WIND LOADS – IMPACTS FROM ASCE 7-22

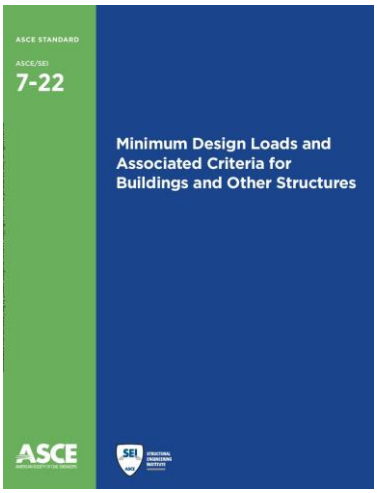
June 2024

CHANGES TO WIND LOADS IN THE 8TH EDITION (2023) FLORIDA BUILDING CODE

IMPACTS FROM ASCE 7-22

American Society of Civil Engineers ASCE 7-22

The 8th Edition (2023) Florida Building Code has been updated to reference ASCE 7-22 *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*. Accordingly, the wind criteria in the 8th Edition FBCB and FBCR have been updated to correlate with ASCE 7-22. ASCE 7-22 includes several notable changes to the wind load provisions. A few key changes are identified as follows and are summarized in this fact sheet:



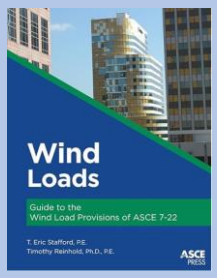
- Updates to the wind speed maps.
- Revised design wind pressures on buildings with roof slopes > 7°.
- New criteria for elevated buildings.
- New tornado loads.
- Other key changes

Updates to the Wind Speed Maps

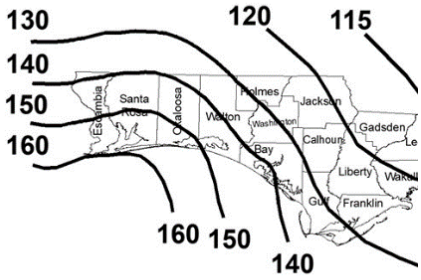
While the wind speed maps in ASCE 7-22 have been revised throughout most of the hurricane-prone region, wind speeds have changed only in the panhandle area of the State of Florida. Wind speeds for the peninsula are unchanged and effectively have not changed since the 2010 FBC. For Risk Categories I, II, and III buildings and structures, wind speeds in the western panhandle have increased. For Risk Category IV buildings and structures wind speeds have increased in the western panhandle and have decreased slightly in the big bend area.

Wind Loads: Guide to the Wind Load Provisions of ASCE 7-22

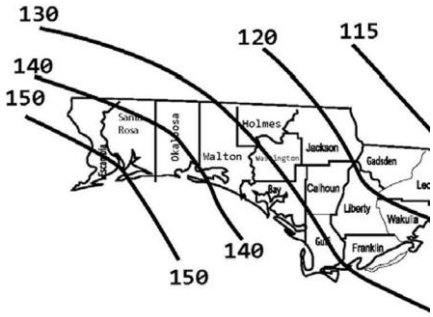
The Guide to the Wind Load Provisions of ASCE 7-22 provides a comprehensive overview of the wind load provisions in ASCE 7-22 and also reflects significant changes from ASCE 7-16.



The figure on the following page provides a closer view of how wind speeds have increased in the western panhandle for Risk Category II buildings and structures. Similar wind speed increases have occurred in the same areas for Risk Category I and III buildings and structures.



Florida Panhandle Excerpt from Figure 1609.3(1) in the 8th Edition (2023) FBCB



Florida Panhandle Excerpt from Figure 1609.3(1) in the 7th Edition (2020) FBCB

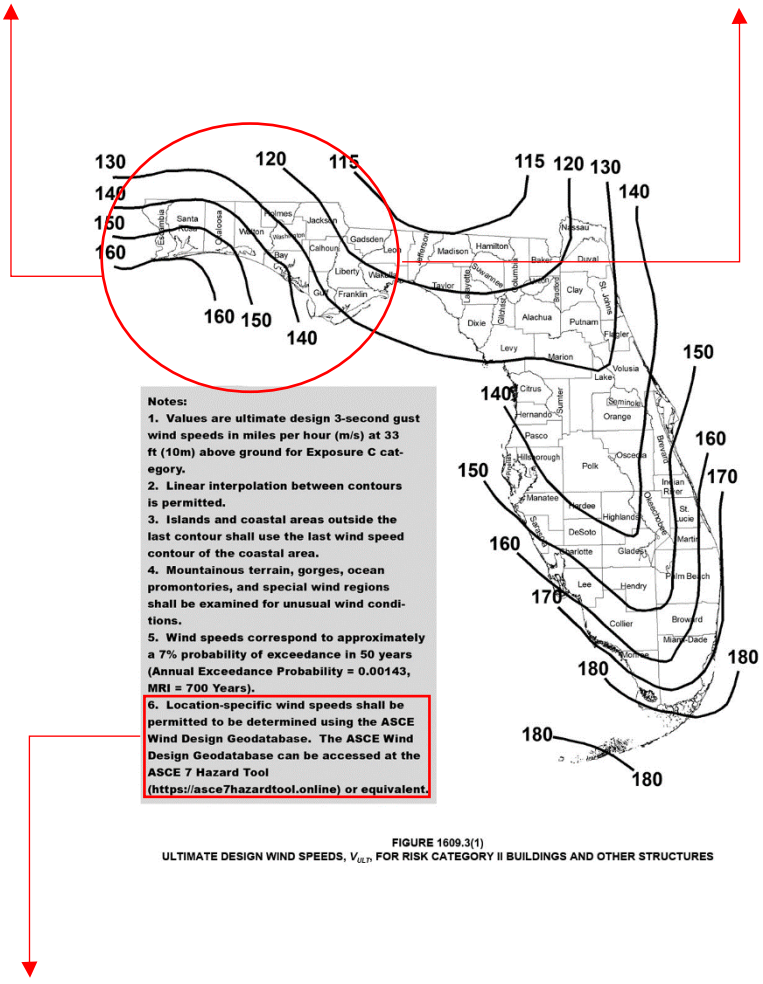
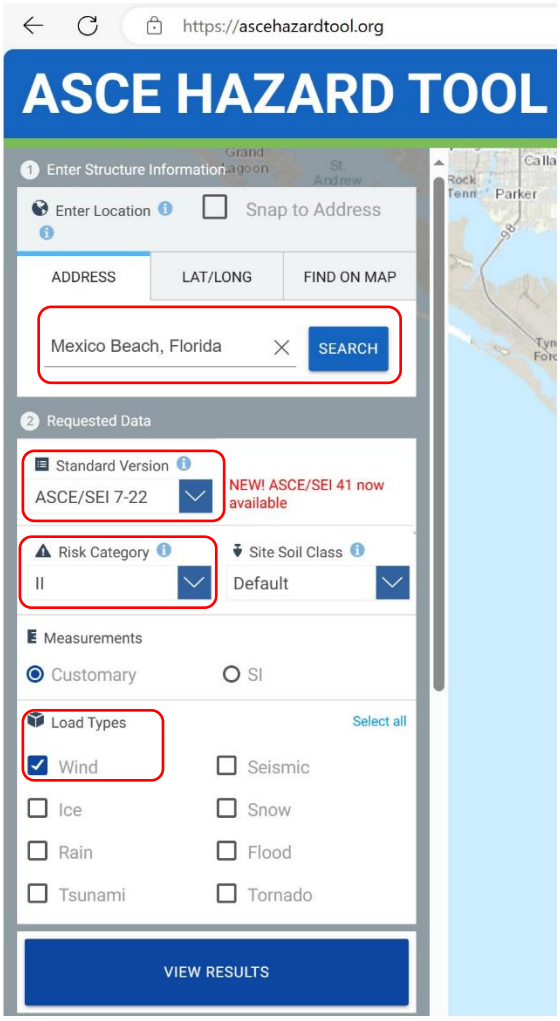


FIGURE 1609.3(1)
ULTIMATE DESIGN WIND SPEEDS, V_{ULT}, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

A new note has been added to Figure 1609.3(1) that permits site-specific wind speeds to be determined in accordance with the ASCE Wind Design Geodatabase (ASCE Hazard tool).

Wind Speed Changes in the Western Panhandle for Risk Category II Buildings and Structures

Another important change to the wind speed maps is the addition of a new note that specifically permits wind speeds to be determined in accordance with the ASCE Wind Design Geodatabase (ASCE 7 Hazard Tool) or equivalent. The ASCE 7 Hazard Tool is a free website that provides structural design parameters for wind, flood, rain, snow, seismic, ice, tsunami, and tornado loads for various editions of ASCE 7. The user can input an address or latitude/longitude coordinates and obtain applicable site-specific structural design parameters.



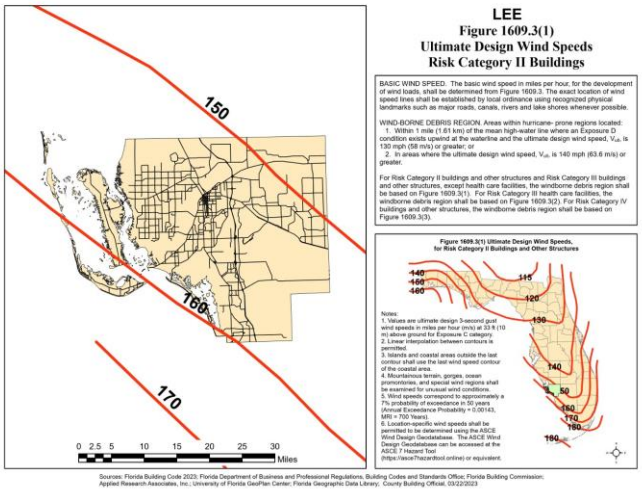
Excerpt from ASCE 7 Hazard Tool Website

Important Information Regarding the Use of the ATC Hazard By Location Website with the 8th Edition (2023) FBC

The ATC Hazard By Location (hazards.atcouncil.org) website has been commonly used in the State of Florida to obtain site-specific wind speeds. The ATC Hazard By Location website provides site-specific wind speeds for ASCE 7-16, ASCE 7-10, and ASCE 7-05. However, the site will not be updated to support ASCE 7-22. Since the 8th Edition (2023) Florida Building Code references ASCE 7-22 for the determination of wind loads, the ATC Hazard By Location website cannot be used to obtain site-specific wind speeds as of December 31, 2023 (effective date of the 8th Edition (2023) Florida Building Code).

Local wind speed maps at the county level can be found at:
https://adhoc.geoplan.ufl.edu/downloads/kate/windspeed_2023/Preliminary_County_PDFs_Draft_20230322/

These maps were developed by the University of Florida and include the V_{ult} design wind speed maps for all 67 counties for Risk Categories I, II, III, and IV.



Lee County Ultimate Design Wind Speeds for Risk Category II Buildings and Other Structures

This is included in this fact sheet for informational purposes only. Please contact the applicable local jurisdiction for wind speeds for a specific site as these maps are often modified locally.

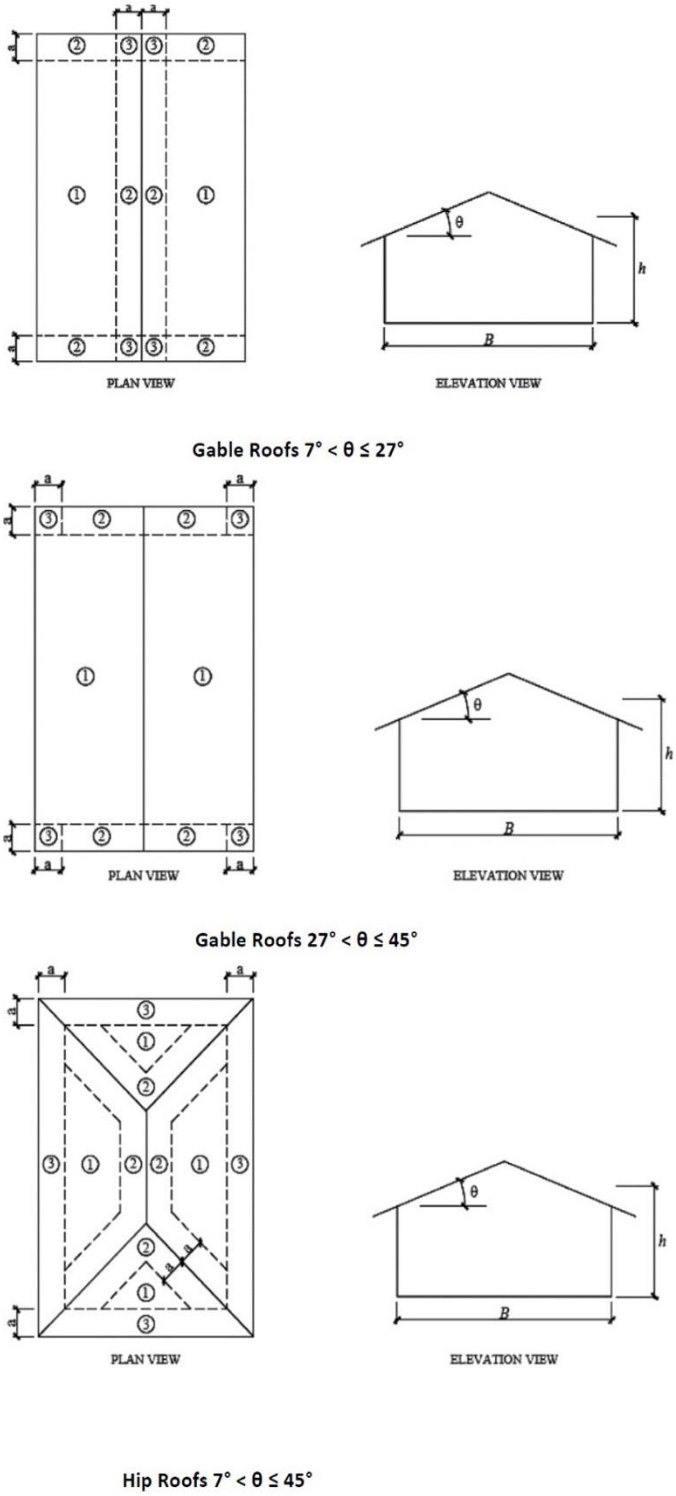
Revised External Pressure Coefficients for Buildings with Gable and Hip Roofs with Slopes Greater than 7°

In ASCE 7-16, roof component and cladding loads for buildings with low slope roofs and mean roof heights of 60 feet or less and gable and hip roofs of all heights were revised significantly. New roof zones were added, and design wind pressures increased significantly for many zones.

In ASCE 7-22, the external pressure coefficients for buildings with gable and hip roofs with slopes greater than 7° have been revised again. The changes represent a simplification of the roof zones and generally lower design pressures for many roof zones. The external pressure coefficients for low slope roofs (0 to ≤ 7°) are unchanged from ASCE 7-16. Key changes include:

- The number of roof zones has been reduced from 5 for gable roofs and 4 for hip roofs to 3 for all roofs (consistent with previous versions of ASCE 7).
- The log graphs have been truncated at effective wind areas of 10 ft^2.
- Roof overhang log graphs have been deleted and a new method for determining component and cladding loads on roof overhangs has been added.

The number log graphs for determining roof component and cladding loads have been reduced from 9 in ASCE 7-16 to 7 in ASCE 7-22. The change back to 3 zones for gable and hip roofs with slopes greater than 7° greatly simplifies the log graphs and figures in ASCE 7-22 including the simplified method in the 8th Edition (2023) Florida Building Code, Residential. Table R301.2(2), Table R301.2(3), and Figure R301.2(7) in the Florida Building Code, Residential provide a simplified method for determining design wind pressures for buildings with mean roof heights 60 feet and less. An excerpt of Figure R301.2(7) from the 8th Edition (2023) Florida Building Code, Residential illustrates how the roof zones in ASCE 7-22 have been simplified.



Excerpt of Figure R301.2(7) from the 8th Edition (2023) Florida Building Code, Residential

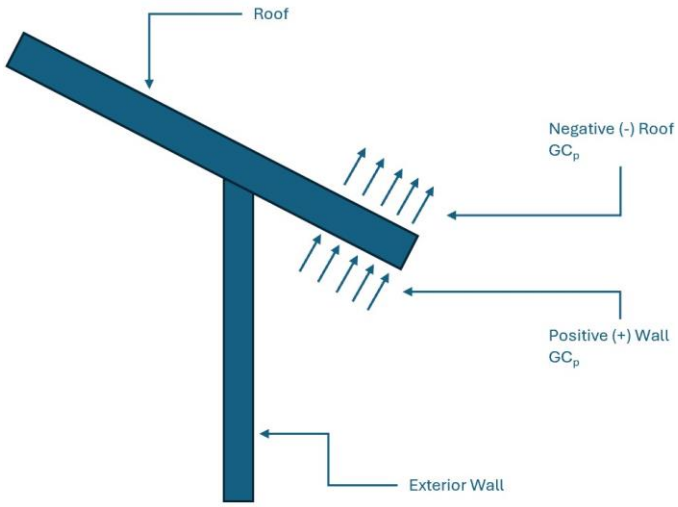
By truncating all the log graphs at effective wind areas of 10 ft^2 and reducing the external pressure coefficients

for many roof zones, design wind pressures on gable and hip roofs with slopes greater than 7° have been reduced for many zones on the roof. However, for some roof zones, design wind pressures are unchanged or have slightly increased. The following table provides a snapshot of how design wind pressures have changed for selected roof zones for the smallest effective wind area.

Zone	ASCE 7-16 GC_p	ASCE 7-22 GC_p	Change in Design Wind Pressure Using the Smallest Effective Wind Area
Gable roofs, 7° < θ ≤ 20°			
2n, 2r (ASCE 7-16) 2 (ASCE 7-22)	-3.0	-2.7	-9%
3r (ASCE 7-16) 3 (ASCE 7-22)	-3.0	-3.0	0%
Gable roofs, 20° < θ ≤ 27°			
2n, 2r (ASCE 7-16) 2 (ASCE 7-22)	-2.5	-2.5	0%
3r (ASCE 7-16) 3 (ASCE 7-22)	-3.6	-3.0	-16%
Gable roofs, 27° < θ ≤ 45°			
2n (ASCE 7-16) 2 (ASCE 7-22)	-2.0	-2.0	0%
3e (ASCE 7-16) 3 (ASCE 7-22)	-3.2	-2.5	-21%
Hip roofs, θ = 45°			
3 (ASCE 7-16) 3 (ASCE 7-22)	-3.6	-2.4	-32%
2e (ASCE 7-16) 2 (ASCE 7-22)	-2.8	-1.8	-34%
2r (ASCE 7-16) 2 (ASCE 7-22)	-2.6	-1.8	-29%

Representative Changes to Roof Design Wind Pressures for Gable and Hip Roofs with Slopes Greater than 7°

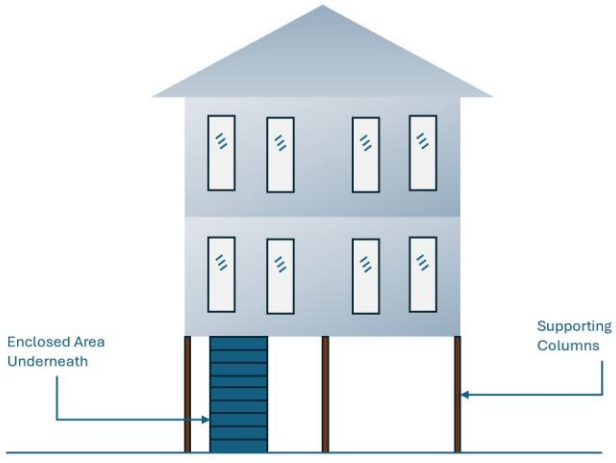
Log graphs for roof overhang external pressure coefficients have been deleted for gable and hip roofs with slopes greater than 7°. For low slope roofs (θ ≤ 7°) the external pressure coefficients for roof overhangs are unchanged from ASCE 7-16. Roof overhang external pressure coefficients for components and cladding loads are now determined by the sum of the external pressure coefficients on the roof area above the overhang and the external pressure coefficient for the adjacent wall. The wall external pressure coefficient applicable to the roof overhang is to be determined based on the effective area of the roof overhand element being considered.



Determination of External Pressure Coefficients for Roof Overhangs for Buildings with Gable and Hip Roofs with Slopes Greater than 7°

New Provisions for Elevated Buildings

New provisions have been added in ASCE 7-22 to address Main Wind-Force Resisting System (MWFRS) loads and Component and Cladding loads on elevated buildings.



Typical Elevated Building

MWFRS loads for elevated buildings are addressed in new Section 27.3.1.1 of ASCE 7-22. For buildings meeting the geometric limitation specified in Section 27.3.1.1, wind loads are permitted to be determined in accordance with the new provisions for wind loads on elevated buildings. For buildings that do not meet the geometric limitations specified in Section 27.3.1.1, wind loads are required to be determined using the normal provisions for buildings sited on ground assuming that wind is unable to pass beneath the building and that the open portion of the building is enclosed.

Component and cladding loads on the bottom horizontal surface of elevated buildings are addressed in new Section 30.3.2.1 for buildings with a mean roof heights ≤ 60 feet and new Section 30.4.2.1 for buildings with a mean roof heights > 60 feet. External pressure coefficients on the bottom of the horizontal surfaces are determined using modified versions of roof component and cladding loads for slopes ≤ 7° (Figure 30.3-2A for buildings with mean roof heights ≤ 60 feet and Figure 30.4-1 for buildings with mean roof heights > 60 feet). The modifications include changes to the zone dimensions based on height above grade of the bottom surface of the elevated building and changes to external pressure coefficients for horizontal surfaces adjacent to enclosed partially enclosed spaces underneath elevated buildings.

Tornado Loads

New Chapter 32 in ASCE 7-22 addresses the design of buildings for tornado loads. The new provisions only apply to Risk Category III and IV buildings located in the tornado-prone region (the State of Florida is located within the tornado-prone region). New tornado speed (V_T) maps have been added that correlate to Enhanced Fujita Scale EF0 – EF2 intensity depending on the risk category and the size of the building or structure.

BASF Tornado Loads – Impacts from ASCE 7-22 Fact Sheet

The BASF Tornado Loads – Impacts from ASCE 7-22 Fact Sheet provides a detailed analysis of the new tornado loads and addresses the impact of these new requirements in ASCE 7-22 on buildings in the State of Florida. The BASF Tornado Loads Fact Sheet can be downloaded at www.buildingasaferflorida.org.

Other Changes in ASCE 7-22

- Slight adjustments to the velocity pressure coefficients (K_z) Exposure B for mean roof heights ≥ 40 feet and Exposure C for mean roof heights ≥ 140 feet.
- All simplified methods have been deleted.
- New wind load provisions for ground-mounted solar panels.
- New wind load provisions for roof pavers.
- Wind load criteria for attached canopies has been expanded to include buildings with mean roof heights > 60 feet.

Resources

Florida Building Code, www.floridabuilding.org

International Code Council, www.iccsafe.org

Insurance Institute for Business and Home Safety, www.ibhs.org

American Society of Civil Engineers, www.asce.org

Wind Loads: Guide to the Wind Load Provisions of ASCE 7-22
https://sp360.asce.org/personifyebusiness/Merchandise/Product-Details/productId/297599150

Don't know where to go for an answer to a specific question?

Contact: Florida Building Commission 850-487-1824 www.floridabuilding.org

Contact: Building A Safer Florida, Inc. 850-222-2772 www.buildingasaferflorida.org