



## **UNIT V: INVESTIGATING REGULATORY REQUIREMENTS**



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## **INVESTIGATING REGULATORY REQUIREMENTS**

### **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.
- Programs established to protect wetlands and other wildlife habitat, which seek to minimize degradation of the environment.
- State- and community-enforced 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.

This unit will provide information about land use regulations, building codes and standards, NFIP minimum requirements and recommendations for exceeding those requirements, and other Federal legislation.

**UNIT OBJECTIVES** After completing this unit, you should be able to:

- 5.1 Identify ways in which the following regulatory measures help reduce damage to coastal residential structures:
  - Land use regulations.
  - Building codes and standards.
  - NFIP minimum requirements.
  - Coastal Barrier Resources Act regulations.
  - Coastal Zone Management regulations.
- 5.2 Identify minimum NFIP requirements for buildings in V and A zones and recommendations for exceeding those requirements.



## **LAND USE REGULATIONS**

State and local governments establish regulations 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 preservations requirements.
- Environment regulations.

Land use regulations are often incorporated into and implemented under comprehensive or master plans developed by local jurisdictions in coordination with their State governments.

### ***IMPACT OF LAND USE REGULATIONS***

With land use regulations, communities can control development in a variety of ways. For example, they can:

- Prohibit or restrict development in specified areas.
- Establish requirements for:
  - Lot size.
  - Clearing and grading.
  - Drainage.
  - Siting of buildings.
  - Floodplain management.
  - Construction of access roads.
  - Installation of utility lines.
  - Planting of vegetative cover.
  - Other aspects of the land development and building construction processes.

The land use regulations enacted and 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 course to list or describe specific regulations.

However, such regulations can have a significant impact on the construction and improvement of residential and other types 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.



**SOURCES OF INFORMATION** The best sources of information about land use regulations include the following:

- **State and local officials** in charge of planning, land management, economic development, building code, floodplain management, and community affairs.
- **Professional organizations** such as the American Planning Association (APA) and its State chapters.

Community officials may be interested in several recent APA projects and publications described below. More detailed information is available on the APA website: <http://www.planning.org>.

**EXAMPLES OF APA PROJECTS AND PUBLICATIONS**

- *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. It 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**

Hazard area identifications (including those on FIRMs) and associated development regulations can be rendered obsolete by a natural event. Take extreme care in siting and designing residential buildings in post-disaster situations.



## ***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*** The purpose of a building code is to establish the minimum acceptable requirements necessary for protecting the public, health, safety, and welfare in the built environment. Building codes set forth requirements for:

- Structural design.
- Materials.
- Fire safety.
- Exits.
- Natural hazard mitigation.
- Sanitary facilities.
- Light and ventilation.
- Environmental control.
- Fire protection.
- Energy conservation.

Building codes apply primarily to new construction, but they 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.

***STANDARDS*** A standard, according to the Council of American Building Officials, 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.”



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 in others. Some States and communities have not adopted any building codes or standards.

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 including all of the text of the standard in the code.

**MODEL BUILDING CODES**

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

**NOTE**

For more 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).

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States and local jurisdictions may adopt a model code—unaltered or with amendments and revisions. They may also adopt and enforce other codes and standards to meet specific needs, such as providing additional resistance to damage in areas subject to flood, wind, and earthquake hazards. Examples of these State and local codes and standards include the South Florida Building Code, the Massachusetts State Building Code, and the Texas Department of Insurance Windstorm Resistant Construction Guide (1998).

Other codes and standards in use include:

- American Society of Civil Engineers (ASCE) *Minimum Design Loads for Buildings and Other Structures*, ASCE 7-98.
- SBCCI *Standard for Hurricane Resistant Residential Construction*, SSTD 10-99.

In addition, trade organizations publish design documents—for example, the High Wind Edition of the *Wood Frame Construction Manual for One- and Two-Family Dwellings* by the American Forest & Paper Association.

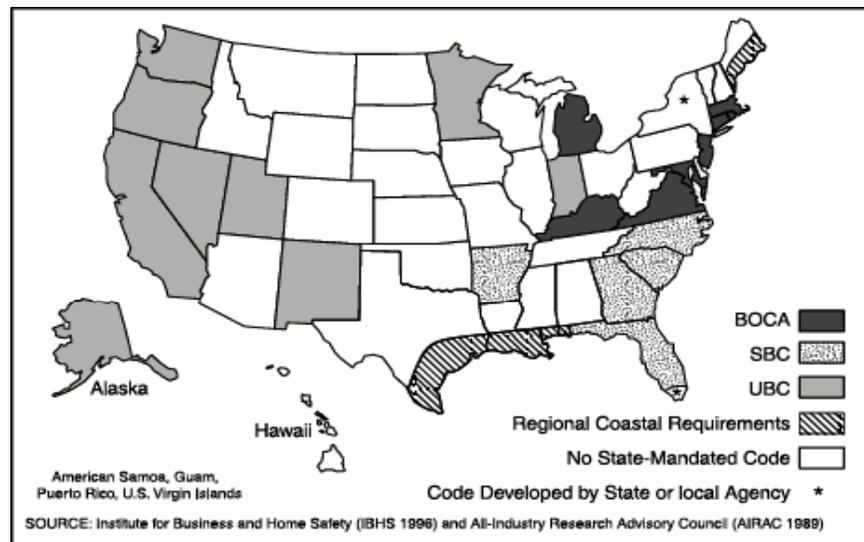


**ADOPTION OF MODEL CODES**

It is important to note that not every State has adopted a model building code, and some of those that have do not require that the code be applied to the construction of one- and two-family residential buildings.

The map in Figure 5-1 shows the States that have adopted a mandatory State building code, based on one of the model codes, that applies to some or all types of construction within the State. The figure also shows areas of the United States that have adopted regional requirements governing coastal construction.

**Figure 5-1. States That Have a Mandatory Building Code Based on One of the Model Building Codes.**



In areas where a model building code has not been adopted or where the existing code is not applied to one- and two-family residential buildings, those engaged in the design and construction of coastal residential buildings are encouraged to follow the requirements of a model building code and the recommendations presented in the *Coastal Construction Manual*.

In general, most coastal States have adopted a model building code and/or specific requirements concerning the construction of buildings in coastal flood and wind hazard areas.

In States where no mandated codes exist, it is common for relatively populous political 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.



**INTERNATIONAL CODES** The International Code Council 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:

- *International Building Code 2000* (IBC 2000).
- *International Residential Code for One- and Two-Family Dwellings 2000* (IRC 2000).
- Mechanical, plumbing, and private sewage disposal codes.

### ***Compliance with NFIP and NEHRP***

Both the IBC 2000 and the IRC 2000 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. (Communities must adopt **both codes** to be compliant with the regulatory requirements of the NFIP.)

The mechanical, plumbing, and private sewage disposal codes are compliant with the applicable provisions of the NFIP regulations.

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).

### ***Adoption of the International Codes***

At the time the *Coastal Construction 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.



***SELF-CHECK REVIEW:  
LAND USE REGULATIONS, BUILDING CODES, AND STANDARDS***

**Instructions:** Answer the following questions. Then turn the page to check your answers. If you answered any items incorrectly, you should review the related material before continuing.

1. \_\_\_\_\_ may prohibit development in specified areas.
  - a. Land use regulations
  - b. Building codes
  - c. Standards
  - d. Model building codes
  
2. \_\_\_\_\_ set forth requirements for the overall design of a building.
  - a. Land use regulations
  - b. Building codes
  - c. Standards
  
3. A single residential building design may be subject to hundreds of \_\_\_\_\_.
  - a. Building codes
  - b. Standards
  
4. The International Building Code is an example of a \_\_\_\_\_.
  - a. Trade organization code
  - b. Land use regulation
  - c. Standard
  - d. Model building code



**The Answer Key for the preceding Self-Check Review is located on the next page.**



*ANSWER KEY*

1. **Land use regulations** may prohibit development in specified areas.
2. **Building codes** set forth requirements for the overall design of a building.
3. A single residential building design may be subject to hundreds of **standards**.
4. The International Building Code is an example of a **model building code**.



## NATIONAL FLOOD INSURANCE PROGRAM—AN OVERVIEW

**PURPOSE** 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 goals are:

- To reduce the loss of life and the damage caused by flooding.
- To help victims recover from floods.
- To promote an equitable distribution of costs among those who are protected by flood insurance and the general public.

**NFIP ACTIVITIES** The NFIP achieves these goals through the following activities:

- 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. The provided information includes:
  - Boundaries of the Special Flood Hazard Area (SFHA)—the area subject to inundation by the flood that has a one percent probability of being equaled or exceeded in any given year.
  - Base flood elevations (BFEs).
  - Flood insurance zones.
- 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 regulated financial assistance** for the acquisition and/or construction of buildings in SFHAs.



**NOTE**

An explanation of **substantial improvement** and **substantial damage** is provided on the next page.

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The NFIP provides 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 received Federal disaster assistance.



### *Substantial Damage and Substantial Improvement*



Under the NFIP, substantially damaged and substantially improved buildings must meet the floodplain management requirements for new buildings.

- **Substantial damage:** 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.
- **Substantial improvement:** 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).

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### ***HOW THE NFIP PROGRAM WORKS***

The NFIP operates through a partnership between the Federal Government, the States, and individual communities (e.g., 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 to 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. However, FEMA encourages communities to establish additional or more stringent requirements as they see fit.



### ***Community Rating System***

In 1990, to provide incentives for communities to adopt more stringent requirements, FEMA established the NFIP Community Rating System (CRS). Through the CRS, FEMA encourages and recognizes community floodplain management activities that exceed the minimum NFIP requirements.

**Goals of the CRS.** 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: reducing flood losses, facilitating accurate insurance rating, and promoting the awareness of flood insurance.

**Class Determination.** Through the CRS, communities are awarded credit points for carrying out floodplain management activities in the following areas:

- Public information.
- Mapping and regulations.
- Flood damage reduction.
- Flood preparedness.

The number of points awarded determines a community's CRS class, from 1 to 10. The class then 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.



**NOTE**

In 1999, nearly 900 communities throughout the United States were receiving flood insurance premium discounts through the 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 or the appropriate FEMA Regional Office.

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### ***FIRMs and FIS Reports***

The regulatory requirements of the NFIP are based on the base flood—the flood that has a one percent probability of being equaled or exceeded in any given year.

To provide communities with the information they need to enact and enforce floodplain management ordinances or laws compliant with the NFIP requirements, FEMA conducts flood hazard studies for communities throughout the United States and publishes the results in the form of FIRMs and FIS reports.

**Information Provided.** FIS reports and FIRMs provide the following information:

- Names and locations of flooding sources.
- Sizes and frequencies of past floods.
- Limits of the SFHA in areas subject to riverine, lacustrine, and coastal flooding.
- Flood insurance zone designations.
- BFEs throughout the SFHA.



#### **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 (1995).

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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 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.



***DETERMINATION  
OF BFEs***

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.

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- **Stillwater elevations** are the elevations of the water surface resulting solely from storm surge (i.e., the rise in the surface of the ocean as a result of 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.
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**The BFEs for coastal flood hazard areas on FIRMs are established 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. Wave runup elevations are greater where the topography is steeper, such as along portions of the Great Lakes, northern Atlantic, and Pacific coasts.



**FLOOD INSURANCE  
ZONES**

The insurance zone designations shown on FIRMs 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—the portion of the SFHA that extends from offshore to the inland limit of a primary frontal dune along an open coast.



**NOTE**

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

V zones also include 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.



**NOTE**

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.

The Coastal A zone defined in the *Coastal Construction Manual* is not established by the NFIP regulations. However, this zone designation is useful because the hazards in coastal A zones are greater than those in non-coastal A zones but less severe than those in V zones.

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**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 (the 500-year flood). Zone C and unshaded Zone X identify areas above the level of the 500-year flood.



**SELF-CHECK REVIEW: NFIP OVERVIEW**

**Instructions:** Answer the following questions. Then turn the page to check your answers. If you answered any items incorrectly, you should review the related material before continuing.

1. The NFIP conducts \_\_\_\_\_ to provide communities with information about flood hazards.
  
2. List three activities carried out by the NFIP.
  - (1) \_\_\_\_\_
  - (2) \_\_\_\_\_
  - (3) \_\_\_\_\_
  
3. The \_\_\_\_\_ provides incentives for communities to adopt more stringent requirements than the NFIP regulations.
  
4. \_\_\_\_\_ is the elevation of the water surface resulting solely from storm surge.
  
5. The BFEs on FIRMs are established at the maximum elevation of \_\_\_\_\_ or \_\_\_\_\_, whichever is greater.
  
6. Which of the following zones has the least risk of damage from high-velocity wave action?
  - a. V1–V30
  - b. AE
  - c. Coastal A
  - d. X



*ANSWER KEY*

**NOTE:** Some of your answers may be slightly different, but they should include the same main points.

1. The NFIP conducts **flood hazard studies** to provide communities with information about flood hazards.

2. List three activities carried out by the NFIP.

**Any of the following:**

- **Conducting flood hazard studies**
- **Providing technical assistance and funding**
- **Requiring participating communities to control construction in the SFHA**
- **Providing flood insurance**
- **Requiring the purchase of flood insurance as a conditions of receiving Federal or federally regulated loans**

3. The **Community Rating System** provides incentives for communities to adopt more stringent requirements than the NFIP regulations.

4. **Stillwater elevation** is the elevation of the water surface resulting solely from storm surge.

5. The BFEs on FIRMs are established at the maximum elevation of **wave crest** or **wave runup**, whichever is greater.

6. Which of the following zones has the least risk of damage from high-velocity wave action?

**d. X**



## NFIP MINIMUM REGULATORY REQUIREMENTS

**INTRODUCTION** 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).

### *Types of Buildings Affected*

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.
- Substantially improved buildings.

Additional requirements apply to new subdivisions and other development in the SFHA.

### *Aspects of the Building Affected*

The minimum NFIP regulatory requirements regarding newly constructed, substantially damaged, and substantially improved buildings affect primarily:

- Type of foundation allowed.
- Required height of the **lowest floor**.
- Installation of building utility systems.
- Use of flood-resistant materials.
- Use of the area below the lowest floor.



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.

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 that apply throughout the SFHA and to A zones and V zones specifically.



**MINIMUM  
REQUIREMENTS—  
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.
- New and replacement sanitary sewage systems.

These requirements, set forth at 44 CFR 60.3(a) and (b), are summarized below.

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

These buildings are subject to the following NFIP regulations:



Communities participating in the NFIP are encouraged to adopt and enforce floodplain management ordinances or laws that include requirements more stringent than the minimum NFIP requirements of the NFIP regulations.

For example, some States and communities require that buildings be elevated **above** rather than simply to the BFE (i.e., freeboard is required).

Check with local floodplain managers and building officials concerning such requirements.

- 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.
  - 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***

This type of development must conform to the following NFIP regulations:

- 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 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***

Within the SFHA, these systems must be designed to minimize or eliminate infiltration of flood waters.

### ***New and Replacement Sanitary Sewage Systems***

Within the SFHA, these systems 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.



**NOTE**

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The NFIP regulations also include requirements specific to **floodplains along rivers and streams**. 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 (1995).

For NFIP requirements concerning **manufactured housing**, refer to Section 60.3 of the NFIP regulations.

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**ADDITIONAL  
REQUIREMENTS—  
BUILDINGS IN A  
ZONES**

The additional **minimum** requirements specific to buildings in Zones AE, A1–A30, AO, and A pertain to:

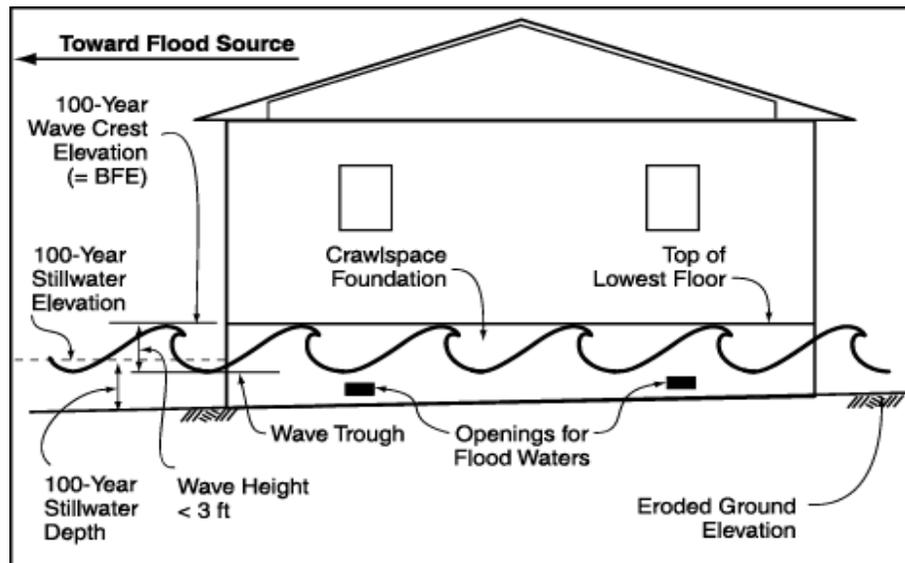
- Elevation of the lowest floor (including basement), in relation to BFE.
- Enclosed areas below the lowest floor.

These requirements, which are the same for coastal and non-coastal A zones, are summarized below

**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 Fig. 5-2).

Figure 5-2. Minimum NFIP A zone requirements. The lowest floors of buildings in Zones AE, A1–A10, 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.



**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.



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Even waves less than 3 feet high can impose large loads on foundation walls. The *Coastal Construction Manual* recommends that buildings in coastal A zones be designed and constructed to meet V zone requirements.

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### ***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.

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**Areas adjacent to V zones**—behind bulkheads or on the back sides of dunes—are sometimes designated Zone AO. For these areas, the *Coastal Construction Manual* encourages the use of open foundations, as required in V zones.

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***Enclosures Below the Lowest Floor in Zones AE, A1–A30, AO, 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:



**NOTE**

For more information about **openings** requirements, refer to *Openings in Foundation Walls for Buildings Located in Special Flood Hazard Areas*, FEMA NFIP Technical Bulletin 1 (1993).

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- **Net Area of Openings.** 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.

Alternatively, a certification may be provided by a registered engineer or architect stating 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 the next two criteria.

- **Placement.** The bottoms of all openings must be no higher than 1 foot above grade.
- **Coverings.** 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.



**ADDITIONAL REQUIREMENTS— BUILDINGS IN V ZONES** The additional **minimum** requirements specific to buildings in Zones VE, V1–V30, and V pertain to:

- Siting of the building.
- Alterations of sand dunes and mangrove stands.
- Elevation of the lowest floor in relation to the BFE.
- Foundation design.
- Enclosures below the BFE.

These requirements, set forth at 44 CFR 60.3(d), are summarized below.

***Siting***

All newly constructed buildings must be **located landward of the reach of mean high tide** (i.e., the mean high water line).

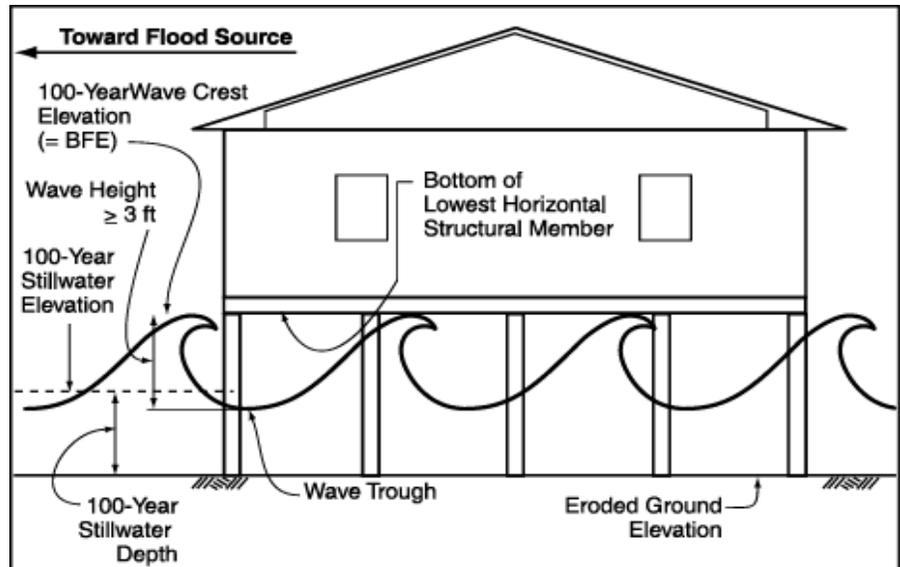
Manmade **alterations of sand dunes or mangrove stands** are prohibited if those alterations would increase potential flood damage. Removing sand or vegetation from, or otherwise altering, a sand dune or removing mangroves may increase potential flood damage. Therefore, such actions must not be carried 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 Fig. 5-3).

Figure 5-3.  
Minimum NFIP V zone requirements. Buildings must be elevated on an open foundation 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 from 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.

**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.



**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 (1993). Consult local officials for specific guidance or requirements.

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### ***Space Below the BFE***

The space below all newly constructed, substantially damaged, and substantially improved buildings must meet the following requirements:



#### **WARNING**

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 these requirements not only violates the local floodplain management ordinance and NFIP regulations but can also lead to large, uninsured losses.

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- **Freedom from Obstructions.** The space below the BFE must either be (1) free of obstructions or (2) 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.

The current NFIP regulatory requirements regarding **breakaway walls** are set forth in 44 CFR 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 (1) the walls will collapse under a water load less than that which would occur during the base flood and (2) the elevated portion of the building and supporting foundation system will not be subject to collapse, displacement, or other structural damage from the effects of wind and water loads acting simultaneously on all components of the building.

- **Permitted Uses.** Additional requirements apply to the use of an enclosed area below the BFE. It may be used only for parking, building access, or storage.
- **Materials.** An enclosed area below the BFE must be constructed of flood-resistant materials.
- **Mechanical/Utility Equipment.** There are specific requirements regarding the placement of mechanical/utility equipment below the BFE.



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.

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**NOTE**

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***Additional Information***

**Alternative Breakaway Wall Designs.** 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 (NCSU) 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 (1999). 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.
- Other design and construction issues.

The bulletin also describes the results of the NCSU-OSU tests.

**Other Sources of Information.** For more information about enclosures, the use of space below elevated buildings, and breakaway walls, refer to:

- *Flood-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas*, FEMA NFIP Technical Bulletin 2 (1993).
  - *Free-of-Obstruction Requirements for Buildings Located in Coastal High Hazard Areas*, FEMA NFIP Technical Bulletin 5 (1993).
-



***SELF-CHECK REVIEW: NFIP MINIMUM REQUIREMENTS***

**Instructions:** Answer the following questions. Then turn the page to check your answers. If you answered any items incorrectly, you should review the related material before continuing.

1. If the foundation of a coastal building is 1/3 within the V zone and 2/3 within the A zone, the building must comply with \_\_\_\_\_ requirements.
  - a. A zone
  - b. V zone
  
2. According to NFIP minimum requirements, newly constructed buildings in a V zone must have the bottom of the lowest structural member at what elevation?  
  
\_\_\_\_\_
  
3. One NFIP requirement is that the building site must be reasonably safe from flooding. This requirement applies to buildings \_\_\_\_\_.
  - a. Only in A zones
  - b. Only in V zones
  - c. In all SFHAs
  - d. Only in subdivisions and other new developments
  
4. Enclosed space below the lowest floors in A and V zones may be used for:  
  
\_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
  
5. Newly constructed buildings in \_\_\_\_\_ zones must be elevated on pilings, posts, piers, or columns.



**The Answer Key for the preceding Self-Check Review is located on the next page.**



*ANSWER KEY*

**NOTE:** Some of your answers may be slightly different, but they should include the same main points.

1. If the foundation of a coastal building is 1/3 within the V zone and 2/3 within the A zone, the building must comply with **V zone** requirements.

2. According to NFIP minimum requirements, newly constructed buildings in a V zone must have the bottom of the lowest structural member at what elevation?

**At or above the BFE**

3. One NFIP requirement is that the building site must be reasonably safe from flooding. This requirement applies to buildings \_\_\_\_\_.

**c. In all SFHAs**

4. Enclosed space below the lowest floors in A and V zones may be used for:

**Parking, building access, and storage.**

5. Newly constructed buildings in **V** zones must be elevated on pilings, posts, piers, or columns.



**RECOMMENDATIONS FOR EXCEEDING MINIMUM NFIP REQUIREMENTS**

The *Coastal Construction Manual* 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 5.1, presented at the end of this section, summarizes the NFIP requirements and the recommendations for exceeding those requirements.

**NON-COASTAL A ZONES** Recommendations for the design and construction of buildings in non-coastal A zones are not within the scope of this course. 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 (1995).
- The IBC 2000 and IRC 2000.
- FEMA's NFIP Technical Bulletin Series.

**COASTAL A ZONES AND V ZONES** 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—wave effects, velocity flows, erosion, scour, and high winds—the *Coastal Construction Manual* recommends that **buildings in coastal A zones should meet the NFIP regulatory requirements for V-zone buildings**, including the performance requirements concerning:

- Resistance to flotation, collapse, and lateral movement.
- Prescriptive requirements concerning:
  - Elevation.
  - Foundation type.
  - Engineering certification of design and construction.
  - Enclosures below the BFE.
  - Use of structural fill.

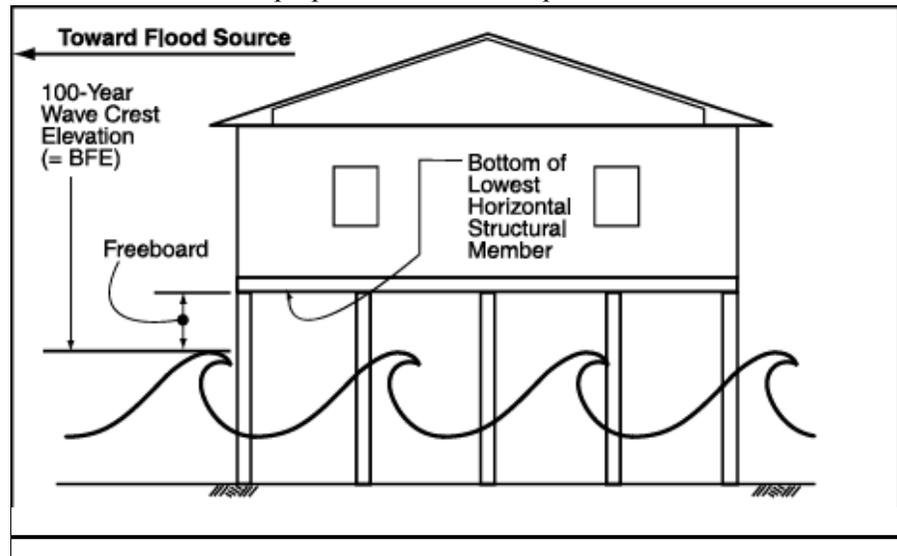


***Recommended Good Practices: Coastal A and V Zones***

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

- **Siting.** 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).
- **Elevation.** The bottom of the lowest horizontal structural member should be elevated **above** (rather than to) the BFE. That is, **freeboard** should be provided (see Fig. 5-4).
- **Space Below the BFE.** 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.
- **Orientation.** In V zones, the lowest horizontal structural members should be oriented perpendicular to the expected wave crest.

Recommendation for exceeding NFIP minimum elevation. The bottom of the lowest horizontal structural member should be above the BFE. In V zones, the lowest horizontal structural members should be perpendicular to the expected wave crest.





**Table 5.1. Summary of NFIP Regulatory Requirements and Recommendations for Exceeding the Requirements**

				Guidance <sup>a</sup>		
				 V Zone	 Coastal A Zone	 A Zone
General Requirements						
<b>Design</b>	<b>Requirement:</b> Building and its foundation must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement from <b>simultaneous wind and water loads</b> .	<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.  <b>Recommendation:</b> Same as a V zone.	<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.			
<b>Materials</b>	<b>Requirement:</b> Structural and nonstructural building materials at or below the BFE must be flood-resistant.	<b>Requirement:</b> Structural and nonstructural building materials at or below the BFE must be flood-resistant.	<b>Requirement:</b> Structural and nonstructural building materials at or below the BFE must be flood-resistant.			
<b>Construction</b>	<b>Requirement:</b> Building must be constructed with methods and practices that minimize flood damage.	<b>Requirement:</b> Building must be constructed with methods and practices that minimize flood damage.	<b>Requirement:</b> Building must be constructed with methods and practices that minimize flood damage.			
<b>Siting</b>	<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.  <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.	<b>Requirement:</b> Encroachments into the SFHA are permitted as long as they do not increase the BFE by more than 1 foot. <sup>b</sup> Encroachments into the floodway are prohibited.  <b>Recommendation:</b> Same as V zone.	<b>Requirement:</b> Encroachments into the SFHA are permitted as long as they do not increase the BFE by more than 1 foot. <sup>b</sup> Encroachments into the floodway are prohibited.			

**Notes:**

<sup>a</sup> “Prohibited” and “Allowed” refer to the minimum NFIP regulatory requirements; individual States and communities may enforce more stringent requirements that supersede those summarized here. **Exceeding minimum NFIP requirements will provide increased flood protection and may result in lower flood insurance premiums.**

<sup>b</sup> Some communities may allow encroachments to cause a 1-foot rise in the flood elevation, while others may allow no rise.



**UNIT V: INVESTIGATING REGULATORY REQUIREMENTS**

**Table 5.1 (Continued)**

	Guidance		
	 V Zone	 Coastal A Zone	 A Zone
<b>Foundation</b>			
<b>Structural Fill</b>	Prohibited	Allowed, but not recommended Compaction required where used; protect against scour and erosion. <sup>c</sup>	Allowed Compaction required where used; protect against scour and erosion. <sup>c</sup>
<b>Solid Foundation</b>	Prohibited	Allowed, but not recommended <sup>c</sup>	Allowed <sup>c</sup>
<b>Open Foundation</b>	Required	Not required, but recommended <sup>c</sup>	Allowed <sup>c</sup>
<b>Lowest Floor Elevation</b>	Not applicable <sup>d</sup>	<b>Requirement:</b> Top of floor must be at or above BFE. <sup>e</sup>  <b>Recommendation:</b> Elevate bottom of lowest horizontal structural member to or above BFE <sup>e</sup> (see next category below); orient member perpendicular to wave crest.	<b>Requirement:</b> Top of floor must be at or above BFE. <sup>e</sup>
<b>Bottom of Lowest Horizontal Structural Member</b>	<b>Requirement:</b> Bottom must be at or above BFE. <sup>e</sup>	<b>Allowed below BFE<sup>e</sup>, but not recommended.</b>  <b>Recommendation:</b> Same as V zone.	<b>Allowed below BFE<sup>e</sup>, but not recommended</b>  <b>Recommendation:</b> Same as V zone.
<b>Orientation of Lowest Horizontal Structural Member</b>	<b>No requirement</b>  <b>Recommendation:</b> Orient perpendicular to wave crest.	<b>No requirement</b>	<b>No requirement</b>
<b>Freeboard</b>	<b>Not required,<sup>e</sup> but recommended</b>	<b>Not required,<sup>e</sup> but recommended</b>	<b>Not required,<sup>e</sup> but recommended</b>

**Notes:**

- <sup>c</sup> Some coastal communities require open foundations in A zones.
- <sup>d</sup> Bottom of lowest horizontal structural member must be at or above the BFE.
- <sup>e</sup> State or community may regulate to a higher elevation (DFE).



Table 5.1 (Continued)

Guidance			
 V Zone	 Coastal A Zone	 A Zone	
<b>Enclosures Below the BFE</b>			
<b>(Also see Certification)</b>	<b>Prohibited</b> , except for breakaway walls, open lattice, and screening. <sup>f</sup>  <b>Recommendation:</b> If constructed, use open lattice or screening instead of breakaway walls.	<b>Allowed, but 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>f,g</sup>	<b>Allowed</b> If an area is fully enclosed, the enclosure walls must be equipped with openings to equalize hydrostatic pressure. Size, location, and coverings of openings governed by regulatory requirements. <sup>f,g</sup>
<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.	<b>Allowed</b> <sup>h</sup>  <b>Recommendation:</b> Same as V zone.	<b>Allowed</b>
<b>Use of Space Below the BFE<sup>l</sup></b>			
	<b>Allowed only</b> for parking, building access, and storage.	<b>Allowed only</b> for parking, building access, and storage.	<b>Allowed only</b> for parking, building access, and storage.
<b>Utilities<sup>i</sup></b>			
	<b>Requirement:</b> Must be designed, located, and elevated to prevent flood waters from entering and accumulating in components during flooding.	<b>Requirement:</b> Must be designed, located, and elevated to prevent flood waters from entering and accumulating in components during flooding.	<b>Requirement:</b> Must be designed, located, and elevated to prevent flood waters from entering and accumulating in components during flooding.

**Notes:**

- <sup>f</sup> Some coastal communities prohibit breakaway walls and allow only open lattice or screening.
- <sup>g</sup> 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.
- <sup>h</sup> Placement of nonstructural fill adjacent to buildings in coastal AO zones is not recommended.
- <sup>l</sup> 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.



**UNIT V: INVESTIGATING REGULATORY REQUIREMENTS**

**Table 5.1 (Continued)**

		<b>Guidance</b>		
		 <b>V Zone</b>	 <b>Coastal A Zone</b>	 <b>A Zone</b>
<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> .	<b>Recommendation:</b> Same as V zone.	<b>Recommendation:</b> Same as V zone.	
<b>Breakaway Walls (Also see Enclosures Below the BFE)</b>	<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>f,g</sup>	<b>Not required, but recommended<sup>f,g</sup></b>	<b>Not required<sup>f,g</sup></b>	
<b>Openings in Below-BFE Walls (Also see Enclosures Below the BFE)</b>	<b>Not applicable<sup>i</sup></b>	<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.	<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.	

**Notes:**

<sup>f</sup> Some coastal communities prohibit breakaway walls and allow only open lattice or screening.

<sup>g</sup> 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.

<sup>j</sup> Walls below BFE must be designed and constructed as breakaway walls that meet the minimum requirements of the NFIP regulations.



***SELF-CHECK REVIEW:  
RECOMMENDATIONS FOR EXCEEDING NFIP MINIMUM REQUIREMENTS***

**Instructions:** Answer the following questions. Then turn the page to check your answers. If you answered any items incorrectly, you should review the related material before continuing.

1. The *Coastal Construction Manual* recommends that. . .
  - A. In coastal A and V zones, the building should be located landward of:
    - a. The reach of the mean high tide
    - b. The long-term erosion setback
    - c. The limit of 100-year storm erosion
    - d. The long-term erosion setback and the limit of 100-year storm erosion
  - B. In coastal A and V zones, the bottom of the lowest horizontal structural member should be elevated:
    - a. At the BFE
    - b. At the stillwater elevation
    - c. Above the BFE
    - d. At the wave crest elevation
  - C. In V zones, the lowest horizontal structural members should be oriented \_\_\_\_\_ to the expected wave crest.
2. According to *Coastal Construction Manual* recommendations for A and V zone construction, which of the following would be most desirable in the space below the BFE?
  - a. Space enclosed by solid, weight-bearing walls
  - b. Enclosed space with openings
  - c. Breakaway walls
  - d. Open latticework or screening



*ANSWER KEY*

1. The *Coastal Construction Manual* recommends that . . .
  - A. In coastal A and V zones, the building should be located landward of:
    - d. The long-term erosion setback and the limit of 100-year storm erosion**
  - B. In coastal A and V zones, the bottom of the lowest horizontal structural member should be elevated:
    - c. Above the BFE**
  - C. In V zones, the lowest horizontal structural members should be oriented **perpendicular** to the expected wave crest.
2. According to *Coastal Construction Manual* recommendations for A and V zone construction, which of the following would be most desirable in the space below the BFE?
  - d. Open latticework or screening**



## COASTAL BARRIER RESOURCES ACT OF 1982

**PURPOSE** 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.
- 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.

**HOW THE LAW WORKS** 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.

### ***“Otherwise Protected Areas”***



#### **NOTE**

Additional information about 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>

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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** 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.



**NOTE**

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**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.

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**COASTAL ZONE MANAGEMENT REGULATIONS**

**PURPOSE** 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.oaa.gov/ocrm/czm>

**PROVISIONS** 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.
- Simplify and expedite governmental decisionmaking 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 decisionmaking.
- Plan for and manage living marine resources.



**VARIATIONS** Coastal zone regulations vary greatly. The following are examples of these variations.

- Many States, such as Washington, Oregon, and Hawaii, provide guidelines for development but **leave 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; they “float” as the physical feature shifts over time.)
- Some States have 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.



To determine whether State coastal zone management regulations apply to a specific property, consult community officials or the appropriate State coastal zone management agency.

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***SELF-CHECK REVIEW: CBRA AND CZM***

**Instructions:** Answer the following questions. Then turn the page to check your answers. If you answered any items incorrectly, you should review the related material before continuing.

1. The CBRA restricts Federal expenditures and financial assistance that could encourage \_\_\_\_\_.
  
2. The CBRA prohibits privately financed development.  
True      False
  
3. The Coastal Barrier Improvement Act designated \_\_\_\_\_, which include lands under some form of public ownership.
  
4. CBRS boundaries are / are not shown on FIRMs. (Circle one.)
  
5. Give an example of the kinds of issues addressed by State Coastal Zone Management regulations.  
\_\_\_\_\_



*ANSWER KEY*

**NOTE:** Some of your answers may be slightly different, but they should include the same main points.

1. The CBRA restricts Federal expenditures and financial assistance that could encourage **development of coastal barriers.**
2. The CBRA prohibits privately financed development.  
**False.**  
**It restricts Federal expenditures and financial assistance, including federally offered flood insurance.**
3. The Coastal Barrier Improvement Act designated **“otherwise protected areas”**, which include lands under some form of public ownership.
4. CBRS boundaries **are** shown on FIRMs.
5. Give an example of the kinds of issues addressed by State Coastal Zone Management regulations.

**Any of the following:**

- **Protection of natural resources**
- **Management of development in high hazard areas**
- **Maintenance of coastal water quality**
- **Development priorities (i.e., for coastal-dependent uses)**
- **Siting of major facilities**
- **Location of new commercial and industrial development**
- **Public access for recreation**
- **Redevelopment of urban waterfronts and ports**
- **Preservation of historic, cultural, and aesthetic coastal features**
- **Simplification of governmental decisionmaking**
- **Coordination of State and Federal actions**
- **Shared coastal decisionmaking (Federal, local, public)**
- **Management of living marine resources**



**UNIT V EXERCISE**

**Instructions:** Use this Unit Exercise to test how well you learned the material presented in Unit V. When you complete the exercise, check your answers against those in the Answer Key that follows. If you answered any questions incorrectly, be sure to review the corresponding section of the unit before proceeding to Unit VI.

1. Land use regulations can be rendered obsolete by a natural hazard event.  
True      False
  
2. Building codes may apply both to new construction and to existing buildings that are being rebuilt, rehabilitated, or modified.  
True      False
  
3. When a local jurisdiction adopts a model building code, it must adopt the entire code, as is.  
True      False
  
4. Few coastal States have adopted a model building code and/or specific requirements concerning the construction of buildings in coastal flood and wind hazard areas.  
True      False
  
5. A community that adopts the IBC 2000 and the IRC 2000 will be compliant with the regulatory building requirements of the NFIP and the recommended provisions of the NEHRP.  
True      False
  
6. The NFIP requires the purchase of flood insurance as a condition of receiving Federal financial assistance for the construction of buildings in SFHAs.  
True      False



7. Hazards in coastal A zones are:
  - a. The same as those in non-coastal A zones.
  - b. More severe than those in V zones.
  - c. The same as those in V zones.
  - d. Greater than those in non-coastal A zones.
  
8. The NFIP operates through a partnership between (1) \_\_\_\_\_,  
(2) \_\_\_\_\_, and (3) \_\_\_\_\_.
  
9. NFIP minimum requirements cover the type of foundation allowed. List two other aspects of coastal construction that are covered by NFIP requirements.
  - (1) \_\_\_\_\_.
  - (2) \_\_\_\_\_.
  
10. If the foundation of a coastal residence lies half in the A zone and half in the V zone, the building must comply with \_\_\_\_\_ requirements.
  - a. A zone
  - b. V zone
  - c. Coastal A zone
  - d. Either A or V zone (builder's choice)
  
11. The NFIP regulations require that buildings be designed and anchored to prevent flotation, collapse, and lateral movement of the building resulting from hydrodynamic and hydrostatic loads. This requirement applies to buildings in:
  - a. A zones only.
  - b. V zones only.
  - c. The SFHA.
  - d. The CBRS.
  
12. The *Coastal Construction Manual* recommends that buildings in coastal A zones be designed and constructed to \_\_\_\_\_ requirements.



**The Answer Key for the preceding Unit Exercise is located on the next page.**



***UNIT V EXERCISE — ANSWER KEY***

**NOTE:** Some of your answers may be slightly different, but they should include the same main points.

1. Land use regulations can be rendered obsolete by a natural hazard event.

**True**

2. Building codes may apply both to new construction and to existing buildings that are being rebuilt, rehabilitated, or modified.

**True**

3. When a local jurisdiction adopts a model building code, it must adopt the entire code, as is.

**False. A model code may be adopted unaltered or with amendments and revisions.**

4. Few coastal States have adopted a model building code and/or specific requirements concerning the construction of buildings in coastal flood and wind hazard areas.

**False. Most coastal States have done so.**

5. A community that adopts the IBC 2000 and the IRC 2000 will be compliant with the regulatory building requirements of the NFIP and the recommended provisions of the NEHRP.

**True**

6. The NFIP requires the purchase of flood insurance as a condition of receiving Federal financial assistance for the construction of buildings in SFHAs.

**True**



7. Hazards in coastal A zones are:

**d. Greater than those in non-coastal A zones**

8. The NFIP operates through a partnership between (1) **the Federal Government**, (2) **the States**, and (3) **individual communities**.

9. NFIP minimum requirements cover the type of foundation allowed. List two other aspects of coastal construction that are covered by NFIP requirements.

**Any of the following:**

- **Required height of the lowest floor**
- **Installation of building utility systems**
- **Use of flood-resistant materials**
- **Use of the area below the lowest floor**

10. If the foundation of a coastal residence lies half in the A zone and half in the V zone, the building must comply with \_\_\_\_\_ requirements.

**b. V zone**

11. The NFIP regulations require that buildings be designed and anchored to prevent flotation, collapse, and lateral movement of the building resulting from hydrodynamic and hydrostatic loads. This requirement applies to buildings in:

**c. The SFHA**

12. The *Coastal Construction Manual* recommends that buildings in coastal A zones be designed and constructed to **V zone** requirements.

# **UNIT 5:** **THE NFIP FLOODPLAIN** **MANAGEMENT REQUIREMENTS**

## **In this unit**

This unit reviews the NFIP standards for floodplain development, including:

- ◆ What maps, base flood elevations and other flood data must be used,
- ◆ When permits are required,
- ◆ Ensuring that new development does not cause increased flooding elsewhere,
- ◆ Standards to ensure that new buildings will be protected from the base flood, and
- ◆ Additional requirements for certain types of development.

Unit 6 reviews more restrictive standards that may be required or recommended for your community. Units 7 through 10 provide guidance on how to administer a program that fulfills the requirements spelled out in this unit.

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## A. THE NFIP'S REGULATIONS

For a community to participate in the National Flood Insurance Program, it must adopt and enforce floodplain management regulations that meet or exceed the minimum NFIP standards and requirements. These standards are intended to prevent loss of life and property, as well as economic and social hardships that result from flooding.

The NFIP standards work – as witnessed during floods in areas where buildings and other developments are in compliance with them. Nationwide each year, NFIP-based floodplain management regulations help prevent more than \$1 billion in flood damages.

This unit focuses on the minimum NFIP criteria. In some instances, more restrictive state standards may exist, and they must also be met by communities in the NFIP. They are the subject of the next unit.

### NFIP REGULATIONS

The NFIP requirements can be found in Chapter 44 of the *Code of Federal Regulations* (44 CFR). Revisions to these requirements are first published in the *Federal Register*, a publication the Federal Government uses to disseminate rules, regulations and announcements.

Most of the requirements related to your community's ordinance are in Parts 59 and 60. These are included in Appendix E along with the mapping regulations of Parts 65 and 70.

Figure 5-1 shows how the regulations are organized. The sections are referred to in shorthand, such as 44 CFR 60.1—Chapter 44, *Code of Federal Regulations*, Part 60, Section 1. In this course, excerpts are shown in boxes:

**44 CFR 59.2(b)** *To qualify for the sale of federally-subsidized flood insurance a community must adopt and submit to the Administrator as part of its application, flood plain management regulations, satisfying at a minimum the criteria set forth at Part 60 of this subchapter, designed to reduce or avoid future flood, mudslide (i.e., mudflow) or flood-related erosion damages. These regulations must include effective enforcement provisions.*

As noted in Unit 2, when your community joined the NFIP, it agreed to abide by these regulations. When your community's FIRM was published, it had to submit its ordinance to FEMA to ensure that it met these requirements.

## **Part 59—General Provisions**

### Subpart A—General

- 59.1 Definitions
- 59.2 Description of program
- 59.3 Emergency program
- 59.4 References

### Subpart B—Eligibility Requirements

- 59.21 Purpose of subpart
- 59.22 Prerequisites for the sale of flood insurance
- 59.23 Priorities for the sale of flood insurance under the regular program
- 59.24 Suspension of community eligibility

## **Part 60—Criteria for Land Management and Use**

### Subpart A—Requirements for Flood Plain Management Regulations

- 60.1 Purpose of subpart
- 60.2 Minimum compliance with floodplain management criteria
- 60.3 Floodplain management criteria for floodprone areas
  - (a) When there is no floodplain map
  - (b) When there is a map, but not flood elevations
  - (c) When there are flood elevations
  - (d) When there is a floodway mapped
  - (e) When there is a map with coastal high hazard areas
- 60.4 Floodplain management criteria for mudslide (i.e., mudflow)-prone areas
- 60.5 Floodplain management criteria for flood-related erosion-prone areas.
- 60.6 Variances and exceptions
- 60.7 Revisions of criteria for floodplain management regulations
- 60.8 Definitions

### Subpart B—Requirements for State Floodplain Management Regulations

### Subpart C—Additional Considerations in Managing Flood-Prone, Mudslide (i.e., Mudflow)-Prone, and Flood-Related Erosion-Prone Areas

Figure 5-1. 44 CFR Parts 59 and 60

Many state NFIP coordinators have prepared model flood damage prevention ordinances to assist communities in meeting the NFIP requirements, so it is likely that your community adopted an ordinance based on the state model.

**NOTE:** Periodically, the NFIP regulations are revised to incorporate new requirements or clarify old ones. These changes are published in the *Federal Register*. Some revisions require local ordinance amendments. Your community may or may not have made the amendments needed to stay updated. Before you complete this unit, you should check with your state NFIP coordinator or FEMA Regional Office to verify that your ordinance is currently in full compliance with the latest NFIP requirements.

## COMMUNITY TYPES

NFIP regulations identify minimum requirements that communities must fulfill to join and stay in the program. The requirements that apply to a particular community depend on its flood hazard and the level of detail of the data FEMA provides to the community. The specific requirements are in Section 60.3, and apply to communities as follows:

- ◆ 60.3(a) FEMA has not provided any maps or data.
- ◆ 60.3(b) FEMA has provided a map with approximate A Zones
- ◆ 60.3(c) FEMA has provided a FIRM with base flood elevations
- ◆ 60.3(d) FEMA has provided a FIRM with base flood elevations and a map that shows a floodway
- ◆ 60.3(e) FEMA has provided a FIRM that shows coastal high hazard areas (V Zones)

Two important notes:

*The NFIP requirements are minimums.* As noted in 44 CFR 60.1(d), “Any floodplain management regulations adopted by a State or a community which are more restrictive than the criteria set forth in this part are encouraged and shall take precedence.”

*These requirements are cumulative.* A 60.3(c) community must comply with all appropriate requirements of sections 60.3(a) and (b). For example, 60.3(a) includes basic requirements for subdivisions and utilities that are not repeated in the later sections. *All* communities in the NFIP must comply with these subdivision and utility requirements.

For example, a 60.3(c) community must use the base flood elevations provided on the FIRM. If that community has an approximate A Zone without a BFE, it must comply with the requirements of 60.3(b) for that area.

The rest of this unit explores the requirements of 44 CFR 60.3. It is organized by subject matter, so it will not correspond with the sections in 44 CFR. Where appropriate, the specific section numbers are referenced.

You should be able to identify where the requirements discussed in this unit appear in your ordinance. If you cannot find a specific reference or if you are not comfortable with your ordinance’s regulatory language, contact your state NFIP coordinator or FEMA Regional Office. FEMA and your state will expect you to enforce these minimum requirements as agreed to. If you don’t think your ordinance language is clear or up to date, you should consider an amendment to remove any doubt.

This unit covers the minimum requirements for participation in the NFIP. As noted, communities are encouraged to enact regulatory standards that exceed these minimums and that are more appropriate for local conditions.



The Community Rating System (CRS) is a part of the NFIP that rewards communities that implement programs that exceed the minimums. It is explained in more detail in Unit 9, Section C. Where provisions that can receive CRS credit are mentioned in this course, they are highlighted with the CRS logo.

## B. MAPS AND DATA

Flood maps and flood data were discussed in Units 3 and 4. This section builds on that information, covering the NFIP requirements as to when and how a community must use those maps and data.

***Basic rule #1: Check to make sure you have the latest flood maps and data published by FEMA. You must use the latest maps to administer your floodplain management ordinance.***

### NFIP MAPS AND DATA

A community must adopt and enforce floodplain management regulations based on data provided by FEMA (44 CFR 60.2(h)). This includes the floodplain boundaries, base flood elevations, FIRM zones and floodway boundaries shown on your current Flood Insurance Rate Map, Flood Boundary Floodway Map and/or Flood Insurance Study.

***44 CFR 60.2(h):*** *The community shall adopt and enforce flood plain management regulations based on data provided by the [Federal Insurance] Administrator. Without prior approval of the Administrator, the community shall not adopt and enforce flood plain management regulations based upon modified data reflecting natural or man-made physical changes.*

This requirement does not prevent a community from adopting and enforcing regulations based on data more restrictive than that provided by FEMA. For example, a community may want to regulate to an historical flood which was higher than the BFEs shown on the FIRM. However, such data must be approved by the FEMA Regional Office before it is used.

This requirement also does not prevent a community from using other technical data to identify and regulate floodprone areas not shown on FEMA maps. For example, many cities and urban counties map and regulate areas on small tributary streams that are not shown on the FIRM.

The community always has a say in what the latest maps and data should be. FEMA will send you proposed revisions to the official FIRM and you will have time to review them and submit your comments to FEMA before they are published. You also have a formal 90-day appeals period during which to submit your appeals before BFEs are made final. If you disagree with the FEMA data at any time and have scientific or technical data to support your position, you should submit a request for a map revision as noted in Unit 4, Section D, *Maintaining and Revising NFIP Maps*.

**Annexations:** If a property is in a recently annexed area that does not show up on your community's map, use the county's map and base flood elevations

(BFEs) to determine the flood protection requirements. In fact, you should formally adopt the county's FIRM in your ordinance to strengthen your basis for regulating areas not currently shown on your FIRM.

**Exceptions:** The basic rule does not cover every situation. Four occasions where a community may vary from the effective FIRM and other data provided by FEMA are:

- ◆ When the FEMA data disagree with ground elevations.
- ◆ When the FEMA data are insufficient. This occurs in approximate A Zones where base flood elevations and floodway boundaries are not provided with the FIRM.
- ◆ When FEMA has provided draft revised data.
- ◆ When FEMA provides "advisory" flood hazard data.

These situations are discussed below.

*Note: these situations only apply to the use of flood data for floodplain management purposes. Insurance agents and lenders must use the current FIRM when determining insurance rates and whether flood insurance is required. If a person wants to vary from the current FIRM to obtain different premium rates or to not have to purchase a flood insurance policy, the FIRM must be officially revised or amended.*

## WHEN FIRM AND GROUND DATA DISAGREE

The BFEs published in the Flood Insurance Study set the level for flood protection purposes. The maps are a graphic portrayal of that information.

Since FEMA usually does not have detailed topographic mapping to use in preparing the flood maps, the flood boundaries are interpolated between cross sections using whatever topographical information is available. This can result in inaccuracies in drawing the boundaries on the map.

The BFE in relation to the actual ground elevation sets the floodplain limits for regulatory purposes. When ground surveys show that a development site is above the BFE, you can record the data and issue the permit. Then, if the developer or owner wants the property removed from the Special Flood Hazard Area designation, he or she can request a Letter of Map Amendment.

It is up to them to apply for a map change, not you. The procedure is discussed in Unit 4, Section D.

Conversely, if site surveys show that areas considered outside the 100-year floodplain on published maps are in fact below the BFE, you should require protection of new buildings to the BFE. Even though a site may be technically out-

side the mapped SFHA, you are not doing future occupants any favors by ignoring the known flood hazard.

## REGULATING APPROXIMATE A ZONES

The second occasion where you may vary from the data provided by FEMA is in approximate A Zones. Approximate A Zones are those areas not studied by the detailed hydrologic/hydraulic methods. These areas are shown as “unnumbered A zones” on the FIRM and “approximate 100-year flood zones” on the Flood Boundary Floodway Map. The FIS will not contain specific base flood elevations for approximate study areas nor will there be a floodway/fringe designation on the FBFM.

**44 CFR 60.3(b)** *When the Administrator has designated areas of special flood hazards (A zones) by the publication of a community's FHBM or FIRM, but has neither produced water surface elevation data nor identified a floodway or coastal high hazard area, the community shall...*

**(3)** *Require that all new subdivision proposals and other proposed developments (including proposals for manufactured home parks and subdivisions) greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals base flood elevation data;*

**(4)** *Obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source, including data developed pursuant to paragraph (b)(3) of this section, as criteria for requiring that new construction, substantial improvements, or other development in Zone A on the community's FHBM or FIRM meet the standards ...*

Regulating development in approximate or unnumbered A Zones is one of the tougher jobs you'll face, especially in counties that have large areas of such zones. 44 CFR Section 60.3(b)(4) requires that you make every effort to use any flood data available in order to achieve a reasonable measure of flood protection. Further, many states and local ordinances require a base flood elevation before a permit can be issued for any development.

Here are some tips in obtaining data needed for unnumbered A Zones. Whichever method you use, be sure to record on the permit records where the flood elevation came from. This will help you be consistent with future development in the same area.

- ◆ Check with your state NFIP coordinator. Some states have regulations or guidance on how to obtain regulatory data. Some have repositories of data or may help conduct a new study.
- ◆ Check with local flood control, sanitary or watershed districts. Like state agencies, they may have their own programs for developing new flood data.

- ◆ If a body of water forms a boundary between two communities, the community on the other side may have a detailed study. Such base flood data are valid for both sides of a body of water.
- ◆ Ask the U.S. Army Corps of Engineers, U.S. Department of Agriculture/Natural Resources Conservation Service, or U.S. Geological Survey if they have knowledge of any flood studies, unpublished reports, or any data that may pertain to the area in question.
- ◆ If the property is along a stream that is near state highway structures such as bridges or culverts, the state highway department may have done a flood study to properly size the structure.
- ◆ If the property is on a river with a power-generating dam, the dam owner may have had to conduct a study for federal licensing.
- ◆ See if your engineer or the developer will conduct a study to calculate BFEs.

Data obtained from one of these other sources should be used as long as they:

- ◆ Reasonably reflect flooding conditions expected during the base flood,
- ◆ Are not known to be technically incorrect, and
- ◆ Represent the best data available.

The FEMA publication *Managing Floodplain Development in Approximate Zone A Areas: A Guide for Obtaining and Developing Base (100-Year) Flood Elevations* provides information on a number of methodologies for developing BFEs in approximate A zones. These methodologies range from detailed methods that produce BFEs and perform floodway analyses similar to those developed for a Flood Insurance Study to simplified methods that can be used in isolated areas where more costly studies cannot be justified.

If your community has approximate A Zones that are likely to be developed, you should get a copy of this document and have your engineer review it. You can also download FEMA's Quick-2 software for computing flood elevations from the FEMA flood hazard mapping website.

## **Small developments**

If the project is an isolated building, such as a single-family home in an undeveloped area or a subdivision or other development that does not meet the thresholds in 44 CFR Section 60.3(b)(3), you still must ensure that the building is protected from flood damages by meeting the requirements of 44 CFR 60.3(a)(3). This paragraph requires you to determine if the site is reasonably safe from flooding and, if it is not, that you ensure the building is constructed with methods and practices that minimize flood damages and meets other construction requirements. In nearly all cases the only way to do this is to require that the building be elevated to above an elevation that you determine.

There are several possible ways of establishing this elevation:

- ◆ Walk the site with the property owner and find a site on high ground for the building. Sometimes by this method alone you can determine a safe building site or establish a safe building elevation, particularly in the floodplain of a small stream. Sometimes detailed topographic maps are available that may help.
- ◆ Use historical records or the flood of record (the highest known flood level for the area). It may be that a recent flood was close to the base flood. If records of the recent flood can be used, base your regulatory flood elevations on them (or add a foot or two to the historical flood levels to provide a margin of error). Before you do this, get a second opinion from your state NFIP coordinator, FEMA Regional Office or other agency that is familiar with the flood data you want to use.
- ◆ Require protection to a set elevation such as at least five feet above grade. Only use this approach if you feel confident that the five feet of elevation will provide adequate flood protection to the building.
- ◆ Require the permit applicant to develop a base flood elevation or develop one yourself using one of the methods in the FEMA publication *Managing Floodplain Development in Approximate Zone A Areas: A Guide for Obtaining and Developing Base (100-Year) Flood Elevations*. This will usually require the services of an engineer, but will be worth the additional expense if it is the only way to make sure the building is protected from flood damage. There are several methods of determining BFEs at varying costs and levels of detail.

The first three methods are not as good as requiring protection to a BFE. However, they may be more appropriate for small isolated projects where the costs of developing BFE information will be high relative to the cost of the building. The third approach will result in lower flood insurance rates than if the building had no protection, but the rates are not as favorable as they would be if a BFE were calculated. Examples of the possible rates are discussed in Unit 9, Section B.

## Larger developments

You are encouraged to discuss the flood hazard as early as possible in discussions with subdividers and developers of large areas. If a subdivision or planned unit development will be partially in the floodplain, there may be ways to avoid building in the flood hazard area, which can save the developer the cost of a flood study.

**44 CFR 60.3(b)(3):** *[Communities must] Require that all new subdivision proposals and other proposed development (including proposals for manufactured home parks and subdivisions) greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals BFE data.*

Any subdivision or other large development that meets this threshold must be evaluated to determine if the proposed site is in an approximate A Zone and whether BFEs are required. If BFEs are required, the developer must conduct the required study (the community, state or other agency may provide assistance). While the study must provide BFEs, you may want to require a floodway delineation and inclusion of other data needed to ensure that the building sites will be reasonably safe from flooding.

BFE data are required for the affected lots in the subdivisions shown in Figure 5-2 and Figure 5-3. Figure 5-2 shows a 76-lot subdivision with several lots clearly affected by an approximate Zone A area. The subdivision depicted in Figure 5-3 is only 12 lots, but BFEs are required because the subdivision covers more than five acres and clearly shows buildable sites affected by an approximate Zone A area.

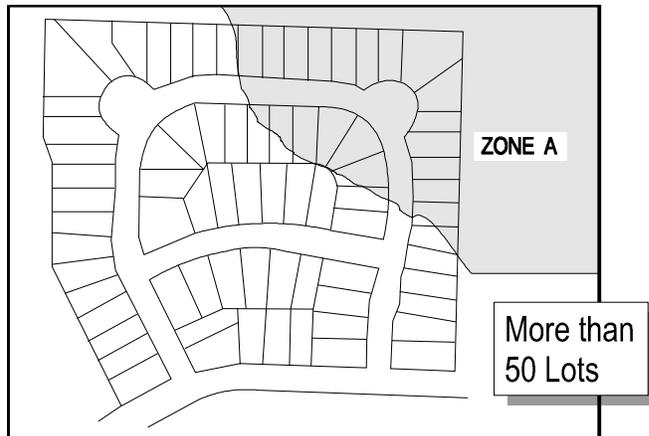


Figure 5-2: Proposed 76-lot subdivision

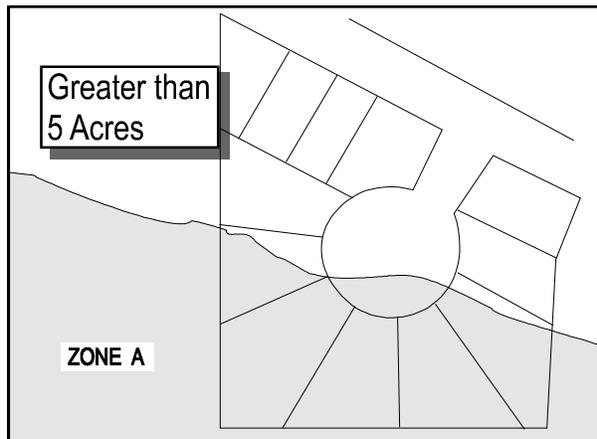


Figure 5-3: Proposed 6.7-acre subdivision

In Figure 5-4, the entire approximate Zone A area is to be left as open space. If the planned subdivision shows the floodplain is contained entirely within an open space lot, it may not be necessary to conduct a detailed engineering analysis to develop BFE data.

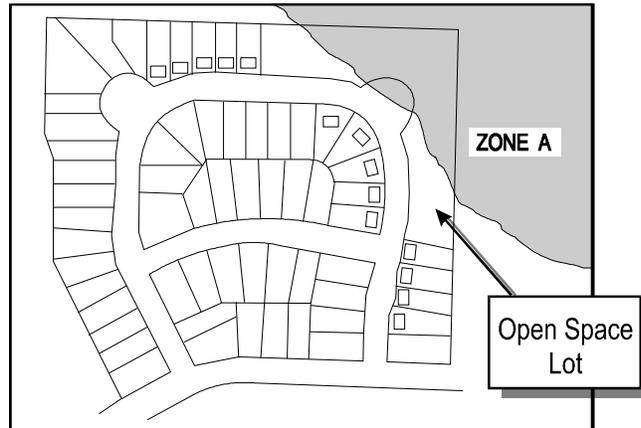
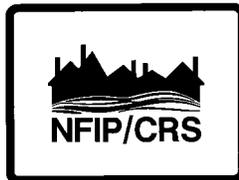


Figure 5-4: Proposed 76-lot subdivision

**44 CFR 65.3:** *As soon as practicable, but not later than six months after the date such information becomes available, a community shall notify the Administrator of [map] changes by submitting technical or scientific data in accordance with this part.*

When a developer prepares a detailed flood study in an approximate A Zone, you must submit the new flood information to FEMA within six months. The community can pass that cost on to the developer by requiring that he or she submit a request for a Letter of Map Revision as a condition of approving the development.



CRS credit is provided if BFEs, floodways and related regulatory data are provided in areas not mapped by the NFIP. This credit can be found in Activity 410, Section 411, of the *CRS Coordinator's Manual* or the *CRS Application*.

## DRAFT REVISED NFIP DATA

The third situation where a community may vary from the official FEMA data is when FEMA has sent some preliminary data to the community for review. Communities are required to “reasonably utilize” the data from a draft or preliminary FIRM or flood insurance study.

Four scenarios are possible:

- ◆ Where the original FIRM shows an A or V Zone with *no* BFEs: Use the draft information. In the absence of other elevation or floodway data, the draft information is presumed to be the best available.
- ◆ Where the original FIRM shows an AE or VE Zone *with* a BFE or floodway and the revision *increases* the BFE or *widens* the floodway: The draft revised data should be used. However, if the community disagrees with the data and intends to appeal, the existing data can be presumed to be valid and may still be used until the appeal is resolved.
- ◆ Where the original FIRM shows an AE or VE Zone *with* a base flood elevation or floodway and the revision *decreases* the BFE or *shrinks* the floodway: The existing data should be used. Because appeals may change the draft data, the final BFE may be higher than the draft. If you were to allow new construction at the lower level as shown in the draft, the owners may have to pay higher flood insurance premiums.
- ◆ Where the original FIRM shows a B, C or X Zone: NFIP regulations do not require that the draft revised data be used. However, you are encouraged to use the draft data to regulate development, since these areas are subject to a flood hazard.

If the community intends to appeal preliminary data, it must be done during the official appeals period. Otherwise, you will have to wait for the new map to become official and submit a request for a map amendment or revision.

For more information on this issue, see *Use of Flood Insurance Study (FIS) Data As Available Data*, FEMA Floodplain Management Bulletin 1-98.

**CLOMRs:** The above four scenarios are also relevant for a Conditional Letter of Map Revision or CLOMR. Note the *conditional* part of a CLOMR. A CLOMR provides that *if* a project is constructed as designed, the BFEs can be revised or modified (or the property in question can be removed from the SFHA) *AFTER* the as-built specifications are submitted *AND* the final LOMR is issued.

A permit cannot be issued based on a lower BFE proposed by a CLOMR until the final LOMR is issued. However, you can issue a permit for that part of the work not dependent on the changes that will result from the LOMR and condition the full permit upon receipt of the final LOMR.

## ADVISORY FLOOD HAZARD DATA

Sometimes FEMA issues advisory data after a major flood where it was found that the FIRM and/or flood insurance study underestimated the hazard. This information is provided so communities can ensure that reconstructed buildings are protected from the true hazard, not the one shown on the FIRM.

When you receive such advisory information, you should “reasonably utilize” it. If your community agrees with the information, the ordinance should be re-

vised to adopt it. If it disagrees with the data, you should be ready to explain why the community is not requiring construction and reconstruction to be protected. You and your community are not helping residents if you allow them to rebuild without protection from a known hazard.

For more information on this issue, see *Use of Flood Insurance Study (FIS) Data As Available Data*, FEMA Floodplain Management Bulletin 1-98.

## C. PERMIT REQUIREMENTS

Permits are required to ensure that proposed development projects meet the requirements of the NFIP and your ordinance. Once a person applies for a permit, you can review the plans and make sure the project complies.

***Basic rule #2: A permit is required for all development in the SFHA shown on your FIRM.***

The first step, therefore, is to get people to apply for a permit.

### DEVELOPMENT PERMIT

**44 CFR 59.** *Definitions: "Development" means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.*

The NFIP requirements are keyed to “development” in the floodplain. “Development” means “any man-made change to improved or unimproved real estate.” This includes, but is not limited to:

- ◆ Construction of new structures
- ◆ Modifications or improvements to existing structures
- ◆ Excavation
- ◆ Filling
- ◆ Paving
- ◆ Drilling
- ◆ Driving of piles
- ◆ Mining
- ◆ Dredging
- ◆ Land clearing
- ◆ Grading
- ◆ Permanent storage of materials and/or equipment

**44 CFR 60.3(a)(1)** [*“60.3(a) communities” that do not have a FIRM must*] *Require permits for all proposed construction or other development in the community, including the placement of manufactured homes, so that it may determine whether such construction or other development is proposed within flood-prone areas;*

If you are a 60.3(a) community, you do not have a FIRM. Consequently, you must require a permit for all development projects throughout your community.

You must review each project's location to determine if it has a flood risk. If it does, the best way to protect a new building from flood damage is to obtain a BFE for the site and require that the building be elevated or protected to or above that BFE.

## **Building permits**

Most communities have long had a system for issuing building permits, but many have not had a permit system for "development." Regulating all development in floodplains is essential because fill or other material can obstruct flood flows just as structures can.

Because a "building permit" often covers only construction or modifications of buildings, this study guide uses the term "development permit." You should check your permit system to ensure that in the floodplain, permits are being required for *ALL* projects that meet the definition of development, not just "building" projects. Make sure you regulate the following in addition to the traditional building projects:

- ◆ Filling and grading.
- ◆ Excavation, mining and drilling.
- ◆ Storage of materials.
- ◆ Repairs to a damaged building that do not affect structural members.
- ◆ Temporary stream crossings
- ◆ Activities by other government agencies, such as roads, bridges and school buildings

If your building permit system does not require permits for these activities, you need to revise your system, enact a new type of "development permit" or otherwise ensure that people apply for a permit for these non-building projects.

## **Small projects**

You have some discretion to exempt obviously insignificant activities from the permit requirement, such as planting a garden, farming, putting up a mailbox or erecting a flagpole. You may also want to exempt routine maintenance, such as painting or re-roofing.

The key is whether the project will present a new obstruction to flood flows, alter drainage or have the potential to be a substantial improvement. These determinations can only be made by the permit official, not the builder, so make sure your exemptions are clear. There should be no possibility of a misunderstanding resulting in construction of a flood flow obstruction or a substantial improvement without a permit.

Some communities specifically exempt small projects in their ordinances. This is the recommended approach, as it avoids challenges that the permit official arbitrarily decides what projects need permits. Check with your state coordinating agency and/or FEMA Regional Office before you do this. You may be able to exempt projects (other than filling, grading or excavating) valued at less than, say, \$500.

## **PERMITS FROM OTHER AGENCIES**

44 CFR 60.3(a)(2) requires all NFIP communities to ensure that other federal and state permits have been obtained. You should not issue your local permit until you are certain that the other agencies' requirements are met.

The purpose of this requirement is to help assure that coordination occurs between various levels of government on projects impacting on floodplains. The requirement has the added benefit of protecting permit applicants by making sure they are aware of and obtain all of the permits necessary for a floodplain development prior to making irreversible financial investments. Permit applicants are not well served if they are allowed to proceed with a project only to have work stopped later by a Federal or State agency because they have not obtained proper permits.

Some communities allow their permit officials to issue the local permit on the condition that other required permits are obtained. However, this is not as effective as holding the local permit until the applicant can show that the other agencies have issued or will issue their permits.

Otherwise, the project may get under way before you are sure that it meets all legal requirements.

To implement this requirement, you're encouraged to develop a list of what permits are required in your jurisdiction. Your state NFIP coordinator should be able to help.

These development activities may require a state permit:

- ◆ Construction in the coastal zone.
- ◆ Construction in floodways or other designated areas.
- ◆ Stream crossings or projects that affect navigable rivers.
- ◆ Installation of septic systems.
- ◆ Subdivision standards or subdivision plat or lot filing requirements.
- ◆ Manufactured housing (mobile home) park or tie-down requirements.
- ◆ Public health facilities, such as hospitals and nursing homes.
- ◆ Alteration of sand dunes.

- ◆ Operating a landfill or hazardous materials storage facility.

The more common federal regulations that may require a permit include:

- ◆ U.S. Army Corps of Engineers Section 404—permits for wetlands filling
- ◆ U.S. Army Corps of Engineers Section 10—permits for work in navigable waterways
- ◆ U.S. Coast Guard—permits for bridges and causeways that may affect navigation.
- ◆ U.S. Fish and Wildlife Service—consultations required under Sections 7 and 10 of the Endangered Species Act of 1973.

You should also check with your county; sewer, sanitary or flood control district; water management district; and any other local or regional agency that may regulate certain types of development in the floodplain.

## D. ENCROACHMENTS

Once a permit application is received and the proposed project is ready for review, the next job is to ensure that the project will not impose flood problems on other properties.

***Basic rule #3: Development must not increase the flood hazard on other properties.***

This is more of a concern in riverine situations where a project may dam or divert flowing water onto other properties or increase flood flows downstream. To prevent this, communities adopt floodways to designate those areas where flood flows are most sensitive to changes brought by development.

Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations. For streams and other watercourses where FEMA has provided BFEs, but no floodway has been designated, the community must review developments on a case-by-case basis to ensure that these increases do not occur.

### REGULATORY FLOODWAYS

**44 CFR 59.1 Definitions:** *"Regulatory floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.*

As explained in Unit 3, Section B, the floodway is the central portion of a riverine floodplain needed to carry the deeper, faster moving water. Buildings, structures and other development activities—such as fill—placed within the floodway are more likely to obstruct flood flows, causing the water to slow down and back up, resulting in higher flood elevations.

A floodway is included with most riverine Flood Insurance Studies and will generally be shown on the Flood Insurance Rate Map (FIRM). Some of the older Flood Insurance Studies will have a separate floodway map. The community officially adopts its “regulatory floodway” in its floodplain management ordinance.

### ENCROACHMENT REVIEW

All projects in the regulatory floodway must undergo an encroachment review to determine their effect on flood flows and ensure that they do not cause problems. Development projects in the flood fringe by definition do not increase flood heights above the allowable level, so encroachment reviews are not needed.

**44 CFR 60.3(d)(3):** *[In the regulatory floodway, communities must] Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge.*

The objective of this requirement and the floodplain management ordinance to ensure that the floodway is reserved to do its natural job: carrying floodwater. The preferred approach is to avoid all development there.

Once your community adopts its floodway, you must fulfill the requirements of 44 CFR 60.3(d). The key concern is that each project proposed in the floodway must receive an encroachment review, i.e., an analysis to determine if the project will increase flood heights. You may also want to require that this review determine if the project will cause increased flooding downstream. Note that the regulations call for preventing ANY increase in flood heights. This doesn't mean you can allow a foot or a tenth of a foot – it means zero increase. If you do not limit the increase to zero, small increases in flood heights from individual developments will cumulatively have significant impacts on flood stages and flood damages. Under NFIP minimum requirements, it is assumed that there will be no cumulative effects since the permissible rise for any single encroachment is zero.

Projects, such as filling, grading or construction of a new building, must be reviewed to determine whether they will obstruct flood flows and cause an increase in flood heights upstream or adjacent to the project site.

Projects, such as such as grading, large excavations, channel improvements, and bridge and culvert replacements, should also be reviewed to determine whether they will remove an existing obstruction, resulting in increases in flood flows downstream.

Your community may conduct the encroachment review, or you may require the developer to conduct it. Most local permit officials are not qualified to make an encroachment review, so most require that this be done by an engineer at the developer's expense.

As the permit reviewer, it is the community's job to ensure that an activity will not cause a problem. You have two options for doing this: For every project you could require the applicant's engineer to certify that there will be no rise in flood heights or you can make the determination for minor projects.

**Encroachment certification:** To ensure that the encroachment review is done right, you may want to require the developer to provide an encroachment certification. This is often called a "no-rise" certification because it certifies that the development project will not affect flood heights. An example of a form developed by the North Carolina state coordinating agency is shown in Figure 5-5.

The certification must be supported by technical data, which should be based on the same computer model used to develop the floodway shown on the community's map.

<b>“NO-RISE” CERTIFICATION</b>
This is to certify that I am a duly qualified registered professional engineer licensed to practice in the State of _____
It is further to certify that the attached technical data supports the fact that proposed _____ (Name of Development) will not impact the 100-year flood elevations, floodway elevations, or floodway widths on _____ (Name of Stream) at published sections in the Flood Insurance Study for _____ (Name of Community) dated _____ (Study Date) and will not impact the 100-year flood elevations, floodway elevations, or floodway widths at unpublished cross-sections in the vicinity of the proposed development.
Attached are the following documents that support my findings:  _____  _____
Date: _____
Signature: _____
Title: _____ {SEAL}

Figure 5-5: Example no-rise certification

Although your community is required to review and approve the encroachment review, you may request technical assistance and review from the FEMA Regional Office or state NFIP Coordinator. If this alternative is chosen, you must review the technical submittal package and verify that all supporting data are included in the package before sending it to FEMA.

**Minor projects:** Some projects are too small to warrant an engineering study and the certification. Many of these can be determined using logic and common sense: a sign post or telephone pole will not block flood flows. Barbed wire farm fences that will be pushed over or ripped out early in the flood may also be permitted without a certification; however, larger more massive fences could be an obstruction to flood flows and may require an engineering study and certification. A driveway, road or parking lot at grade (without any filling) won't cause an obstruction, either.

Building additions, accessory buildings, and similar small projects can be located in the conveyance shadow. This is the area upstream and downstream of an existing building or other obstruction to flood flows. Flood water is already flowing around the larger obstruction, so the addition of a new structure will not change existing flood flow.

Determining the limits of the conveyance shadow is illustrated in Figure 5-6. Small structures located completely within the shadow can be permitted without the engineering analysis needed for a no-rise certification.

*Note: Just because a small structure can be located in the conveyance shadow, it is still preferable to keep all development out of the floodway. Don't forget: all buildings must be elevated or otherwise protected from the base flood.*

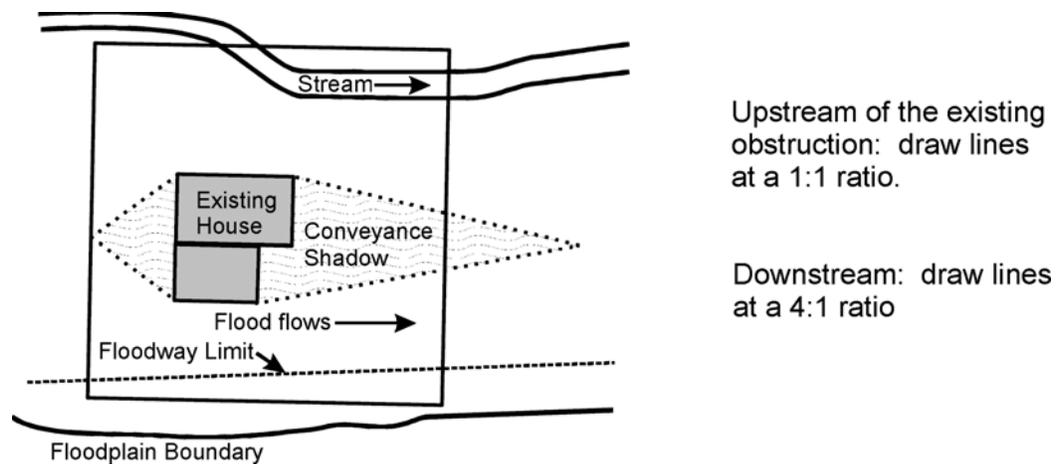


Figure 5-6. Determining the conveyance shadow

## STREAMS WITHOUT FLOODWAY MAPS

If your community has a FIRM with base flood elevations along rivers or streams, but no mapped floodway, you must evaluate all development to ensure that it will not increase flood stages by more than one foot.

**44 CFR 60.3(c)(10):** *[Communities must] Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.*

For the purposes of administering your ordinance, you should treat the entire riverine floodplain as a floodway. You should require the same encroachment cer-

tification to ensure that a development project will not obstruct flood flows and cause increased flooding on other property. This approach is recommended for all other riverine floodplains without a mapped floodway.

In riverine floodplains where no floodway has been designated, the review must demonstrate that the *cumulative* effect of the proposed development, when combined with all other existing and anticipated development:

- ◆ Will not increase the water surface elevation of the base flood more than one foot at any point within the community, and
- ◆ Is consistent with the technical criteria contained in Chapter 5 (Hydraulic Analyses) of the Flood Insurance Study: Guidelines and Specifications for Study Contractors, FEMA-37, 1995.

This review must be required for all development projects, although you may make the same judgments on minor projects as for floodways. You should pay particular attention to developments that may create a greater than one-foot increase in flood stages, such as bridges, road embankments, buildings and large fills.

Note: In some states, floodways are mapped based on allowing flood heights to increase by less than one foot. In those states, the encroachment certification must be based on that more restrictive state standard, not the FEMA standard that allows a one-foot rise.

## ALLOWABLE INCREASES IN FLOOD HEIGHTS

In some situations, it may be in the public interest to allow increase in flood heights greater than those allowed under the NFIP regulations.

For example, it would be hard to build a flood control reservoir without affecting flood heights. Because a dam would have a major impact on flood heights, there needs to be a way to permit such projects, especially those that are intended to reduce flooding.

However, when the project will change the flood level, maps must be changed to reflect the new hazard.

**44 CFR 60.3(d)(4)** *Notwithstanding any other provisions of § 60.3, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision, fulfills the requirements for such revisions as established under the provisions of § 65.12, and receives the approval of the Administrator.*

If your community proposes to permit an encroachment in the floodway or the floodplain that will cause increases in the BFE in excess of the allowable level,

you're required to apply to the FEMA Regional Office for *conditional* approval of such action prior to permitting the project to occur.

As part of your application for conditional approval, you must submit:

- ◆ A complete application and letter of request for conditional approval of a change in the FIRM or a Conditional Letter of Map Revision (CLOMR), along with the appropriate fee for the change (contact the FEMA Regional Office for the fee amount).
- ◆ An evaluation of alternatives which, if carried out, would not result in an increase in the BFE more than allowed, along with documentation as to why these alternatives are not feasible.
- ◆ Documentation of individual legal notice to all affected property owners (anyone affected by the increased flood elevations, within and outside of the community) explaining the impact of the proposed action on their properties.
- ◆ Concurrence, in writing, from the chief executive officer of any other communities affected by the proposed actions.
- ◆ Certification that no structures are located in areas which would be affected by the increased BFE (unless they have been purchased for relocation or demolition).
- ◆ A request for revision of BFE determinations in accordance with the provisions of 44 CFR 65.6 of the FEMA regulations.

Upon receipt of the FEMA conditional approval of the map change and prior to approving the proposed encroachments, you must provide evidence to FEMA that your community's floodplain management ordinance incorporates the post-project condition BFEs.

## E. NEW BUILDINGS IN A ZONES BUILDINGS

**Basic rule #4: New, substantially improved or substantially damaged buildings must be protected from damage by the base flood.**

In this course, the term “building” is the same as the term “structure” in the NFIP regulations. Your ordinance may use either term.

**44 CFR 59.1 Definitions:** "Structure" means, for flood plain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home.

The term “building” or “structure” does not include open pavilions, bleachers, carports and similar structures that do not have at least two rigid walls and a roof.

How to determine if a building is substantially improved or substantially damaged is discussed in Unit 8. In this unit, consider the term “building” as an all-encompassing term that includes substantial improvements and repairs of substantial damage to a building.

Residential and nonresidential buildings are treated differently. A residential building must have a higher level of protection—if it is to be built in the floodplain, it must be elevated above the BFE. Nonresidential buildings, on the other hand, may be elevated or floodproofed (made watertight below the BFE).

### ELEVATION

**44 CFR 60.3(c)(2) [Communities must] Require that all new construction and substantial improvements of residential structures within Zones A1-30, AE and AH zones on the community's FIRM have the lowest floor (including basement) elevated to or above the base flood level...**

In Zones A1-A30, AE and AH, all new construction and substantial improvements of residential structures must be elevated so that the lowest floor (including the basement) is elevated to or above the BFE. This can be done in one of three ways:

- ◆ Elevation on fill.
- ◆ Elevation on piles, posts, piers or columns.
- ◆ Elevation on walls or a crawlspace.

### Fill

Fill can be used by itself or in conjunction with other types of foundations to raise the lowest floor of a building above the BFE. However, restrictions to the

use of fill apply in floodways where fill would cause an increase in flood heights and in V zones where it would act as an obstruction to waves.

Some communities require or encourage the use of fill to elevate residential buildings because they consider fill a safer construction method since the building itself is not in contact with floodwaters. Other communities limit the use of fill in the flood fringe to protect flood storage capacity or require compensatory storage, which is discussed in Unit 6, Section C.

Where fill is the method of choice, it should be properly designed, installed in layers and compacted. Simply adding dirt to the building site may result in differential settling over time.

The fill should also be properly sloped and protected from erosion and scour during flooding. To provide a factor of safety for the building and its residents, it is recommended that the fill extend 10 – 15 feet beyond the walls of the building before it drops below the BFE.

### **Piles, posts, piers or columns**

Piles, piers, posts or columns are appropriate foundations for elevating buildings above the BFE where there is deeper flooding, fill is not feasible or not allowed, or for areas with high velocity flooding. Where flooding is likely to have high velocities or waves, leaving the area below the building free of obstruction with no lower area enclosure is preferred. As illustrated in Figure 5-8, this permits unrestricted flow of floodwater under the building. There will be less force applied to the building by floodwaters and less impact on flood heights than if solid walls were used.



Figure 5-7. These two new buildings elevated on fill were not damaged by this 100-year flood.



Figure 5-8. Elevation on piers

## Walls or crawlspace

The third elevation technique is to build on solid walls. In shallower flooding areas, this elevation technique is the same as creating a crawlspace—a foundation of solid walls that puts the lowest floor above the flood level. In deeper flooding areas this often results in elevating the building a full story and creation of an enclosed area below the BFE.

When solid walls are used, care must be taken to ensure that hydrostatic or hydrodynamic pressure does not damage the walls. As discussed in Unit 1, Section B, these water pressures can cause a solid wall to collapse damaging the elevated portion of the building.

There are two ways to prevent this:

- ◆ Stem walls can be used on two sides parallel to the flow of water. The other two sides are kept open (Figure 5-9). This minimizes the obstruction to floodwaters and lessens pressure on the foundation.
- ◆ The walls can be built with openings large enough to allow floodwaters to flow in and out, preventing differential pressures on the walls. Openings are required any time there is a fully enclosed area below the BFE. This is discussed in more detail in the later section on enclosures.



Figure 5-9: Building elevated on parallel stem walls.



Figure 5-10: Building elevated on crawlspace with openings.

When a crawlspace is used to elevate the building above the base flood elevation, it creates an enclosed area below the BFE that must meet all requirements that apply to enclosures including the openings requirement (see the sections of this Unit on Enclosures and Openings). In addition the floor of the crawlspace must be at or above the lowest adjacent grade to the building to minimize hydro-

static pressures against the crawlspace walls and the ponding of water within the crawl space after a flood.

Recently FEMA issued a policy allowing communities to permit construction of crawlspaces with their floors below grade in the Special Flood Hazard Area (SFHA) under certain conditions. Communities that wish to allow below-grade residential crawlspace construction must require that the interior grade of the crawlspace is no more than two feet below the lowest adjacent grade, the height of the crawlspace measured from the interior grade of the crawlspace to the top of the crawlspace wall does not exceed four feet at any point, and the building meets other limitations. These communities must adopt these requirements as part of their floodplain management ordinance. Below-grade crawlspaces that meet these requirements will not be considered basements, but the buildings will still have higher flood insurance rates than if the same crawlspace had its floor at or above lowest adjacent grade.

Technical Bulletin 11-01 *Crawlspace Construction for Buildings Located in Special Flood Hazard Areas* provides a best practices approach for crawlspace construction. While communities may allow below-grade crawlspace construction, the Technical Bulletin continues to recommend that the interior of the crawlspace be backfilled so that the interior grade is level to or higher than the lowest adjacent grade (LAG) to the building. The Technical Bulletin offers appropriate considerations and guidance for below-grade crawlspace construction. Communities that wish to allow below-grade crawlspaces should refer to the Technical Bulletin for the specific requirements that must be incorporated into their floodplain management ordinance.

## How high?

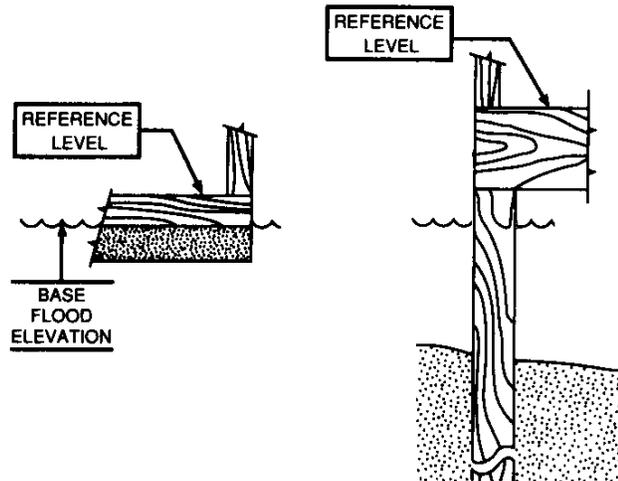
NFIP regulations require that the lowest floor of a building must be elevated above the BFE. Note three things about this minimum requirement:

1. The term “lowest floor” includes a basement because all usable portions of a building must be protected from flood damage.

**44 CFR 59.1. Definitions:** "Lowest Floor" means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of section 60.3.

2. The minimum requirement is to elevate to the BFE. In the next unit, we will discuss freeboard, an extra margin of protection that requires the lowest floors to be one or more feet above the BFE.
3. In A Zones, under the minimum NFIP requirement, the lowest floor is measured from the top of the floor (Figure 5-11). However, all portions of

the building below the BFE must be constructed with flood resistant materials and building utility systems (including ductwork) must be elevated above the BFE or floodproofed (made watertight) to that elevation. To meet these requirements, it is recommended that buildings on elevated foundations, such as piles or a crawlspace, have supporting beams or floor joists and building utility systems elevated to or above the BFE to protect them from flood damage. This is generally easier than using flood resis-



tant materials for floor support systems or floodproofing building utility systems.

Figure 5-11. In A Zones: the top of the floor is the reference level

## Elevation Certificate

Because most new buildings built in the floodplain are residences, elevating them is one of the most important requirements of the NFIP. To ensure that a building is elevated above the BFE, the lowest floor is surveyed and an elevation certificate is obtained and kept by the local permit office. This is discussed in more detail in Unit 7, Section G.

## ENCLOSURES

Enclosures are areas created by a crawlspace or solid walls that fully enclose areas below the BFE. They deserve special attention for two reasons:

- ◆ The walls of enclosed areas are subject to flood damage from hydrostatic and hydrodynamic forces.
- ◆ People are tempted to convert enclosures that are intended to be flooded into areas that can sustain damage in a flood.

NFIP regulations allow certain uses in enclosures below the BFE because they can be designed so that they are subject to minimal flood damage. Three uses are allowed:

- ◆ building access
- ◆ vehicle parking
- ◆ storage.

The storage permitted in an enclosed lower area should be limited to that which is incidental and accessory to the principal use of the structure. For example, if the structure is a residence, storage should be limited to items such as lawn and garden equipment, bicycles, and snow tires which either have a low damage potential or that can be easily moved to the elevated portion of the building if there is a flood.

The floodplain regulation requirements can be easier to accept if owners and builders are encouraged to think about the enclosed lower areas as usable space. If a building has to be elevated, say, five feet above grade, the owner should be encouraged to go up eight feet. This allows the lower area to be used for parking—and provides three extra feet of flood protection.

However, if the lower area is enclosed, there is a tendency for the owner to forget about the flood hazard and convert the enclosure to a bedroom or other finished room. This must be prevented.

Since floodwaters are intended to enter the enclosure—it must be built of flood-resistant materials (see the section on flood-resistant materials do determine which are acceptable). Not allowed are finishings such as carpeting, paneling, insulation (both cellulose and fiberglass) and gypsum wallboard (also known as drywall and sheet rock).

Utilities that serve the upper level also must be protected from flood damage. Consequently, a furnace cannot be put in an enclosure unless it is located above the BFE. This is explained in more detail in *Engineering Principles and Practices for Flood Damage-Resistant Building Support Utility Systems*, FEMA 348, and November 1999. When the lower area enclosure is used to provide access to the upper level, a stairway can be designed that provides this access yet is resistant to flood damage. Installing an elevator is more difficult, but there are ways to design and install an elevator that will face minimal flood damage, as explained in *Elevator Installation for Buildings Located in Special Flood Hazard Areas*, FIA-TB-4, FEMA 1993.

## Openings

As noted in Unit 1, solid walls can collapse from hydrostatic pressure if floodwaters get too deep outside the building. To prevent this, an enclosure must

have openings to allow floodwaters to enter and leave, thus automatically equalizing hydrostatic flood forces on both sides of the walls.

**44 CFR 60.3(c)(5)** *[Communities must] Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria: A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.*

You can be sure the openings are adequate by using one of two methods.

The first method is to have the design meet or exceed the following three criteria:

1. The bottom of the openings must be no higher than one foot above grade (see Figure 5-12).
2. The openings shall be installed on at least two walls of the enclosure to ensure that at least one will work if others get blocked or plugged.
3. Provide a minimum of two openings having a net area of not less than one square inch for every square foot of enclosed area that is subject to flooding. If the area of the enclosure is 1,000 square feet, the area of the openings combined must total at least 1,000 square inches.

For example, removing a concrete block from a block wall results in an 8” x 16” or 128 square inches opening (see Figure 5-12). To determine how many openings would be needed, divide the square footage of the floor area by 128.

Example 1:  $\frac{1,280 \text{ square foot house}}{128 \text{ square inches/opening}} = 10$       10 openings will be needed

Example 2:  $\frac{2,000 \text{ square foot house}}{128 \text{ square inches/opening}} = 15.62$       16 openings will be needed

If the opening is covered by a standard crawlspace vent cover or grate, the net area of the opening must be used and the number of openings increased accordingly. Net areas can be found on manufacturers specifications or estimated if specifications are not available.

The second method of meeting the requirement is to have the design certified by a registered professional engineer or architect as meeting the requirement to automatically equalize hydrostatic forces on exterior walls by allowing for the entry and exit of floodwaters. Under some circumstances it may be possible to vary the size or location of the openings based on this certification.

Openings may be equipped with screens, louvers, valves or other coverings or devices to keep animals out of the enclosure. However, any covering must permit the automatic flow of floodwater in both directions.

The opening sizes in the previous examples and in Figure 5-12 are based on the size of standard crawlspace vents, which most building codes require to be installed in a crawlspace for ventilation purposes. Often these are located close to the floor in order to circulate air around the floor joists.

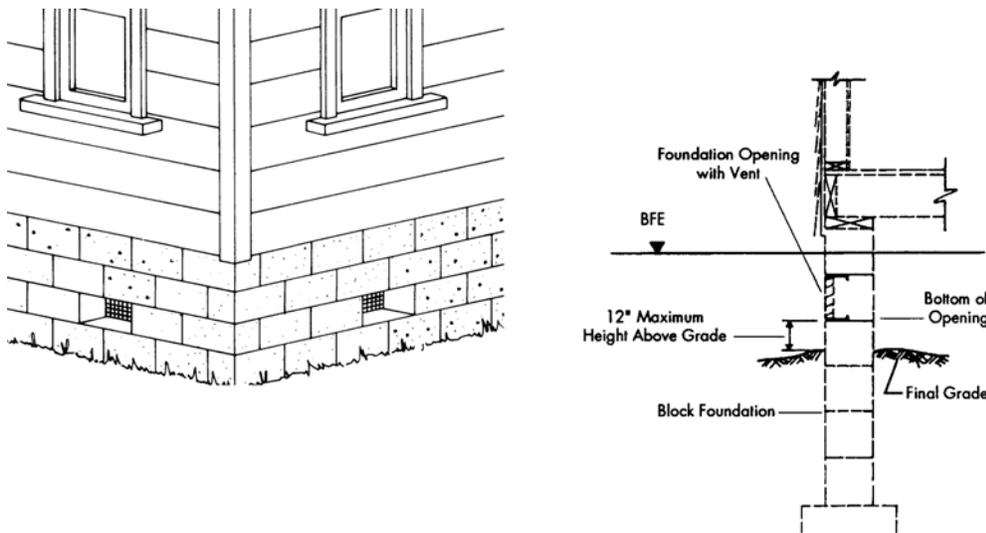


Figure 5-12. Opening location in solid foundation wall

Air vents are located well above the ground in an elevated house and would not meet the NFIP requirement that the bottom of the opening be within one foot of grade. However, NFIP requirements and building codes can be satisfied by the same vents if they meet the three criteria listed above.

Garage doors cannot be used to satisfy this requirement because they do not permit the automatic flow of floodwaters. However, garage doors may have vents in them that meet the above criteria.

Openings are not required for stem wall foundations that have been backfilled with a concrete floor slab poured that is supported by the fill.

For further guidance, refer to *Openings in Foundation Walls*, FIA-TB-1 (FEMA 1993).

## Use

Enclosed areas are designed to be flooded and can be used only for parking vehicles, storage or access to the elevated living area—uses that can be designed so they are subject to little or no flood damage.

The type of storage permitted in an enclosed lower area should be limited to that which is incidental and accessory to the principal use of the structure. For instance, if the structure is a residence, the enclosure should be limited to storage of lawn and garden equipment, snow tires, and other low damage items, which can be conveniently moved to the elevated part of the building.

The interior portion of an enclosed area should not be partitioned or finished into separate rooms, except to separate the garage from the access and storage areas.

If a building is elevated eight feet or more, regulating the use of the enclosure presents special problems. Over time, the owner may forget the flood hazard and want to convert the floodable area into a finished room. Such an action would increase the flood damage potential for the building and violate the conditions of the building permit.

However, because the room is hidden behind walls, it can be very hard for the permit office to catch such a conversion. You should carefully check new building plans for signs, such as roughed in plumbing and sliding glass doors that indicate that the owner may expect to finish the area in the future. You should also clearly state on your permit what the limitations are on construction and use of the enclosed area.

One way to help prevent conversions is to have the owner sign a nonconversion agreement. An example developed by the North Carolina State NFIP Coordinator is in Figure 5-13.

This DECLARATION made this \_\_\_\_ day of \_\_\_\_\_, 20\_\_, by \_\_\_\_\_  
("Owner") having an address at \_\_\_\_\_

WITNESSETH:

WHEREAS, the Owner is the record owner of all that real property located at \_\_\_\_\_ in the City of \_\_\_\_\_ in the County of \_\_\_\_\_, designated in the Tax Records as \_\_\_\_\_.

WHEREAS, the Owner has applied for a permit or variance to place a structure on that property that either (1) does not conform, or (2) may be noncompliant by later conversion, to the strict elevation requirements of Article \_\_\_\_\_ Section \_\_\_\_\_ of the Floodplain Management Ordinance of \_\_\_\_\_ ("Ordinance") and under Permit Number \_\_\_\_\_ ("Permit").

WHEREAS, the Owner agrees to record this DECLARATION and certifies and declares that the following covenants, conditions and restrictions are placed on the affected property as a condition of granting the Permit, and affects rights and obligations of the Owner and shall be binding on the Owner, his heirs, personal representatives, successors and assigns.

UPON THE TERMS AND SUBJECT TO THE CONDITIONS, as follows:

1. The structure or part thereof to which these conditions apply is: \_\_\_\_\_

2. At this site, the Base Flood Elevation is \_\_\_\_\_ feet above mean sea level, National Geodetic Vertical Datum.

3. Enclosed areas below the Base Flood Elevation shall be used solely for parking of vehicles, limited storage, or access to the building. All interior walls, ceilings and floors below the Base Flood Elevation shall be unfinished or constructed of flood resistant materials. Mechanical, electrical or plumbing devices shall not be installed below the Base Flood Elevation.

4. The walls of the enclosed areas below the Base Flood Elevation shall be equipped and remain equipped with vents as shown on the Permit.

5. Any alterations or changes from these conditions constitute a violation of the Permit and may render the structure uninsurable or increase the cost for flood insurance. The jurisdiction issuing the Permit and enforcing the Ordinance may take any appropriate legal action to correct any violation.

6. Other conditions: \_\_\_\_\_

In witness whereof the undersigned set their hands and seals this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Owner \_\_\_\_\_ (Seal)

\_\_\_\_\_  
Witness \_\_\_\_\_ (Seal)

Figure 5-13: Example Nonconversion agreement

## FLOODPROOFING

Nonresidential buildings must be elevated or floodproofed. If they are elevated, they must meet the same standards as for residential buildings that were just reviewed. Elevation is the preferred method of flood protection because it is more dependable. Elevated commercial and industrial buildings can often be designed so that they can continue to operate during a flood reducing or eliminating business disruptions. Also, it will generally prove to be less expensive to elevate a non-residential building than to floodproof it. However, there will be situations where floodproofing may be the only feasible alternative for protecting a nonresidential building.

**44 CFR 59.1. Definitions:** "Flood proofing" means any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

**44 CFR 60.3(c)(3) [Communities must]** Require that all new construction and substantial improvements of non-residential structures within Zones A1-30, AE and AH zones on the community's firm (i) have the lowest floor (including basement) elevated to or above the base flood level or, (ii) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;

**44 CFR 60.3(c)(4) [Communities must]** Provide that where a non-residential structure is intended to be made watertight below the base flood level, (i) a registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of paragraph (c)(3)(ii) or (c)(8)(ii) of this section, and (ii) a record of such certificates which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained with the official designated by the community under §59.22(a)(9)(iii);

For the purposes of regulating new construction, floodproofing is defined measures incorporated in the design of the building so that below the BFE:

- ◆ Walls are watertight (substantially impermeable to the passage of water),
- ◆ Structural components can resist hydrostatic and hydrodynamic loads and effects of buoyancy, and
- ◆ Utilities are protected from flood damage.

Most floodproofing is appropriate only where floodwaters are less than three feet deep, since walls and floors may collapse under higher water levels.

A registered professional engineer or architect must prepare the building plans and certify the floodproofing measures, preferably using the FEMA Floodproofing Certificate form. This is discussed in more detail in Unit 7, Section G.

Floodproofing techniques that require human intervention are allowed but should be discouraged. Human intervention means that a person has to take some action before the floodwater arrives, such as turn a valve, close an opening or switch on a pump. There are many potential causes of failure for these techniques, including inadequate warning time, no person on duty when the warning is issued, the responsible person can't find the right parts or tools, the person is too excited or too weak to install things correctly, and/or the electricity fails.

Before you approve plans for a building that relies on human intervention to be floodproofed, you should make sure that there are plans and precautions to keep such problems from occurring. Techniques that rely on human intervention should only be allowed in areas with adequate warning time and in situations where there will be someone present who is capable of implementing or installing the required measures.

More information on floodproofing can be found in FEMA's Technical Bulletin 3-93, *Non-Residential Floodproofing Requirements and Certification for Buildings Located in Special Flood Hazard Areas* (FIA-TB-3. 1993)

## **How high?**

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 insurance rates as a building elevated to the BFE. Unit 9, Section B, discusses this in more detail.

## BASEMENTS

For the purposes of the NFIP, a basement is defined as any area that is subgrade on all sides. The “lowest floor” of a building is the top of the floor of the basement if there is a basement. Since the “lowest floor” of a residential building must be at or above the BFE, it will be highly unusual to construct a basement in a floodplain that met these requirements.

**44 CFR 59.1** Definitions: "Basement" means any area of the building having its floor subgrade (below ground level) on all sides.

Note that “walkout basements,” “daylight basements” or “terrace levels” are usually subgrade on only three sides, with the downhill side at or above grade. Thus, they are not considered basements for either floodplain management or flood insurance rating purposes (but they are still the lowest floor of a building for floodplain management and insurance rating purposes). If these areas are used only for parking, access, or storage and they meet other ordinance requirements, they can be regulated as enclosures below an elevated building and not be considered the lowest floor of the building.

On the other hand, cellars, the lower level of a split-level or bi-level house, garden apartments and other finished floors below grade are considered basements under NFIP regulations.

Since the lowest floor of a residential building must be above the BFE, the only way to build a residential basement in the floodplain under NFIP minimum requirements is if it is elevated on fill and surrounded by fill. Floodproofed non-residential basements are allowed, provided they meet the requirements discussed in the previous section on floodproofing.

## BASEMENT EXCEPTIONS

A few communities have obtained exceptions to the NFIP regulations that allow them to permit floodproofed residential basements. The soil types and flooding conditions in these communities allow construction of floodproofed basements that are not subject to damage by hydrostatic or hydrodynamic forces.

A community may apply for an exception to allow floodproofed residential basements if it can demonstrate flood depths are less than five feet, velocities are less than five feet per second, there is adequate warning time for the site and it has appropriate construction requirements. This exception is explained in 44 CFR 60.6(c).

Buildings with floodproofed basements must have their design certified by a registered engineer or architect and are more difficult and more expensive to construct than buildings elevated above the BFE. Improperly designed or constructed

basements can collapse or otherwise fail resulting in major damage to the structure.

## **BASEMENTS AND LOMR-F AREAS**

It has become a common practice in some areas of the country to fill an area to above the BFE and then obtain a Letter of Map Revision based on fill (LOMR-F) to remove the land from the floodplain. Once the land is no longer in the floodplain, the builder obtains permits to build residences with basements below the BFE. This practice has raised a number of issues and concerns:

- ◆ The procedure was being used to get around community floodplain management ordinances.
- ◆ Buildings with basements below BFE were being built too close to the edges of these fills that could be subject to severe flood damage if the basement walls are subjected to hydrostatic pressure from surface water or groundwater during flooding.
- ◆ LOMR-Fs for nearly identical buildings were being granted or not granted based on the date the LOMR was applied for and not on the risk to the building.

FEMA issued a final rule on May 4, 2001 revising LOMR-F procedures to address these issues. The new procedure places responsibility back in the hands of the community by requiring that, before a LOMR-F is granted, the community sign a community acknowledgement form and make findings that:

- ◆ The project, including any buildings, meets all the requirements of the community's floodplain management ordinance, and
- ◆ Any existing or future development on the filled area is "reasonably safe from flooding".

FEMA will not act on a LOMR-F request without this acknowledgement.

**44 CFR 65.2(c)** "Reasonably safe from flooding" means that base flood waters will not inundate the land or damage structures to be removed from the SFHA and that any subsurface waters related to the base flood will not damage existing or proposed buildings."

FEMA has issued Technical Bulletin 10-01 *Ensuring That Structures Built on Fill In or Near Special Flood Hazard Areas Are Reasonably Safe From Flooding* to provide guidance on how to make the determination that an area is "reasonably safe from flooding". The risk to buildings built in these areas will vary depending on soil conditions, the location of the building relative to the edge of the fill, and whether the building will have a basement below the BFE.

The safest method of constructing a building on filled land removed from the SFHA is to elevate the entire building above BFE. If basements are to be built in these areas, Technical Bulletin 10-01 provides a simplified method for determining whether those basements will be “reasonably safe from flooding”.

Communities have asked for guidance on how they can ensure that future buildings placed on the property will be “reasonably safe from flooding” since, once the LOMR-F is issued, the land is no longer in the SFHA and generally is not subject to their floodplain management ordinance. Communities have several options they can use.

They can withhold signing the acknowledgement until the LOMR-F applicant provides sufficient information on the location and type of proposed buildings to evaluate those building sites against the criteria in Technical Bulletin 10-01. For example, the community could require submission of a subdivision plat or grading plan showing future building locations.

They could adopt or use other requirements that allow them to ensure any future buildings on the filled property remain reasonably safe from flooding. For example, a community may have building code requirements to ensure that any future basements are properly constructed to resist damage from groundwater.

Technical Bulletin 10-01 provides a number of other alternatives for ensuring that unimproved land is “reasonably safe from flooding” and stays that way. Communities have the option of requiring that the applicant submit any engineering information necessary to make the determination.

The criteria in Technical Bulletin 10-01 can also be used to ensure that buildings built with basements that are adjacent to the floodplain are constructed in a way that minimizes potential damages from groundwater during a flood.

For further information, see Technical Bulletin 10-01 *Ensuring that structures Built on Fill in or Near Special Flood Hazard Areas are Reasonably Safe from Flooding in Accordance with the National Flood Insurance Program (TB 10-01)*.

## ANCHORING

**44 CFR 60.3(a)(3)** ...If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall (i) be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy...

Both elevated and floodproofed buildings must be properly anchored to stabilize them against flood forces. This means anchoring the building to its foundation and ensuring that the foundation won't move. Therefore, you need to make sure there is adequate protection against hydrostatic and hydrodynamic forces and erosion and scour that can undercut the foundation.

In areas of shallow flooding and low flood velocities, normal construction practices suffice. Additional anchoring measures, such as reinforcing crawlspace walls, using deeper footings, using extra bolts to connect the sill to the foundation, or installing rods to connect the cap to the sill, should be required in three situations:

- ◆ Where the flood flows faster than five feet per second.
- ◆ In coastal areas subject to waves and high winds.
- ◆ In manufactured or mobile homes (see the section on Manufactured Homes for details).

In some areas it may be necessary to use foundations such as piles or piers which provide less resistance to floodwaters.

If your community has any of these conditions, you should see if there are state standards that take these into account, such as state coastal construction or manufactured housing (mobile home) tie-down regulations. If not, it is recommended that the builder's architect or engineer sign a statement saying the design of the building includes "anchoring adequate to prevent flotation, collapse and lateral movement" during the base flood.

## FLOOD-RESISTANT MATERIAL

Whether a building is elevated or floodproofed, it is important that all parts exposed to floodwaters be made of flood-resistant materials (Figure 5-14). This includes all portions of the building below the BFE including foundation elements such as floor beams and joists and any below BFE enclosures.

**44 CFR 60.3(a) (3)** ...If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall (ii) be constructed with materials resistant to flood damage...

"Flood-resistant materials" include any building product capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage. "Prolonged contact" means at least 72 hours, and "significant damage" is any damage requiring more than low-cost cosmetic repair (such as painting).

- ◆ Concrete, concrete block or glazed brick
- ◆ Clay, concrete or ceramic tile
- ◆ Galvanized or stainless steel nails, hurricane clips and connectors (in areas subject to saltwater flooding)
- ◆ Indoor-outdoor carpeting with synthetic backing (do not fasten down)
- ◆ Vinyl, terrazzo, rubber or vinyl floor covering with waterproof adhesives.
- ◆ Metal doors and window frames.
- ◆ Polyester-epoxy paint (do not use mildew-resistant paint indoors, especially on cribs, playpens or toys because it contains an ingredient that is toxic)
- ◆ Stone, slate or cast stone (with waterproof mortar)
- ◆ Mastic, silicone or polyurethane formed-in-place flooring. Styrofoam insulation
- ◆ Water-resistant glue
- ◆ Pressure treated (.40 CCA minimum) or naturally decay resistant lumber, marine grade plywood

Figure 5-14: Flood-resistant materials

For further details on flood-resistant material requirements, refer to FEMA Technical Bulletin 2-93, *Flood-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas*.

## **ACCESSORY STRUCTURES**

Certain accessory structures may not qualify as “buildings.” For example, open structures, such as carports, gazebos and picnic pavilions that do not have at least two rigid walls, are not “buildings” and do not have to be elevated or flood-proofed.

In some cases, low-cost accessory buildings may be wet-floodproofed and do not have to be elevated or dry floodproofed. These structures could include detached garages and small boathouses, pole barns and storage sheds. Such structures must meet these requirements:

- ◆ The owner must obtain a variance (contact your FEMA Regional Office on procedures for this type of variance),
- ◆ The building must be used only for parking or storage,

- ◆ The building must have the required openings to allow floodwaters in and out,
- ◆ The building must be constructed using flood resistant materials below the BFE,
- ◆ The building must be adequately anchored to resist floatation, collapse, and lateral movement, and
- ◆ All building utility equipment including electrical and heating must be elevated or floodproofed.

Wet floodproofing involves using flood-resistant materials below the BFE and elevating things subject to flood damage above the BFE. Items that should be installed above the BFE include electrical boxes, switches and outlets. Only the minimum amount of electrical equipment required by code may be located below the BFE, and that equipment must be flood damage resistant.

For additional guidance, see *Wet Floodproofing Requirements*, FIA-TB-7, FEMA 1994, and *Engineering Principles and Practices for Flood Damage-Resistant Building Support Utility Systems*.

## MANUFACTURED HOMES

**44 CFR 59.1 Definitions:** "Manufactured home" means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

Manufactured homes include not only manufactured homes that meet HUD manufactured home standards, but also older mobile homes that pre-date these standards.

### Elevation

Generally, manufactured homes must meet the same flood protection requirement as "stick built" or conventional housing. Since they are usually residential buildings, they must be elevated so the lowest floor is above the BFE.

**44 CFR 59.1** Definitions: "Manufactured home park or subdivision" means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

**44 CFR 59.1** Definitions: "Existing manufactured home park or subdivision" means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by the community.

**44 CFR 60.3(c)(6)** Require that manufactured homes placed or substantially improved within Zones A1-30, AH, and AE on the communities FIRM on sites (i) Outside of a manufactured home park or subdivision, (ii) In a new manufactured home park or subdivision, (iii) In an expansion to an existing manufactured home park or subdivision, or (iv) In an existing manufactured home or subdivision on which a manufactured home has sustained "substantial damage" as the result of a flood, be elevated on a permanent foundation such the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist floatation collapse and lateral movement.

**44 CFR 60.3(c)(12)** Require that manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A-1-30, AH, and AE on the community's FIRM that are not subject to the provisions of paragraph (c)(6) of this section be elevated so that either (i) the lowest floor of the manufactured home is at or above the base flood elevation, or (ii) the manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.

44 CFR Section 60.3(c)(6) establishes the basic elevation and anchoring requirements that apply to most manufactured home placements including those outside of manufactured home parks and subdivision and in new manufactured home parks and subdivisions. These manufactured homes must have their lowest floors at or above the BFE. These requirements also apply to manufactured homes placed in expansions to existing manufactured home parks and on sites where manufactured homes are substantially damaged by a flood. As with stick-built housing, all parts of the manufactured home below the BFE must be constructed with flood resistant materials and building utility systems must either be elevated or made watertight to the BFE. The best way to meet this requirement is to elevate the bottom of the manufactured home chassis to this elevation. See FEMA's *Manufactured Home Installation in Flood Hazard Areas*, FEMA-85, for additional guidance

44 CFR Section 60.3(c)(12) allows for a limited exemption to elevating to the BFE for sites in existing manufactured housing (mobile home) parks. These older

manufactured home parks were established before Flood Insurance Rate Maps (FIRMs) were issued for the community and before the community adopted a floodplain management ordinance that meets NFIP requirements. In such older parks, a newly placed manufactured home chassis must be “supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade.”

This exemption does not apply to repairing or replacing a manufactured home on a site in an existing manufactured home park where a manufactured home has been substantially damaged by a flood.

This exemption is a compromise that tries to balance the flood hazard against the severe economic impacts on some manufactured home park owners that would result if elevation to the BFE were required. There are often practical difficulties in elevating manufactured homes to the BFE in many of the older parks due to small lot sizes and the split ownership of the manufactured home and the lot itself. The exemption may not be necessary or appropriate for your community, especially if manufactured home parks are able to meet the requirement to elevate to the BFE. In other areas, the flood hazard may be so severe that the exemption may put lives and property at too great a risk. Many states have not included this exemption in their model ordinances and it may not be in your regulations.

## Anchoring

*44 CFR 60.3(c)(6) ...[Manufactured homes must] be elevated on a permanent foundation ... and be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement.*

A “permanent foundation” means more than a stack of concrete blocks. It should include a below-grade footing capable of resisting overturning, the depth needs to account for frost depth and expected scour, the footing must be sized appropriately for the site’s soil bearing capacity, and the design needs to account for seismic and other hazards.

The following types of permanent foundations can be used:

- ◆ Reinforced piers,
- ◆ Post-tensioned piers
- ◆ Posts,
- ◆ Piles,
- ◆ Poured concrete walls,
- ◆ Reinforced block walls, or
- ◆ Compacted fill.

“Adequately anchored” means a system of ties, anchors and anchoring equipment that will withstand flood and wind forces. The system must work in saturated soil conditions. Usually this means over-the-top or frame tie-downs in addition to standard connections to the foundation.

Most states have manufactured home tie-down regulations. Check with your state NFIP coordinator to see if your state’s regulations also meet the NFIP anchoring standard. If so, you need only make sure that the state requirement is met for each new manufactured home installed in your floodplain.

If not, see FEMA’s *Manufactured Home Installation in Flood Hazard Areas*, FEMA-85, for additional guidance on anchoring. The anchoring requirement does apply in an existing (pre-FIRM) manufactured housing or mobile home park. Even if the manufactured home is not elevated above the BFE, the anchoring system must still withstand the forces of a flood over the first floor.

**Evacuation:** In some areas, there is adequate warning time to remove a manufactured home from harm’s way. Protecting such property should not be discouraged, so FEMA allows an evacuated manufactured home to be put back on the original site in an existing manufactured home park without having to meet the requirements for siting a new manufactured home. Since much can go wrong in trying to evacuate a manufactured home, evacuation is not a substitute for permanently protecting the manufactured home by elevating it to or above the BFE.

## RECREATIONAL VEHICLES

**44 CFR 59.1** Definitions: "Recreational vehicle" means a vehicle which is:

- (a) built on a single chassis;
- (b) 400 square feet or less when measured at the largest horizontal projection;
- (c) designed to be self-propelled or permanently towable by a light duty truck; and
- (d) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

A recreational vehicle placed on a site in an SFHA must:

- ◆ Meet the elevation and anchoring requirements for manufactured homes, OR
- ◆ Be on the site for fewer than 180 consecutive days, OR
- ◆ Be fully licensed and ready for highway use. “Ready for highway use” means that it is on its wheels or jacking system is attached to the site only by quick disconnect type utilities and has no permanently attached additions.

The purpose of this requirement is to prevent recreational vehicles from being permanently placed in the floodplain unless they are as well protected from flooding as a manufactured home.

The NFIP does not have minimum requirements for recreational vehicle parks or campgrounds other than the limitations on the placement of recreational vehicles. Recreational vehicle parks and campgrounds are often good uses for floodplains, particularly when flooding usually occurs during seasons when these facilities are not in use or where there is plenty of warning time prior to a flood. These facilities should not be permitted in flash flood areas since there may be loss of life if flooding occurs as well as loss of the recreational vehicles.

## **AO AND AH ZONES**

AO Zones are shallow flooding areas where FEMA provides a base flood depth. Since there is no BFE, the rules read a little differently.

All new construction and substantial improvements of residential structures shall have the lowest floor (including basement) elevated above the highest adjacent grade:

- ◆ At least as high as the depth number specified in feet on the community's FIRM, or
- ◆ At least two feet if no depth number is specified.

All new construction or substantial improvements of nonresidential structures shall meet the above requirements or, together with attendant utility and sanitary facilities, be floodproofed to the same elevation.

AH Zones are also shallow flooding areas, but have BFEs. Buildings in AH zones must meet the same requirements as in AE zones.

In AO and AH Zones, adequate drainage paths are required around structures on slopes to guide floodwater around and away from proposed structures. (Requiring this throughout the community is a good idea, as it will prevent local drainage problems from causing surface flooding.)

## **A99 AND AR ZONES**

An A99 Zone is an SFHA that will be protected by a Federal flood control project that is currently under construction and which meets specified conditions.

An AR Zone is an SFHA that used to be a B, C or X Zone that used to be protected by an accredited flood control system. The system has been decertified but is in the process of being restored to provide protection to the base flood level.

When the flood control systems are completed or restored, the areas in A99 and AR Zones are expected to be remapped and taken out of the SFHA. Until then, they are treated as SFHA for insurance purposes and there are some flood-plain management requirements.

A99 and AR Zones are special situations—few exist. If you have one, you should contact your state NFIP coordinating agency or FEMA Regional Office for guidance on regulatory requirements for you situation.

## F. NEW BUILDINGS IN V ZONES

Zones V1-30, VE and/or V identified on FIRMs designate high hazard areas along coastlines that are subject to flooding from storm surge and wave impacts during coastal storms and hurricanes. Different construction standards apply in V-zones to help buildings withstand these wave impacts. See Unit 3 for information on how V-zones are designated. Many V Zones are also subject to erosion and scour which can undercut building foundations.

***Basic rule #5: Due to wave impacts, V Zones have special building protection standards in addition to the requirements for A Zones.***

This section identifies only those building protection requirements that differ from the A Zone criteria. Unless mentioned in this section, all A Zone standards apply for new and substantially improved buildings in V Zones. If your community contains V-zones, you will need more information than is contained in this section to adequately regulate coastal construction. You should obtain a copy of FEMA's *Coastal Construction Manual*, FEMA-55 (May 2000) and, if possible, attend a course on coastal construction offered by FEMA, your state, or a building code organization.

### BUILDING LOCATION

New or substantially improved buildings in V Zones must be located landward of the reach of mean high tide. They cannot be built over water. In fact, it's best to be as far back from the shore as possible in order to avoid the more dangerous areas subject to waves and erosion. The ability of a building to withstand wave impacts increases the farther it is set back from the shore.

Avoid areas of sand dunes and mangroves. Human alteration of sand dunes and mangrove stands within V Zones is prohibited unless it can be demonstrated that such alterations will not increase potential flood damage.

Both of these natural features are protected against alteration because they are important first lines of defense against coastal storms and can do much to reduce losses to inland coastal development.

Generally, you can assume that any removal or other alteration of a sand dune will increase flood damage. The burden should be placed on the permit applicant to demonstrate that this will not occur. This will require a report by a coastal engineer or geologist.

### ELEVATION ON PILES OR COLUMNS

All new construction and substantial improvements to buildings in V Zones must be elevated on pilings, posts, piers or columns.

**44 CFR 60.3(e)(4)** [The community must] Provide that all new construction and substantial improvements in Zones V1-30 and VE, and also Zone V if base flood elevation data is available, on the community's FIRM, are elevated on pilings and columns so that (i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level...

Other methods of elevating buildings —on fill, solid walls or crawlspaces— and floodproofing are prohibited because these techniques present obstructions to wave action. The force of a breaking wave is so great that these types of foundations would be severely damaged, resulting in collapse of the building. Waves can also ramp up on fill and reach the elevated portions of the building.

Construction on piles or columns allows waves to pass under the building without transmitting the full force of the waves to the building's foundation. A special case is made for installing breakaway walls between the pilings or columns, but such walls are not supporting foundation walls.

While fill is not allowed for structural support for buildings within V Zones because of the severe erosion potential of such locations, limited fill is allowed for landscaping, local drainage needs, and to smooth out a site for an unreinforced concrete pad. However, this fill cannot in any way obstruct the flow of water under the building.

**How high?** Within V Zones, the controlling elevation is the bottom of the lowest horizontal structural member of the lowest floor. (In comparison, within A Zones, the controlling elevation is the *top* of the lowest floor.) This is to keep the entire building above the anticipated breaking wave height of a base flood storm surge.

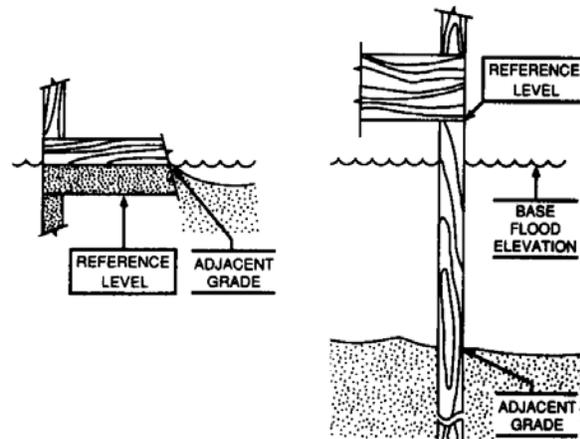


Figure 5-15: In V Zones, the lowest floor is measured from the bottom of the lowest horizontal structural member

## Wind and water loads

The design of the supporting foundation must account for wind loads in combination with the forces that accompany the base flood. Cross bracing and proper connections are key to doing this.

**44 CFR 60.3(e)(4) ... (ii)** [The community must ensure that] the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of (e)(4)(i) and (ii) of this section.

Piles made of wood, steel, or pre-cast concrete are preferred over block columns and similar foundations that are less resistant to lateral forces. Pilings are necessary in areas subject to erosion and scour, but it is critical that they be embedded deep enough (Figure 5-16).

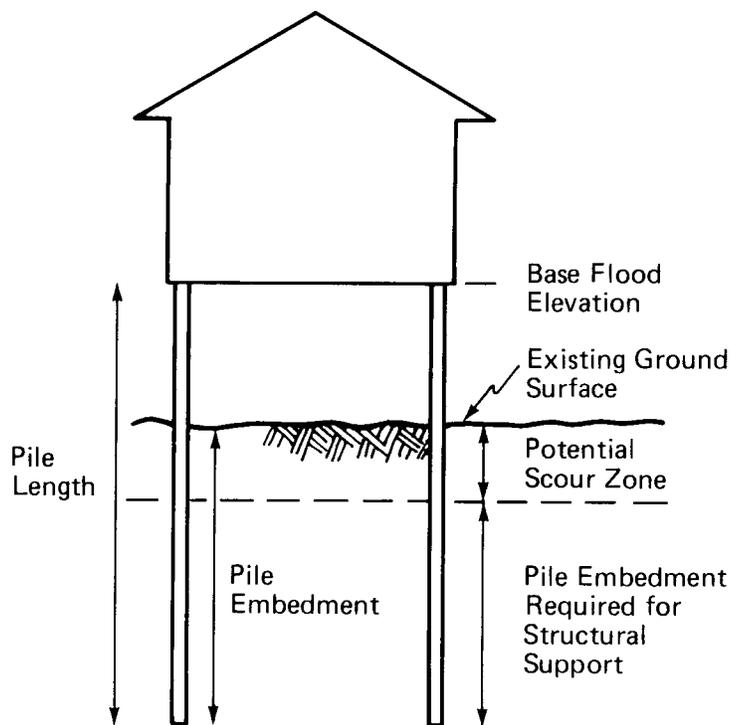


Figure 5-16: Piles must be embedded well below the scour depth



Figure 5-17: This house had inadequate pile embedment and cross bracing

## Certification

Designing and constructing a V-zone building requires the involvement of a design professional to ensure that the building will withstand the combined forces of wind and wave impact. A registered professional engineer or architect must develop or review the structural design, specifications and plans for the construction, and certify that the design and planned methods of construction are in accordance with accepted standards of practice for meeting the above provisions.

You must maintain a copy of the engineer's or architect's certification in the permit file for all structures built or substantially improved in the V Zone.

The North Carolina Division of Emergency Management has prepared a V-Zone certification form (Figure 5-18) to ensure that these requirements are met. This is provided as an example. Check with your state NFIP coordinator to see if your state has developed a V Zone certification form.

## BREAKAWAY WALLS

The preferred method of constructing a V-zone building is to leave the area below the elevated floor free of obstruction or to enclose the area only with latticework or insect screening. That way waves can freely flow under the building without placing additional loads on the foundation. The only solid walls allowed below the lowest floor in a building in a V Zone are breakaway walls that will give way under wind and water loads without causing collapse, displacement or other damage to the elevated portion of the building or the supporting pilings or columns. Just as in A Zones, this space enclosed by these walls is to be used

solely for parking of vehicles, building access or storage, and must be constructed of flood-resistant material.

<b>V-Zone Certification</b>				
<b>Property Information</b>			<b>For Insurance Company Use</b>	
Name of Building Owner			Policy Number	
Building Address or Other Description				
City		State	Zip Code	
<b>SECTION I: FLOOD INSURANCE RATE MAP (FIRM) INFORMATION</b>				
<i>Note: to be obtained from appropriate FIRMs</i>				
Community Number	Panel Number	Suffix	Date of FIRM Index	FIRM Zone
<b>SECTION II: ELEVATION INFORMATION</b>				
<i>Note: This form is not a substitute for an Elevation Certificate. Elevations should be rounded to nearest tenth of a foot.</i>				
1. Elevation of the Bottom of Lowest Horizontal Structure Member .....				feet
2. Base Flood Elevation .....				feet
3. Elevation of Lowest Adjacent Grade .....				feet
4. Approximate Depth of Anticipated Scour/Erosion Used for Foundation Design .....				feet
5. Embedment Depth of Pilings or Foundation Below Lowest Adjacent Grade .....				feet
6. Datum Used: _____	NGVD '29	NAVD '88	Other	
<b>SECTION III: FLOOD INSURANCE RATE MAP (FIRM) INFORMATION</b>				
<i>Note: This section must be certified by a registered professional engineer or architect</i>				
I certify that I have developed or reviewed the structural design, plans and specifications for construction and that the methods of construction to be used are in accordance with accepted standards of practice for meeting the following provisions:				
a) The bottom of the lowest horizontal structure member of the lowest floor (excluding the pilings or columns) is elevated to or above the BFE; and,				
b) The pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of the wind and water loads acting simultaneously on all building components. Water loading values used are those associated with the base flood including wave action. Wind loading values used are those required by the applicable State or local building code. The potential for scour and erosion at the foundation has been anticipated for conditions associated with the flood, including wave action.				
<b>SECTION IV: FLOOD INSURANCE RATE MAP (FIRM) INFORMATION</b>				
<i>Note: This section must be certified by a registered professional engineer or architect</i>				
I certify that I have developed or reviewed the structural design, plans and specifications for construction and that the design and methods of construction to be used for the breakaway walls are in accordance with accepted standards of practice for meeting the following provisions:				
c) Breakaway collapse shall result from water load less than that which would occur during the base flood; and,				
d) The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (wind and water loading values defined in Section III)..				
<b>SECTION V: CERTIFICATION</b>				
<i>(Check: Section III _____ and/or Section IV _____ )</i>				
Name of Certifier		Title		
Firm Name		License Number		
Street Address		Phone Number ( _____ )		
City	State	Zip Code		
Signature			Date	

Figure 5-18: Sample V Zone certification

**44 CFR 60.3(e)(5)** [The community must] Provide that all new construction and substantial improvements within Zones V1-30, VE, and V on the community's FIRM have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. For the purposes of this section, a breakaway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:...

Solid breakaway walls are allowed, as are garage doors that meet the same breakaway requirements. Solid breakaway walls are intended to collapse under the force of wave impacts without damaging the buildings foundation or the elevated portion of the building. All solid breakaway walls should have their designs certified by a registered professional engineer or architect. This can be done as part of the anchoring certification discussed earlier in this section.

The area enclosed by solid breakaway walls should be limited to less than 300 square feet because:

- ◆ Flood insurance rates increase dramatically for enclosures larger than 300 square feet.
- ◆ Larger areas encourage conversion to habitable living areas, which are difficult to detect and enforce as violations and which can sustain significant damage during a storm.

## **COASTAL AE ZONES**

NFIP regulations apply the same minimum requirements to both coastal AE zones and riverine AE zones. FEMA has concluded that these standards may not provide adequate protection in coastal AE zones subject to wave effects, velocity flows, erosion, scour, or combinations of these forces. Wave tank studies have shown that breaking waves considerably less than the 3-foot criteria used to designate VE zones can cause considerable damage.

FEMA's *Coastal Construction Manual*, FEMA-55 (May 2000) and other recent FEMA publications have introduced the concept of Coastal AE Zone to encourage use of V-zone construction methods and standards in these areas. For example, pile or column or other open foundations are more likely to withstand wave impacts than other types of foundations. If your community contains Coastal AE Zones, you are encouraged to revise your ordinances to apply all or some of the VE zone standards to these areas.

## G. OTHER REQUIREMENTS

The primary thrust of the NFIP regulations is to protect insurable buildings and reduce future exposure to flood hazards. However, there are some additional requirements that help ensure that the buildings stay habitable and additional flood problems are not created.

### SUBDIVISIONS

As noted in Section B of this unit, once you obtain base flood elevations for a subdivision or other large development, new buildings must be properly elevated or floodproofed. These subdivisions and developments must also be reviewed to ensure they are reasonably safe from flood damage.

**44 CFR 60.3(a)(4)** *[The community must] Review subdivision proposals and other proposed new development including manufactured home parks or subdivisions, to determine whether such proposals will be reasonably safe from flooding. If a subdivision proposal or other proposed new development is in a flood-prone area, any such proposals shall be reviewed to assure that (i) all such proposals are consistent with the need to minimize flood damage within the flood-prone area, (ii) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage, and (iii) adequate drainage is provided to reduce exposure to flood hazards;*

This review applies to subdivisions and other development, such as apartments, parks, shopping centers, schools and other projects.

If a site is floodprone, the builder should:

- ◆ Minimize flood damage by locating structures on the highest natural-ground.
- ◆ Have public utilities and facilities located and constructed so as to minimize flood damage.
- ◆ Provide adequate drainage for each building site.

The site plans of new development and proposed plats for subdivisions can usually be designed to minimize the potential for flood damage while still achieving the economic goals of the project. For example, lot size could be reduced and the lots clustered on high ground, with building sites having views of the floodplain. See Unit 6 for ideas on how subdivisions can be designed to minimize flood damages.

## WATER AND SEWER SYSTEMS

**44 CFR 60.3(a)(5)** *[The community must] Require within flood-prone areas new and replacement water supply systems to be designed to minimize or eliminate infiltration of flood waters into the systems; and*

**44 CFR 60.3(a)(6)** *[The community must] Require within flood-prone areas (i) new and replacement sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters and (ii) onsite waste disposal systems to be located to avoid impairment to them or contamination from them during flooding.*

The objective of these requirements is to ensure that a building that is protected from flood damage can still be used after the flood recedes.

In most instances, these criteria can be met through careful system design. Manholes should be raised above the 100-year flood level or equipped with seals to prevent leakage. Pumping stations should have electrical panels elevated above the BFE.

On-site waste disposal systems should be located to ensure they will not release contamination in a flood and can be used after flood waters recede. The first objective should be to locate the system outside the flood hazard area, if that is feasible. At a minimum, an automatic backflow valve should be installed to prevent sewage from backing up into the building during flooding.

## WATERCOURSE ALTERATIONS

**44 CFR 60.3(b)(6)** *[The community must] Notify, in riverine situations, adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse, and submit copies of such notifications to the [Federal Insurance] Administrator;*

The community must notify adjacent communities and the appropriate state agency prior to altering or relocating any river or stream within its jurisdiction. Copies of such notifications must be submitted to the FEMA Regional Office.

**44 CFR 60.3(b)(7)** *[The community must] Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained;*

Any alteration or relocation of a watercourse should not increase the community's flood risks or those of any adjacent community. This could happen if the watercourse's capacity to carry flood flow is reduced because a smaller or less-efficient channel is created, or by modifications to the floodway as a result of the project. You must ensure that the altered or relocated channel has at least the capacity of the old channel. For any significant alteration or relocation, you should consider requiring the applicant to have an engineer certify that the flood-flow

carrying capacity is maintained and that there will be no increase in flood flows downstream.

After altering a watercourse, the developer has created an artificial situation and must assume responsibility for maintaining the capacity of the modified channel in the future. Otherwise, flooding is likely to increase as the channel silts in, meanders or tries to go back to its old location.

Federal and state permits may be required for any alteration or relocation activity. It is recommended that the community require the submittal and approval of a CLOMR from FEMA for large-scale proposals (see CLOMR procedures discussion in Unit 4, Section D).

# **UNIT 6: ADDITIONAL REGULATORY MEASURES**

## **In this unit**

The NFIP encourages states and communities to implement flood-plain management programs that go beyond NFIP minimum requirements since local flood hazards vary and what makes sense in one state or community may not make sense in another. This unit begins with a discussion of the problems that can arise when regulations are so restrictive they effectively “take” people’s freedom to use their properties. Although NFIP minimum requirements have not been held by the Courts as a “taking”, it may become an issue in States and communities that adopt more restrictive regulations.

It then describes some of the more common regulatory approaches that exceed the NFIP’s minimum standards that result in a better and more appropriate local floodplain management program. These include:

- State required regulatory standards,
- Higher local standards,
- Regulations that address special flood hazards, and
- Environmental protection regulations.

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# INTRODUCTION

**44 CFR 60.1(d)** *The criteria set forth in this subpart are minimum standards for the adoption of flood plain management regulations by flood-prone... communities. Any community may exceed the minimum criteria under this Part by adopting more comprehensive flood plain management regulations utilizing the standards such as contained in Subpart C of this part. In some instances, community officials may have access to information or knowledge of conditions that require, particularly for human safety, higher standards than the minimum criteria set forth in Subpart A of this part. Therefore, any flood plain management regulations adopted by a State or a community which are more restrictive than the criteria set forth in this part are encouraged and shall take precedence.*

The NFIP regulatory standards are minimums. They may not be appropriate for every local situation or unique circumstances.

Therefore, states and communities are encouraged to enact more restrictive requirements where needed to better protect people and properties from the local flood hazard.

This unit reviews the more common approaches to this.



Many of these more restrictive requirements are eligible for credit under the Community Rating System (CRS), a program which provides insurance premium discounts to policyholders in communities with more restrictive flood-plain management programs (see Unit 9, Section C). Where CRS credit is provided, it is highlighted with this CRS logo.

## A. TAKING

Why not simply tell people that they can't build in the floodplain? If we did, we wouldn't have to worry about new buildings getting flooded and the regulations would be simple to administer: Just say "No."

While this regulatory standard appears desirable, it has one fatal legal problem: It could be a "taking."

The Fifth Amendment to the Constitution states, "Nor shall property be taken for public use without just compensation." The Constitution contains this provision because in England, the king could take property and use it for his own purpose—such as quartering troops or hunting—without compensation.

The term "taking" has come to mean any action by a government agency that relieves a person of his or her property without payment.

Government agencies possess the authority to acquire privately owned land. Under the power of eminent domain, they can acquire land without the owner's agreement provided the acquisition clearly is for a demonstrably public purpose and official condemnation proceedings are followed. Some common examples of eminent domain actions are:

- Purchase of land for roads and public works projects.
- The development of public park land.
- Utility acquisition of rights of way for transmission lines, etc.

Courts have ruled that a taking may also occur when the government enacts a law, standard or regulation that limits the use of the land to the extent that the owner has been deprived of all of his or her economic interest in using the property. Thus, the government has "taken" the property under a legal provision known as inverse condemnation.

In cases where a court has found a taking, the governmental body has been required to compensate the property owner. Often, though, the regulations are retracted as applied to that property.

Usually, courts undertake a complicated balancing of public and private interests in deciding a taking issue. The courts will consider such factors as:

- Regulatory objectives.

- The harm posed by uncontrollable development.
- Reasonableness of the regulations.
- Severity of the economic impact upon the private property owner.

<b>Case</b>	<b>Issue</b>	<b>Decision/Impact</b>
Village of Euclid v. Ambler Realty Company (1926)	The use of police power to regulate land use	The court upheld the basic concept of zoning.
Turnpike Realty Co. v. Town of Dedham (1972)	Challenge to the constitutionality of the NFIP	The court upheld the floodplain management regulations.
Just v. Marienette (1972)	A wetland regulatory case	The court decided that a landowner does not have the unlimited right to use the land for a purpose which is unsuited to its natural state or that will injure the rights of others.
Texas Landowners Association v. Harris (1978)	Challenge to the validity of the NFIP and its mitigation requirements	The courts held that the NFIP was reasonable. A community could not claim a taking if insurance or disaster relief was denied for failure to comply with NFIP standards, because they are benefits, not rights.
First Evangelical Lutheran Church of Glendale v. Los Angeles County, LA (1987)	Whether a temporary building moratorium that was deemed a taking would require compensation	The U.S. Supreme Court held that temporary regulatory takings could require compensation. This case was sent back to the state to decide if a taking had occurred. The state endorsed the floodplain regulations and held that the regulations were not a taking.
Adolph v. FEMA (1988)	Whether the parish floodplain management regulations adopted constituted a taking	The court upheld that the NFIP as a whole is not a taking, nor are the parish regulations.
April v. City of Broken Arrow (1989)	Whether two Oklahoma floodplain ordinances constituted a taking (requirement for elevation of new homes to 1 foot above the 100-year flood elevation)	The courts accepted the general proposition that local public officials must be afforded reasonable <i>elasticity</i> in planning and implementing legitimate state interests and held that regulations were valid.
Lucas v. South Carolina Coastal Council (1992)	South Carolina Supreme Court—whether the South Carolina Beachfront Management Act constituted a taking.  U.S. Supreme Court—whether the property owner was entitled to compensation for his alleged “total loss of value” attributed to the Beachfront Management Act	The South Carolina Supreme Court ruled that the Act did not constitute a taking and reversed the trial court’s award of \$1.2 million to Lucas.  The U.S. Supreme Court ruled that where the value of a property is essentially “destroyed” by regulation, compensation should be paid.
Dolan v. Tigard (1994)	Imposition of a floodplain bike path as a condition of a permit to expand commercial structures	The U.S. Supreme Court found that the business owners should not be required to construct a bike path to obtain the permit.

**Figure 6-1. Selected cases of challenges to land use regulations**

Very restrictive floodplain regulations and the regulatory standards of the NFIP have been challenged as a taking in a number of cases. Figure 6-1 summarizes important cases challenging the legality or constitutionality of NFIP or similar land use regulations.

Most NFIP criteria are performance standards that do not prohibit development of a floodplain site provided the performance standards are met. For example, development in the floodway is prohibited only if it increases flood heights. Permit applicants who can find a way to develop in the floodway without increasing the flood problem are permitted to do so. These performance-oriented standards of the NFIP have never been ruled as a taking. This is highly significant, given that more than 19,000 communities administer floodplain management ordinances.

Although it may be more costly to build according to the NFIP standards and, in some instances, it may not be economical to develop a property, the performance standard is a valid exercise of the police power because it is based on a legitimate public purpose: preventing flood damage. Floodway requirements in particular are defensible because they prevent the actions of one property owner from increasing flood damage to his or her neighbors.

The NFIP regulatory criteria have not lost a taking case because they allow any floodprone site to be built on as long as precautions are taken to protect new structures and neighboring property from flood damage. The owners are not denied all economic uses of their properties as long as their construction accounts for the level of hazard.

Some courts have supported regulatory standards that are more restrictive than NFIP regulations, such as complete prohibitions of new buildings or new residences in the floodway. These cases tied the prohibition to the hazard and the need to protect the public from hazards created by the development.

Regulations need to be reasonable. For example, a complete prohibition of development in a shallow flooding area where there is no velocity may not be considered as “reasonable” by a court.

The rationale does not always have to be tied to property damage. For example, in upholding the State’s prohibition of new buildings in the floodway, the Illinois Supreme Court noted that while buildings could be protected, the residents would be surrounded by moving water during floods, preventing access by emergency vehicles.

“The prohibition takes into consideration not only the concern about preventing further flooding, but also the concern about the need to provide disaster relief services and the need for

the expenditure of state funds on shelters and rescue services for victims of flooding.” (Beverly Bank v. Illinois Department of Transportation, September 19, 1991).

The lesson is that before your community enacts a regulatory provision that severely restricts the use of property, your community’s attorney should review the provision to be sure it will not be overturned as a taking. Regulatory standards that are reasonable, tied to the hazard and support public objectives should be upheld.

## B. STATE REGULATORY STANDARDS

All states now allow communities to regulate development to the NFIP standards. Some states also require that their communities regulate to a higher standard for certain aspects of floodplain management.

This section reviews the more common state requirements. If your ordinance was based on a state model, you should be compliant with all state requirements as well as the NFIP standards.

According to a 1995 survey by the Association of State Floodplain Managers (ASFPM), 24 states have some kind of riverine standards more restrictive than those of the NFIP. Of those, 10 require that communities regulate to the higher standard; three states have opted to implement and enforce the higher standard directly; and 10 states use a combination of both approaches.

Eight states prohibit buildings or residences from their floodways at least in some areas. Twelve states allow less than the NFIP's one-foot rise in the flood-way. States are more likely to regulate some or all of the floodways than the flood fringes, because they require more technical expertise than those that apply to the fringe and because the impacts of floodway development are more extensive, often going beyond local corporate limits.

The ASFPM survey found that 32 states have enacted some regulations governing shoreline development. For states with ocean or bay coasts, this regulatory authority is usually implemented under the state's coastal zone management program. All the Great Lakes states have lakeshore regulatory standards or permit programs, usually administered as part of state shoreland management programs.

Twenty-three states now have standards for their coastal high hazard areas that exceed those of the NFIP. Sixteen states regulate areas subject to coastal erosion. Sixteen states have regulations or standards to preserve or protect sand dunes and 16 states regulate or set higher standards for lakeshore areas.

Nineteen states have stricter building construction requirements than does the NFIP. The most common additional standard is freeboard (requiring new buildings to be elevated higher than the base (100-year) flood level). This standard may apply to all buildings in the floodplain or only to certain types, such as new jails, hospitals, nursing homes, mobile home parks, or hazardous materials facilities.

Here are some other common state regulatory requirements:

- 25 states either directly regulate the handling and storage of stormwater in their jurisdictions or establish standards that communities must meet.
- 30 states have regulations or standards for the control of erosion and sediment.
- 23 have either direct regulations or state standards to restrict or prohibit some or all development within a certain distance from bodies of water.
- 16 of those have setbacks for coastal and/or lakeshore areas.
- 14 states have special rules for areas that lie below dams or are protected by levees.
- 30 states have adopted measures to regulate hazardous materials in flood-plains
- 29 states have special public health standards that apply to floodplains

Twenty-four state governors have issued a directive to their state agencies on floodplain management. Most of these were implemented to meet the minimum NFIP requirements but many go beyond them. Five states have wetlands policy set by executive order, five have orders on hazard mitigation or disaster recovery, and two states have other resource protection executive orders that affect flood-plains.

For more information on which states have which requirements, see *Flood-plain Management 1995: State and Local Programs*, Association of State Floodplain Managers, 1995.

## C. HIGHER REGULATORY STANDARDS

FEMA has established minimum floodplain management requirements for communities participating in the NFIP. Communities must also enforce more restrictive State requirements. However, communities should seriously consider enacting regulations that exceed the minimum state and federal criteria.

In fact, the NFIP requires communities to at least consider additional measures which are found in 44 CFR 60.22, Planning Considerations for Floodprone Areas. They are summarized in Figure 6-2.

- (a) The floodplain management regulations adopted by a community for floodprone areas should:
  - (1) Permit only that development of floodprone areas which
    - (i) is appropriate in light of the probability of flood damage
    - (ii) is an acceptable social and economic use of the land in relation to the hazards involved
    - (iii) does not increase the danger to human life
  - (2) Prohibit nonessential or improper installation of public utilities and public facilities.
- (b) In formulating community development goals after a flood, each community shall consider:
  - (1) Preservation of the floodprone areas for open space purposes
  - (2) Relocation of occupants away from floodprone areas
  - (3) Acquisition of land or land development rights for public purposes
  - (4) Acquisition of frequently flood-damaged structures.
- (c) In formulating community development goals and in adopting floodplain management regulations, each community shall consider at least the following factors:
  - (1) Human safety
  - (2) Diversion of development to areas safe from flooding
  - (3) Full disclosure to all prospective and interested parties
  - (4) Adverse effects of floodplain development on existing development
  - (5) Encouragement of floodproofing to reduce flood damage
  - (6) Flood warning and emergency preparedness plans
  - (7) Provision for alternative vehicular access and escape routes
  - (8) Minimum retrofitting requirements for critical facilities
  - (9) Improvement of local drainage to control increased runoff
  - (10) Coordination of plans with neighboring community's floodplain management programs
  - (11) Requirements for new construction in areas subject to subsidence
  - (12) Requiring subdividers to furnish delineations for floodways
  - (13) Prohibition of any alteration or relocation of a watercourse
  - (14) Requirement of setbacks for new construction within V Zones
  - (15) Freeboard requirements
  - (16) Requirement of consistency between state, regional
  - (17) Requirement of pilings or columns rather than fill to maintain storage capacity and local comprehensive plans
  - (18) Prohibition of manufacturing plants or facilities with hazardous substances
  - (19) Requirements for evacuation plans

**Figure 6-2: NFIP planning considerations (44 CFR 60.22)**

Some of the more common approaches taken by communities to better regulate floodplain development are explained in this section.

## **LOCATION RESTRICTIONS**

Where the hazard is so severe that certain types of development should be prohibited, a location restriction provision may be appropriate. Some communities prohibit some or all development in all or parts of their floodplains. A common approach is to prohibit particular structures in the floodway or areas exceeding certain flood depths or velocities.

Because this is the most restrictive higher regulatory provision, location restriction language has to be drafted carefully to avoid a taking challenge. Sometimes, a community can tie transfers of development rights or other benefits to a development that avoids the flood hazard area. These types of “win – win” situations benefit everyone and reduce the potential for challenging the ordinance.

### **Highly hazardous areas**

Prohibiting development makes sense in high hazard areas, where people are exposed to a life-threatening situation even though buildings could be protected from flood damage. For example, it would be appropriate to prohibit development at the apex of an alluvial fan or along a narrow floodplain in a stream valley that is susceptible to flash flooding.

### **Subdivision design**

Undeveloped land, still in large tracts, offers the best opportunity to limit where certain types of development will be located. When a developer wants to subdivide the land, communities have many tools to arrange the development so that buildings are kept out of the floodplain or at least the building sites are located in the least hazardous areas of the floodplain. This has two advantages over simply requiring the buildings to be protected from flooding:

- Buildings aren't isolated by floodwaters, putting a strain on local emergency services to guard them or evacuate or rescue their occupants, and
- The neighborhood will have waterfront open space and recreation areas – a valuable amenity in most communities.

A housing development can be clustered, as shown in Figure 6-3, so the developer can sell the same number of home sites as a conventional subdivision. Check your state laws on whether cluster development can be mandated or just encouraged during the subdivision review process.

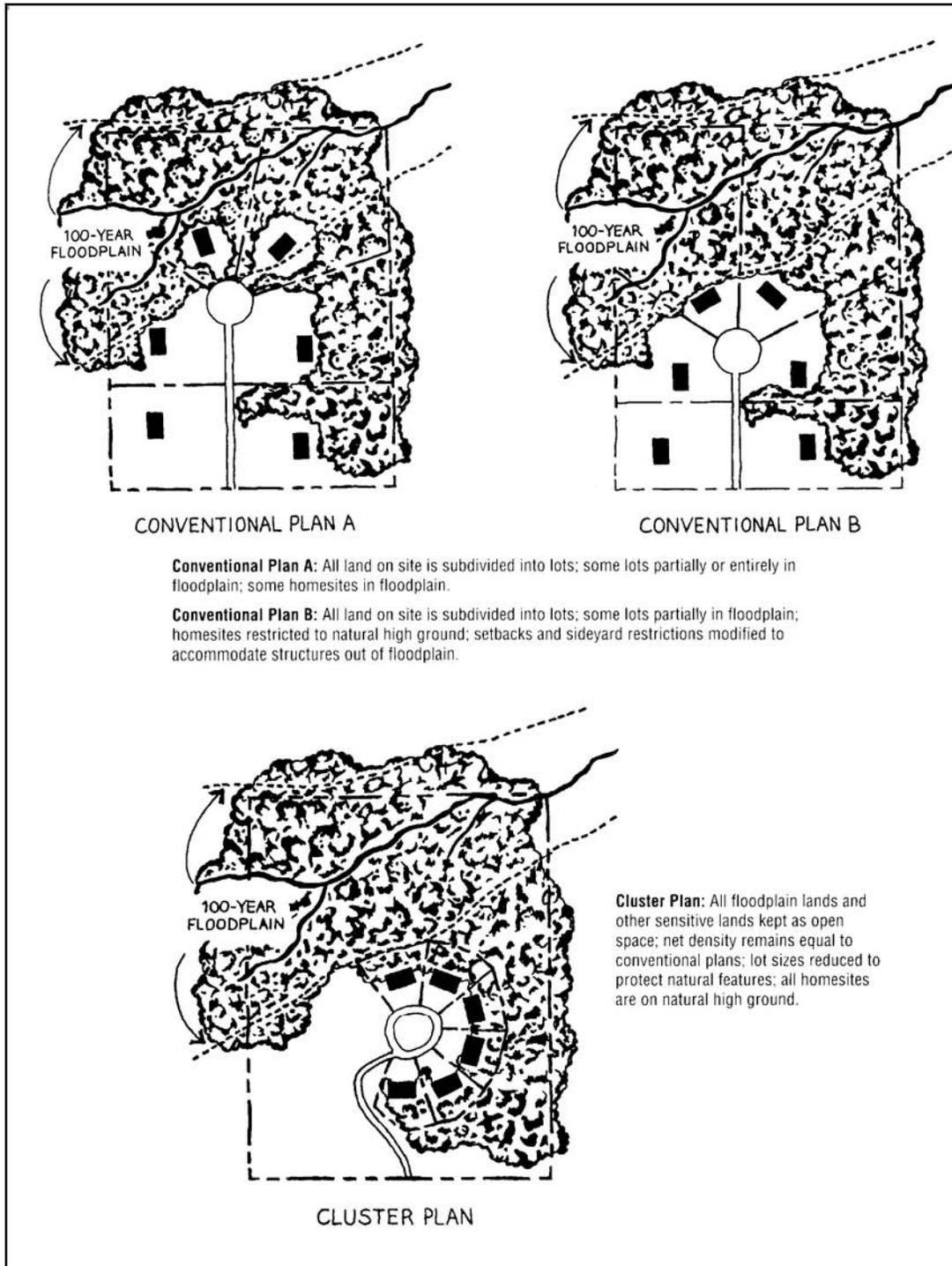


Figure 6-3. Clustering can keep buildings out of smaller floodplains

*(Source: Subdivision Design in Flood Hazard Areas)*

As explained in pages 17-25 of the American Planning Association's *Subdivision Design in Flood Hazard Areas*, the planner's toolbox contains other tools for encouraging developers to avoid floodplains. A density transfer can be used to, say, trade development rights with a flood-free site. Credits or bonuses can be given to increase the allowable density if the developer puts building sites on high ground or does not disturb a wetland.

The planned unit development (PUD) approach offers developers flexibility in planning the entire area. For example, a PUD may have a cluster development with houses closer together than allowed under normal zoning lot line setbacks.

Subdivision and planning regulations also can mandate that a certain portion of a development be set aside as open space for recreation or stormwater management purposes. Developers find that it is cheaper to put the open space in the floodplain than to put buildings there that have to incorporate the more expensive floodplain requirements. Linear parks and greenways that connect the open space areas through a community are becoming more and more popular and help sell new developments.



The Community Rating System credits land development criteria that discourage development in floodplains under Activity 430LD in the *CRS Coordinator's Manual* and the *CRS Application*. See also *CRS Credit for Higher Regulatory Standards* for example regulatory language.

## Setbacks

Setbacks may be used to keep development out of harm's way while at the same time achieving other community purposes. Setback standards establish minimum distances that structures must be positioned—set back—from river channels and coastal shorelines. Setbacks can be defined by vertical heights or horizontal distances.

While floodplain boundaries are defined by vertical measures, horizontal set-backs also provide protection from flood damage, especially in coastal areas where the effects of waves decrease further inland.

For coastal shorelines, setback distances act as buffer zones against beach erosion. In riverine situations, setbacks prevent disruption to the channel banks and protect riparian habitat. Such setbacks are frequently created to serve as isolation distances to protect water quality, and stream and wetland resources.

Setbacks from watercourses have been used to minimize the effect of non-point sources of pollution caused by land development activities, timber harvesting and agricultural activities.

Solid waste landfills and on-site sewage disposal systems often are restricted within certain distances of a body of water.



The Community Rating System credits setbacks that prevent disruption to shorelines, stream channels and their banks under Activity 430, Section 431.g.2 in the *CRS Coordinator's Manual* and the *CRS Application*. See also *CRS Credit for Higher Regulatory Standards* for example regulatory language.

## Manufactured homes

Many communities have adopted provisions prohibiting the placement of manufactured (mobile) homes in the floodway. Check your ordinance. This used to be a minimum requirement of the NFIP and may still be on your books.

## Natural areas



The natural functions and values of floodplains coupled with their hazardous nature have led communities to promote and guide the less intensive use and development of floodplains. More and more municipalities are requiring that important natural attributes such as wetlands, drainage ways and floodplain areas be set aside as open space as a condition to approving subdivision proposals. The Community Rating System provides substantial credit for preserving floodplain areas as open space. If buildings and filling are prohibited, credit is found under Activity 420 Open Space Preservation, Section 421.a in the *CRS Coordinator's Manual* and the *CRS Application*. If the area has been kept in or restored to its natural state, more credit is provided under Section 421.c.

## Low-density zoning

When a community prepares its land use plan and zoning ordinance, it should consider what uses and densities are appropriate for floodplains. If buildings are not prohibited entirely, the community should zone its floodplains for agricultural or other low-density use to reduce the number of new structures. For example, it's better to have a floodplain zoned for agricultural or conservation use with a minimum lot size of 20 or 40 acres than to allow four single-family homes to every acre. In some areas, "residential estate" zones with minimum lot sizes of two to five acres provide lots large enough that homes can be built out of the floodplain. Some states have land use planning laws that require local plans before enacting a zoning ordinance. Some—including Oregon, Florida, New Hampshire and Hawaii—mandate that local plans account for floods and other natural hazards.



The Community Rating System provides substantial credit for zoning floodplains with low-density uses under Activity 430LZ Low Density Zoning in the *CRS Coordinator's Manual* and the *CRS Application*.

## **BUILDING REQUIREMENTS**

### **Freeboard**

Freeboard is an additional height requirement above the base flood elevation (BFE) that provides a margin of safety against extraordinary or unknown risks. This reduces the risk of flooding and makes the structure eligible for a lower flood insurance rate.

While not required by the NFIP standards, your community is encouraged to adopt at least a one-foot freeboard to account for the one-foot rise built into the concept of designating a regulatory floodway and the encroachment requirements where floodways are not identified.

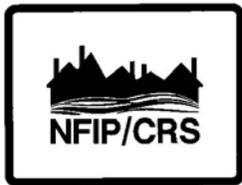
Other reasons for considering a freeboard are that it:

- Accounts for future increases in flood stages if additional development occurs in the floodplain.
- Accounts for future flood increases due to upstream watershed development.
- Acts as a hedge against backwater conditions caused by ice jams and debris dams.
- Reflects uncertainties inherent in flood hazard modeling, topography, mapping limitations and floodplain encroachments.
- Provides an added measure of safety against flooding.
- Results in significantly lower flood insurance rates due to lower flood risk.

Freeboard safety factors are common in the design of flood control projects and floodplain development. Many communities have incorporated freeboard requirements into the elevation and floodproofing requirements stipulated by the NFIP. Freeboard requirements adopted by communities range from six inches to four feet.

When constructing a new elevated building, the additional cost of going up another foot or two is usually negligible. Elevating buildings above the flood level also reduces flood insurance costs for current and future owners.

Figure 9-3 shows the insurance rates for a post-FIRM single-family dwelling. Note that the higher the building is above the BFE, the lower the rate. These rates are based on the true or actuarial cost of insuring a building in the floodplain. By adding one foot of freeboard above the BFE, the cost for the first layer of coverage is reduced from 45 cents per \$100 of coverage to 26 cents. This shows how the extra foot reduces the potential for flood damage.



The Community Rating System credits freeboard under Activity 430, Section 431.a in the *CRS Coordinator's Manual* and the *CRS Application*. See also *CRS Credit for Higher Regulatory Standards* for example regulatory language.

## Foundation standards

Without a safe and sound foundation, an elevated building can suffer damage from a flood due to erosion, scour or settling. The NFIP regulations provide performance standards for anchoring new buildings and foundation and fill placement standards for floodproofed buildings and V Zones.

However, the NFIP performance standards do not specify how a building's foundations are to be constructed. Especially in areas where an engineer's certificate is not required by the NFIP regulations, more specific foundation construction standards would help protect buildings from flood damage.

One option is to require that a registered professional engineer or architect certify the adequacy of elevated building foundations and the proper placement, compaction and protection of fill when it is used in building elevation. This is an ordinance requirement in the New Orleans area where subsidence threatens so many buildings.

The national model building codes address building foundations and the proper placement, compaction and protection of fill. You and your building department should review how these standards are enforced.

An alternative is to require a specific construction standard, such as requiring the V Zone standard for new structures in coastal AE and AH Zones. Coastal AE Zones are of particular concern, since they are subject to wave action of up to three feet in height and the NFIP A Zone construction standards do not address this hazard.



The Community Rating System credits foundation protection under Activity 430, Section 431.b in the *CRS Coordinator's Manual* and the *CRS Application*. See also *CRS Credit for Higher Regulatory Standards* for example regulatory language.

## SAFETY REQUIREMENTS

### Critical facilities

For some activities and facilities, even a slight chance of flooding poses too great a threat. These should be given special consideration when formulating regulatory alternatives and floodplain management plans.

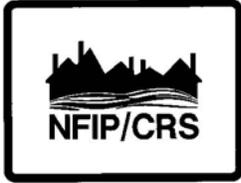
The following are examples of the types of critical facilities that should be given special attention:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic and/or water-reactive materials.
- Hospitals, nursing homes and housing likely to have occupants who may not be sufficiently mobile to avoid injury or death during a flood.
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during and after a flood.
- Public and private utility facilities that are vital to maintaining or restoring normal services to flooded areas before, during and after a flood.

A critical facility should not be located in a floodplain. Communities often prohibit critical or hazardous facilities or uses from the floodway, the V Zone, or the entire floodplain. While a building may be considered protected from the base flood, a higher flood or an error on the builder's or operator's part could result in a greater risk than the community is willing to accept.

If a critical facility must be located in a floodplain, then it should be designed to higher protection standards and have flood evacuation plans. The more common standards—freeboard, elevation above the 500-year floodplain and elevated access ramps—should be required.

According to Executive Order 11988, federal agencies must meet rigorous alternative site evaluations and design standards before funding, leasing or building critical facilities in the 500-year floodplain. Executive Order 11988 is discussed further in Section E of this unit.



The Community Rating System provides credits for prohibiting critical facilities from the 500-year floodplain or requiring them to be protected from damage by the 500-year flood in Activity 430. See the *CRS Coordinator's Manual* and the *CRS Application*. See *CRS Credit for Higher Regulatory Standards* for example regulatory language.

## Hazardous materials

While prohibiting or protecting hazardous materials from the floodplain makes sense, it would be wise to have specific standards in your ordinance. The following lists were taken from the Corps of Engineers' Flood Proofing Regulations. The first is of items that are extremely hazardous or vulnerable to flood conditions so they should be prohibited from the SFHA or even the 500-year floodplain:

Acetone	Prussic acid
Ammonia	Magnesium
Benzene	Nitric acid
Calcium carbide	Oxides of nitrogen
Carbon disulfide	Phosphorus
Celluloid	Potassium
Chlorine	Sodium
Hydrochloric acid	Sulfur

The following items are sufficiently hazardous that larger quantities they should be prohibited in any space below the base flood elevation

Acetylene gas containers	Gasoline
Storage tanks	Charcoal/coal dust
Lumber /buoyant items	Petroleum products

Larger quantities of the following items should be prohibited in any space below the base flood elevation

Drugs	Soaps/detergents
Food products	Tires
Matches/sulfur products	

## Dry land access

Fire prevention, evacuation and rescue operations are common emergency response activities associated with flooding. The effectiveness and success of these efforts greatly depend on readily available access. However, streets and roads are usually the first things to be inundated in the event of a flood.



To ensure access, some communities have enacted ordinance provisions requiring that all roads and other access facilities be elevated to or above the BFE. Some require elevation to within one foot of the BFE so at least fire and rescue equipment can travel on them during a flood.

While some local officials may feel that this approach is too restrictive, it is important to note that emergency response personnel die every year attempting to rescue flood-stranded citizens. Also, others may die or be seriously injured because they cannot be rescued in time.



**Figure 6-4: Four people died in a 1978 flood in this critical facility.**

***This nursing home in Rochester, Minnesota, was isolated by high velocity floodwaters. Because there was no dry land access, firefighters could not rescue the occupants.***

Naturally, there are some areas with floodplains so extensive that a developer cannot be expected to connect his development to high ground. As with all regulatory standards, you must carefully weigh the local hazard, the regulation’s objectives, and the costs and benefits of meeting the standard before you draft new ordinance language.

The Community Rating System has credited dry land access provisions under Activity 430, Section 431.i in the *CRS Coordinator’s Manual* and the *CRS Application*.

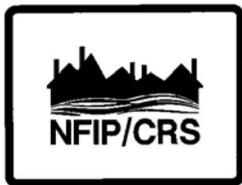
## **ENCROACHMENT STANDARDS**

Some states and communities are not comfortable with allowing development in the flood fringe to increase flood heights by up to a foot. A one-foot increase in flood heights will increase

the potential for flood damage to floodprone buildings and affect properties that were otherwise not threatened by the base flood. This is especially true in flat areas where a one-foot increase can extend the floodplain boundary by blocks.

These states and communities require floodway mapping and encroachment studies to allow a smaller surcharge, usually 0.5 or 0.1 foot. Twelve states require that regulatory maps use a smaller floodway mapping surcharge than the NFIP's one-foot minimum standard. This results in a wider floodway, but less potential for increased flood losses due to future development.

In Minnesota, one watershed district took another regulatory approach, enacting regulations that restricted encroachments in the flood fringe to 20 percent of the total floodplain area. In Washington State, some communities treat higher velocity and deeper flood fringe areas as floodways and make development in those areas comply with the floodway construction standards.



The Community Rating System credits more restrictive floodway mapping standards under Activity 410 Additional Flood Data, Section 411.c in the *CRS Coordinator's Manual* and the *CRS Application*.

## COMPENSATORY STORAGE

The NFIP floodway standard in 44 CFR 60.3(d) restricts new development from obstructing the flow of water and increasing flood heights. However, this provision does not address the need to maintain flood storage. Especially in flat areas, the floodplain provides a valuable function by storing floodwaters. When fill or buildings are placed in the flood fringe, the flood storage areas are lost and flood heights will go up because there is less room for the floodwaters. This is particularly important in smaller watersheds that respond sooner to changes in the topography.

For this reason, some communities adopt more restrictive standards that regulate the amount of fill or buildings that can displace floodwater in the flood fringe. One simple approach is to prohibit filling and buildings on fill—all new buildings must be elevated on columns or flow-through crawlspaces.

Check your statutory authority, because in some states buildings are allowed only if they are on fill. Some communities prefer buildings on fill because floodwaters do not come in contact with the building's foundation and it provides a safe spot above flood levels outside the building walls.

Another approach is to require compensatory storage to offset any loss of flood storage capacity. The developer is required to offset new fill put in the floodplain by excavating an additional floodable area to replace the lost flood storage area. This should be done at “hydraulically equivalent” sites—fill put in below the 10-year flood elevation should be compensated by removal of soil below that elevation elsewhere in the floodplain.



The Community Rating System credits both water quantity and water quality stormwater management regulations and plans under Activity 450 in the *CRS Coordinator’s Manual* and the *CRS Application*. See also *CRS Credit for Stormwater Management* for example regulatory language.

## STORMWATER MANAGEMENT

A floodplain management program in an urbanizing area must confront the increase in flood flows caused by development within the watershed. As forests, fields and farms are covered by impermeable surfaces like streets, rooftops and parking lots, more rain runs off at a faster rate. In an urbanized area, the rate of runoff can increase fivefold or more.

Changes in the surface drainage system compound this problem. Stormwater runoff travels faster on streets and in storm drains than it did under pre-development conditions. As a result, flooding is more frequent and more severe (Figure 1-13). Efforts to reduce the impact of increased runoff that results from new development in a watershed are known as stormwater management.

One way to reduce the impact of stormwater from new development is to require the developer to restrict the rate at which the increased runoff leaves the property. The developer must build a facility to store stormwater runoff on the site.

Under stormwater detention, the stored water is held for release at a restricted rate after the storm subsides. Under stormwater retention, stormwater runoff is held for later use in irrigation or groundwater recharge, or to reduce pollution.

As an alternative to using a uniform standard for all areas, many communities regulate development according to a master plan that analyzes the combined effects of existing and expected development on stormwater and flood flows in the watershed. Such watershed-specific regulations may allow different amounts of runoff for different areas in order to control the timing of increased flows into the receiving streams.

Instead of requiring developers to build stormwater facilities on-site, a plan may require them to contribute funds for a regional facility. By planning the runoff from entire watersheds, this approach can be more effective in reducing increases in downstream flooding.

Stormwater management also has water quality aspects, and includes efforts to reduce erosion and the entry of sediment and pollutants into receiving streams.



The Community Rating System credits both water quantity and water quality stormwater management regulations and plans under Activity 450 in the *CRS Coordinator's Manual* and the *CRS Application*. See also *CRS Credit for Stormwater Management* for example regulatory language.

## TEMPORARY MORATORIUM

Following a flood, a number of communities have imposed moratoriums on rebuilding in the damaged area, effectively prohibiting floodplain development. Often, temporary measures are put in place after a flood to allow time to plan for acquisition, relocation, or redevelopment of the area, or to install flood control projects.

A temporary moratorium should specify when it will be lifted, such as “within three months or when the plan is completed, whichever is sooner.” An open ended moratorium may be viewed by a court as a taking, since the owner has no idea when he or she will be allowed to build or rebuild.

## D. FLOOD HAZARDS OF SPECIAL CONCERN

The mapping and regulatory standards of the NFIP do not completely address every flood problem in the United States. Certain floodplains and flood-related hazards are more destructive and harder to map than riverine, coastal and shallow flooding.

Unit 1 introduced these flood hazards, so we won't discuss them in detail here. This section reviews the more common regulatory standards appropriate to each hazard.

In addition to regulations, communities should address these special hazards in their planning, public information, hazard disclosure and flood warning programs.



More information on these hazards and the Community Rating System credit for mapping and managing them is found in *CRS Credit for Special Hazard Areas*.

### COASTAL EROSION

Coastal erosion occurs to properties in the coastal floodplain and to properties on bluffs above the floodplain. Estimates are that 24 percent of the Atlantic, Pacific, Gulf of Mexico and Great Lakes coasts face significant erosion.

Special erosion rate maps are needed to regulate new construction to protect it from coastal erosion. Normally, 30-, 60- or 100-year erosion zones are used. Erosion zones are generally calculated by multiplying the annual rate of erosion times the number of years of protection to be provided.

The 30-year erosion zone is the area that will likely erode over the next 30 years. It is measured inland from a known point, such as the dune or vegetation line. Erosion zones are “moving targets.” They can change each year as the dune or vegetation line moves inland (or seaward). Erosion rates also vary over the years, moving at a faster or slower rate than the annual average.

### Regulatory standards

There are NFIP regulatory performance standards and planning considerations for erosion-prone areas in 44 CFR 60.5 and 60.24, respectively. As with 44 CFR 60.3, the NFIP requirements are keyed to the type of hazard data provided by FEMA. Since there are no FEMA

erosion-prone maps published yet, there are no NFIP requirements for managing erosion-prone areas. Therefore, Sections 60.5 and 60.24 should be viewed as advisory.

Several states have erosion management requirements. Their typical regulatory standards include:

- All new buildings must be located landward of the 30-year erosion zone
- All larger buildings must be located landward of the 60-year erosion zone
- Deeper pilings and special foundation provisions
- Traffic restricted on sand dunes and other protective features

For more information, contact your state's coastal zone management office. See also FEMA's Coastal Construction Manual.

## **TSUNAMIS**

A tsunami is a wave or series of waves generated at sea or near shore by an earthquake, volcano or landslide. Tsunamis can move as fast as 1,000 kilometers per hour from their point of origin, usually in the Pacific Ocean.

Tsunamis pose two special hazards: a short warning time and very deep flooding.

Tsunamis are hard to recognize at sea but when they reach shallow water, a wave builds up. The effect is more like a rise in sea level than a breaking wave. In narrow areas, where water is concentrated, the resulting water level can be very high, in some areas as much as 20 or 30 feet above normal tides.

Tsunami inundation areas generally are not mapped by FEMA because they are not considered a normal condition of flooding. However, recent federal-state efforts have improved the availability of maps and data for the Pacific states. For more information on tsunami maps, contact your state's emergency management or coastal zone management office.

## **Regulatory standards**

The best regulatory approach is to use an estimated tsunami flood level or the BFE, whichever is higher. Keeping new buildings out of the area that lies below that elevation, or protecting them from flood damage below that elevation, would be appropriate. If not all new buildings can be prohibited, at least critical facilities and/or high-occupancy buildings should be prevented from locating in the area that will have little advance warning of a flood.

A community should also tie development of a tsunami-prone area to the availability of a warning system. Without adequate warning, occupying such an area can be deadly.

See also CRS Credit for Management of Pacific and Caribbean Tsunami Hazards.

## **CLOSED BASIN LAKES**

Two types of lakes pose special hazards to adjacent development:

- Lakes with no outlets, like the Great Salt Lake, Utah, Devil's Lake, North Dakota, and the Salton Sea, California; and
- Lakes with inadequate, regulated or elevated outlets, such as the Great Lakes and many glacial lakes.

These are referred to as "closed basin lakes." Closed basin lakes are subject to large fluctuations in elevation that can persist for weeks, months or years.

Closed basin lakes were formed in almost every part of the United States:

- Glaciers scoured out lakes in the northern tier of states and Alaska.
- Tectonic action created lakes with no outlets (playas) in the western U.S.
- Channel migration formed oxbow lakes along the Mississippi and other large rivers.
- Sinkhole lakes formed where there are large limestone deposits at or near the surface and adequate surface water and rainfall to dissolve the lime-stone.

## **Regulatory standards**

As with tsunamis, the key to regulating these areas is to determine the appropriate regulatory flood elevation that will likely be higher than the BFE. The elevation can be determined by studying historical or geological records, or identifying the elevation of the lowest point where water can leave.

Areas lower than the regulatory elevation should have construction standards that protect buildings and their occupants from prolonged flooding. Other than prohibiting new buildings entirely, the best approach is to require:

- Construction of new buildings on fill above the regulatory elevation. The fill should be engineered and placed to resist wave action.
- Protection of utilities

- Access from dry land.
- Alternatives to septic systems, which won't work under water.
- Alternatives to on-site wells, which would be polluted when floodwater mixes with ground water.



For more information, see CRS Credit for Management of Areas Adjacent to Closed Basin Lakes and Reducing Losses in High Risk Flood Hazard Areas: A Guidebook for Local Officials.

## UNCERTAIN FLOW PATHS

This hazard includes alluvial fans and moveable bed streams. They occur in hilly or mountainous areas rich in sediments and where precipitation is not sufficient to carry the sediments downstream as rapidly as they accumulate. In the United States, these conditions exist primarily in the arid and semi-arid regions west of the Great Plains, although there are alluvial fans in Alaska and Appalachia.

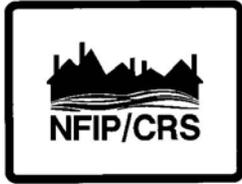
Both types of uncertain flow path floodwaters carry large amounts of sediment which can fill in a channel or move it to a new location. Regulatory standards must address the three components of the hazard: velocity of the water, sediment and debris; the volume and movement of sediment and debris during floods; and the potential for channel migration during a flood.

Alluvial fans are currently designated on the FIRM as an AO Zone with Velocity. The NFIP AO Zone requirement that a building be elevated above the highest adjacent grade to the depth number may not be adequate as velocities and sediment loads increase.

### Regulatory standards

A good study may be able to identify the limits of channel migration and require new buildings to be set back from that area. A permit applicant can be required to prepare such a study.

Otherwise, because the characteristics of the hazard is site-specific, many ordinances simply require the builder to have an engineer certify that the project will be protected. In alluvial fans, a subdivider can be required to install debris basins, channels and walls to keep debris and velocity flows away from houses.



For more information, see CRS Credit for Management of Areas with Uncertain Flow Paths and Reducing Losses in High Risk Flood Hazard Areas: A Guidebook for Local Officials.

## **DAM BREAKS**

Almost every state has a dam safety office that has identified high hazard dams. The designation is based on both the height of the dam and the amount of development at risk downstream.

Should a dam give way, the area covered by the resulting flood downstream is called the dam breach inundation area. Dam breach analyses may have been done for some of the dams upstream of your community, in which case you can obtain a map of the area subject to inundation. (Check with your state dam safety office that the map was prepared using an approved method.)

Close to the dam, the dam breach inundation area is likely to be larger than the base floodplain. A regulatory program should encompass such areas outside the base floodplain. It should also take into account the lack of warning time a dam break would pose.

### **Regulatory standards**

Typical measures include:

- Prohibiting construction of buildings in the dam breach inundation area.
- Prohibiting siting of critical facilities in the dam breach inundation area.
- Requiring new buildings to be elevated above the BFE or the dam breach elevation, whichever is higher.
- Requiring dam owners to maintain their facilities.
- Requiring dam owners to establish warning systems if their dams are in danger of failing.

For more information, contact your state dam safety office or the Association of State Dam Safety Officials, Lexington, Kentucky.



CRS credit for dam failure regulations is provided in Activity 630 Dam Safety, Section 631.b of the *CRS Coordinator's Manual* and the *CRS Application*.

## **ICE JAMS**

Ice jams form in several ways and at different times in winter and early spring. Damage from ice jam flooding often exceeds that of clear water flooding because of higher surface elevations, rapid increases in flood elevations and physical damage caused by moving ice floes.

### **Regulatory standards**

FEMA and the Corps of Engineers have developed an ice jam flood study methodology (see Appendix 3 of Flood Insurance Study Guidelines and Specifications for Study Contractors). If your community has a study done following this methodology, you should adopt the results as your regulatory flood elevation.

In the absence of such a detailed study, you should use the historic ice jam flood of record plus a foot or two of freeboard as your building protection level. Other standards should include requiring new buildings to be elevated on engineered fill or pilings, and prohibiting new buildings (or at least requiring them to be on fill) in the floodway or other defined area subject to ice floes.

For more information, contact the Corps of Engineers, which has ice jam expertise in its district offices and its Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire.

See also CRS Credit for Management of Areas Subject to Ice Jam Floods.

## **MUDFLOWS**

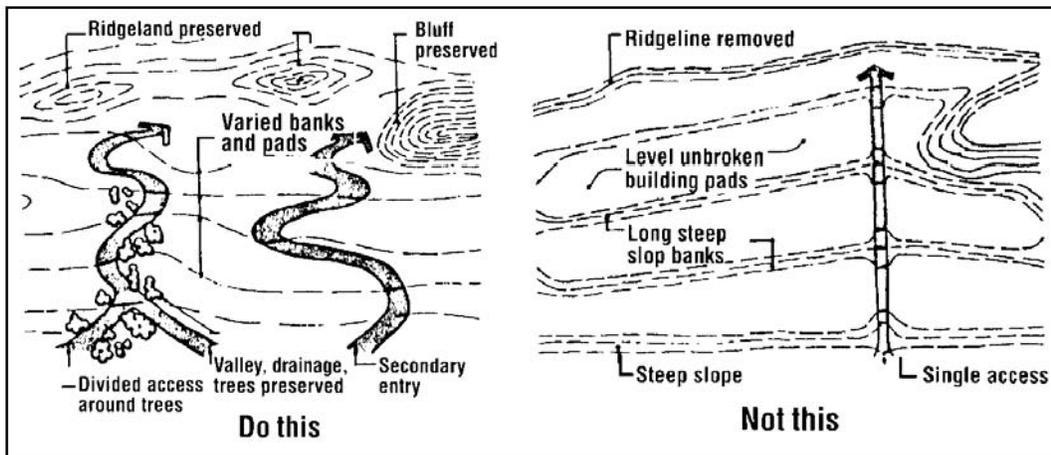
Because mudflows may not occur in mapped floodplains, additional mapping may be required. This requirement can be keyed to steeper slopes or areas with known unstable soils.

In addition to regulations, communities can undertake public information, fire control and other programs to prevent mudflow conditions from developing.

### **Regulatory standards**

If the hazard is not already mapped, developers in the identified areas of steeper slopes or unstable soils should be required to prepare flow hazard studies. Here are regulatory measures appropriate for areas with mudflow hazards or potential:

- Require designs that they work with natural flow channels, not cut across them.
- Require engineered foundations on compacted fill or pilings.
- Avoid locating buildings on or below steep slopes.
- Require debris basins, channels and walls to keep the debris away from houses.
- Require design, construction and drainage practices that direct runoff and debris away from unstable areas.
- Enforce grading and cut and fill standards that minimize disruption of natural drainage ways (Figure 6-5).



**Figure 6-5. Los Angeles County's hillside grading guidelines.**

For more information, see Planning for Hillside Development.

## **E. ENVIRONMENTAL PROTECTION MEASURES**

Flooding may not occur often enough in your area to be viewed as a problem in need of a solution. This may make it difficult to obtain the public and political support needed to carry out local floodplain management measures designed solely to reduce future flood losses.

Support often can be gained by associating flood loss reduction with broader community concerns and goals. A larger constituency for managing the community's floodplains can be built if other interests realize that their needs can be met through their involvement and support in flood protection. This, in turn, brings more resources and expertise into play.

Then, too, designing and packaging funding proposals to meet a number of community goals can boost your chances of obtaining outside resources. One approach is to tie the need to manage the floodplain to protect your community's economic well-being with the need to protect and maintain the natural resources and functions of the floodplain. These resources and functions can be of considerable benefit to the community, a benefit often unrealized or underestimated.

## **STRATEGIES**

Preservation and restoration are the two basic approaches to protecting a floodplain's natural resources. Preservation strategies focus on strict control or prohibition of development in sensitive or highly hazardous areas. Restoration strategies focus on actions to improve the quality or functioning of degraded floodplains.

It is not always possible — or necessary — to make a distinction between the two strategies.

Unit 1 contained an overview of the tools that can be used to preserve and protect a floodplain's natural and cultural resources. They include:

- Floodplain, wetland and coastal barrier regulations.
- Development and redevelopment policies.
- Land acquisition and preservation.
- Information and education.
- Tax adjustments.

This section focuses on the development controls and regulatory standards you can use to protect natural resources or minimize harm to them. These measures, used by all levels of government, are among the most effective means available for protecting natural resources of floodplains and reducing flood damage.

## **FEDERAL REGULATIONS**

Federal regulations and those in many states protect resources by limiting the ways, location and extent to which these resources may be modified. Two federal regulations can have far-reaching impact:

- NEPA: When a federal agency proposes to fund a project located in a flood hazard area, the National Environmental Policy Act (NEPA) requires an evaluation of the project's environmental impact as part of the decision-making process. The

evaluation should include the impact on flooding as well as water and air quality.

- EO 11988: Executive Order 11988 Floodplain Management requires federal agencies to check NFIP maps to see if a proposed project will be in a floodplain. If one is, the agency must follow an eight-step process to determine whether there is a feasible alternative to location in the floodplain. If not, the project must include flood damage reduction measures. In short, Federal agencies must meet the same or more restrictive development standards as do private property owners under the community's NFIP regulations.

## **WETLAND PROTECTION**

The federal regulation that local permit officials see most often is the program established by Section 404 of the Clean Water Act. Jointly administered by the Corps of Engineers and the U.S. Environmental Protection Agency, the Section 404 program regulates the discharge of dredged or fill material into U.S. waters, including adjacent wetlands.

The Section 404(b)(1) guidelines provide extensive environmental criteria for judging permit applications while emphasizing the need to prevent avoidable losses of aquatic resources, as well as the need to minimize adverse environmental impacts.

All coastal states and many inland states have their own wetlands regulations. Because inland wetlands generally receive less protection than coastal or "tidal" wetlands, many communities establish regulations that are more restrictive than the Federal or state programs.

The desire to reduce the cumulative impacts of wetland losses has led many jurisdictions to adopt a "no net loss of wetlands" policy. No net loss is addressed either in terms of acreage or the functional value of the wetlands. Despite these programs and other such efforts, as recent as 1989 it was estimated that the country was losing 300,000 – 450,000 acres of wetlands each year.

## **RARE AND ENDANGERED SPECIES**

Undeveloped floodplains may contain habitat for rare and endangered species of plants and animals. On the federal level, the Endangered Species Act of 1973 directs federal agencies not to undertake or assist projects that would adversely affect any endangered species.

The Act also requires an "incidental take permit" when it appears that the habitat of a rare or endangered species will be "taken" or impacted by a non-federal activity. Communities should coordinate their permit review with this program which is administered by the U.S. Fish and Wildlife Service.

Many states have programs to identify rare and endangered species and to acquire or regulate tracts that are home to them. Some states and communities have sensitive areas regulations or a similar approach that protects such habitats.

## **ON-SITE SEWAGE DISPOSAL**

Most states and municipalities regulate the design, location and placement of on-site sewage systems. Because the objective of such programs is to prevent surface and subsurface contamination, there are many requirements to selecting a proper site and designing a system that will work in a flood.

Less than desirable locations for on-site systems include areas with high groundwater tables, impervious soils, certain types of porous soils, and the potential for flooding. These characteristics often coincide with floodplains.

Regulations that restrict where septic systems can go often mean that a property owner cannot build in or near the floodplain.

## **FACILITIES SITTING**

Stringent government regulations restrict the siting of critical facilities —hazardous waste facilities, nuclear power plants, hospitals, police and fire stations —in a floodplain area.

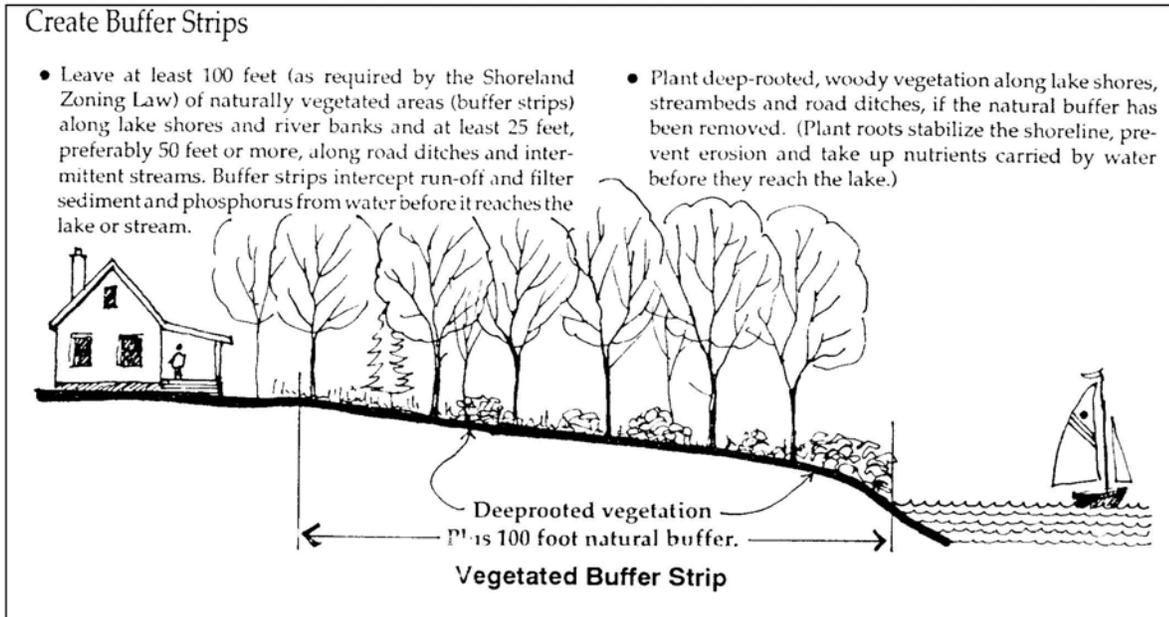
States and your community also may have siting regulations that discourage or prevent dangerous or hazardous development in floodplain areas. These include storage of hazardous materials, sanitary landfills and related activities.

## **WATER QUALITY RESTRICTIONS**

Since the enactment of the Clean Water Act in 1972 and related state legislation, more care is being given to the regulation of direct discharges of pollutants into waterways. Federal and state point source regulations focus on wastewater treatment plants and industrial sites where polluted water is piped to a stream or lake at a single point.

Non-point sources of pollutants are harder to regulate. If stormwater is not collected and sent to a wastewater treatment plant, it flows directly into a body of water. On its way, stormwater collects sediments from soil erosion as well as road oil, pesticides, lawn treatment chemicals and other pollutants. There is no treatment facility to clean this runoff water.

Regulatory approaches for non-point sources include buffer zones or stream setbacks where there are on-site disposal systems, timber harvesting, tilling of soil, mining, or development in general. These requirements are often part of, or complement, state or local stormwater management regulations.



**Figure 6-6: Buffer strips.**

Source: Environmental Management: A Guide for Town Officials, Maine Department of Environmental Protection, 1992

## SPECIAL DESIGNATIONS

Stream corridors often possess special value for an area, region or state. These corridors are given special designations—such as a wild or scenic river—and are afforded an extra level of recognition and protection.

While such programs are not necessarily regulatory in nature, they do encourage proper planning and land use control, discourage unwanted development, and guide federal and state actions.

The Community Rating System credits preserving areas for their natural functions under Activity 420 Open Space Preservation. Credit for prohibiting critical facilities in flood-plains and for prohibiting on-site sewage treatment, landfills and other hazardous use or threats to public health, is provided in Activity 430 Higher Regulatory Standards, respectively. Water quality regulations are credited in Activity 450 Stormwater management.

# **UNIT 7:** **ORDINANCE ADMINISTRATION**

## **In this unit**

This unit covers things you need to know to effectively administer your floodplain management ordinance, including:

- The legal basis for your ordinance,
- The duties and qualifications of the person who administers it,
- How to process permits,
- Conducting inspections,
- Enforcement tools,
- Appeals and variances, and
- Record keeping.

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# INTRODUCTION

Generally, the NFIP does not have specific requirements on how local ordinances should be administered. Administrative requirements vary from state to state due to differences in state enabling legislation. In addition FEMA wants to provide communities the flexibility to establish administrative procedures that are compatible with their other regulations and ordinances.

The NFIP does require that the local ordinance be legally enforceable and enforced uniformly throughout the community (44 CFR 60.1(b)). There are also some record keeping requirements that assist in verifying community and building compliance with the regulations.

If FEMA finds that a community's program is not in full compliance with its NFIP obligation, then it may require certain administrative adjustments to the program. How the program is administered, though, is dependent on the State's enabling legislation and the administrative practices currently used or established by the community.

This unit, therefore, is primarily a series of recommended administrative procedures. Those items that are NFIP requirements are highlighted in the "44 CFR" regulation boxes.

## **A. THE ORDINANCE**

This reference guide assumes that your community has a floodplain regulation ordinance in effect. While the reference guide does not provide a model ordinance or ordinance language, it does describe the significance of your ordinance, and provides guidance on how to enforce some of its provisions.

If you need to enact or revise your floodplain regulations, contact your state NFIP coordinator to see if there is a model appropriate to your state laws and flooding conditions that you could use as a foundation for your local ordinance.

### **STATUTORY AUTHORITY**

As used in this reference guide, ordinance is the generic term for a law passed by a local government. In some states it is called a “by-law” or some other name.

In all states, the authority to enact an ordinance comes from state law.

Communities are created by their state. Their powers are granted by and limited by state law or statutory authority, which is also known as enabling legislation. Your state has a specific law or set of laws authorizing your community to enact and enforce floodplain regulations. That law probably sets these parameters:

- The purpose and limits of the regulatory authority—for example, your community may not be able to regulate development projects undertaken by state agencies or public utilities.
- Minimum regulatory standards—many states mandate a certain building code or floodway encroachment standard.
- Prerequisites for enacting or amending the ordinance—a zoning ordinance may have to be based on a comprehensive plan or be adopted only after a public hearing.
- Requirements for issuing variances or allowing special uses.
- Prerequisites for the administering official—the community may have to have a certified building official enforce its building code.

Some state laws provide for state oversight of local regulations. In some cases, developers must apply to the state for a permit. In other cases, they may appeal to the state if they feel the community has not interpreted the regulations correctly.

In most states, local laws are subject to “Dillon’s rule,” named after a judge named Dillon who ruled in the 19th Century that because local governments are created by state government, they can do only what state laws specifically authorize.

If an action is not authorized by statute, a community cannot do it.

At one time, some communities did not have the statutory authority to implement the minimum NFIP regulatory requirements. FEMA worked with those states, so now all communities (cities and counties) should have all the authority they need to fulfill their NFIP obligations.

In some states, larger communities may be granted home rule. A home rule community is authorized to do anything that is not prohibited by statute. However, zoning and building laws are usually specific enough that even home rule communities must follow their provisions.

## **TYPES OF ORDINANCES**

Floodplain regulations are usually found in one of four types of regulations: zoning ordinances, building codes, subdivision regulations, sanitary regulations, and “stand alone” ordinances. Each is explained below.

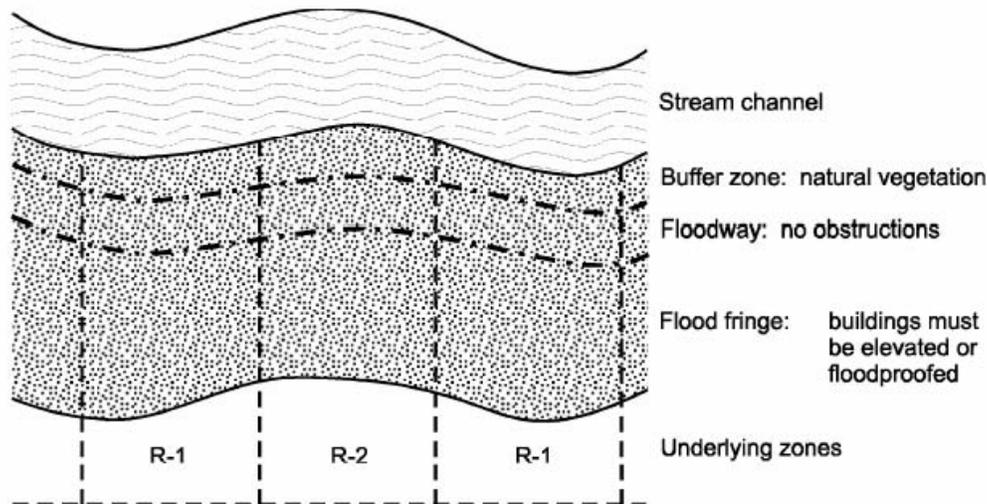
### **Zoning ordinance**

A zoning ordinance regulates development by dividing the community into zones or districts and setting development criteria for each district. Two approaches address development in floodprone areas: separate districts and overlay zoning.

In a separate district, the floodplain can be designated as one or more separate zoning districts that only allow development that is not susceptible to damage by flooding. Appropriate districts include public use, conservation, agriculture, and cluster or planned unit developments that keep buildings out of the floodplain, wetlands and other areas that are not appropriate for intensive development.

Overlay zoning adds special requirements in areas subject to flooding. The areas can be developed in accordance with the underlying zone, provided the flood protection

requirements are met. As illustrated in Figure 7-1, there may also be setbacks or buffers to protect stream banks and shorelines or to preserve the natural functions of the channels and adjacent areas.



**Figure 7-1. Example of overlay zoning**

## **Building codes**

A *building code* establishes construction standards for new buildings. Building codes generally do not establish site or location requirements. These requirements are implemented through subdivision or zoning ordinances or other land development regulations.

Many communities have adopted one of these national model building codes:

- The National Building Code of the Building Officials and Code Administrators (BOCA) has its flood resistant design and construction standards in Chapter 31.
- The Standard Building Code of the Southern Building Code Congress International (SBCCI) incorporates by reference the SBCCI Standard for Floodplain Management as its flood resistant design and construction standard.
- The Uniform Building Code of the International Conference of Building Officials (ICBO) includes flood resistant design and construction standards in a separate appendix that must be adopted by reference.

- The One and Two Family Dwelling Code of the Code Administrators and Building Officials (CABO) has no flood resistant design and construction standards but does have drainage provisions.
- The International Codes (I-Codes) of the International Code Council include the International Building Code (IBC), the International Residential Code (IRC), and several codes covering building utility systems and existing buildings. The I-Codes are consistent with all NFIP requirements related to the construction of flood resistant buildings.
- The National Fire Protection Association (NFPA) has issued the NFPA 5000 Building Construction and Safety Code. This code also is consistent with all NFIP requirements related to the construction of flood resistant buildings.

Many, but not all, NFIP regulatory requirements appear in parts of these codes

FEMA worked closely with the International Code Council and the National Fire Protection Association in developing their codes to assure consistency with NFIP requirements. Those NFIP requirements that relate to the actual construction of buildings are reflected in the bodies of the International Building Code and International Residential Code. Requirements related to building utilities are contained in the International Plumbing Code, International Mechanical Code, International Fuel Gas Code, and the International Private Sewage Disposal Code. The other NFIP requirements, such as administrative provisions, and requirements that apply to floodways, subdivisions and manufactured homes are contained in Appendix G of the International Building Code. Communities that adopt the I-codes have the option of either adopting Appendix G or addressing these other NFIP requirements through other codes and regulations.

Similarly, NFIP requirements that relate to the actual construction of buildings are reflected in the body of the NFPA 5000 Code. The other NFIP requirements are included in Annex C of the NFPA 5000 Code. Communities that adopt the NFPA 5000 Code have the option of either adopting Annex C or addressing these other NFIP requirements through other codes and regulations.

FEMA supported incorporation of NFIP flood resistant construction requirements into the I-Codes and the NFPA code because it felt these requirements could be more effectively administered as part of a building code with full involvement of the

community's building department. However, there will be challenges in adopting either the I-Codes or the NFPA 5000 Code that your community will need to address.

- Make sure that all applicable NFIP requirements are met in either the I-Codes or the NFPA 5000 Code or your other codes and ordinances.
- Make sure that your State or community has not amended the I-Codes or the NFPA 5000 Code in a way that makes them inconsistent with NFIP minimum requirements.
- Designate which community agencies are responsible for meeting various NFIP requirements and establish administrative procedures to assure that coordination occurs between these agencies on individual development proposals.
- If a State agency directly enforces the I-Codes or NFPA 5000 Code for certain categories of buildings, make sure you work out similar procedures with that State agency.

FEMA and the International Code Council have jointly developed a publication that provides a comprehensive explanation of how the International Code Series can be used to meet the requirements of the NFIP. The publication is entitled *Reducing Flood Losses Through the International Code Series* and is available from the following code groups: Building Official and Code Administrators International, Inc. (800) 214-4321;

International Conference of Building Officials (888) 699-0541, and

Southern Building Code Congress International, Inc. (888) 447-2224.

If your community will be adopting the I-Codes, you should obtain a copy of this publication. This publication may also be of interest to communities adopting the NFPA 5000 Code since many of the administrative and implementation issues are the same no matter which code you adopt.

## **Subdivision regulations**

Subdivision regulations govern how land will be divided into single lots. They set construction and location standards for the infrastructure the developer will provide, including roads, sidewalks, utility lines, storm sewers and drainageways.

As noted in Unit 6, Section C, subdivision regulations offer an opportunity to keep buildings out of the floodplain entirely with cluster developments.

They can also require that every lot have a buildable area above the BFE, include dry land access and meet other standards that provide more flood protection than a building code can.

## **Sanitary regulations**

The NFIP's requirements for water and sewer system protection are some-times best located in the regulations that set the construction standards for these systems.

## **“Stand alone” ordinance**

Many, if not most, communities in the NFIP have enacted a separate ordinance that includes all the NFIP regulatory requirements, usually based on a FEMA or state model.

The advantage of doing this is that one ordinance contains all floodplain development standards. Developers can easily see what is required of them, and FEMA and the state can easily see if your community has adopted the latest requirements.

The disadvantage to a separate ordinance is that it may not be coordinated with other building, zoning or subdivision regulations. Some communities have found that by adopting a stand alone model, they adopt standards that are inconsistent or even contrary to the standards in the other regulations. For example, your building code may require crawlspace vents to be high, near the floor joists, while the floodplain ordinance requires them to be no more than one foot above grade.

If you have a stand alone ordinance, you should review its provisions with all other offices and ordinances that regulate land development and building construction. Make sure that others know the floodplain regulations and that there are no internal inconsistencies. For example, a floodplain ordinance administered by the city engineer may not be coordinated with the permit process conducted by the building department.

## **CONTENTS**

Whether your floodplain regulations are in one ordinance or several, they should have these provisions:

- **Purpose:** Why was the ordinance adopted? What are its objectives? This provision helps set the tone for regulatory standards. For example, if the only purpose of the ordinance is to meet the NFIP minimum building requirements, a court may rule that it should not have higher regulatory standards that

protect life safety.

- Definitions: What technical terms are needed? Most ordinances have to define terms like “development,” “building,” “base flood elevation” and “lowest floor” in order for the regulations to be clearly understood.
- Adoption of flood data: Your community needs to adopt the flood maps, profiles and other regulatory flood data. This provision may need to be amended when new studies are published or new areas are annexed.
- Requirement for a development permit: Your ordinance must have a development permit process. Relying on your community’s building code or zoning ordinance permit process may not be sufficient because those programs may not require permits for all development, including fill, mining, etc.
- Construction standards: This is the meat of the ordinance. It should cover all of the NFIP standards discussed in Unit 5 and additional regulatory standards required by the state or that the community deems appropriate. The standards should include provisions for:
  - Building protection standards (elevation, floodproofing, anchoring)
  - Standards for manufactured (mobile) homes and manufactured home parks
  - Construction standards peculiar to the flood zones in your community, such as V, AO, AH and A99
  - Construction in the floodway and standards for encroachments where floodways are not mapped
  - Standards for subdivisions
  - Standards for water and sewer service
  - Rules on water course alterations
- Designation of administrator: The community must officially designate one person responsible for administering the ordinance. This provision may list that person’s duties, as detailed in the next section.
- Appeals process: The regulations need to provide a way for people to appeal or request a variance when they feel that the construction standards are overly harsh or inappropriate. This process should be handled by a separate body, such as a board of appeals or planning commission; it should not be left up to the decision of a single person, such as the administrator.

- **Enforcement:** The ordinance must have enforcement procedures clarifying penalties for violations. These are usually fines and orders to correct the violation.
- **Abrogation and greater restriction:** This is a legal provision that specifies that the ordinance take precedence over less restrictive requirements.
- **Severability:** This is a statement that the individual provisions are separable and if any one is ruled invalid, it does not affect the rest of the ordinance.

## B. THE ADMINISTRATOR

The state grants communities the police powers to adopt, administer and enforce local codes and regulations, including floodplain regulations. Generally, elected officials delegate authority for ordinance administration and enforcement to a subordinate officer.

A local floodplain administrator might be an existing local staff person, such as the building inspector, community zoning official, engineer or planner. The community also might contract to have the job done by the county, regional planning agency, another jurisdiction or authority, or a private firm.

Throughout this reference guide, the person designated as responsible for administering the floodplain management ordinance is called “the administrator.” This reference guide also assumes that you are the administrator, so the terms “you” and “the administrator” are used interchangeably.

### DUTIES

In general, the administrator is responsible for ensuring that development activities comply with the floodplain management regulations and other applicable codes and ordinances.

Duties of the administrator vary depending on the kind, size and characteristics of the community. However, certain responsibilities are common to all ordinance administrators. Here is a list of such duties:

**Understand the regulations:** This is the most important of all of your duties and is the main subject of this reference guide. A sound working knowledge of the general and technical provisions of various federal, state and local regulations is essential. You must be able to explain them to others, to review permit applications for compliance, and to provide adequate interpretations.

**Ensure that permits are applied for:** Often people do not realize that they need to apply for a permit for a project in the floodplain. You need to ensure that the public is informed as to when permits are needed and how they are obtained. Anyone engaged in a development project without a permit must be told to stop and apply for one.

**Correct violations:** You must evaluate complaints, conduct investigations and use legal recourse when necessary to correct violations.

**Process permit applications:** Your primary role is to review permit applications for compliance with applicable local regulations. This involves:

- Collecting permit fees, where applicable.
- Assessing the accuracy and completeness of the application.
- Evaluating site plans, topographic data, building design plans and other technical data.
- Identifying deficiencies and devising ways to correct them.
- Issuing or denying the permit.
- Helping applicants pursue appeals or requests for variances.

**Coordinate with other programs:** Responsibility for permit review may re-side in your office or be shared with other offices, such as public works, planning and zoning, code enforcement or housing departments. Depending on your duties, you may be involved in coordinating permit reviews.

You must advise the applicant of any need for additional local, state or federal permits for the proposed development. Your office could have copies of the permit application forms or advise applicants whom to contact.

One of your NFIP responsibilities is to notify adjacent communities and the state NFIP coordinating agency prior to any alteration or relocation of a water-course. You must submit evidence of such notification to the FEMA Regional Office.

You should also notify adjacent communities of plans for a substantial commercial development or large subdivision that could affect their flood hazard areas.

**Ensure projects are built according to approved permits:** You or your staff must perform periodic and timely on-site inspections to confirm visually that development is following the approved plans. The best way to do this is with a series of inspections at appropriate stages in the construction process, as discussed later in this unit. A certificate of use or occupancy is a final permit that allows the owner to use the building. It should not be given until a final inspection confirms that everything was done according to the approved plans.

**Take enforcement actions:** When noncompliant activities are uncovered, you must act to resolve the situation. This may involve issuing stop-work orders or other violation

notices, coordinating enforcement procedures with the community's attorney, or appearing in court.

**Keep records:** You should have on hand a sufficient supply of current permit applications, variance requests and other administrative forms. A project file should be kept for each development permit application.

**Maintain and update flood data and maps:** As noted in Unit 4, Section D, your community should maintain an adequate supply of maps showing the regulatory floodplain for your office and the public to use. All map corrections and notices of map revisions should be recorded and denoted on administrative maps, with the details kept in an indexed file.

You should also cooperate with federal, state and local agencies, and private firms, undertaking flood studies. You must submit any new floodplain data to the FEMA Regional Office within six months of their development. Community staff should review revisions to maps (including Conditional Letters of Map Revision and Letters of Map Revision) to ensure they meet your regulations.

You must notify the FEMA Regional Office and the state within one year of an annexation or when your community has assumed or relinquished authority to adopt or enforce floodplain management regulations for a particular area. The NFIP has special procedures that need to be followed to ensure that these areas are properly mapped and regulated and remain eligible for flood insurance.

**44 CFR 59.22(a)(9)(v)** *Upon occurrence, [the community must] notify the Administrator in writing whenever the boundaries of the community have been modified by annexation or the community has otherwise assumed or no longer has authority to adopt and enforce flood plain management regulations for a particular area. In order that all FHBMs and FIRMs accurately represent the community's boundaries, include within such notification a copy of a map of the community suitable for reproduction, clearly delineating the new corporate limits or new area for which the community has assumed or relinquished flood plain management regulatory authority.*

You must notify the FEMA Regional Office and the state within six months of physical changes that can affect flooding conditions, such as channel modifications or upstream detention.

**44 CFR 65.3.** *A community's base flood elevations may increase or decrease resulting from physical changes affecting flooding conditions. As soon as practicable, but not later than six months after the date such information becomes available, a community shall notify the Administrator of the changes by submitting technical or scientific data in accordance with this part. Such a sub-mission is necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and flood plain management requirements will be based upon current data.*

**Update the ordinance:** If your community is notified of changes in federal or state laws and/or regulations that would require changing your floodplain management ordinance, you must revise your ordinance within six months.

**44 CFR 60.7.** *From time to time Part 60 may be revised as experience is acquired under the Program and new information becomes available. Communities will be given six months from the effective date of any new regulation to revise their flood plain management regulations to comply with any such changes.*

Similarly, if you are given new flood data by FEMA, you have six months to update your ordinance to adopt the data and the regulatory requirements appropriate for that level of data (Unit 5, Section A, Community Types relates the level of data to the regulatory requirements).

**44 CFR 60.2(a)** *A flood-prone community ... will be given a period of six months from the date the Administrator provides the data set forth in § 60.3(b), (c), (d), (e) or (f), in which to meet the requirements of the applicable paragraph.*

A certified copy of any ordinance revision should be submitted to the FEMA Regional Office and to the state NFIP coordinating agency promptly after adoption.

## QUALIFICATIONS

Your state may set minimum requirements for the person who administers the floodplain management ordinance, such as requiring that the post be held by a certified building official. A few states are encouraging or requiring that the ordinance be administered by a “certified floodplain manager,” a new certification that may be conferred by your state, the floodplain management association in your state, or the Association of State Floodplain Managers (ASFPM). Information on the ASFPM certification program can be obtained at <http://www.floods.org>.

In most instances, there are no specific qualifications or prerequisites for a floodplain administrator. This does not mean just anyone can do any part of the job of administering the ordinance. One of your jobs is to make sure that the person with the right qualifications helps you. You will probably need help from three other professions:

- Some tasks should be conducted by an engineer experienced in hydrologic and hydraulic studies, such as reviewing a developer's flood study before you accept new flood elevations.
- You will need help from a registered land surveyor to complete Elevation Certificates. While there are limited instances where a properly appointed local administrator can complete an Elevation Certificate, most states require that such work only be done by a registered land surveyor.
- You should always consult your community's attorney before you initiate an enforcement action.

## **TRAINING**

In many cases, only you will have the expertise needed to administer your ordinance. As the administrator, you will probably be your community's primary source of information on:

- The basic NFIP requirements.
- Additional requirements of your ordinance.
- How to use the NFIP maps and regulatory flood data.
- How maps are reviewed and revised.
- When permits are needed.
- Whether a proposed project meets the ordinance's standards.
- Whether a completed project complies with the approved plans.
- What records are needed.
- How to deal with citizens and builders.
- How to deal with violations.
- How floodplain development regulations and flood insurance rating are related.
- Where citizens and builders can get more information or help.

These topics are not taught at any high school or college. To learn these things you will need additional training. Here are some ways to get it:

- Read this study guide and make use of the learning checks.
- Spend time with the floodplain administrator in a neighboring community.
- Check with the FEMA Regional Office and/or the state NFIP coordinator before you issue your first few permits or certificates of occupancy.
- Request a Community Assistance Visit whereby a FEMA or state person will visit you and review your procedures.
- Attend a workshop put on by your state NFIP coordinator.
- Attend a meeting or conference of your state or national floodplain management association (contact the state coordinator for information about these associations).
- If available before you take a certification test, attend a recommended training or refresher course.
- Attend the Emergency Management Institute.
- Visit FEMA's web site periodically (<http://www.fema.gov>).
- Order and review the publications listed in Appendix C.

The Emergency Management Institute (EMI) in Emmitsburg, Maryland, provides several courses related to the administrator's job. While you may not need to take the resident course that covers the same information as this study guide, EMI offers three others that would be helpful:

- National Flood Insurance Program/Community Rating System
- Digital Hazard Data (how to use digital FIRMs and other data)
- Retrofitting Floodprone Residential Buildings

These courses are designed to give you step-by-step practical knowledge and experience. In addition, by attending an EMI course you meet other local administrators from around the country from whom you also can learn the ins and outs of floodplain management administration.

EMI courses run Monday through Friday, two to four times a year. They are free for state and local officials. Generally FEMA will pay transportation to Emmitsburg and will house you in dormitories on campus. For more information, See Appendix G, ask your local emergency manager, or call EMI at 800/238-3358.

## LIABILITY

Ordinance administrators naturally fear they could be sued if a person gets flooded or if a building that they permit is damaged by a flood. Debated nation-ally for some time, this issue has been studied extensively by Dr. Jon Kusler, a nationally known attorney in floodplain management law.

Dr. Kusler summarized his most recent findings in *Floodplain Management in the United States: An Assessment Report, Volume 2*, prepared for the Federal Interagency Floodplain Management Task Force, 1992.

Excerpts from that report are quoted here. However, your community's legal department should provide more specific guidance.

- Government agencies are generally not liable for flood damage unless the flood was caused by a government action. “Except in a few instances, governments are not liable for naturally occurring flood damages. Government has, in general, no duty to construct dams, adopt regulations, or carry out other hazard reduction activities unless required to do so by a statute. It is only where a government unit causes flood damages or in-creases natural flood damages that liability may arise.” (*Floodplain Management in the United States: An Assessment Report, Volume 2, Page 1012*)
- Liability is based on negligence; a community is well defended by a properly administered program. “In general, government units are not 'strictly or absolutely' responsible for increased flood damages. Liability usually results only where there is a lack of reasonable care. ... Where the standard of reasonable care is judicially applied to an activity, the seriousness of foreseeable threat to life or economic damage is an important factor in determining reasonableness of conduct. In general, the more serious the anticipated threat, the greater the care the government entity must exercise. (*Floodplain Management in the United States: An Assessment Re-port, Volume 2, Page 1013*)
- Policy or discretionary actions are more defensible than nondiscretionary, ministerial actions. It is better to have clear standards spelled out in the ordinance adopted by your governing board than to leave a lot of interpretation up to the administrator. “As a general rule, courts do not hold legislative bodies or administrative agencies liable for policy decisions or errors in judgment where the legislature or agency exercises policymaking or

discretionary powers. But they often hold agencies responsible for failure to carry out nondiscretionary duties or for negligence in carrying out ministerial actions.” (*Floodplain Management in the United States: An Assessment Report, Volume 2, Page 1013*)

- “... from a legal perspective it may be desirable to submit proposed standards ... to a community's legislative body (e.g., community council) for debate and approval. Due to the special way legislative decisions are treated by the courts, legislative judgments, particularly those of a discretionary nature, are less likely to result in a successful liability suit than are agency decisions. Courts generally defer to legislative judgment.” (*Flood-plain Management in the United States: An Assessment Report, Volume 2, Page 1017*)
- Government employees are usually protected from liability suits. “Although governments may be liable for increased flood or drainage losses in a broad range of contexts, government employees are usually not personally liable for planning, permit issuance, operation of dams, adoption of regulations or other activities. ... No personal liability results where a government employee acts in good faith, within the scope of his or her job, and without malice. Successful lawsuits for hazard-related damages against government employees under common law theories or pursuant to Section 1983 of the Civil Rights Act are apparently nonexistent.” (*Flood-plain Management in the United States: An Assessment Report, Volume 2, Pages 1013 - 1014*)

Based on these findings, you can protect yourself from lawsuits by:

- Adopting sound and appropriate flood protection standards: Remember, NFIP standards are minimums. Buildings should not be allowed in a mountainous floodplain with no warning time and very high velocities, even though the NFIP minimums would allow it. If you know flooding could be or has been higher than the BFE shown on the FIRM, you are not doing your residents any favors by allowing them to build buildings ex-posed to a known hazard.
- Becoming technically competent in the field: You won't be sued if you have ensured that the project was properly constructed. There is no grounds for a suit if no one is damaged by flooding: “... 'liability can be avoided if flood damages are avoided.' From a legal perspective, this is a sound philosophy.” (*Floodplain Management in the United States: An Assessment Report, Volume 2, Page 1017*)

- Insuring the community: Your community may want to purchase liability insurance or establish a self-insurance pool or plan to protect itself.
- Encouraging property owners to buy flood insurance coverage. If people are compensated for any flood losses, they are less likely to file a lawsuit.
- Adopting an ordinance provision that exempts the community from liability. Several states' model ordinances have language like the following:

**Disclaimer of Liability:**

- (i) The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on available information derived from engineering and scientific methods of study.
- (ii) Larger floods may occur or flood heights may be increased by man-made or natural causes.
- (iii) This ordinance does not imply that development either inside or outside the SFHA will be free from flooding or damage.
- (iv) This ordinance does not create liability on the part of the City or any officer or employee therefore for any flood damage that results from reliance on this ordinance or any administrative decision made lawfully thereunder. (*Floodplain Management in Northeastern Illinois*, Illinois Department of Natural Resources, 1996, p. 56)

The Association of State Floodplain Managers has produced a valuable report about legal liability risks facing those communities that do not take adequate steps to require mitigation where the risk is known ([www.floods.org](http://www.floods.org)).

## C. DEVELOPMENT PERMITS

Once the ordinance is in force, any development or change in land use requires authorization, generally in the form of a permit from the local administrator or agency. This section of Unit 7 discusses the permit review process that leads to approval or denial of an application.

This discussion reviews a standard process. It is not a mandatory process, but it does ensure that all of your NFIP requirements will be met. If your community has a permit process that has proven successful, you should review this section to see if there are things you would want to add to your process.

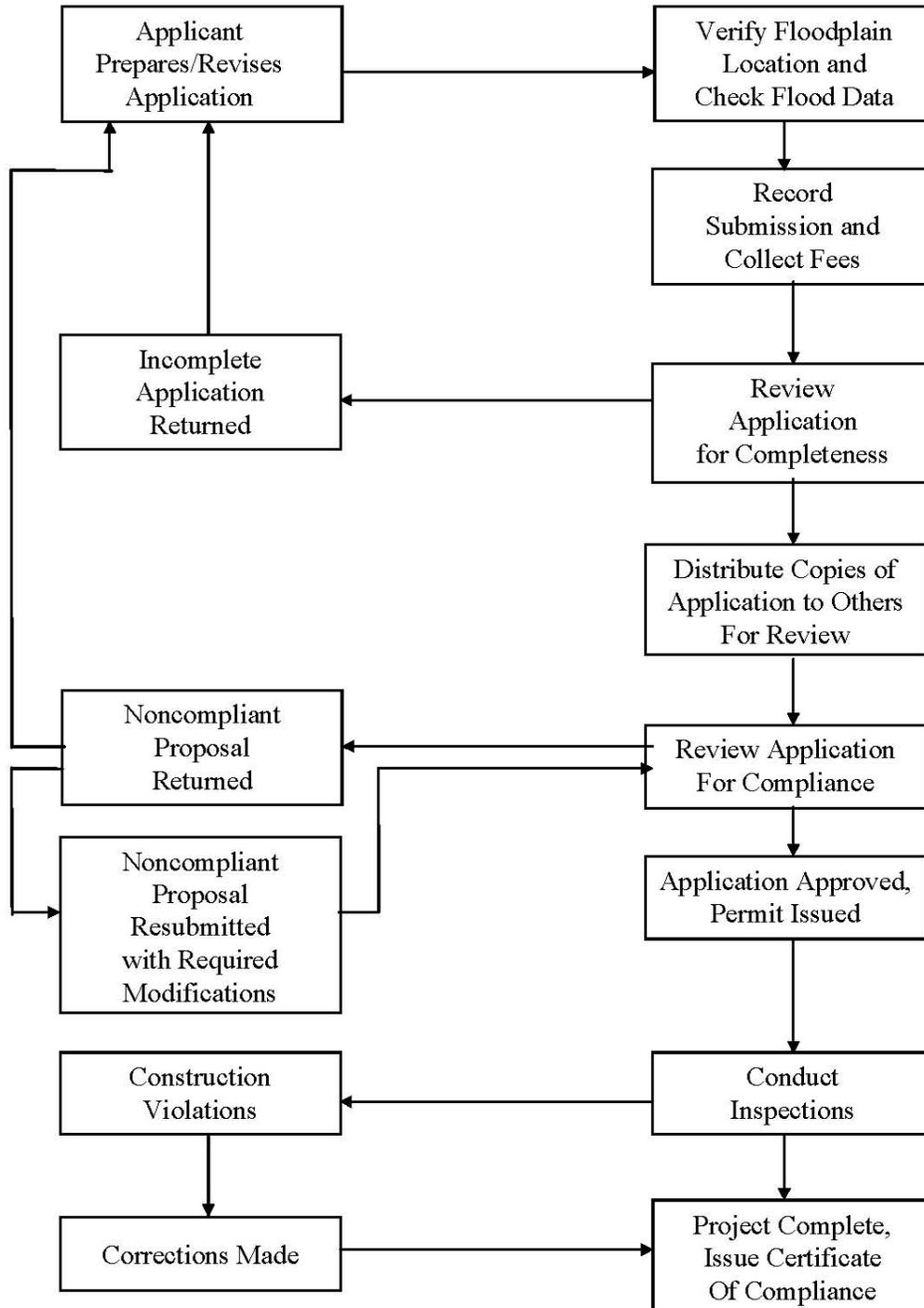
Figure 7-2 shows the permit process that forms the organization for this section. To facilitate your work, you may want to develop your own checklist. An example developed by the State of South Carolina is at the end of this section in Figure 7-3.

### WHEN A PERMIT IS REQUIRED

A permit is required for almost any development-related change to the flood-plain, including but not limited to:

- Construction of new structures
- Modifications or improvements to existing structures
- Excavation
- Filling
- Paving
- Drilling
- Driving of piles
- Mining
- Dredging
- Land clearing
- Grading
- Permanent storage of materials and/or equipment

While most communities have issued building permits for some time, many don't have a permit system that covers such a wide range of activities. The regulation of all development in floodplains is essential because fill or other material can obstruct flood flows just as structures can.



**Figure 7-2. Permit process flow chart**

## EXEMPTIONS

Your statutory authority may limit your community's ability to regulate some development. The most common limitation is over activities by federal agencies, tribal lands, state agencies, other local governments, and public utilities. Check with your state NFIP coordinator to determine what is exempt from a local ordinance.

**44 CFR 60.1(b)** *These regulations must be legally-enforceable, applied uniformly throughout the community to all privately and publicly owned land within flood-prone ... areas, and the community must provide that the regulations take precedence over any less restrictive conflicting local laws, ordinances or codes.*

You cannot exempt activities by your own community government. Just because the public works department doesn't get a permit from the building department does not mean that it doesn't have to follow the NFIP rules that govern all development within your statutory authority.

If State actions are exempt from your permit authority, your state should have adopted floodplain management requirements that are comparable to your ordinance. This is usually done in the form of a governor's executive order or by adopting state floodplain management regulations. Similarly, Federal agency activities are subject to the provisions of Executive Order 11988 Floodplain Management that references NFIP requirements. In both situations the state or federal agency should be applying the same or similar requirements to their actions as would be applied through your floodplain management ordinance. If there are activities being conducted in your floodplain by a State or Federal agency that are not meeting State floodplain management requirements or the requirements of Executive Order 11988, contact your FEMA Regional Office.

You do have some discretion to exempt obviously insignificant activities from the permit requirement—such as planting a garden, farming, putting up a mailbox or erecting a flagpole. Other projects, such as reroofing and replacing siding, will not affect flood flows or be substantial improvements. See also the discussion on the NFIP's development permit requirements in Unit 5, Section C.

Some communities specify exempt projects in their ordinances. Check with your state coordinating agency and/or FEMA Regional Office before you do this, because you don't want to exempt projects that could be considered floodway violations or substantial improvements or otherwise not meet NFIP minimum requirements.

## **PERMIT APPLICATION FORM**

A good administrative form can serve as a checklist for identifying the kinds of information that should accompany a permit application.

Your community should have its own permit application form. Figure 7-4, at the end of this section, is the model form developed by the state of North Carolina. It contains all the required information for a floodplain development permit application. Your form may be different, but the review process is the same.

Note: If you use the form in Figure 7-4 to develop your own permit application program, be sure to include all other state and local requirements. You may want to include checklists of items you will need to look at.

Where a particular activity that is required by the NFIP regulations is mentioned in this unit's text, the reference to 44 CFR Part 60 is included in brackets (e.g. [44 CFR 60.3(c)(5)]). These activities must be included in the permit process in order for the community to remain in full compliance with the NFIP.

Forms are a valuable and necessary tool in reviewing development proposals for regulatory compliance. When designed properly, they can be the most efficient way to get information that is essential to conducting an effective and thorough review. The forms should be revised periodically to remain current with changes in the floodplain management ordinance and to include pertinent information.

## **APPLICATION REVIEW**

Submission of a development permit application starts the permit process.

Before submitting an application, the prospective applicant often will contact you to obtain a copy of the regulations, locate the proposed site in relation to the NFIP maps, determine flood elevations, or gather procedural and technical information needed to complete the application.

This informal part of the permit process can be important in guiding the applicant to locate and design the development in compliance with local regulations. It also can help the applicant to prepare a complete application, avoiding unnecessary delays at the outset.

Some communities ensure that the permit process will go smoothly by having a formal pre-application meeting with a developer to review a preliminary plan.

## REVIEW FOR COMPLETENESS

The application package should contain all the administrative forms, plans, blueprints and technical documentation required for you to review the proposed project for regulatory compliance. If the application package is incomplete, the review can't go forward. The applicant should be advised of missing documents and told that the review will not start until the missing documents are submitted.

Some states and communities require that a permit be issued within so many days of receipt of the application. You should not officially "receive" the application or log it in until it has been reviewed and determined to be complete.

You should review the package in a timely manner. The review should include the following procedures:

**1. Make sure all administrative forms are completed satisfactorily and properly signed.** Scan the administrative forms to ensure that all questions have been answered. If important items are left blank or not addressed completely, bring them to the attention of the applicant for completion.

Inaccurate information also should be brought to the attention of the applicant. Your review should be halted until deficiencies are corrected.

**2. Briefly review site plans, grading and excavation plans, and building design plans for completeness.** Depending on the specificity or detail of the administrative forms, the various plans that accompany the application will provide the technical data needed for a thorough review.

The site plan is a critical component of floodplain development proposals. Such a plan should show:

- Location of property lines.
- Required set backs lines and easements.
- Topographic information, such as contour lines or spot elevations.
- Streets.
- Watercourses.
- Existing and proposed structures.
- Proposed building elevations of all new construction and the existing lowest

floor for substantially improved or substantially damaged structures.

- All clearing, filling and other proposed changes to the ground.
- Floodway and floodplain boundaries.
- Base flood elevations.
- In V zones, the line of the mean high tide and Zone V/Zone A boundary; if there is more than one Zone on the lot, the BFE and boundary locations should be depicted on the plans.

When a plan is prepared by a registered professional architect, engineer or land surveyor, it should be stamped with the license seal to certify technical accuracy.

**3. Ensure that all necessary certifications are included and properly signed.** The applicant must provide all completed certifications needed for the permit review.

Based on the minimum NFIP requirements, four situations would require the filing of certified documents with the permit application:

- Floodway encroachment: If any part of the proposed project is to be located in a designated floodway, the applicant must submit an engineering certification and documentation demonstrating that the proposed encroachment would not result in any increase in base flood heights. If the project is in a riverine floodplain where no floodway has been adopted, the certification would show that there the project will not exceed the allow-able increase a flood heights. This certification could be the same as the No-Rise Certification shown in Figure 5-5. [44 CFR 60.3(c)(10) and (d)(3)]
- Floodproofed building: In the event a nonresidential structure is to be floodproofed, the applicant must submit a statement from a registered professional engineer or architect certifying that the design and methods of construction meet these standards [44 CFR 60.3(c)(4)]. A second, as-built, certificate is also required to be submitted later.
- Enclosures below the lowest floor. Unit 5, Section E covered the requirements for openings in enclosures. If an applicant designs an enclosure below the lowest floor using an alternative to the NFIP standard, a registered professional architect or engineer must certify the design [44 CFR 60.3(c)(5)]. If a full-story enclosure is planned below the elevated lowest floor, you should require the applicant to sign a non-conversion agreement such as the one in

Figure 5-13.

- V Zone construction. An applicant proposing to construct a building in a V zone must supply a statement from a registered professional architect or engineer certifying the design and method of construction of the elevated building and the design of breakaway walls [44 CFR 60.3(e)(4)]. See Figure 5-18 for an example. An as-built certificate is also recommended to be submitted later

**4. Ensure that all necessary federal and state permits are being obtained.** You must review the application package to determine whether federal and state permits are necessary [44 CFR 60.3(a)(2)]. To help you and the applicant, you might include the agency or program names as a checklist on your permit application form.

When obtaining federal and state approval takes a long time, you may condition issuance of your permit on the applicant's obtaining such permits later. The applicant should provide documentation to the administrator stating that the required federal and state permits have been applied for, and that portion of the project affected by needed permits will not proceed until those permits are issued.

For example, getting a Section 404 wetlands permit from the Corps of Engineers may take several months. Under such circumstances, you may issue a local permit with the stipulation that the applicant must have obtained all required permits before beginning construction. You can verify this at your first inspection.

**5. Submit copies of appropriate parts of the application package to other departments for review.** Depending on the type and size of the proposed development and on the regulatory responsibilities of other departments or offices in your community, the applicant should submit a sufficient number of copies to allow for others' review.

Here are some departments and agencies who might need to review a portion of the application:

- Building department.
- Zoning department.
- Engineer's office.
- Health department (septic system approval).
- FEMA Regional Office (for assistance in evaluating a no-rise floodway

application, change to a floodway delineation or other activity that will result in a map revision).

- State NFIP coordinating agency (state permit requirements, alteration or relocation of a watercourse).
- U.S. Army Corps of Engineers (404 permit, technical assistance).
- Environmental Protection Agency.
- U.S. Fish and Wildlife Service (incidental take permits under Section 10 of the Endangered Species Act of 1973).
- State public health agency (permits for hospitals, nursing homes, etc.).
- Natural Resources Conservation Service (impact of subdivisions and other large development on the natural resources of the area).
- Adjacent communities (alteration or relocation of a watercourse).

If your office hasn't done this already, you should contact these agencies, determine what, if anything, they need to review, and prepare a checklist for permit applicants that advise them of the other approvals that will be needed.

## **REVIEW FOR COMPLIANCE**

Now that you have a complete application package, follow these recommended procedures to verify that the project will meet all of your ordinance requirements.

**1. Examine site information.** Check the site plan to ensure that the plotted floodplain, floodway, and V Zone boundaries appear accurately plotted. Look for possible obstructions in the floodway and other potential violations.

Inspect the plan carefully and compare it with the FIRM, floodway map and profile. In coastal areas, you should determine if the site is in a COBRA zone and so advise the applicant/property owner (COBRA zones are explained in Unit 3, Section F and Unit 9, Section D).

Some project sites may be located close to the boundaries of the SFHA. Because the map scale is small, or it is difficult to pinpoint the project site, you may have trouble determining whether the project will be in or out of the SFHA. See Unit 4, Section B, on making floodplain and floodway boundary determinations.

*Remember, a floodplain development permit is required only if the planned structure is located within the SFHA. For example, while the applicant's property may be located partially in the SFHA, the proposed structure would be built on land outside the SFHA. In this case, floodplain regulations would not apply and no special floodplain development permit is needed. However, if clearing, grading, filling, or road or bridge construction associated with erecting the structure is within the SFHA, a permit is necessary.*

*Note that while you can use better ground elevation data to determine that a building location is above the BFE (and therefore outside the SFHA), the property will remain in the SFHA on the FIRM. That means that it is still subject to the flood insurance purchase requirement and the rates will be set at SFHA rates. It is the owner's responsibility to submit a request for a Letter of Map Amendment (LOMA) in order to have the FIRM reflect the better data (see Unit 4, Section D for more information on LOMAs).*

**2. Review building plans.** If a building site is in the SFHA, all buildings must be protected to the BFE or higher.

*In this reference guide, the term "building" is the same as the term "structure" in the NFIP regulations. Your ordinance may use either term. The terms are re-viewed in more detail in Unit 5, Section E.*

The application package must include building design plans that show:

- The kind and potential use of the structure.
- The elevation of the lowest floor.
- The type of foundation system.
- The existence of any enclosure below the lowest floor, along with electrical and plumbing plans for the area, location of openings and materials proposed for use in an enclosure below the BFE.
- The height to which a nonresidential structure is to be floodproofed and the complete list of floodproofing techniques to be used, with detailed drawings

Any conflict or inconsistency with applicable regulations will require adjustments to the building plans.

**3. Have the community's engineer review engineering documents.** As listed previously, depending on the type and location of the structure being pro-posed, as many as four engineering documents or certifications are needed to show compliance with

NFIP requirements concerning floodway encroachment, floodproofing, enclosures below the lowest floor and V Zone construction.

All engineering documents should be examined by your community's staff engineer, or a consulting engineer available to perform reviews, to ensure that acceptable technical standards were used and that calculations are correct. If your community does not have a staff engineer, the state NFIP coordinating agency or FEMA Regional Office may be able to help review the data.

## **APPLICATION APPROVAL OR DENIAL**

Once you complete your review of the permit application papers for completeness and technical compliance with the ordinance, a decision on the application is due.

**If the proposed development is in compliance with regulations, issue a permit.** The permit becomes the official authorization from the community allowing the applicant to proceed, based on the information submitted in the application package. A sample permit developed by the North Carolina state NFIP coordinator is shown in Figure 7-5.

Somewhere in the permit record, such as the approved plans, the application form or the permit form itself, a record should be kept of the base flood elevation and the required floor elevation. There should also be a general statement that all construction will be in accordance with all codes and ordinances (see Section 1, item 6 in Figure 7-4).

The day a permit is issued is the date of the "start of construction," provided construction begins within 180 days. Used for insurance rating purposes, this date determines what FIRM was in effect when the building was built, regardless when ground was broken or construction was finished.

For regulatory purposes, a permit may be effective or valid for a certain period of time, according to the standard used in your other regulations. If at the end of this period the project is not complete, the permit technically expires. However, ordinances routinely provide for the permit officer to issue written extensions to allow completion of the development under the conditions of the original permit.

**If the application is not in compliance with local regulations, the permit should be denied.** The applicant then can choose to:

- Withdraw the permit application.

- Redesign the project to bring it into compliance with regulations.
- Appeal to the Board of Appeals.
- Ask for a variance to the regulations.

While you may not be formally required to disclose the reasons for denying an application, it is good policy to do so in writing. This tells the applicant what areas are noncompliant so that if he or she wishes to resubmit the application, appropriate corrections can be made.

Appeals and variances are covered in Section F of this unit. Clarifying the deficiencies for the applicant also can help reduce the number of appeals of administrative and regulatory decisions you make

Building Permit Number: \_\_\_\_\_

Applicant's Name:	Owner's Name:
Site Address, Tax #, Parcel #:	Address:
Telephone:	Telephone:

**I. All development - Base Flood Elevation Data provided.**

- A. The as-built elevation certification from a registered land surveyor or professional engineer has been submitted? " Yes " No
- B. The lowest floor elevation is at or above the required lowest floor elevation? " Yes " No
- C. Electrical, heating, ventilation, plumbing, air conditioning equipment (including duct work) and other service facilities are located above BFE or floodproofed? " Yes " No

**II. Development in Zones A, AE, A1-A30 and AH.**

- A. *Solid foundation perimeter walls located below BFE.:*
  - 1. There are at least two (2) openings? " Yes " No
  - 2. Square footage of enclosed area subject to flooding \_\_\_\_\_
  - 3. Square inches of venting required \_\_\_\_\_
  - 4. Square inches per opening (multiply l by w) \_\_\_\_\_
  - 5. Number of required vents (3 above divided by 4 above) \_\_\_\_\_
  - 6. Foundation contains the minimum number of vents? " Yes " No
  - 7. The bottom of each opening is no higher than one (1) foot above grade? " Yes " No
  - 8. Any cover on openings will permit the automatic flow of floodwaters in both directions? " Yes " No
- B. *Base flood elevation and/or floodway data not available or AO Zones:*
  - 1. The lowest floor is at least three (3) feet above the highest adjacent grade? " Yes " No
  - 2. The development meets the setback requirements of the ordinance? " Yes " No
  - 3. If 2 above was "no", has a No-Rise Certification been submitted? " Yes " No

Reviewer's Name: \_\_\_\_\_ Date reviewed: \_\_\_\_\_
- C. *Floodway data is provided.*
  - 1. Did this development encroach in the floodway? " Yes " No
  - 2. Do the actual field conditions meet the proposed actions and technical data requirements? " Yes " No
  - 3. If C1 was "yes", has a No-Rise Certification been submitted? " Yes " No

Reviewer's Name: \_\_\_\_\_ Date reviewed: \_\_\_\_\_

**III. Development in Zones V, VE, and V!-V30, VO (Coastal High Hazard Areas).**

- A. Development location complies with all coastal setback requirements? " Yes " No
  - B. Structure is securely anchored to pilings or columns and certification by a registered, professional architect or engineer has been submitted? " Yes " No
- Reviewer's Name: \_\_\_\_\_ Date reviewed: \_\_\_\_\_
- C. Walls permitted below the base flood elevation consist of decorative lattice work or, where permitted, are breakaway and have been certified by a registered, professional architect or engineer? " Yes " No
- Reviewer's Name: \_\_\_\_\_ Date reviewed: \_\_\_\_\_

Local Administrator's Signature: \_\_\_\_\_ Date : \_\_\_\_\_

**Figure 7-3. Sample permit review checklist**

(Developed by the South Carolina Department of Natural Resources)

**SAMPLE  
FLOODPLAIN DEVELOPMENT PERMIT APPLICATION**

This form is to be filled out in duplicate.

**SECTION I: General Provisions (APPLICANT to read and sign):**

1. No work of any kind may start until a permit is issued.
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Compliance is issued.
5. The permit will expire if no work is commenced within six months of issuance.
6. Applicant is hereby informed that other permits may be required to fulfill local, state, and federal regulatory requirements.
7. Applicant hereby gives consent to the Local Administrator or his/her representative to make reasonable inspections required to verify compliance.
8. THE APPLICANT, CERTIFY THAT ALL STATEMENTS HEREIN AND IN ATTACHMENTS TO THIS APPLICATION ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND ACCURATE.

(APPLICANT'S SIGNATURE) \_\_\_\_\_ DATE \_\_\_\_\_

**SECTION 2: Proposed Development (To be completed by APPLICANT)**

NAME	ADDRESS	TELEPHONE
APPLICANT	_____	_____
BUILDER	_____	_____
ENGINEER	_____	_____

**PROJECT LOCATION:**

To avoid delay in processing the application, please provide enough information to easily identify the project location. Provide the street address, lot number or legal description (attach) and, outside urban areas, the distance to the nearest intersecting road or well-known landmark. A sketch attached to this application showing the project location would be helpful.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Figure 7-4a. Sample floodplain development permit application form**  
(Developed by the North Carolina Division of Emergency Management)

Application # \_\_\_\_\_  
Page 2 of 4

**DESCRIPTION OF WORK (Check all applicable boxes):**

A. STRUCTURAL DEVELOPMENT

<u>ACTIVITY</u>	<u>STRUCTURE TYPE</u>
<input type="checkbox"/> New Structure	<input type="checkbox"/> Residential (1-4 Family)
<input type="checkbox"/> Addition	<input type="checkbox"/> Residential (More than 4 Family)
<input type="checkbox"/> Alteration	<input type="checkbox"/> Non-residential (Floodproofing? <input type="checkbox"/> Yes)
<input type="checkbox"/> Relocation	<input type="checkbox"/> Combined Use (Residential & Commercial)
<input type="checkbox"/> Demolition	<input type="checkbox"/> Manufactured (Mobile) Home (In Manufactured Home Park? <input type="checkbox"/> Yes)
<input type="checkbox"/> Replacement	

ESTIMATED COST OF PROJECT \$ \_\_\_\_\_

B. OTHER DEVELOPMENT ACTIVITIES

Clearing    Fill    Mining    Drilling    Grading

Excavation (Except for Structural Development Checked Above)

Watercourse Alteration (Including Dredging and Channel Modifications)

Drainage Improvements (Including Culvert Work)

Road, Street or Bridge Construction

Subdivision (New or Expansion)

Individual Water or Sewer System

Other (Please specify) \_\_\_\_\_

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After completing SECTION 2, APPLICANT should submit form to the Local Administrator for review.

**SECTION 3: Floodplain Determination (To be completed by the Administrator)**

The proposed development is located on FIRM Panel No. \_\_\_\_\_, Dated \_\_\_\_\_.

The Proposed Development:

Is NOT located in a Special Flood Hazard Area (Notify the applicant that the application review is complete and NO FLOODPLAIN DEVELOPMENT PERMIT IS REQUIRED).

Is partially located in the SFHA, but building/development is not.

Is located in a Special Flood Hazard Area  
FIRM zone designation is \_\_\_\_\_.  
"100-Year" flood elevation at the site is: \_\_\_\_\_ ft. NGVD (MSL)  
 Unavailable

Is located in the floodway.  
FBFM Panel No. \_\_\_\_\_ Dated \_\_\_\_\_  
(if different from the FIRM panel and date)

See Section 4 for additional instructions.

SIGNED \_\_\_\_\_ DATE \_\_\_\_\_

**Figure 7-4b. Sample floodplain development permit application form**  
(Developed by the North Carolina Division of Emergency Management)





No. \_\_\_\_\_

# FLOODPLAIN DEVELOPMENT PERMIT

Specify for what purpose the permit is issued—  
New construction, alterations, fill, excavation, other

ISSUED TO: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PROJECT ADDRESS: \_\_\_\_\_  
(if different from permittee's address)

ISSUED BY: \_\_\_\_\_  
Floodplain Management Administrator

DATE: \_\_\_\_\_  
(This permit expires 180 days from this date)

THIS PERMIT MUST BE POSTED ON THE PREMISES IN A CONSPICUOUS PLACE SO AS TO BE  
CLEARLY VISIBLE FROM THE STREET.

**Figure 7-5. Sample permit form**

## **D. INSPECTIONS**

You can't assume that construction and development will proceed as spelled out in the permit you've approved. Follow-up conversations and inspections are vital to ensure that the applicant adheres to the permit's requirements.

Taking a hands-off attitude toward construction can create many problems for both the project's owners and your community.

The most effective way to ensure compliance is to inspect the site frequently during construction. This is particularly important in the early phases of work on a building because that's when errors in location or elevation of the lowest floor can be found and corrected. An inspection program also puts builders, developers and property owners on notice that the community will insist that projects are completed in compliance with regulations.

We recommend a series of three inspections for every project, especially any project that involves construction of a building.

### **FIRST INSPECTION**

Do this inspection before ground is broken. Ideally, this site visit should be after the site is staked out to allow you to check the plans in relation to the ground and lot boundaries. With plans in hand, you should determine that the site as identified on the proposed plans is consistent with actual ground conditions.

Check the following:

- The location of the floodplain and floodway boundaries.
- Setbacks from lot lines, channel banks, etc.
- Floodway encroachments, if applicable.

If the building, filling, etc., as staked out is in violation of the approved plans or of the ordinance requirements, you must tell the developer to make revisions.

The project must not be allowed to proceed until you have gone back and verified that it is in compliance.

## **SECOND INSPECTION**

Schedule your second inspection of a project involving a new building or addition to a building just before installation of the lowest floor. You need to ensure that the lowest floor will be built at the height stipulated in the permit application, and that the foundation is the type specified in the plans.

The type of foundation dictates your schedule:

- If the building is on a slab foundation, the inspection is best done when the forms are placed. You can check the proposed floor elevation by checking the elevation of the top of the forms. If the forms are high enough, you can approve the pouring the slab.
- If the building is on an elevated foundation (crawl space, piles, etc.), the inspection is best done when the foundation is completed. If the top of the foundation is high enough, you can approve placement of the floor.
- If the building is to be floodproofed and the floodproofing technique is easy to identify—such as a reinforced concrete stem wall up to the BFE plus freeboard—this inspection should be conducted when that portion of the project is completed.

Making sure a structure is properly elevated is the key to the entire regulatory process. If this doesn't happen, the permit process is pretty much for naught. Therefore, an inspection at the point of initial construction, where changes to the height of the foundation can be made without major difficulty, is best. Once the foundation is poured or laid, it can be very expensive for the property owner to change the building location or the elevation of the lowest floor.

### **Checking elevations**

You can confirm the floor elevation at this stage in one of two ways. First, you can have the builder submit a survey of the floor elevation. This survey must be done by a surveyor or engineer.

The alternative approach is to check for yourself:

- Before construction or sometimes as part of the first inspection, the developer's surveyor or your engineer can shoot an elevation reference mark to a nearby stationary object such as a tree or telephone pole. The mark should

be at the same elevation as the height to which the lowest floor should be elevated.

- During the second inspection, you can use a hand level to determine whether the lowest floor will be as high as the reference mark.
- This will give you a rough estimate that the building will be close to the correct elevation. A hand level will not give accurate elevations so, if you are in doubt obtain, a survey.

Note: Neither approach relieves the builder of having to provide an as-built elevation or floodproofing certificate when the project is done. It simply verifies that the building will be elevated or floodproofed to the proper elevation before it is too late to make changes.

During your second inspection, also check:

- Whether any fill meets the necessary compaction, slope and protection standards contained in your regulations.
- The building's location matches the permit application plans.
- The number and size of crawlspace or enclosure openings.
- Whether any part of the project encroaches into the floodway.
- In V Zones, get an as-built foundation certification at this time, such as the V Zone certification in Figure 5-18.

## **THIRD INSPECTION**

The third and last inspection is conducted as the project nears completion. The purpose of this "final" inspection is to:

- Ensure that the foundation and floor elevation has not been altered since the second inspection.
- Obtain an as-built elevation or floodproofing certificate.
- Verify that enclosures below the lowest floors have adequate openings.
- Ensure that nothing subject to flood damage, such as a furnace or air conditioning unit, has been located below the lowest floor.

- Check breakaway walls in V Zones.
- Check for floodway encroachments.
- Check the anchoring system used in securing manufactured homes.
- You may wish to obtain photographs during the final inspection to document compliance and retain the photographs in the permit file. These photographs can be useful if the property owner later makes alterations to the building without obtaining permits. Be sure to document the date and circumstances under which the photographs were taken.

## **Certificate of occupancy**

After the project passes final inspection, many communities issue a document called a certificate of occupancy, certificate of compliance or use permit.

This certificate allows the owner to move in to the newly constructed building or addition. Usually a new building cannot be sold until the seller has this certificate; some utility companies will not start service until the certificate is presented.

Before a certificate is completed, you must make sure that all needed documents are received and checked. You must have an elevation certificate and the other forms noted in the later section on record keeping.

## **LATER INSPECTIONS**

Certifying a structure for occupancy is the final step in the permit process. However, the property must remain in compliance with your ordinance and the conditions under which the permit was issued.

Your office should periodically check to ensure that the property continues to remain in compliance over time. Later inspections are particularly important when a structure contains an enclosure below the lowest floor. Such areas can be easily modified and made into habitable spaces in violation of regulations.

In some states, communities do not have the statutory authority to go onto private property to look for violations. This can make it hard, if not impossible, to verify whether an enclosed area has been modified. If this is true in your community, your ordinance should prohibit enclosures or limit their allowable size to less than 300 square feet. Allow

larger enclosures only if they have wood lattice or screening so you can tell from the street if changes have been made.

## **E. ENFORCEMENT**

Adequate, uniform and fair enforcement means two things:

- All development in a floodplain must have a permit.
- All development with a permit must be built according to the approved plans.

In order to ensure that development is meeting these requirements, you must monitor the floodplain, and where necessary, conduct an inspection of a property. Some permit officials have statutory limits on where they can go to inspect a potential violation. Be sure to review your authority to access onto private property with your attorney.

If you discover development activities without permits or contrary to the approved plans, you must enforce your ordinance. You have several methods for enforcing your ordinance. This section explores these methods.

## **VOLUNTARY COMPLIANCE**

The best approach is to convince the developer or property owner that complying with the ordinance is in his or her own best interest. This may take some explanation of the flood hazard and how the rules protect the property (or neighboring properties) from that hazard.

If the issue is protection of a building, the flood insurance rate table in Figure 9-3 can show how expensive insurance could be. Even if the developer or the current property owner is not interested in flood insurance, future owners may want it and probably will be required to purchase it as a condition of a mortgage or loan. Expensive flood insurance may make the building very difficult to sell.

Should voluntary efforts not work, here are the other compliance tools you have.

## **ADMINISTRATIVE STEPS**

Your first steps in enforcement involve what you can do as an ordinance administrator. Be sure to review these with your community's attorney before you start:

- Contact the property owner or building contractor in person or by telephone to explain your concerns.

- Notify the property owner (in writing) of the nature of the violations and what to do to correct them.
- Post a violation notice on the property.

If a problem is found during construction of a permitted project, you have additional tools:

- If the violation is a serious one, or if the problem still exists after a follow-up inspection, you can issue a stop-work order or revoke the permit.
- You can withhold the certificate of occupancy until the problem is corrected. Usually utilities will not be turned on or a bank loan will not be closed until the certificate of occupancy is issued.

## LEGAL RECOURSES

If your administrative measures do not bring results, go back to your community's attorney and discuss the next steps. Your attorney can take the case to court and request two additional enforcement measures be brought to bear.

You can help the attorney by having complete records of all correspondence and meetings with the person accused of the violation. You should also identify what section of the ordinance was violated, when and how, and what was specifically allowed in the approved permit.

You should advise the attorney about what actions can be taken that will bring the project into compliance. Depending on the violation, these actions could include removing the building (or other project), retrofitting the building to protect it, applying for a variance, or revising the maps to remove the problem from the floodplain, floodway, V Zone, etc.

**Fine.** Your ordinance should establish a maximum fine per offense. Usually each day a violation continues is considered a separate offense. This approach encourages a quick remedy to the problem.

A per-day fine for a summary offense from a local district justice or magistrate can be difficult to get because many courts would believe that such a severe financial penalty does not fit the infraction. However, the threat of seeking the fine may be sufficient to persuade a property owner to remedy the violation.

**Recordation.** Depending on your statutory authority, you may be able to re-record the violation in the property’s deed records. This will inform potential purchasers as well as “cloud the deed,” making it hard for the owner to sell the property or the buyer to obtain title insurance. This approach is more appropriate for new developments that are likely to be sold in the near future.

**Injunction.** An injunction is a court order to stop further noncompliant conduct. A temporary restraining order will be issued if the activity can be shown to be a danger to the public and that immediate irreparable harm can occur.

**Housing court.** Dealing with your state or county’s judicial system can be expensive and difficult. Your case has to wait its turn and compete with many cases for attention.

To speed up the enforcement process, some communities enact special enforcement ordinances to create a municipal housing court or a building court. This is a local judicial body that has several advantages:

- The judge or administrative judge will be familiar with housing or building code law.
- The community has more control over when cases will be heard.
- Such courts usually are less formal. For example, the defendant may not have to have an attorney present.

The establishment of these courts varies by state law. Your attorney or state department of local government affairs or housing can provide more information on how it can work in your community.

## **SECTION 1316**

Section 1316 of the National Flood Insurance Act authorizes FEMA to deny flood insurance to a property declared by a State or community to be in violation of their floodplain management regulations.

Section 1316 is used when all other legal means to remedy the violation have been exhausted and the structure is still noncompliant. Section 1316 is a way the NFIP can support communities in the enforcement of their ordinances. Check with your state NFIP coordinator or FEMA Regional Office on how Section 1316 works in your state.

If invoked under Section 1316, denying flood insurance means:

- The property may be difficult or impossible to sell.
- The market value of the property may fall.
- The cost of suffering flood damage without insurance may be too great a risk for the property owner.
- Lending institutions holding the property's mortgage may threaten to fore-close.
- Any permanent reconstruction will be denied disaster assistance.

In some cases a Section 1316 insurance denial will be sufficient to convince the property owner to correct the violation. Section 1316 also has the advantage of limiting any taxpayer liability if the building is damaged by a flood, as the owner will be ineligible for an insurance claim and disaster assistance.

If a structure that has received a Section 1316 declaration is made compliant with the community's floodplain management ordinance, then the Section 1316 declaration can be rescinded by the community and flood insurance eligibility restored.

## **F. APPEALS, SPECIAL USES AND VARIANCES**

Generally, procedures for Appeals, special uses and variances are specified by state law. They require judgment calls involving several people, as ordinances typically do not allow only one person to decide these issues. Here is when they can occur and how they are usually handled.

### **Appeals**

Ambiguous language or differing interpretations can lead the applicant and permit office to disagree. Your ordinance should have a process for referring these disagreements to a board of appeals or adjustment which will interpret the ordinance and settle the dispute.

### **Special uses**

Some regulations require that certain situations be given a special review to determine if they should be allowed and, if so, whether conditions should be attached to the permit. While the NFIP sets construction standards for all buildings, your community may have decided that residences should not be allowed in a floodway and that floodproofed nonresidential buildings should be allowed only if certain conditions are met. Some official body needs to determine if a special use permit or if a conditional permit should be issued.

### **Variances**

Zoning ordinances, building codes and floodplain management regulations cannot be written to anticipate every imaginable situation. A process for issuing variances gives a builder a way to seek permission to vary from the letter of the rules because of a special situation.

A variance can mean that the minimum standards of the NFIP may not be met by a project due to a special local circumstance. Because of this, most of this section is devoted to variances.

### **Boards**

In all three cases, the applicant submits a request to a knowledgeable board of arbiters. Typically, variances and special or conditional use permits are handled by the planning commission or other body that is responsible for writing and amending the

ordinance. Appeals are usually handled by a separate board of appeals or board of adjustments. Sometimes all three processes are handled by the same body and sometimes, especially in smaller communities, that body is the city council or governing board.

These boards do not have authority to change the ordinance, just to apply or interpret the ordinance's provisions. They may or may not have authority to make a final decision. If not, they make recommendations to the governing board which makes the final decision.

## **VARIANCES**

A *variance* is a grant of relief by a community from the terms of a land use, zoning or building code regulation. Because a variance can create an increased risk to life and property, variances from flood elevation or other requirements in the flood ordinance should be rare.

Granting variances is a local decision that must be based on not only NFIP criteria, but also on state law and other provisions the community may wish to require. Your community's review board must consider the fact that every newly constructed building adds to the local government's responsibilities and remains a part of the community for the indefinite future.

Variances are based on the general principal of zoning law that they pertain to a piece of property and are not personal in nature. Though standards vary from state to state, in general a variance is granted for a parcel with physical characteristics so unusual that complying with the ordinance would create an exceptional hardship to the applicant or surrounding property owners. Those characteristics must:

- Be unique to that property and not shared by adjacent parcels.
- Pertain to the land, not to any structure, its inhabitants or the property owners.

Characteristics that might justify a variance include an irregularly shaped lot, a parcel with unsuitable soils, or a parcel with an unusual geologic condition below ground level. It is difficult, however, to imagine any physical characteristic that would give rise to a hardship sufficient to justify issuing a variance to a flood elevation requirement. There are usually alternative ways to construct a compliant building even in these situations.

Your community should grant variances based only on a structure-by-structure review. Never grant variances for multiple lots, phases of subdivisions or entire subdivisions.

## **NFIP requirements**

NFIP regulations do not address appeals, special uses or conditional permits. Follow the procedures used in your zoning ordinance or building code as these are usually prescribed by state law.

Because variances may expose insurable property to a higher flood risk, NFIP regulations set guidelines for granting them. The guidelines, which are designed to screen out situations in which alternatives other than a variance are most appropriate, appear in 44 CFR 60.6(a). They are summarized in Figure 7-6.

A review board hearing a variance request must not only follow procedures given in the NFIP criteria, it must consider the NFIP criteria in making its decision. When the NFIP guidelines are followed, few situations qualify for a variance.

**Good and sufficient cause.** The applicant must show good and sufficient cause for a variance. Remember, the variance must pertain to the land, not its owners or residents. Here are some common complaints about floodplain rules that are NOT good and sufficient cause for a variance:

- The value of the property will drop somewhat.
- It will be inconvenient for the property owner.
- The owner doesn't have enough money to comply.
- The property will look different from others in the neighborhood.
- The owner started building without a permit and now it will cost a lot to bring the building into compliance

**Hardship.** The concept of unnecessary hardship is the cornerstone of all variance standards. Strict adherence to this concept across the country has limited the granting of variances.

*The applicant has the burden of proving unnecessary hardship.* Reasons for granting the variance must be substantial; the proof must be compelling. The claimed hardship must be exceptional, unusual and peculiar to the property involved. Financial hardship,

inconvenience, aesthetic considerations, physical handicaps, personal preferences or the disapproval of one's neighbors do not qualify as exceptional hardships.

The local board must weigh the applicant's plea of hardship against the purpose of the ordinance. Given a request for a variance from floodplain elevation requirements, the board must decide whether the hardship the applicant claims outweighs the long-term risk to the owners and occupants of the building would face, as well as the community's need for strictly enforced regulations that protect its citizens from flood danger and damage.

When considering variances to flood protection ordinances, local boards continually face the difficult task of frequently having to deny requests from applicants whose personal circumstances evoke compassion, but whose hardships are simply not sufficient to justify deviation from community-wide flood damage prevention requirements.

1. Variances shall not be issued by a community within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result;
2. Variances may be issued by a community for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, in conformance with the procedures of paragraphs (a) (3), (4), (5) and (6) of this section;
3. Variances shall only be issued by a community upon...
  - (i) a showing of good and sufficient cause,
  - (ii) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and
  - (iii) a determination that the granting of a variance will not result in increased flood height, additional threat to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances;
4. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief;
5. A community shall notify the applicant in writing over the signature of a community official that...
  - (i) the issuance of a variance to construct a structure below the base flood level will result in increased premium rates for flood insurance up to amounts as high as \$25 for \$100 of insurance coverage and;
  - (ii) such construction below the base flood level increases risks to life and property. Such notification shall be maintained with a record of all variance actions as required in paragraph (a) (6) of this section.
6. A community shall...
  - (i) maintain a record of all variance actions, including justification for their issuance, and
  - (ii) report such variances issued in its annual or biennial report submitted to the [Federal Insurance] Administrator.
7. Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that...
  - (i) the criteria of paragraphs (a) (1) through (a) (4) of this section are met, and
  - (ii) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

**Figure 7-6: NFIP variance criteria (44 CFR 60.6(a))**

These problems can be resolved through other means, even if the alternatives to a variance are more expensive or complicated than building with a variance, or if they require the property owner to put the parcel to a different use than originally intended, or to build elsewhere.

Here are two examples:

**Example 1.** A small undeveloped lot is surrounded by lots on which buildings have been constructed at grade. The ordinance requires new buildings to be constructed at a level several feet above grade.

If the owner were to build a new house, it would look different. Potential buyers would ask questions and find out about the flood problem in the area. If it were built on fill, the lot might drain onto the neighbors' property.

This situation probably would not warrant a variance because the owner does not face an exceptional hardship. Appearance is not a hardship and no action should be taken to hide the hazard from others. There are ways to elevate a building without creating a drainage problem, such as elevating the building on pilings or a crawlspace, or grading the fill to drain away from adjoining properties.

**Example 2.** A property owner seeks a variance because he or she would have to spend several thousand dollars to elevate a house to comply with the ordinance, and several thousand more to build a wheelchair ramp or an elevator to provide access for a handicapped member of the family.

While financial considerations are important to property owners and the needs of a handicapped person must be accommodated, these difficulties do not put this situation in the category of "exceptional hardships" because:

- The characteristics that result in the claimed hardship do not pertain to the property but are personal.
- A variance is not needed to provide day-to-day access to the building, which can be provided by building a ramp or elevator.
- Having a handicapped person occupy a floodprone dwelling raises a critical public safety concern.

If a variance is granted and the building is constructed at grade, the handicapped or infirm person must leave when floodwaters begin to rise, yet he or she may need help to

do so. This poses an unnecessary danger to the handicapped person and places an extra demand on the community's emergency services personnel, who may be called upon to rescue the resident in the event of a flood.

On the other hand, if the building is properly elevated, the handicapped person either can be evacuated or can survive the flood simply by remaining at home safely above the floodwaters.

In effect, the variance would not relieve the property owner of his or her difficulty, but likely only postpone and perhaps ultimately increase it. It would not help the community, either, as the building will be susceptible to damage long after the current owners are gone.

It would be more prudent for both the owner and the community if the variance were denied and the home built at the proper elevation with handicapped access. This would ensure the safety of all family members when floodwaters rise, as well as protect the property owner's and the community's investment in the property.

**Public safety and expense.** Flood damage prevention ordinances are intended to help protect the health, safety, well-being and property of the local citizens. Variances must not create threats to public safety or nuisances.

Because it would increase damage to other property owners, no variance may be issued within a regulatory floodway that will result in any increase in 100-year flood levels (44 CFR 60.6(a)(1)).

**Fraud and victimization.** Variances must not defraud or victimize the public. Any buildings permitted below the BFE face increased risk of damage from floods, and future owners of the property — and the community — are subject to all the costs, inconvenience, danger and suffering that those increased flood damages may bring.

Future owners may purchase the property, unaware that because of a variance, it is subject to potential flood damages and can be insured only at high rates.

**Minimum variation necessary.** A variance is a request to vary from the rules, not to ignore them. Any variance should allow only minimum deviation from the local requirements.

For example, even if an applicant can justify not elevating a building above the BFE, the review board should not automatically allow the building to be built at grade. The

board should still require as much elevation as possible, to provide some flood protection without causing exceptional hardship.

In some instances it may be possible to vary individual provisions of the ordinance without reducing the overall level of protection. For example, a well-engineered building might be constructed in a V Zone on a foundation other than piles or columns.

In considering variances, the review board should use local technical staff expertise and recommendations from the building, planning, zoning or engineering departments. The local technical staff should consider varying other requirements in order to provide the needed flood protection. For example, it may be more appropriate to issue a variance to the front yard setback requirement in order to get the building out of the floodway.

**Flood insurance rates.** While a variance may allow deviation from building standards specified in a local ordinance, flood insurance rates and the flood insurance purchase requirement—which must be enforced by lending institutions—cannot be waived.

This can create severe financial consequences for a property owner, as insurance rates for a building built below BFE can be substantially higher than those for elevated buildings. A variance from elevation requirements—the most common kind of variance requested—increases the risk to a building, and that increased risk is reflected in higher annual insurance premiums (Figure 9-3).

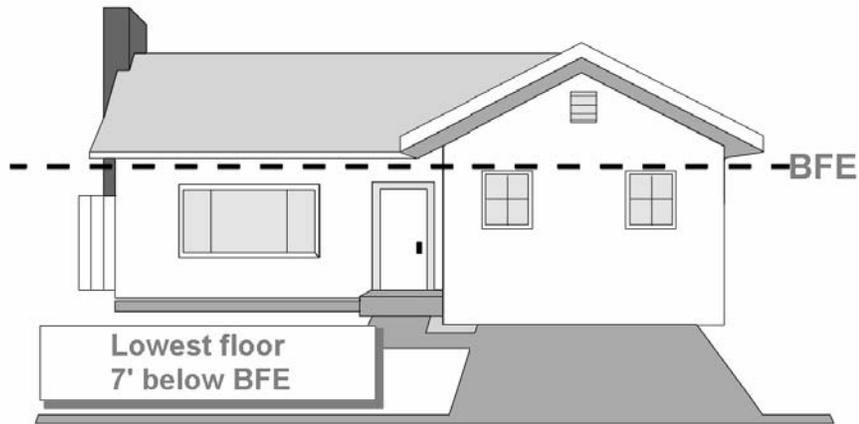
If a variance is requested to construct a building below the BFE, you must notify the applicant (in writing) that granting the variance will result in increased flood insurance premium rates, up to \$25 per \$100 of coverage. In many instances, the variance-induced rates will be so high as to make the building essentially uninsurable because the owners cannot afford the premium. (In one case, a marine supply store on the Gulf Coast was built 14 feet below BFE in a V zone. The annual flood insurance premium was \$25,000—on a \$100,000 building.)

The original owner who applied for a variance may not care, but if approved, the variance's impact may matter a great deal to subsequent potential owners who cannot afford the property's high insurance rates. The result may be owner abandonment; your community could be left with a vacant, flood-damaged and essentially uninsurable building.

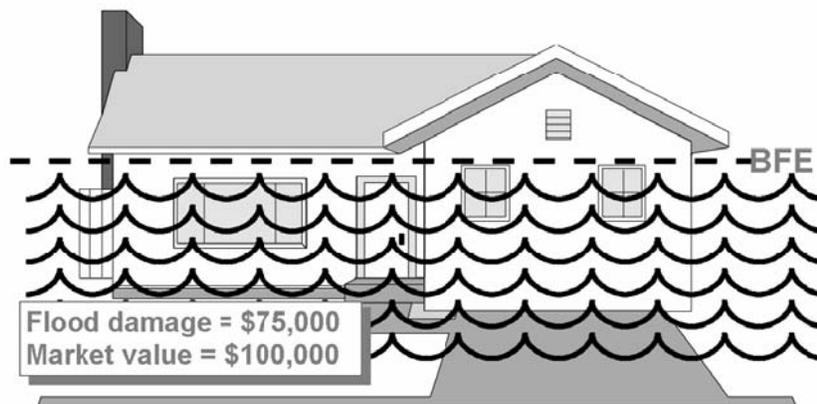
Figures 7-7 through 7-12 illustrate the premiums for a single-family home protected to different levels. They provide a clear picture of the cost of actuarial post-FIRM flood insurance rates and, therefore, the true risk to which the building is being exposed.

You should give these two pages of illustrations to anyone considering seeking a variance to save construction costs. A variance may save money in the short term, but over the long run, the owner will pay much more in insurance premiums or, if uninsured, in flood losses.

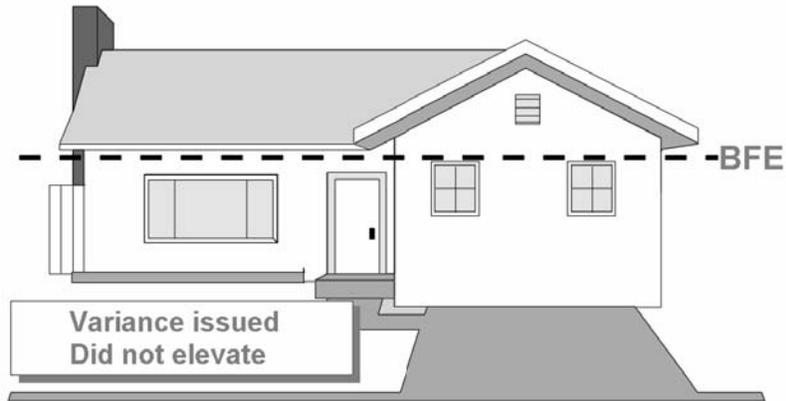
*Note: These premiums are for the purposes of this example. Insurance rates vary, based on location, date of construction and lowest floor elevation, and must be computed case-by-case. The premiums shown for the next series of illustrations were computed based on \$100,000 in building coverage. Current rates for these buildings may be different than those shown.*



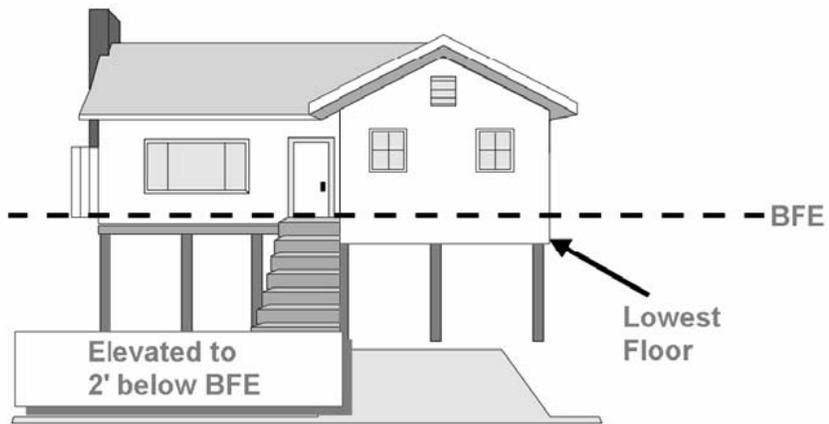
**Figure 7-7. Pre-FIRM building—1995 insurance rate: \$595**



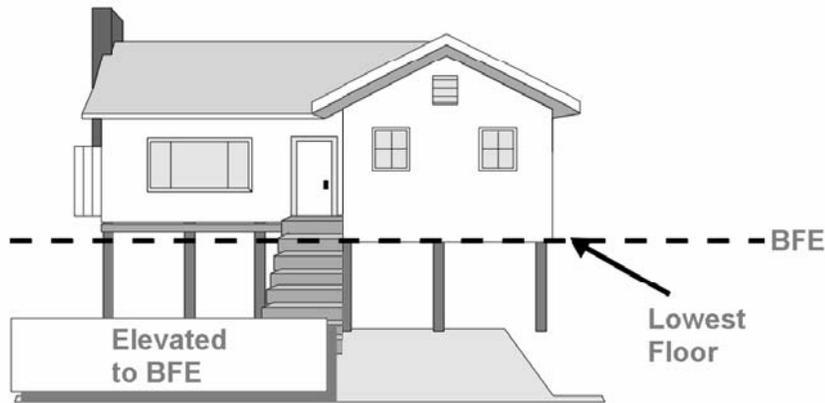
**Figure 7-8. Pre-FIRM building—substantially damaged by 1997 flood**



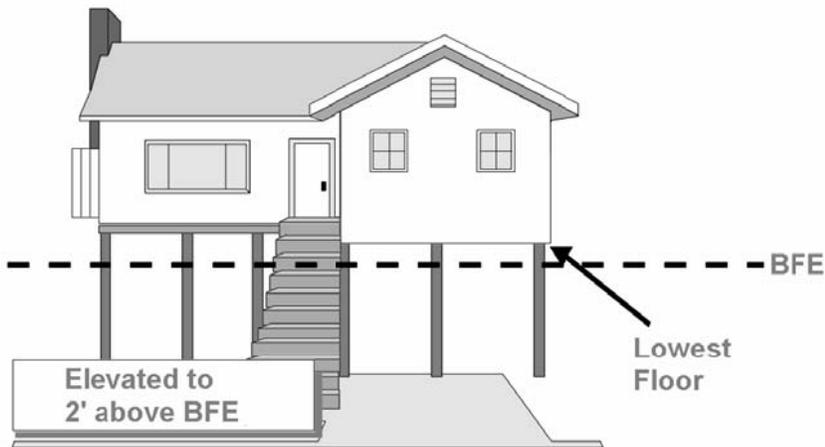
**Figure 7-9. Repaired—variance issued and building is not elevated to or above the BFE (building is 7 feet below BFE); actuarial rate: \$3,090**



**Figure 7-10. Repaired—variance allowed. Elevated to 2' below BFE; actuarial rate: \$1,140**



**Figure 7-11. Repaired—elevated to BFE; actuarial rate: \$351**



**Figure 7-12. Repaired—elevated 2 feet above BFE; actuarial rate: \$216**

## Historic buildings

A variance may be issued for the reconstruction, rehabilitation or restoration of historic structures if the variance is the minimum necessary to preserve the historic character and design of the structure. “Historic structures” are those listed in the National Register of Historic Places or the State Inventory of Historic Places, or that contribute to a historic district.

Changes to the structure must not destroy or alter the characteristics that made it an historic building. A certified local historic board or the state historic preservation officer must review and approve remodeling, renovations and additions before granting a

variance. Whatever mitigation measures can be taken to reduce future flood damage must be required—such as elevating an air conditioner or using flood-resistant materials.

Many older buildings are not considered historic, so the first thing to check is whether the structure proposed for an exemption is historic. Look for it on a list maintained by:

- The National Register of Historic Places.
- Federally-certified state programs operated through a state historic preservation officer.
- A federally-certified local historic preservation board.

Structures are listed in the National Register or on a federally-recognized state or local inventory in one of two ways: as an individual building, or as a primary, secondary, or other contributing building in a designated historic district.

Structures are either listed or may be eligible to be listed. Only a federally-certified state or local historic preservation program can make such determinations. Either the state historic preservation office or federally-certified local historic preservation board should be consulted to determine if a structure proposed for the historic exemption is indeed historic.

**Figure 7 – 13. Definition of “historic building”**

### **Functionally dependent use**

A variance may be issued for new construction, substantial improvements and other development necessary for the conduct of a functionally dependent use. A functionally dependent use is one that must be located or carried out close to water—such as a docking or port facility necessary for the unloading of cargo or passengers, shipbuilding and ship repair.

A functionally dependent use variance could be issued provided that:

- There is good and sufficient cause for providing relief from the regulations.
- The variance will be the minimum necessary to provide relief.
- The variance does not cause a rise in the 100-year flood level within a regulatory floodway.

The structure or other development must be protected by methods that minimize flood damage during the base flood and create no additional threats to public safety. One way of accomplishing this is to use wet-floodproofing techniques such as using flood resistant

materials, elevating mechanical equipment, locating offices above the BFE, using ground fault interrupt electrical circuits, or developing an emergency plan to remove contents before a flood.

## **Records**

The community must keep a record of all variances and the rationale for granting them. These are subject to review by FEMA or the state NFIP coordinator during a Community Assistance Visit.

The records must include a copy of the written notification to the applicant that the issuance of a variance to construct a building below the BFE will result in increased flood insurance premium rates as high as \$25 per \$100 of coverage, and such construction below the BFE increases risk to life and property.

It is recommended that the variance findings, conditions and authorization be recorded in the county deed records. This provides a means of permanently notifying future or prospective owners about the terms and conditions of the variance.

## **G. RECORDS**

Records show what you approved and what you told the developer, forming a “paper trail” needed for administrative or legal proceedings related to development projects. Such records are vital if the project violates your ordinance. They also give future owners information about the property.

Records are also checked by FEMA or the state to determine if your community is in full compliance with the NFIP.

This section reviews what records you must—or should—keep to meet your community’s obligation to the NFIP.

## **PERMIT FILE**

Your community should have a permit record system that is keyed to a geo-graphical identifier (not just a building permit number) such as: street address, lot and block number, township, section and range, or county appraiser’s property ID number.

You should have a file for each permit application. The files should have some indicator on the folder to show that it is a floodplain permit, such as a different color file folder or file label.

Permit files should contain copies of these items, as appropriate:

- The permit application form and all attachments, including the site plan.
- All correspondence pertinent to the project.
- Flood and floodway data prepared by the developer.
- Engineering analyses of floodway encroachments and watercourse alterations.
- Special engineering designs for enclosures below the BFE.
- In coastal high hazard areas, engineering certifications of designs and construction methods of new and substantially improved buildings.
- In coastal high hazard areas, certification of specially designed breakaway walls.
- Any variances or appeals proceedings.
- Records of inspections of the project while under construction.
- Documentation of the “as-built” lowest floor elevation of all new and substantially improved buildings.
- Certification of the elevation to which any nonresidential building has been floodproofed.
- Certificates of compliance or occupancy.

Keeping these records is a requirement to participate in the NFIP; there is no statute of limitations as to how long they should be kept. You may want to keep a separate log or record of floodplain permits so you can readily retrieve those floodplain projects to show FEMA or the state NFIP coordinator.

It is not necessary to keep the entire building plans and other documents longer than is required for local code purposes. However, if you allow below-BFE enclosures, your files should include the ground floor plan of those buildings in case of a future violation issue.

## ELEVATION CERTIFICATE

Your permit file needs an official record that shows how high new buildings and substantial improvements were elevated. This is needed both to show compliance with the ordinance and for the owner to obtain a flood insurance policy.

There is no mandated form for keeping building elevation records, but we strongly recommend that you use FEMA's Elevation Certificate Form (FEMA Form 81-31). A blank copy is in Appendix F

If your community is participating in the Community Rating System, the FEMA form must be used for new construction and substantial improvements to existing buildings. Insurance agents writing flood insurance policies also must use the form to properly rate many types of buildings. Accordingly, FEMA encourages communities to use the form to help their residents obtain flood insurance without additional cost.

The FEMA form is an eight-page packet. It includes the two-page FEMA Form 81-31, Elevation Certificate, and instructions on how to complete it. Additional copies of the packet are available in bulk at no cost by calling 800/638-6620, ext. 2 (customer service).

There is a software version of the FEMA Elevation Certificate. It can be ordered at no charge by calling the CRS order number, 317/848-2898. If you use the software version, or keep elevation records on a computer database, you also need to keep the original signed "hard copy" of the surveyor's certification.

The responsibility for obtaining and filing an elevation certificate rests on the local permit official. Part or all of the form may be completed by a land surveyor, engineer, architect, or local official authorized by ordinance to provide floodplain management information. Most communities require the permit applicant to obtain the elevation certificate. (Depending on state law, if you are comfortable with using a transit or level you, as the floodplain ordinance administrator, can check the finished elevations and certify them for the record.)

You may give property owners or surveyors blank forms and expect them to complete the entire form. This practice does not relieve local officials in CRS communities from the requirement to ensure that the forms are complete and accurate. In non-CRS communities, the permit official should at least double-check the form to ensure that it is complete and that Sections A, B and D (on property, map and community information) are correct. You may wish to fill out Section B of the form and provide it to the surveyor to ensure that the map information on the Elevation Certificate is correct.

**Annexations.** The FEMA Elevation Certificate form is self-explanatory. One problem arises when a community annexes or extends its planning or regulatory jurisdiction over Special Flood Hazard Areas for the unincorporated areas of a county or an adjacent community. Some communities enroll in the NFIP before a Flood Hazard Boundary Map or FIRM has been issued for them.

Both situations lead to considerable confusion as to flood zone determination, as well as knowing which community number and panel numbers should be used on Elevation Certificates and other NFIP documents.

*Flood zone determination:* If the subject property is located within areas annexed from the county or within an area of extraterritorial planning jurisdiction, use the county flood maps to determine the appropriate flood zone.

*Community Identification Number:* In item 1 of Section B of the FEMA form (“Community Number”), use the municipality’s NFIP ID number once a property is annexed or included in an extraterritorial planning jurisdiction.

*Flood Map Panel Number:* For property located in annexed areas or in the extraterritorial jurisdiction, for item 2 of Section B (“Panel Number”), use the entire county ID and panel number— “370087 0005,” not just “0005.” For sites within the “area not included,” state “No NFIP Map.”

## **FLOODPROOFING CERTIFICATE**

Floodproofing means making a building watertight or substantially impermeable to floodwaters. It is an option only allowed for nonresidential buildings.

Designs for a floodproofed building must account for flood warning time, uses of the building, mode of entry to and exit from the building and the site, floodwater velocities, flood depths, debris impact potential and flood frequency.

FEMA’s Technical Bulletin 3-93, *Non-Residential Floodproofing Requirements and Certification for Buildings Located in Special Flood Hazard Areas*, has a detailed discussion on each of these considerations.

For insurance rating purposes, the building’s floodproofed design elevation must be at least one foot above the BFE to receive rating credit. If floodproofed only to the BFE, the floodproofing credit cannot be used, resulting in higher flood insurance rates.

44 CFR Sections 60.3(b)(5) and (c)(4) require the community to obtain and maintain a registered professional engineer's certification that a nonresidential building was properly floodproofed. You are encouraged to use the one-page FEMA certification form included in Appendix F because it fulfills NFIP insurance rating needs as well as floodplain management requirements.

## V ZONE CERTIFICATION

Buildings in coastal high hazard areas or V Zones are subject to a greater hazard than buildings built in other types of floodplains. Not only do they have to be elevated above the base flood level, they must be protected from the impact of waves, hurricane-force winds and erosion.

The NFIP regulations require coastal communities to ensure that buildings built in the V Zone are anchored to resist wind and water loads acting simultaneously.

**44 CFR 60.3(e)(4)** *[The community must] Provide that all new construction and substantial improvements in Zones V1-30 and VE ... are elevated on pilings and columns so that (i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level; and (ii) the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of (e)(4)(i) and (ii) of this section.*

While FEMA does not provide a V Zone certification form, Figure 5-18 shows the form developed by the state of North Carolina. Be sure to check with your FEMA Regional Office before you use your own version of it.

## NO-RISE CERTIFICATION

As discussed in Unit 5, Section D, your ordinance requires that riverine flood-plains be free of encroachments that will cause an increase in flood levels. Where a floodway has been mapped, construction in the flood fringe is assumed to not be a problem.

You need to document that a project in the floodway—or in a riverine flood-plain where the floodway hasn't been mapped—will not cause an increase in flood heights. An engineering analysis must be conducted before you can issue a permit. Your permit file

needs a record of the results of this analysis, usually in the form of a no-rise certification or an equivalent document.

The engineering or no-rise certification must be supported by technical data and signed by a registered professional engineer. The supporting technical data should be based on the standard step-backwater computer model used to develop the 100-year floodway shown on your FIRM or Flood Boundary and Floodway Map and the results tabulated in your Flood Insurance Study.

Although communities are required to review and approve the no-rise submittal, they may request technical assistance and review from the FEMA Regional Office. However, if this alternative is chosen, you must review the technical package and verify that all supporting data, listed in succeeding paragraphs, are included in the package before forwarding it to FEMA.

Figure 5-5 is a sample no-rise certification form developed by the North Carolina NFIP coordinating agency. Before using it, check with your state NFIP coordinating agency or FEMA Regional Office for additional guidance or requirements.

## **BIENNIAL REPORT**

Every two years, participating communities must complete a form describing the community's progress in the previous two years in implementing floodplain management measures [44 CFR 59.22]. A copy of a biennial report appears in Figure 7-14.

FEMA sends the one-page form to your chief elected official. It must be completed and returned to FEMA within 30 days.

The only way you can complete the biennial report is to have complete and accessible permit records. You need to keep track of:

- Changes in community boundaries.
- Physical or topographical changes that affect flood hazard areas.
- Amendments to your floodplain ordinance.
- The number of building permits issued in the floodplain.
- The number of variances issued.

You also need to be able to tell FEMA:

- The number of people and number of buildings in the floodplain.
- Whether you would like any floodplain management assistance.

FEDERAL EMERGENCY MANAGEMENT AGENCY  
NATIONAL FLOOD INSURANCE PROGRAM

O.M.B. No. 3067-0018  
Expires Oct. 31, 2005

Biennial Report for  
Calendar Year 2001 and 2002

RETURN TO:  
Federal Emergency Management Agency  
Biennial Report Coordinator  
P.O. Box 1038  
Jessup, Maryland 20794-1038

**REGULAR PROGRAM  
(With Base Flood Elevations)**

**INSTRUCTIONS**

1. This report should be completed by the locally designated Floodplain Manager (e.g., your City Manager, City Planner, Building Inspector, etc.).

2. Please return this report within 45 days of receipt to the address above, or fax it to 1-800-358-9620. If you would like to respond via the Internet, go to [www.floodmaps.fema.gov/br](http://www.floodmaps.fema.gov/br) and use the following PIN number \_\_\_\_\_.

For more information, contact the FEMA Map Assistance Center toll free at 1-877-FEMA-MAP (1-877-336-2627).

**SECTION I – Changes in your community that may have affected flood hazard areas:**  
*If you answer "yes" to any question in this section, please be prepared to provide explanatory information and/or technical data including, when appropriate, your own community map or a copy of the Flood Insurance Rate Map showing the areas affected. Do not send this information at this time. FEMA may contact you by phone in the near future for this information.*

A. Does your community have any changes to the base data on your Flood Insurance Rate Maps? (e.g., adding/correcting street, adding Letters of Map Revision, or annexations/corporate limit changes) Yes  No

B. Have the characteristics of watersheds in your community changed to the extent that your floodplain needs to be restudied? (e.g., major landuse changes due to urbanization, deforestation, wildfires, or stream relocation due to erosion/siltation) Yes  No

C. Does your community have information that may be incorporated into a Flood Insurance Rate Map? (e.g., watershed studies or Base Flood Elevations established by developers) Yes  No

D. Has there been a significant man-made change affecting your designated flood hazard areas? (e.g., levees, bridges, culverts, extensive filling, excavation, or stream channelization) Yes  No

**SECTION II – Community Floodplain Management Data during the last 2 years (calendar years 2001-2002 only):**

A. Has your community updated its floodplain management ordinance during the reporting period? Yes  No   
If so, please send a copy of the new law to the return address identified above.

B. How many building permits were granted within the last 2 calendar years for new structures (including substantial improvements to existing structures) in the designated flood hazard areas shown on your community's Flood Insurance Rate Map? \_\_\_\_\_

C. How many variances to your local floodplain management ordinance were granted within the last 2 calendar years for new structures or substantial improvement to existing structures in designated flood hazard areas shown on your community's Flood Insurance Rate Map? Please provide ONLY the number of variances granted for structures with the lowest floor below the Base Flood Elevation. \_\_\_\_\_

D. Is your community in need of technical assistance in improving local floodplain management, such as regulation interpretation, planning, enforcement procedures, floodproofing, or a community visit? Yes  No

E. Please update the demographic information for your community that was provided to FEMA when your community last reported to the National Flood Insurance Program. If any numbers are NOT correct or a "0" appears, please provide the revised number in the space below. If precise data are not available, please provide your best estimate.

	Permanent Year-Round Population	1-4 Family Structures	All other Structures
1. In your <u>entire</u> community (including flood hazard areas)			
2a. In your flood hazard areas <u>only</u> .			

2b. How did you determine the number of structures in the flood hazard areas?  GIS data  best estimate  tax map overlays  other (explain) \_\_\_\_\_

NAME, TITLE, SIGNATURE, AND E-MAIL ADDRESS	PHONE NO. (with area code)	Date	
		Month	Year

Retain a copy of this report for your records  
REPLACES ALL PREVIOUS EDITIONS

FEMA Form 81-29, Feb. 03

**Figure 7-14. Example Biennial Report**