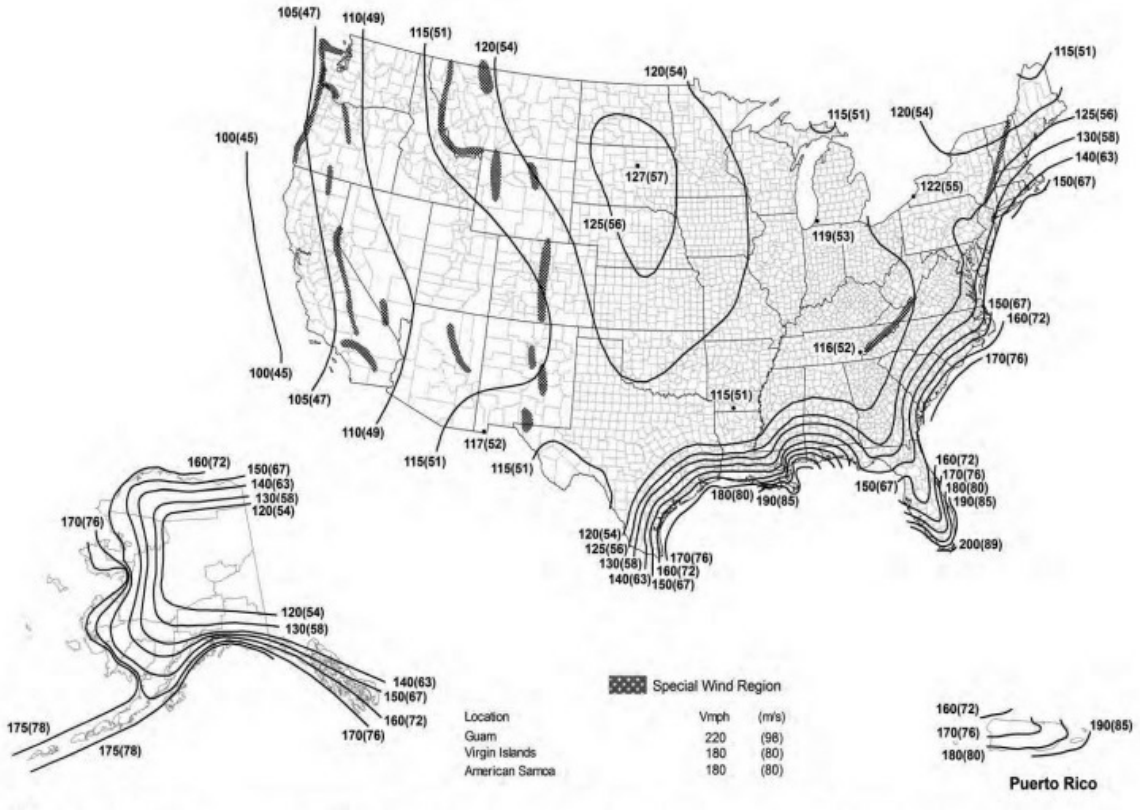
FIGURE 1609.3(1)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure C Category.
2. Linear interpolation between contours. Point values are provided to aid with interpolation.
3. Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).
6. Location-specific basic wind speeds shall be permitted to be determined using www.atcouncil.org/windspeed

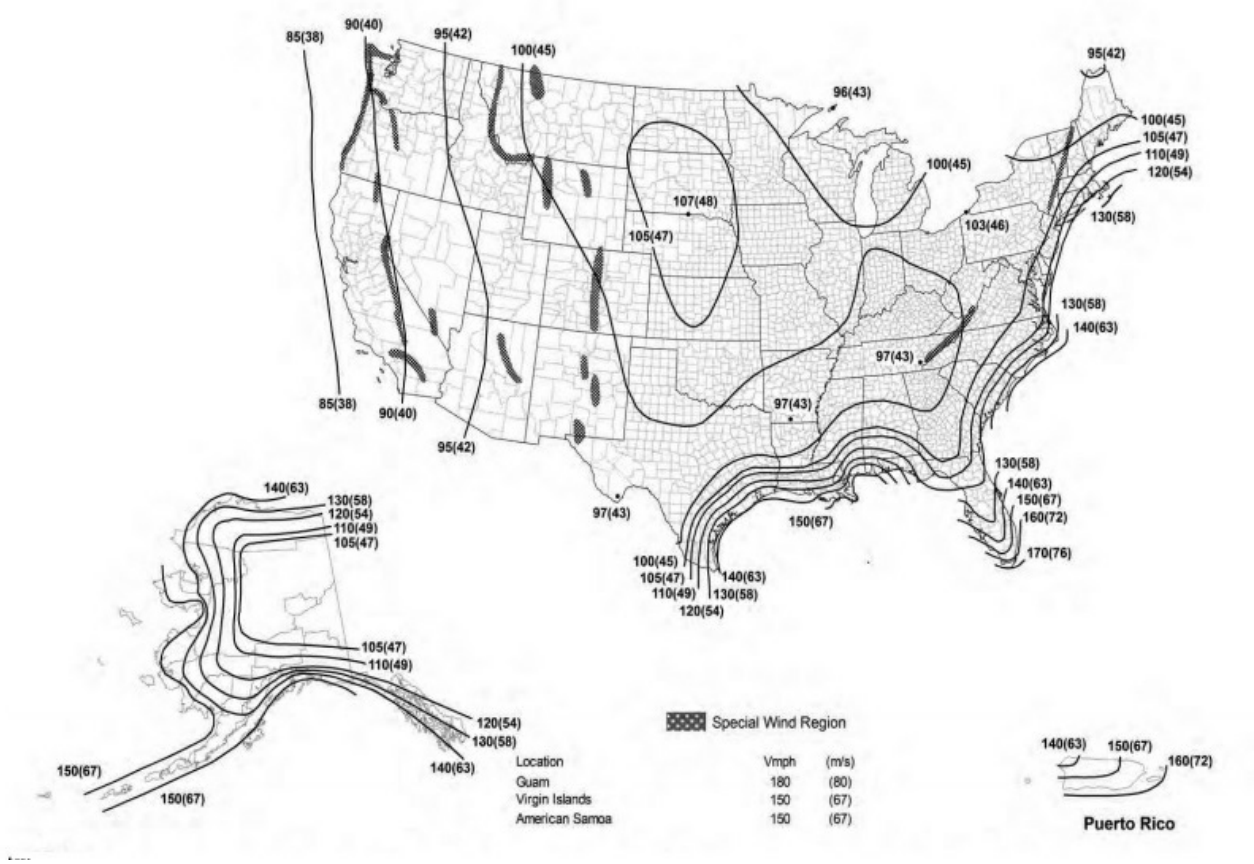
FIGURE 1609.3(2)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY III BUILDINGS AND OTHER STRUCTURES



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure C Category.
2. Linear interpolation between contours. Point values are provided to aid with interpolation.
3. Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 1.6% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00033, MRI = 3000 Years).
6. Location-specific basic wind speeds shall be permitted to be determined using www.atcouncil.org/windspeed

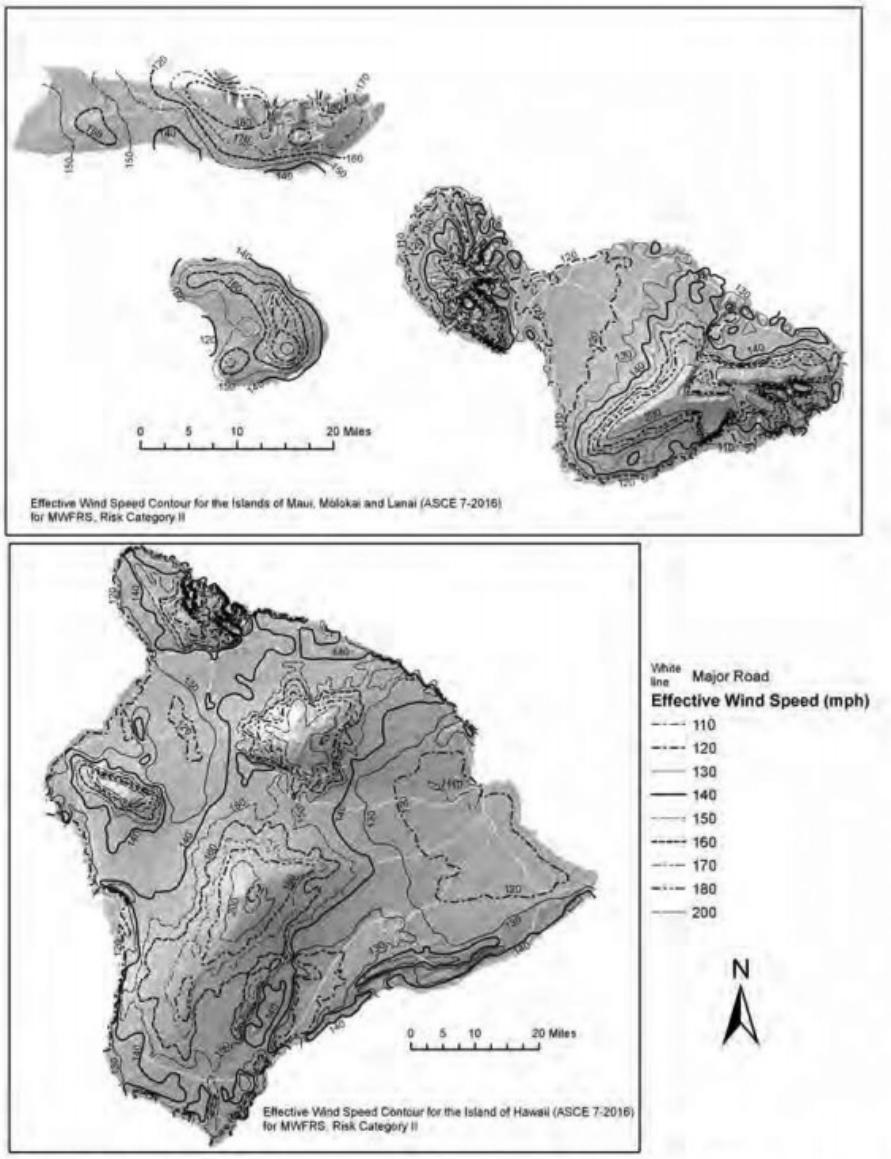
FIGURE 1609.3(3)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY IV BUILDINGS AND OTHER STRUCTURES



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure C Category.
2. Linear interpolation between contours. Point values are provided to aid with interpolation.
3. Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 15% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00333, MRI = 300 Years).
6. Location-specific basic wind speeds shall be permitted to be determined using www.atcouncil.org/windspeed

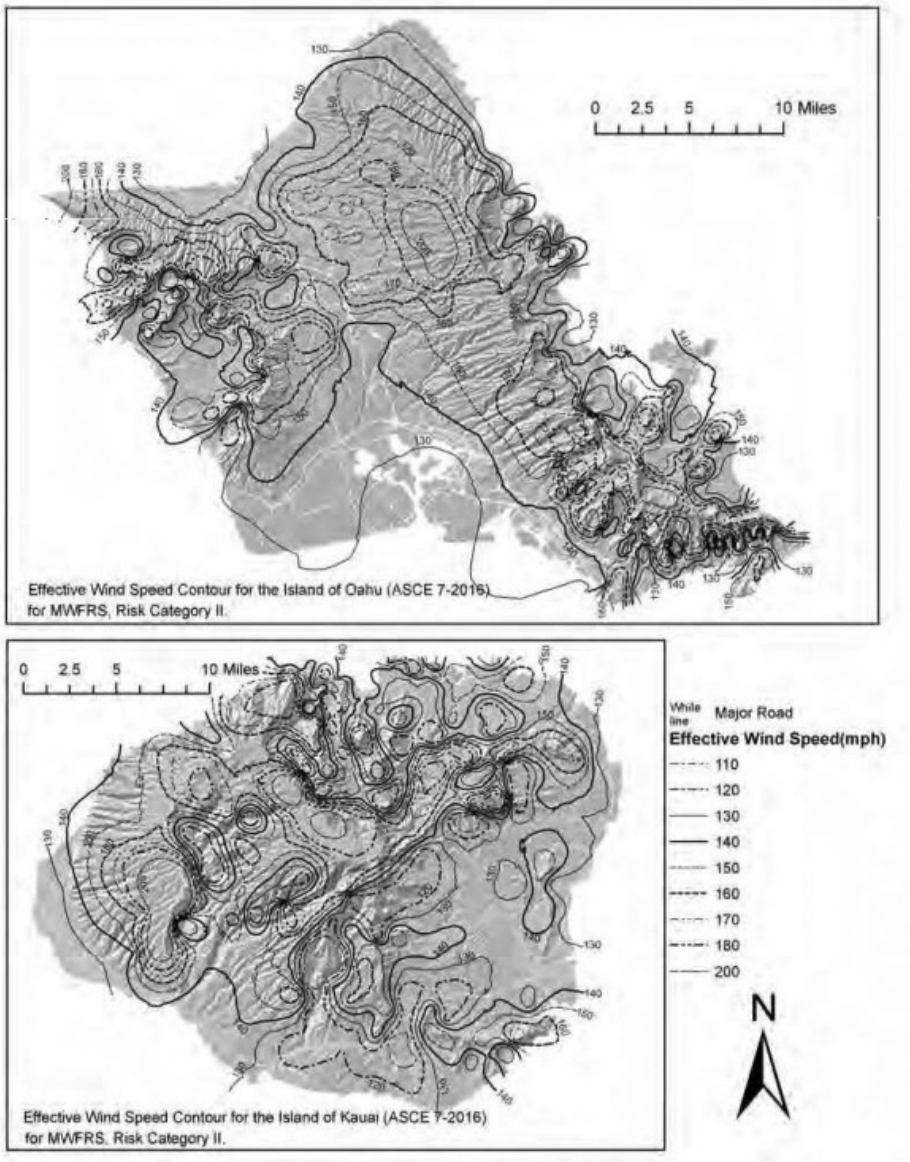
FIGURE 1609.3(4)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY I BUILDINGS AND OTHER STRUCTURES



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour at 33 feet (10 m) above ground for Exposure C Category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the las wind speed contour of the coastal area.
4. It is permitted to use the standard values of Kzt of 1.0 and Kd as given in Table 26.6-1 of ASCE 7.
5. Ocean promontories and local escarpments shall be examined for unusual wind conditions.
6. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

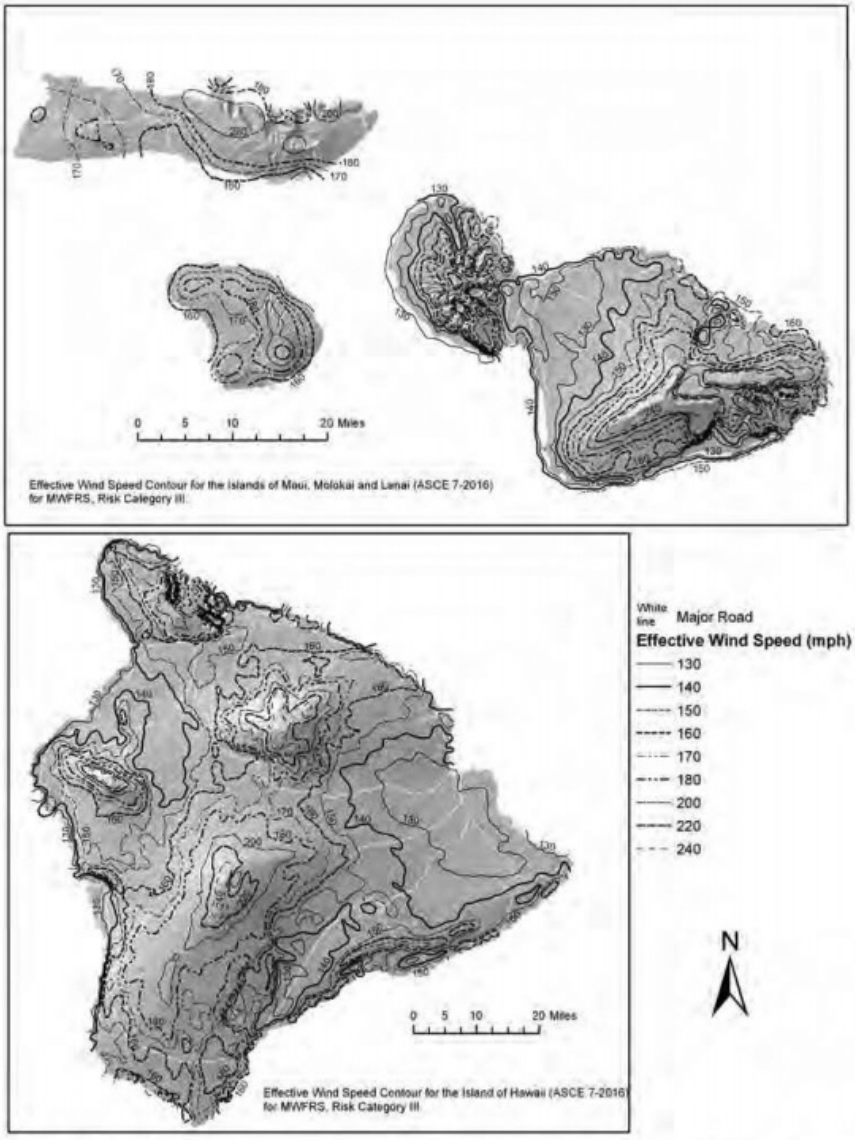
FIGURE 1609.3(5)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES IN HAWAI



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour at 33 feet (10 m) above ground for Exposure C Category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the las wind speed contour of the coastal area.
4. It is permitted to use the standard values of Kzt of 1.0 and Kd as given in Table 26.6-1 of ASCE 7.
5. Ocean promontories and local escarpments shall be examined for unusual wind conditions.
6. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

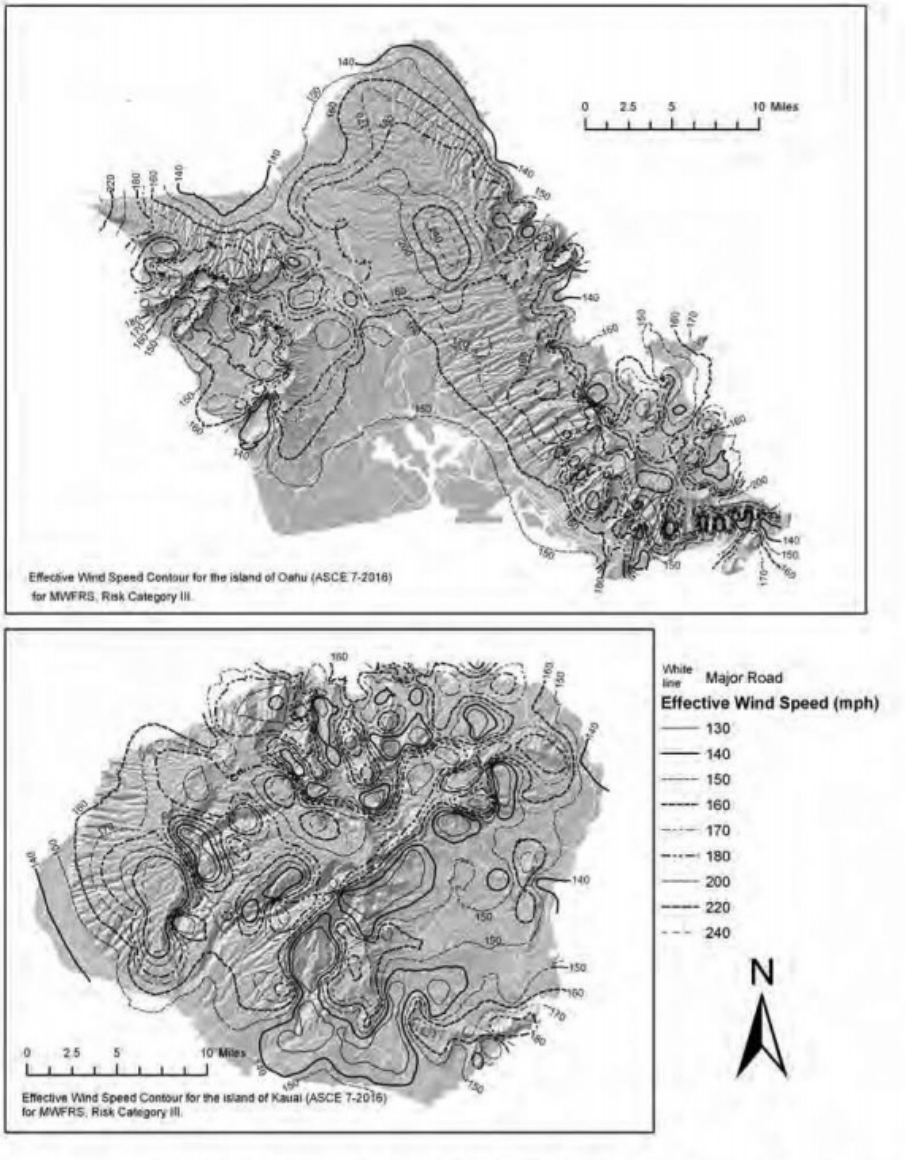
FIGURE 1609.3(6)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES IN HAWAII (OAHU, KAUAI)



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour at 33 feet (10 m) above ground for Exposure C Category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the las wind speed contour of the coastal area.
4. It is permitted to use the standard values of Kzt of 1.0 and Kd as given in Table 26.6-1 of ASCE 7.
5. Ocean promontories and local escarpments shall be examined for unusual wind conditions.
6. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

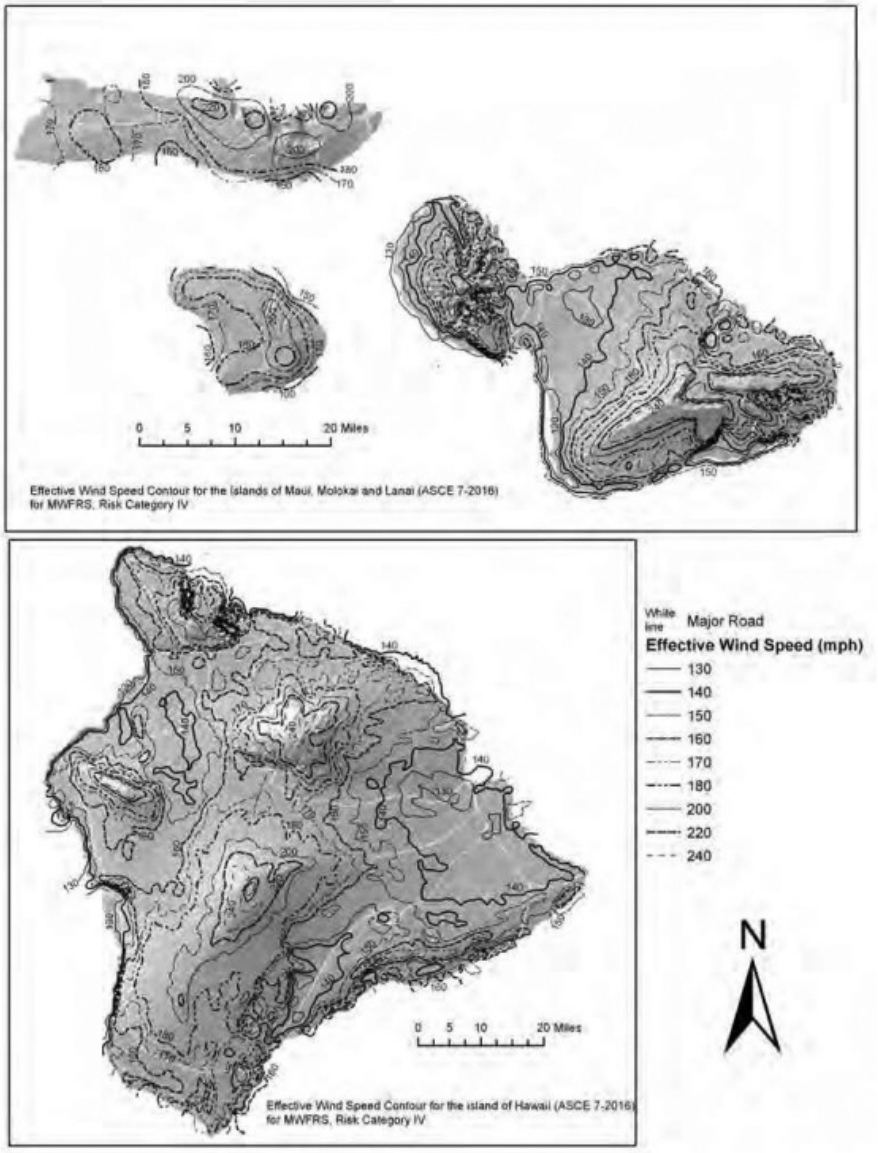
FIGURE 1609.3(7)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY III BUILDINGS AND OTHER STRUCTURES IN HAWAII



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour at 33 feet (10 m) above ground for Exposure C Category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the las wind speed contour of the coastal area.
4. It is permitted to use the standard values of Kzt of 1.0 and Kd as given in Table 26.6-1 of ASCE 7.
5. Ocean promontories and local escarpments shall be examined for unusual wind conditions.
6. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

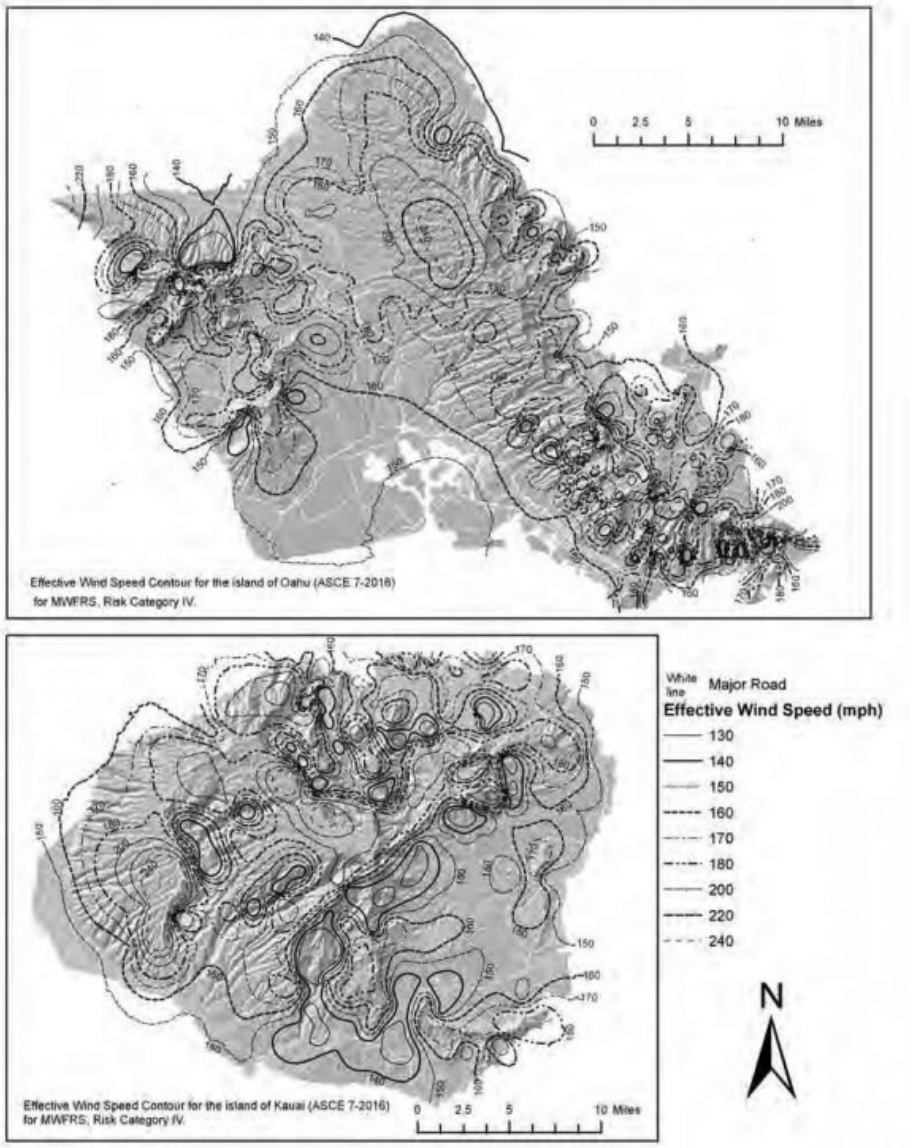
FIGURE 1609.3(8)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY III BUILDINGS AND OTHER STRUCTURES IN HAWAII (OAHU, KAUAI)



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour at 33 feet (10 m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. It is permitted to use the standard values of Kzt of 1.0 and Kd as given in Table 26.6-1 of ASCE 7.
5. Ocean promontories and local escarpments shall be examined for unusual wind conditions.
6. Wind speeds correspond to approximately a 1.7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

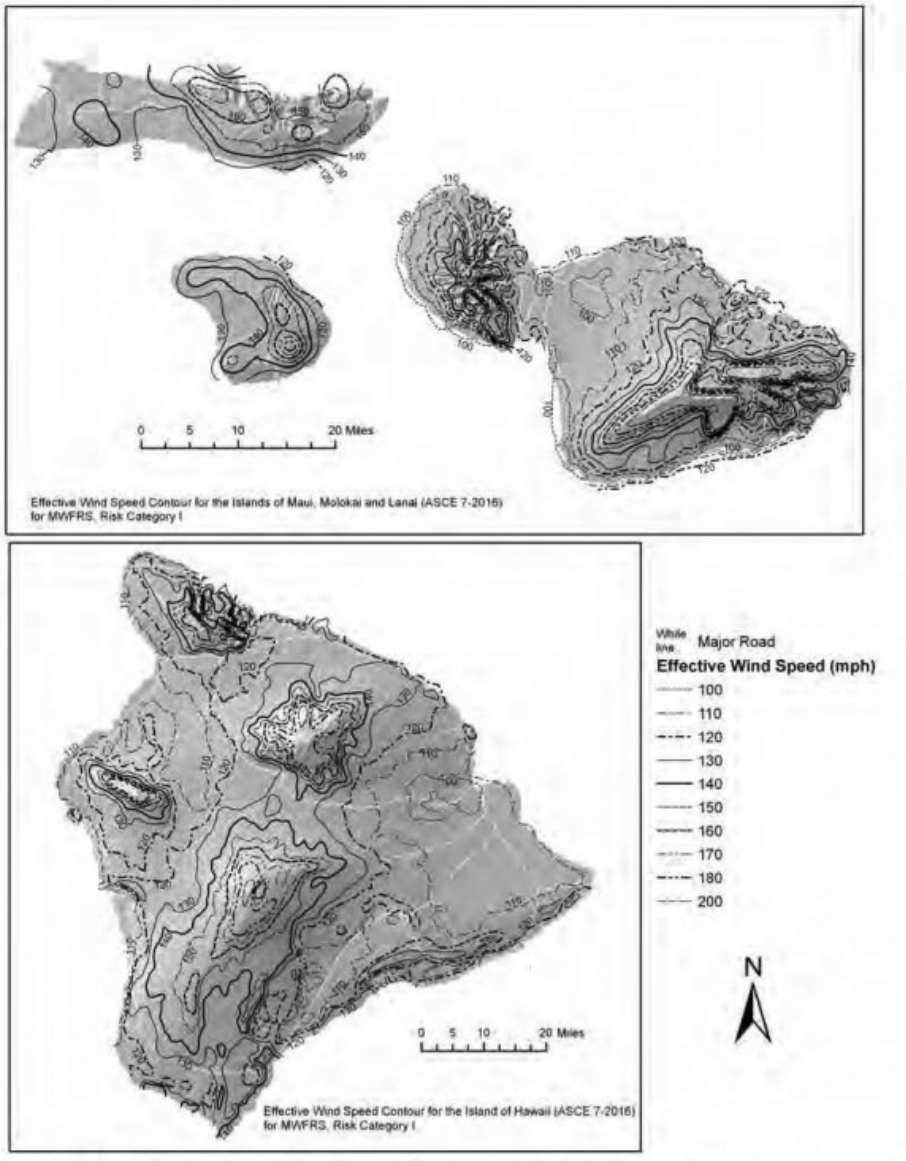
FIGURE 1609.3(9)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY IV BUILDINGS AND OTHER STRUCTURES IN HAWAII



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour at 33 feet (10 m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. It is permitted to use the standard values of Kzt of 1.0 and Kd as given in Table 26.6-1 of ASCE 7.
5. Ocean promontories and local escarpments shall be examined for unusual wind conditions.
6. Wind speeds correspond to approximately a 1.7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

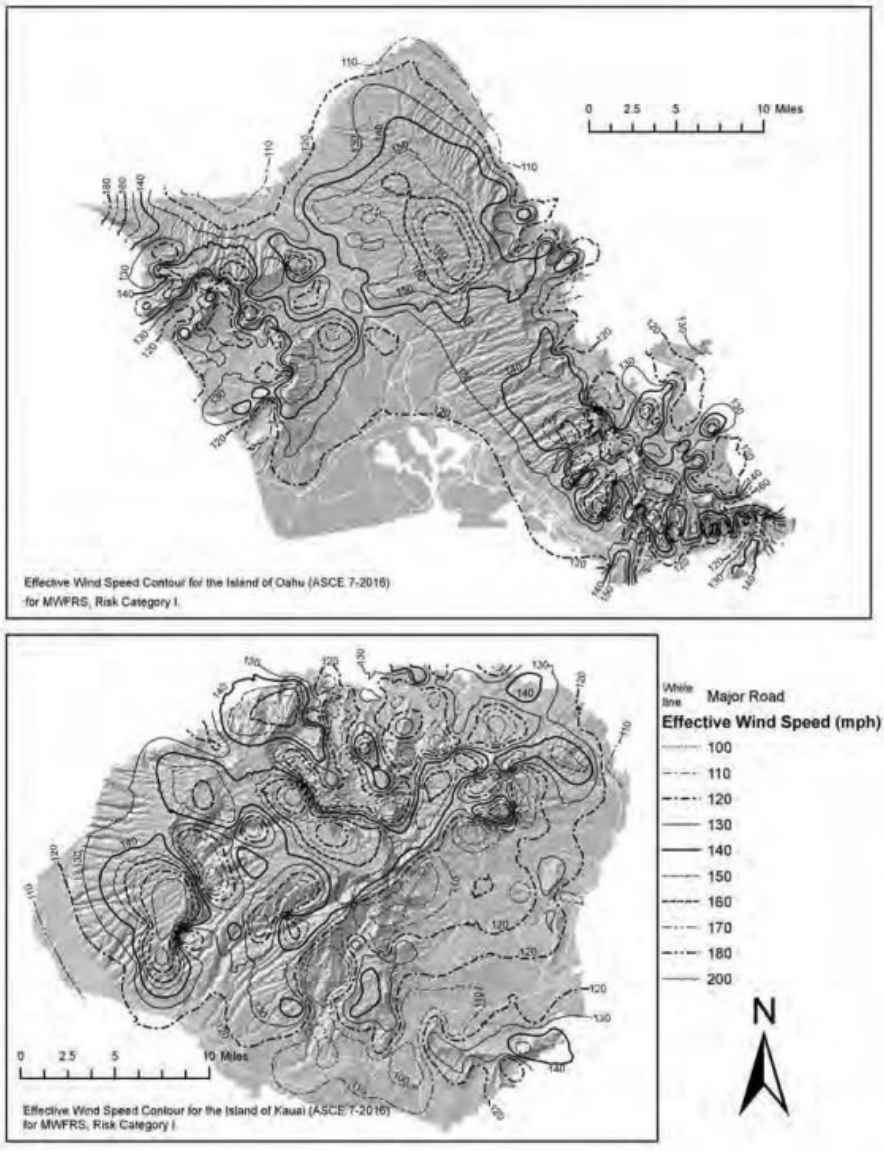
FIGURE 1609.3(10)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY IV BUILDINGS AND OTHER STRUCTURES IN HAWAII (OAHU, KAUAI)



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour at 33 feet (10 m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. It is permitted to use the standard values of Kzt of 1.0 and Kd as given in Table 26.6-1 of ASCE 7.
5. Ocean promontories and local escarpments shall be examined for unusual wind conditions.
6. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

FIGURE 1609.3(11)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY I BUILDINGS AND OTHER STRUCTURES IN HAWAII



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour at 33 feet (10 m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. It is permitted to use the standard values of Kzt of 1.0 and Kd as given in Table 26.6-1 of ASCE 7.
5. Ocean promontories and local escarpments shall be examined for unusual wind conditions.
6. Wind speeds correspond to approximately a 15% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

FIGURE 1609.3(12)
BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY I BUILDINGS AND OTHER STRUCTURES IN HAWAII (OAHU, KAUAI)

1609.3.1 Wind speed conversion.

Where required, the basic design wind speeds of Figures 1609.3(1) through 1609.3(12) shall be converted to *allowable*

stress design wind speeds, V_{asd}, using Table 1609.3.1 or Equation 16-17.

$$V_{asd} = V\sqrt{0.6} \quad \textbf{(Equation 16-17)}$$

where:

V_{asd} = *Allowable stress design* wind speed applicable to methods specified in Exceptions 4 and 5 of Section 1609.1.1.

V = Basic design wind speeds determined from Figures 1609.3(1) through 1609.3(12).

TABLE 1609.3.1
WIND SPEED CONVERSIONS[a, b, c]

V	100	110	120	130	140	150	160	170	180	190	200
V_{asd}	78	85	93	101	108	116	124	132	139	147	155

For SI: 1 mile per hour = 0.44 m/s.

a. Linear interpolation is permitted.

b. V_{asd} = allowable stress design wind speed applicable to methods specified in Exceptions 1 through 5 of Section 1609.1.1.

c. V = basic design wind speeds determined from Figures 1609.3(1) through 1609.3(12).

1609.4 Exposure category.

For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features.

1609.4.1 Wind directions and sectors.

For each selected wind direction at which the wind *loads* are to be evaluated, the exposure of the building or structure shall be determined for the two upwind sectors extending 45 degrees (0.79 rad) either side of the selected wind direction. The exposures in these two sectors shall be determined in accordance with Sections 1609.4.2 and 1609.4.3 and the exposure resulting in the highest wind *loads* shall be used to represent winds from that direction.

1609.4.2 Surface roughness categories.

A ground surface roughness within each 45-degree (0.79 rad) sector shall be determined for a distance upwind of the site as defined in Section 1609.4.3 from the following categories, for the purpose of assigning an exposure category as defined in Section 1609.4.3.

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

Surface Roughness C. Open terrain with scattered obstructions having heights generally less than 30 feet (9144 mm). 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.

1609.4.3 Exposure categories.

An exposure category shall be determined in accordance with the following:

Exposure B. For buildings with a mean roof height of less than or equal to 30 feet (9144 mm), Exposure B shall apply where the ground surface roughness, as defined by Surface Roughness B, prevails in the upwind direction for a distance of not less than 1,500 feet (457 m). For buildings with a mean roof height greater than 30 feet (9144 mm), Exposure B shall apply where Surface Roughness B prevails in the upwind direction for a distance of not less than 2,600 feet (792 m) or 20 times the height of the building, 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 of not less than 5,000 feet (1524 m) or 20 times the height of the building, whichever is greater. Exposure D shall apply where the ground surface roughness immediately upwind of the site is B or C, and the site is within a distance of 600 feet (183 m) or 20 times the *building height*, whichever is greater, from an Exposure D condition as defined in the previous sentence.

1609.5 Tornado loads.

The design and *construction* of *Risk Category* III and IV *buildings* and other structures located in the tornado-prone region

as shown in Figure 1609.5 shall be in accordance with Chapter 32 ofASCE 7, except as modified by this code.

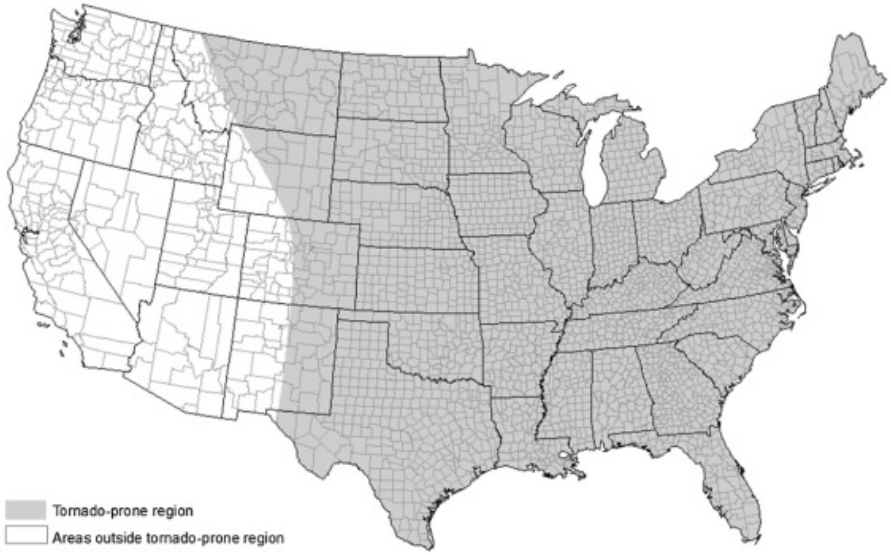


FIGURE 1609.5
TORNADO-PRONE REGION

1609.5.1 Roof deck.
(Section deleted.)

1609.5.2 Roof coverings.
(Section deleted.)

1609.5.3 Rigid tile.
(Section deleted.)

1609.6 Roof systems.
Roof systems shall be designed and constructed in accordance withSections 1609.6.1 through 1609.6.3, as applicable.

1609.6.1 Roof deck.
The roof deck shall be designed to withstand the greater of wind pressures or tornado pressures determined in accordance with ASCE 7.

1609.6.2 Roof coverings.
Roof coverings shall comply with Section 1609.6.1.

Exception: Rigid tile roof coverings that are air permeable and installed over a roof deck complying with Section 1609.6.1 are permitted to be designed in accordance with Section 1609.6.3.

Asphalt shingles installed over a roof deck complying with Section 1609.6.1 shall comply with the wind-resistance requirements of Section 1504.2.

1609.6.3 Rigid Tile.
Wind and tornado loads on rigid tiles shall comply withSections 1609.6.3.1 or 1609.6.3.2, as applicable.

1609.6.3.1 Wind loads.
Wind loads on rigid tile roof coverings shall be determined in accordance with the following equation:

$$M_a = q_h C_L b L L_a [1.0 - G C_p]$$

For SI: **(Equation 16-18)**

$$M_a = \frac{q_h C_L b L L_a [1.0 - G C_p]}{1,000}$$

where:

b = Exposed width, feet (mm) of the roof tile.
C_L = Lift coefficient. The lift coefficient for concrete and clay tile shall be 0.2 or shall be determined by test in accordance with Section 1504.3.1.

GC_p = Roof pressure coefficient for each applicable roof zone determined from Chapter 30 of ASCE Roof coefficients shall not be adjusted for internal pressure.

L = Length, feet (mm) of the roof tile.

L_a = Moment arm, feet (mm) from the axis of rotation to the point of uplift on the roof tile. The point of uplift shall be taken at 0.76L from the head of the tile and the middle of the exposed width. For roof tiles with nails or screws (with or without a tail clip), the axis of rotation shall be taken as the head of the tile for direct deck application or as the top edge of the batten for battened applications. For roof tiles fastened only by a nail or screw along the side of the tile, the axis of rotation shall be determined by testing. For roof tiles installed with battens and fastened only by a clip near the tail of the tile, the moment arm shall be determined about the top edge of the batten with consideration given for the point of rotation of the tiles based on straight bond or broken bond and the tile profile.

M_a = Aerodynamic uplift moment, feet-pounds (N-mm) acting to raise the tail of the tile.

q_h = Wind velocity pressure, psf (kN/m^2) determined from Section 26.10.2 ofASCE 7.

Concrete and clay roof tiles complying with the following limitations shall be designed to withstand the aerodynamic uplift moment as determined by this section.

1. The roof tiles shall be either loose laid on battens, mechanically fastened, mortar set or adhesive set.
2. The roof tiles shall be installed on solid sheathing that has been designed as components and cladding.
3. An underlayment shall be installed in accordance withChapter 15.
4. The tile shall be single lapped interlocking with a minimum head lap of not less than 2 inches (51 mm).
5. The length of the tile shall be between 1.0 and 1.75 feet (305 mm and 533 mm).
6. The exposed width of the tile shall be between 0.67 and 1.25 feet (204 mm and 381 mm).
7. The maximum thickness of the tail of the tile shall not exceed 1.3 inches (33 mm).
8. Roof tiles using mortar set or adhesive set systems shall have not less than two-thirds of the tile's area free of mortar or adhesive contact.

1609.6.3.2 Tornado loads.

Tornado loads on rigid tile roof coverings shall be determined in accordance withSection 1609.6.3.1, replacing q_h with q_{hT} and (GC_p) with K_{vT} (GC_p) in Equation 16-18, where:

q_{hT} = tornado velocity pressure, psf (kN/m^2) determined in accordance with Section 32.10 ofASCE 7.

K_{vT} = tornado pressure coefficient adjustment factor for vertical winds, determined in accordance with Section 32.14 of ASCE 7.