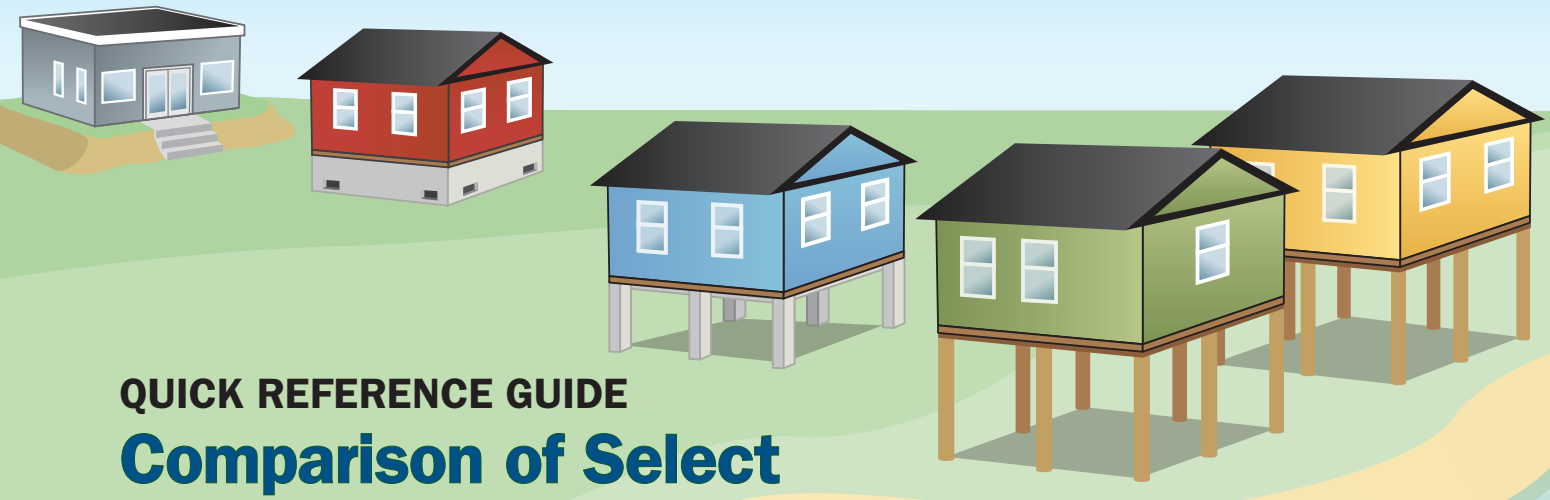


QUICK REFERENCE GUIDE

Comparison of Select NFIP and 2018 I-Code Requirements for Special Flood Hazard Areas

Using this Quick Reference Guide	
Flood Zone Map	Page 2
NFIP and 2018 IRC (residential)	Page 3 (Zone A & CAZ) and Page 4 (Zone V)
NFIP and 2018 IBC and ASCE 24-14 (non-residential)	Page 5-6 (Zone A & CAZ) and Page 7-8 (Zone V)
Existing Buildings	Page 8

DID YOU KNOW?

The NFIP refers to the Base Flood Elevation (BFE) for lowest floor elevation and other requirements, while the I-Codes and ASCE 24 refer to the BFE or Design Flood Elevation (DFE). The DFE is always the BFE or higher.

Additional height above the BFE is known as "freeboard."

The IBC/ASCE 24 limits construction in high risk flood hazard areas, including alluvial fan, flash flood, mudslide, erosion-prone, high velocity flow, ice jam, and debris areas.

Communities that participate in the National Flood Insurance Program (NFIP) adopt and enforce floodplain management regulations and codes that govern development in Special Flood Hazard Areas.

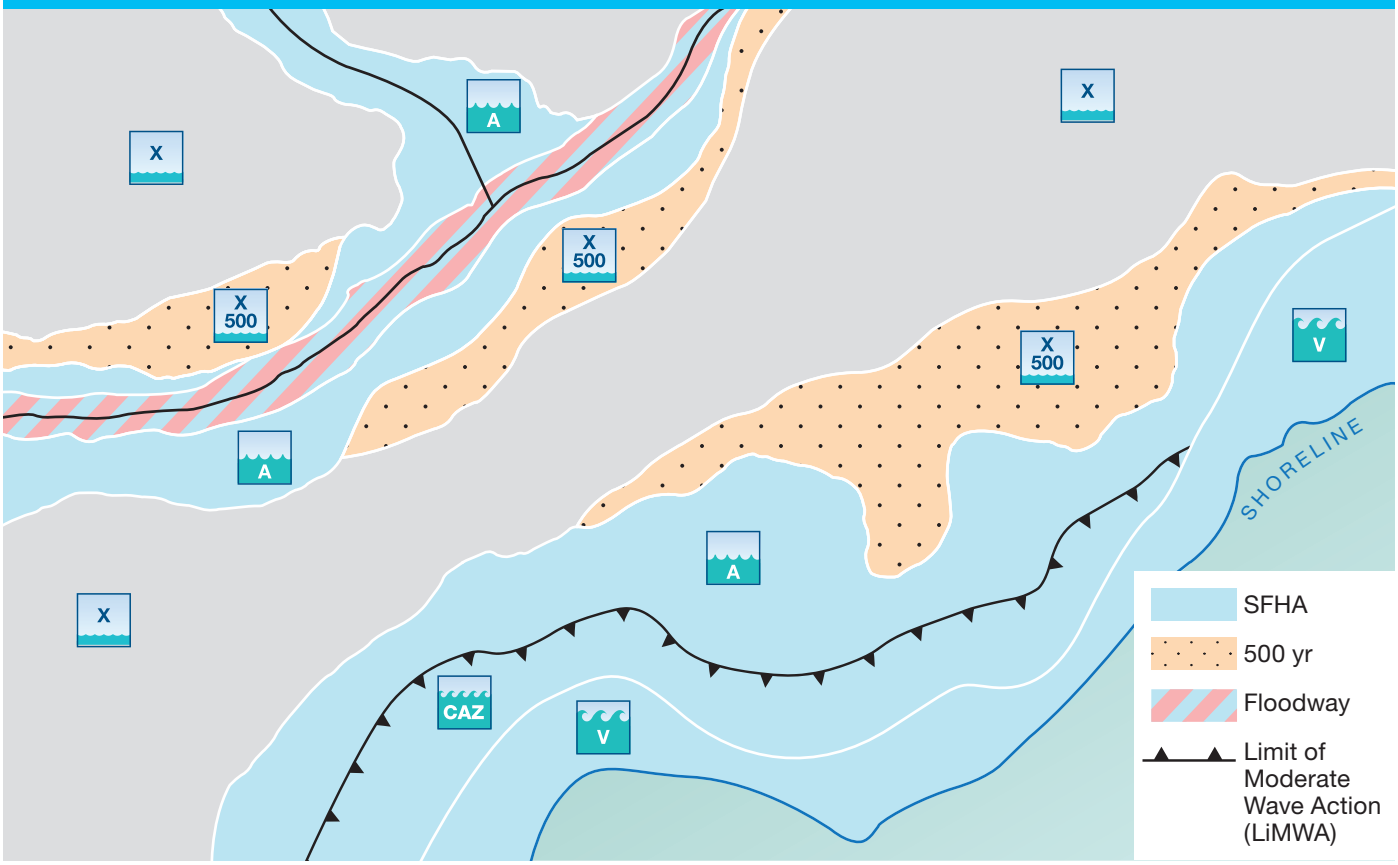
The International Residential Code® (IRC) and International Building Code® (IBC), by reference to ASCE 24, *Flood Resistant Design and Construction*, a design standard developed by the American Society of Civil Engineers (ASCE), include requirements that govern the design and construction of buildings and structures in flood hazard areas.

FEMA has determined that the flood provisions in the 2018 edition of the International Codes® (I-Codes) meet or exceed the minimum NFIP requirements (44 CFR §60.3). In some respects, the IRC and IBC/ASCE 24 expand on NFIP requirements with more specificity, additional requirements, and some limitations not found in NFIP regulations.

This Quick Reference Guide illustrates some of the key similarities and differences between the requirements of the NFIP and the requirements in the 2018 I-Codes and ASCE 24-14 for dwellings and buildings assigned Flood Design Class 2 in the IBC/ASCE 24. The similarities and differences shown in this guide are in foundation types, lowest floor elevations, enclosures below elevated buildings, and attendant utilities and equipment.

FEMA

FLOOD ZONE MAP



DID YOU KNOW?

CAZ

The NFIP regulations do not define or have specific provisions for Coastal A Zone (CAZ), treating CAZ like Zone A. Starting in 2009, new and revised Flood Insurance Rate Maps (FIRMs) for coastal areas show the Limit of Moderate Wave Action (LiMWA), which delineates the landward limit of the CAZ. If a LiMWA is delineated or a community designates a CAZ, the 2015 and later editions of IBC/ASCE 24 and IRC require buildings in CAZs to be treated like Zone V buildings, with exceptions that permit backfilled stem wall foundations designed to account for wave action, erosion, and local scour.

DID YOU KNOW?

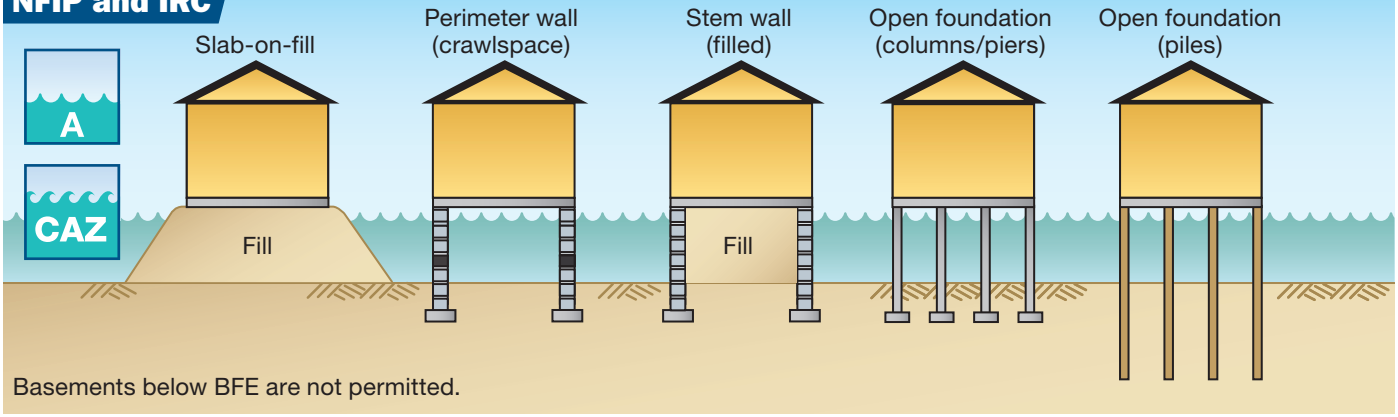
The 2018 IRC requires lowest floors to be at or above BFE plus one foot, while earlier editions required lowest floors at or above the BFE. In IBC/ASCE 24, lowest floor elevations vary with Flood Design Class and are higher for certain uses, high occupancy buildings, and critical and essential facilities.

The NFIP and I-Codes require buildings in Zone V to be designed to resist the effects of wind and flood loads acting simultaneously. The effects of high winds can extend much farther inland than Zone V. The IRC includes a map identifying shaded regions where wind design is required.

Comparison of Zone A Requirements: NFIP and IRC

FOUNDATION TYPE

NFIP and IRC

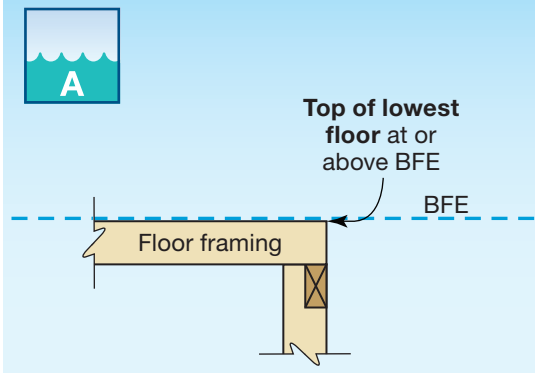


Basements below BFE are not permitted.

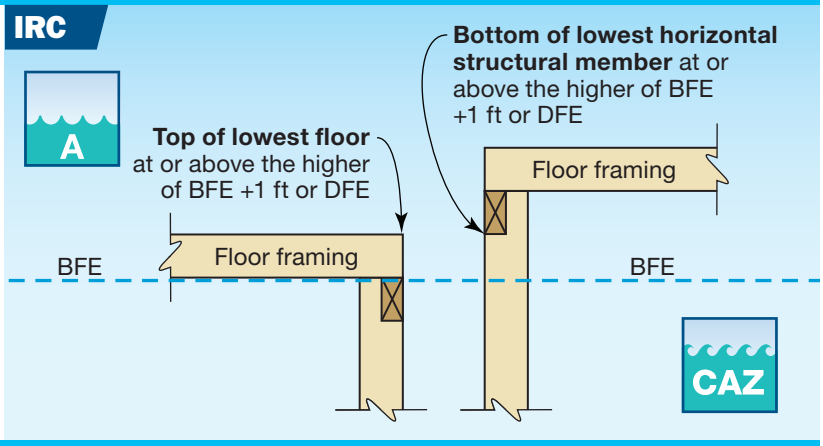
	Slab-on-fill	Perimeter wall (crawlspace)	Stem wall (filled)	Open foundation (columns/piers)	Open foundation (piles)
NFIP Zone A	✓	✓	✓	✓	✓
IRC Zone A	✓	✓	✓	✓	✓
IRC CAZ	✗	✗	✓	✓	✓

LOWEST FLOOR ELEVATION

NFIP

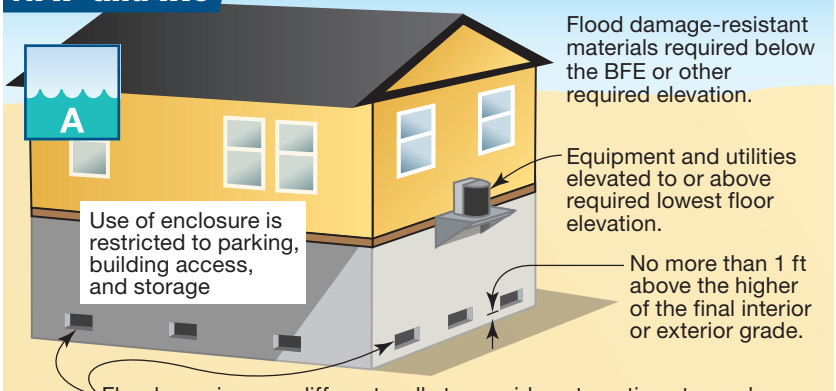


IRC



EQUIPMENT AND ENCLOSURES BELOW ELEVATED BUILDINGS

NFIP and IRC



Flood damage-resistant materials required below the BFE or other required elevation.

Equipment and utilities elevated to or above required lowest floor elevation.

No more than 1 ft above the higher of the final interior or exterior grade.

Flood openings on different walls to provide automatic entry and exit of floodwater. A minimum of 2 flood openings are required, but the total number of openings depends on the type and size of the openings and the size of the enclosed area.

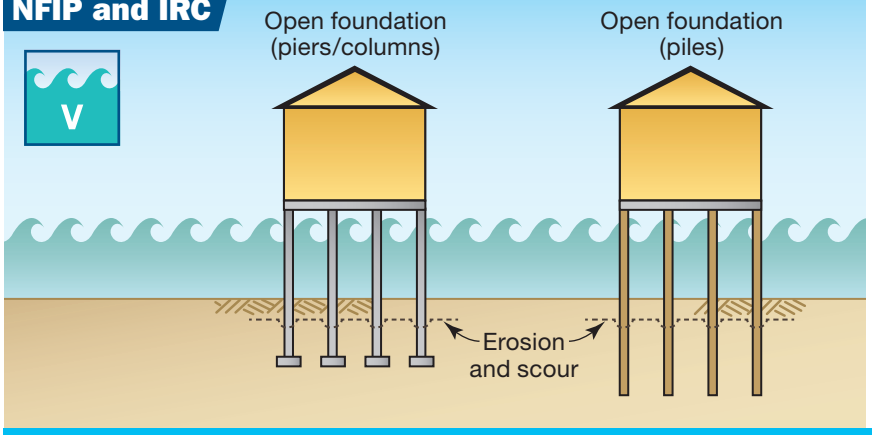
IRC

In CAZ, the IRC requires flood openings in breakaway walls, prohibits mounting equipment and utilities on or penetrating through breakaway walls, and requires exterior doors at the top of stairways enclosed by breakaway walls.

Comparison of Zone V Requirements: NFIP and IRC

FOUNDATION TYPE

NFIP and IRC



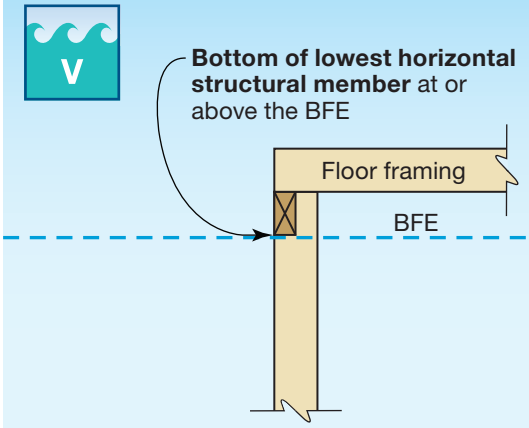
The NFIP and IRC permit only pile and column foundations in Zone V.

Both the NFIP and IRC require foundation designs to be certified by registered design professionals.

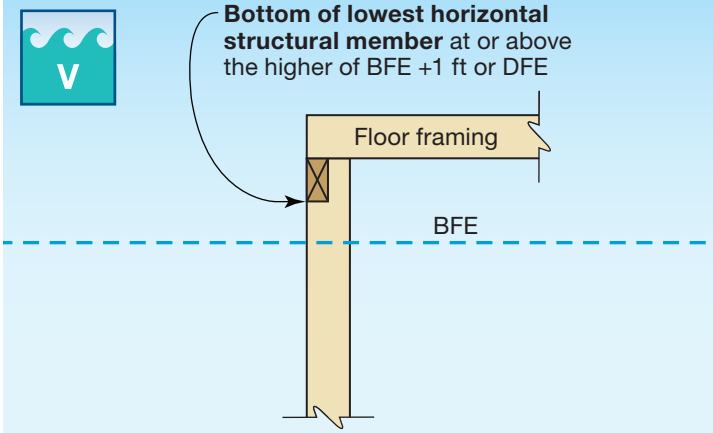
The IRC requires foundation designs in Zone V and CAZ to account for scour and erosion.

LOWEST FLOOR ELEVATION

NFIP

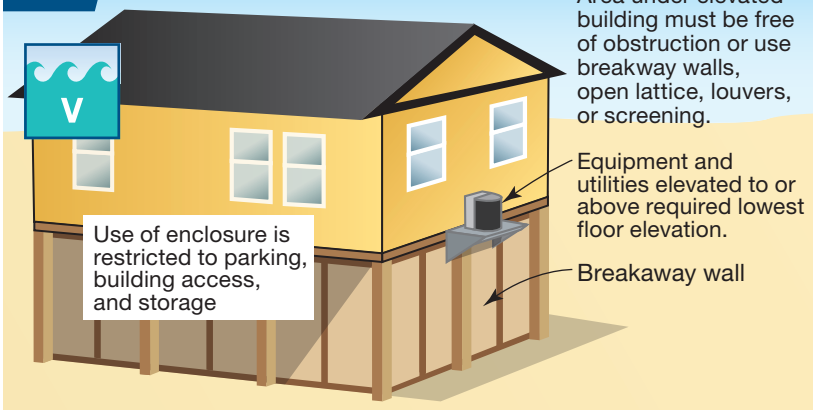


IRC



EQUIPMENT AND ENCLOSURES BELOW ELEVATED BUILDINGS

NFIP



Flood damage-resistant materials required below the BFE or other required elevation.

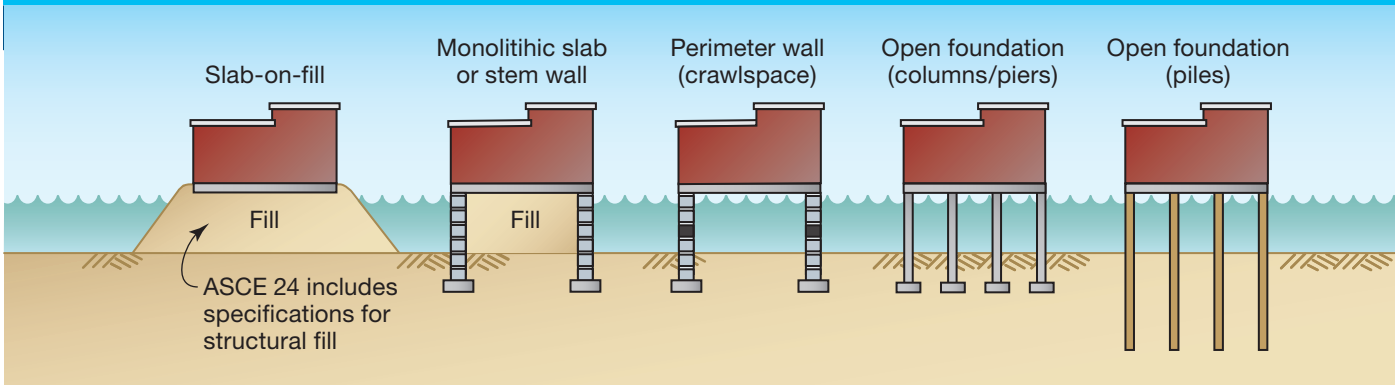
IRC

In Zone V, IRC requires flood openings in breakaway walls (see page 3), prohibits mounting equipment and utilities on or penetrating through breakaway walls, and requires exterior doors at the top of stairways enclosed by breakaway walls.

The NFIP and IRC require registered design professionals to certify breakaway walls that exceed a design safe loading resistance of 20 pounds per square foot.

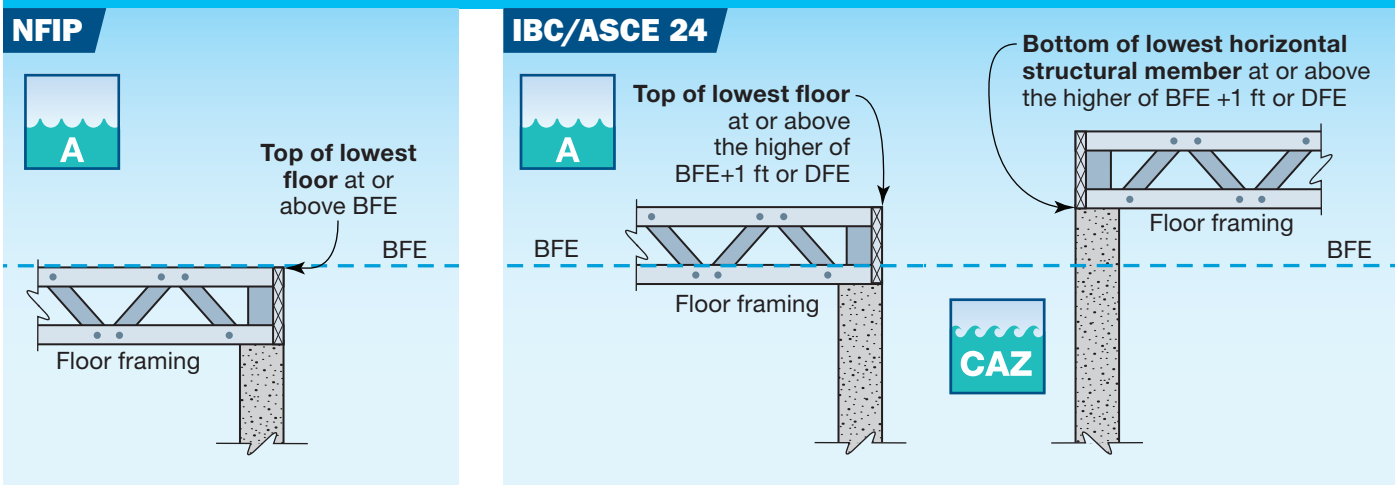
Comparison of Zone A Requirements: NFIP and IBC/ASCE 24

FOUNDATION TYPE



	Slab-on-fill	Monolithic slab or stem wall	Perimeter wall (crawlspace)	Open foundation (columns/piers)	Open foundation (piles)
NFIP Zone A	✓	✓	✓	✓	✓
IBC Zone A	✓	✓	✓	✓	✓
IBC CAZ	✗	✓	✗	✓	✓

LOWEST FLOOR ELEVATION



DID YOU KNOW?

The NFIP and IBC/ASCE 24 allow *non-residential* buildings in Zone A to be dry floodproofed to or above the required lowest floor elevation instead of elevating. Basements are permitted to be dry floodproofed. Designs for dry floodproofing must be certified by registered design professionals. IBC/ASCE 24 does not permit dry floodproofing in Coastal A Zones.

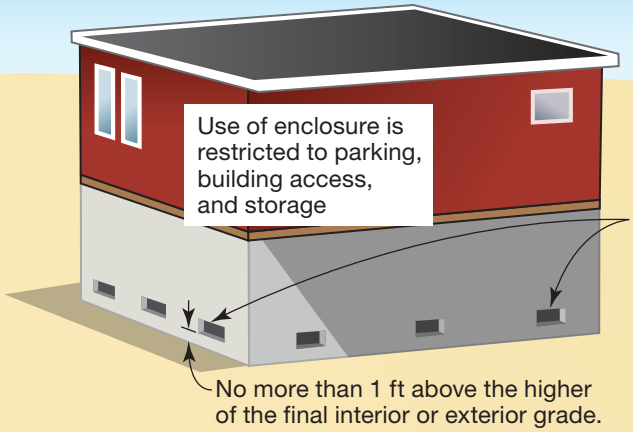
IBC/ASCE 24 includes limitations on the use of dry floodproofing based on flood velocity and, when human intervention measures are specified, warning time before the onset of flooding. Maintenance and operation plans, with regular inspections and deployment practice, are critical for effective dry floodproofing performance.

Residential buildings and residential areas of mixed-use structures are not permitted to be dry floodproofed.

Comparison of Zone A Requirements: NFIP and IBC/ASCE 24

ENCLOSURES BELOW ELEVATED BUILDINGS

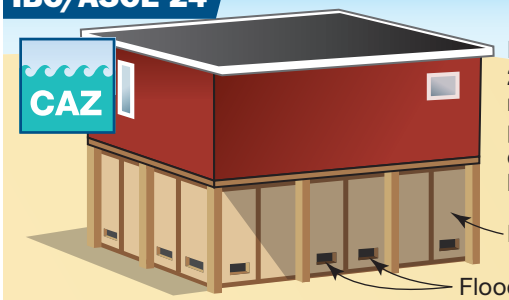
NFIP and IBC/ASCE 24



DID YOU KNOW?

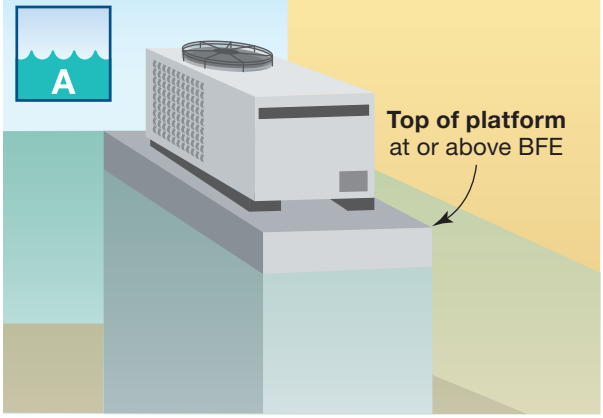
The NFIP regulations do not have explicit requirements for elevators, but the IBC/ASCE 24 do. Elevators are permitted below the BFE and elevator shafts are not required to break away or have flood openings. Foundation designs must account for flood loads acting on elevators and non-breakaway shaft walls.

IBC/ASCE 24

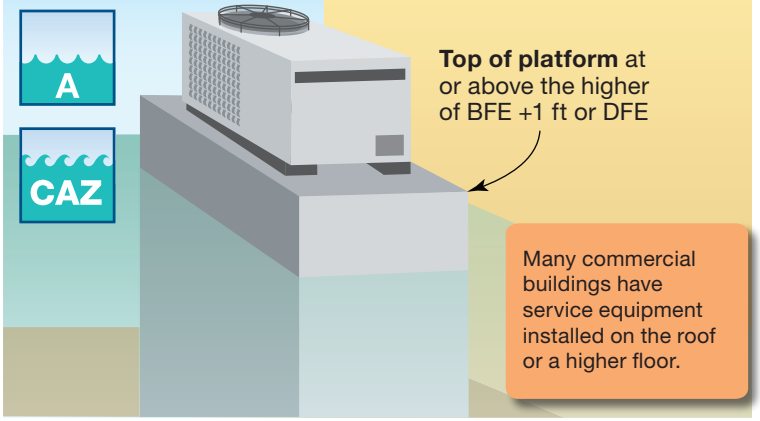


EQUIPMENT

NFIP



IBC/ASCE 24



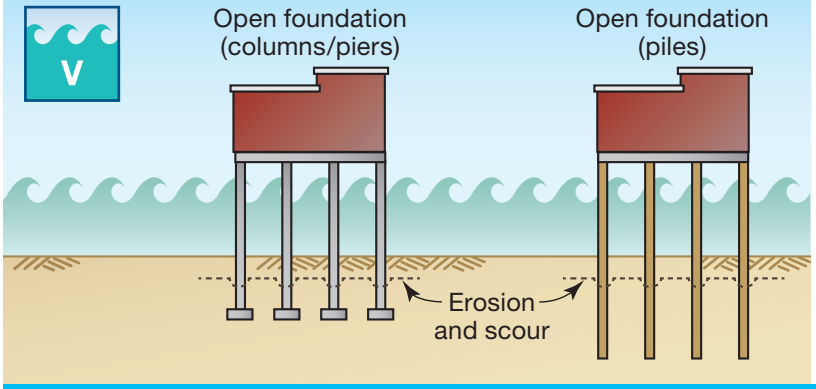
DID YOU KNOW?

The IBC/ASCE 24 require attendant utilities and equipment to be at or above the same elevations specified for lowest floors, which vary with Flood Design Class and are higher for certain uses, high occupancy buildings, and critical and essential facilities. Also, above ground tanks must be elevated on platforms or structural supports or the tanks and their foundations must resist flood loads, including floating debris.

Comparison of Zone V Requirements: NFIP and IBC/ASCE 24

FOUNDATION TYPE

NFIP and IBC/ASCE 24

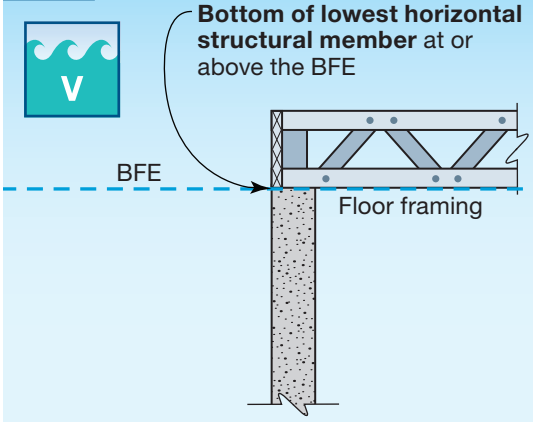


DID YOU KNOW?

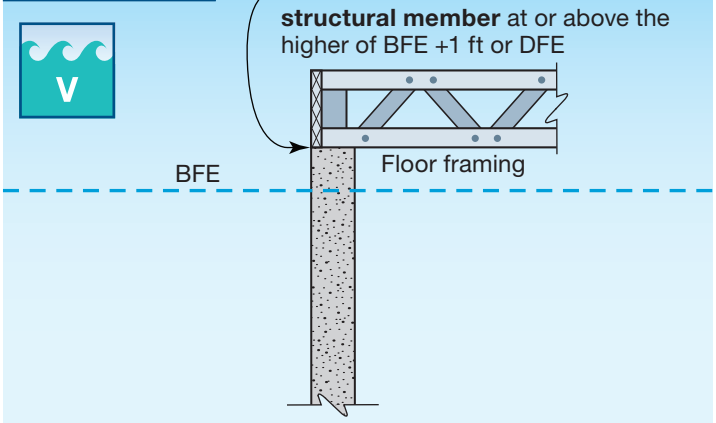
In Zone V, the NFIP and IBC/ASCE 24 do not permit buildings elevated on fill, stem wall foundations, or perimeter wall foundations, and dry floodproofing is not permitted.

LOWEST FLOOR ELEVATION

NFIP

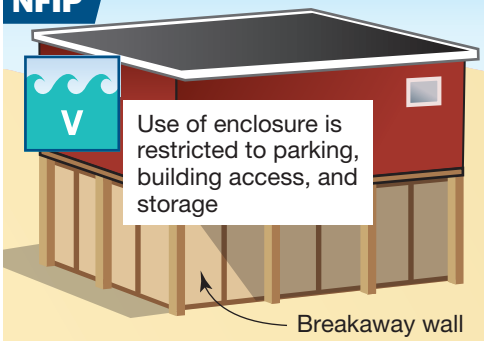


IBC/ASCE 24



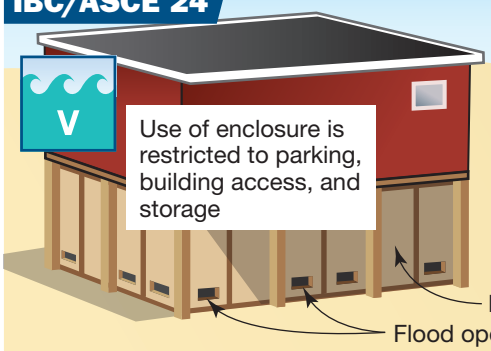
ENCLOSURES BELOW ELEVATED BUILDINGS

NFIP



Flood damage-resistant materials required below the BFE or other required elevation.

IBC/ASCE 24



In Zone V and Coastal A Zone, the IBC/ASCE 24 requires flood openings in breakaway walls (see page 6), prohibits mounting equipment and utilities on or penetrating through breakaway walls, and requires exterior door at top of stairways enclosed by breakaway walls.

Flood damage-resistant materials required below the BFE or other required elevation.

DID YOU KNOW?

In Zone V, the NFIP and IBC/ASCE 24 require the area under elevated buildings to be free of obstruction or enclosed by breakaway walls, open lattice, louvers, or screening. The IBC/ASCE 24 applies the same requirement in Coastal A Zones.

Comparison of Zone V Requirements: NFIP and IBC/ASCE 24

UTILITIES AND EQUIPMENT

DID YOU KNOW?

In Zone V, utilities and equipment must be elevated to or above the required lowest floor elevation. Most commercial buildings have service equipment installed on the roof or a higher floor.

In Zone V, elevators are permitted below the BFE and elevator shafts are not required to break away or have flood openings. Foundation designs must account for flood loads acting on elevators and non-breakaway shaft walls.

To satisfy the NFIP and I-Code free-of-obstruction requirements, tanks that serve buildings in Zone V must be elevated on platforms or be installed underground and designed and anchored to account for buoyancy forces, taking into consideration erosion and scour.

NFIP and I-Code Requirements for Existing Buildings

The NFIP regulations and I-Codes have requirements for existing buildings. When improvements and alterations are determined to be Substantial Improvements (improvement costs equal or exceed 50% of pre-improvement building market value), or when repair of damage of any origin is determined to be Substantial Damage (costs to repair to pre-damage condition equal or exceed 50% of pre-damage building market value), existing buildings must be brought into compliance with the requirements for new construction, including the requirements for foundations, elevation, enclosures, equipment and utilities, and flood damage-resistant materials.

For More Information

Find FEMA Building Science publications at http://www.fema.gov/building-science-publications.

Find guidance for NFIP requirements in FEMA Technical Bulletins at https://www.fema.gov/nfip-technical-bulletins.

Find excerpts of the flood provisions of the 2009 and later editions of the I-Codes and *Highlights of ASCE 24* at https://www.fema.gov/building-code-resources. Available on the same website is *Reducing Flood Losses Through the International Codes: Coordinating Building Codes and Floodplain Management Regulations*, which includes a chapter on the differences between NFIP requirements and the I-Codes.

See *CodeMaster: Flood Resistant Design*, an 8-page guide to designing structures for flood loads in accordance with the IBC, IRC, ASCE 24, and ASCE 7, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*. The *CodeMaster* and ASCE standards can be purchased at http://shop.iccsafe.org/ and the ASCE Bookstore at https://www.asce.org.

For additional information, contact community floodplain management or building departments and NFIP State Coordinating Agencies. Contact the FEMA Building Science Helpline at FEMA-Buildingsciencehelp@fema.dhs.gov or (866) 927-2104.

FEMA