



FEMA

HMA
Hazard Mitigation
Assistance



Using ASCE 24 for Hazard Mitigation Assistance

January 25, 2018

Agenda

- Overview of the Hazard Mitigation Program
- What is ASCE 24 and what does it cover?
- How should it be addressed in an HMA grant application?
- Overview of ASCE 24 use with Elevation Projects
- Overview of ASCE 24 use with Mitigation Reconstruction Projects
- Overview of ASCE 24 use with Dry Floodproofing Projects
- FEMA Resources when using ASCE 24
- Questions

Hazard Mitigation Assistance Program

HMA Program provides assistance for mitigation activities that reduce damage and protect life and property from future damages.

HMA Addendum (dated 2/27/2015) states: *“FEMA will use ASCE 24-14, or latest edition, or its equivalent as the minimum design criteria for all HMA-funded structure elevation, dry flood proofing, and mitigation reconstruction projects in flood hazard areas.”*



Detailed information on FEMA HMA Programs:
<https://www.fema.gov/hazard-mitigation-assistance>

HMA Grant Programs

- **Hazard Mitigation Grant Program (HMGP):** Provides grants to implement long-term hazard mitigation measures after a major disaster declaration in a given State.
- **Pre-Disaster Mitigation (PDM) Program:** Provides nationally competitive grants for hazard mitigation planning and implementing mitigation projects before a disaster event.
- **Flood Mitigation Assistance (FMA) Program:** Provides grants on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program (NFIP).



The FEMA Building Codes and Standards Directive



Hazard Mitigation Assistance Guidance Addendum

Hazard Mitigation Grant Program, Pre-Disaster Mitigation
Program, and Flood Mitigation Assistance Program

February 27, 2015



Federal Emergency Management Agency
Department of Homeland Security
500 C Street, S.W.
Washington, DC 20472

- As of September 6, 2016 - “FEMA will encourage and, to the extent permitted by law, require the integration and use of nationally recognized voluntary consensus-based building codes and standard consistently across FEMA programs.”
- Policy applies to all FEMA offices and programs
 - Includes Public Assistance
- FEMA programs will adopt as appropriate regulations, policies, grant conditions, or other appropriate instruments, where legally permitted...

ASCE 24 Consensus Standard

- Addresses:
 - Construction materials
 - Design and engineering requirements
 - Testing practices
- ASCE standards are developed by a consensus process that includes balloting by a committee and a public review
- Developed by industry organizations and professional associations
- Supplements the building code
- May be incorporated by reference into the building code



ASCE 24 Sections (1 of 2)

Each section builds on the previous section

1. General (*scope, definitions, basic requirements, and flood loading per ASCE 7*)
2. Basic Requirements for Flood Hazard Areas that are not identified as Coastal High Hazard Areas and Coastal A Zones (*buildings in most A zones*)
3. High Risk Flood Hazard Areas (*alluvial fans, flash flood areas, mudslide areas, erosion-prone areas, high-velocity flow areas, areas subject to wave action, and ice jams and debris areas*)
4. Coastal High Hazard Areas and Coastal A Zones (V Zones included)
5. Materials (*specific requirements for flood hazard areas, steel, concrete, masonry, wood, and finishes*)

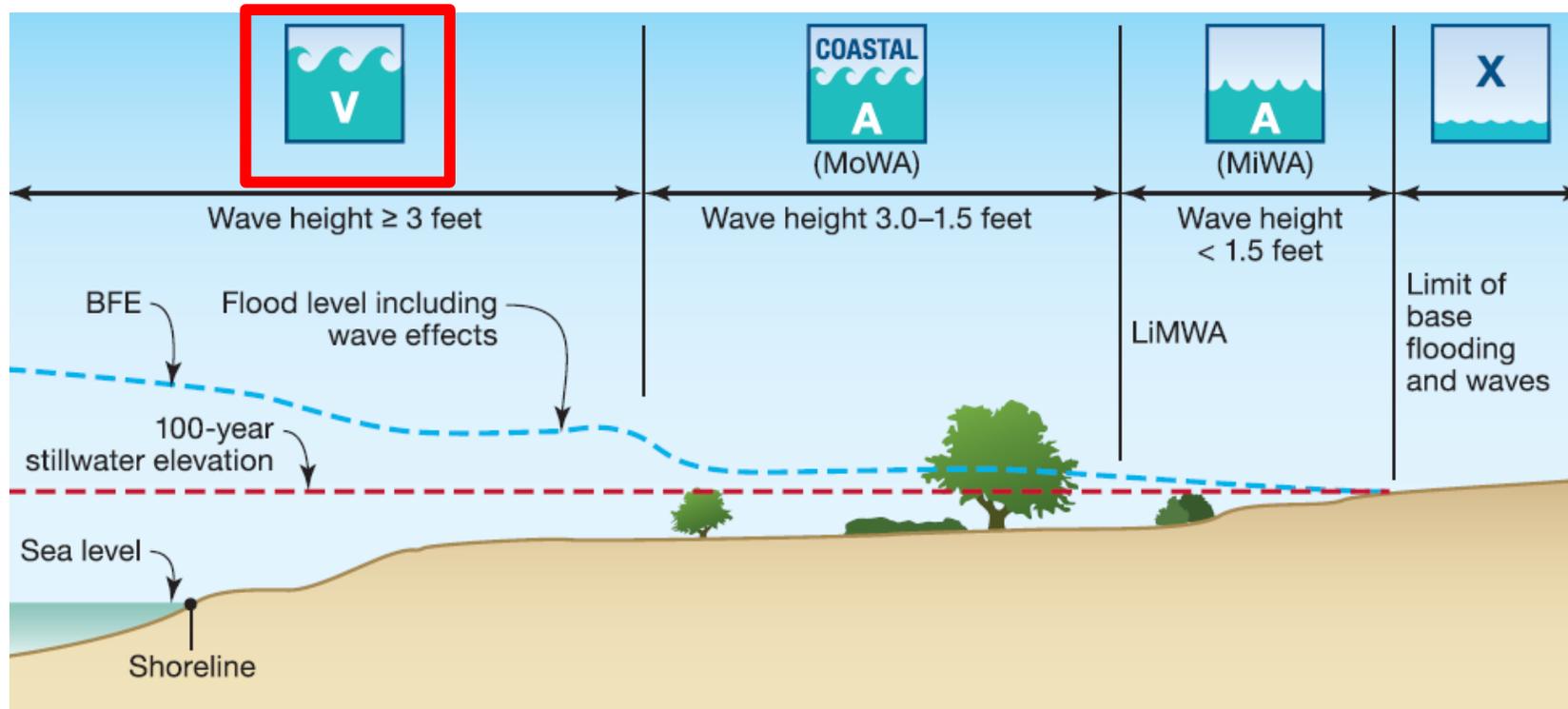
Note: ASCE 24 and the International Building Codes utilize a modified flood zone designation that is more restrictive than the NFIP.

ASCE 24 Sections (2 of 2)

6. Dry Floodproofing and Wet Floodproofing
 7. Attendant Utilities and Equipment (*electrical, mechanical, plumbing, and elevators*)
 8. Building Access
 9. Miscellaneous Construction (*decks, porches, garages, carports, accessory structures, chimneys, pools, and tanks*)
 10. References
- Commentary (*covers all chapters*)

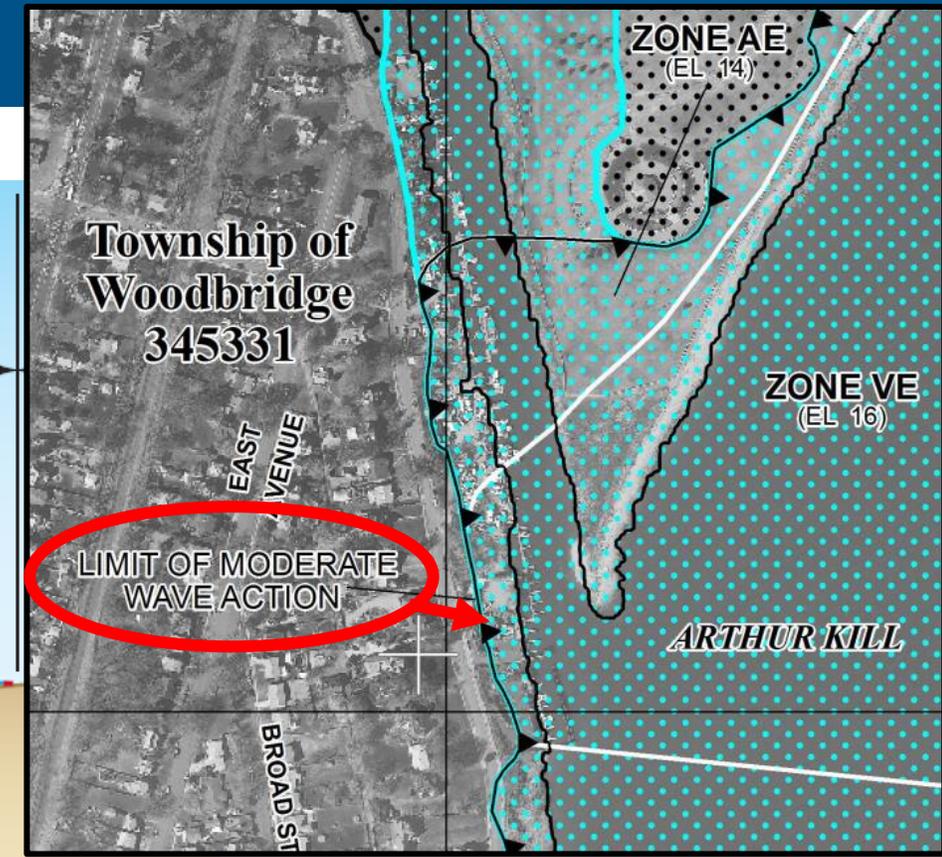
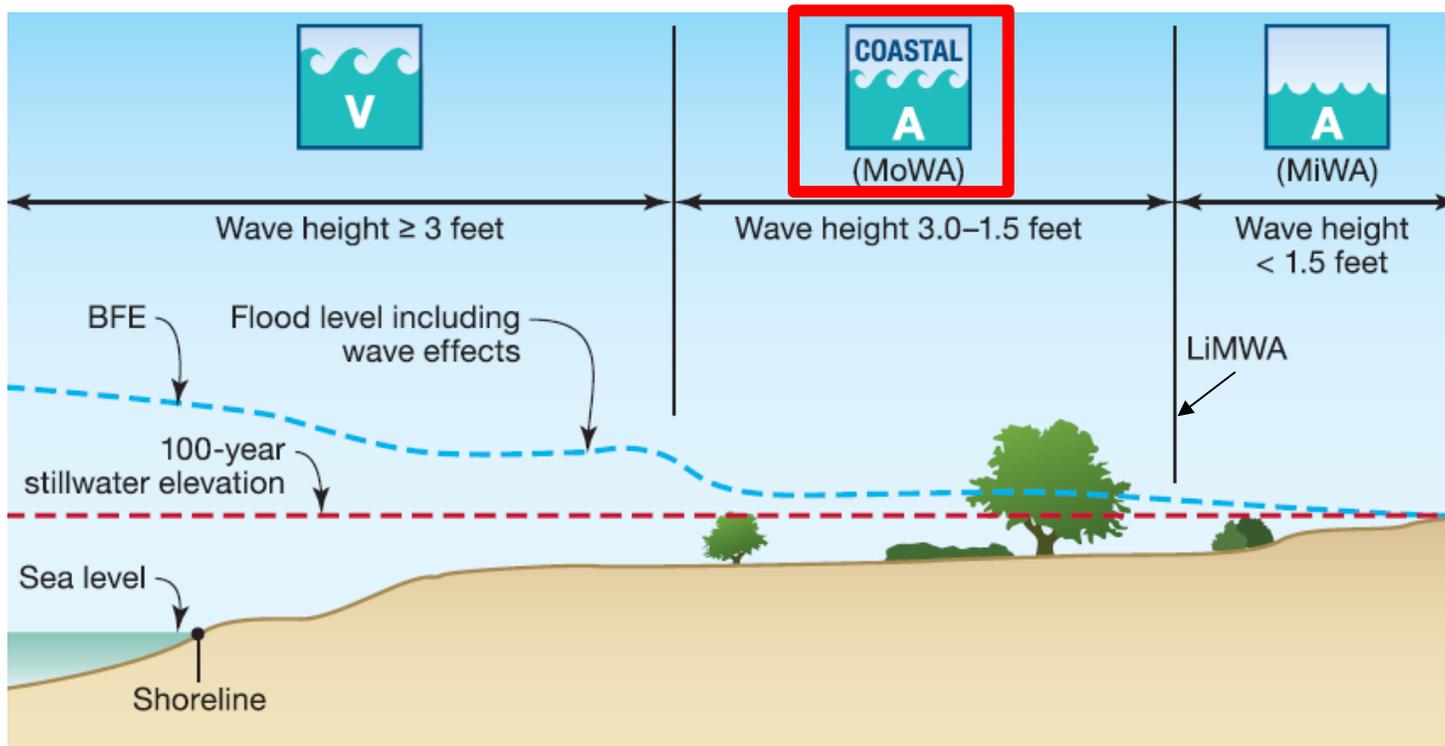
Note: Buildings are grouped by Flood Design Classes, which increase requirements based on the importance of the building to a community or life safety.

ASCE 24 Categories of Coastal Flood Zones



V Zones: 3 foot or higher waves – Require Open Foundations and Compliance is measured to the Bottom of Lowest Horizontal Structural Member of the Lowest Floor Designated on Flood Insurance Rate Maps (FIRMs)

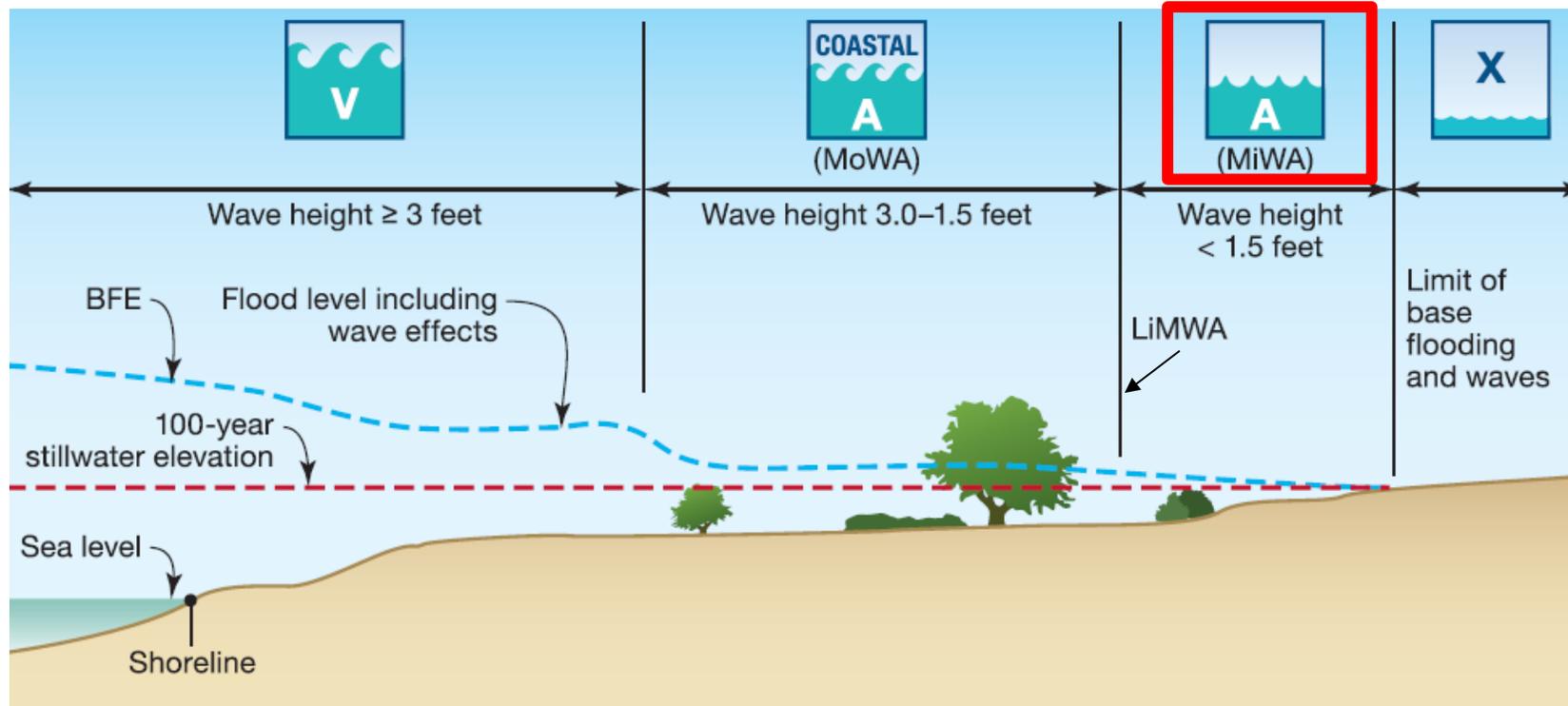
Categories of Coastal Flood Zones



Example FIRM

Coastal A Zones: 1.5 foot to 3 foot waves – Require Open Foundations and Compliance is measured to the Bottom of Lowest Horizontal Structural Member of the Lowest Floor
Only required if the Line of Moderate Wave Action (LiMWA) is shown on the FIRM

Categories of Coastal Flood Zones



A Zones: Less than 1.5 foot waves – Allows Closed Foundations (with openings) and Fill. Compliance is measured to the Top of the Lowest Floor Designated on Flood Insurance Rate Maps (FIRMs)

ASCE 24 and the NFIP

- The provisions of ASCE 24 are consistent with NFIP performance requirements.
- ASCE 24 provisions meet or exceed NFIP regulations.
- Establishes new minimum requirements (*ASCE 24 is now the standard of practice*)
- In comparison with NFIP requirements, ASCE 24:
 1. Provides more specific requirements
 2. Incorporates the Coastal A Zone with foundation requirements
 3. Requires new construction and Substantial Improvement/Damage construction to incorporate freeboard
 4. Requires to dry floodproofing to consider human intervention requirements



Compliance with ASCE 24

Projects that do not constitute *new construction* or Substantial Improvements:

- May not be required to comply with every provision of ASCE 24
- FEMA encourages the use of ASCE 24 to the largest extent practicable.

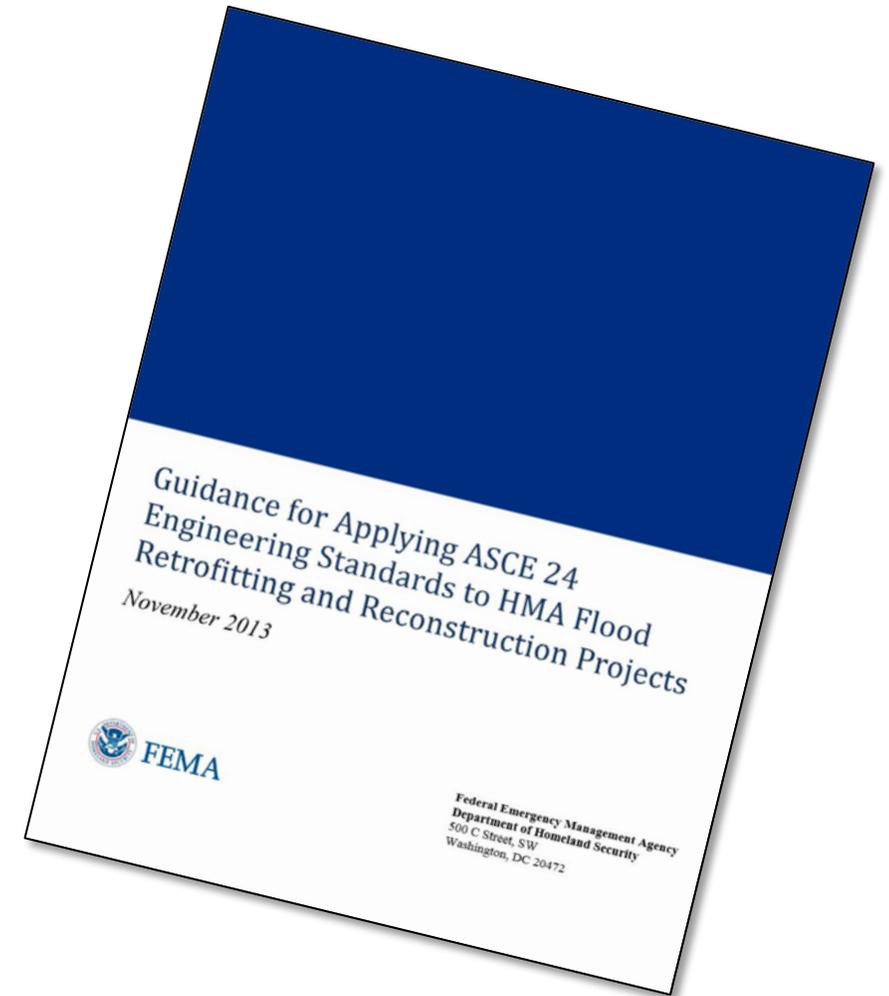
FEMA Funded Retrofitting projects:

- Complete compliance with ASCE 24 is preferred
- Some requirements of ASCE 24 may be satisfied via a “deemed to comply” approach meeting the spirit of ASCE 24

Note: HMA funded elevation and dry floodproofing projects must comply with ASCE 24 regardless of whether they were Substantially Damaged or they trigger Substantial Improvement.

FEMA's Guidance for Applying ASCE 24

- Different from the actual ASCE 24 Standard (You will need both for project oversight)
- Ensures that each project meets FEMA's HMA requirements which includes adhering to project-related design standards
- Supports integration of ASCE 24 as the minimum standard for flood-related HMA projects



ASCE 24 Applicability to HMA Projects

- **Applicants and Sub-applicants** – verify ASCE 24 will be incorporated into project design by including an affirmative certification statement.
- **Example** (all three suggested for complete statement):
 - *The Applicant affirms that the proposed scope of work will be implemented in conformance with the design criteria outlined in the ASCE 24-05 [or 24-14], Flood Resistant Design and Construction, standard if this application is approved for Hazard Mitigation Assistance (HMA).*

ASCE 24 Applicability to HMA Projects (continued)

- *The Applicant understands that prior to project closeout, verification and design documentation and/or certification must be submitted to FEMA to demonstrate that conformance with accepted engineering practices, established codes, standards, modeling techniques, or best practices, including adherence to ASCE 24-05 [or 24-14] minimum design and construction requirements has been met.**
- *The Applicant understands that failure to implement this project, if approved, in conformance with ASCE 24-05 [or 24-14] will constitute a breach of the terms and conditions of the Grant Award Agreement and may result in a recoupment of Federal assistance.**

*This statement is more likely to be used in the grant agreement; however, it is best to include it in the application as well.

Design professionals should be familiar with ASCE 24 and incorporate it into their design and construction oversight estimate. Local building officials should verify that projects incorporated ASCE 24 into the design and should verify that the construction meets ASCE 24 requirements.

What Qualifies as Design Documentation and/or Certification?

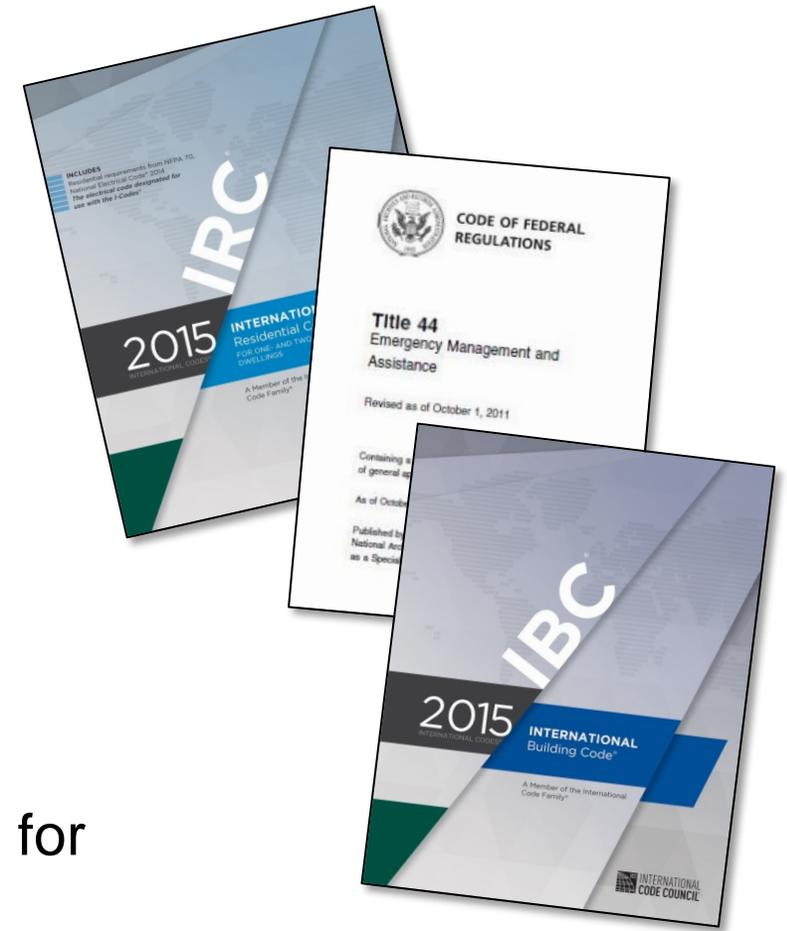
- A statement or affidavit from a design professional involved in evaluating the building and developing the design to meet ASCE 24 “deemed to comply” requirements
- A “template” design that meets ASCE 24, developed by the contractor and with the help of a designer, based on the existing foundation type, soil, condition of the building, etc. that could be used anytime these conditions are the same
- A statement or affidavit from a local official with technical competency certifying that the design meets the spirit of ASCE 24

Applying Codes, Standards, and Ordinances

HMA projects must comply with:

- State and local laws/ordinances
- Consensus standards referenced in the codes
- Federal laws, regulations, and statutes, and requirements within NFIP

Even if a project is technically feasible and cost effective, if implementing the project violates a Federal, State, or local ordinance, code, or requirement, the project will be ineligible for Federal assistance.



Plan on Doing a Code Compliance Check

- Each project should undergo a code compliance check
- If improvements trigger Substantial Improvement/Damage requirements, provisions in the building code or flood ordinance must be met
- 2012 and 2015 IRC, IBC, and IEBC describe various categories to classify work on existing buildings



Code Adoption Vs. Standard Adoption

States and communities regulate building construction by adopting and enforcing building codes

- Building codes set minimum requirements for structural design, materials, natural hazard mitigation, etc.
- Numerous standards are incorporated into building codes by reference

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

(Source: 2015 International Building Code, Section 1612 Flood Loads)

Note: Communities that do not currently have a building code will need to plan for how they will make sure the requirements have been met during design and construction of the building.

Design Standards



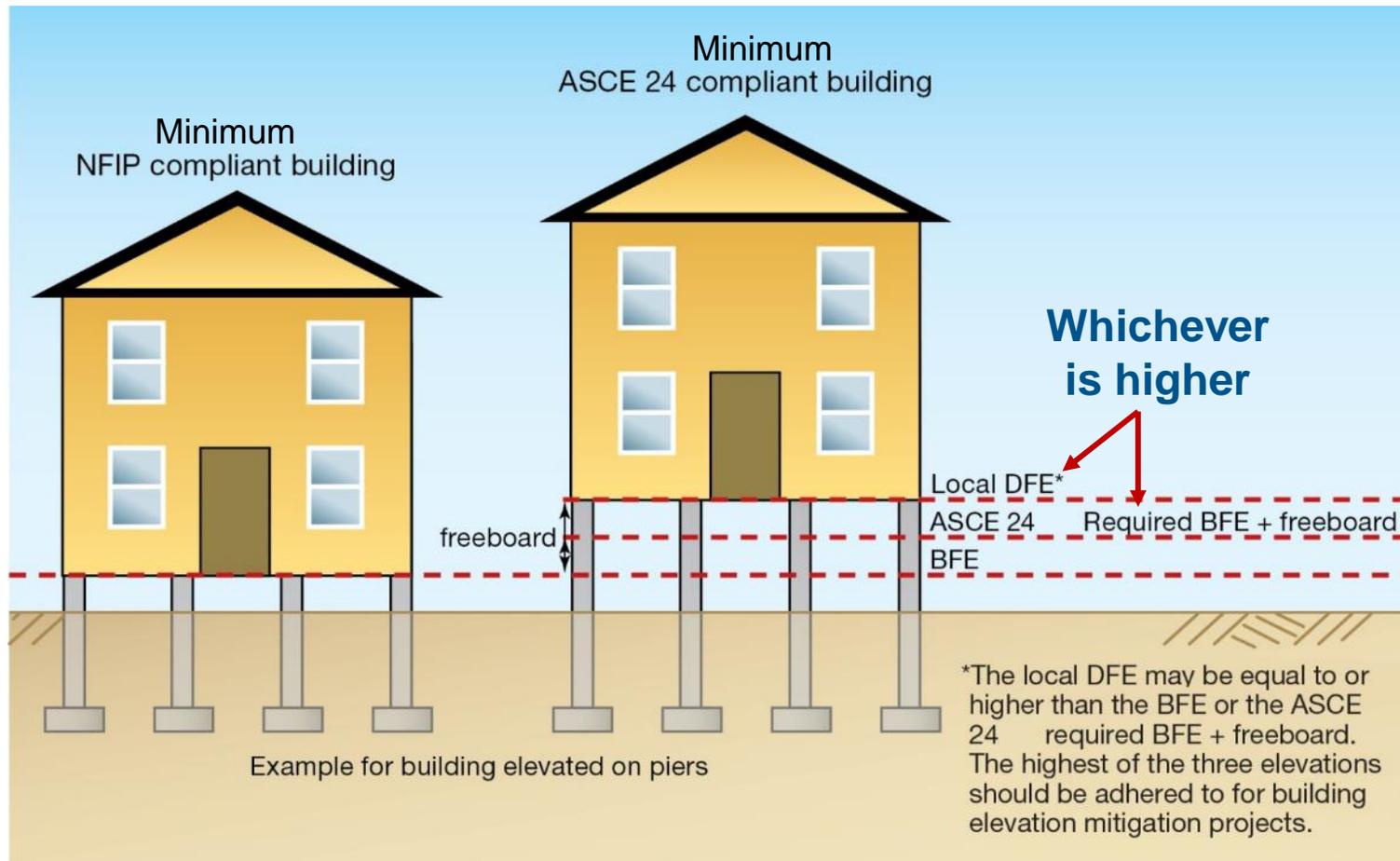
What is Elevation?

Elevation: The raising of an existing structure on fill or foundation elements, such as solid perimeter walls, piers, posts, columns, or pilings.



Elevation of home on an open foundation

NFIP and ASCE 24 Elevation Requirements



Example of A Zone requirement

Flood Design Class	Minimum Elevation
1	DFE
2	BFE+1 or DFE*
3	BFE+1 or DFE*
4	BFE+2 or DFE or 500-year flood elevation*

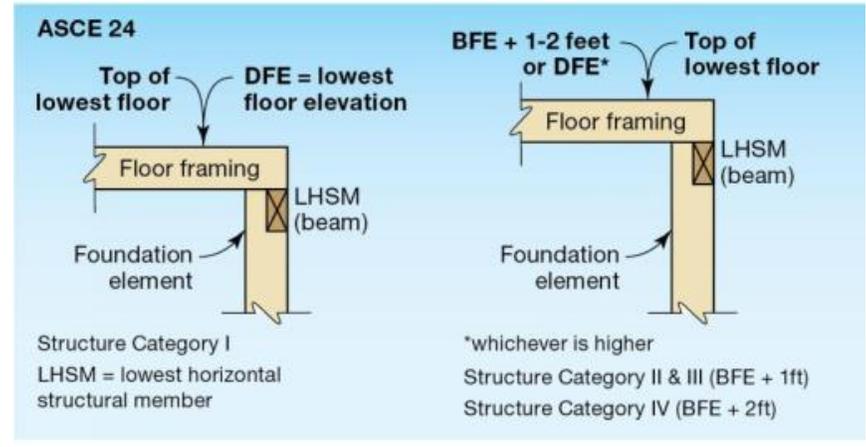
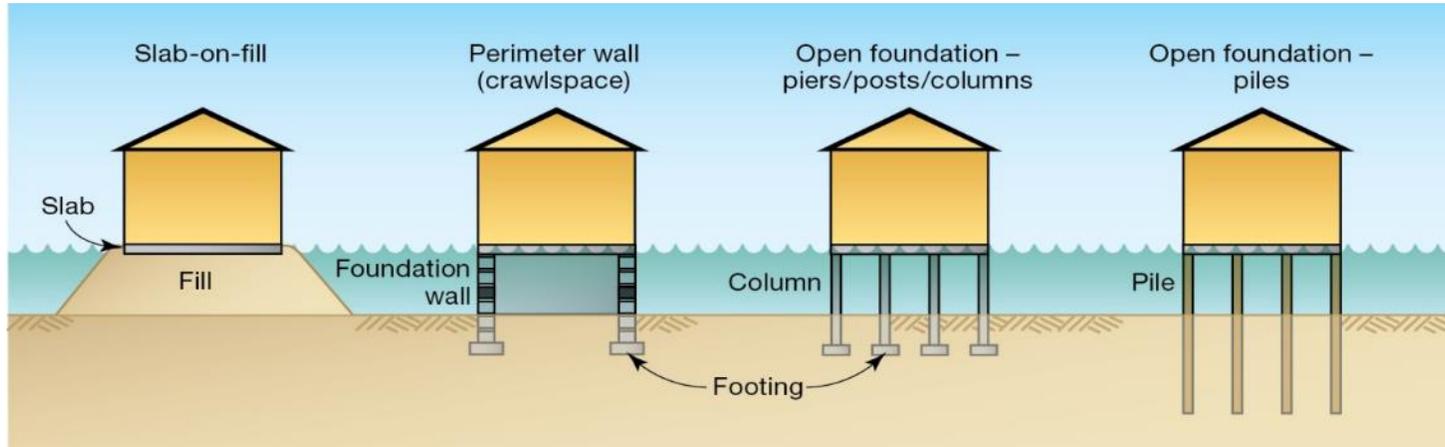
* Whichever elevation is higher

Applying ASCE 24 Requirements to Elevation Projects

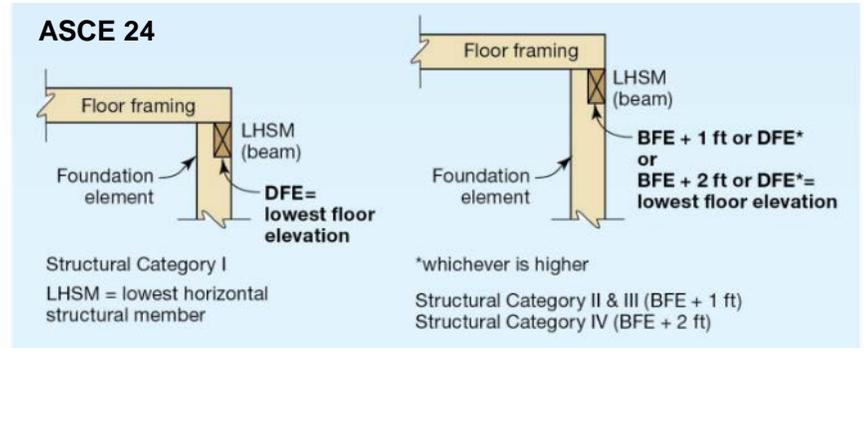
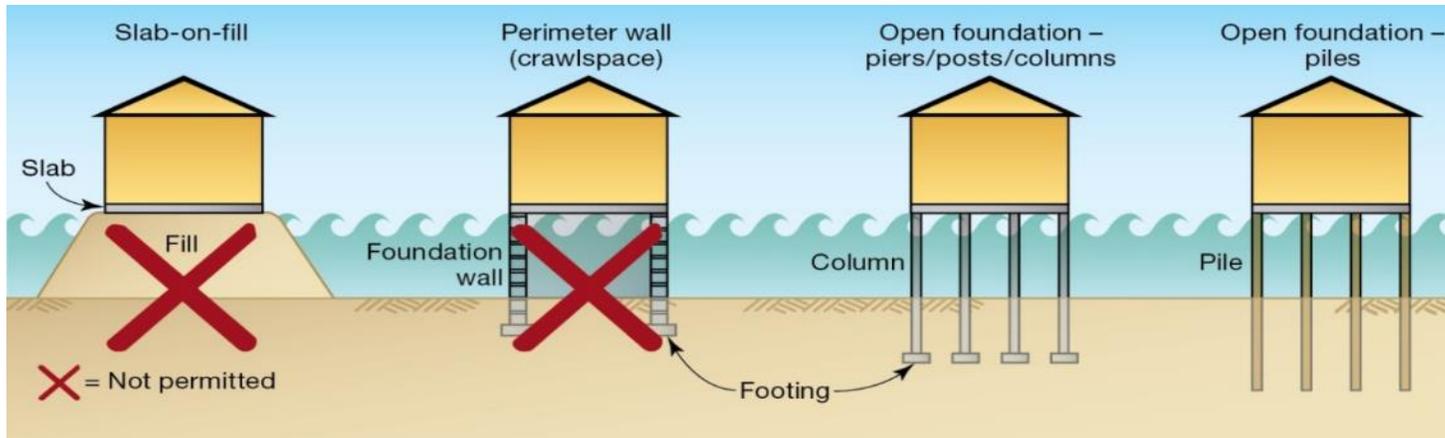
- Allowable foundation types and requirements will be dictated by the applicable flood zone
- Foundation designed/constructed to resist floatation, collapse, or lateral movement under design loads (applies only to foundation)
- If existing foundation is used then the design needs to verify that the used portions of the foundation will meet ASCE 24 requirements – this could be impacted based on flood zones
- Foundation walls must include flood openings
- All materials below the required elevation will need to meet NFIP Technical Bulletin 2
- All utilities below the required elevation will need to be elevated or protected

Allowable Foundation Types for Elevation

A Zones



V Zones and Coastal A Zones



Applying ASCE 24 Requirements to Mitigation Reconstruction

- **Definition:** Constructing a compliant building on the same site where an existing building has been partially or completely demolished or destroyed
 - Must meet NFIP and HMA general policy requirements
 - Must be designed to latest edition of International Codes
 - Now eligible for assistance under all HMA programs
 - Square footage no more than 10 percent greater than that of original structure
- ASCE 24 requirements **must be met in their entirety** as mitigation reconstruction qualifies as **new construction**

What is Dry Floodproofing?

Dry floodproofing: A combination of measures that results in a structure, including the attendant utilities and equipment, being watertight, with all elements substantially impermeable and with structural components having the capacity to resist flood loads.

Note: Dry floodproofing is not an allowable project type in High Risk Flood Hazard Areas, Coastal High Hazard Zones, and Coastal A Zones

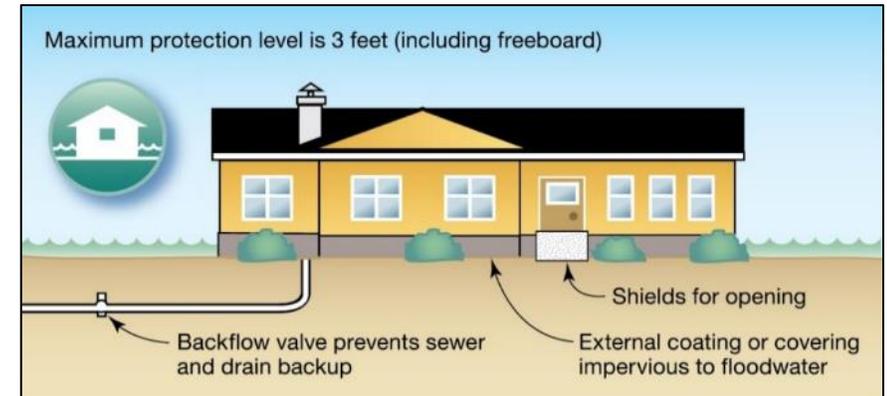


Figure 1-9, FEMA P-259



Applying ASCE 24 Requirements to Dry Floodproofing

- Must meet elevation requirements, flood zone restrictions, and flood velocity restrictions
- ASCE 24 materials requirements apply to all aspects of the protection
- A system that can render the floodproofed area “substantially impermeable” to floodwaters without the assistance of sump pumps
- Sump pumps shall provide a means to remove accumulated water
- Meet egress requirements of one exit door, window, or opening above the minimum elevation
- Meet flood warning time of 12 hours unless the community has a system with time for notification, travel time to site, installation time, and evacuation time.
- All removable covers and shields must meet flood load requirements
- Where shields and covers are used, have a flood emergency plan and approved by AHJ

Applying ASCE 24 Requirements to Dry Floodproofing

Strict compliance with ASCE 24 can be difficult with existing structures. Dry floodproofing provisions should be applied as follows:

- **Primarily Intended for:**
 - Nonresidential Buildings and nonresidential portions of mixed-use buildings
- **Protection of Building Utility Systems:**
 - Utility lines/systems within the floodproofed area will be protected.
 - Utility lines/sanitary systems **outside** dry floodproofed area must be protected.
- **Historic Residential Buildings (nonresidential capacity):**
 - Adhere to ASCE 24 provisions as closely as possible without compromising historic designation of building.
- **Historic Residential Buildings (residential capacity):**
 - Adhere to ASCE 24 provisions – pay attention to egress requirements from the dry floodproofed area.

ASCE 24 Applies to the Floodproofing Certificate

- Required by the NFIP and building codes for dry floodproofing projects
- Required for NFIP flood insurance
- It is **now** an “as-built” certification
- Required in Zone A for:
 - Non-residential structures
 - Portions of mixed-use buildings with all residential uses above the required level of protection
- Important for building owners to understand
- Requires compliance with ASCE 24

DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
**FLOODPROOFING CERTIFICATE
FOR NON-RESIDENTIAL STRUCTURES** OMB Control Number: 1660-0069
Expiration: 11/30/2018

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Privacy Act Statement

Authority: Title 44 CFR § 61.7 and 61.8.

Principal Purpose(s): This information is being collected for the primary purpose of estimating the risk premium rates necessary to provide flood insurance for new or substantially improved structures in designated Special Flood Hazard Areas.

Routine Use(s): The information on this form may be disclosed as generally permitted under 5 U.S.C. § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA-03 – National Flood Insurance Program Files System or Records Notice 73 Fed. Reg. 77747 (December 19, 2008); DHS/FEMA/NFIP/LOMA-1 – National Flood Insurance Program (NFIP) Letter of Map Amendment (LOMA) System of Records Notice 71 Fed. Reg. 7990 (February 15, 2006), and upon written request, written consent, by agreement, or as required by law.

Disclosure: The disclosure of information on this form is voluntary; however, failure to provide the information requested may result in the inability to obtain flood insurance through the National Flood Insurance Program or being subject to higher premium rates for flood insurance. Information will only be released as permitted by law.

Purpose of the Floodproofing Certificate for Non-Residential Structures

Under the National Flood Insurance Program (NFIP), the floodproofing of non-residential buildings may be permitted as an alternative to elevating to or above the Base Flood Elevation (BFE). A floodproofing design certification is required for non-residential structures that are floodproofed. This form is to be used for that certification.

A floodproofed building is a building that has been designed and constructed to be watertight (substantially impermeable to floodwaters) below the BFE and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. Before a floodproofed building is designed, numerous planning considerations, including flood warning time, uses of the building, mode of entry to and exit from the building and the site in general, floodwater velocities, flood depths, debris impact potential, and flood frequency, must be addressed to ensure that dry floodproofing will be a viable floodplain management measure.

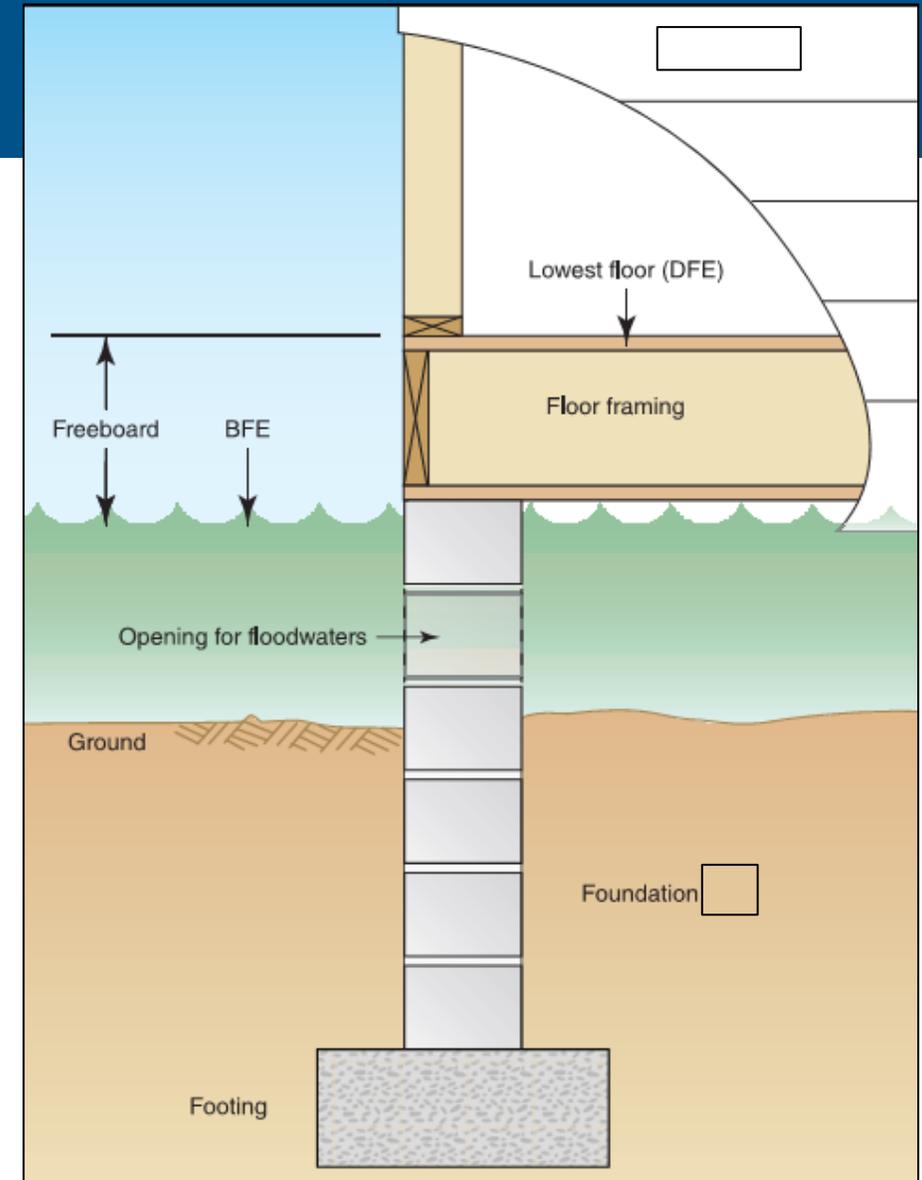
The minimum NFIP requirement is to floodproof a building to the BFE. However, when it is rated for flood insurance one-foot is subtracted from the floodproofed elevation. Therefore, a building has to be floodproofed to one foot above the BFE to receive the same favorable flood insurance rates as a building elevated to the BFE.

Additional guidance can be found in FEMA Publication 926, Floodproofing Non-Residential Buildings (2013), available on FEMA's website at <https://www.fema.gov/media-library/assets/documents/34770>.

FEMA Form 066-0-34 (6-15) Page 1 of 4

Benefits of Using ASCE 24

- Reduced building and building contents damage during a base flood event
- A factor of safety if changes in the floodplain increase flood heights
- Reduced time out of the house
- Potential for reduced flood insurance premiums
- Communities who adopt and enforce ASCE 24 can be eligible for Community Rating System (CRS) Credits



FEMA Resources

- Guidance for Applying ASCE 24 Engineering Standards to HMA Flood Retrofitting and Reconstruction Projects (2013)
- Highlights of ASCE 24-14 Flood Resistant Design and Construction (2015)
- Highlights of ASCE 24-05 Flood Resistant Design and Construction (2010)
- FEMA P-312 – *Homeowner’s Guide to Retrofitting* (2014)
- *FEMA P-259, Engineering Principles and Practices of Retrofitting Floodprone Residential Structures*, 3rd Edition (2012)
- FEMA P-55, *Coastal Construction Manual*, 4th Edition (2011)
- FEMA P-936 – *Floodproofing Non-Residential Buildings* (2013)
- FEMA NFIP Technical Bulletins

Questions?

FEMA Flood/Wind Building Science Helpline

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866-927-2104