

# Chapter 6: Investigating Regulatory Requirements

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# Investigating Regulatory Requirements

## 6.1 Introduction

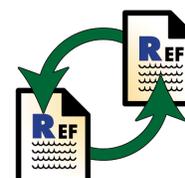
States and communities throughout the United States enforce regulatory requirements that determine where and how buildings may be sited, designed, and constructed. These requirements include those associated with regulatory programs established by Federal and state statutes, building codes and standards, and locally adopted floodplain management and land use ordinances and laws. Applicable regulatory programs include the National Flood Insurance Program (NFIP), which is intended to reduce the loss of life and damage caused by natural hazards, and programs established to protect wetlands and other wildlife habitat, which seek to minimize degradation of the environment. In addition, states and communities enforce requirements aimed specifically at the regulation of construction along the shorelines of oceans, bays, and lakes .

Federal, state, and local regulatory requirements can have a significant effect on the siting, design, construction, and cost of buildings. Therefore, designers, property owners, and builders engaged in residential construction projects in the coastal environment should conduct a thorough investigation to identify all regulations that may affect their properties and projects.

## 6.2 Land Use Regulations

State and local governments establish regulations for governing the development and use of land within their jurisdictions. The goal of these land use regulations is generally to promote sound physical, social, and economic development. The regulations take many forms – including zoning and floodplain management ordinances, subdivision regulations, utility codes, impact fees, historic preservation requirements, and environmental regulations – and they are often incorporated into and implemented under comprehensive or master plans developed by local jurisdictions in coordination with their state governments.

With land use regulations, communities can prohibit or restrict development in specified areas; they can also establish requirements for lot size, clearing and grading, and drainage, as well as the siting of buildings, floodplain management, construction of access roads, installation of utility lines, planting of vegetative cover, and other aspects of the land development and building construction processes. The land use regulations enacted and



### CROSS-REFERENCE

Appendix G, in Volume III of this manual, presents selected examples of how states and communities identify coastal hazard areas and regulate development in those areas.

enforced by state and local governments across the country vary in content and complexity according to the needs and concerns of individual jurisdictions; therefore, it is beyond the scope of this manual to list or describe specific regulations. Clearly, however, such regulations can have a significant impact on the construction and improvement of residential and other type of buildings in both coastal and non-coastal areas. Therefore, it is important that designers, builders, and property owners be aware of the regulations that apply to their projects.

The best sources of information about land use regulations are state and local planning, land management, economic development, building code, floodplain management, and community affairs officials. Professional organizations such as the American Planning Association (APA) and its state chapters are also excellent sources of information. Community officials may be interested in several recent APA projects and publications (described on the APA web site, <http://www.planning.org>):

- *Subdivision Design in Flood Hazard Areas* (Morris 1997), APA Planning Advisory Service Report Number 473. This report provides information and guidance on subdivision design appropriate for floodplain areas and includes several examples of state and local subdivision requirements in coastal floodplains. The report was prepared under a cooperative agreement with FEMA.
- *Modernizing State Planning Statutes: the Growing Smart<sup>sm</sup> Working Papers* (APA 1996), American Planning Advisory Service Report Number 462/463, and *Growing Smart<sup>sm</sup> Legislative Guidebook* (APA 1998). Growing Smart<sup>sm</sup> is a major initiative launched by the APA in 1994. The Project will result in a national planning statute clearinghouse and database of state legislative materials, and in model planning legislation and commentary. Chapter 7 of the document includes a model Natural Hazards Element for incorporation into local government comprehensive plans.
- *Planning for Post-Disaster Recovery and Redevelopment* (Schwab et al. 1998), APA Planning Advisory Service Report Number 483/484. This report provides all-hazards guidance for local planners. It includes a model ordinance for regulating hazard areas and includes case studies for five hazard scenarios (flood, hurricane, wildfire, earthquake, and tornado). The report includes a model Natural Hazards Element (taken from the *Growing Smart<sup>sm</sup> Legislative Guidebook*) for incorporation into local comprehensive plans. The report was prepared under a cooperative agreement with FEMA.



## WARNING

Designers and floodplain management officials are cautioned that hazard area identifications (including those on FIRMs) and associated development regulations can be rendered obsolete by a natural hazard event. Extreme care should be taken in siting and designing residential buildings in post-disaster situations.

### 6.3 Building Codes and Standards

Many states and communities regulate the construction of buildings by adopting and enforcing building codes and standards that affect how buildings are designed and constructed. Building codes set forth requirements for structural design, materials, fire safety, exits, natural hazard mitigation, sanitary facilities, light and ventilation, environmental control, fire protection, and energy conservation. The purpose of a code is to establish the minimum acceptable requirements necessary for protecting the public health, safety, and welfare in the built environment. Building codes apply primarily to new construction, but may also apply to existing buildings that are being rebuilt, rehabilitated, or modified. Codes may also apply when a building is undergoing a change of occupancy as defined by the code.

A standard is “a prescribed set of rules, conditions, or requirements concerned with the definition of terms; classification of components; delineation of procedures; specification of dimensions, materials, performance, design, or operations; descriptions of fit and measurement of size; or measurement of quality and quantity in describing materials, products, systems, services, or practices” (CABO 1997). There are hundreds of standards related to design and construction practices, and thousands of standards related to construction materials. When a standard is developed according to definitive rules of procedure and consensus, it may be incorporated into a building code by reference rather than by inclusion of all of the text of the standard in the code.

Most building codes in the United States are based on model building codes. Model building codes are the result of an effort begun early in the 20<sup>th</sup> century to produce a model law or guide document that could be adopted by a legislative body to reduce losses caused by fire and other hazards. Six model building codes are now used in the United States:

- *International Building Code (IBC)*, published by the International Code Council (ICC) (ICC 2000a)
- *International Residential Code for One- and Two-Family Dwellings (ICC)*, published by the International Code Council (ICC) (ICC 2000b)
- *Uniform Building Code (UBC)*, published by the International Conference of Building Officials (ICBO) (ICBO 1997)
- *The BOCA National Building Code*, published by Building Officials & Code Administrators International (BOCA) (BOCA 1996)
- *Standard Building Code (SBC)*, published by the Southern Building Code Congress International (SBCCI) (SBCCI 1997)
- *International One-and Two-Family Dwelling Code*, published by the Council of American Building Officials (CABO) (CABO 1998)



#### WARNING

The adoption and enforcement of building codes and standards is not consistent across the United States. Codes and standards in some states and communities may be more restrictive than those in others. In addition, some states and communities have not adopted any building codes or standards.



#### NOTE

For additional information about building codes and standards, refer to *An Introduction to Model Codes* (CABO 1997), published by the Council of American Building Officials, now the International Code Council (ICC).



jurisdictions, towns, and cities to have some form of regulatory control on the construction of housing. In the entire United States, about 4,400 political jurisdictions have adopted some type of building code.

The International Code Council (ICC) was formed to bring together the three model code groups—ICBO, BOCA, and SBCCI—under a unifying code body in support of common code development. Among the new codes developed by the ICC are the *International Building Code 2000* (ICC 2000a) (hereafter referred to as the IBC 2000), the *International Residential Code for One- and Two-Family Dwellings 2000* (ICC 2000b) (hereafter referred to as the IRC 2000). The IBC 2000 and the IRC 2000 both meet the minimum building science requirements of the NFIP regulations. Together, the IBC 2000 (with its Appendix G) and the IRC 2000 meet the minimum requirements of the NFIP regulations. Note that communities must adopt both codes to be compliant with the regulatory requirements of the NFIP. Also, the IRC 2000 and the IBC 2000 are both substantially equivalent to the National Earthquake Hazards Reduction Program 1997 *NEHRP Recommended Provisions for Seismic Regulations for New Buildings* (FEMA 1997).

At the time this manual went to print, many states and communities were considering adoption of the IBC 2000 and the IRC 2000. Thus many state and local building code requirements may change as a result. Variations from one state or jurisdiction to the next, coupled with potential code revisions, make it imperative that the designer work with local officials to identify the current codes, standards, and other construction requirements that apply. Even in states and communities that have not adopted the IBC 2000 and IRC 2000, designers may elect to use the new codes.

## 6.4 National Flood Insurance Program

### 6.4.1 Background

Congress created the NFIP in 1968 when it passed the National Flood Insurance Act. The NFIP, which is administered by FEMA, is a voluntary program whose goal is to reduce the loss of life and the damage caused by flooding, to help victims recover from floods, and to promote an equitable distribution of costs among those who are protected by flood insurance and the general public. It does this by:

- conducting flood hazard studies and providing each community with a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report, which present flood hazard information, including the boundaries of the Special Flood Hazard Area (SFHA) — the area subject to inundation by the flood that has a 1-percent probability of being equaled or exceeded in any given year — base flood elevations (BFEs), and flood insurance zones,



#### NOTE

The ICC has also developed mechanical, plumbing, and private sewage disposal codes, all of which are compliant with the applicable provisions of the NFIP regulations.



#### NOTE

Under the NFIP, **substantially damaged** and **substantially improved** buildings must meet the floodplain management requirements for new buildings. Damage to a building (regardless of the cause) is considered substantial damage if the cost of restoring the building to its before-damage condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. Similarly, an improvement of a building (such as reconstruction, rehabilitation, or addition) is considered a substantial improvement if its cost equals or exceeds 50 percent of the market value of the building before the start of construction of the improvement.

For more information, consult your local floodplain management officials or refer to *Answers to Questions About Substantially Damaged Buildings*, FEMA 213 (FEMA 1991).

- providing state and local agencies with technical assistance and funding in support of flood hazard mitigation,
- requiring participating communities to control construction so that new buildings, substantially improved buildings, and repaired substantially damaged buildings in the SFHA are in compliance with floodplain management ordinances and laws intended to eliminate or reduce flood damage,
- providing residents in participating communities with flood insurance so that the need for disaster relief is reduced,
- requiring the purchase of flood insurance as a condition of receiving Federal or federally related financial assistance for the acquisition and/or construction of buildings in SFHAs, and
- providing the means by which disaster assistance agencies and Federal lending regulatory agencies can fulfill their obligation to require that flood insurance be purchased for property in the SFHA that is securing a Federal or federally regulated loan or that has been the recipient of Federal disaster assistance.



### NOTE

In 1999, nearly 900 communities throughout the United States were receiving flood insurance premium discounts through the Community Rating System (CRS) as a result of implementing local mitigation, outreach, and educational activities that go beyond minimum NFIP requirements. For more information about the CRS, contact the NFIP Coordinating Agency for your state (see Appendix D) or the appropriate FEMA Regional Office (see Appendix C).

The NFIP operates through a partnership between the Federal Government, the states, and individual communities such as counties, parishes, and incorporated cities, towns, townships, boroughs, and villages. Participation in the NFIP is voluntary. In participating communities, affordable, federally backed flood insurance is made available to property owners and renters. In return, each community adopts and enforces a floodplain management ordinance or law, which it uses to define regulatory floodplains and control floodplain development, including new construction, substantial improvement of existing buildings, and repairs of substantially damaged buildings.

A participating community's floodplain management ordinance or law must, at a minimum, meet the requirements of the NFIP regulations, but FEMA encourages communities to establish additional or more stringent requirements as they see fit. In 1990, to provide incentives for communities to adopt more stringent requirements, FEMA established the NFIP Community Rating System (CRS), a program through which FEMA encourages and recognizes community floodplain management activities that exceed the minimum NFIP requirements. Under the CRS, flood insurance premium rates within participating communities are adjusted to reflect the reduced flood risk resulting from community activities that meet the three goals of the CRS: (1) reducing flood losses, (2) facilitating accurate insurance rating, and (3) promoting the awareness of flood insurance.

Through the CRS, communities are awarded credit points for carrying out floodplain management activities in the areas of public information, mapping

and regulations, flood damage reduction, and flood preparedness. The number of points awarded determines a community's CRS class (from 1 to 10), which, in turn, determines the amount of reduction in the flood insurance premium rates for structures within and outside the SFHA. Participation in the CRS is voluntary; any community compliant with the rules and regulations of the NFIP may apply for a CRS classification. In addition to helping communities obtain insurance premium discounts, the CRS promotes floodplain management activities that help save lives, reduce property damage, and promote sustainable, more livable communities.

As noted above, the regulatory requirements of the NFIP are based on the flood that has a 1-percent probability of being equaled or exceeded in any given year. The NFIP regulations refer to this flood as the "base flood." To provide communities with the information they need to enact and enforce floodplain management ordinances or laws compliant with the requirements of the NFIP, FEMA conducts flood hazard studies for communities throughout the United States and publishes the results in the form of FIRMs and FIS reports (see Section 3.3, in Chapter 3).

The information provided by FIS reports and FIRMs includes the names and locations of flooding sources; the sizes and frequencies of past floods; the limits of the SFHA in areas subject to riverine, lacustrine, and coastal flooding; flood insurance zone designations; and BFEs throughout the SFHA. With this information, communities can manage floodplain development and FEMA can establish insurance rates for houses and other buildings. Of particular importance for a coastal construction project are the BFE and the flood insurance zone designation at the building site. The following sections explain how BFEs and zone designations are determined for coastal flood hazard areas and how they affect coastal construction.

## 6.4.2 Determination of BFEs and Flood Insurance Zones in Coastal Flood Hazard Areas

### 6.4.2.1 Base Flood Elevations

To determine BFEs for areas affected by coastal flooding, FEMA computes 100-year stillwater elevations and then determines the maximum 100-year wave heights and, in some areas, the maximum 100-year wave runup, associated with those stillwater elevations (see Chapter 3). Stillwater elevations are the elevations of the water surface resulting solely from storm surge (i.e., the rise in the surface of the ocean due to the action of wind and the drop in atmospheric pressure associated with hurricanes and other storms.) Wave heights are the heights, above the wave trough, of the crests of wind-driven waves. Wave runup is the rush of wave water up a slope or structure.



### NOTE

A FIRM consists of one or more numbered panels that cover the geographic area of a community such as a city, town, or county. FIRMs that consist of two or more panels are accompanied by an index map that shows the layout of the panels. For more information about FIRMs, refer to FEMA's *Guide to Flood Maps*, FEMA 258 (FEMA 1995b).



### NOTE

A detailed discussion of the methodology for computing stillwater elevations, wave heights, and wave runup is beyond the scope of this manual. Refer to *Guidelines and Specifications for Wave Elevation Determination and V Zone Mapping* (FEMA 1995c) for more information.



### NOTE

Zones AE, VE, and X appear on FIRMs produced since the mid-1980's. On older FIRMs, the corresponding zones are A1-A30, V1-V30, and B or C, respectively.



### NOTE

As explained in Chapters 1 and 3, this manual defines an additional hazard zone—coastal A zone—which is not established by the NFIP regulations. As further explained in those chapters, the hazards in coastal A zones are greater than those in non-coastal A zones but less severe than those in V zones.



### NOTE

For more information about the NFIP and its minimum requirements, check with the appropriate NFIP State Coordinating Agency (see Appendix D) or FEMA Regional Office (see Appendix C).

The BFEs shown for coastal flood hazard areas on FIRMs are established not at the stillwater elevation, but at the maximum elevation of either the wave crest or the wave runup, whichever is greater. Whether the wave crest elevation or the wave runup elevation is greater depends primarily on upland topography. In general, wave crest elevations are greater where the upland topography is gentle, such as along most of the Gulf, southern Atlantic, and middle-Atlantic Coasts, and wave runup elevations are greater where the topography is steeper, such as along portions of the Great Lakes, northern Atlantic, and Pacific Coasts.

#### 6.4.2.2 Flood Insurance Zones

The insurance zone designations shown on FIRMs (see Chapter 3) indicate the magnitude and severity of flood hazards. The zone designations that apply to coastal flood hazard areas are listed below, in decreasing order of magnitude and severity.

**Zones VE, V1–V30, and V** – These zones, collectively referred to as V zones, identify the Coastal High Hazard Area, which is the portion of the SFHA that extends from offshore to the inland limit of a primary frontal dune along an open coast and any other portion of the SFHA that is subject to high-velocity wave action from storms or seismic sources. V zones are generally based on wave heights (3 feet or greater) or wave runup depths (3 feet or greater).

**Zones AE, A1–A30, AO, and A** – These zones, collectively referred to as A zones, identify portions of the SFHA that are not within the Coastal High Hazard Area. Although both A zones and V zones designate areas at risk from a flood of the same magnitude, the hazard in V zones is greater because of the presence of breaking waves with heights equal to or greater than 3 feet. It is important to note that FIRMs use Zones AE, A1-A30, AO, and A to designate both coastal and non-coastal SFHAs, and that the regulatory requirements of the NFIP are the same for buildings in coastal and non-coastal A zones. However, buildings in coastal A zones may be subject to breaking waves with heights less than 3 feet and wave runup with depths less than 3 feet.

**Zones X, B, and C** – These zones identify areas outside the SFHA. Zone B and shaded Zone X identify areas subject to inundation by the flood that has a 0.2-percent probability of being equaled or exceeded during any given year. This flood is often referred to as the 500-year flood. Zones C and unshaded Zone X identify areas above the level of the 500-year flood.

#### 6.4.3 Minimum Regulatory Requirements Imposed by Communities Participating in the NFIP

The floodplain management ordinances or laws adopted by communities that participate in the NFIP are based, in part, on the minimum NFIP regulatory requirements set forth at Title 44, Chapter 1, Section 60.3 of the U.S. Code of

Federal Regulations (44 CFR 60.3). Community floodplain management ordinances and laws include requirements concerning the following types of buildings in the SFHA, including those in both A zones and V zones: newly constructed buildings, substantially damaged buildings (see NOTE on page 6-5), and substantially improved buildings (see NOTE on page 6-5). Additional requirements apply to new subdivisions and other development in the SFHA.

The **minimum** NFIP regulatory requirements regarding newly constructed, substantially damaged, and substantially improved buildings affect primarily the **type of foundation** allowed, the required **height of the lowest floor**, the **installation of building utility systems**, the **use of flood-resistant materials**, and the **use of the area below the lowest floor**. In recognition of the greater hazard posed by breaking waves 3 feet high or higher, FEMA has established minimum NFIP regulatory requirements for V-zone buildings that are more stringent than the minimum requirements for A-zone buildings. Therefore, the location of a building in relation to the A-zone/V-zone boundary on a FIRM can affect the design of the building. In that regard, it is important to note that **a building or other structure that has any portion of its foundation in a V zone must be built to comply with V-zone requirements**. The following sections summarize the minimum NFIP regulatory requirements. (For the exact wording of the regulations, refer to Title 44, Chapter I, of the CFR.) Section 6.4.3.1 describes the minimum requirements that apply throughout the SFHA. Sections 6.4.3.2 and 6.4.3.3 describe requirements specific to A zones and V zones, respectively.

#### 6.4.3.1 Minimum Requirements for All Buildings in All SFHAs

The **minimum** floodplain management requirements applied in **all** SFHAs by communities participating in the NFIP affect buildings, subdivisions and other new development, new and replacement water supply systems, and new and replacement sanitary sewage systems. These requirements, set forth at 44 CFR 60.3(a) and (b), can be summarized as follows:

##### **Newly Constructed , Substantially Damaged, and Substantially Improved Buildings in the SFHA**

- Building sites must be reasonably safe from flooding.
- Buildings must be:
  - designed (or modified) and anchored to prevent flotation, collapse, and lateral movement of the building resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,
  - constructed with materials resistant to damage from immersion in flood waters,
  - constructed with methods and practices that minimize flood damage, and



### NOTE

Under the NFIP, the “lowest floor” of a building includes the floor of a basement. The NFIP regulations define a basement as “... any area of a building having its floor subgrade (below ground level) on all sides.” For insurance rating purposes, this definition applies even when the subgrade floor is not enclosed by full-height walls, such as in a subgrade parking area under a building elevated on an open foundation. Refer to *Below-Grade Parking Requirements for Buildings Located in Special Flood Hazard Areas*, NFIP Technical Bulletin 6 (FEMA 1993a) (see Appendix H).



### WARNING

Communities participating in the NFIP are encouraged to adopt and enforce floodplain management ordinances or laws that include requirements more stringent than the minimum requirements of the NFIP regulations. For example, some states and communities require that buildings be elevated **above** rather than simply to the BFE. The additional elevation required is referred to as “free-board” (see Figure 6-4). Check with local floodplain managers and building officials concerning such requirements.



## WARNING

This manual does not cover manufactured housing. For NFIP requirements concerning manufactured housing, refer to Section 60.3 of the NFIP regulations.



## WARNING

In addition to the floodplain management requirements discussed in this manual, the NFIP regulations include requirements specific to floodplains along rivers and streams. Because this manual focuses on the construction of residential buildings in coastal areas, it does not discuss these additional requirements. For more information about these requirements, consult local floodplain management officials. Also refer to *Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings*, FEMA 259 (FEMA 1995a).

- constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within their components during conditions of flooding.

- If FEMA has not provided BFE data on the FIRM, the community must obtain and reasonably use any BFE data available from other sources for the purpose of regulating construction in Zone A.

### Subdivisions and Other New Development in the SFHA

- All proposals for subdivisions and other new development in the SFHA must be consistent with the need to minimize flood damage within the floodprone area.
- All public utilities and facilities, such as sewer, gas, electrical, and water systems for such subdivisions and other new developments must be located and constructed to minimize or eliminate flood damage.
- Adequate drainage must be provided for all such subdivisions and new developments in order to reduce exposure to flood hazards.
- All proposals for subdivisions and other new developments greater than 50 lots or 5 acres, whichever is less, in an SFHA for which no BFEs are shown on the effective FIRM must be accompanied by 100-year flood elevation data.

### New and Replacement Water Supply Systems in the SFHA

- New and replacement water supply systems within the SFHA must be designed to minimize or eliminate infiltration of flood waters.

### New and Replacement Sanitary Sewage Systems in the SFHA

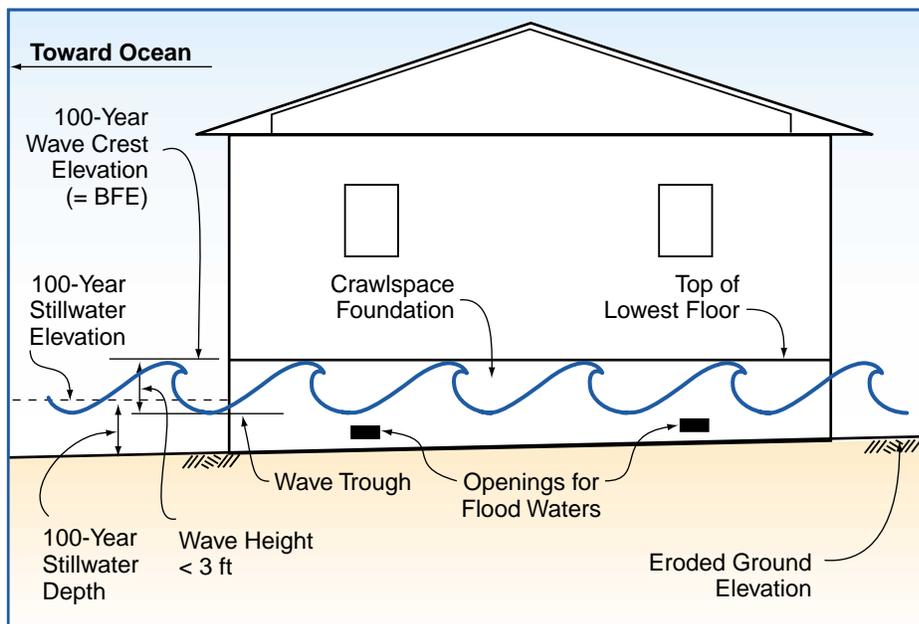
- New and replacement sanitary sewage systems in the SFHA must be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.
- On-site waste disposal systems must be located to avoid impairment to them or contamination from them during flooding.

#### 6.4.3.2 Additional Minimum Requirements for Buildings in A Zones

The additional **minimum** requirements specific to buildings in Zones AE, A1-A30, AO, and A pertain to (1) the elevation of the lowest floor, including basement, in relation to the BFE or the depth of the 100-year flood and (2) enclosed areas below the lowest floor. Note that these requirements are the same for coastal and non-coastal A zones.

#### Building Elevation in Zones AE and A1-A30

The top of the lowest floor, including the basement floor, of all newly constructed, substantially damaged, and substantially improved buildings must be at or above the BFE (see Figure 6-2).



**Figure 6-2**  
**Minimum NFIP A-zone requirements:** The lowest floors of buildings in Zones AE, A1-A30, and A must be at or above the BFE. Foundation walls below the BFE must be equipped with openings that allow the entry of flood waters so that interior and exterior hydrostatic pressures can equalize.



For new, substantially damaged, and substantially improved **non-residential** buildings in A zones, the NFIP regulations allow dry-floodproofing as an alternative to elevating the lowest floor to or above the BFE or base flood depth. Dry-floodproofing refers to making the portion of a building below the BFE or base flood depth watertight, with walls substantially impermeable to the passage of water and with structural components capable of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy. The design, specifications, and construction plans for all dry-floodproofing projects must be certified by a registered professional engineer or architect. Additional information is available in *Non-Residential Floodproofing — Requirements and Certification for Buildings Located in Special Flood Hazard Areas*, FEMA’s NFIP Technical Bulletin 3 (FEMA 1993d).

### Building Elevation in Zone A

FIRMs do not present BFEs in SFHAs designated Zone A (i.e. unnumbered A zones). The lowest floors of buildings in Zone A must be elevated to or above the BFE whenever BFE data are available from other sources. If no BFE data are available, communities must ensure that the building is constructed with methods and practices that minimize flood damage.

### Building Elevation in Zone AO

Zone AO designates areas where flooding is characterized by shallow depths (averaging 1–3 feet) and/or unpredictable flow paths. In Zone AO, the top of the lowest floor, including the basement floor, of all newly constructed, substantially damaged, and substantially improved buildings must be above the highest grade adjacent to the building by at least the depth of flooding in feet shown on the FIRM. For example, if the flood depth shown on the FIRM is 3 feet, the top of the lowest floor must be at least 3 feet above the highest grade adjacent to the building. If no depth is shown on the FIRM, the minimum required height above the highest adjacent grade is 2 feet.

Note that areas adjacent to V zones—behind bulkheads or on the back sides of dunes—are sometimes designated Zone AO. For these areas, this manual encourages the use of open foundations, as required in V zones (see Section 6.4.3.3), in Zone AO.



### NOTE

For more information about openings requirements for the walls of enclosures below the lowest floors of buildings in A zones, refer to *Openings in Foundation Walls for Buildings Located in Special Flood Hazard Areas*, FEMA NFIP Technical Bulletin 1 (FEMA 1993e) (see Appendix H).



### WARNING

Even waves less than 3 feet high can impose large loads on foundation walls. This manual recommends that buildings in coastal A zones be designed and constructed to meet V-zone requirements (see Section 6.5.2 and Chapter 11).

### Enclosures Below the Lowest Floor in Zones AE, A1-A30, AO, and A

Enclosed space below the lowest floors of newly constructed, substantially damaged, and substantially improved buildings may be used only for parking of vehicles, access to the building, or storage. The walls of such areas must be equipped with openings designed to allow the automatic entry and exit of flood waters so that interior and exterior hydrostatic pressures will equalize during flooding. Designs for openings must either meet or exceed the following minimum criteria:

1. A minimum of two openings with a total net area of not less than 1 in<sup>2</sup> for every 1 ft<sup>2</sup> of enclosed area subject to flooding must be provided.
2. The bottoms of all openings must be no higher than 1 foot above grade.
3. The openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of flood waters.

An alternative to meeting criterion 1 is to provide a certification by a registered engineer or architect that states that the openings are designed to automatically equalize hydrostatic forces on exterior walls by allowing the entry and exit of flood waters. Even if such a certification is provided, however, the openings must still meet criteria 2 and 3 above.

#### 6.4.3.3 Additional Minimum Requirements for Buildings in V Zones

The additional **minimum** requirements enforced by participating communities regarding newly constructed buildings, substantially damaged buildings, and substantially improved buildings in Zones VE, V1-V30, and V pertain to the **siting** of the building, the **elevation of the lowest floor** in relation to the BFE, the **foundation design, enclosures below the BFE**, and **alterations of sand dunes and mangrove stands** (refer to 44 CFR 60.3(d)).

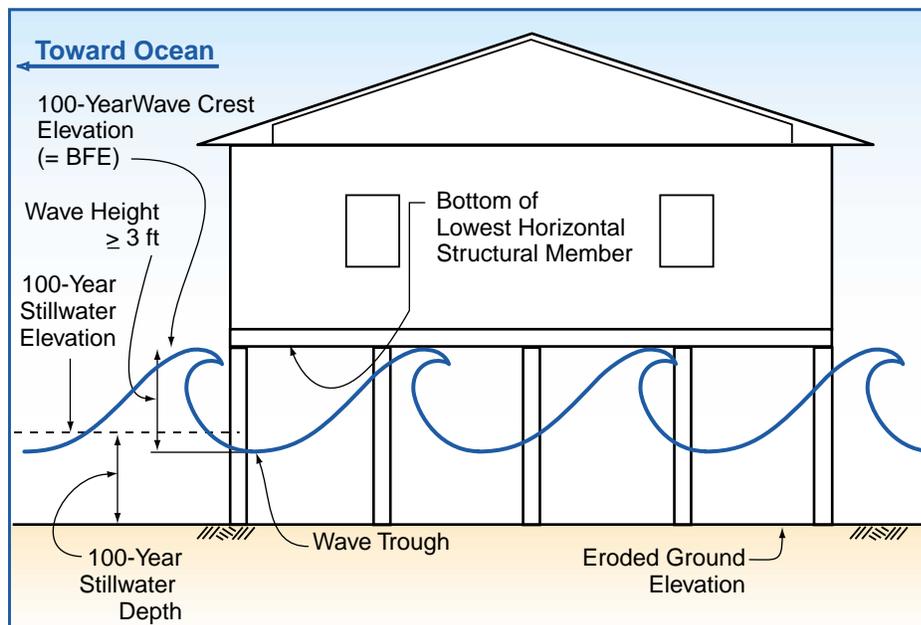
#### Siting

All newly constructed buildings must be located landward of the reach of mean high tide (i.e., the mean high water line). In addition, manmade alterations of sand dunes or mangrove stands are prohibited if those alterations would increase potential flood damage. Removing sand or vegetation from, or otherwise altering, a sand dune or removing mangroves may increase potential flood damage; therefore, such actions must not be carried out without the prior approval of a local official.

#### Building Elevation

All newly constructed, substantially damaged, and substantially improved buildings must be **elevated on pilings, posts, piers, or columns so that the**

bottom of the lowest horizontal structural member of the lowest floor (excluding the vertical foundation members) is at or above the BFE (see Figure 6-3).



**Figure 6-3**  
**Minimum NFIP V-zone requirements:** In V zones, buildings must be elevated on an open foundation (e.g., pilings, posts, piers, or columns) so that the bottom of the lowest horizontal structural member is at or above the BFE.

### Foundation Design

The piling or column foundations for all newly constructed, substantially damaged, and substantially improved buildings, as well as the buildings attached to the foundations, must be anchored to resist flotation, collapse, and lateral movement due to the effects of wind and water loads acting simultaneously on all components of the building. **A registered engineer or architect must develop or review the structural design, construction specifications, and plans for construction and must certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the building elevation and foundation design standards** described above.

In addition, **erosion control structures and other structures such as bulkheads, seawalls, and retaining walls may not be attached to the building or its foundation.**

### Use of Fill

**Fill may not be used for the structural support of any building within Zones VE, V1-V30, and V.** Fill may be used in V zones for minor landscaping and site drainage purposes (consult local officials for specific guidance or requirements).



### NOTE

For more information about the use of fill in V zones, refer to *Free of Obstructions Requirements for Buildings Located in Coastal High Hazard Areas*, FEMA NFIP Technical Bulletin 5 (FEMA 1993c) (see Appendix H).



## NOTE

For more information about enclosures, the use of space below elevated buildings, and breakaway walls, refer to Section 12.4.6, 12.6.2, and 12.8 of this manual and to the following FEMA NFIP Technical Bulletins (see Appendix H):

*Design and Construction Guidance for Breakaway Walls for Structures Located in Coastal High Hazard Areas*, NFIP Technical Bulletin 9 (FEMA 1999a)

*Flood-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas*, NFIP Technical Bulletin 2 (FEMA 1993b)

*Free-Of-Obstruction Requirements for Buildings Located in Coastal High Hazard Areas*, NFIP Technical Bulletin 5 (FEMA 1993c).



## WARNING

Although the NFIP regulations permit below-BFE enclosures that meet the criteria presented here, many communities may have adopted ordinances that prohibit all such enclosures or that establish more stringent criteria, such as an enclosure size limitation. Check with local officials about such requirements.

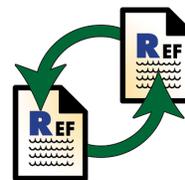
## Space Below the BFE

The space below all newly constructed, substantially damaged, and substantially improved buildings must either be **free of obstructions** or enclosed only by non-supporting **breakaway walls**, open wood **latticework**, or **insect screening** intended to collapse under water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or the supporting foundation system. Furthermore, there are specific NFIP requirements regarding **permitted uses** below the BFE, use of **flood-damage-resistant materials** below the BFE, and placement of **mechanical/utility equipment** below the BFE. These requirements have been developed over the years, based on damage to thousands of structures during many flood events—they should not be ignored by the designer, contractor, or owner. Failure to comply with not only these requirements not only violates the local floodplain management ordinance and NFIP regulations, but can also lead to large, uninsured losses.

The current NFIP regulatory requirements regarding breakaway walls are set forth at 44CFR 60.3(e)(5). The regulations specify a design safe loading resistance for breakaway walls of not less than 10 lb/ft<sup>2</sup> and not more than 20 lb/ft<sup>2</sup>. However, the regulations also provide for the use of alternative designs that do not meet the specified loading requirements. In general, breakaway walls built according to such designs are permitted if a registered professional engineer or architect certifies that the walls will collapse under a water load less than that which would occur during the base flood and that the elevated portion of the building and supporting foundation system will not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all components of the building. Additional requirements apply to the use of an enclosed area below the BFE—it may be used only for parking, building access, or storage, and it must be constructed of flood-resistant materials.

The current NFIP regulations do not provide specifications or other detailed guidance for the design and construction of alternative types of breakaway walls. However, the results of recent research conducted for FEMA and the National Science Foundation by North Carolina State University (NCSSU) and Oregon State University (OSU), including full-scale tests of breakaway wall panels, provide the basis for prescriptive criteria for the design and construction of breakaway wall panels that do not meet the requirement for a loading resistance of 10-20 lb/ft<sup>2</sup>. These criteria are presented in *Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings*, FEMA NFIP Technical Bulletin 9 (FEMA 1999a). The criteria address breakaway wall construction materials, including wood framing, light-gauge steel framing, and masonry; attachment of the walls to floors and foundation members; utility lines; wall coverings such as interior and

exterior sheathing, siding, and stucco; and other design and construction issues. In addition, the bulletin describes the results of the NCSU-OSU tests. The test results are described in greater detail in *Behavior or Breakaway Walls Subjected to Wave Forces: Analytical and Experimental Studies* (Tung et al. 1999).



### CROSS-REFERENCE

See Section 12.4.6 for information on the construction of breakaway wall enclosures.

## 6.5 Recommendations for Exceeding Minimum NFIP Regulatory Requirements

Section 6.4 describes the minimum requirements of the NFIP regulations concerning buildings in A zones and V zones. This section presents recommendations for exceeding NFIP minimum requirements. These recommendations address the significant hazards present in coastal A zones and V zones and are aimed at increasing the ability of coastal residential buildings to withstand natural hazard events. Table 6.1, presented at the end of this section, summarizes the NFIP requirements and the recommendations of this manual regarding buildings in A zones, coastal A zones, and V zones.

### 6.5.1 Non-Coastal A Zones

Recommendations for the design and construction of buildings in non-coastal A zones are not within the scope of this manual. Designers seeking guidance regarding good practice for the design and construction of such buildings should consult local floodplain management, building, or code officials. Additional guidance can be found in *Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings*, FEMA 259 (FEMA 1995a); the IBC 2000 (ICC 2000a) and IRC 2000 (ICC 2000b); and FEMA's NFIP Technical Bulletin Series (see Appendix H for copies of Technical Bulletins).

### 6.5.2 Coastal A Zones and V Zones

As explained in Chapters 1 and 3 of this manual, the NFIP regulations do not differentiate between coastal and non-coastal A zones. Because coastal A zones may be subject to the types of hazards present in V zones, such as wave effects, velocity flows, erosion, scour, and high winds, **this manual recommends that buildings in coastal A zones meet the NFIP regulatory requirements for V-zone buildings** (i.e., the performance requirements concerning resistance to flotation, collapse, and lateral movement and the prescriptive requirements concerning elevation, foundation type, engineering certification of design and construction, enclosures below the BFE, and use of structural fill—see Section 6.4.3.3).

To provide a greater level of protection against the hazards in coastal A zones and V zones, this manual recommends the following as good practice for the siting, design, and construction of buildings in those zones:

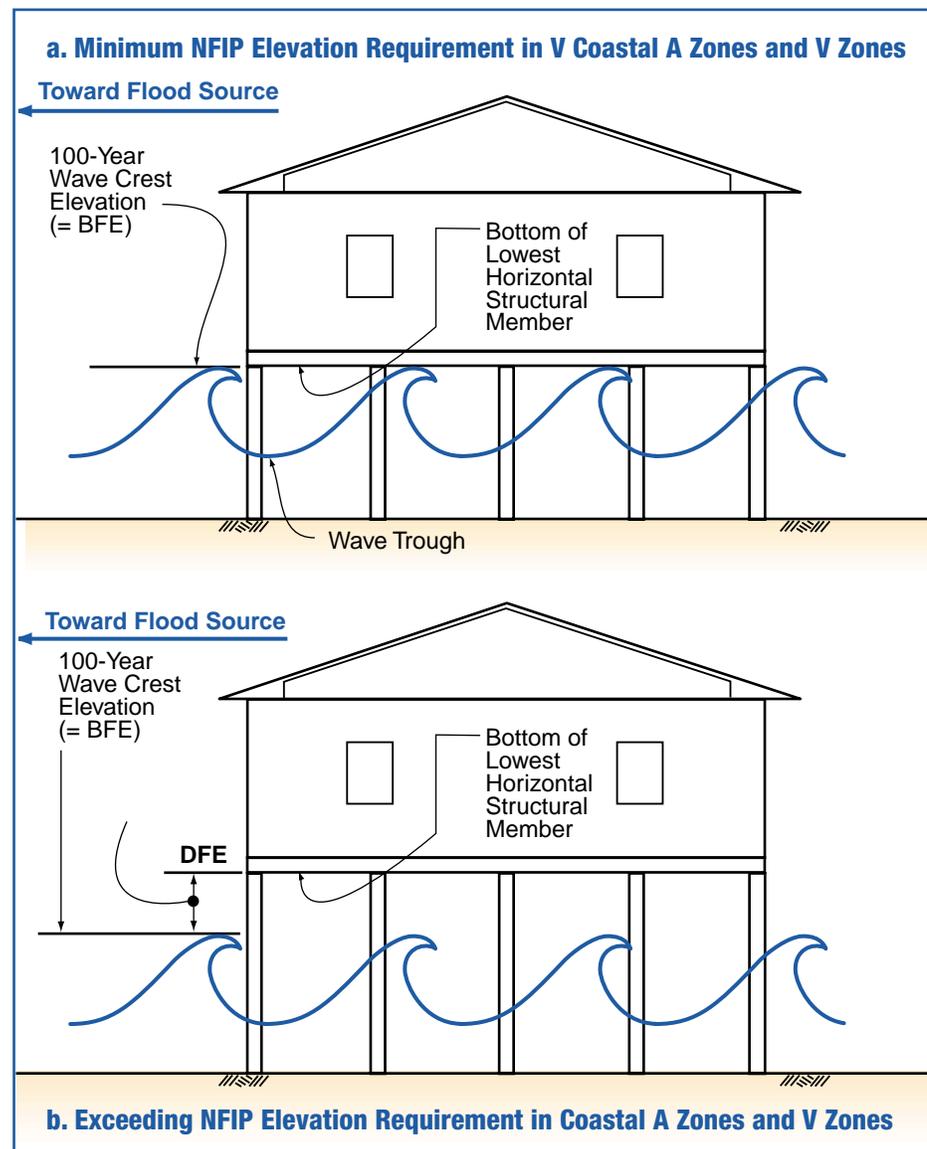
- The building should be located landward of both the long-term erosion setback and the limit of 100-year storm erosion, rather than simply landward of the reach of mean high tide.
- The bottom of the lowest horizontal structural member should be elevated **above**, rather than **to**, the BFE (i.e., provide freeboard—see Figure 6-4).
- Open latticework or screening should be used in lieu of breakaway walls in the space below the elevated building, or, at a minimum, the use of solid breakaway wall construction should be minimized.

**Figure 6-4**  
**Recommended elevation for buildings in coastal A zones and V zones:** The bottom of the lowest horizontal structural member should be above the BFE (rather than elevated to the BFE as shown in Figure 6-3). The additional amount of elevation above the BFE is referred to as *freeboard*. In V zones, the lowest horizontal structural members should be perpendicular to the expected wave crest.



### NOTE

To determine whether state coastal zone management regulations apply to a specific property, the designer or property owner should consult community officials or the appropriate state coastal zone management agency (see Appendix E, in Volume III of this manual).



In V zones, the lowest horizontal structural members should be oriented perpendicular to the expected wave crest.

### 6.5.3 Summary

Table 6.1 Summarizes NFIP regulatory requirements for A, coastal A, and V zones, and recommendations for exceeding the requirements. Because the table occupies four pages, the notes are presented twice—here and at the end of the table.

**Table 6.1** Summary of NFIP Regulatory Requirements and Recommendations for Exceeding the Requirements

Notes	
a	“Prohibited” and “Allowed” refer to the minimum NFIP regulatory requirements; individual states and communities may enforce more stringent requirements that supersede those summarized here. <b>Exceeding minimum NFIP requirements will provide increased flood protection and may result in lower flood insurance premiums.</b>
b	In this column, “TB” means NFIP Technical Bulletin (e.g., TB 1 = Technical Bulletin 1), and “CFR” means the U.S. Code of Federal Regulations. Refer to Appendix H for copies of the bulletins cited here.
c	Some communities may allow encroachments to cause a 1-foot rise in the flood elevation, while others may allow no rise.
d	Some coastal communities require open foundations in A zones.
e	Bottom of lowest horizontal structural member must be at or above the BFE.
f	State or community may regulate to a higher elevation (DFE).
g	Some coastal communities prohibit breakaway walls and allow only open lattice or screening.
h	If an area below the BFE in an A-zone building is fully enclosed by breakaway walls, the walls must meet the requirement for openings that allow equalization of hydrostatic pressure.
i	Placement of nonstructural fill adjacent to buildings in coastal AO zones is not recommended.
j	There are some differences between what is permitted under floodplain management regulations and what is covered by NFIP flood insurance. Building designers should be guided by floodplain management requirements, not by flood insurance policy provisions. See Section 9.3.1.1, in Chapter 9, for additional information.
k	Walls below BFE must be designed and constructed as breakaway walls that meet the minimum requirements of the NFIP regulations (see Section 6.4.3.3).

**Table 6.1** Summary of NFIP Regulatory Requirements and Recommendations for Exceeding the Requirements (continued)

			
	V Zone	Coastal A Zone	A Zone
	Guidance <sup>a</sup>  X-ref <sup>b</sup>	Guidance <sup>a</sup>  X-ref <sup>b</sup>	Guidance <sup>a</sup>  X-ref <sup>b</sup>
General Requirements			
<b>Design</b>	<p><b>Requirement:</b> building and its foundation must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement due to <b>simultaneous wind and water loads</b></p> <p>Section 6.4.3.3</p>	<p><b>Requirement:</b> building must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy</p> <p><b>Recommendation:</b> same as V zone</p> <p>Section 6.4.3.1</p>	<p><b>Requirement:</b> building must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy</p> <p>Section 6.4.3.1</p>
<b>Materials</b>	<p><b>Requirement:</b> structural and nonstructural building materials at or below the BFE must be flood-resistant</p> <p>Section 6.4.3.1 <b>TB2</b> (see Appendix H)</p>	<p><b>Requirement:</b> structural and nonstructural building materials at or below the BFE must be flood-resistant</p> <p>Section 6.4.3.1 <b>TB2</b> (see Appendix H)</p>	<p><b>Requirement:</b> structural and nonstructural building materials at or below the BFE must be flood-resistant</p> <p>Section 6.4.3.1 <b>TB2</b> (see Appendix H)</p>
<b>Construction</b>	<p><b>Requirement:</b> building must be constructed with methods and practices that minimize flood damage</p> <p>Section 6.4.3.1</p>	<p><b>Requirement:</b> building must be constructed with methods and practices that minimize flood damage</p> <p>Section 6.4.3.1</p>	<p><b>Requirement:</b> building must be constructed with methods and practices that minimize flood damage</p> <p>Section 6.4.3.1</p>
<b>Siting</b>	<p><b>Requirement:</b> all new construction shall be landward of mean high tide; alteration of sand dunes and mangrove stands that increases potential flood damage is prohibited</p> <p><b>Recommendation:</b> site new construction landward of the long-term erosion setback and landward of the area subject to erosion during the 100-year coastal flood event</p> <p>Section 6.4.3.3 CFR 60.3(e)(3) and 60.3(e)(7)</p> <p>Section 6.5.2 Section 7.5 Chapter 8</p>	<p><b>Requirement:</b> encroachments into the SFHA are permitted as long as they do not increase the BFE by more than 1 foot<sup>c</sup>; encroachments into the floodway are prohibited</p> <p><b>Recommendation:</b> same as V zone</p> <p>CFR 60.3(c)(10)</p> <p>Section 6.5.2 Section 7.5 Chapter 8</p>	<p><b>Requirement:</b> encroachments into the SFHA are permitted as long as they do not increase the BFE by more than 1 foot<sup>c</sup>; encroachments into the floodway are prohibited</p> <p>CFR 60.3(c)(10)</p>

**Table 6.1** Summary of NFIP Regulatory Requirements and Recommendations for Exceeding the Requirements (continued)

						
	<b>V Zone</b>		<b>Coastal A Zone</b>		<b>A Zone</b>	
	<b>Guidance<sup>a</sup></b>	 <b>X-ref<sup>b</sup></b>	<b>Guidance<sup>a</sup></b>	 <b>X-ref<sup>b</sup></b>	<b>Guidance<sup>a</sup></b>	 <b>X-ref<sup>b</sup></b>
<b>Foundation</b>						
<b>Structural Fill</b>	<b>Prohibited</b>	Section 6.4.3.3 TB5 (see Appendix H)	<b>Allowed, but not recommended;</b> compaction required where used; protect against scour and erosion <sup>d</sup>	Section 6.5.2	<b>Allowed;</b> compaction required where used; protect against scour and erosion <sup>d</sup>	
<b>Solid Foundation</b>	<b>Prohibited</b>	Section 6.4.3.3 TB5 (see Appendix H)	<b>Allowed, but not recommended<sup>d</sup></b>	Section 6.5.2	<b>Allowed<sup>d</sup></b>	
<b>Open Foundation</b>	<b>Required</b>	Section 6.4.3.3 TB5 (see Appendix H)	<b>Not required, but recommended<sup>d</sup></b>	Section 6.5.2	<b>Allowed<sup>d</sup></b>	
<b>Lowest Floor Elevation</b>	<b>Not Applicable<sup>e</sup></b>		<b>Requirement:</b> top of floor must at or above BFE <sup>f</sup> <b>Recommendation:</b> elevate bottom of lowest horizontal structural member to or above BFE <sup>f</sup> (see next category below); orient member perpendicular to wave crest	Section 6.4.3.2	<b>Requirement:</b> top of floor must at or above BFE <sup>f</sup>	Section 6.4.3.2
<b>Bottom of Lowest Horizontal Structural Member</b>	<b>Requirement:</b> bottom must at or above BFE <sup>f</sup>	Section 6.4.3.3 TB5 (see Appendix H)	<b>Allowed below BFE<sup>f</sup>, but not recommended</b> <b>Recommendation:</b> same as V zone	Section 6.5.2	<b>Allowed below BFE<sup>f</sup>, but not recommended</b> <b>Recommendation:</b> same as V zone	
<b>Orientation of Lowest Horizontal Structural Member</b>	No requirement <b>Recommendation:</b> orient perpendicular to wave crest	Section 6.5.2	No requirement		No requirement	
<b>Freeboard</b>	<b>Not required<sup>f</sup>, but recommended</b>	Section 6.5.2	<b>Not required<sup>f</sup>, but recommended</b>	Section 6.5.2	<b>Not required<sup>f</sup>, but recommended</b>	

**Table 6.1** Summary of NFIP Regulatory Requirements and Recommendations for Exceeding the Requirements (continued)

			
	<b>V Zone</b>	<b>Coastal A Zone</b>	<b>A Zone</b>
	<b>Guidance<sup>a</sup></b>	<b>Guidance<sup>a</sup></b>	<b>Guidance<sup>a</sup></b>
	 <b>X-ref<sup>b</sup></b>	 <b>X-ref<sup>b</sup></b>	 <b>X-ref<sup>b</sup></b>
<b>Enclosures Below The BFE</b>			
(Also see CERTIFICATION)	<b>Prohibited</b> , except for breakaway walls, open lattice, and screening <sup>g</sup>  <b>Recommendation:</b> if constructed, use open lattice or screening instead of breakaway walls	Section 6.4.3.3  <b>TB5 &amp; TB9</b> (see Appendix H)  Allowed, but <b>not recommended</b> ; if an area is fully enclosed, the enclosure walls must be equipped with openings to equalize hydrostatic pressure; size, location, and covering of openings governed by regulatory requirements  <b>Recommendation:</b> if enclosure is constructed, use breakaway walls, open lattice, or screening (as required in V zone) <sup>g,h</sup>	Section 6.5.2  Section 6.4.3.2  <b>TB1</b> (see Appendix H)  <b>Allowed</b> ; if an area is fully enclosed, the enclosure walls must be equipped with openings to equalize hydrostatic pressure; size, location, and covering of openings governed by regulatory requirements <sup>g,h</sup>
			Section 6.4.3.2  <b>TB1</b> (see Appendix H)
<b>Nonstructural Fill</b>			
	<b>Allowed</b> for minor landscaping and site drainage as long as the fill does not interfere with the free passage of flood waters and debris beneath the building or cause changes in flow direction during coastal storms that could result in damage to buildings	Section 6.4.3.3  <b>TB5</b> (see Appendix H)  <b>Allowed<sup>i</sup></b>  <b>Recommendation:</b> same as V zone	Section 6.5.2  <b>Allowed</b>
<b>Use of Space Below BFE<sup>j</sup></b>			
	<b>Allowed only</b> for parking, building access, and storage	Section 6.4.3.3  <b>TB5</b> (see Appendix H)  <b>Allowed only</b> for parking, building access, and storage	Section 6.4.3.2  <b>TB1</b> (see Appendix H)  <b>Allowed only</b> for parking, building access, and storage
			Section 6.4.3.2  <b>TB1</b> (see Appendix H)
<b>Utilities<sup>j</sup></b>			
	<b>Requirement:</b> must be designed, located, and elevated to prevent flood waters from entering and accumulating in components during flooding	Section 6.4.3.1  <b>FEMA 348</b> (FEMA 1999b)  <b>Requirement:</b> must be designed, located, and elevated to prevent flood waters from entering and accumulating in components during flooding	Section 6.4.3.1  <b>FEMA 348</b> (FEMA 1999b)  <b>Requirement:</b> must be designed, located, and elevated to prevent flood waters from entering and accumulating in components during flooding
			Section 6.4.3.1  <b>FEMA 348</b> (FEMA 1999b)

**Table 6.1** Summary of NFIP Regulatory Requirements and Recommendations for Exceeding the Requirements (continued)

					
		V Zone	Coastal A Zone	A Zone	
		Guidance <sup>a</sup>	X-ref <sup>b</sup>	Guidance <sup>a</sup>	X-ref <sup>b</sup>
<b>Certification</b>					
<b>Structure</b>	<b>Required:</b> registered engineer or architect must certify that the design and methods of construction are in accordance with accepted standards of practice for meeting the design requirements described under <b>GENERAL REQUIREMENTS</b>	Section 6.4.3.3	<b>Recommendation:</b> same as V zone	Section 6.5.2	<b>Recommendation:</b> same as V zone
<b>Breakaway Walls</b> (Also see ENCLOSURES BELOW THE BFE)	<b>Required:</b> either of the following: (1) walls must be designed to provide a safe loading resistance of between 10 lb/ft <sup>2</sup> and 20 lb/ft <sup>2</sup> OR (2) a registered engineer or architect must certify that the walls will collapse under a water load associated with the base flood and that the elevated portion of building and its foundation will not be subject to collapse, displacement, or lateral movement under simultaneous wind and water loads <sup>g,h</sup>	Section 6.4.3.3  TB 9 (see Appendix H)	Not required, but <b>recommended</b> <sup>g,h</sup>	Section 6.5.2	Not required <sup>g,h</sup>
<b>Openings in Below-BFE Walls</b> (Also see ENCLOSURES BELOW THE BFE)	Not Applicable <sup>k</sup>		<b>Required:</b> unless number and size of openings meets regulatory requirements, registered engineer or architect must certify that openings are designed to automatically equalize hydrostatic forces on walls by allowing the automatic entry and exit of flood waters	Section 6.4.3.3  TB 1 (see Appendix H)	<b>Required:</b> unless number and size of openings meets regulatory requirements, registered engineer or architect must certify that openings are designed to automatically equalize hydrostatic forces on walls by allowing the automatic entry and exit of flood waters

**Table 6.1** Summary of NFIP Regulatory Requirements and Recommendations for Exceeding the Requirements (continued)

Notes	
a	“Prohibited” and “Allowed” refer to the minimum NFIP regulatory requirements; individual states and communities may enforce more stringent requirements that supersede those summarized here. <b>Exceeding minimum NFIP requirements will provide increased flood protection and may result in lower flood insurance premiums.</b>
b	In this column, “TB” means NFIP Technical Bulletin (e.g., TB 1 = Technical Bulletin 1), and “CFR” means the U.S. Code of Federal Regulations. Refer to Appendix H for copies of the bulletins cited here.
c	Some communities may allow encroachments to cause a 1-foot rise in the flood elevation, while others may allow no rise.
d	Some coastal communities require open foundations in A zones.
e	Bottom of lowest horizontal structural member must be at or above the BFE.
f	State or community may regulate to a higher elevation (DFE).
g	Some coastal communities prohibit breakaway walls and allow only open lattice or screening.
h	If an area below the BFE in an A-zone building is fully enclosed by breakaway walls, the walls must meet the requirement for openings that allow equalization of hydrostatic pressure.
i	Placement of nonstructural fill adjacent to buildings in coastal AO zones is not recommended.
j	There are some differences between what is permitted under floodplain management regulations and what is covered by NFIP flood insurance. Building designers should be guided by floodplain management requirements, not by flood insurance policy provisions. See Section 9.3.1.1, in Chapter 9, for additional information.
k	Walls below BFE must be designed and constructed as breakaway walls that meet the minimum requirements of the NFIP regulations (see Section 6.4.3.3).

## 6.6 Coastal Barrier Resources Act of 1982

The Coastal Barrier Resources Act (CBRA) of 1982 was enacted to protect vulnerable coastal barriers from development; minimize the loss of life; reduce expenditures of Federal revenues; and protect fish, wildlife, and other natural resources. This law established the Coastal Barrier Resources System (CBRS), which is managed by the U.S. Department of the Interior, Fish and Wildlife Service. The law restricts Federal expenditures and financial assistance that could encourage development of coastal barriers. The CBRA does not prohibit privately financed development; however, it does prohibit most new Federal financial assistance, **including federally offered flood insurance**, in areas within the CBRS (also referred to as CBRA areas). Flood insurance may not be sold for buildings in the CBRS that were constructed or substantially improved after October 1, 1983. The financial risk of building in these areas is transferred from Federal taxpayers directly to those who choose to live in or invest in these areas.



### NOTE

Additional information about Coastal Barrier Resources System (CBRS) regulations and areas included in the CBRS is available at the U.S. Fish and Wildlife Service website at <http://www.fws.gov/cep/cbrtable.html>.

The Coastal Barrier Improvement Act (CBIA), passed in 1991, tripled the size of the CBRS to over 1.1 million acres. The CBIA also designated “otherwise protected areas” that include lands that are under some form of public ownership. The CBIA prohibits the issuance of flood insurance on buildings

constructed or substantially improved after November 16, 1991, for the areas added to the CBRS, including these “otherwise protected areas.” An exception is made to allow insurance for buildings located in “otherwise protected areas” that are used in a manner consistent with the purpose for which the area is protected. Examples include research buildings, buildings that support the operation of a wildlife refuge, and similar buildings.

CBRS boundaries are shown on a series of maps produced by the Department of the Interior (DOI). In addition, FEMA has transferred CBRS boundaries to FIRMs so that insurance agents and underwriters may determine eligibility for flood insurance coverage. Before constructing a new building, substantially improving an existing building, or repairing a substantially damaged building, the designer or property owner should review the FIRM to determine whether the property is within the CBRS. In situations where the FIRM does not allow for a definitive determination, the designer or property owner should consult local officials. In some situations, it may be necessary to request a determination from the U.S. Fish and Wildlife Service based on the DOI maps.

## 6.7 Coastal Zone Management Regulations

The Coastal Zone Management (CZM) Act of 1972 encourages adoption of coastal zone policies by U.S. coastal states in partnership with the Federal Government. CZM regulations have been adopted by 27 coastal states and 5 island territories. Two of the three remaining coastal states—Indiana and Minnesota—are preparing CZM regulations for the Great Lakes for Federal approval. For current information concerning the status of state and national CZM programs, refer to the website of the National Oceanic and Atmospheric Administration, National Ocean Service, Office of Coastal Resource Management, at <http://wave.nos.noaa.gov/ocrm/czm>.

Each state’s CZM program contains provisions to:

- protect natural resources,
- manage development in high hazard areas,
- manage development to achieve quality coastal waters,
- give development priority to coastal-dependent uses,
- have orderly processes for the siting of major facilities,
- locate new commercial and industrial development in or adjacent to existing developed areas,
- provide public access for recreation,
- redevelop urban waterfronts and ports, and preserve and restore historic, cultural, and aesthetic coastal features,



### NOTE

**Remember:** Any building within a CBRS area that is constructed or substantially improved after October 1, 1983, or the date of designation for areas added to the system in 1991, is not eligible for Federal flood insurance or other Federal financial assistance. The same restriction applies to substantially damaged buildings in a CBRS area that are repaired or renovated after those dates.

- simplify and expedite governmental decision-making actions,
- coordinate state and Federal actions,
- give adequate consideration to the views of Federal agencies,
- ensure that the public and local government have a say in coastal decision-making, and
- comprehensively plan for and manage living marine resources.

Coastal zone regulations vary greatly. Many states, such as Washington, Oregon, and Hawaii, provide guidelines for development while leaving the enactment of specific regulatory requirements up to county and local governments.

Most state coastal zone regulations control construction seaward of a defined boundary line, such as a dune or road. Many states, though not all, regulate or prohibit construction seaward of a second line based on erosion. Some of these lines are updated when new erosion mapping becomes available; lines that follow physical features such as dune lines are not fixed and “float” as the physical feature shifts over time. Examples of other types of state coastal regulations include requirements concerning the placement or prohibition of shore protection structures and the protection of dunes.

Some states not only control new construction, but also regulate renovations and repairs of substantially damaged buildings to a greater degree than required by the NFIP. These regulations help limit future damage in coastal areas by requiring that older buildings be brought up to current standards when they are renovated or repaired.

In addition to regulating the construction of buildings near the coast, many jurisdictions regulate the construction of accessory structures, roads and infrastructure, and other development-related activities.

## 6.8 References

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