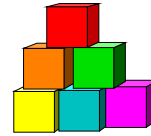


BUILDING BLOCKS



EFFECTIVE DATE: September 2, 2015

SUBJECT: To establish compliance with the construction of buildings and structures governed by the Florida Building Code (FBC) 5th Edition – *Building* and ASCE 24-14 - Flood Resistant Design and Construction.

AUTHORITY: FBC 5th Edition: Chapter 1 – Administration, 101.2 Scope; Section 1612 Flood Loads; 1612.4 Design and construction; Chapter 5 of ASCE 7 – Wind Load and ASCE 24 – Flood Resistant Design and Construction; Collier County Flood Damage Prevention Ordinance

PURPOSE: To establish that compliance with Chapter 5 of ASCE 7 and ASCE 24-14 is required for buildings and structures located in flood hazard areas, including coastal high hazard areas.

RELATED BUILDING BLOCKS: A-128 Certified Site Plans and Spot Surveys and A-132 FEMA Inspections

DEFINITIONS:

Base Flood Elevation (BFE): The BFE is the elevation of flooding, including wave height, having the 1% chance of being equaled or exceeded in any given year. The BFE is identified on Collier County’s effective Digital Flood Insurance Rate Map (DFIRM).

Design Flood Elevation (DFE): The elevation of the “*design flood*,” including wave height, relative to the datum specified on the community’s legally designated flood hazard map.

In general, the BFE and the DFE are the same elevation on the Collier County effective DFIRM.

For the purposes of South Florida Water Management District (SFWMD) DFEs, the SFWMD DFE will be compared to the BFE + 1, and the higher elevation will be required.

Dry floodproofing: A combination of design modifications that results in a building or structure, including the attendant utilities and equipment and sanitary facilities, being water tight with walls substantially impermeable to the passage of water and with structural components having the capacity to resist *loads* as identified in ASCE 7 (Section 1612 FBC).

Flood Hazard Area: The greater of the following two areas: 1) The area within a floodplain subject to a 1-percent of greater chance of flooding in any given year. 2) The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

For the purposes of this Building Block, the Flood Hazard Area in Collier County shall include any flood zone that begins with a "V" or "A".

PERMITS:

The FBC *Building* establishes in **Chapter 1 – Administrative** the scope the *Building* code and reads as follows:

101.2 Scope. The provisions of this code shall apply to the construction, alteration, relocation, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.

Exceptions:

1. Detached one- and two-family dwellings and multiple single family dwellings (town houses) not more than three stories above grade plane in height with a separate means of egress and their accessory structures shall comply with the Florida Building Code, Residential.
2. Existing buildings undergoing repair, alterations or additions or change of occupancy shall comply with Chapter 34 of this code.

Section 1612 Flood Loads establishes General and Design and construction standards as follows:

1612.1 General. Within flood hazard areas as established in Section 1612.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvement and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one flood hazard area, the provisions associated with the most restrictive flood hazard area shall apply.

1612.4 Design and construction. The design and construction of buildings and structures located in flood hazard areas, including coastal high hazard areas, shall be in accordance with Chapter 5 of ASCE 7 and ASCE 24.

1612.4.1 Modifications of ASCE 24. Table 6-1 and Section 6.2.1 in ASCE 24 shall be modified as follows:

1. The title of Table 6.1 shall be “Minimum Elevation of Floodproofing, Relative to Base Flood Elevation (BFE) of Design Flood Elevation (DFE), in Coastal A Zones and in Other Flood Hazards Areas that are not High Risk Flood Hazard Areas.”
2. Section 6.2.1 shall be modified to permit dry floodproofing in Coastal A Zones, as follows: “Dry floodproofing of nonresidential structures and nonresidential areas of mixed-use structures shall not be allowed unless such structures are located outside of High Risk Flood Hazard areas and Coastal High Hazard Areas. Dry floodproofing shall be permitted in Coastal A Zones provided wave loads and the potential for erosion and local scour are accounted for in the design. Dry floodproofing of residential structures or residential areas of mixed-use structures shall not be permitted.”

#

Collier County’s Flood Damage Prevention Ordinance (FDPO) provides elevation requirements for non-residential construction in Code of Laws Sec. 62-126. General Standards and Sec. 62-127. Specific Standards which establish the following:

Code of Laws Sec. 62-126. General Standards

* * * * *

Note: The following provision does not apply to developments with a South Florida Water Management permit.

- (16) Building Lowest floor and Slab Minimum Elevations for all areas of Collier County:
 - (a) Plans shall show that construction of the Lowest floor meets the elevation criteria listed below or engineered properly to a site specific design and certified by a Registered architect or Professional engineer; when conflict exists between the FIRM Elevation and others, the higher elevation shall be required:
 - i. FIRM Elevation - the elevation that has been established by the Flood Insurance Study (FIS);
 - ii. Paved Road - a minimum of 18 inches above the crown of the nearest street or interior finished roadway system if finished with paving; in the event that the nearest street or interior finished roadway system is located on an evacuation route, a minimum of 18 inches above the crown of the nearest side street; or
 - iii. Graded or unfinished Road - 24 inches above the crown if graded or otherwise unfinished; or
 - iv. Mean Sea Level - Lowest floors should be no lower than elevation 5.7 feet in relation to NAVD of 1988 [with an allowable exception for the bottom of the lowest horizontal structural member of the Lowest floor of accessory structures within the V-Zones as described in Section 62-129(13)(h)]; or

- v. Water Management Design -
 - 1. Buildings with projects which have water management routing and storage facilities designed and built for a 25 year, 3 day storm event in accordance with South Florida Water Management District's criteria may use a Lowest floor elevation in accordance with the project's water management designed 100 year zero discharge elevation or the FIRM elevation, whichever is higher.
 - 2. Buildings which are not within projects having water management storage facilities designed and built for a 25 year, 3 day storm event in accordance with South Florida Water Management District's criteria shall use a Lowest floor elevation of 18 inches above the adjacent roadway crown elevation or the FIRM elevation, whichever is higher.
- (b) On parcels where unusual topographic conditions exist and the above standard conditions cannot be reasonably applied, the Building Official will consider requests to decrease the Lowest floor elevation. All requests will require an analysis, by a Professional engineer, of the 25 year, three (3) day storm event and the 100 year, 3 day storm event using zero discharge, for the entire discharge, for the entire drainage basin in which the proposed Structure is located. Reductions may be allowed on the basis of the analysis, but in no case shall the Lowest floor be less than the FIRM.
- (c) Slabs for garages, carports, screen enclosures, etc., must be at least equal in elevation to the crown of the nearest street.

Code of Laws Sec. 62-127. Specific Standards

* * * * *

(2) Non-Residential Construction. All New construction and Substantial improvement of any commercial, industrial, or non-residential Building (including Manufactured home) shall have the lowest floor, including Basement, elevated to no lower than the BFE. All commercial, industrial, or non-residential Buildings located in A-Zones may be Floodproofed, in lieu of being elevated, provided that all areas of the Building components, together with attendant utilities and sanitary facilities, below the BFE are watertight with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy. [NOTE: Floodproofing to just the BFE will result in a higher Flood insurance premium rate for the Structure because the Flood insurance policy requires rating a Structure at one foot below the Floodproofing elevation.] A Professional engineer or Registered architect shall certify that the standards of this subsection are satisfied using the FEMA Floodproofing Certificate. Such certification along with the corresponding engineering data, and the operational and maintenance plans shall be provided to the Floodplain Administrator.

#

Flood Design Class and Elevation Requirements:

ASCE 24-14 Table 1-1 Flood Design Class of Buildings and Structures			
Use or Occupancy of Building and Structure	Flood Design Class ¹	Elevation Requirement ²	
		Zones A, AH & AE	Zone VE
Buildings and structures that normally are unoccupied and pose minimal risk to the public or minimal disruption to the community should they be damaged or fail due to flooding. Flood Design Class 1 includes (1) temporary structures that are in place for less than 180 days, (2) accessory storage buildings and minor storage facilities (does not include commercial storage facilities), (3) small structures used for parking of vehicles, and (4) certain agricultural structures. [Note (a)]	1	Built at BFE or DFE and consistent with local FDPO	Built at BFE or DFE and consistent with local FDPO
Buildings and structures that pose a moderate risk to the public or moderate disruption to the community should they be damaged or fail due to flooding, except those listed as Flood Design Classes 1, 3, and 4. Flood Design Class 2 includes the vast majority of buildings and structures that are not specifically assigned another Flood Design Class, including most residential, commercial, and industrial buildings.	2	BFE + 1 or DFE, whichever is higher and consistent with local FDPO	BFE + 1 or DFE, whichever is higher and consistent with local FDPO
Buildings and structures that pose a high risk to the public or significant disruption to the community should they be damaged, be unable to perform their intended functions after flooding, or fail due to flooding. Flood Design Class 3 includes (1) buildings and structures in which a large number of persons may assemble in one place, such as theaters, lecture halls, concert halls, and religious institutions with large areas used for worship; (2) museums; (3) community centers and other recreational facilities; (4) athletic facilities with seating for spectators; (5) elementary schools, secondary schools, and buildings with college or adult education classrooms; (6) jails, correctional facilities, and detention facilities; (7) healthcare facilities not having surgery or emergency treatment capabilities; (8) care facilities where residents have limited mobility or	3	BFE +1 or DFE, whichever is higher and consistent with local FDPO	BFE <u>+2</u> or DFE, whichever is higher and consistent with local FDPO

¹ See ASCE 24-14 Table 1-1 Flood Design Class of Buildings and Structures for additional details.

² See Table 2-1 for minimum elevations for Flood Hazard Areas Other Than Coastal High Hazard Areas and Table 4-1 for minimum elevations for Coastal High Areas and Coastal A Zones for additional details.

<p>ability, including nursing homes but not including care facilities for five or fewer persons; (9) preschool and child care facilities not located in one- and two-family dwellings; (10) buildings and structures associated with power generating stations, water and sewage treatment plants, telecommunication facilities, and other utilities which, if their operations were interrupted by a flood, would cause significant disruption in day-to-day life or significant economic losses in a community; and (11) buildings and other structures not included in Flood Design Class 4 (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 the quantity of the material exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released. [Note (b)]</p>			
<p>Buildings and structures that contain essential facilities and services necessary for emergency response and recovery, or that pose a substantial risk to the community at large in the event of failure, disruption of function, or damage by flooding. Flood Design Class 4 includes (1) hospitals and health care facilities having surgery or emergency treatment facilities; (2) fire, rescue, ambulance, and police stations and emergency vehicle garages; (3) designated emergency shelters; (4) designated emergency preparedness, communication, and operation centers and other facilities required for emergency response; (5) power generating stations and other public utility facilities required in emergencies; (6) critical aviation facilities such as control towers, air traffic control centers, and hangars for aircraft used in emergency response; (7) ancillary structures such as communication towers, electrical substations, fuel or water storage tanks, or other structures necessary to allow continued functioning of a Flood Design Class 4 facility during and after an emergency; and (8) 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 of the material</p>	4	BFE +2 or DFE or 500 yr. flood elevation, whichever is higher and consistent with local FDPO	BFE +2 or DFE or 500 yr. flood elevation, whichever is higher and consistent with local FDPO

exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released. [Note (b)]			
<p>[Note (a)] Certain agricultural structures may be exempt from some of the provisions of this standard; see ASCE 24-14 Section C1.4.3.</p> <p>[Note (b)] Buildings and other structures containing toxic, highly toxic, or explosive substances shall be eligible for assignment to a lower Flood Design Class if it can be demonstrated to the satisfaction of the authority having jurisdiction by a hazard assessment as described in ASCE 7-10 Section 1.5.3 of Minimum Design Loads for Buildings and Other Structures that a release of the substances is commensurate with the risk associated with that Flood Design Class.</p>			

For additional information on ASCE 24-14 visit:

Highlights: <http://www.fema.gov/media-library/assets/documents/14983>

To purchase: <http://www.asce.org/templates/publications-book-detail.aspx?id=6963>

Examples:

1. New commercial office building, Class 2, no SFWMD permit, located in AE 9 food zone = Designed with the lowest floor of the building at 10 ft. NAVD or dry floodproofed to 10 ft. NAVD
2. New retail building, Class 2, with a SFWMD permit and DFE of 14 ft. NAVD, located in a AH 12 food zone = Designed with the lowest floor of the building at the DFE of 14 ft. NAVD (DFE is higher than BFE +1) or dry floodproofed to 14 ft. NAVD
3. New multi-family structure, Class 2, with a SFWMD permit and DFE of 13 ft. NAVD, located in a AH 12 flood zone = Designed with the lowest floor of the building at 13 ft. NAVD (DFE and BFE +1 are the same, no dry floodproofing)
4. New school/emergency shelter, Class 4, with a SFWMD permit and DFE of 17 ft. NAVD, located in a AH 16.5 NAVD flood zone, 500 yr. elevation 16.8 NAVD = Designed with the lowest floor of the building at 18.5 ft. NAVD (BFE +2 is higher than DFE and 500 yr. elevation)
5. Accessory shed with slab, Class 1, no SFWMD permit, located in AH 12 = Designed with the lowest floor at least equal in elevation to the crown of the nearest street and vented to BFE or dry floodproofed to BFE.