**National Flood Insurance Program (NFIP) Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials**

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# UNIT O: ORIENTATION

## In this unit

This orientation presents a summary of the study guide and desk reference:

- Its goals and objectives,
- How it is organized,
- The materials used, and
- Where to get help.

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# A. INTRODUCTION

The responsibility for reducing flood losses is shared by all units of government—local, state and federal—and the private sector.

Fulfilling this responsibility depends on having the knowledge and skills to plan and implement needed floodplain management measures. The fundamental floodplain management program that most others are built on is the National Flood Insurance Program (NFIP).

**Cover**

The house on the cover survived Hurricane Ivan in September 2004 with minimal damage. It is located in an AE Zone on Perdido Bay in Escambia County, Florida. The owner chose to elevate the building on pilings to well above the Base Flood Elevation (BFE). The storm surge in this area approximated the BFE and the nearby pre-FIRM buildings built on slabs were demolished or severely damaged by waves and debris.

The NFIP provides the maps and regulatory basis for local floodplain management. It is also the primary source of insurance protection for floodprone properties. Its success depends on the people responsible for administering its mapping, regulatory and insurance aspects.

This document can serve two purposes. First, it can be used as a study guide to enhance the knowledge and skills of local officials responsible for administering and enforcing local floodplain management regulations. It is also intended to broaden their understanding of floodplain management strategies that can be applied at the local level. Local officials and others can use the study guide to help them study for the exam for the Association of State Floodplain Manager's (ASFPM) Certified Floodplain Manager designation.

Second, the study guide can be used as a desk reference that you can refer to when specific issues arise as you implement your floodplain management ordinance. Guidance is included on how to handle many of these issues and information provided that will help you explain the requirements to citizens of your community. References are included on where to find more information or guidance on many issues. The FEMA documents that are referenced are available from the FEMA Distribution Center at 1-800-480-2520. The address is: Federal Emergency Management Agency, Attention: Publications, PO Box 2012, Jessup, MD 20794-2012. Most of these publications can also be can be downloaded from the FEMA website, http://www.fema.gov.

While any interested person may use this study guide and desk reference, it is written specifically for the local official who is responsible for administering his or her community's floodplain management regulations. Thus, references to "you," assume that you are a local official.

## STUDY GUIDE OBJECTIVES

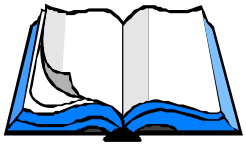
Upon completing this study guide, you should:

1. Be familiar with flood hazards and how human development interacts with the natural process of flooding.
2. Understand the purpose of the NFIP and your community's role in it.
3. Understand the basis for flood maps and data.
4. Be able to use floodplain studies and maps to support your floodplain management program.
5. Be able to explain the minimum regulatory requirements of the NFIP.
6. Be familiar with additional regulatory standards that your community could adopt.
7. Understand your responsibilities in administering your community's floodplain regulations for new construction.
8. Understand how to administer your community's floodplain regulations for repairs and improvements to existing buildings.
9. Be familiar with how flood insurance policies are written and how they relate to your community's regulations.
10. Be prepared to administer your floodplain regulations following a disaster.

These 10 objectives are the topics of the 10 units in this study guide.

# B. STUDY GUIDE MATERIALS

Study guide materials include text pages and dividers that can be inserted into a loose-leaf notebook. There is also a Flood Insurance Study and map for a sample community that can be ordered separately.



## NOTEBOOK

The loose-leaf notebook holds the primary instructional material —ten units—and eight appendices.

In **Units 1 and 2**, you'll be introduced to the kinds of floods common to communities in the United States, the concepts behind floodplain management and the NFIP.

In **Unit 3**, you'll learn about the various types of flood data needed to administer a floodplain management program.

**Unit 4** discusses how to use the data provided in NFIP studies and maps.

**Unit 5** is the first of four units about administering floodplain management regulations. In Unit 5, you'll find out about the minimum regulatory requirements communities must enforce under the NFIP.

**Unit 6** contains additional measures recommended to help make your regulations more effective and more appropriate to your local flood conditions and community needs.

**Unit 7** discusses the steps needed to administer a floodplain management ordinance.

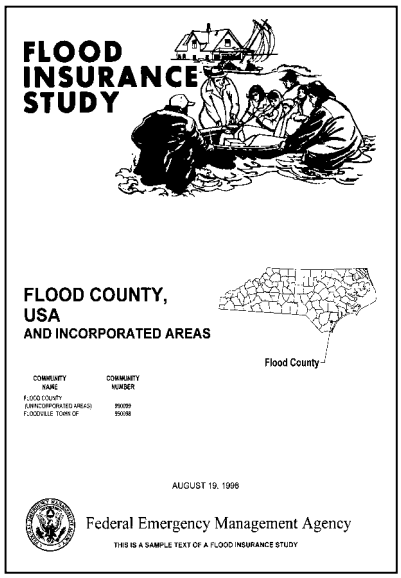
**Unit 8** goes into detail on the special situations of dealing with changes to existing buildings.

In **Unit 9**, the relationship between flood insurance and your floodplain management program is reviewed.

**Unit 10** reviews the things you need to be ready for following a disaster and how you can make your community's program more effective in reducing flood losses.

The eight appendices provide contacts for assistance, references, technical terms, and NFIP materials.

## FLOOD INSURANCE STUDY AND MAPS




The fictitious community of Flood County, USA, has been selected as a sample community for the purposes of this course.

The Flood Insurance Study and Flood Insurance Rate Map for Flood County provide opportunities to read and interpret the data in a typical flood insurance study and maps. This town provides examples of both coastal and riverine data and maps. The Flood Insurance Study and Maps can be ordered separately from the study guide and desk reference.

**Engineers Scale**. You should obtain a clear plastic engineer's scale or similar measuring devise for use in several of the exercises in this study guide and for day-to-day implementation of your ordinance. A scale helps convert measurements on a map to distance on the ground.

## LEARNING CHECKS

Learning checks and unit learning exercises are included as Appendix H to help you master the material. Answers to the learning checks and exercises are included.

# C. USING THE STUDY GUIDE

To administer a floodplain management program, you need to know about regulations and procedures under the National Flood Insurance Program. This study guide is designed to prepare you to serve as your community's floodplain management administrator.

As you can tell by the size of this volume and accompanying materials, you need to acquire a daunting amount of information. Most of what you need is covered in these pages, as this course is a comprehensive guide to the NFIP and your role as administrator.

By design, this study guide will help you learn. Key words and phrases appear with underlines and they are listed in the glossary in Appendix D. Each unit has frequent learning checks and a comprehensive review at the end. Be sure to do all of these – you learn best when you practice using the materials.

The study guide and desk reference does not have an index. However, each of the ten units covers a specific topic or area. At the beginning of each unit and at the beginning of the study guide are detailed Tables of Contents. You should be able to find where an issue is addressed in the study guide by scanning the Table of Contents.

## WHERE TO GET HELP

For help in understanding any of the course content, contact your FEMA Regional Office or NFIP State Coordinator.

These offices are listed in Appendices A and B.

# D. ACKNOWLEDGMENTS

This study guide and desk reference is based on a home-study course that was developed through FEMA's Emergency Management Institute (EMI) dated March 1998. Although that course is not currently being offered by EMI, the course materials provided a wealth of information that has proved useful to local floodplain managers. For that reason, they have been updated and reformatted into a study guide and desk reference.

The home-study course on which this study guide and desk reference is based was prepared by French & Associates, Ltd., Park Forest, Illinois, under FEMA task order EME-97-SA-0424. It was adapted from a home study course created by FEMA Region IV for North Carolina, prepared by James M. Wright, Nancy B. Sidell, Christy King and Steven Randolph. That course in turn was based on materials from a resident course offered at the Emergency Management Institute, course E-273*, Managing Floodplain Development through the National Flood Insurance Program*.

Many individuals and organizations helped create the original home study course, particularly: Tom Boven and Tom Hirt, FEMA, EMI; Katie Hayden and Elizabeth Lemersal, FEMA Mitigation Directorate, Washington, D.C.; Prairie Wordsmiths, Urbana, Illinois (editing and design), and the NFIP State Coordinating Agencies from the following states who provided handbooks and publications that proved very helpful: Delaware, Illinois, Maine, Michigan, Minnesota, Missouri, North Carolina, Oklahoma, South Carolina, Washington, and Wisconsin.

The home-study course was converted to a study guide and desk reference and updated by FEMA staff in April 2004. At that time the study guide was thoroughly reviewed to ensure consistency with current NFIP regulations, procedures and policies. FEMA staff that participated in that effort include Mike Robinson, David Stearrett, and Bill Lesser with support from Don Beaton, Mark Crowell and Lois Forster. Michael Baker Jr., Inc. of Alexandria, Virginina prepared the document for publication.

Questions or comments on the study guide and desk reference should be sent to the Community Assistance Section, Risk Assessment Branch of FEMA's Mitigation Division.

### Illustrations

Except as noted here, all illustrations are from FEMA or French & Associates. Special thanks to Dewberry & Davis for its support in preparing many of the figures.

Figure credits: 1-6: Managing Coastal Erosion, p. 31; 1-10: Landslide Loss Reduction, Colorado Geological Survey, 1989, p. 15; 1-14: Striking a Balance –

A Guide to Coastal Processes and Beach Management in Delaware, Delaware Department of Natural Resources and Environmental Control, 1985; 1-17: Roanoke Times and World News; 5-17 Berry A. Williams & Associates, Inc.; 6-3: Subdivision Design in Flood Hazard Areas, p. 19; 6-5: Planning for Hillside Development, p. 4; 6-6: Environmental Management: A Guide for Town Officials, Maine Department of Environmental Protection, 1992, p. 4.

# UNIT 1: FLOODS AND FLOODPLAIN MANAGEMENT

## In this unit

Unit 1 lays the groundwork for the course by explaining:

- The more common types of floods and floodplains,
- How floods affect floodplain development,
- The strategies and tools for floodplain management, and
- Basic terms used throughout the course.

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## INTRODUCTION

Throughout time, floods have altered the floodplain landscape. These areas are continuously shaped by the forces of water—either eroded or built up through deposit of sediment. More recently, the landscape has been altered by human development, affecting both the immediate floodplain and events downstream.

Historically, people have been attracted to bodies of water as places for living, industry, commerce and recreation. During the early settlement of the United States, locations near water provided necessary access to transportation, a water supply and water power. In addition, these areas had fertile soils, making them prime agricultural lands.

This pattern of development continued as communities grew. In recent decades, development along waterways and shorelines has been spurred by the aesthetic and recreational value of these sites.

The result has been an increasing level of damage and destruction wrought by the natural forces of flooding on human development. It is probable that you are taking this course because your community has experienced some of this. You, yourself, or someone you know may have suffered through a flood and a long, painful and expensive repair and recovery process.

The purpose of this study guide is to familiarize you with how this problem can be curbed through proper management of how your floodplains are developed. Communities that guide development following the standards of the National Flood Insurance Program have seen the results – their new buildings and neighborhoods have had less damage and suffering from flooding.

To start, we need an orientation into the natural processes of flooding. That is the focus of Section A. Many terms are introduced in this section, such as watershed and coastal erosion that are used throughout the course.

Next, we review of the other part of the equation – human development in the path of that flooding. The final section in this unit discusses the Federal government's overall floodplain management effort and the other strategies and tools that help prevent and reduce flood damage.

# A. FLOODS AND FLOODPLAINS

Floods are part of the Earth's natural hydrologic cycle.

The cycle circulates water throughout the environment (Figure 1-1). This process maintains an overall balance between water in the air, on the surface and in the ground.

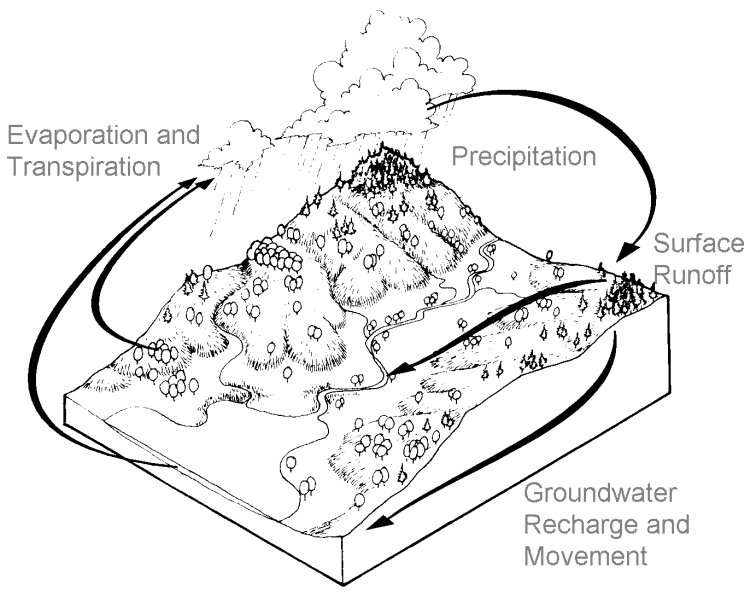


**Figure 1-1. The Hydrologic cycle**

Sometimes the hydrologic cycle gets outs of balance, sending more water to an area than it can normally handle.

The result is a flood.

A flood inundates a floodplain. There are different types of floodplains and they are based on they type of flooding that forms them.

Most floods fall into one of three major categories:

- Riverine flooding
- Coastal flooding
- Shallow flooding

## RIVERINE FLOODING

A watershed is an area that drains into a lake, stream or other body of water. Other names for it are basin or catchment area.

Watersheds vary in size. Larger ones can be divided into sub-watersheds.

Figure 1-2 shows a watershed and some of the key terms. The boundary of a watershed is a ridge or divide. Water from rain and snowmelt are collected by the smaller channels (tributaries) which send the water to larger ones and eventually to the lowest body of water in the watershed (main channel).

Channels are defined features on the ground that carry water through and out of a watershed. They may be called rivers, creeks, streams or ditches. They can be wet all the time or dry most of the time.

When a channel receives too much water, the excess flows over its banks and into the adjacent floodplain. Flooding that occurs along a channel is called riverine flooding.

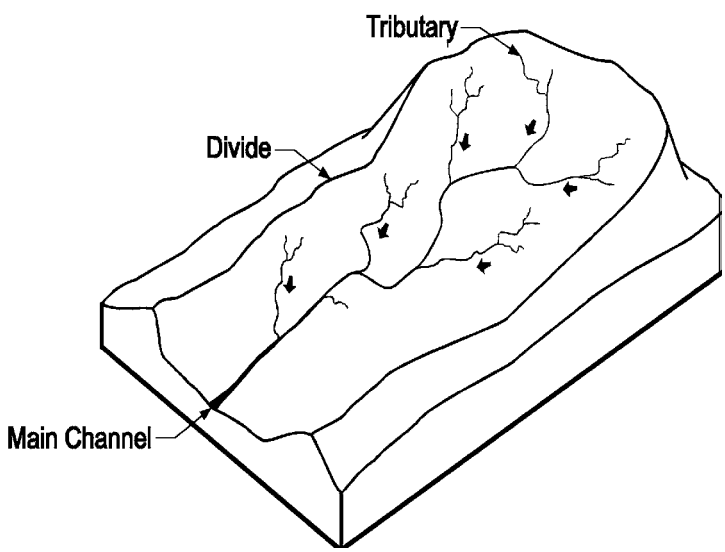


**Figure 1-2. Riverine Watershed and Floodplain**

What happens in a watershed will affect events and conditions downstream. Terrain helps determine the dynamics of riverine flooding. In relatively flat areas, shallow, slow-moving floodwater may cover the land for days or even weeks.

In hilly and mountainous areas, a flood may come scant minutes after a heavy rain. Such a flash flood gives short notice and moves so fast that it is particularly dangerous to people and property in its path.

## Overbank flooding

The most common type of flooding in the United States is called overbank flooding (Figure 1-3).

Overbank flooding occurs when downstream channels receive more rain or snowmelt from their watershed than normal, or a channel is blocked by an ice jam or debris. For either reason, excess water overloads the channels and flows out onto the floodplain.

Overbank flooding varies with the watershed's size and terrain. One measure of a flood is the speed of its moving water, which is called velocity. Velocity is measured in feet per second.

Hilly and mountainous areas have faster moving water, so velocity can pose a serious hazard. In flat areas, the flood may move slowly, making its velocity less of a hazard.

Terrain may affect how much warning people have that a flood is building. Conditions on a river that drains a large watershed may warn of a pending flood hours or even days before actual flooding. On the other hand, streams in hilly areas may give no warning that a flash flood is about to strike.

Flood depths vary, as do flood durations. Generally, the larger the river, the deeper the flood and the longer it will last. However, in hilly or mountainous areas with narrow valleys, flooding can be very deep in small watersheds.

Depending on the size of the river and terrain of its floodplain, flooding can last for days and cover wide areas.

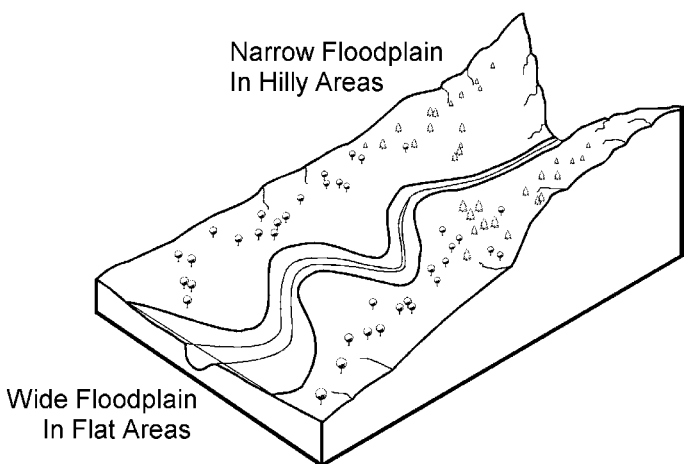


**Figure 1-3. Riverine floodplain**

### Flash flooding

A severe storm that drops much rainfall in a short time can generate a flash flood. All flash floods strike quickly and end swiftly.

While flash floods occur in all fifty states, areas with steep slopes and narrow stream valleys are particularly vulnerable, as are the banks of small tributary streams. In hilly areas, the high-velocity flows and short warning time make flash floods hazardous and very destructive.

In urban areas, flash flooding can occur where impervious surfaces, gutters and storm sewers speed runoff. Flash floods also can be caused by dam failure, the release of ice-jam flooding, or collapse of debris dams.

Flash floods rank first as the cause of flood-related deaths in the United States. In the 1970s, four flash floods in a five-year period killed 570 people. Death tolls associated with the 1993 Mississippi River flood or hurricanes are in another category because such events build over several days, giving people enough time to evacuate safely.

- In 1972, 118 people died along Buffalo Creek in West Virginia when an embankment made of coal refuse washed out, destroying 546 houses and damaging as many more.
- Weeks later, 236 people died when heavy rain and a dam failure inundated the area near Rapid City, South Dakota. Property damage exceeded $100 million.
- In 1976, heavy rains spawned floods in Colorado's Big Thompson Canyon, killing 139 people.
- The next year, 77 people died in Johnstown, Pennsylvania, when heavy rain overwhelmed a dam, causing $200 million in damage.

### Riverine erosion

River channels change as water moves downstream, acting on the channel banks and on the channel bottom (the thalweg). This force is made more potent during a flood, when the river's velocity increases.

Several features along a river are affected by this flow of water in different ways. A meander is a curve in a channel. On the outside of a meander, the banks are subject to erosion as the water scours against them (Figure 1-4). On the other hand, areas on the inside of meanders receive deposits of sand and sediment transferred from the eroded sites.

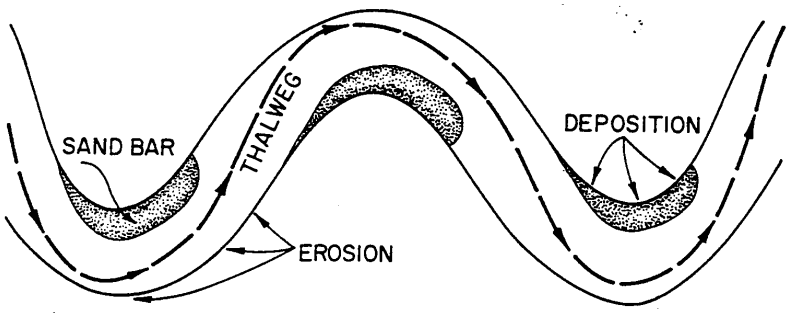


**Figure 1- 4. Erosion changes the shape of channels**

Properties on the outside of curves face a double threat of inundation and undercutting from riverine erosion during floods (Figure 1- 5).

In addition, meanders do not stay in the same place—they migrate slowly downstream and across the floodplain, reworking the shape of the channel within the floodplain.

**Figure 1-5. Riverine erosion can undercut structures**

## COASTAL FLOODING

Development along the coasts of the oceans, the Gulf of Mexico, and large lakes can be exposed to two types of flood problems not found in riverine areas: coastal storms and coastal erosion. The Pacific and Caribbean coasts face a third hazard: tsunamis.

### Coastal storms

Hurricanes and severe storms cause most coastal flooding. These include "Nor'easters," which are severe storms on the Atlantic coast with winds out of the northeast.

Persistent high wind and changes in air pressure push water toward the shore, causing a storm surge which can raise the level of a large body of water by several feet. Waves can be highly destructive as they move inland, battering structures in their path.

On open coasts, the magnitude of a flood varies with the tides. An increase in the level of the ocean during high tide will flood larger areas than a storm that strikes during low tide.

Major coastal storms can significantly change the shape of shoreline landforms, making sandy coastal floodplains particularly unstable places for development.

Wind and waves shape sand dunes, bluffs and barrier islands. Because these landforms provide natural buffers from the effects of a storm, their preservation is important to the protection of inland development.

## Coastal erosion

Long-term coastal erosion is another natural process that shapes shorelines. It is a complex process that involves natural and human-induced factors. The natural factors include sand sources, sand size and density, changes in water level, and the effects of waves, currents, tides and wind. These factors determine whether a shoreline will recede or accrete.

Human activity—such as construction of groins or seawalls, the dredging of channels and placement of sandbags—also can contribute to coastal erosion by altering the natural systems that transport sand.

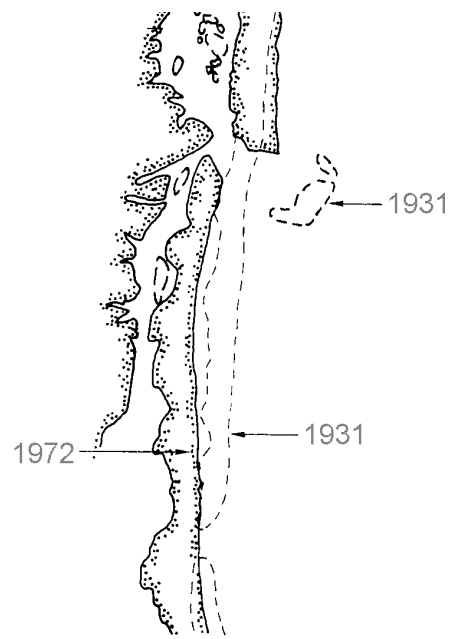


**Figure 1-6. This area of the Maryland shore shows how erosion can move or remove entire islands over a period as short as 40 years.**

## TSUNAMIS

Another hazard along the coast is a tsunami, a large wave often called a "tidal wave" even though tides and tsunamis are not related. Caused by an underwater earthquake or volcano, a tsunami is a pressure wave that can raise water levels as much as 15 feet.

In the open ocean, a tsunami's wave may be only a few feet high. Because the wave's energy extends from the surface to the bottom, that energy is compressed as the wave approaches shallow water, creating higher, more life-threatening waves (Figure 1-7).

Tsunamis usually occur in the Pacific Ocean, but they have caused floods in the Caribbean. Because they can happen on a clear day and are not related to storms, they can catch many people unawares.

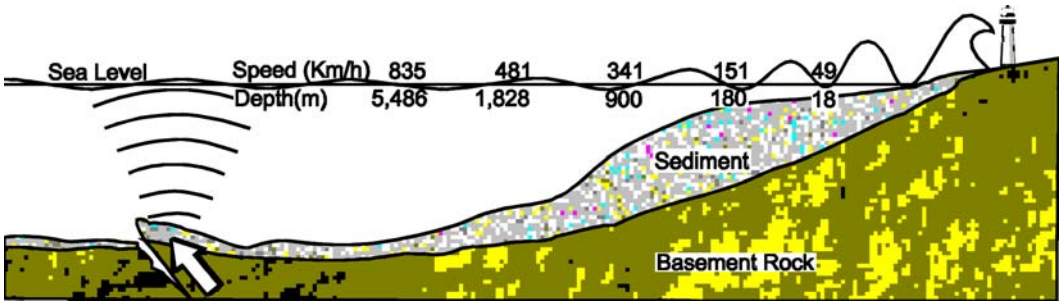


**Figure 1- 7. Tsunami waves increase in shallower water.**

### Lake flooding

Lake shores can flood in ways similar to ocean coasts. Along the Great Lakes, severe storms can produce waves and cause shoreline erosion. FEMA is starting to map Great Lakes flooding with the same techniques it uses for ocean coastal flooding.

## SHALLOW FLOODING

Shallow flooding occurs in flat areas where a lack of channels means water cannot drain away easily. Shallow flood problems fall into three categories: sheet flow, ponding and urban drainage.

### Sheet flow

Where there are inadequate or no defined channels, floodwater spreads out over a large area at a somewhat uniform depth in what's called sheet flow.

Sheet flows occur after an intense or prolonged rainfall during which the rain cannot soak into the ground. During sheet flow, the floodwaters move downhill and cover a wide area.

### Ponding

In some flat areas, runoff collects in depressions and cannot drain out, creating a ponding effect. Ponding floodwaters do not move or flow away. Floodwaters will remain in the temporary ponds until they infiltrate into the soil, evaporate or are pumped out.

Ponding is especially a problem in glaciated areas, where glaciers carved out depressions; in areas where caves and sinkholes are common, and in other areas where man-made features, such as roads and railroad embankments, have blocked outlets.

### Urban drainage

An urban drainage system comprises the ditches, storm sewers, retention ponds and other facilities constructed to store runoff or carry it to a receiving stream, lake or the ocean. Other man-made features in such a system include yards and swales that collect runoff and direct it to the sewers and ditches.

When most of these systems were built, they were typically designed to handle the amount of water expected during a 10-year storm. Larger storms overload them, and the resulting backed-up sewers and overloaded ditches produce shallow flooding.

Another urban drainage problem occurs in the areas protected by levees. Being in floodplains, they are flat and don't drain naturally, especially when a levee blocks the flow to the river.

To drain these areas, channels have been built and pumps installed to mechanically move the water past the levee. Often, these man-made systems do not have the capacity to handle heavy rains or intense storms.

## SPECIAL FLOOD HAZARDS

The flooding types described so far are the more common types found in the United States. There are many special local situations in which flooding or flood-related problems do not fit the national norm.

This section discusses five of those special flood hazards:

- Closed basin lakes
- Uncertain flow paths.
- Dam breaks.
- Ice jams.
- Mudflows.

### Closed basin lakes

There are two types of closed basin lake:

- 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.

Seasonal increases in rainfall cause a closed basin lake's level to rise faster than it can drain. As a result, they are subject to large fluctuations in water surface elevation. Floodwaters in closed basin lakes may stay up for weeks, months or even years.

The long periods of high water make closed basin lake flooding particularly problematic. Properties may not be heavily damaged, but they are unusable for long periods because they are surrounded by—or under—water. Buildings are isolated and septic fields are unusable. Properties are exposed to waves (and sometimes ice) that add to the hazard.

### Uncertain flow paths

The section on riverine erosion explained that stream channels change their locations gradually or only after very large and rare floods. However, in some areas of the country, *every* flood may change channels.

For example, in mountainous areas, high-velocity floodwater picks up sediment and rock. At the base of the valley where the slope flattens out, the floodwater decreases in speed and spreads out, as in a sheet flow, dropping sediment and rock over a fan-shaped area called an alluvial fan.

Figure 1-8 shows how an alluvial fan can have numerous channels. During the next flood, the channels may be in different locations.

Alluvial fan flooding is more common in the mountainous western states, where there is less ground cover and more opportunity for erosion.

Alluvial fan floods are not as predictable as riverine floods—one never knows where the floodwaters will spread out across the fan. Thus, they pose three hazards:

- Velocity of floodwaters and the debris they carry.
- Sediment and debris deposited by the floodwaters.
- The potential for the channel to move across the fan during the flood.

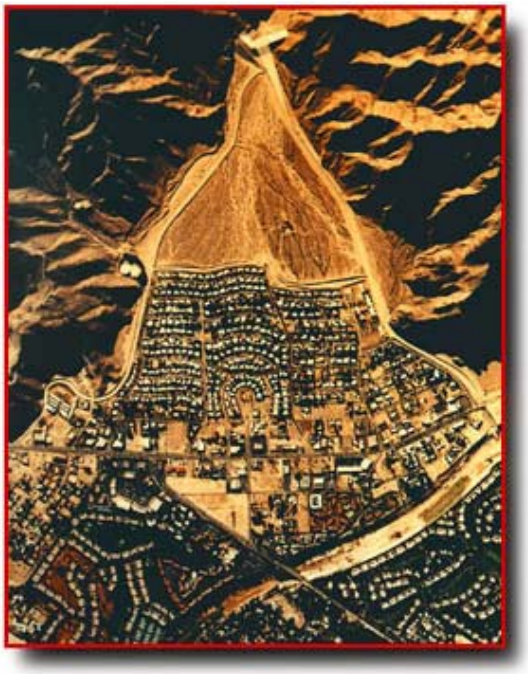

**Figure 1-8. An alluvial fan can have numerous channels.**

The arid west is subject to another type of flooding that features uncertain flow paths, known as movable stream beds.

When a high-velocity flood runs through an area with sand or loose soil, the erosion and sedimentation can occur so fast that the stream channel can be lowered, filled in or relocated through processes known as degradation, aggradation and migration. In some cases, these processes may occur simultaneously, or one process may occur in one flood and another process in a later event.

## Dam breaks

A break in a dam can produce an extremely dangerous flood situation because of the high velocities and large volumes of water released by such a break. Sometimes they can occur with little or no warning on clear days when people are not expecting rain, much less a flood.

Breaching often occurs within hours after the first visible signs of dam failure, leaving little or no time for evacuation. (As noted in the earlier section on flash flooding, three of the four top killer floods in the 1970s were related to the failure of a dam or dam-like structure.)

Dam breaks occur for one of three reasons:

- The foundation fails due to seepage, settling or earthquake.
- The design, construction, materials or operation were deficient.

- Flooding exceeds the capacity of the dam's spillway.

Proper design can prevent dam breaks. While dam safety programs can ensure that new dams are properly designed, there are still many private or locally built dams that were poorly designed and maintained.

### Ice jams

Ice jam flooding generally occurs when warm weather and rain break up frozen rivers or any time there is a rapid cycle of freezing and thawing.

The broken ice floats downriver until it is blocked by an obstruction such as a bridge or shallow area (Figure 1-9). An ice dam forms, blocking the channel and causing flooding upstream.

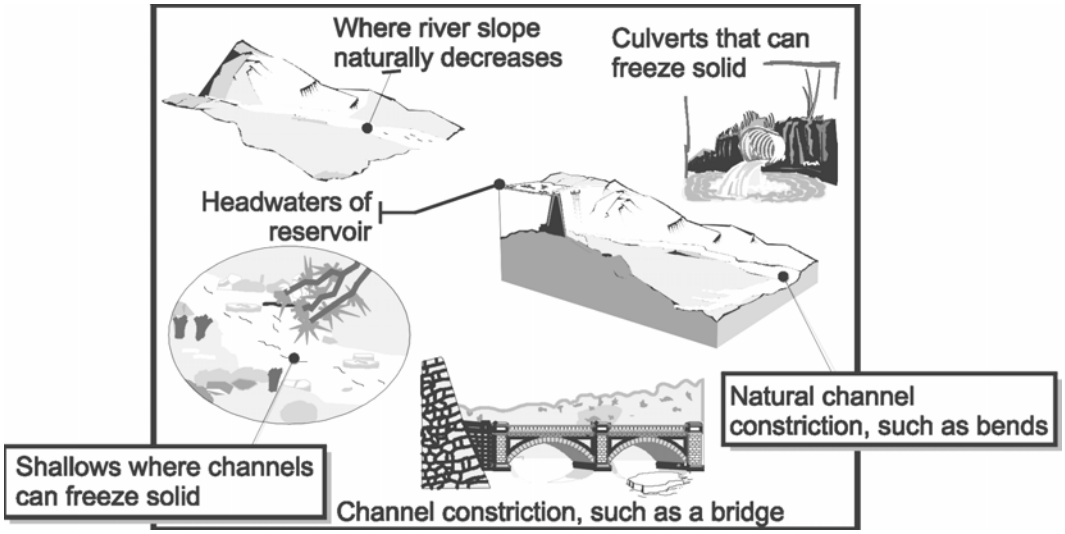


**Figure 1-9. Likely Ice Jam Areas**

Ice jams present three hazards:

- Sudden flooding of areas upstream from the jam, often on clear days with little or no warning.
- Movement of ice chunks (floes) that can push over trees and crush buildings (see Figure 1-18).
- Sudden flooding of areas downstream when an ice jam breaks. The impact is similar to a dam break, damaging or destroying buildings and structures.

### Mudflow

A mudflow is a type of landslide that occurs when runoff saturates the ground. Soil that is dry during dry weather turns into a liquid solution that slides downhill.

They typically cause more damage than clear-water flooding due to the combination of debris and sediment, and the force of the debris-filled water.

The NFIP officially defines a “mudslide (i.e. mudflow)” as “a condition where there is a river, flow or inundation of liquid mud down a hillside usually as a result of a dual condition of loss of brush cover, and the subsequent accumulation of water on the ground preceded by a period of unusually heavy or sustained rain.” The NFIP provides flood insurance coverage for mudslides that meet this definition, but does not map or require floodplain management measures in these areas.

What many people view as mudfloods are technically landslides and are not covered by the NFIP.

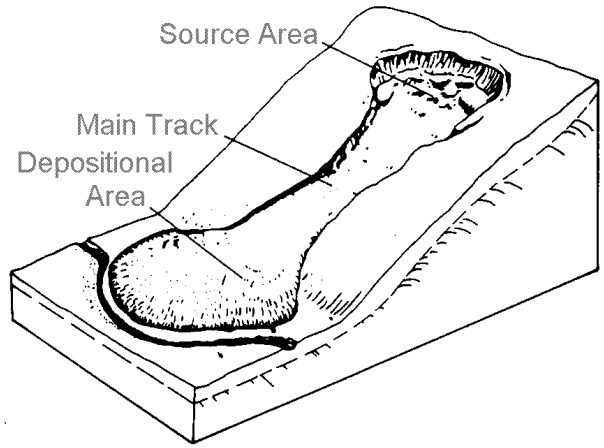


**Figure 1-10. Mudflows are caused by saturated soil**

## NATURAL AND BENEFICIAL FLOODPLAIN FUNCTIONS

Floodplain lands and adjacent waters combine to form a complex, dynamic physical and biological system found nowhere else. When portions of floodplains are preserved in their natural state, or restored to it, they provide many benefits to both human and natural systems.

Some are static conditions—such as providing aesthetic pleasure—and some are active processes, such as reducing the number and severity of floods, helping handle stormwater runoff and minimizing non-point water pollution. For example, by allowing floodwater to slow down, sediments settle out, thus maintaining water quality. The natural vegetation filters out impurities and uses excess nutrients.

Such natural processes cost far less money than it would take to build facilities to correct flood, stormwater, water quality and other community problems.

Natural resources of floodplains fall into three categories: water resources, living resources and societal resources. The following sections describe each category's natural and beneficial functions.

### Natural flood and erosion control

Over the years, floodplains develop their own ways to handle flooding and erosion with natural features that provide floodwater storage and conveyance, reduce flood velocities and flood peaks, and curb sedimentation.

Natural controls on flooding and erosion help to maintain water quality by filtering nutrients and impurities from runoff, processing organic wastes and moderating temperature fluctuations.

These natural controls also contribute to recharging groundwater by promoting infiltration and refreshing aquifers, and by reducing the frequency and duration of low surface flows.

### Biologic resources and functions

Floodplains enhance biological productivity by supporting a high rate of plant growth. This helps to maintain biodiversity and the integrity of ecosystems.

Floodplains also provide excellent habitats for fish and wildlife by serving as breeding and feeding grounds. They also create and enhance waterfowl habitats, and help to protect habitats for rare and endangered species.

### Societal resources and functions

People benefit from floodplains through the food they provide, the recreational opportunities they afford and the scientific knowledge gained in studying them.

Wild and cultivated products are harvested in floodplains, which are enhanced agricultural land made rich by sediment deposits. They provide open space, which may be used to restore and enhance forest lands, or for recreational opportunities or simple enjoyment of their aesthetic beauty.

Floodplains provide areas for scientific study and outdoor education. They contain cultural resources such as historic or archaeological sites, and thus provide opportunities for environmental and other kinds of studies.

These natural resources and functions can increase a community's overall quality of life, a role that often has been undervalued. By transforming stream and river floodplains from problem areas into value-added assets, the community can improve its quality of life.

Parks, bike paths, open spaces, wildlife conservation areas and aesthetic features are important to citizens. Assets like these make the community more appealing to potential employers, investors, residents, property owners and tourists.

**Figure 1-11 Floodplains offer recreation and aesthetic benefits.**

# B. FLOODPLAIN DEVELOPMENT

Throughout time, floods have altered the floodplain landscape. These areas are continuously shaped by the forces of water—either eroded or built up through deposit of sediment. More recently, the landscape has been altered by human development, affecting both the immediate floodplain and events downstream.

Historically, people have been attracted to bodies of water as places for living, industry, commerce and recreation. During the early settlement of the United States, locations near water provided necessary access to transportation, a water supply and water power. In addition, these areas had fertile soils, making them prime agricultural lands.

This pattern of development continued as communities grew. In recent decades, development along waterways and shorelines has been spurred by the aesthetic and recreational value of these sites.

Because floodplains have attracted people and industry, a substantial portion of this country's development is now subject to flooding. Floodplains account for only seven percent of the nation's total land area. However, they contain a tremendous amount of property value. It is estimated that there are 8 – 10 million households in our floodplains.

Two problems result from floodplain development:

- Development alters the floodplain and the dynamics of flooding.
- Buildings and infrastructure are damaged by periodic flooding.

## FLOODPLAIN DEVELOPMENT DYNAMICS

Human development can have an adverse impact on floods and floodplains. Three types of problems are reviewed here.

### Riverine floodplains

The most obvious impact of development on riverine flooding comes with moving or altering channels or constructing bridges and culverts with small openings. Construction and regrading of the floodplain can obstruct or divert water to other areas. Levees and dikes are the best known examples of this, but even small construction projects have an impact (Figure 1-12).

Filling obstructs flood flows, backing up floodwaters onto upstream and adjacent properties. It also reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels. This also increases floodwater velocity.

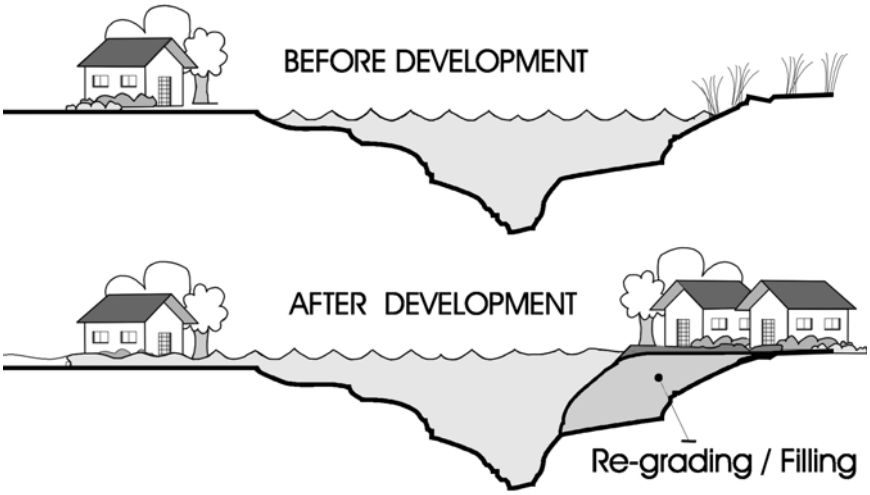


**Figure 1-12. Effects of development on a riverine floodplain**

## Watersheds

Development in riverine watersheds affects the runoff of stormwater and snowmelt. Buildings and parking lots replace the natural vegetation which used to absorb water. When rain falls in a natural setting, as much as ninety percent of it will infiltrate the ground; in an urbanized area, as much as ninety percent of it will run off (Figure 1-13).

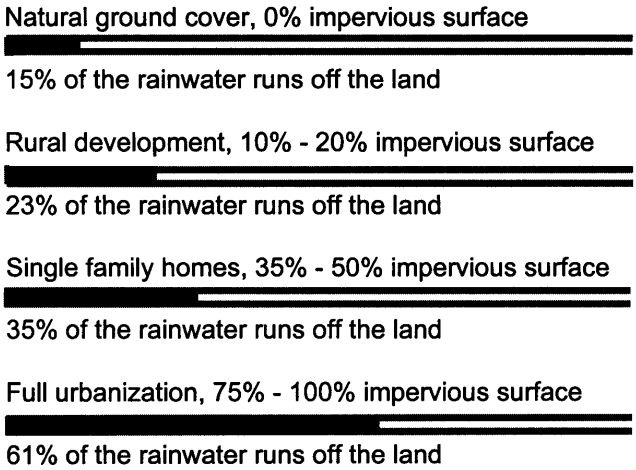


**Figure 1-13. Effects of development on stormwater runoff. (Data for Northeastern Illinois)**

Urban features alter flood dynamics as well. Storm sewers and more efficient ditches that come with urban drainage systems speed flood flows. The result of urbanization is that there is more runoff in the watershed and it moves faster, increasing flooding downstream. Thus, a 10-year storm may produce the runoff equivalent of a 25-year storm, overloading the man-made drainage system.

Urbanization also changes the timing of flows along the tributaries. If one subwatershed develops faster than another, the flood will leave sooner than it used to, possibly arriving at the main channel at the same time as the peak arrives from another tributary, causing increased flooding downstream.

## Coasts

Coastal development similarly affects the dynamics of coastal flooding. Removing the sand from beaches and dunes removes the natural barrier built up by flood forces over the years and exposes inland areas to increased risk of flooding.

Coastal erosion is affected by construction of navigation channels, breakwaters, and jetties, and mining of sand. Often construction of barriers, seawalls, or even sandbag walls to protect buildings from flooding or erosion has an adverse affect on properties at the end of the walls where erosion is accelerated.

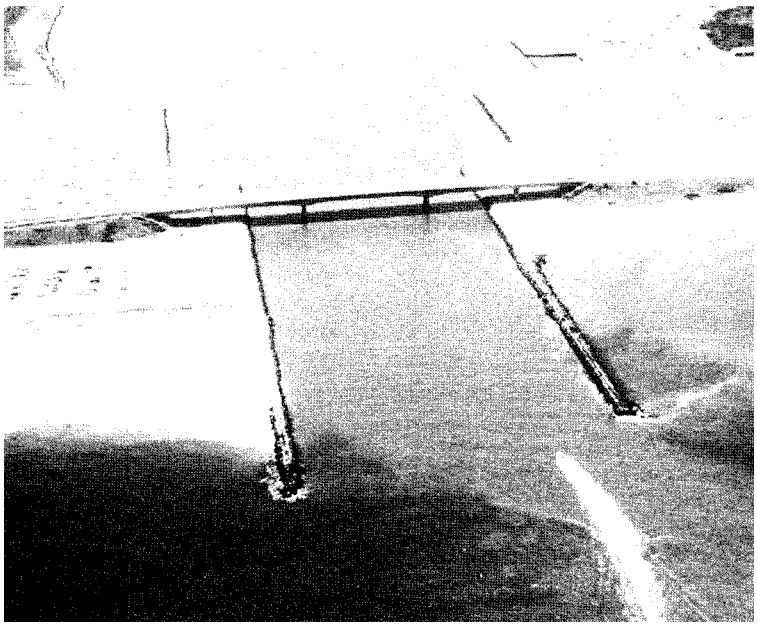

**Figure 1-14. Jetties to protect a navigation inlet affect sand accumulation and erosion.**

## FLOOD DAMAGE

Floodplains are home to between 8 and 10 million households. In an average year, floods kill 150 people and cause over $6 billion in property damage. Nationally, average annual flood losses continue to increase.

Floods can hurt or kill people, and damage property, in several ways. Knowing the impact of a potential hazard—and guarding against it—is integral to administering a floodplain management program.

As a floodplain management administrator, you need to be knowledgeable about the five main causes of flood damage:

- Hydrodynamic forces
- Debris impact
- Hydrostatic forces
- Soaking
- Sediment and contaminants

### Hydrodynamic forces

Moving water creates a hydrodynamic force which can damage a building's walls in three ways (see Figure 1-15):

- Frontal impact, as water strikes the structure.
- Drag effect, as water runs along the sides of a structure.
- Eddies or negative pressures, created as water passes the downstream side.

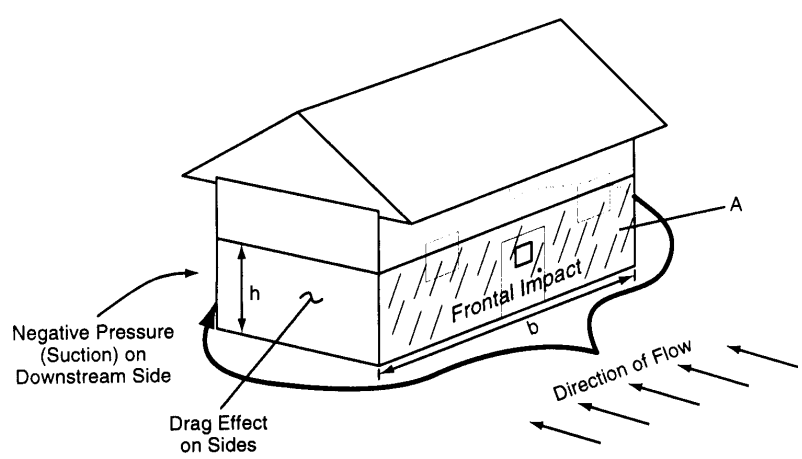


**Figure 1-15. Hydrodynamic forces on a building.**

The speed of moving water is called velocity, a force that is measured in feet per second. The faster water moves, the more pressure it puts on a structure and the more it will erode stream banks and scour the earth around a building's foundation.

Floodwaters moving faster than 5 feet per second comprise a high-velocity flood, requiring special design considerations for buildings, roads, bridges and other manmade structures in its path.

**Figure 1-16. Beaches are particularly susceptible to undermining of foundations due to velocity flows.**

While velocity is one factor in determining the potential harm of a flood, the total impact of moving water is related to the depth of the flooding. Studies have shown that deep water and low velocities can cause as much damage as shallow water and high velocities.

People are more susceptible to damage than buildings: Studies have shown that it doesn't take much depth or velocity to knock a person over. Thus, no areas with moving floodwater can be considered safe for walking (Figure 1-17).

A car will float in only two feet of moving water, which is one reason floods kill more people trapped in vehicles than anywhere else. Often victims put themselves in perilous situations by ignoring warnings about travel or mistakenly thinking that a washed-out bridge is still open.

**Figure 1-17. Even shallow floodwaters can stop cars and wash people off their feet**

### Debris impact

Debris also increases the hazard posed by moving water. Floodwaters can and will pick up anything that will float—logs, lumber, ice, even propane tanks and vehicles (Figure 1-18). Moving water will also drag or roll objects that don't float. All of this debris acts as battering rams that can knock holes in walls.

**Figure 1-18. Ice floes and other large items of debris can crush a house**

## Hydrostatic forces

The weight of standing water puts hydrostatic pressure on a structure. The deeper the water, the more it weighs and the greater the hydrostatic pressure.

Because water is fluid, it exerts the same amount of pressure sideways (lateral pressure) as it does downward. As water gets deeper, it exerts more lateral pressure than shallow water.

Most walls are not built to withstand lateral pressure. Studies and tests have shown that the lateral force presented by three feet of standing water can be enough to collapse the walls of a typical frame house.

Basement walls and floors are particularly susceptible to damage by hydrostatic pressure. Not only is the water deeper, a basement is subjected to the combined weight of water and saturated earth. Water in the ground underneath a flooded building will seek its own level – resulting in uplift forces that can break a concrete basement floor (Figure 1-19).

**Figure 1-19. This basement floor broke from hydrostatic pressure**

Hydrostatic pressure can also cause damage due to floatation or buoyancy. Improperly anchored buildings can float off their foundations and empty in-ground storage tanks can pop out of the ground even forcing their way through several inches on concrete.

## Soaking

When soaked, many materials change their composition or shape.

Wet wood will swell, and if it is dried too fast it will crack, split or warp. Plywood can come apart. Gypsum wallboard will fall apart if it is bumped before it dries out. The longer these materials are wet, the more moisture they will absorb.

Soaking can cause extensive damage to household goods. Wooden furniture may get so badly warped that it can't be used. Other furnishings, such as upholstery, carpeting, mattresses and books, usually are not worth drying out and restoring. Electrical appliances and gasoline engines won't work safely until they are professionally dried and cleaned.

### Sediment and contaminants

Many materials, including wood and fiberglass or cellulose insulation, absorb floodwater and its sediment. Even if allowed to dry out, the materials will still hold the sediment, salt and contaminants brought by the flood. Simply letting a flooded house dry out will not render it clean—and it certainly will not be as healthy a place as it was before the flood.

Few floods, especially those that strike inland, have clear floodwater, and so they leave a mess made of natural and man-made debris. Stormwater, snowmelt and river water pick up whatever was on the ground, such as soil, road oil, and farm and lawn chemicals. If a wastewater treatment plant upstream was inundated, the floodwaters will likely include untreated sewage.

Especially in the arid west and coastal areas, flooding can leave large amounts of sand, sediment and debris (Figure 1-20) that require major cleanup efforts. After the water recedes or evaporates, these sediments are left on and in a building, and its contents.

**Figure 1-20. Debris flows can completely fill a house with sediment**

## SAFETY AND HEALTH HAZARDS

Floods pose a variety of hazards as they build, crest and subside. At different points in the life of a flood, people are displaced, damage occurs and finally a cleanup can begin. Disruption of normal public utilities and the presence of flood debris and damage can produce safety and health hazards.

When utilities are damaged, hazards arise. Electrocution is the second most frequent cause of flood deaths, claiming lives in a flooded area that is carrying a live current created when electrical components short. Floods also can damage gas lines, floors and stairs, creating secondary hazards such gas leaks and unsafe structures. If the water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

Fire can be a result of too much water: floods can break gas lines, extinguish pilot lights, and short circuit electrical wiring – causing conditions ripe for a fire. Fire equipment may not be able reach a burning building during high water.

Floods bring and leave health hazards in the form of animal carcasses, garbage and ponds that can become breeding grounds for germs and mosquitoes. Any flooded items that come in close contact with people must be thrown out, including such things as food, cosmetics, medicines, stuffed animals and baby toys. Clothes and dishes need to be washed thoroughly.

Mold, mildew and bacteria grow in damp, flooded areas. One health hazard occurs when heating ducts in a forced-air system are not properly cleaned following inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants.

Flooding, especially repetitive flooding, takes a toll on people's mental health. Stress comes from facing the loss of time, money, property and personal possessions such as heirlooms. This is aggravated by fatigue during cleanup and anxiety over lost income, health risks and damage to irreplaceable items.

Children and the elderly are especially susceptible to stress from the disruption of their daily routines.

# C. FLOODPLAIN MANAGEMENT

The strategies and tools available to prevent problems and protect people and development from flooding have been developed over many years. A short history of U.S. policy on floodplain management will help explain their evolution.

## EVOLUTION

The federal government got involved in floodplain management in the 1800s, when it had an interest in maintaining the navigability of rivers to facilitate interstate commerce. The great Mississippi River flood of 1927 led the federal government to become a major player in flood control.

As defined by the Flood Control Acts of 1928 and 1936, the role of government agencies was to build massive flood control structures to control the great rivers, protect coastal areas and prevent flash flooding. The 1936 act alone authorized construction of some 250 projects for both flood control and relief work.

Until the 1960's, such structural flood control projects were seen as the primary way to reduce flood losses. Public policy emphasized that flood losses could be curbed by controlling floodwater with structures, such as dams, levees and floodwalls. But people began to question the effectiveness of this single solution. Disaster relief expenses were going up, making all taxpayers pay more to provide relief to those with property in floodplains. Studies during the 1960s concluded that flood losses were increasing, in spite of the number of flood control structures that had been built.

One of the main reasons structural flood control projects failed to reduce flood losses was that people continued to build in floodplains. In response, federal, state and local agencies began to develop policies and programs with a "non-structural" emphasis, ones that did not prescribe projects to control or redirect the path of floods. Since the 1960s, floodplain management has evolved from heavy reliance on flood control, or structural measures, to one using a combination of many tools.

The creation of the National Flood Insurance Program in 1968 was a landmark step in this evolution. The NFIP:

- Established an insurance program as an alternative to disaster relief.
- Distributed responsibility for floodplain management to all levels of government and the private sector.
- Set a national standard for regulating new development in floodplains.
- Began a comprehensive floodplain mapping program.

Also during the 1960s and 1970s, interest increased in protecting and restoring the environment, including the natural resources and functions of floodplains. Coordinating flood-loss reduction programs with environmental protection and watershed management programs has since become a major goal of federal, state and local programs.

As a result of this evolution, we no longer depend solely on structural projects to control floodwater. U.S. floodplain policies are now multi-purpose and result in a mix of solutions to suit many situations. Consequently, administrators like you have several non-structural flood protection measures at their disposal. They include:

- Regulations to prohibit development in high-hazard areas.
- Building codes requiring flood-resistant construction for new buildings in floodprone areas.
- Acquisition and relocation of buildings in high hazard areas.
- Modifying or retrofitting existing buildings.
- Installing flood warning systems.
- Controlling stormwater runoff.
- Providing self-help advice to property owners.

## THE UNIFIED NATIONAL PROGRAM FOR FLOODPLAIN MANAGEMENT

To coordinate the efforts of the many government programs that can affect flooding or floodplain development, Congress created the Unified National Program for Floodplain Management under the National Flood Insurance Act of 1968.

The Unified National Program sets forth a conceptual framework for coordinating the floodplain management efforts of federal, state and local agencies as well as private parties.

The program is coordinated by a Federal Interagency Floodplain Management Task Force made up of federal agencies that are involved in flooding, or with development that can be affected by flooding.

The Task Force defines “floodplain management” as “a decision-making process that aims to achieve the wise use of the nation’s floodplains.” “Wise use” means both reduced flood losses *and* protection of the natural resources and functions of floodplains.

Where floodplain development is permitted, floodplain management results in development and construction measures that minimize the risk to life and property from floods and the risk to the floodplain's natural functions posed by human development.

### Strategies and tools

The Task Force has identified four floodplain management strategies for reducing the human economic losses from flooding as well as minimizing the losses of natural and beneficial floodplain resources. Each strategy is supported by an array of tools which are summarized in the rest of this section.

Many of the tools can be used in more than one strategy.

In most cases, a combination of these tools is needed to reduce risks and protect natural resources and functions. Because floodplain management is a process, there is no one "best" set of tools or one single "wise use" of the floodplain.

The important message from this definition of floodplain management is to consider all the options and account for both the hazard and the natural values before developing or implementing any action that will change the floodplain.

## FLOODPLAIN MANAGEMENT STRATEGIES

### *Strategy 1:* Modify human susceptibility to flood damage

**Reduce disruption by avoiding hazardous, uneconomic or unwise use of floodplains.**

Tools include:

- Regulating floodplain use by using zoning codes to steer development away from hazardous areas or natural areas deserving preservation, establishing rules for developing subdivisions, and rigorously following building, health and sanitary codes.
- Establishing development and redevelopment policies on the design and location of public services, utilities and critical facilities.
- Acquiring land in a floodplain in order to preserve open space and permanently relocate buildings.
- Elevating or floodproofing new buildings and retrofitting existing ones.
- Preparing people and property for flooding through forecasting, warning systems and emergency plans.
- Restoring and preserving the natural resources and functions of floodplains.

### *Strategy 2:* Modify the impact of flooding

**Assist individuals and communities to prepare for, respond to and recover from a flood.**

Tools include:

- Providing information and education to assist self-help and protection measures.
- Following flood emergency measures during a flood to protect people and property.
- Reducing the financial impact of flooding through disaster assistance, flood insurance and tax adjustments.
- Preparing post-flood recovery plans and programs to help people rebuild and implement mitigation measures to protect against future floods

### *Strategy 3:* Modify flooding itself

**Develop projects that control floodwater.**

Tools include:

- Building dams and reservoirs that store excess water upstream from developed areas.
- Building dikes, levees and floodwalls to keep water away from developed areas.
- Altering channels to make them more efficient, so overbank flooding will be less frequent.
- Diverting high flows around developed areas.
- Treating land to hold as much rain as possible where it falls, so it can infiltrate the soil instead of running off.
- Storing excess runoff with on-site detention measures.
- Protecting inland development with shoreline protection measures that account for the natural movement of shoreline features.
- Controlling runoff from areas under development outside the floodplain.

### *Strategy 4:* Preserve and restore natural resources

**Renew the vitality and purpose of floodplains by reestablishing and maintaining floodplain environments in their natural state.**

Tools include:

- Floodplain, wetlands and coastal barrier resources or land use regulations, such as zoning, can be used to steer development away from sensitive or natural areas.
- Development and redevelopment policies on the design and location of public services, utilities and critical facilities.
- Land acquisition; open space preservation; permanent relocation of buildings; restoration of floodplains and wetlands, and preservation of natural functions and habitats.
- Information and education to make people aware of natural floodplain resources and functions and how to protect them.
- Tax adjustments to provide a financial initiative for preserving lands or restoring lands to their natural state.
- Beach nourishment and dune building to protect inland development by maintaining the natural flood protection features.

# UNIT 2: THE NATIONAL FLOOD INSURANCE PROGRAM

## In this unit

Unit 2 introduces the National Flood Insurance Program:

- How it evolved,
- How it works,
- The roles of the state and local partners participating in the NFIP
- The community's obligations to the program.

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# A. HISTORY

Historically, people at risk from flooding could only hope for help from their neighbors and charitable organizations in the event of a flood.

Government assistance varied from community to community, and flood insurance was scarce. During the 1920s, the insurance industry concluded that flood insurance could not be a profitable venture because the only people who would want flood coverage would be those who lived in floodplains.

Since they were sure to be flooded, the rates would be too high to attract customers.

During the 1960s, Congress became concerned with problems related to the traditional methods of dealing with floods and flood damage—construction of structural projects and federal disaster assistance. Both were proving to be quite expensive, with no end in sight.

Congress concluded that:

- Although Federal flood programs were funded by all taxpayers, they primarily helped only residents of floodplains.
- Flood protection structures were expensive and could not protect everyone.
- People continued to build and live in floodplains, thus still risking disaster.
- Disaster relief was both inadequate and expensive.
- The private insurance industry could not sell affordable flood insurance because only those at high risk would buy it.

In 1968, Congress passed the National Flood Insurance Act to correct some of the shortcomings of the traditional flood control and flood relief programs. The act created the National Flood Insurance Program (NFIP) to:

- Transfer the costs of private property flood losses from the taxpayers to floodplain property owners through flood insurance premiums.
- Provide floodplain residents and property owners with financial aid after floods, especially smaller floods that do not warrant federal disaster aid.
- Guide development away from flood hazard areas.
- Require that new and substantially improved buildings be constructed in ways that would minimize or prevent damage during a flood.

Congress charged the Federal Insurance Administration (which at that time was in the Department of Housing and Urban Development) with responsibility for the program. The program is currently administered by the Federal Emer-

gency Management Agency (FEMA) within the Department of Homeland Security.

Participation in the NFIP grew slowly. In 1972, Hurricane Agnes devastated a wide area of the eastern United States. Disaster assistance costs were the highest ever, leading Congress to examine why the NFIP was so little used. Investigators found that few communities had joined the NFIP—there were fewer than 100,000 flood insurance policies in force nationwide. The availability of flood insurance alone had not been enough to motivate communities to join the NFIP or individuals to purchase flood insurance.

To remedy this, the Flood Disaster Protection Act was passed in 1973. The Act prohibited most types of Federal assistance for acquisition or construction of buildings in the floodplains of non-participating communities. It also required that buildings located in identified flood hazard areas have flood insurance coverage as a condition of receiving Federal financial assistance or loans from federally insured or regulated lenders, and as a condition for receiving federal disaster assistance. These "sanctions" for non-participation, which are detailed later in this unit, make it hard for any community that wants federal assistance for properties in floodplains to avoid joining the NFIP.

The 1973 Act spurred participation in the program dramatically. By the end of the decade, more than 15,000 communities had signed on and about two million flood insurance policies were in effect.

In 1979, the Federal Insurance Administration (FIA) and the NFIP were transferred to the newly created Federal Emergency Management Agency (FEMA). During the early 1980's, FIA worked to reduce the program's dependence on its authority to borrow from the Federal Treasury. Through a series of rate increases and other adjustments, the program has been self-supporting since 1986. The NFIP is funded primarily through premium income, which pays nearly all administrative and mapping costs as well as claims. In recent years the NFIP has received supplemental funding from Congress to accelerate its Map Modernization program.

Since 1973, the program has been amended several times. The most important changes came under the National Flood Insurance Reform Act of 1994 which fine tuned various aspects of the program, such as authorizing the Community Rating System, increasing the maximum amount of flood insurance coverage, strengthening the mandatory purchase requirement, and establishing a grant program for mitigation plans and projects.

The Reform Act and the initiation of a flood insurance advertising campaigns boosted sales of flood insurance policies again. By the August of 2003, there were nearly 4.4 million flood insurance policies in force.

By January of 2004, there also were 19,937 participating communities. As shown in Figure 2-1, the greatest growth in numbers of communities occurred in the late 1970's, after the provisions of the 1973 amendments took effect.

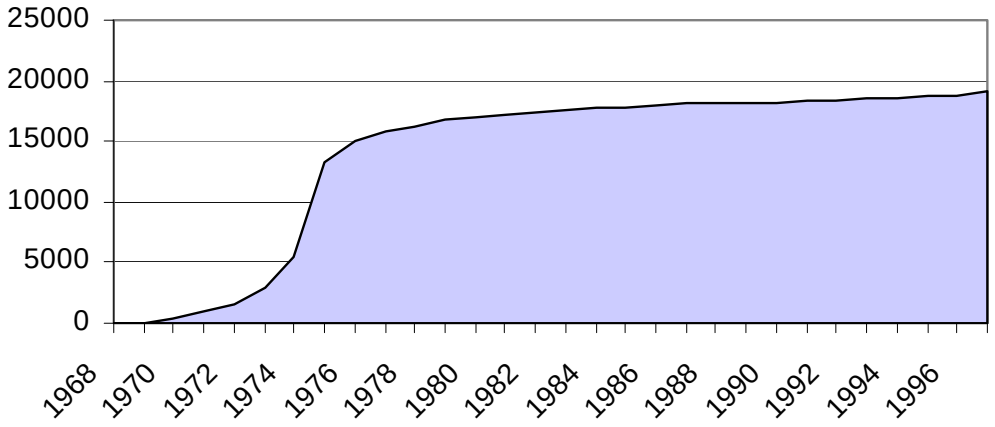


**Figure 2-1. NFIP community participation**

# B. HOW THE NFIP WORKS

The NFIP is based on a mutual agreement between the Federal Government and the community. Federally backed flood insurance is made available in those communities that agree to regulate development in their mapped floodplains. If the communities do their part in making sure future floodplain development meets certain criteria, FEMA will provide flood insurance for properties in the community.

Because most communities with a known flood problem are in the NFIP, this reference guide does not cover how a community applies to join. However, it does explain the three basic parts to the NFIP—mapping, insurance, and regulations. As discussed below, these three parts are interconnected and mutually supportive.

## MAPPING

FEMA has prepared a floodplain map and developed flood hazard data for most communities in the country. The maps and data are used for several purposes:

- Communities, states and Federal agencies use them as the basis for the regulating new floodprone construction,
- Insurance agents use them when rating flood insurance policies, and
- Lenders and Federal agencies used them to determine when flood insurance must be purchased as a condition of a loan or financial assistance.

FEMA has issued two kinds of maps:

- The first map received for most communities was called a Flood Hazard Boundary Map (FHBM). This just showed the boundaries of the floodplain using approximate methods.
- Most communities have had their FHBMs replaced by a Flood Insurance Rate Map, or FIRM. A FIRM usually is based on a Flood Insurance Study and includes flood elevations and other hazard information needed to better protect new construction from flood damage.

Buildings that pre-date the FIRM are treated differently than buildings built after the flood hazard was made public on the FIRM. These existing structures are called “pre-FIRM” buildings, while new construction is called “post-FIRM.”

The flood insurance rates for post-FIRM buildings are based on how protected they are from the mapped hazard. Therefore, both the NFIP’s regulations and insurance coverage depend on the accuracy and utility of the maps.

The NFIP’s maps and flood studies are covered in depth in Units 3 and 4.

## INSURANCE

Every building located in a participating community may be covered by a flood insurance policy—even buildings not located in a mapped floodplain. Coverage is for damage by a "flood."

A flood is defined by NFIP regulations as

> A "general and temporary condition of partial or complete inundation of normally dry land areas from:
>
> (1) "The overflow of inland or tidal waters or
>
> (2) "The unusual and rapid accumulation or runoff of surface waters from any source."

The official definition also includes mudflows and erosion.

Flood insurance premiums for post-FIRM buildings are based on the degree of flood protection they are provided. Therefore, it is very important for communities to ensure that new buildings in the floodplain are constructed properly.

The flood insurance premium rates for pre-FIRM buildings are subsidized by the NFIP. Owners of these policies do not pay "actuarial" rates, i.e., rates based on the true risk the building is exposed to.

No matter whether a building is pre-FIRM or post-FIRM, with flood insurance, owners of floodprone properties pay more of their share toward flood relief. And, they get claims paid when needed.

The NFIP has paid out over $12 billion in flood insurance claim payments for big and small floods (see Figure 2-2). Insurance provides relief for all floods, including those not large enough or severe enough to warrant federal disaster aid.

| | | |
|---|---|---|
| TROPICAL STORM ALLISON | 6/01 | $1,084 MILLION |
| LOUISIANA STORM | 5/95 | $584 MILLION |
| HURRICANE FLOYD | 9/99 | $437 MILLION |
| HURRICANE OPAL | 10/95 | $399 MILLION |
| HURRICANE HUGO | 9/89 | $376 MILLION |
| NOR'EASTER | 10/92 | $342 MILLION |
| MIDWEST FLOOD | 6/93 | $271 MILLION |
| HURRICANE FRAN | 9/96 | $214 MILLION |
| MARCH STORM | 3/93 | $211 MILLION |
| HOUSTON FLOODS | 10/94 | $217 MILLION |
| HURRICANE ANDREW | 8/92 | $168 MILLION |

**Figure 2-2. Largest claim events paid by the NFIP**

Flood insurance and its relation to construction regulations are discussed in more detail in Unit 9.

## REGULATIONS

The NFIP underwrites flood insurance coverage only in those communities that adopt and enforce floodplain regulations that meet or exceed NFIP criteria. Buildings built in accordance with these regulations have a lower risk of flooding and can be insured at lower rates.

The community's floodplain regulations are designed to ensure that new buildings will be protected from the flood levels shown on the FIRM and that development will not make the flood hazard worse. Over time, exposure to flood damage should be reduced as the older pre-FIRM buildings are replaced by post-FIRM buildings that comply with the regulations. Eventually a community should have only post-FIRM building's subject to little or no flood damage.

The NFIP construction regulations focus on protecting insurable buildings, but they also provide a degree of protection to other types of development. These criteria are detailed in Unit 5.

Floodplain regulations initially were controversial and difficult to enforce. Many people wanted the freedom to build what they want without government controls. In some areas, they still may not be aware they need a local permit to build. However, as time has passed the regulations have become increasingly accepted as necessary to reduce flood damages and protect citizens from loss.

As a result of public opposition, a community may be inclined to not fully enforce all of the provisions of its ordinance, which puts its participation in the NFIP in peril. If the community does not fulfill its NFIP obligations to the federal government and allows construction in violation of its regulations, three things can happen:

- New buildings will be built subject to flood damage
- Insurance on an improperly constructed building may be very expensive.
- FEMA can impose sanctions on the community, to encourage it to correct its floodplain management program. The sanctions are discussed in Section D.

# C. ROLES AND RESPONSIBILITIES

The National Flood Insurance Program is founded on a mutual agreement between the federal government and each participating community. Local, state and federal governments, and private insurance companies must share roles and responsibilities to meet the goals and objectives of the NFIP.

The community's role is of paramount importance. Residents and property owners can get flood insurance only if the community carries out its responsibilities.

## THE COMMUNITY ROLE

A community is a governmental body with the statutory authority to enact and enforce development regulations. These governmental bodies vary form state to state, but can include cities, towns, villages, townships, counties, parishes, special districts, states and Indian nations.

The community enacts and implements the floodplain regulations required for participation in the NFIP. The community's measures must meet regulations set by its state, as well as NFIP criteria. The NFIP requirements are covered in Unit 5.

A participating community commits itself to:

- Issuing or denying floodplain development/building permits.
- Inspecting all development to assure compliance with the local ordinance.
- Maintaining records of floodplain development.
- Assisting in the preparation and revision of floodplain maps.
- Helping residents obtain information on flood hazards, floodplain map data, flood insurance and proper construction measures.

## THE STATE ROLE

Each governor has selected a state coordinating agency for the NFIP. While the role of this agency varies from state to state, it usually includes:

- Ensuring that communities have the legal authorities necessary to adopt and enforce floodplain management regulations.
- Establishing minimum state regulatory requirements consistent with the NFIP.
- Providing technical and specialized assistance to local governments.

- Coordinating the activities of various state agencies that affect the NFIP.

Most states participate in the Community Assistance Program (CAP). Under CAP, NFIP funds are available on a 75 percent / 25 percent cost share to help the state coordinating agency provide technical assistance to communities and to monitor and evaluate their work. The telephone numbers of the state coordinating agencies are listed in Appendix B. Communities can contact their state coordinating agency for technical assistance in meeting NFIP requirements.

States also participate in the NFIP by establishing and enforcing floodplain management regulations for state-owned properties. This can be done through legislation, but more often has been done through a governor's executive order. A number of states have their own floodplain management statutes and regulations and operate floodplain management programs of their own in addition to supporting implementation of the NFIP.

## THE FEDERAL ROLE

The Federal Emergency Management Agency (FEMA) within the Department of Homeland Security (DHS) administers the NFIP through its Regional Offices and its Mitigation Division.

The ten FEMA *Regional Offices* each have a Mitigation Division that coordinates the NFIP with states and communities. Each FEMA regional office covers four to eight states and territories. Together they work with the nearly 20,000 participating communities. A list of the regional offices, their addresses and the states they cover appears in Appendix A.

The Regional Offices are responsible for:

- Assisting the state NFIP coordinating agencies.
- Assessing community compliance with the minimum NFIP criteria.
- Advising local officials responsible for administering the ordinance.
- Answering questions from design professionals and the public.
- Helping review and adopt new maps and data.
- Approving community floodplain management regulations.
- Providing information and training on the flood insurance purchase requirements.

The *FEMA Mitigation Division* in Washington, D.C., sets national policy for floodplain regulations, researches floodplain construction practices and administers the flood hazard mapping program. The Division has mapped more than 100 million acres of flood hazard areas nationwide and designated some six million acres of floodways along 40,000 stream and river miles.

*The Mitigation Division* also administers the insurance portion of the program. It sets flood insurance rates, establishes coverage, monitors applications and claims, and markets flood insurance.

The NFIP is operated as a self-supporting program. All NFIP expenses, including claims payments, floodplain management, and administration and, until recently, flood hazard mapping, are paid through insurance premiums, fees on insurance policies, and fees from map revision requests. Congress has recently provided supplemental funding to accelerate the NFIP's Map Modernization program.

Private insurance companies write and service most NFIP flood insurance policies through an arrangement with FEMA called the Write-Your-Own Program. The NFIP also contracts for agent training and other assistance through regional insurance offices. They can be reached through the FEMA Regional Offices.

# D. COMMUNITY PARTICIPATION

The NFIP is based on a cooperative agreement between the community and FEMA. FEMA can only make flood insurance available in those communities that agree to regulate future development in the floodplain.

## JOINING THE NFIP

Participation in the NFIP is voluntary. There is no Federal law that requires a community to join, although some states have requirements. However, as discussed later in this section, a nonparticipating community faces sanctions, such as loss of Federal aid for insurable buildings in the floodplain. These make participation a very important decision for many communities.

To join, a community must adopt a resolution of intent to participate and cooperate with FEMA. The community agrees to "maintain in force…adequate land use and control measures consistent with the [NFIP] criteria" and to:

> (i) Assist the Administrator in the delineation of the floodplain,
>
> (ii) Provide information concerning present uses and occupancy of the flood plain,
>
> (iii) Maintain for public inspection and furnish upon request, for the determination of applicable flood insurance risk premium rates within all areas having special flood hazards, elevation and floodproofing records on new construction,
>
> (iv) Cooperate with agencies and firms which undertake to study, survey, map, and identify flood plain areas, and cooperate with neighboring communities with respect to the management of adjoining flood plain areas in order to prevent aggravation of existing hazards;
>
> (v) Notify the Administrator 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.

The community must also adopt and submit a floodplain management ordinance that meets or exceeds the minimum NFIP criteria. These criteria are explained in Unit 5 of this course.

As shown in Figure 2-1, most communities joined in the 1970's. At that time they were provided with a Flood Hazard Boundary Map which showed only the approximate boundaries of the floodplain. Generally, they entered the "Emergency Phase" whereby their regulatory responsibilities were limited because of the limited flood hazard data provided on the map.

Participating communities receive a Flood Insurance Rate Map (FIRM) and most get a Flood Insurance Study with more detailed flood hazard data. After a period to review and appeal the draft map and study, the community is given six months to adopt the new data in a more comprehensive ordinance.

The FIRM takes effect at the end of the six month period. If the ordinance has been adopted in time, the community is converted to the "Regular Phase" on that date. That is also the date that differentiates "pre-FIRM" buildings from "post-FIRM buildings."

If the ordinance is not adopted in time, the community is suspended from the NFIP. The FIRM still goes into effect on the same date and is used by lenders and Federal agencies for determining where loans can be issued and federal assistance can be provided.

As of the end of August 2003, 97% of the NFIP communities were in the Regular Phase.

## COMPLIANCE

The community's floodplain management program and permit records are reviewed periodically by the FEMA Regional Office or state NFIP coordinating agency. Either agency may inspect records as part of a community assistance visit (CAV) or community assistance contact (CAC).

If a community doesn't uphold its part of the agreement and fails to adequately enforce its floodplain management regulations, FEMA has recourse through three approaches:

- Reclassification under the Community Rating System
- Probation
- Suspension from the program

### Reclassification under the Community Rating System

NFIP/CRS

The Community Rating System (CRS) provides a discount in the flood insurance premiums for properties in communities that participate in the CRS and implement floodplain management programs that exceed minimum NFIP requirements. The CRS is explained in Unit 9, Section C. As of May 1, 2004, 1,002 communities participate in CRS. This represents 66% of policies in force.

CRS Communities that are deemed to no longer be in full compliance with the NFIP requirements can be reclassified to Class 10. Should that happen, residents would lose their CRS flood insurance premium discounts.

### Probation

Probation represents formal notification to the community that FEMA regards the community's floodplain management program as non-compliant with the NFIP criteria.

Prior to imposing probation, FEMA provides the community a 90-day written notice and lists specific deficiencies in its program and violations. FEMA also notifies all policy holders of the impending probation, telling them that an additional $50 premium will be charged on policies sold or renewed during the probation period. The objective of this surcharge is to bring the policy holders' attention to the fact that their community is not compliant and failure to correct the problems may lead to suspension.

The community has 90 days to avoid this sanction by correcting the program deficiencies and remedying the identified violations. Probation may be continued for up to one year after the community corrects all program deficiencies. This ensures that the community has truly changed its ways and become compliant and that all policies holders are advised of the situation when their policies are renewed.

### Suspension

If, after a period of probation, a community fails to remedy its violations and program deficiencies, it will be suspended from the NFIP for failure to enforce its floodplain management regulations. Suspension means the community is no longer in the NFIP. It is subject to the sanctions for non-participation that are explained in the next section.

FEMA grants a community 30 days to show why it should not be suspended and then sends it a 30-day suspension letter. FEMA may also conduct a written or oral hearing before suspension takes effect.

A community suspended under the NFIP may apply to the FEMA Regional Office for reinstatement by submitting the following:

- A local legislative or executive measure reaffirming the community's intent to comply with the NFIP criteria.
- Evidence that all program deficiencies have been corrected.
- Evidence that any violations have been remedied to the maximum extent possible.

FEMA may reinstate the community to full program status, bring it to a probationary status, or withhold reinstatement for up to one year after a satisfactory submission from the community.

A community will also be suspended if, following due notice, it fails to adopt revisions to its floodplain ordinance in response to flood map revisions or amended minimum NFIP criteria. Communities have a 6 month period after a new or revised map is issued to update their floodplain management regulations to incorporate the new data and make any other necessary changes. If at the end of the 6 months the community has not adopted a compliant ordinance, it is automatically be suspended.

It is not uncommon for communities to be suspended for failure to adopt compliant ordinances. Sometimes communities get a late start revising their ordinance and cannot complete the ordinance adoption process in the allotted 6 months. These communities are reinstated into the NFIP upon adoption of the ordinance provided no non-compliant development has taken place during the suspension.

## SANCTIONS FOR NON-PARTICIPATION

A community that does not join the NFIP, has withdrawn from the program, or is suspended from it faces the following sanctions:

- Flood insurance will not be available. No resident will be able to purchase a flood insurance policy.
- If the community withdraws or is suspended, existing flood insurance policies will not be renewed.
- No Federal grants or loans for the acquisition or construction of buildings may be made in identified flood hazard areas under programs administered by Federal agencies such as HUD, EPA, and SBA.
- No Federal disaster assistance may be provided to repair insurable buildings located in identified flood hazard areas for damage caused by a flood.
- No Federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas. This includes policies written by FHA, VA, and others.
- Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazard areas that:
  - There is a flood hazard and
  - The property is not eligible for Federal disaster relief.

These sanctions can be severe on any community with a substantial number of buildings in the floodplain. Most communities with a flood problem have joined the NFIP and are in full compliance with their regulatory obligations.

# UNIT 3:
# NFIP FLOOD STUDIES AND MAPS

## In this unit

This unit describes the flood data, studies, and maps that the National Flood Insurance Program provides to communities to assist them in carrying out their floodplain management program. It reviews:

- Flood study and map terminology,
- How flood studies are prepared along riverine floodplains,
- How flood studies are prepared on coastal floodplains, and
- How the NFIP maps display the study data.

## Materials needed for this unit

- Flood Insurance Study, Flood County, USA and Incorporated Areas
- Flood Insurance Rate Map, Flood County, USA and Incorporated Areas

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# A. NFIP FLOOD STUDIES

## FLOOD STUDY TERMINOLOGY

Before describing how flood studies are developed, we first need to introduce some of the common terms used in floodplain analysis and in the National Flood Insurance Program (NFIP). The following terms are integral for understanding the basis for flood studies and flood maps:

- The base flood,
- The 100-year flood,
- Special Flood Hazard Area, and
- Base Flood Elevation.

### The base flood

Floods come in many sizes — with varying degrees of magnitude and frequency.

Rivers and coastlines are expected to flood, as all bodies of water have floodplains. But rivers and coastlines are different, as well; each has its own probability of flooding. Probability is a statistical term having to do with the size of a flood and the odds of that size of flood occurring in any year.

For each river, engineers assign statistical probabilities to different size floods. This is done to understand what might be a common or ordinary flood for a particular river versus a less likely or a severe flood for that same river.

In order to have common standards, the NFIP adopted a baseline probability called the base flood. The base flood is the one-percent annual chance flood. The one-percent annual chance flood is the flood that has a one-percent (one out of 100) chance of occurring in any given year. The base flood, which is also informally referred to as the 100-year flood, is the national standard used by the NFIP and all Federal agencies for the purposes of requiring the purchase of flood insurance and regulating new development

The one-percent annual chance flood was chosen as a compromise between a more frequent flood (such as a 10-percent chance flood), which would permit excessive exposure to flood risk, and a more infrequent flood (say, a 0.1-percent chance flood), which would be considered an excessive and unreasonable standard.

## The 100-year flood

The one-percent annual chance flood is also called the 100-year flood because the inverse of one percent (one divided by one percent or 0.01) equals 100. This calculation gives us the flood's recurrence interval, in terms of probability, which is 100 years.

The term "100-year flood" is often misconstrued. Commonly, people interpret the 100-year flood definition to mean "once every 100 years." This is wrong. You could experience a 100-year flood two times in the same year, two years in a row, or four times over the course of 100 years. You could also not experience a 100-year flood over the course of 200 or more years.

To avoid confusion (and because probabilities and statistics can be confusing), the NFIP uses the term "base flood." A 100-year base flood is defined as having a one-percent chance of being reached or exceeded in any single year. Thus, the 100-year flood also is called the "one-percent annual chance flood."

To restate, "100-year flood" and "base flood" both refer to a flood that has a one-percent chance of occurring in any given year. The terms "base flood," "100-year flood," and "one-percent annual chance flood" are often used interchangeably.

## Special flood hazard area and base flood elevation

The land area covered by the floodwaters of the base flood is the base floodplain. On NFIP maps, the base floodplain is called the Special Flood Hazard Area (SFHA). The SFHA is designated as Zone A, AE, A1-30, AO, AH, V, VE or V1-30 depending on the amount of flood data available, the severity of the flood hazard, or the age of the flood map (see the discussion of zones in this Unit for more information.).

The SFHA is the area where the NFIP's floodplain management regulations must be enforced by the community as a condition of participation in the NFIP and the area where the mandatory flood insurance purchase requirement applies.

The computed elevation to which floodwater is anticipated to rise during the base flood is the Base Flood Elevation (BFE).

**WHAT ARE THE ODDS OF BEING FLOODED?**

The term "100-year flood" has caused much confusion for people not familiar with statistics. Another way to look at flood risk is to think of the odds that a 100-year flood will happen sometime during the life of a 30-year mortgage—a 26% chance for a structure located in the SFHA.

Chance of Flooding over a Period of Years

| Time Period | Flood Size 10-year | 25-year | 50-year | 100-year |
|---|---|---|---|---|
| 1 year | 10% | 4% | 2% | 1% |
| 10 years | 65% | 34% | 18% | 10% |
| 20 years | 88% | 56% | 33% | 18% |
| 30 years | 96% | 71% | 45% | 26% |
| 50 years | 99% | 87% | 64% | 39% |

Even these numbers do not convey the true flood risk because they focus on the larger, less frequent, floods. If a house is low enough, it may be subject to the 10- or 25-year flood. During a 30-year mortgage, it may have a 26% chance of being hit by the 100-year flood, but the odds are 96% (nearly guaranteed) that it will be hit by a 10-year flood. Compare those odds to the only 1-2% chance that the house will catch fire during the same 30-year mortgage.

## IDENTIFYING FLOODPRONE AREAS

The National Flood Insurance Act of 1968 directed the Federal Insurance Administration (FIA) to:

- Identify all floodprone areas within the United States.
- Establish flood-risk zones within floodprone areas.

Today, the Federal Emergency Management Agency's (FEMA) Mitigation Division is responsible for implementing this directive. FEMA has conducted flood studies and produced various forms of maps. The flood studies analyze the terrain and the factors that affect flood hazards. This information is used to draw the maps that delineate floodplain boundaries.

The maps and flood studies also show projected flood elevations, flood velocities, floodway dimensions, insurance rating zones, and descriptions of how the study was conducted and how the maps were prepared. This information is needed for flood insurance and floodplain management purposes.

All of this information is referred to as a community's Flood Insurance Study (FIS), which is conducted under standards set by FEMA for the NFIP. FEMA has prepared flood insurance studies for more than 19,000 communities.

In keeping with the directive of the National Flood Insurance Act of 1968, initial flood study and mapping efforts of the NFIP were focused on identifying all floodprone areas within the United States. Flood data and floodplain information from many sources — such as soils mapping, actual high water profiles, aerial photographs of previous floods, topographic maps, etc. — were used to overlay the *approximate* outline of the base (100-year) floodplain for specific stream reaches on available community maps, usually U. S. Geological Survey topographic quadrangle maps.

These documents were referred to as Flood Hazard Boundary Maps and were based on approximate studies. Most communities used a Flood Hazard Boundary Map when they first joined the NFIP.

As money was appropriated by Congress, FEMA performed more detailed studies for many communities, resulting in the publication of Flood Insurance Study reports and Flood Insurance Rate Maps (FIRMs). These studies provide communities with data needed to adopt and implement more comprehensive floodplain management measures and to enter the Regular Phase of the NFIP.

FISs, also referred to as detailed studies, were carried out for developed communities and for those areas experiencing rapid growth. FISs contain guidance on understanding the FIRM as well as information needed for new construction allowed in developing and developed areas.

Today, almost every community in the NFIP has a FIRM, which may contain approximate and/or detailed flood hazard analyses. The areas mapped with approximate studies are areas where, originally, there was little or no development or expectation of development. However, recent development may have created a need for future detailed studies in these areas.

Flood maps are one of the most vital parts of a floodplain management program, so it is important to understand how the maps were created and to be familiar with the information that is available within the accompanying flood study.

## Flood Insurance Study

When a flood study is completed for the NFIP, the information and maps are assembled into a Flood Insurance Study (FIS). A FIS is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community.

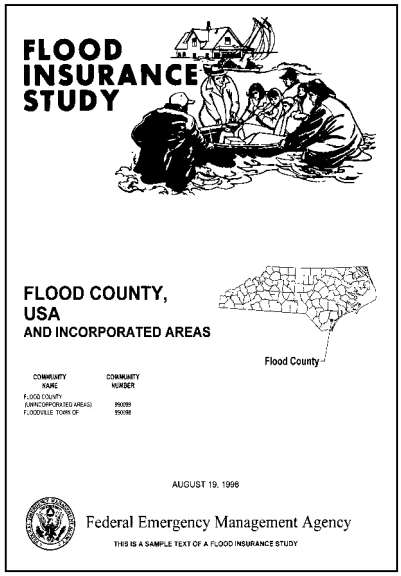
The FIS report and associated maps delineate the SFHA, designate flood risk zones and establish base flood elevations. They serve as the basis for rating flood insurance and for regulating floodplain development and carrying out other floodplain management measures.

The study has three components:

- The FIS — Flood Insurance Study report
- The FIRM — Flood Insurance Rate Map
- Prior to 1986, a separate Flood Boundary and Floodway Map (FBFM) was issued as a component of the FIS for each community studied.

The FIS report includes:

- An appraisal of the community's flood problems in a narrative that describes:
  - -- the purpose of the study,
  - -- historic floods,
  - -- the area and flooding sources studied, and
  - -- the engineering methods employed.
- A vicinity map of the community and, occasionally, photographs of historic floods.
- Tables summarizing various flood hazard data.
- Computed flood profiles for various recurrence probabilities, usually the 10-, 50-, 100-, and/or 500-year floods.


FLOOD INSURANCE STUDY

FLOOD COUNTY, USA
AND INCORPORATED AREAS

Flood County

| COMMUNITY NAME | COMMUNITY NUMBER |
|---|---|
| FLOOD COUNTY (UNINCORPORATED AREAS) | 990099 |
| FLOODVILLE TOWN OF | 990098 |

AUGUST 19, 1996

Federal Emergency Management Agency

THIS IS A SAMPLE TEXT OF A FLOOD INSURANCE STUDY

### Flood County, USA and Incorporated Areas

Included in the reference guide materials are the FIS report and maps for Flood County, USA and Incorporated Areas. This fictitious community was developed to illustrate examples of both riverine and coastal flood hazards.

This unit uses these documents for Flood County, USA and Incorporated Areas:

- The FIS report, and
- The FIRM, accompanying Map Index, and panels 25, 38, and 40.

Flood County is subject to flooding from several flooding sources; however, this unit concentrates on the following three sources:

- The Rocky River, which drains from the west, and flows through the Town of Floodville to the Atlantic Ocean.
- Cobb Brook, which flows from the west to the Rocky River.
- The Atlantic Ocean.

As you look at Flood County, you may find that some street names do not appear on the FIRM. This is because flood hazard maps are created to show details related to identified floodplains. If your community flood maps lack street names, use a supplementary street map to assist you in locating properties accurately.

As you work through this unit, we recommend that you locate similar sections in your community's FIS and see how this information pertains to your situation. The outline is similar for all FISs, so you should be able to locate the same tables and exhibits in the table of contents.

# B. RIVERINE STUDIES

Detailed flood studies are conducted differently for different types of flooding, which are:

- Riverine flooding of rivers, streams or other waterways,
- Lacustrine flooding of lakes and ponds,
- Coastal flooding caused by hurricanes or severe storms, and
- Shallow flooding, ponding, and sheet flow.

As you recall from Unit 1, there are other types of flooding, such as alluvial fans, ice jams, and mudflows. This unit does not cover how these areas are studied because each situation is unique. If your community has these unique hazards, Appendix C lists some reference materials that may be of assistance.

Riverine flooding occurs in rivers, streams, ditches or other waterways that are subject to overbank flooding, flash floods, and urban drainage system flooding. Riverine studies involve, among other factors, the collection and analysis of information about the river's watershed, the topography or the lay of the land along the river, precipitation, and the characteristics of the river itself.

## HYDROLOGY

In order to determine the depth of flood waters and to determine the size or width of floodplains, engineers must first examine the watershed to determine the amount of water that will reach a stream and be carried by the stream during a flood event.

Hydrology, a science dealing with the distribution and circulation of water in the atmosphere, on land surfaces, and underground, is used to determine flood flow frequencies. The study of a watershed's behavior during and after a rainstorm is, therefore, hydrology. A hydrologic analysis determines the amount of rainfall that will stay within a watershed — absorbed by the soil, trapped in puddles, *etc.* — and the rate at which the remaining amount of rainfall will reach the stream.

The rainfall that reaches the stream is called runoff. Increased runoff will, in turn, increase flood discharge. Discharge is the amount of water flowing down a stream channel. Discharges are measured in cubic feet per second or cfs. (A cubic foot of water is about 7.5 gallons.) Data for this measurement is taken by stream gauges at specified locations along a given stream also known as gaging stations.

Significant development or other changes in the watershed (both within a community and any upstream communities) can significantly change the flood discharges. Often, the increase in impervious areas associated with urbanization

causes increase in stream discharges. In addition, new technical data such as new regional equations, new design storms, and in some circumstance, increase in the length of gage records, might significantly affect the base discharge estimation.

Runoff amounts and discharge rates vary depending on soil type, ground slope, land use, and the presence of storm sewers. In general, more runoff occurs on non-vegetated land, on paved and built-on urban land, and on steeper slopes.

Discharges are estimated by using rainfall and snowmelt data and historical stream records or by using regional equations that represent such data. Computer models allow engineers to incorporate numerous watershed characteristics into the hydrologic analyses. Discharge rates also generally increase as the size of a watershed increases.

Upon completion of the hydrologic analysis, engineers have flood discharges for various size rainstorms that are measured at different points along a stream, such as at the confluence with another stream and at the mouth of a tributary stream.

## CROSS SECTIONS

All detailed flood studies examine the areas through which floodwater will flow. This requires a determination of ground elevations and obstructions to flow (such as vegetation, buildings, bridges, and other development) for these areas. Accurate data on the channel geometry and changes in the floodplain are obtained from ground surveys, aerial photography, or topographic maps.

To locate the true elevations at a site, surveyors have established elevation reference marks or bench marks that are referenced to a common vertical elevation reference called a datum. The use of a datum ensures uniformity of references to land elevations and avoids misinterpretation of flood elevations.

Established reference marks and bench marks with a recorded elevation allow surveyors to describe the changes in the ground levels or stream characteristics as elevations relative to the referenced datum. They are also used by surveyors to determine the elevations of buildings that are at risk of flooding.

A cross section is a graphical depiction of the stream and the floodplain at a particular point along the stream. It is taken at right angles to the flow of the stream. At each cross section, the engineer has accurate information on the size and geometry of the channel, the shape of the floodplain, and the changes in the elevation of the ground. A typical surveyed cross section is shown in Figure 3-1.

Cross sections are taken of the floodplain at locations along the stream that are representative of local conditions. Cross sections are taken at each bridge or other major obstruction and at other locations, depending on how much the stream or adjacent floodplain conditions change (Figure 3-2). The more changes there are in

topography (perhaps steep riverbanks changing to large flat overbank areas), the more cross sections are needed to define the floodplain accurately.

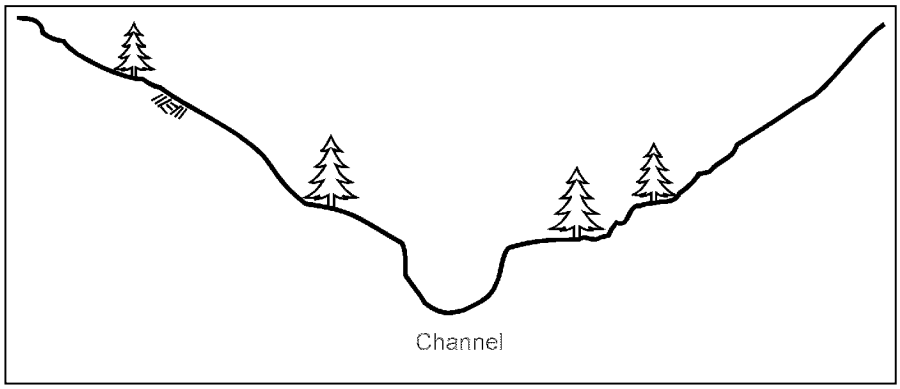



**Figure 3-1: Surveyed cross section**

### About Datums and Elevations

During the 1920s, the U.S. government created a network of 21 tidal gages in the U.S. and five in Canada to provide a fixed continental datum that would bring a consistent relationship to all vertical elevation determinations in the U.S. This new datum was known as the Mean Sea Level (MSL) Datum of 1929 and is the base elevation to which all relief features and elevation data are referenced in the contiguous United States. In 1973, to avoid confusion in many communities that used a local mean sea level datum, the name was changed to the National Geodetic Vertical Datum (NGVD) of 1929. NGVD is also the datum of reference for the vast majority of FISs.

Most permanent elevation reference marks (or bench marks) are referenced to the NGVD (see example). Reference marks are not always brass caps; they can be chiseled squares or other designated markers left by surveyors. The city or county surveyor or engineer's office should have a list of bench marks in the community. An ultimate goal of the NFIP is to convert all FISs to a newer standard called the North American Vertical Datum (NAVD) of 1988. This latest standard will eliminate inconsistencies caused when the NGVD is not consistent at all 26 tidal stations.

When reporting elevations for structures, cross sections, or topographic mapping, it is very important to note the datum to which the survey is referenced. Differences between NAVD 88 and NGVD 29 vary by as much as –1.5 feet along the east coast of southern Florida to + 4.9 feet in the Rocky Mountains of Colorado. Software for converting between NAVD 88 and NGVD 29 is available from the National Geodetic Survey.

There are now 600,000 permanent benchmarks associated with the NAVD of 1988. See *Flood Insurance Study: Guidelines and Specifications for Study Contractors,* FEMA-37 (1995), for further information.

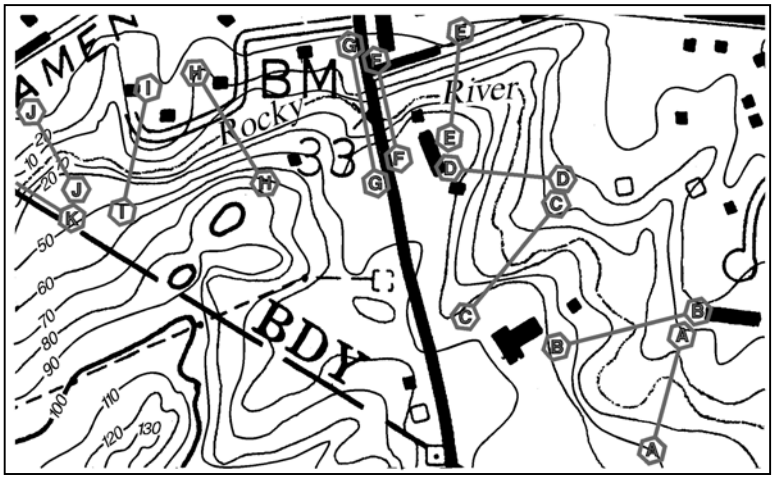



**Figure 3-2: Typical cross section locations**

The surveyors and engineers also estimate the roughness factor along the floodplain to determine how fast floodwater will flow through the area. Roughness factors are related to ground surface conditions, and they reflect changes in floodwater velocity due to ground friction. For example, water will flow faster over mowed grass and pavement than it will over an area covered in bushes and trees, or planted in tall crops.

A portion of the collected survey information is used in the hydrologic analysis, but the surveyed cross sections and other survey information are the building blocks of the hydraulic analysis and mapping efforts.

## HYDRAULICS

Hydraulics, a science that deals with fluids in motion, is used to determine how a quantity of water will flow through a channel or floodplain. For purposes of floodplain analysis, hydraulics is the study of floodwaters moving through the stream and the floodplain. Hydraulic analysis combines:

- Flood hydrology, or discharges,
- The cross section data on how much area there is to carry the flood, and
- Stream characteristics — roughness, slope, locations and sizes of structures.

The data are usually processed using a computer model, most commonly HEC-2 or HEC-RAS, which were developed by the U.S. Army Corps of Engineers' Hydrologic Engineering Center.

Changes in hydraulic conditions of a stream usually occur when new bridges, culverts and road crossings are constructed, and when there are changes in the physical characteristics of the stream. If a bridge or culvert is not properly sized, it can cause flood waters to back-up, which increases flood levels upstream.

Although most bridge openings and culverts are designed to allow stream flows associated with frequent storm events to pass without such backwater effects, they may still cause increase in the base flood elevation. Therefore, any bridges, culverts, or other road crossings that have been constructed since the analyses for the effective FIS and FIRM were completed should be evaluated for their potential effect on the base flood and the associated floodway. In addition, any significant changes in the stream channel or floodplain geometry could affect the floodplain and floodway. One should always ask the questions: 1) has any portion of the floodplain been filled? 2) has the stream channel migrated or changed location because of significant erosion and/or depositions? 3) have any portions of the stream been channelized, widened, or dredged? 4) have there been significant changes in the vegetation in the floodplain? Aerial photographs are useful tools in evaluating changes in stream channels and floodplains.

The hydraulic study produces determinations of flood elevations, velocities, and floodplain widths at each cross section for a range of flood flow frequencies (Figure 3-3). These elevations are the primary source of data used by engineers to map the floodplain.

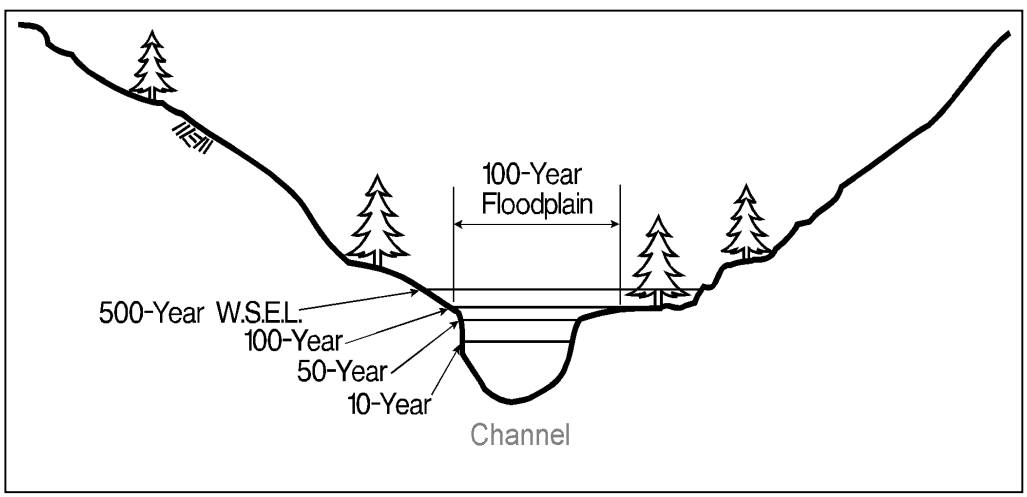



**Figure 3-3: Cross section with flood elevations**

A FIS typically produces elevations for the 10-, 50-, 100-, and 500-year floods. Water-Surface Elevations (WSEL) for the 10-, 50-, and 500-year floods are typically used for other floodplain management purposes. For example, the 10-year flood data may be used for locating septic systems, the 50-year flood for placing bridges and culverts, and the 500-year for siting critical facilities, such as hospitals or emergency operation facilities.

## FLOOD PROFILE

The hydraulic computer program generates potential flood elevations at each cross section, but flood elevations at locations between the cross sections need to be determined as well. This is done by plotting the elevations at the cross sections

on a graph and connecting the plotted points. Such a graph is called a flood profile.

Figure 3-4 shows a portion of the flood profile for the Rocky River. The entire profile is found in the back of the Flood County FIS report.

The bottom of the graph (the horizontal axis or x-axis) shows the distance along the stream, which is commonly called stationing. For stationing, you start at the mouth of a stream (its point of discharge into a larger body of water) and look upstream. Generally, when profiles are plotted, the slope of the streambed will rise as you read the graph from left to right.

River distances are measured in either feet or miles (1mile=5280 feet), or meters and kilometers (1 kilometer=1000 meters). For most profiles, the distance is measured above the mouth of the stream or above its confluence (where it meets with another stream). In the case of Flood County, the stream distances for the Rocky River are measured above the County Boundary.

The left and right sides of the graph (the vertical axis or y-axis) show elevations in feet (NGVD). The legend at the bottom right corner shows the symbol for each flood profile plotted. Bridges are indicated with an "I" shaped symbol. The bottom of the "I" represents the bridge's low chord (lowest beam) and the top of the "I" represents the top of the roadway or the top of a solid bridge railing.

Additional information is provided on the profiles, such as corporate limits and confluences of smaller streams. Profiles also provide a picture of stream characteristics, such as steep sections of the streambed and where restrictive bridge openings cause floodwaters to back up (see the footbridge in Figure 3-4).

By reading a profile, you can determine the flood elevation at any point along the stream. Reading profiles is covered in Unit 4.

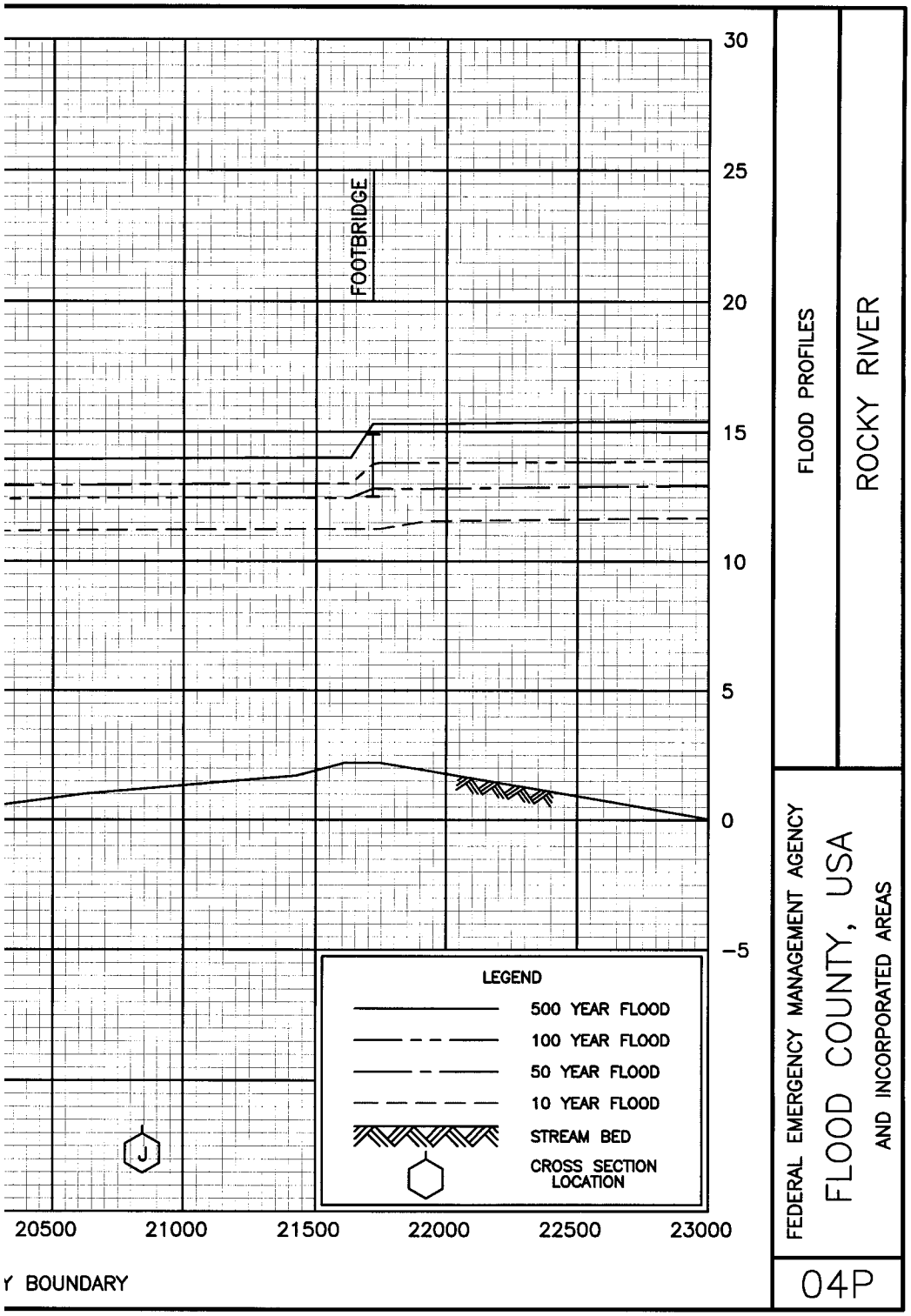



**Figure 3-4: Rocky River flood profile**

## FLOODPLAIN MAP

The next step in the mapping process is to transfer the flood elevation data onto a map showing ground elevation data. This is called a topographic map or contour map because points with the same elevation are connected by a contour line. The topographic or contour map is often referred to as the base map.

The most common topographic maps used are produced by the U.S. Geological Survey. Some communities have prepared their own topographic maps and provided them to FEMA during the study process to improve the accuracy of their floodplain maps.

The base flood elevations from the cross sections and profiles are plotted on the topographic map. Floodplain boundary lines are drawn connecting these plotted points using the contour lines as a guide. The completed map illustrates the SFHA (Figure 3-5).

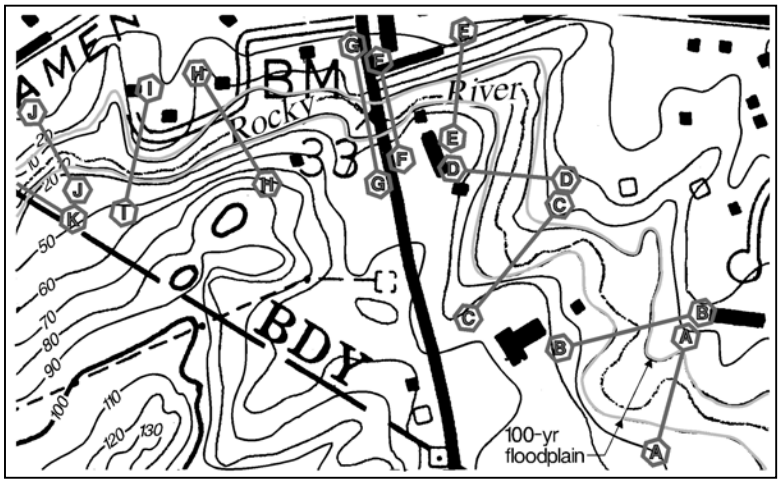



**Figure 3-5: The BFEs at the cross sections from the Rocky River profile are used to plot the BFEs on the contour map.**

*Lines are connected to show the floodplain boundary on a map.*

It is important to remember that floodplain map boundaries are only as accurate as the topographic map on which they are drawn. Since the U.S. Geological Survey topographic quadrangle maps have so small a scale, the SFHA boundaries cannot be precisely mapped. This is important to remember when determining if a building is in or out of the floodplain, and, therefore, the use of other relevant measurements may be required and is recommended.

Correlating map features with ground features requires care, because maps do not always represent exact conditions on the ground. Where there is an apparent discrepancy between floodplain boundaries shown on a map and actual ground conditions, as the local administrator, you can use elevation data to resolve the

matter by locating the flood elevation on the ground via an elevation survey. This elevation represents the actual extent of flooding for that particular flood.

> Note: Banks, lending institutions and others who must read the FIRM to determine if flood insurance is required must go by the map. They cannot make on-site interpretations based on data other than the FIRM. However, they may recommend that the property owner submit a request for a map revision or map amendment so the map can be officially changed to reflect the more accurate data (see Unit 4, Section D).

## FLOODWAY ANALYSIS

The final step in preparing most riverine flood studies is to produce the floodway analysis, which identifies where encroachment by development will increase flood elevations significantly and worsen flood conditions.

The floodway is the stream channel and that portion of the adjacent floodplain that must remain open to permit passage of the base flood. Floodwaters generally are deepest and swiftest in the floodway, and anything in this area is in the greatest danger during a flood. FEMA has mapped designated floodways in more than 8,000 communities.

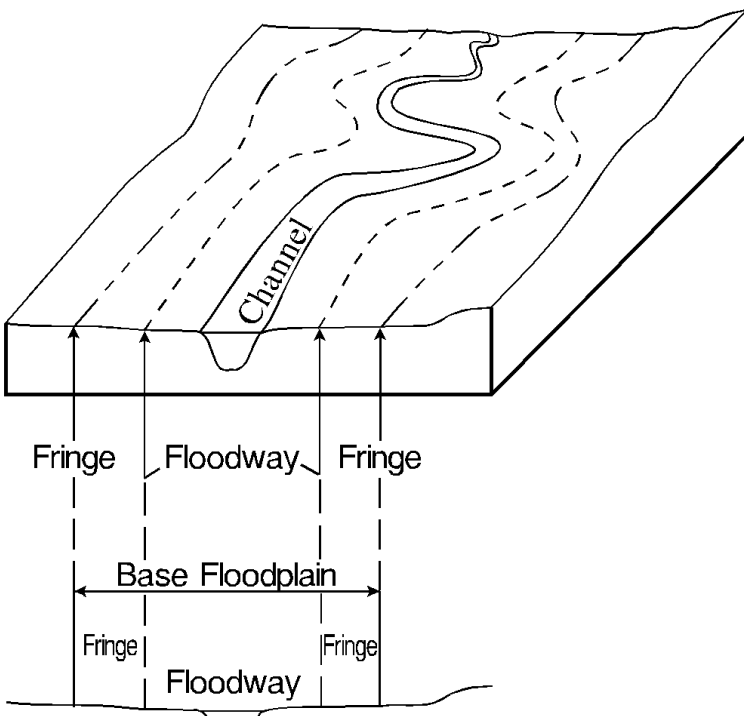



**Figure 3-6: Floodway cross section and map**

The remainder of the floodplain is called the flood fringe (Figure 3-6), where water may be shallower and slower. The floodway and the flood fringe together comprise the base floodplain or special flood hazard area. On the flood map these areas will be designated as Zone A1-30 or AE. NFIP minimum standards provide that other areas outside the boundaries of the floodway can be developed without further analysis. Consequently, most communities permit development in the flood fringe if the development is elevated or otherwise protected to the base flood level (or any higher state or local standards). Development in the floodway is allowed if it can be demonstrated that no rise in the base flood elevation will occur. It is recommended, however, that

floodway development be discouraged or even prohibited because of the hazardous nature of this area.

A floodway analysis determines the boundaries of the floodway using these floodplain management concepts:

- Continued development in the floodplain will likely further obstruct flood flows, which will back water up or divert it to other properties.
- Properties on both sides of a river or stream should be treated equitably. The degree of obstruction permitted now for one should be permitted in the future for the other.
- Property owners should be allowed to develop their land, provided they do not obstruct flood flows, cause damage or create a nuisance to others. (A community may allow development in the flood fringe that cumulatively increases the BFE, but NFIP regulations specify that such total increases cannot exceed one foot at any point along the stream. Some states or communities have more restrictive standards that must be met.)

A floodway analysis is done with a computer program that can make the necessary calculations of the effects of further development. Beginning at both edges of the floodplain, the computer model starts "filling" the floodplain. This "squeezes" the floodwater toward the channel and causes the flood level to rise. At the point where this process reaches a one foot rise, the floodway boundaries are drawn (Figure 3-7).

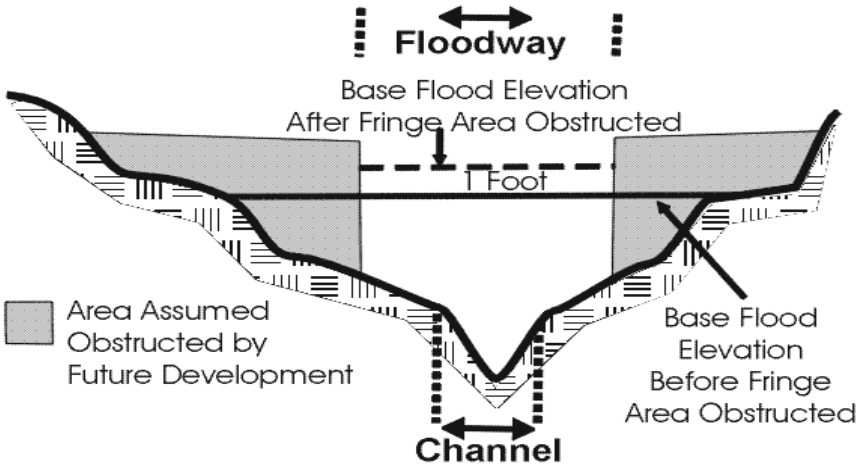



**Figure 3-7: Computer floodway analysis**

The floodway boundaries at each cross section are transferred to the topographic or contour map that shows the SFHA boundaries. The plotted points are connected to show the floodway and flood fringe on the floodplain map.

Not every cross section will show an exact one-foot rise. Topographic conditions and the need to "smooth out" the floodway line will result in some cross sections having increases of less than one foot.

Allowing flood heights to rise up to one foot is a compromise standard. Prohibiting any rise in flood heights would prohibit most types of new development or redevelopment. On the other hand, allowing development to cause significant increases in flood heights can cause great problems for others.

States and communities may use a more restrictive standard for delineating a floodway. Some may allow only a 0.5-foot or 0.1-foot rise in the base flood elevation in the floodway analysis. This results in wider floodways and less area in the flood fringe.

A floodway analysis should be prepared with close coordination between the modeling engineer and those who are responsible for community planning and floodplain management.

The number of possible floodway configurations is almost limitless. Therefore, in choosing a regulatory configuration, the interests of individual property owners and the community as a whole must be weighed.

# C. COASTAL FLOOD STUDIES

Coastal flood studies are conducted for communities along the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and the Caribbean Sea. Coastal studies are used to establish a base flood and an SFHA, but they may also designate a coastal high hazard area (V Zone).

Note that coastal communities, particularly counties, may also have riverine floodplains with designated floodways.

## STORM SURGE

Most coastal floods are caused by coastal storms, usually hurricanes and northeasters. Such storms bring air pressure changes and strong winds that "pile" water up against the shore in what is called a storm surge.

A computer simulation of a coastal storm is developed based on data from past storms. Such data include wind speeds, wind direction, and air pressure from historical hurricanes and northeasters. The resulting surge elevations are then calibrated using historical information so the probabilities for each event can be determined.

The coastal storm surge computer program produces stillwater flood elevations — the elevations of various coastal floods, not including waves. The computer model is calibrated by reproducing the observed historical stillwater elevations. The program determines the stillwater elevation from these historical data.

## WAVES

In addition to storm surge, wave action is an important aspect of coastal storms. Wind-driven waves produce velocities and impacts that may cause significant structural damage. The coastal flood study analyzes how high the wave crest elevation will be above the stillwater elevation as water is driven onshore.

When waves hit the shore, water is moving with such force that it keeps traveling inland. This is called wave runup, when land areas that are higher than the stillwater elevation are flooded (Figure 3-8). Wave setup is defined as the additional elevation of the water surface over normal surge elevation caused by onshore mass transport of the water by wave action. Wave set-up is a function of deepwater wave height and duration.

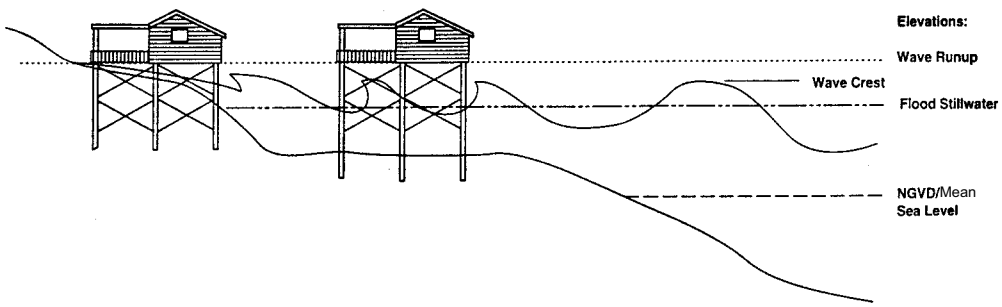



**Figure 3-8: Wave runup**

## HYDRAULIC ANALYSIS

As with riverine studies, a coastal hydraulic analysis determines where moving water goes. Using similar surveying techniques as in a riverine study, the coastal flood engineer surveys transects instead of cross sections.

A transect shows the elevation of the ground both onshore and offshore. The ground elevation data are used by computer programs to determine the expected height of the wave crests and runup above the storm surge.

A transect schematic is shown in Figure 3-9. A transect location map appears on page 11 of Flood County's FIS report. This map shows where the transects were measured.

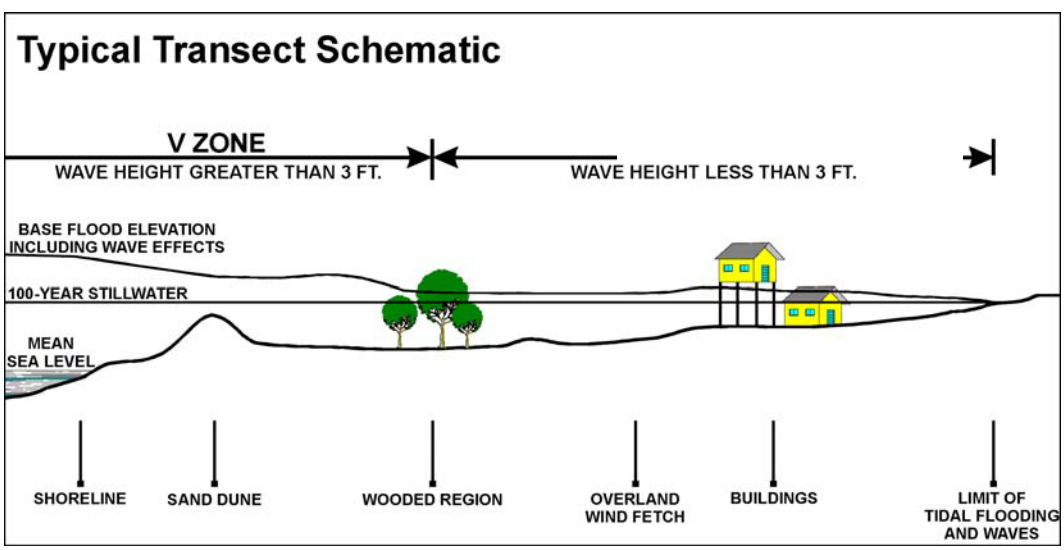



**Figure 3-9. Transect schematic**

Underwater topography, called bathymetry, and the shapes and locations of coastal islands, headlands, estuaries, harbors, and other coastal features are also taken into consideration in determining flood elevations.

The official BFE is the stillwater elevation plus wave runup, or the wave crest elevation, whichever is greater. The resulting BFE can be many feet higher than the stillwater elevation.

Obstructions such as dunes or buildings break the waves, dissipating wave energy so that wave height and BFEs are reduced as you go inland. Figure 3-9 shows that as water moves inland, the waves break and the base flood elevation (including wave effects) is reduced while the stillwater elevation stays the same.

## COASTAL HIGH HAZARD AREA

Waves pack a lot of power. Much more destructive than standing or slow-moving water, their power increases dramatically with their height. For the purposes of the NFIP, the flood study identifies the coastal high hazard area as that most hazardous part of the coastal floodplain, due to its exposure to wave effects. This is typically the area between the shoreline and the most landward of the following points:

- where the computed wave heights for the base flood are three feet or more,
- the inland limit of the primary frontal dune, or
- where the eroded ground profile is three feet below the computed runup elevation.

The three-foot wave height threshold was selected because a three-foot wave generally carries enough energy to break a wall panel away from a floor to which it has been nailed.

These areas are designated as V Zones, where the "V" stands for "velocity wave action." V Zones are subject to more stringent regulatory requirements and a different flood insurance rate structure because they are exposed to an increased degree of risk. Coastal flood areas not within the coastal high hazard area are mapped as A Zones *(*see Figure 3-9*)*.

## COASTAL FLOODPLAIN MAP

After gathering stillwater elevation and wave height data at the transects, the coastal flood engineer then transfers the elevation data to the best available topographic map. Flood elevations between transects are interpolated, taking local topography into consideration.

Flood County FIRM number 99009C, Panel 0040 D, shows a coastal floodplain for the Atlantic Ocean coastline. Note that south of Flower Street, the

V Zone boundaries meander along the shoreline, and the BFEs decrease over a relatively wide space from 14 feet to 12 feet (above NGVD, or roughly sea level). Landward of the Zone VE (EL 12) boundary, the zones change to Zone AE, with BFEs decreasing from 11 feet to 10 feet NGVD. These wider flood zones are typical of gradually varying topography on barrier island beaches or marshland.

In contrast, the V Zone boundaries between Flower Street and Public Way are narrower and roughly parallel to the shoreline, with BFEs decreasing rapidly from 14 feet to 13 feet NGVD. Note also that the area directly landward of the Zone VE (EL 13) is designated Zone AO (Depth 2'), signifying shallow flooding of 2 feet NGVD or less. This situation often occurs when a substantial dune line or flood protection structure exists along the shoreline.

# D. SHALLOW FLOODING STUDIES

For the NFIP, shallow flooding is defined as flooding with an average depth of one to three feet in areas where a clearly defined channel does not exist. Shallow flooding can exist in any of the following situations:

- *Ponding:* In flat areas, water collects or "ponds" in depressions.
- *Sheet flow:* In steeper areas where there are no defined channels or on flat plains, water will spread out over the land surface.
- *Urban drainage:* Local drainage problems can be caused where runoff collects in yards or swales or when storm sewers back up.
- *Coastal flooding:* Wave runup will send water inland over flat areas or over dunes. Often it may collect or pond behind an obstruction which keeps it from draining back into the ocean.

For the purposes of the NFIP, shallow flooding is distinguishable from riverine or coastal flooding because it occurs in areas where there is no channel or identifiable flow path.

Shallow flooding is mapped based on historic flood experiences and a study of the topography. In some areas, the techniques used for riverine studies are used. The result will either be a BFE or a base flood depth (in feet above the ground). A shallow flooding study usually produces data for the base flood, but not for the 10-year or other floods.

On Flood County's FIRM, there is a small area upstream of Argyle Way, on Panel 0038, that is shown as "Zone AO (Depth 2')," indicating that the base flood depth is two feet above the ground. Therefore, it is a sheet flow area. Sheet flow areas (which usually have depths established) are AO Zones, and ponding areas (which have BFEs established) are usually designated AH Zones on a FIRM.

# E. APPROXIMATE STUDIES

Detailed studies are expensive — a riverine study typically costs $5,000 to $10,000 per mile of stream that is to be mapped — so it is not cost effective to perform a detailed study in watersheds where there is little or no development and none is anticipated, such as in rural areas.

Therefore, some NFIP maps show floodplains that were mapped using approximate study methods. Flood data and floodplain information from a variety of sources — such as soils mapping, actual high water profiles, aerial photographs of previous floods, and topographic maps — were used to overlay the approximate outline of the base floodplain for specific stream reaches on available community maps, usually U.S. Geological Survey topographic quadrangle maps.

In addition, many flooding sources have been studied by other Federal, State, or local agencies. Some of these studies do not meet the NFIP standards for a FIS, but often contain valuable flood hazard information, which may be incorporated into the NFIP maps as approximate studies. Those types of studies typically cover developed or developing areas. They often contain flood elevation profiles that can be used as "best available data" for floodplain management purposes.

# F. NFIP MAPS

This section will explain how flood hazards and flood insurance zones are depicted on NFIP maps. The Flood County, USA and Incorporated Areas maps will be referenced wherever possible. As this information is presented, look for similar types of maps or map features on your community's maps.

Maps published with an FIS are:

- The Flood Insurance Rate Map (the FIRM), which is published in an old format in studies prepared before 1986 and a new format in studies prepared after 1986.
- The Flood Boundary and Floodway Map (the FBFM or Floodway Map), which was included in studies prepared before 1986.
- Again, since 1986, the Flood Boundary and Floodway Map information has been incorporated into the Flood Insurance Rate Map.

The maps allow you to identify SFHAs, determine the location of a specific property in relation to the SFHA, determine the BFE at a specific site, locate regulatory floodways, and identify undeveloped coastal barriers where flood insurance is not available.

The flood maps, particularly the FIRMs, come in many formats because of the mapping of additional hazards, the need for more regional flood maps, and the increased use of computer generated maps. Several general features are included on all maps.

Originally, the FIRMs were designed for use by insurance agents and lenders. The Floodway Maps were created for use by local floodplain managers and administrators. For all studies conducted since 1986, the FIRM contains both the flood insurance rate zones and floodways.

## GENERAL MAP FEATURES

Flood maps are either flat or Z-fold. Flat maps are on 11-inch-by-17-inch "ledger" size paper. Z-fold maps are on larger pages and get their name from the way they are folded. The current flood maps for most communities are now Z-fold.

Your packet includes the FIRM panels for Flood County, USA and Incorporated Areas, which are Z-fold maps.

All flood maps are prepared with general features or elements that may include an index, a legend (or key to map), a title block, community name and number information, panel or map number information, an arrow pointing north on the map, and effective date or revision date information.

Many communities, especially counties, are geographically too large to fit on one map or panel at a usable scale. Maps for these communities are divided into two or more panels with unique panel numbers. Whenever a community requires more than one panel, a Map Index for both the FIRM and Floodway Map is prepared.

In this section, we will discuss the Map Index, elevation reference marks, and map scales and direction. Other map features will be presented as we discuss FIRMs and Floodway Maps.

## MAP INDEX

The Map Index shows the community's boundaries, highlighting prominent features such as major highways, railroads, and streams. The map index shows how the community is displayed on the various panels.

Flood County's Map Index shows that the county's FIRM has three panels, 0025, 0038, and 0040. In cases where panels have no identified flood hazard areas (or no floodways on a Floodway Map), they are not printed. Note that panel 0030 D was not printed, as is indicated on the index by an asterisk (*).

The number of panels that have been printed for a particular community appears in the title block ("Panels Printed: 25, 38, 40).

### Title block

The title block is the lower right portion of the opened map for both the Map Index and the FIRM panels. The FIRM panel title block includes:

- the community's name -- Flood County, USA and Incorporated Areas,
- the six-digit community identification number or map number -- 99009C,
- the panel number, such as "0025," "0038," or "0040,"
- a map panel suffix – "D," which indicates the number of revisions that have been made (e.g., "D" is the fourth publishing of that panel), and
- a map effective or revision date – "August 19, 1998."

### Map revision date

The date in the title block shows the map's most recent revision. As changes occur within a community that results in a change in flood elevations or floodplain delineations, FEMA republishes *only the Map Index and the changed map panels*. Any revised panels are given a new map revision date and a new suffix letter.

Once the panels are issued to the community, the date on the panel is referred to as the *effective date*. Some communities have map panels with different

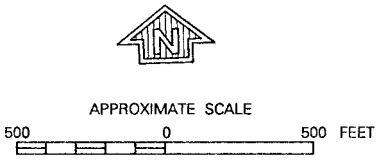
effective dates. The Map Index lists the current effective date for the most recently revised panel of a FIRM or of the FIRM itself, if all panels were revised.

With each revision comes a new panel suffix. Note that Flood County's panels were last revised in 1998 and have the suffix "D."

### Map scales and north direction

Different scales may be used for a single community with more than one panel. As an example, the map scale on the Flood County FIRM Panel 0038 is 1 inch = 500 feet (one inch equals 500 feet), and the scale of panel 40 is 1 inch = 1,000 feet.

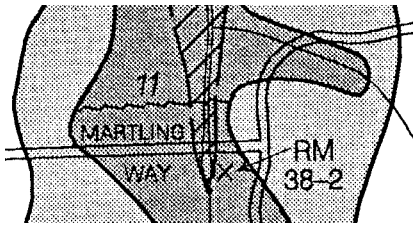
Different scales are used on FIRM and Floodway Maps, depending on the size of the mapped area for a community and the base map that is used.




An arrow pointing north is shown on all maps, including the map index. For FIRMs and Floodway Maps, the north direction arrow is located near the map scale. The north direction on the maps may be "turned" to maximize the mapped area that can be shown on a panel and to minimize the number of panels. To ensure correct orientation and accurate use of the FIRM, it is very important to pay attention to the direction of the north arrow on the panel.

### Elevation reference marks

Elevation reference marks are located on FIRMs and Floodway Maps. For these two types of maps, locations are identified with a small "x" and the designation "ERM" or "RM" simply followed by a reference mark number. For the newer Digital FIRMs (DFIRMs), locations are identified with a small "x" and the designation "ERM" or "RM" followed by the panel number and the number of the reference mark. Descriptions of the marks, including their elevations, appear either on FIRM panels, on Floodway Maps, or in the FIS text. Note that some ERM and RM descriptions may appear on a different map panel than the mark itself due to space limitations.




ERMs and RMs are important sites. They provide a ground elevation reference for surveyors to start from when they determine the elevation of a building, a cross, section, or topography for a site. Occasionally, an ERM cannot be found as described on the FIRM or Floodway Map because new construction or some other change in the area has obliterated the monument. In these instances, the next closest ERM may be used. Alternatively, USGS, USC&GS, or NGS bench marks, which are marked on most USGS 7.5 minute series topographic maps, may be used.

## FIRM Zones

FIRMs show different floodplains with different zone designations. These are primarily for insurance rating purposes, but the zone differentiation can be very helpful for other floodplain management purposes. The more common zones are listed in Figure 3-10.

| | |
|---|---|
| **Zone A** | The 100-year or base floodplain. There are six types of A Zones:<br>**A** The base floodplain mapped by approximate methods, *i.e.,* BFEs are not determined. This is often called an unnumbered A Zone or an approximate A Zone.<br>**A1-30** These are known as numbered A Zones (*e.g.,* A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).<br>**AE** The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.<br>**AO** The base floodplain with sheet flow, ponding, or shallow flooding. Base flood depths (feet above ground) are provided.<br>**AH** Shallow flooding base floodplain. BFEs are provided.<br>**A99** Area to be protected from base flood by levees or Federal Flood Protection Systems under construction. BFEs are not determined.<br>**AR** The base floodplain that results from the decertification of a previously accredited flood protection system that is in the process of being restored to provide a 100-year or greater level of flood protection. |
| **Zone V and VE** | **V** The coastal area subject to a velocity hazard (wave action) where BFEs are not determined on the FIRM.<br>**VE** The coastal area subject to a velocity hazard (wave action) where BFEs are provided on the FIRM. |
| **Zone B and Zone X (shaded)** | Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from the 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile. |
| **Zone C and Zone X (unshaded)** | Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood. |
| **Zone D** | Area of undetermined but possible flood hazards. |

**Figure 3-10: Flood Insurance Rate Map Zones**

*Note that the special Flood Hazard Area (SFHA) includes only A and V Zones.*

## FLOOD HAZARD BOUNDARY MAP (FHBM)

FHBMs (Figure 3-18) were initially prepared to provide flood maps to many communities in a short period of time. They were made in the 1970s and early 1980s without benefit of detailed studies or hydraulic analyses for nearly all floodprone communities in the nation (over 21,000). They were intended for interim use in most communities until more detailed studies could be carried out.

FHBMs are still being used where detailed Flood Insurance Studies have not been prepared or cannot be justified. They are to be used for floodplain management, in conjunction with other local studies and other available data.

On the FHBM, the SFHA is designated as a shaded area labeled "Zone A," and no base flood elevations are given (see Figure 3-18).

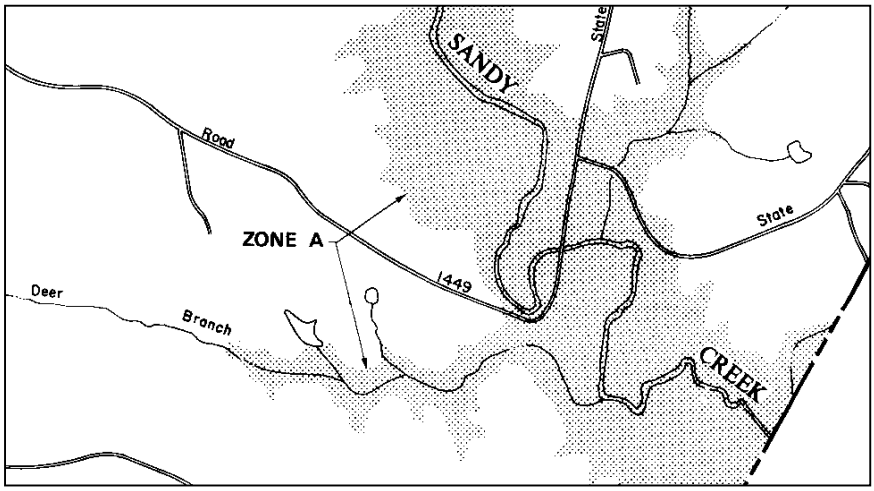



**Figure 3-18: Flood Hazard Boundary Map**

In some cases, FEMA simply converted the FHBM to a FIRM by issuing a letter to the community stating that the FHBM shall be considered a FIRM. In those cases, the community was instructed to line out FHBM on the map's title box and write in FIRM.

## FLOOD INSURANCE RATE MAP (FIRM) — OLD FORMAT (PRE 1986)

The FIRM is used to generally determine:

- Whether a property is in the floodplain.
- The flood insurance zone that applies to the property.
- The approximate base flood elevation (BFE) at the site.

**Date:** Several dates may be listed in the FIRM legend, including:

- Initial Identification — date of the first Flood Hazard Boundary Map (FHBM).
- Any dates of revisions to the FHBM that have occurred since the initial identification.
- Flood Insurance Rate Map Effective — the date of the initial or first FIRM. This is the date used to determine whether a building is "pre-FIRM" or "post-FIRM."
- Flood Insurance Rate Map Revisions — dates of subsequent revisions to the FIRM.

The FIRM also will show:

**Base (100-year) floodplain or SFHA:** Designated by the dark-shaded areas (Insurance Zones A, A1–A30, A99, AO, AH, AR, V, V1–V30).

**500-year floodplain:** Designated by the lighter-shaded areas (Insurance Zone B).

**Base Flood Elevation (BFE):** The water surface elevation of the base flood at that point of the stream is denoted in whole numbers by wavy lines running across the floodplain. Coastal Zones within the area of 100-year tidal flooding, as well as some AH Zones, may have BFE lines, and some lake AE Zones have the base flood elevation noted in parentheses beneath the zone designations.

**Zone break line (Gutter line):** The thin white line separates flood insurance rate zones within the 100-year floodplain.

**Approximate floodplain areas:** The 100-year floodplain areas are delineated using approximate methods. No BFEs are shown in approximate floodplain areas; these areas are classified as (unnumbered) A Zones.

An example of an approximate floodplain may be found in the upper left corner of Flood County FIRM Panel 0040, on Rocky River. The detailed study does not extend upstream of cross section K. Note that there are no cross sections or BFEs shown in this A Zone, which extends onto Panel 0025.

## FLOOD BOUNDARY AND FLOODWAY MAP (FLOODWAY MAP) – OLD FORMAT (PRE 1986)

The Flood Boundary and Floodway Map is also known as the FBFM or, simply, the Floodway Map. The Floodway Map shows how the floodplain is divided into the floodway and flood fringe where streams are studied in detail. They also show general floodplain areas where floodplains have been studied by approximate methods.

Floodway Maps have these features:

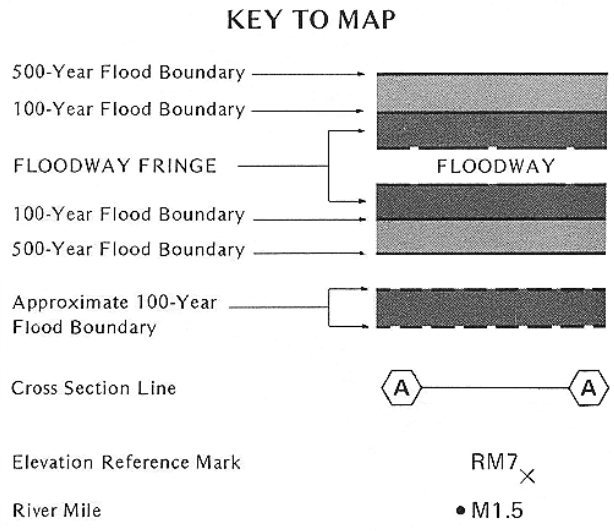
**Title block:** Includes the community name, county name, panel number, community number, and the map date. The panel numbers may be different from the FIRM panel numbers.

**Map scale:** The Floodway Map may have the same or a different scale than the FIRM for the same community.

**Cross section line:** These lines represent the location of some of the surveyed cross sections used in the computer model of the stream for calculating 100-year flood elevations. These cross sections can be used to relate a specific point on the Floodway Map to the flood profile and floodway data table.

**Floodway:** The 100-year floodplain has been divided into two areas, the floodway and the flood fringe. The white area adjacent to and including the channel is the floodway. The shaded area is the fringe.

One problem with this method of delineating floodways is that sometimes people confuse the white floodway with the white area representing land that is free from flooding. Also, because the floodway is mapped separately, often property owners, lenders, real estate agents, and others do not have easy access to the Floodway Maps and do not know of the severe flood hazard associated with the floodway.




FISs published since 1986 have corrected this problem — they do not have separate FIRM and Floodway Maps. Floodways are delineated on the newer FIRMs as a diagonally hatched area (see Figures 3-11 and 3-12).

Note that no BFEs or flood zone names are shown on the Floodway Map.

The floodway is usually wider in flatter, wider floodplains and narrower in steeper areas where floodplains are narrower.

If a map panel area does not include any detailed study streams or floodways, a Floodway Map will not be printed; only a FIRM panel will be printed. Because coastal studies do not have floodways, all of the data needed are shown in the FIS report and on the FIRM.

**Flood fringe:** The fringe is shown as a shaded area outside of the floodway but still within the 100-year floodplain. The flood fringe and the floodway together comprise the special flood hazard area.

**500-year floodplain:** More lightly shaded areas adjacent to, but outside of, the 100-year floodplain delineate the 500-year floodplain for streams studied in detail.

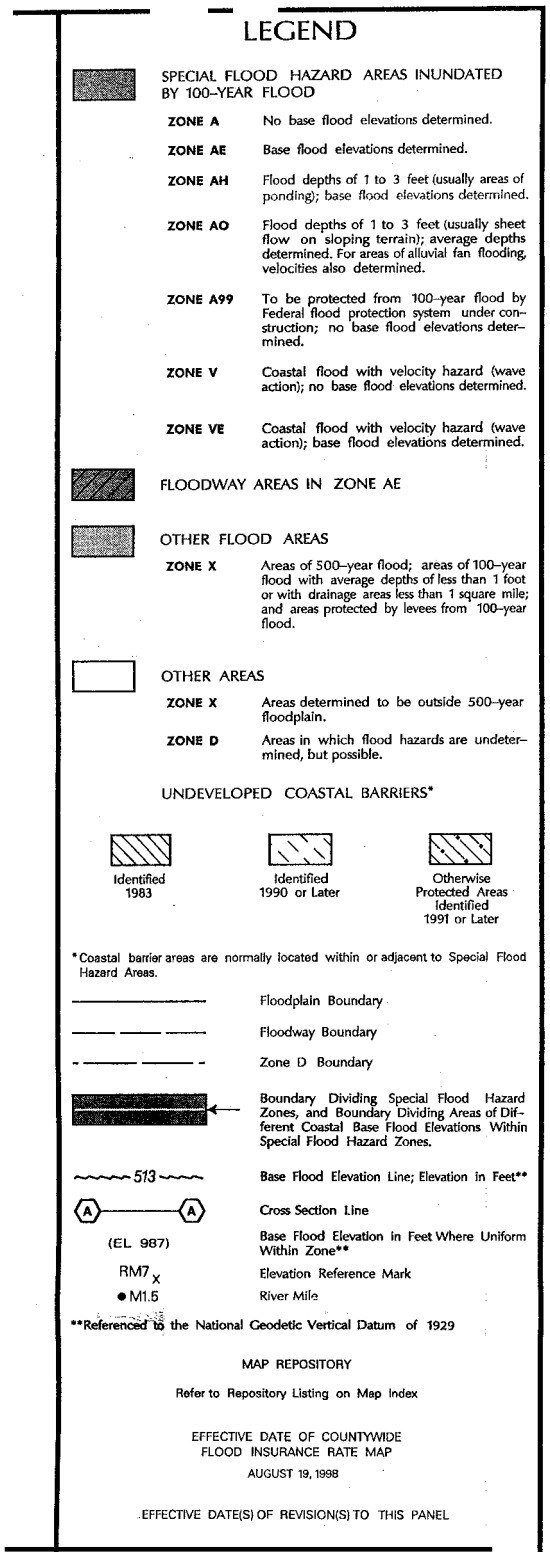
**Approximate floodplain areas:** The 100-year floodplain areas are determined using approximate methods. The boundaries of the approximate floodplain on the Floodway Map are shown as dashed lines.

## FLOOD INSURANCE RATE MAP — NEW FORMAT (SINCE 1986)

Flood maps have been redesigned over the years since the first FISs were prepared in the late 1960s, making them easier to use. A new format for FIRMs was introduced in 1986 that includes:

- Floodways and other floodplain management information, such as cross sections, that were previously provided on separate Flood Boundary and Floodway Maps (Floodway Maps). (Except in a few instances, Floodway Maps are no longer being prepared.)
- Simplified flood insurance zone designations. The previous Zones A1-A30 and V1-V30 were replaced by the designations AE and VE; Zones B and C were replaced by Zone X. The 500-year floodplain is still shown as "shaded" portions of Zone X.

Figure 3-11 shows the legend for the new FIRM format. Figure 3-12 is an example of a new format FIRM with a floodway. With these changes, the FIRMs are more easily used by community officials for floodplain management, by lenders to determine the need for flood insurance, by insurance agents to rate policy applications, and by land surveyors, engineers, property owners and others to determine flood hazards in a given location. The Flood County, USA and Incorporated Areas map uses the newer format.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

**ZONE A** No base flood elevations determined.

**ZONE AE** Base flood elevations determined.

**ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

**ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

**ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.

**ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.

**ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

**ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

**ZONE X** Areas determined to be outside 500-year floodplain.

**ZONE D** Areas in which flood hazards are undetermined, but possible.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983

Identified 1990 or Later

Otherwise Protected Areas Identified 1991 or Later

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet**

A — A — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone**

RM7 x — Elevation Reference Mark

● M1.5 — River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

AUGUST 19, 1998

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

**Figure 3-11: New format FIRM legend**

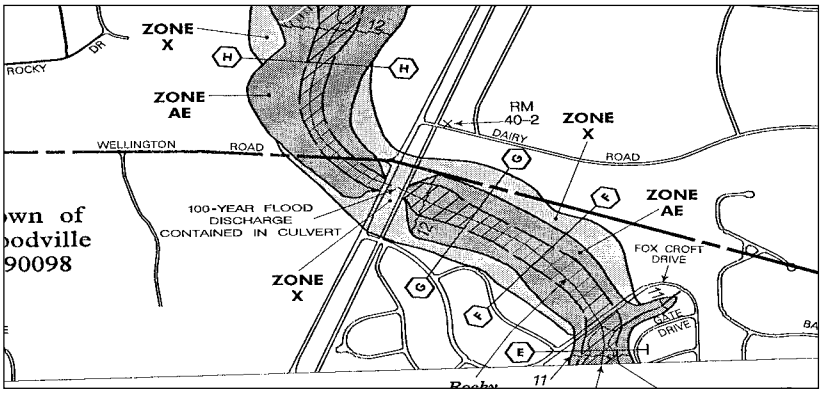



**Figure 3-12: Floodway in new FIRM format**

## PARTIAL MAP INITIATIVES FIRM

In some cases, it is more cost efficient for FEMA to update and print only a portion of the total FIRM and FBFM panels for a community in the new format. This is referred to as Partial Map Initiatives FIRM. Here, instead of printing the entire set of separate FIRM and FBFM panels for the community, only those panels affected by the revision elements are combined into the new format FIRM panel. To clarify this for the community, the FBFM index would show that those FBFM panels were no longer printed and that the floodway mapping information would appear on the new format FIRM showing that same area. The FIS report would also indicate on the Notice to User Page the combination of FIRM and FBFM panels and the differentiation between the old and new format zone labeling.

## FIRMS WITH COASTAL AND LAKE FLOODPLAINS

### Coastal FIRMs

Coastal areas include the shores of the Atlantic and Pacific Oceans, the Gulf of Mexico and the Caribbean Sea, and inlets subject to tides. They also include the shorelines of the Great Lakes.

Coastal high hazard areas subject to flooding *and* wave action of three feet or more are designated as V Zones. The number in parentheses after or below the V Zone designation is the BFE. There are several V Zones on Panel 0040 of Flood County FIRM.

### Coastal Barrier Resources System

Undeveloped portions of coastal barrier islands and similar land forms in the Coastal Barrier Resources System (CBRS) — such as coastal mainland along the shore of the Great Lakes, along bays, inlets, or estuaries — have been identified and included on applicable map panels. They are called CBRA areas, established by the Coastal Barrier Resources Act of 1982 and the Coastal Barrier Improvement Act of 1990.

The Acts provide protection to CBRA areas by prohibiting most expenditures of federal funds including the provision of flood insurance for new and substantially improved buildings in the mapped area. The restrictions are covered in more detail in Unit 9, Section D.

The designations for these undeveloped coastal barriers depend on when they were designated by the acts; therefore, not all CBRA areas have the same date of designation. Examples of the three different screens used on the FIRM are shown in the legend for Flood County FIRM Panel 0040. The prohibition date is indicated for each CBRA zone on the FIRM. It should be noted that although FEMA shows CBRA areas on its FIRMs, only Congress can authorize a revision to their boundaries.

Flood County has an extensive CBRA area, which appears on FIRM Panels 0038 and 0040. Note that the designation and delineation of CBRS units are not directly related to the floodplain.

### Lakes

Most lakes have a BFE, shown in parentheses below the flood zone that has been rounded off to the nearest whole number (see Figure 3-13). The actual BFE, to the nearest tenth of a foot, can be obtained from the FIS report. However, many long lakes, especially reservoirs, have a higher BFE at the upstream end than at the outfall. These types of lakes and reservoirs have BFEs shown with wavy lines, the same as riverine BFEs. They also appear on the stream profiles in the FIS report.

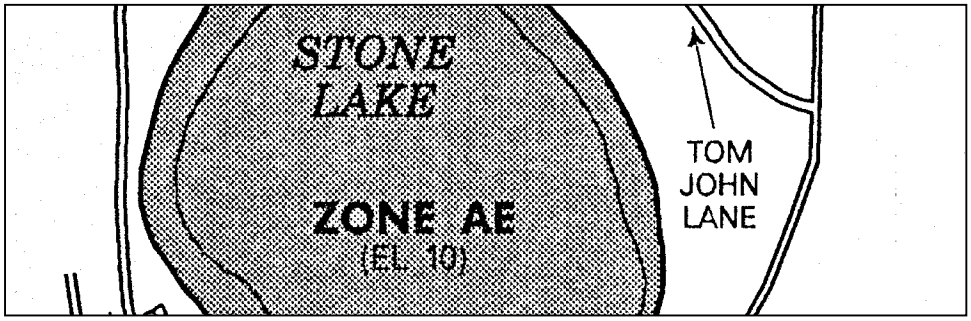



**Figure 3-13: FIRM with lake floodplain**

Where studies have been carried out for lakes and reservoirs, information on BFEs is contained in Section 3.0 of the FIS report. A *Summary of Stillwater Elevations* table is provided in the FIS report (Figure 3-14). Note that the actual BFEs to the nearest one-tenth of a foot appear in the table, but the BFE on the FIRM is shown in parentheses rounded to the nearest whole number. For the most accurate BFE, use the "100-year flood elevation" from the table, not the FIRM. For a shortcut method, you can add 0.4 foot to the elevation shown on the FIRM. This will get you an elevation at least as high as the number shown in the table.

| FLOODING SOURCE AND LOCATION | ELEVATION (ft. NGVD) | | | |
|---|---|---|---|---|
| | 10-YEAR | 50-YEAR | 100-YEAR | 500-YEAR |
| STONE LAKE<br>Entire shoreline within Flood County | 7.0 | 9.0 | 10.2 | 12.8 |

**Figure 3-14: Summary of stillwater elevations for a lake**

## SHALLOW FLOODING FIRMS

Under the NFIP, ponding or sheet flow constitutes shallow flooding, which is mapped based on historic flood experiences and study of the topography.

An example of a shallow flooding area is on the Flood County FIRM, panel 0038, upstream of Argyle Way, in an area marked "Zone AO (Depth 2')." Also, Panel 0040 shows an area where wave runup overtops and ponds behind a seawall, berm, or other feature that keeps the water from flowing back to the ocean.

We don't know how high the base flood is in relation to sea level in Flood County "Zone AO (Depth 2')." However, we do know that the base flood should be no deeper than two feet above the ground.

## FIRMS WITH FLOOD PROTECTION PROJECTS

Some FIRMs may show areas protected from flooding by the 100-year flood because of the presence of a levee, concrete dike, floodwall, seawall, or other structure. These areas are usually designated as shaded Zone X and marked with the following note:

- This area protected from the 100-year flood from (Flooding Source Name) by LEVEE, DIKE, or other structure subject to failure or overtopping during larger floods.
- This is an indication that the flood protection structure has either been evaluated and found to meet all of the NFIP requirements for flood control structures, or has been certified by a Federal agency with levee design responsibility as having been adequately designed and constructed to provide protection from the 100-year flood.
- Floodways will be delineated at the landside toe of a levee that is recognized as providing 100-year flood protection.
- A levee that provides a lower level of protection, and that is not certified or does not meet the requirements for levees, may be shown on the FIRM, and flood elevations are computed as if the levee did not exist.

## COUNTYWIDE FIRMS

The Flood County FIS report and FIRM covers the unincorporated areas of Flood County and all incorporated areas within Flood County. Therefore, it is referred to as a *countywide FIRM*. Countywide FIRMs show flood hazard information for all geographic areas of the county, including other jurisdictions such as villages, towns, and cities.

Previously, FHBM, FIRM and FBFM maps were prepared separately for each jurisdiction. County FIRMs, for example, showed the flood hazards identified only in the unincorporated areas of the county and did not show any flood information inside the corporate limits of a municipality. In countywide mapping, once the countywide map is produced, all of the identified flood hazard areas within the boundaries of the county are shown on one set of maps along with all floodway information maps (see section titled Flood Insurance Rate Map—New Format).

The countywide FIRM format has a number of advantages, and one in particular is that the user can see the relationship and simultaneous effect of each floodplain on a number of communities. In addition, FIRMs do not need to be updated when municipal boundaries change. Although boundaries might change, communities will continue to find the flood hazard information they need on the same countywide FIRM.

Figure 3-15 shows the title block of a countywide FIRM panel. The title block lists the communities mapped on that panel and their six-digit NFIP community ID numbers. The FIRM panel has a map number with five digits consisting of the NFIP-assigned state number as the first two digits and the NFIP-assigned county number as the next three digits followed by the letter "C," which stands for "countywide," and then the four digit panel number and suffix. Do not confuse the map panel number with the community number.

All previous map dates for each floodprone community in a countywide FIS are located on the community map history Table (Figure ).The initial FIRM date for each community is shown on the FIRM index. These are the "post-FIRM" dates for insurance rating. Don't confuse them with the effective date of the latest FIRM panel, which is shown in the title block.

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

## JEFFERSON COUNTY, ALABAMA AND INCORPORATED AREAS

**PANEL 344 OF 660**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| BIRMINGHAM, CITY OF | 010116 | 0344 | E |
| UNINCORPORATED AREAS | 010217 | 0344 | E |

**Notice To User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.**

**MAP NUMBER**
**01073C0344 E**

**EFFECTIVE DATE:**
**JANUARY 20, 1999**

Federal Emergency Management Agency

**Figure 3-15: Title block of countywide FIRM panel**

## DIGITAL FIRMS

The conversion of FIRMs to a digital format has many benefits. For example, they can be revised and updated easily with just a few keystrokes, and they can be incorporated in the community's mapping system and tied in with other geographic information systems, such as the zoning map.

Users must bear in mind that the simple conversion of FIRMs to a digital format does not inherently improve the engineering quality of the product. Many of the same difficulties with interpretation of flood risk data — and the requirement that users apply sound judgment in methods selected for decision making and map interpretation — remain unchanged.

FEMA charges a fee for all digital FIRM data products. Any questions regarding these products may be directed to:

Federal Emergency Management Agency
Map Service Center
P.O. Box 1038
Jessup, Maryland 20794-1038

Phone: 800/358-9616
Fax: 800/358-9620
Internet: http://www.fema.gov

### Digital Flood Insurance Rate Map (DFIRM)

The FIRM for Flood County, USA and Incorporated Areas is actually a Digital Flood Insurance Rate Map, or DFIRM. This is because it is a more recent publication, created with new digital methods; however, whether the maps are new DFIRMs or conventional FIRMs, they are still generally referred to as FIRMs. The DFIRM is comprised of all digital data required to create the hardcopy FIRM. These data include base map information, graphics, text, shading, and other geographic and graphic data. An example of a hardcopy paper DFIRM is shown in Figure 3-16.

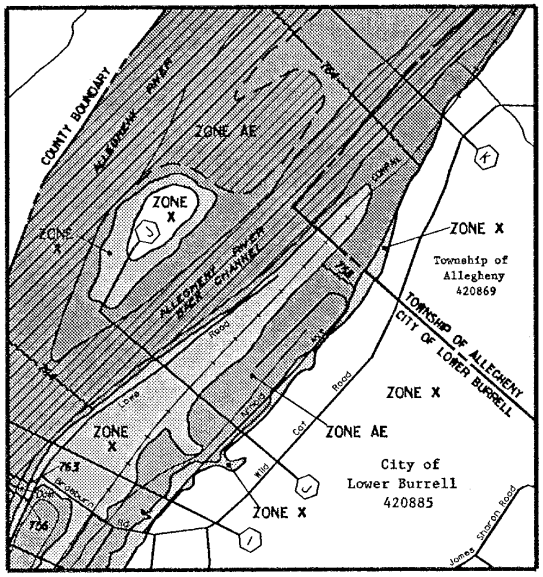



**Figure 3-16: Hardcopy DFIRM**

The majority of DFIRMs are produced in a countywide format, where all flood hazards for the county and incorporated communities are shown on one set of maps. It can be used for floodplain management purposes in a manner similar to other flood maps, but it can also be combined with other digital map information to create new information for planning purposes. DFIRMs are also produced for single jurisdictions when producing a countywide map would not be cost effective.

### Digital Flood Insurance Rate Map – Digital Line Graph

The Digital Flood Insurance Rate Map - Digital Line Graph (DFIRM-DLG) is intended to be the primary means of transferring flood-risk data depicted on FIRMs to Geographic Information Systems (GIS). GISs are computer-based map systems that allow the user to keep a map updated easily and to correlate geographic information with other data, such as tax records on properties.

The Digital Flood Insurance Rate Map - Digital Line Graph (DFIRM-DLG) is a database created by extracting certain flood risk data from the DFIRM. The DFIRM-DLG does not include base map information, nor does it include graphic data required to create a hardcopy FIRM.

Communities whose digital base mapping files were used as the base map for the DFIRM will find that they may easily use the DFIRM-DLG files for determination of flood zones and for enforcement of regulations. A graphic image of a DFIRM-DLG is shown in Figure 3-17.

The digital data captured from the hardcopy DFIRM consists of FEMA hydrography (location of water bodies), flood hazard zones, BFEs, cross-section locations, and elevation reference marks.

All lines and area features in DLG files are encoded with one or more seven-digit attribute codes that provide the user with detailed information about the features. FEMA intends to make the DFIRM-DLG available on CD-ROM compatible with Insurance Services Office (ISO) 9660 standards.

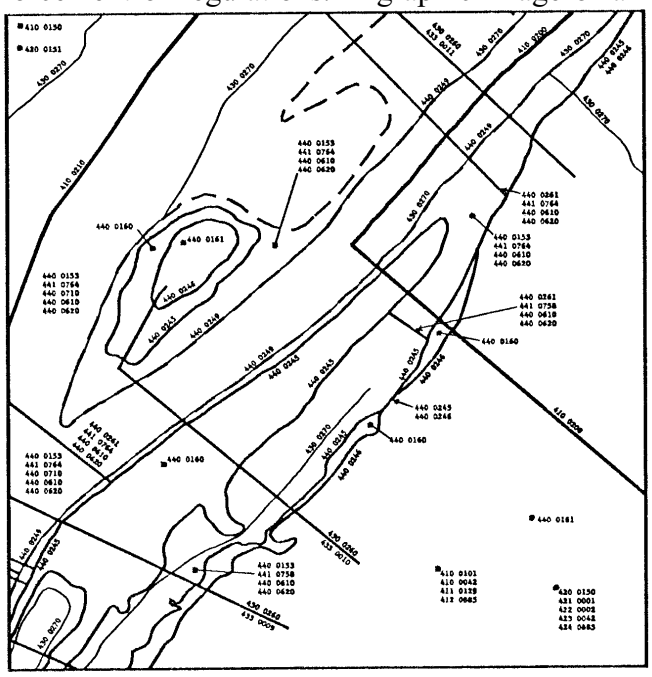


**Figure 3-17: Graphic image of a DFIRM-DLG**

With many commercially available GIS software packages, DLG data can be directly converted into vector data usable within the GIS environment. Third-party conversion software is also available that will convert DLG data to other proprietary GIS formats.

The DFIRM-DLG, when coupled with digital base map files or the local community digital base, can be used in a GIS to determine whether a structure is located within an SFHA. It should be noted that if a GIS is used to determine that a structure is within or near an SFHA, and a different base map source was used to generate the hardcopy DFIRM, the determination should be confirmed by referencing the printed hardcopy DFIRM.

### Q3 Flood Data

In the Q3 Flood Data Product, FEMA has developed a graphical representation of certain features of the FIRM. The Q3 Flood Data are in three formats that are usable with desktop mapping and GIS software packages. These formats are:

- Digital Line Graph
- ARC/INFO
- MapInfo

Q3 Flood Data are created by digitally capturing certain key features from the current effective paper FIRMs. These features are converted into area features in one countywide data layer. The following vectorized (lines and areas) data features are included:

- SFHA and 500-year floodplain,
- Flood insurance zone designations,
- Floodway boundaries (if available),
- COBRA zones,
- Political boundaries,
- Community/map panel identification numbers,
- Boundaries between FIRM panels, and
- U.S. Geological Survey 7.5 minute (1:24,000 scale) quadrangle neatlines.

Several features are *not* included. They are:

- Hydrographic features,
- Base flood elevations,

- Cross section lines,
- Roads, road names or address ranges, and
- Elevation reference mark locations and elevations.

Q3s were developed to support insurance-related activities and are designed to provide guidance and a general proximity of the location of SFHAs. Q3s do not replace paper FIRMs as the legal document.

The data are not suitable for applications such as detailed site design and development plans or flood risk determinations. They cannot be used to determine absolute delineations of floodplain boundaries, but instead should be seen as portraying zones of uncertainty and possible risks associated with flooding.

Q3 Flood Data incorporate map revisions and letters of map revision and amendment. However, they do not correct for edge-matching errors, overlaps, etc., that were in the original paper FIRMs.

FEMA has produced Q3s for almost 900 counties nationwide. They are organized by county and contain data from all existing paper FIRM panels for the incorporated and unincorporated areas of the county.

Q3 Flood Data are available on CD-ROM from the FEMA Map Service Center. You can access the list of Q3 counties on the Internet and download sample data, data standards, and other Q3 information (http://www.fema.gov).

# UNIT 4:
# USING NFIP STUDIES AND MAPS

## In this unit

This unit covers how to use the materials introduced in Unit 3:

- How to find and use the data provided in a Flood Insurance St
- How to find a site on a flood map
- How to obtain flood elevations from a profile
- How to keep the maps and data up-to-date over the years

## Materials needed for this Unit

- Flood Insurance Study, Flood County, USA, and Incorporated Areas
- Flood Insurance Rate Map, Flood County, USA, and Incorporated Areas
- Engineer's scale

Additional information can be found in *Answers to Questions about the National Flood Insurance Program*, questions 81 – 95.

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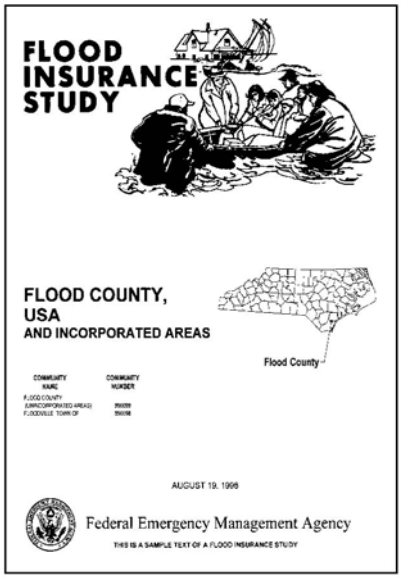
# A. USING FIS REPORTS

The majority of Flood Insurance Study (FIS) reports use the same outline and numbering system. In this section, we will highlight the report's contents; explore the report's data, tables, and profiles; and describe how they are related to the Flood Insurance Rate Map (FIRM) and Floodway Map.

The most important reason for using a FIS report, in conjunction with a Floodway Map and/or a FIRM, is to determine whether or not a site is located in a Special Flood Hazard Area (SFHA), a V Zone, and/or a floodway, and to determine the Base Flood Elevation (BFE).

Important: Because the elevation determinations for riverine or coastal floodplains are typically used to establish flood elevations for construction in SFHAs and other purposes, accuracy is critical. You may want to have another person double check your determinations before using them in the permit application process.

## FIS REPORT CONTENTS




The Flood County FIS report cover has an outline map. Note that the location of Flood County is pinpointed on the outline map. The date of the FIS and the community identification numbers are also indicated on the cover page.

Section 1.0 of all FIS reports states the purpose of the FIS, authority of and acknowledgments by its authors, and coordination steps taken during the preparation of the study.

Section 2.0 provides background information on the community, its flood problems, which areas were studied, and what flood protection measures are in effect.

Section 3.0 discusses the engineering methods used. Section 3.1 covers the hydrologic analysis — how much water will flow through the floodplain during peak floods. Section 3.2 describes the hydraulic analysis — how high the water will get. Development of this information was described in Unit 3.

Section 4.0 discusses how the flood map was prepared from flood data for floodplain management applications. Section 4.1 covers mapping the floodplain boundaries — where the water will go. If the study included a floodway determination, Section 4.2 describes the

floodway study and mapping. Section 4.0 also includes the Floodway Data Table. How to interpret and use these and other data is covered later in this unit.

Section 5.0 covers data related to flood insurance, some of which you will not need to use. This section can be a useful reference, as it describes the flood insurance zones identified on the map.

Completing the FIS report are the following four sections: Section 6.0, Flood Insurance Rate Map; Section 7.0, Other Studies; Section 8.0, Location of Data; and, Section 8.0, Bibliography and References.

Most riverine FIS reports include flood profiles as an exhibit at the end of the document. Coastal analyses include a map of transect locations and tables containing data relating the transects to the stillwater and base flood elevations. The Flood County FIS report has both.

## USING FLOOD DATA AND TABLES

### Flood discharges

Turn to Table 3, *Summary of Discharges*, in Section 3.1 on page 9 of the Flood County FIS report. An excerpt from that table is shown below (Figure 4-1*)*.

TABLE 3 - SUMMARY OF DISCHARGES

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) | | | |
|---|---|---|---|---|---|
| | | 10-YEAR | 50-YEAR | 100-YEAR | 500-YEAR |
| COBB BROOK | | | | | |
| At the confluence with the Rocky River | 4.2 | 560 | 910 | 1,080 | 1,550 |

**Figure 4-1: Flood County, FIS Report Table 3 - Summary of Discharges**

Figure 4-1 (*Table 3 – Summary of Discharges*) summarizes the peak amount of water discharge for various flood frequencies at locations within the study area. The hydrologic study procedures for arriving at these amounts were discussed in Unit 3, Section B. The sizes of the drainage areas (watersheds) contributing to the water runoff producing the floods are also shown in the table.

The 100-year flood discharge for Cobb Brook at its confluence with the Rocky River is 1,080 cubic feet per second (cfs). This means that during the peak of the base or 100-year flood 1,080 cubic feet of water will pass this point each second.

Those administering the local ordinance may never have a need for these data. They are, however, important in making subsequent calculations of flood elevations as part of the hydraulic engineering study.

## Floodway Data Table

The Floodway Data Table in Section 4.2 of the FIS report presents data from the hydraulic analysis (Table 6, page 17 in the report). Part of this table is reproduced below (Figure 4-2).

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION (FEET NGVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| Rocky River | | | | | | | | |
| A | 4,395 | 115 | 1,233 | 6.1 | 9.9 | 9.9 | 10.0 | 0.1 |
| B | 5,537 | 13 | 142 | 9.2 | 10.4 | 10.4 | 10.5 | 0.1 |
| C | 9,610 | 100 | 323 | 8.4 | 10.9 | 10.9 | 11.1 | 0.2 |
| D | 10,995 | 85 | 861 | 7.2 | 11.2 | 11.2 | 11.3 | 0.1 |
| E | 12,695 | 245 | 1,887 | 5.1 | 11.3 | 11.3 | 11.4 | 0.1 |
| F | 13,845 | 270 | 2,403 | 4.5 | 11.5 | 11.5 | 11.5 | 0.0 |
| G | 14,513 | 230 | 2,553 | 3.7 | 11.6 | 11.6 | 11.6 | 0.0 |
| H | 16,625 | 180 | 2,000 | 4.2 | 11.7 | 11.7 | 11.7 | 0.0 |

[1]Feet above county boundary

**Figure 4-2: Flood County, USA, FIS Report Table 6 - Floodway Data**

All numbers in the table are calculated at each floodplain cross section. The first two columns under "Flooding Source" identify the stream name and the cross sections used in the FIS, and the distance of the given cross section from some reference point, usually the mouth of the flooding source, a corporate limit, or a county boundary. The footnotes at the bottom of the Floodway Data Table identify this reference point.

The locations of these cross sections are shown on the accompanying FIRM and Flood Profile (unless otherwise indicated on the Floodway Data Table). Cross-section A of the Rocky River is approximately 500 feet below (or downstream of) Glebe Way. You can find cross-section A on FIRM panel 38. It is the line that crosses the Rocky River and has the letter "A" in a hexagon at each end.

Remember that a floodway's width usually is not symmetrical; it varies with the topography at each cross section. The next three columns ("Floodway") provide data at each cross section. At cross-section A, on the Rocky River, the floodway is 115 feet wide. This means that from the floodway boundary on one side of the stream of this cross section to the floodway boundary on the other side of the stream is 115 feet. This is useful for double-checking the width of the floodway portrayed on the FIRM.

Figure 4-3 is a representation of the description of cross-section A given in Table 6.

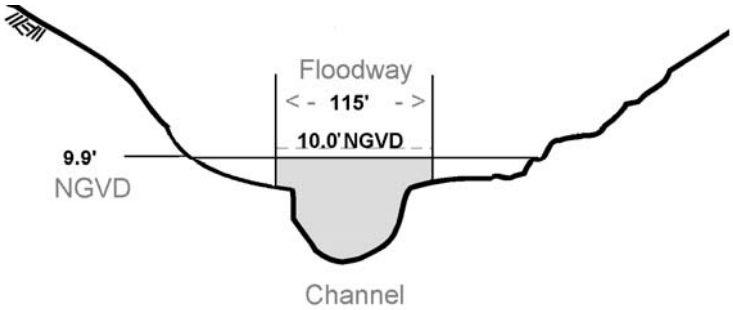



**Figure 4-3: Representation of cross-section A of the Rocky River**

The cross sectional area of the floodway here is 1,233 square feet. This is the cross sectional area of the floodway below the elevation of the base flood at this location (the shaded area of Figure 4-3). The average or mean velocity of the base flood in the floodway is 6.1 feet per second. This is an average velocity. Velocities will generally be higher in the channel than in the over bank areas.

Of the last four columns under "Base Flood Water Surface Elevation," you should be primarily concerned with the first one, "Regulatory," which provides the regulatory flood elevation. This is equivalent to the 100-year flood elevation or BFE. The other columns depict the increase in water-surface elevation if the floodplain is encroached upon so that the water-surface elevation is increased no more than 1 foot. This amount of encroachment is used to define the floodway width. Notice that no cross section has an increase of more than 1.0 foot, in accordance with NFIP standards. Some States and communities regulate to the "With Floodway" elevation to take into account possible future increases in flood stage that will occur as the floodplain is developed.

## COASTAL AND LAKE ELEVATIONS

**Coastal flood elevations.** Table 4, *Transect Descriptions,* on page 12 in the FIS report for Flood County, shows the stillwater elevations and the maximum wave crest elevations of 100-year flood events along the coast.

Coastal regulatory flood elevations include the increase due to wave height. Therefore, use the BFE from the FIRM, not the stillwater elevations in the table.

The base flood elevations on the FIRM are rounded to the nearest foot, which means that if a base flood elevation was actually 8.3 feet, it would show as 8 feet on the FIRM. To correct for this, the recommended rule of thumb is to add 0.4 foot to the rounded BFE on the FIRM. This makes sure that the regulatory elevation you use will be high enough.

For the coast, use the base flood elevation from the FIRM (plus 0.4 foot), not the table.

**Lake flood elevations.** On inland lakes and reservoirs, the FIS generally does not include the effects of waves. For these areas, information on base flood elevations is contained in Section 3.0 of the FIS report, and data is presented in a table titled *Summary of Stillwater Elevations*. Note that in this table the BFE is shown to the nearest one-tenth of a foot, but the BFE shown in parentheses on the FIRM is rounded to the nearest *whole* number (Figure 3-13).

For lakes and reservoirs, *use the base flood elevation from the table, not the FIRM.*

## RELATING REPORT DATA TO MAPS AND PROFILES

Unit 3 described the data that are developed and used in preparing an FIS for a community. Each set of data is used for calculations needed to produce additional data for the FIS.

The data contained in the FIS report are consistent with those found on the accompanying profiles and FIRM. For example, the base flood water-surface elevations at each identified cross section can be found in the Floodway Data Table, read from the flood profiles, and interpolated from the FIRM. Within the limits of map accuracy, you should obtain the same answer regardless of which source you use.

In the same way, the distances between cross sections, or their distance from some reference, can be found using any or all of the above data sources. Again, the answers should be about the same.

The elevations of the computed profiles contained in the FIS report are used with ground elevation data to determine the limits of the various zones shown on the FIRM. Again, flood elevations can be determined at any location along the studied stream using either the flood profiles or the FIRM. All the data fit one another. If obvious mistakes are found, please advise the FEMA Regional Office.

Note: Due to the limited detail and large scale of the base maps used for most FIRMs, much interpolation between contour lines is done in mapping the floodplain boundaries. This is why you may find discrepancies when actual ground elevations are surveyed: the maps are just the best available graphic representations of the BFEs.

Here's the order of precedence for identifying the BFE at a particular location:

- The most accurate BFEs are found in the Floodway Data Table (for a riverine floodplain) and the Summary of Stillwater Elevations table (for a lake). These BFEs

are listed to 0.1 foot. However, the Floodway Data Table is only good for sites on or next to a cross section.

- The next most accurate source of elevation data is the profile. This plot of the cross-section data is difficult to read accurately.
- The least accurate source of elevation data for a riverine floodplain is the FIRM. BFEs are rounded to the nearest whole foot. However, the FIRM is the only source of base flood elevations for coastal floodplains and AO and AH Zones.

BFEs take precedence if there is a dispute between the BFE and the boundaries of the SFHA shown on the maps. As a local permit administrator, you can make your decisions based on the most accurate source of data.

*It must be noted that banks (and others who must read the FIRM to determine if flood insurance is required) must go by the map. They cannot make on-site interpretations based on data other than the FIRM. However, they may recommend that the property owner submit a request for a Letter of Map Revision based on Fill (LOMR-F) or a Letter of Map Amendment (LOMA) so the map can be officially changed to reflect the more accurate data (see Unit 4, Section D).*

Again, only FEMA can amend or correct the maps. Discrepancies should be brought to FEMA's attention through a request for a map change, such as a Letter of Map Amendment (LOMA) (see Section D in this unit).

Reading and using flood profiles, the last set of data contained in a Flood Insurance Study report, will be covered in Section C of this unit.

# B. USING THE FLOOD MAPS

## LOCATING A SITE

How easily you can locate a site on an NFIP map will depend on your familiarity with properties in the community and with the scale of the flood maps.

For our exercise purposes here, the general location of the sites are shown on the Flood County Map Index. The site is adjacent to the Rocky River, just downstream of the corporate limits of Floodville. (Remember to check your north arrow. The top of the map is not always north.)

To locate a site, follow these steps:

*The steps for a site in Flood County are shown in italics. The general location of the sites are shown on the Flood County Map Index. Site A is close to Floodville Lake.*

- If your community has more than one map panel, use the map index to determine which panel to use. Use map landmarks —highways, streets, or streams —to find the site on the index.

  *The Map Index for Flood County shows the site adjacent to Floodville Lake on panel 38.*

- Find the area containing Floodville Lake on the map panel. Be sure the map panel is the most recent one — compare its suffix letter with the suffix letter for that panel on the current Map Index. Remember, in many communities, panels will have different effective dates due to revisions that do not affect the whole community.

  *Floodville Lake is shown at the top right side of panel 38.*

- If there is an asterisk on the panel number, either no flood hazard has been identified in that area or it is entirely one flood zone and the panel was not printed.

  *See panel 30 on the Map Index for Flood County as an example.*

- Locate the site as accurately as possible. Use a detailed street or road map as well as the tax appraiser's plat map to identify the property boundaries, if necessary. You will probably have to obtain the distance on the ground between the site and one or more identifiable points, such as the centerline of a road or street, a bridge, or some other feature on the map. Locate these points on the flood map.

*Site A is bounded to the north by Good Place, to the south by Kalef Lane, beginning 200 feet west of Barclay Lane and extending west for 200 feet.*

- Convert the distance to the map scale and plot the site on the map.

  *Flood County FIRM panel 38 has a scale of 1 inch = 500 feet. This means you should use the "50" scale on the engineer's scale provided with this course. Example: If you read a length of 5 on the scale, this would be equivalent to 500 feet on the map.*

## DETERMINING STATIONING

In order to identify the BFE at a development site, the stream stationing for the site must be determined. The stationing of a site will allow us to read the flood profiles. In some cases stationing may be referred to as mileage.

- Locate Site B on the Flood County FIRM that shows cross sections. Identify which labeled cross sections are nearest to your site, both upstream and downstream.

  *Site B is near Glebe Way adjacent to the Rocky River. It is located approximately 100' south of the southern portion of Glebe Way and approximately 350' west of the intersection of Foley Drive and Chris Drive. Follow the steps in the previous discussion to locate this site on the Flood County FIRM.*

- Check the map scale used for the panel. The scale is in the map legend or key.

  *For Flood County panel 38 the map scale is 1 inch = 500 feet.*

Use an engineer's scale to measure the distance along the stream from the site to the nearest cross section, *following all bends and curves of the stream*. It would be worthwhile to measure the distances to both cross sections to check accuracy.

*Site B is approximately 650' downstream of cross-section B and approximately 300' upstream (north) of cross-section A, East of the Rocky River*

.

- If the stationing is based on mileage, convert these distances to miles by dividing by 5,280. In the case of Flood County, the stationing is based on feet.

  *When converting to miles, we lose a little accuracy. Rounding the numbers, our site is 0.12 mile downstream of cross-section B and 0.06 mile upstream of cross-section A.*

Keep these numbers in mind; they will be used shortly. This approach will also work by measuring from another point that shows up on the profile, such as a bridge or confluence with another stream.

## BASE FLOOD ELEVATIONS FROM MAPS

BFEs are shown on the FIRMs as whole numbers. For AE Zones, or coastal and lake floodplains, use the BFE printed in parentheses below the flood zone designation. *No interpolation is necessary*. The same holds true for AH Zones with whole number base flood elevations.

> *The base flood elevation for properties in the vicinity of the Rocky River at the confluence of Cobb Brook is 10 feet (NGVD or above mean sea level).*

For other numbered AE Zones, read the BFE from the nearest wavy "base flood elevation line." Refer to the map legend or key if you are unsure of the line markings.

> *For the Site B example, the base flood elevations on the FIRM, are marked "10," above and below the site. If the site fell between the base flood elevations of 10 and 11, such as the area north of Site B between Glebe Way and Martling Way along the Rocky River, we could interpolate to find a correct base flood elevation based on the distance of the site from the base flood elevation lines. We could also locate the site on the profile based on how far upstream or downstream it is from cross-section A or B. Lastly, we could chose the higher base flood elevation, (e.g., 11) to best ensure protection from flooding.*

Zone A areas indicate approximate floodplain boundaries. No detailed study has been performed to determine base flood elevations in these areas.

There are no base flood elevations in AO Zones with base flood depths. Instead, the equivalent flood protection level is the number of feet shown in parentheses after the "Zone AO." This is not an elevation above sea level, it is the depth of flooding measured above ground level. The zones are also described in the Flood County FIS report Section 5.0, page 18, *Insurance Applications.*

> *West of the intersection between Barclay Lane and Argyle Way on FIRM panel 38 is a small Zone AO (Depth 2 feet). The base flood elevation for a site in this zone would be two feet above the grade of any adjacent building.*

## LOCATING THE FLOODWAY BOUNDARY

If the site is at a surveyed cross section, floodway width data from the Floodway Data Table may be used as a more accurate measure than field and map measurements. Remember that the width listed in the table is the distance from the floodway boundary on one side of the stream to the floodway boundary on the other side of the stream.

If the floodway width measured on the map at that site is at a cross section, the map should be used because it is the floodway officially adopted by the community. If there is a significant difference between the map width at the site and the closest cross section width in the Floodway Data Table, contact the FEMA Regional Office for an interpretation.

Most sites won't fall conveniently on a cross section, so here are the steps using the map as shown in the video:

- Locate Site C on the map and select the correct engineer's scale for the map scale.

  *Site C is located between Floodville Lake and Barclay Lane on Flood County FIRM panel 38. It is approximately 1,130 feet upstream of Argyle Way, and approximately 230 feet east of the intersection of Good Place and Barclay Lane.*

Using the engineer's scale, measure the distance from the floodway boundary to a nearby feature on the ground. For streets, use the center of the street, both on the map and on the ground.

  *The floodway boundary is approximately 105 feet from the intersection of Barclay Lane and Good Place.*

- If any portion of the building site, proposed grading, fill, bridge, or other obstruction is determined to be within the floodway, the floodway provisions of your ordinance also apply.
- Site C falls inside of the floodway.

# C. USING PROFILES

As discussed in Unit 3, Section B, a flood profile is a graph of computed flood elevations at the floodplain cross sections. It can be used to determine elevations of floods of various frequencies at any location along the studied stream.

## PROFILE FEATURES

Four flood levels are typically shown on the flood profile fold-out sheets at the back of the FIS report: the 10-, 50-, 100-, and 500-year (10%, 2%, 1%, and 0.2%) floods. Only the 100- year flood is used for compliance with NFIP standards; the others are useful for other floodplain management applications, such as septic system design and location, bridge and culvert design, urban stormwater management, selecting sites for critical facilities, and determining how frequently a site or facility will flood.

In addition to the flood elevation lines, FIS profile sheets contain:

- a plot of the stream bed elevation,
- the locations of the cross sections used in the FIS and shown on the FIRM (a letter within a hexagon),
- the locations of roads, and
- culverts and bridges (usually depicted as a large “I”).

The data are plotted on a grid to facilitate their interpretation. With few exceptions, the large grid squares are one inch on each side and are divided into 10 squares in both directions. This grid pattern makes taking measurements much easier.

Refer to the profile for Cobb Brook at the back of the Flood County FIS report. The bottom, or x-axis, shows the distance along the river in feet upstream of the confluence with the Rocky River. For this profile, each large square is 200 feet and each little square is 20 feet.

The left side, or y-axis, shows the elevation in feet NGVD. Each large square represents 10 feet and each small square is 1.0 foot. Be aware that profiles in other FIS reports may have different scales.

Figure 4-5 shows a sample of the data that are plotted on the profile shown for Cobb Brook in Flood County. Before you look at it, measure the distance (in feet) and base flood elevations from the profile for cross-sections A, B, and C.

| Cross section | Feet above confluence with Rocky River | 100-Year Flood elevation |
|---|---|---|
| A | 1,080 | 10.14 |
| B | 1,880 | 23.8 |
| C | 2,600 | 31.1 |

**Figure 4-5: Plotted Data, Flood Profile 01P, Cobb Brook**

## DETERMINING BASE FLOOD ELEVATIONS

### Profiles

Here are the steps to determine the BFE for a site using the flood profiles in the FIS report:

- Using the FIRM, locate features near the site that appear on the profile, such as a bridge or cross section.

  *We'll work with the Rocky River profile at Site D, just south of the footbridge. The footbridge is located on Flood Profile 04P, at a point approximately 21,700 feet above the county boundary.*

- Follow the stationing procedures described in the previous section to determine the site's distance from a cross section or other feature that appears on the profile.

  *Site D is north of the Rocky River, approximately 850 feet upstream of cross-section J and approximately 3,600 feet downstream of cross-section K. The footbridge also appears on the profile.*

- Find the feature(s) on the flood profile for that stream.

  *The footbridge is located between cross-sections J and K. These cross sections are shown on Flood Profiles 04P and 05P at stream distances of 20,850 and 25,360.*

- Check the scale used for the profile, and, using the engineer's scale, measure the distance from the feature(s) to the site.

You can use the "50" scale on the engineer's scale, or you can count squares. At this scale, each little square is 50 feet, so Site D is approximately 17 little squares upstream (right) of cross-section J.

- Find the site's location on the appropriate flood profile line and read the elevation on the y-axis. You can count squares or use the engineer's scale. Don't forget, the scale on the y-axis is different from the x-axis scale.

*For the Rocky River profile, you may find it easiest to use the "50" scale on the y-axis because it is five feet to the inch.*

- Find where the site intersects the profile. Draw a straight line to the left or right edge of the graph.

  *The second line down is the base (100-year) flood profile. Read the flood elevation off either the left or right edge of the page. At Site D, the base flood elevation is 13.8 feet. Check the 10-, 50-, and 500- year elevations and see if you get: 11.3, 12.7 and 15.3, respectively.*

  *Note how this produces a more accurate number than interpolating between the two wavy lines on the FIRM. Instead of guessing the elevation of the site between the BFE lines, we can tell that it is 13.8*

- A surveyor can establish the flood elevation at the site so the owner or builder will know how high the base flood elevation is predicted to be.

  *A surveyor can either shoot 13.8 feet at the site or shoot any elevation and tell the owner how high the base flood is in relation to the mark.*

Be sure to check each profile's scale before you use it. On Flood Profile 02P in the FIS report for Flood County, the x-axis scale is 1 inch = 500 feet and the y-axis scale is 1 inch = 5 feet. Flood Profile 01P covers steeper terrain and the y-axis is at a scale of (1 inch = 10) feet (each little square represents one foot).

## Other types of floodplains

In coastal floodplains and areas of shallow flooding (AH or AO Zones), the base flood elevation or depth number is listed in parentheses below the zone designation on the FIRM. Use that elevation because there is no profile for these zones. Except for lake floodplains with stillwater elevation tables to 0.1 foot, the FIRM is the most accurate source for base flood elevations.

## Relating flood elevations to the ground

If the site is clearly outside the boundary of the base floodplain, as with Site A, no floodplain regulations apply unless the site adjoins the SFHA and surveyed ground elevations are *below* the base flood elevation.

If it cannot be determined whether the site is in or out of the floodplain, additional information and/or investigation will be needed. In this instance, ground elevation and lowest floor elevations of any structures will be needed for the site, so one who wishes to apply for a

Letter of Map Amendment (LOMA) of Letter of Map Revision based on Fill (LOMR-F) may need to hire a surveyor.

A field visit by the local administrator or designee and measurements on the ground may also be required. The actual site elevations are compared to the base flood elevation, read from the FIS flood profiles, for that location.

If the site elevations are above the base flood elevation, the site is outside the floodplain and the applicant should be advised about the map amendment/revision process. If they are lower, it is within the floodplain and subject to the provisions of the ordinance.

*It must be noted that banks (and others who must read the FIRM to determine if flood insurance is required) must go by the map. They cannot make on-site interpretations based on data other than the FIRM. However, they may recommend that the property owner submit a request for a LOMR-F or LOMA so the map can be officially changed to reflect the more accurate data (see Unit 4, Section D).*

## RELATING PROFILES TO MAPS

Base flood elevations shown on the FIRM are directly related to elevation data shown on the flood profiles. Within the limits of map accuracy, you should obtain the same elevation whether you use the map or profile.

*However, the flood profiles should always be used to determine flood elevations along rivers and streams.*

If you find obvious mistakes or discrepancies between the tables, profiles, and FIRM, contact the FEMA Regional Office.

From reading the profile in Section C of this Unit, Determining Base Flood Elevations, we determined the base flood elevation to be 13.8 feet. From reading the FIRM, we can only establish that the base flood elevation for Site D should be between 13 and 14 feet.

These computations show that the FIRM and the FIS report profile are consistent and provide a double check to make you comfortable with your determination.

# D. MAINTAINING AND REVISING NFIP MAPS

NFIP maps are vital to effective enforcement of your floodplain management responsibilities. They are also key to accurate flood insurance rating and fair determinations of the flood insurance purchase requirement.

As the primary repository for NFIP maps, it is important that the community maintain adequate copies and keep them updated. You should have at least one master map that includes all the changes, annexations, map revisions, etc.

It is also important that you keep copies of old, revised maps. They provide a historical record of what was known and the basis of what was required in the past. For example, a property may not have been shown in the SFHA on an old FIRM, so there were no building requirements. If that property is later flooded, you will need to show the old map as the basis for the community's action.

Similarly, people who purchased flood insurance based on the FIRM zone in effect at the time are entitled to keep that FIRM zone as the basis for their rates. You will be doing your citizens a valuable service if you have a copy of an old FIRM.

## ORDERING MAPS

Additional copies of your community's FIS report, FIRM, and Floodway Map can be ordered by calling **1-800-358-9616**. The toll-free map distribution center number is staffed Monday through Friday from 8 a.m. to 8 p.m. Eastern Standard Time.

Requests may be faxed to 1-800-358-9620, or mailed to:

Map Service Center
P.O. Box 1038
Jessup, MD 20794-1038

Maps are provided at no charge to local government officials. The FIS report and Floodway Maps must be specifically requested, or only the FIRMs will be sent.

Be prepared to give your Community Identification Number.

## CHANGING NFIP MAPS

No map is perfect and no flood situation is static. From time to time, FEMA, communities, or individuals may find it necessary for a FIRM or Floodway Map to be updated, corrected, or changed.

Common reasons why a map may need to be changed include:

- **To correct non-flood-related features,** such as a change in the community's corporate limits. The local government should send the correct information to its FEMA Regional Office. However, the community does not need a new map if it has annexed an area that is shown on an adjacent community's FIRM. It can regulate floodplain development using that FIRM and flood data.
- Since it is expensive to reprint and redistribute flood maps, corporate boundary changes are usually made only when maps are revised for new or better flood data. One way to minimize the need for such changes is for a municipality to adopt the adjacent community's FIRM. This would clarify the regulatory flood data for newly annexed properties and areas in the community's extraterritorial jurisdiction.
- **To include better ground elevation data.** As noted earlier, maps do not always represent site-specific ground elevations. If there is better information on natural ground elevations, the applicant may apply to have the map reflect the better topographic information.
- **To reflect changes in ground elevations in the floodplain.** If there has been a substantial change in ground elevation — for example, fill has been placed in the floodplain to raise building sites above the base flood elevation — the applicant may request a map change to reflect the new ground information.
- **To revise flood data.** A request may be made to revise the existing study, based on a new flood study. The applicant must demonstrate that the original study was in error or that the new study is based on more accurate or better technical data.
- **To submit new flood data.** When a flood study is prepared for a development in an unnumbered A Zone, the data can be submitted to FEMA for later incorporation into the FIS or revised FIRM.
- **To reflect a flood control project.** If a new levee, reservoir, or channel modification affects the flow of the base flood, the community must request that the map be revised to reflect the new conditions or new (lower) base flood elevations. The map cannot be changed until the project is constructed and/or operating.

It is important to note that many small projects, such as channel clearing or retention basins in new subdivisions, do not have a measurable effect on the base flood and, therefore, do not warrant a map change. The request for a change needs to be carefully prepared by an engineer who knows FEMA's flood study guidelines.

It must be remembered that a community participating in the NFIP is obligated by its agreement with FEMA to submit new or revised map information when it becomes available. Section 65.3 of the NFIP regulations states:

> *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 [FEMA] of the changes by submitting technical or scientific data…*

Another point to keep in mind is that lenders, insurance agents, and communities must use the published flood maps. Lenders are affected by changes in a FIRM as they enforce the mandatory flood insurance purchase requirements. Communities are affected by changes in a FIRM and a Floodway Map as they enforce floodplain management regulations.

Consequently, uniform procedures have been established for requesting and administering map changes.

## TYPES OF CHANGES

FEMA has four approaches to changing NFIP maps: restudies, limited map maintenance projects, amendments, and revisions. Requests for a restudy, amendment, or revision must be approved or made by the community, since they affect the local floodplain management program.

A ***restudy*** is a new Flood Insurance Study for some or all of the community. For example, FEMA may decide to conduct a restudy where development in a small watershed has substantially changed stormwater runoff conditions over the 15 or 20 years since the original FIS was completed. Or a restudy may be needed where growth is occurring along streams without base flood elevations.

A ***limited map maintenance project (LMMP)*** is a small-scale restudy that is limited in size and cost. It is frequently used for studies in unnumbered A Zones.

A ***map revision*** is used for other cases, including:

- scientifically based challenges to the flood elevations

- to incorporate new data that become effective after the construction of a flood control project
- to reflect fill placed in the floodplain after the flood study currently in effect was completed
- to change the floodplain or floodway boundaries
- to include new flood data

An ***amendment*** is used to remove an area that was inadvertently included in the SFHA. Often the ground is higher than depicted on the base map used for the FIRM. This typically happens because of the problem of accurately locating the floodplain boundary on a topographic map. For example, more detailed ground elevation data can be used to amend a FIRM to show a property that is higher than the BFE to be outside the SFHA.

FEMA will make map amendments based on the information submitted by the applicant. Unlike the three other types of changes, an amendment doesn't challenge the FIS or FIRM; it simply removes certain areas or buildings from the SFHA because they are higher than the base flood elevation.

## MAPS AND LETTERS

FEMA uses two methods to make flood map changes.

The first is to actually change the map and publish new copies. Here the effective date of a map is changed. A restudy or limited map maintenance project will generally result in a new map. Sometimes revisions and amendments result in a reprinted map. However, republishing the map can be expensive and is done only if the change affects a large area.

The other method is to issue a letter that describes the map change. FEMA does this when the revision can be adequately described in writing or through use of a small, annotated map panel, such as when only one lot or building is affected.

There are two types of ***Letters of Map Change (LOMC)***: a ***Letter of Map Revision***, or ***LOMR***, and a ***Letter of Map Amendment***, or ***LOMA*** . The terms relate to the map changes described in the previous section. A "LOMR-F" refers to a LOMR based on new fill in the floodplain.

Because such a letter officially amends or revises the effective NFIP map, it is a public record that the community must maintain. Any LOMC should be noted on the community's master flood maps and filed by panel number in an accessible location.

If provided with a legal description of the land area above the BFE, FEMA can issue a LOMC for only a portion of the parcel. Or, a LOMC might state that only a specifically described portion (i.e. the front 70 feet with the exception of any recorded easements), is removed from the SFHA. However, the LOMC might then also state that portions of the rest of the property remain within the SFHA, subject to all floodplain management regulations.

NFIP maps are not changed based on *proposed* projects. However, an applicant may request a ***Conditional Letter of Map Revision (CLOMR)*** or a ***Conditional Letter of Map Revision based on Fill (CLOMR-F)*** based on proposed plans. A ***Conditional Letter of Map Amendment (CLOMA)*** can be requested for a vacant lot. These conditional letters inform the builder and others (such as the bank financing the project) that when the project is completed, it will qualify for a LOMR, LOMR-F, or LOMA. A LOMR, LOMR-F, or LOMA will still be required to officially change the NFIP map.

A processing fee is charged for LOMRs, CLOMRs , LOMR-Fs, and CLOMR-Fs and CLOMAs. There is no fee for requesting a LOMA.

An example of a LOMA is in Figure 4-6. For this site, the owner supplied the survey data needed to show that the lowest grade adjacent to his house was higher than the base flood elevation shown on the FIRM. Because the request affects only one property, a letter can be issued that describes the property and the type of map change ("This letter amends the above-referenced NFIP map to remove the structure from the SFHA.").

Federal Emergency Management Agency
Washington, D.C. 20472

FEB 23 1999

LETTER OF MAP AMENDMENT
218-70-RS

IN REPLY REFER TO CASE NO.: 99-04-1816A

Community: Town of Plymouth,
Washington County, North Carolina
Community No.: 370249
Map Panel Affected: 0003 C
Map Effective Date: May 2, 1995

We reviewed a request dated January 4, 1999, for a Letter of Map Amendment (LOMA). All required information for this request was received on February 1, 1999. Using the information submitted and the effective National Flood Insurance Program (NFIP) map, we determined that a portion of the property described below is located in the Special Flood Hazard Area (SFHA), an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood); however, the structure on the property is not in the SFHA.

| | |
|---|---|
| Property Description: | Lot 103, Liverman Heights, as described and recorded in a General Warranty Deed, Book 274, Pages 513 and 514, on August 21, 1979, by the Washington County Register of Deeds |
| Street Address: | 109 Ida Street |
| Flooding Source: | Conaby Creek |

This letter amends the above-referenced NFIP map to remove the structure from the SFHA. The structure is now located in Zone X (unshaded), an area above the 0.2-percent-annual-chance flood level. Flood insurance coverage for the structure may be available under a low-cost policy (see enclosed document). Because portions of the property remain in the SFHA, any future construction or substantial improvement on the property remains subject to Federal, State, and local regulations for floodplain management.

An additional enclosed document provides information about LOMAs. If you have any questions about this letter, please contact Helen Cohn of our staff in Washington, D.C., either by telephone at (202) 646-3457 or by facsimile at (202) 646-4596.

Sincerely,

Matthew B. Miller

Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosures

cc: State Coordinator (w/o enclosures)
Region (w/o enclosures)
Community Map Repository

**Figure 4-6: First page from a Letter of Map Amendment**

## REQUESTING MAP CHANGES

If you want a restudy or a limited map maintenance project, call your FEMA Regional Office or State NFIP coordinator and ask about the procedures.

If you want a map changed to reflect a new study that has already been done or to reflect better ground elevation data, use one of the following FEMA forms.

MT-1: Letter of Map Amendment (LOMA)
Conditional Letter of Map Amendment (CLOMA)
Letter of Map Revision (Based on Fill) (LOMR-F)
Conditional Letter of Map Revision (Based on Fill) (CLOMR-F)

MT-2: Letter of Map Revision (LOMR)
Conditional Letter of Map Revision (CLOMR)
Physical Map Revision

MT-EZ: Letter of Map Amendment (LOMA) for a single lot
Letter of Map Revision (Based on Fill) (LOMR-F) for a single lot

The MT-EZ is the shortest and simplest of the three forms. A copy is included in Appendix F. This is the form that would be used to request a LOMA like the one in Figure 4-6. A land surveyor is needed to certify the elevation data. Appendix F also includes a handout that explains the map change policies to property owners.

The building elevation certification requires some information not normally required on a FEMA Elevation Certificate, specifically, the lowest elevation on the parcel. This requirement is in addition to the lowest grade adjacent to the structure (including attached decks) and the lowest floor elevation (including the garage, crawlspace, or basement).

If the garage, crawlspace, or basement floor is below the base flood elevation and the building was built on fill that was placed in an identified SFHA, FEMA cannot issue a LOMA or LOMR even though the post-fill lowest adjacent grade is above the base flood elevation.

Except for the MT-EZ, requests for map changes should be completed by a qualified engineer or surveyor. The most common reason that a map change request is not completed is that the applicant did not submit adequate technical data to validate the change.

*Note that a bank still has the prerogative to require the purchase of a flood insurance policy on a building that has been removed from the SFHA. The bank can require flood insurance as a condition of the loan in order to protect its investment in the property. For example, lenders in Florida typically still require flood insurance coverage for structures determined to be in shaded Zone X or Zone B.*

Filled, unimproved land can be removed from SFHA on only the basis of the filled elevation, if no construction of a structure has begun when the request is submitted to FEMA.

Effective June 4, 2001, FEMA revised to process for issuing Letters of Map Revision (Based on Fill) (LOMR-F) to require assurances from the community that, for the area to be remove from the floodplain, all requirements of 44 CFR 60.3 have been met and that any existing or proposed structures in that area will be "reasonably safe from flooding." If the community cannot make these assurances, the LOMR-F will not be processed. Further guidance on the community's responsibility for making these assurances can be found in Unit 5 and in the MT-2 instructions and Technical Bulletin 10-01 *Ensuring That Structures Built on Fill in or Near Special Flood Hazard Areas Are Reasonably Safe From Flooding.*

Additional information on map changes can be found in *Answers to Questions about the National Flood Insurance Program*, questions 81 – 95.

# 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.

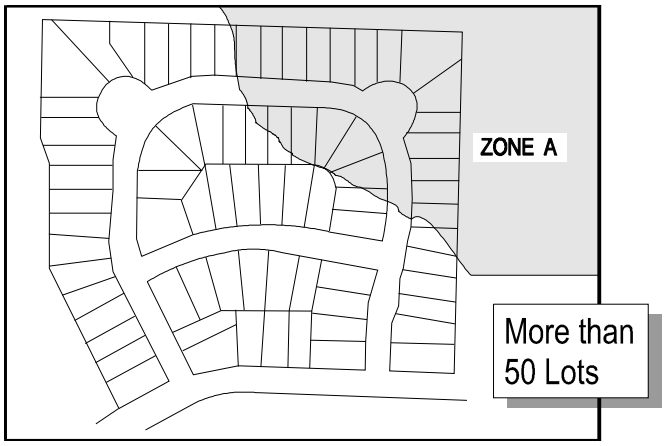



Figure 5-2: Proposed 76-lot subdivision

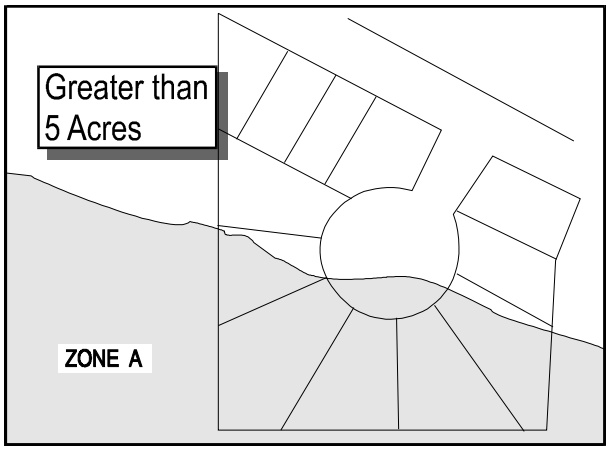



Figure 5-3: Proposed 6.7-acre subdivision

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.

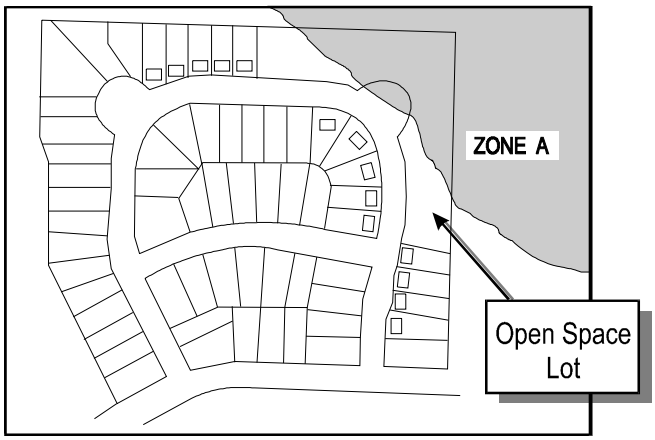



Figure 5-4: Proposed 76-lot subdivision

> ***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.

NFIP/CRS

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 <u>development</u> 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.

**"NO-RISE" CERTIFICATION**

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.*

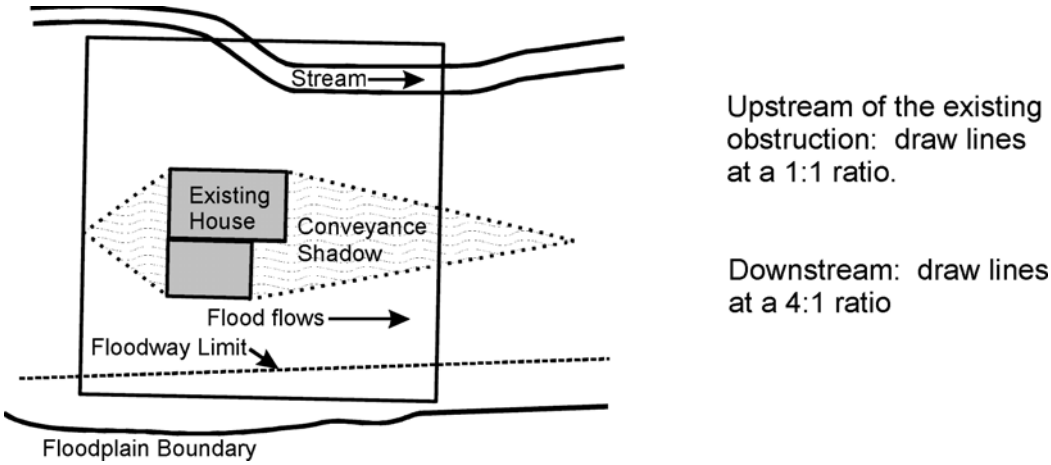



Figure 5-6. Determining the conveyance shadow

## 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.

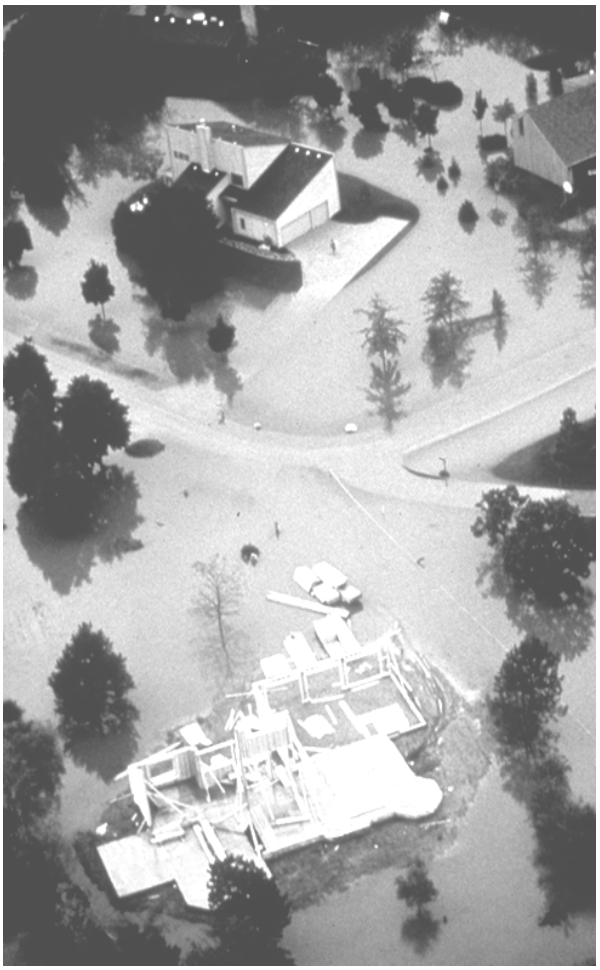


Figure 5-7. These two new buildings elevated on fill were not damaged by this 100-year flood.

## 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.

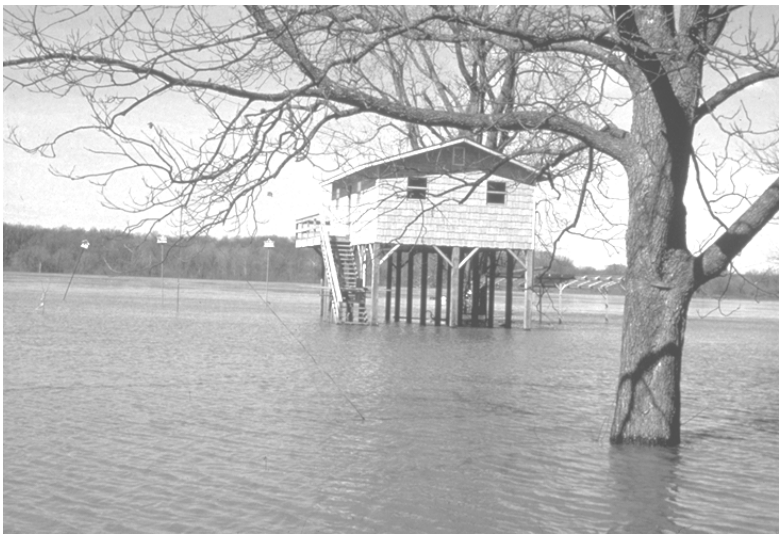


Figure 5-8. Elevation on piers

## 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:

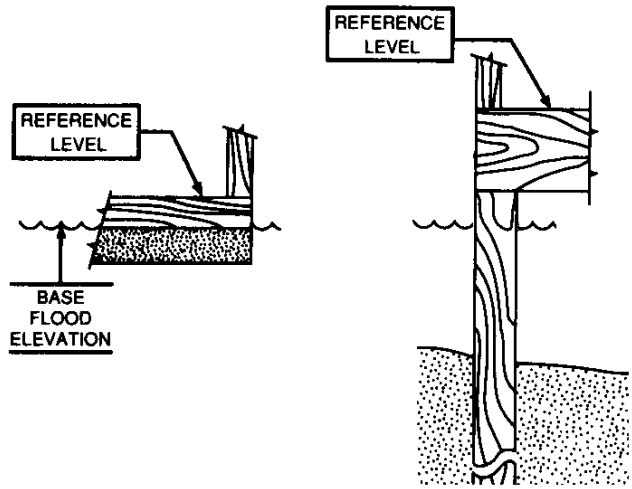
1. The term "lowest floor" includes a basement because all usable portions of a building must be protected from flood damage.

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

   Example 2: $\frac{\text{2,000 square foot house}}{\text{128 square inches/opening}} = 15.62$ — 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.

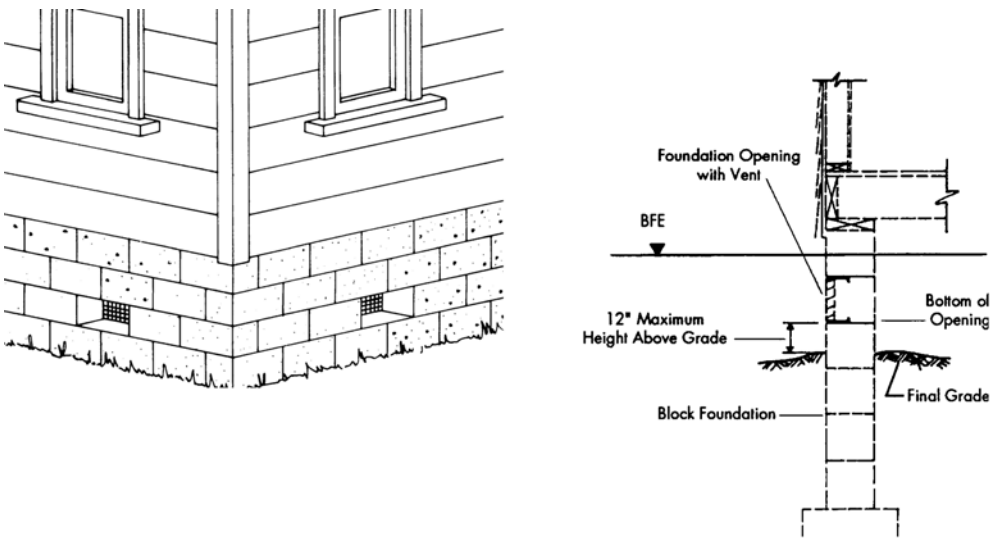



Figure 5-12. Opening location in solid foundation wall

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 (I) 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 __.

_____ _____ (Seal)
Owner

_____ _____ (Seal)
Witness

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 nonresidential basement 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 floodproofed.

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.

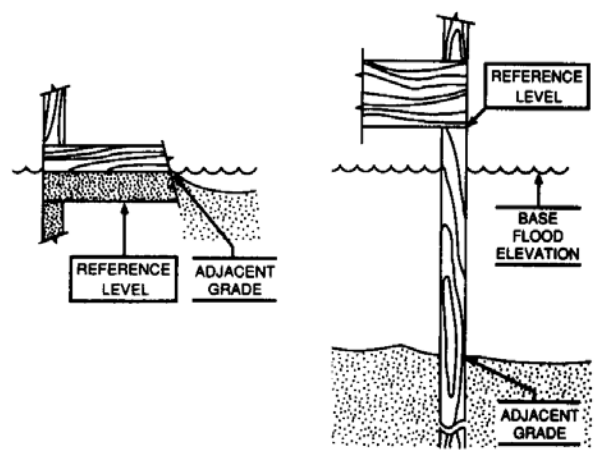



Figure 5-15: In V Zones, the lowest floor is measured from the bottom of the lowest horizontal structural member

## 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).

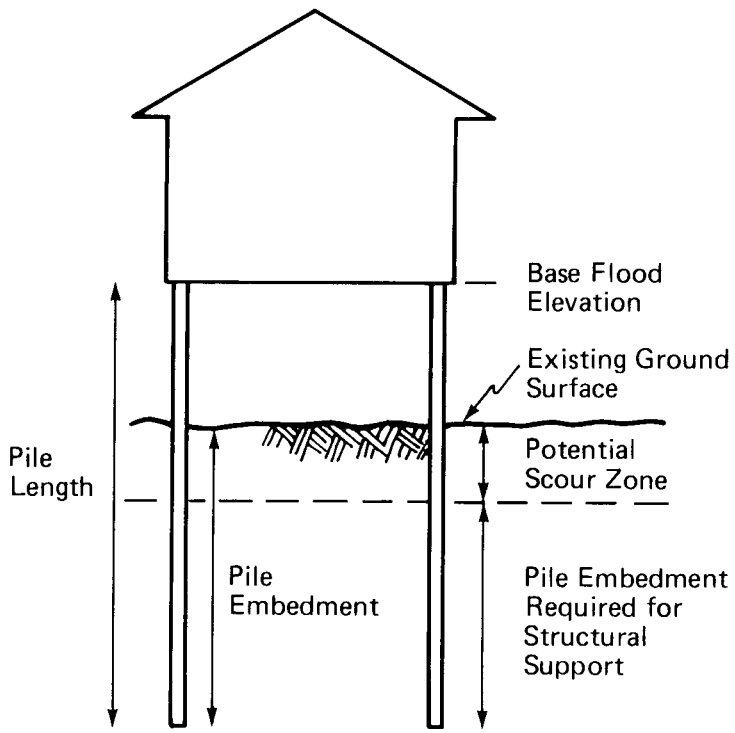



Figure 5-16: Piles must be embedded well below the scour depth

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.

| V-Zone Certification | | | | |
|---|---|---|---|---|
| Property Information | | | For Insurance Company Use | |
| Name of Building Owner | | | Policy Number | |
| Building Address or Other Description | | | | |
| City | | | State | Zip Code |
| SECTION I: FLOOD INSURANCE RATE MAP (FIRM) INFORMATION<br>*Note: to be obtained from appropriate FIRMs* | | | | |
| Community Number | Panel Number | Suffix | Date of FIRM Index | FIRM Zone |
| SECTION II: ELEVATION INFORMATION<br>*Note: This form is not a substitute for an Elevation Certificate. Elevations should be rounded to nearest tenth of a foot.* | | | | |
| 1. Elevation of the Bottom of Lowest Horizontal Structure Member ..... _____ feet<br>2. Base Flood Elevation ..... _____ feet<br>3. Elevation of Lowest Adjacent Grade ..... _____ feet<br>4. Approximate Depth of Anticipated Scour/Erosion Used for Foundation Design ..... _____ feet<br>5. Embedment Depth of Pilings or Foundation Below Lowest Adjacent Grade ..... _____ feet<br>6. Datum Used: _____ NGVD '29 _____ NAVD '88 _____ Other | | | | |
| SECTION III: FLOOD INSURANCE RATE MAP (FIRM) INFORMATION<br>*Note: This section must be certified by a registered professional engineer or architect*<br>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:<br>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,<br>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. | | | | |
| SECTION IV: FLOOD INSURANCE RATE MAP (FIRM) INFORMATION<br>*Note: This section must be certified by a registered professional engineer or architect*<br>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:<br>c) Breakaway collapse shall result from water load less than that which would occur during the base flood; and,<br>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).. | | | | |
| SECTION V: CERTIFICATION<br>*(Check: Section III ____ and/or Section IV _____ )* | | | | |
| Name of Certifier | | Title | | |
| Firm Name | | | License Number | |
| Street Address | | | Phone Number<br>( ) | |
| 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 floodprone 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 floodprone 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.

| Case | Issue | Decision/Impact |
|---|---|---|
| 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 *elasticity* 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.<br>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.<br>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.

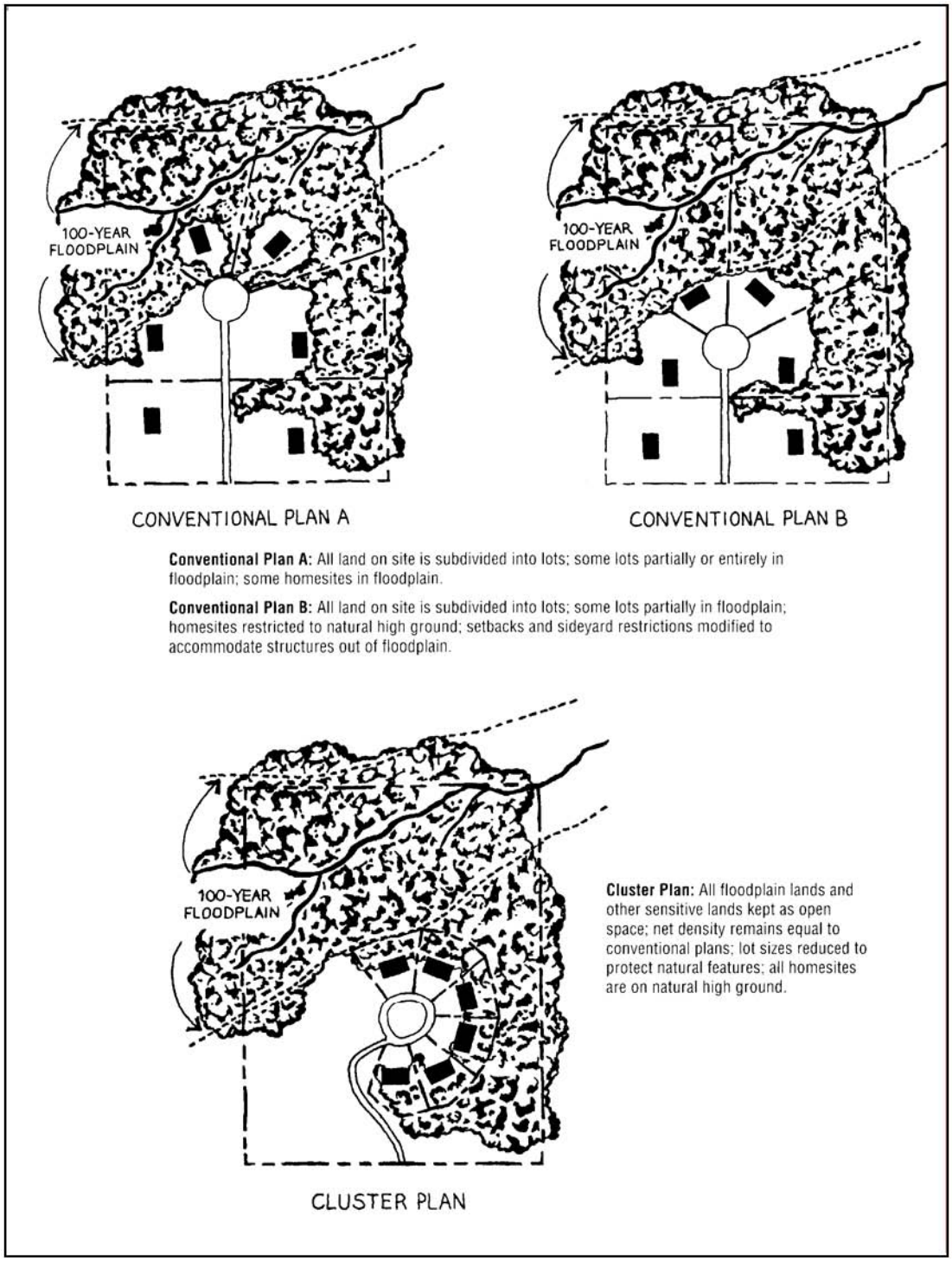


**Figure 6-3. Clustering can keep buildings out of smaller floodplains**

***(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
Ammonia
Benzene
Calcium carbide
Carbon disulfide
Celluloid
Chlorine
Hydrochloric acid
Prussic acid
Magnesium
Nitric acid
Oxides of nitrogen
Phosphorus
Potassium
Sodium
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
Storage tanks
Lumber /buoyant items
Gasoline
Charcoal/coal dust
Petroleum products

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

Drugs
Food products
Matches/sulfur products
Soaps/detergents
Tires

## 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 flood-waters 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).

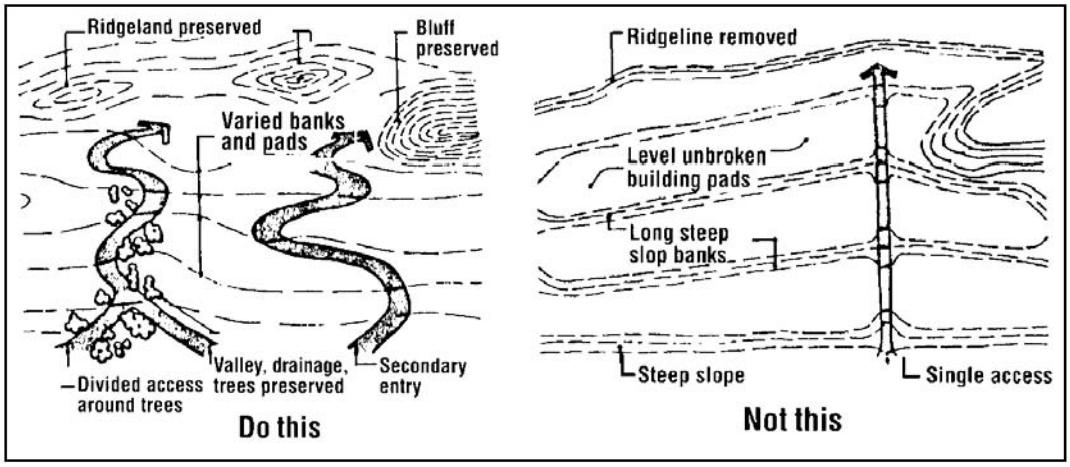


**Figure 6-5. Los Angeles County's hillside grading guidelines.**

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 de-termine 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.

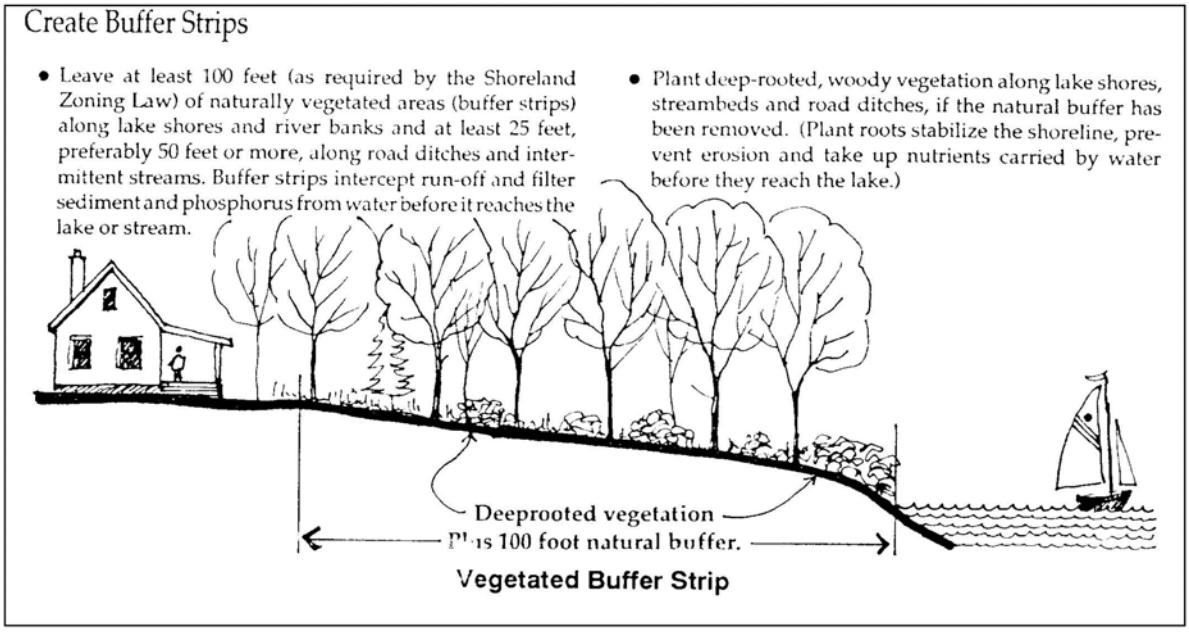


**Figure 6-6: Buffer strips.**

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 en-forced 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. How-ever, 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.

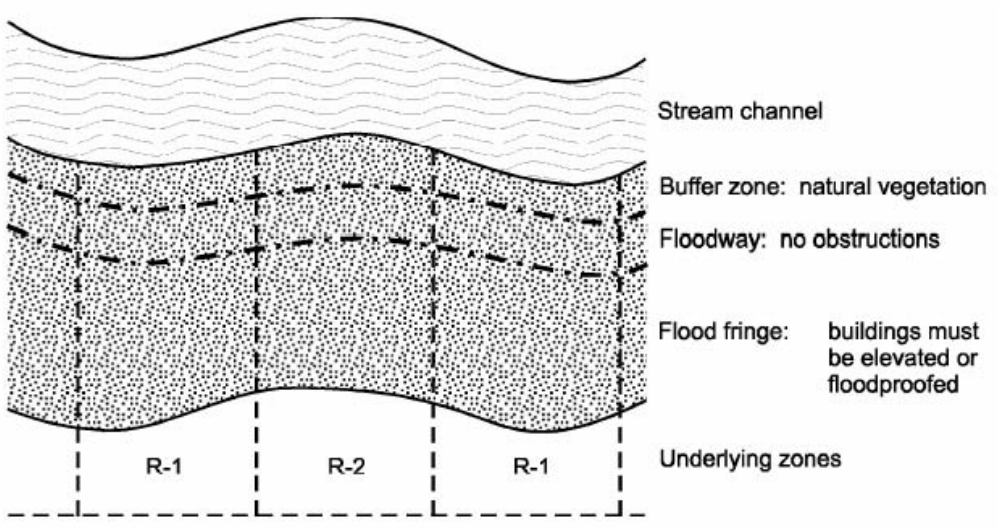


**Figure 7-1. Example of overlay zoning**

## 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 of 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. (8009) 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 en-force 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, your 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 be-comes 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, pro-vides 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 avail-able 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).

# 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.

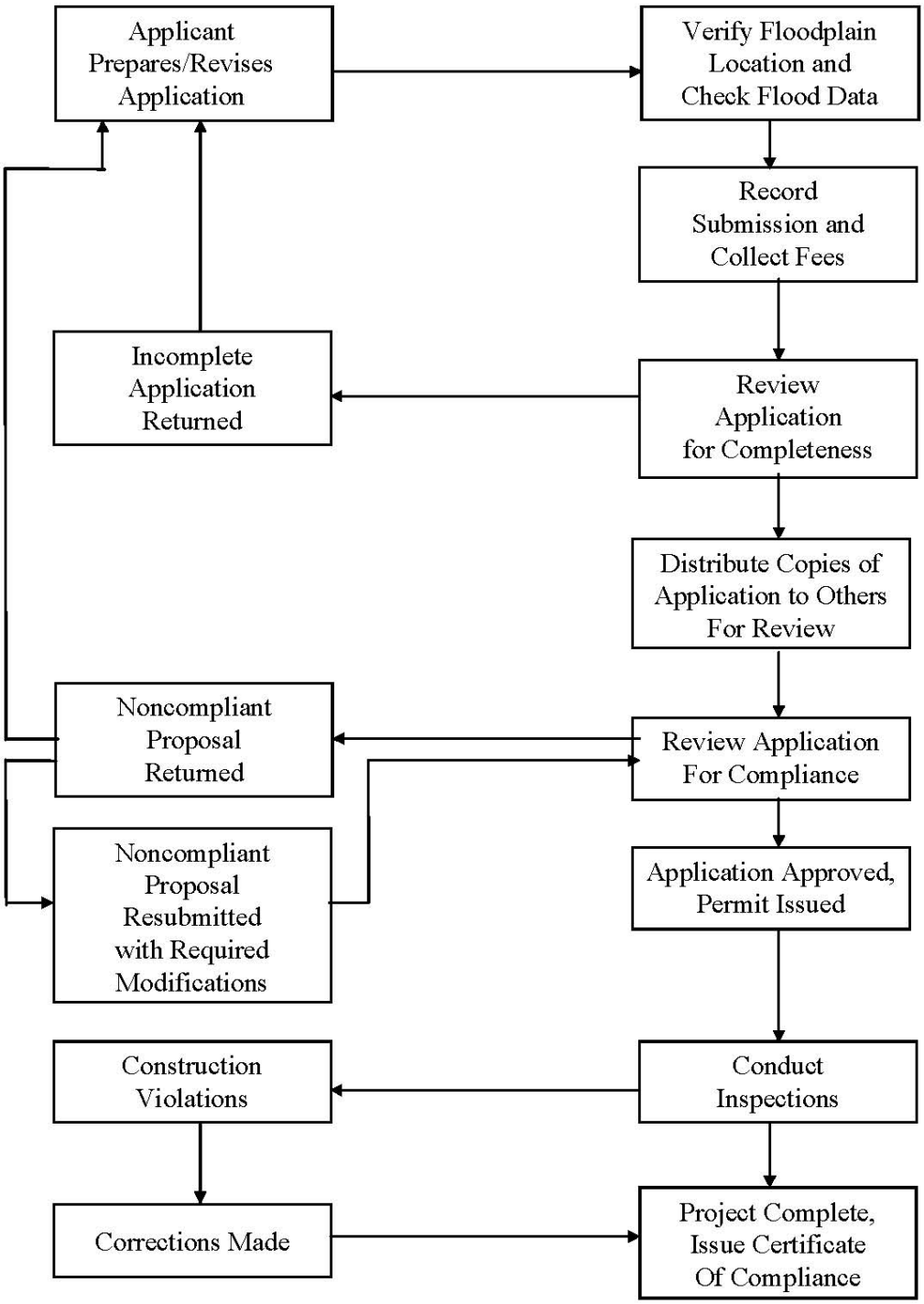


**Figure 7-2. Permit process flow chart**

## 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 be-cause 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 pro-vide 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. Be-cause 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)

Application # ____
Page 1 of 4

**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)

DESCRIPTION OF WORK (Check all applicable boxes): Application # _____

Page 2 of 4

A. STRUCTURAL DEVELOPMENT

| ACTIVITY | STRUCTURE TYPE |
|---|---|
| ❑ New Structure | ❑ Residential (1-4 Family) |
| ❑ Addition | ❑ Residential (More than 4 Family) |
| ❑ Alteration | ❑ Non-residential (Floodproofing? ❑ Yes) |
| ❑ Relocation | ❑ Combined Use (Residential & Commercial) |
| ❑ Demolition | ❑ Manufactured (Mobile) Home (In Manufactured Home Park? ❑ Yes) |
| ❑ 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)_____

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)

Application # _____

Page 3 of 4

**SECTION 4: Additional Information Required** (To be completed by Local Administrator)

The applicant must submit the documents checked below before the application can be processed:

❑ A site plan showing the location of all existing structures, water bodies, adjacent roads, lot dimensions, and proposed development.

❑ Development plans, drawn to scale, and specifications, including where applicable: details for anchoring structures, proposed elevation of lowest floor (including basement), types of water-resistant materials used below the first floor, details of floodproofing of utilities located below the first floor, and details of enclosures below the first floor.

Also, _____

❑ Subdivision or other development plans. (If the subdivision or other development exceeds 50 lots or 5 acres, whichever is the lesser, the applicant must provide "100-year" flood elevations if they are not otherwise available).

❑ Plans showing the extent of watercourse relocation and/or landform alterations.

❑ Change in water elevation (in feet) _____ ❑ Meets ordinance limits on elevation increases ❑ YES ❑ NO

❑ Top of new compacted fill elevation _____ ft. NGVD (MSL).

❑ Floodproofing protection level (non-residential only) _____ ft. NGVD (MSL). For floodproofed structures, applicant must attach certification from registered engineer or architect.

❑ Certification from a registered engineer that the proposed activity in a regulatory floodway will not result in any increase in the height of the "100-year" flood. A copy of all data and hydraulic/hydrologic calculations supporting this finding must also be submitted.

❑ Other: _____

_____

**SECTION 5: PERMIT DETERMINATION** (To be completed by **LOCAL ADMINISTRATOR**)

I have determined that the proposed activity: A. ❑ Is
B. ❑ Is not

in conformance with provisions of Local Law # _____, 19___. The permit is issued subject to the conditions attached to and made part of this permit.

SIGNED_____DATE_____

If Box A is checked, the Local Administrator may issue a Development Permit upon payment of designated fee. If Box B is checked, the Local Administrator will provide a written summary of deficiencies. Applicant may revise and resubmit an application to the Local Administrator or may request a hearing from Board of Appeals.

Application # _____

**Figure 7-4c. Sample floodplain development permit application form**

(Developed by the North Carolina Division of Emergency Management)

APPEALS: Appealed to Board of Appeals? ❑ Yes ❑ No
Hearing date:_____
Appeals Board Decision - Approved? ❑ Yes ❑ No

Reasons/Conditions:_____

_____

_____

**SECTION 6: AS-BUILT ELEVATIONS** (To be submitted by **APPLICANT** before Certification of Compliance is issued)

The following information must be provided for structures that are part of this application. This section must be completed by a registered professional engineer or a licensed land surveyor (or attach a certification to this application). Complete 1 and 2 below.

1. Actual (As-Built) Elevation of the top of the lowest floor, including basement (in Coastal High Hazard Areas, bottom of lowest horizontal structural member of the lowest floor, excluding piling(s) and columns) is: _____ ft. NGVD (MSL).

2. Actual (As-Built) Elevation of floodproofing protection is _____ft. NGVD (MSL).

**SECTION 7: COMPLIANCE ACTION** (To be completed by **LOCAL ADMINISTRATOR**)

The **LOCAL ADMINISTRATOR** will complete this section as applicable based on inspection of the project to ensure compliance with the community's local law for flood damage prevention.

INSPECTIONS DATE: _____ BY_____ DEFICIENCIES? ❑ Yes ❑ No
DATE_____ BY_____ DEFICIENCIES? ❑ Yes ❑ No
DATE_____ BY_____ DEFICIENCIES? ❑ Yes ❑ No

**SECTION 8: CERTIFICATE OF COMPLIANCE** (To be completed by **LOCAL ADMINISTRATOR**)

Certificate of Compliance issued: DATE_____ BY_____

**Figure 7-4d. 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 (crawlspace, 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 changes 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 com-plying 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-cord 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 con-duct. 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 foreclose.
- 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 hard-ship 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 mini-mum 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 in-stances, 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**

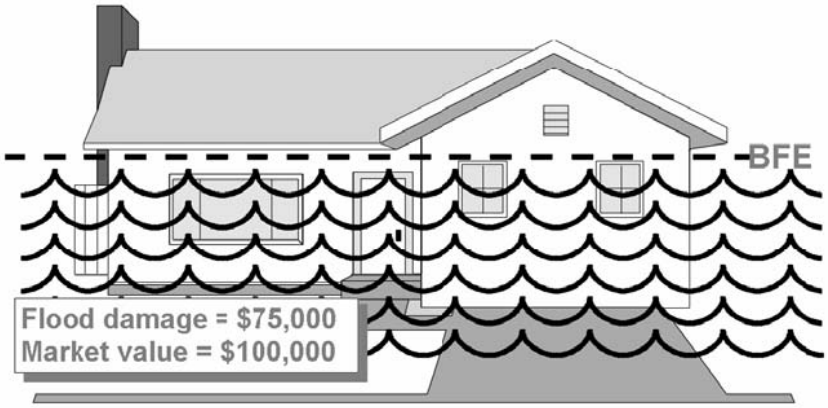


**Figure 7-8. Pre-FIRM building—substantially damaged by 1997 flood**

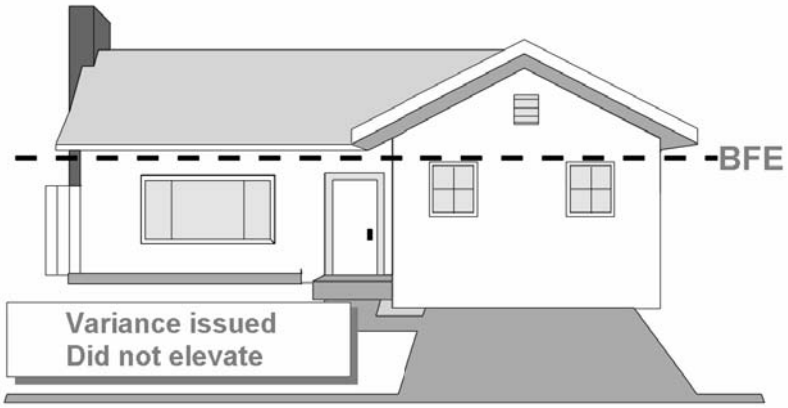


**Figure 7-9. Repaired—variance issued and building is not elevated to or above the BFE (building is 7 feet below BFE); actuarial rate: $3,090**

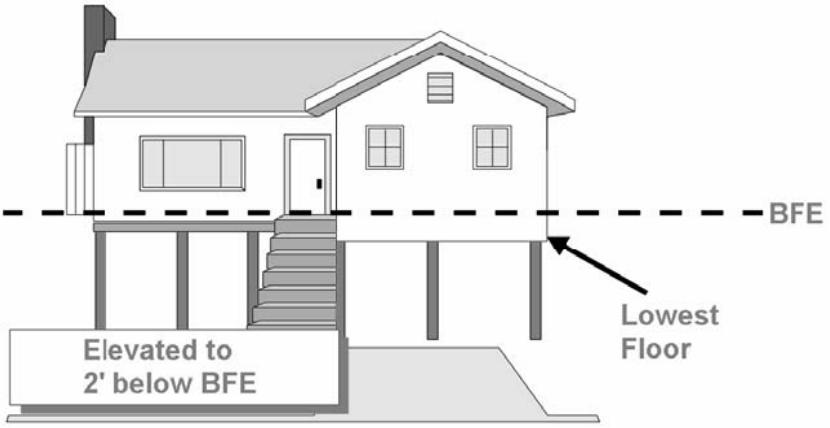


**Figure 7-10. Repaired—variance allowed. Elevated to 2' below BFE; actuarial rate: $1,140**

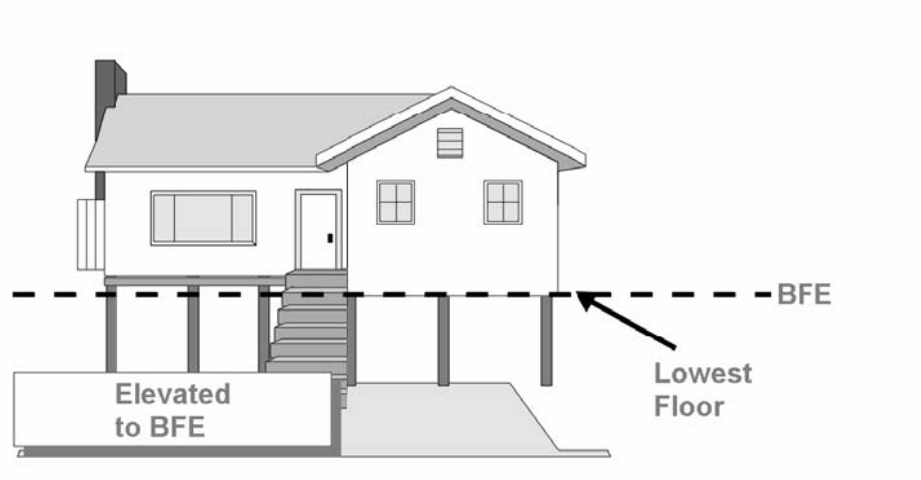


**Figure 7-11. Repaired—elevated to BFE; actuarial rate: $351**

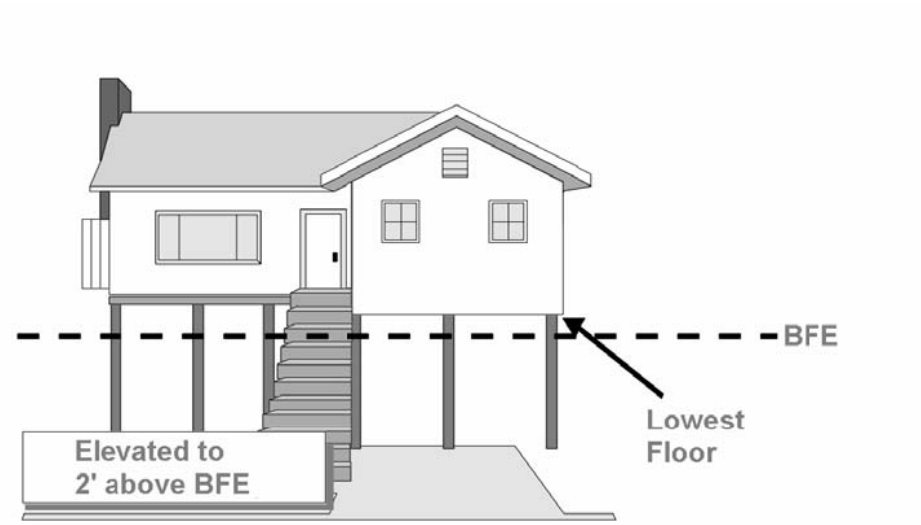


**Figure 7-12. Repaired—elevated 2 feet above BFE; actuarial rate: $216**

## 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 in 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

**REGULAR PROGRAM**
**(With Base Flood Elevations)**

RETURN TO:
Federal Emergency Management Agency
Biennial Report Coordinator
P.O. Box 1038
Jessup, Maryland 20794-1038

**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 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.*

| | Yes | No |
|---|---|---|
| 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) | ☐ | ☐ |
| 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) | ☐ | ☐ |
| 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) | ☐ | ☐ |
| 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) | ☐ | ☐ |

**SECTION II – Community Floodplain Management Data during the last 2 years (calendar years 2001-2002 only):**

| | Yes | No |
|---|---|---|
| A. Has your community updated its floodplain management ordinance during the reporting period? 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? | ☐ | ☐ |

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 entire community (including flood hazard areas) | | | |
| | | | |
| 2a. In your flood hazard areas only. | | | |
| | | | |

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 |
| | | | |

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Retain a copy of this report for your records
REPLACES ALL PREVIOUS EDITIONS

**Figure 7-14. Example Biennial Report**

# UNIT 8
# SUBSTANTIAL IMPROVEMENT AND SUBSTANTIAL DAMAGE

## In this unit

This unit covers:

- The substantial improvement rule – how to regulate major additions and other improvements to buildings in the floodplain.
- The substantial damage rule – how to regulate reconstruction and repairs to buildings that have been severely damaged.
- Exceptions to the basic rules for some special cases.

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# INTRODUCTION

In previous units we focused on the rules and regulations that prevent or reduce damage from floods to new buildings. But what happens when the owner wishes to make an improvement, such as an addition, to an existing building? What if a building is damaged by a fire, flood or other cause?

***Basic rule:*** *If the cost of improvements or the cost to repair the damage exceeds 50 percent of the market value of the building, it must be brought up to current floodplain management standards.*

That means an existing building must meet the requirements for new construction.

People who own existing buildings that are being substantially improved will be required to make a major investment in them in order to bring them into compliance with the law. They will not be happy. If the buildings have just been damaged, they will be financially strapped and your elected officials will want to help them, not make life harder for them.

For these reasons, it is easy to see that this basic rule can be difficult to administer. It is also the one time when your regulatory program can reduce flood damage to existing buildings. That's why this course devotes this unit to administering the substantial improvements and substantial damage regulations.

*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 reviewed in more detail in Unit 5, Section E.*

# A. SUBSTANTIAL IMPROVEMENT

***44 CFR 59.1. Definitions:*** *"Substantial improvement" means any reconstruction, rehabilitation, addition or other improvement to a structure, the total cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement.*

This section provides information on determining whether a building has been substantially improved and on what NFIP requirements apply.

## PROJECTS AFFECTED

All building improvement projects worthy of a permit must be considered. These include:

- Remodeling projects.
- Rehabilitation projects.
- Building additions.
- Repair and reconstruction projects (these are addressed in more detail in Section B on substantial damage)

If your community does not require permits for, say, reroofing, minor maintenance or projects under a certain dollar amount, then such projects are not subject to the substantial improvement requirements. However, if you have a larger project that includes reroofing, etc., then it must include the entire cost of the project.

One problem you may face is a builder trying to avoid the requirement by applying for a permit for only part of the job and then later applying for another permit to finish the work. If both applications are together worth more than 50% of the value of the building, the combined project should be considered a substantial improvement and subject to the rules.

FEMA requires that the entire improvement project be counted as one. In order to help you enforce this, you may want to count all applications submitted over, say, one year as one project. Check with your attorney on whether your ordinance clearly gives you the authority to do this and be sure to spell it out in the permit papers given to the applicant.

Some communities require that improvements be calculated cumulatively over several years. All improvement and repair projects undertaken over a period of five years, 10 years or the life of the structure are added up. When they total 50 percent, the building must be brought into compliance as if it were new construction.

The Community Rating System credits keeping track of improvements to enforce a cumulative substantial improvement requirement. It also credits using a lower threshold than 50 percent. These credits are found under Activity 430, Section 431.c and d in the *CRS Coordinator's Manual* and the *CRS Application*. See also *CRS Credit for Higher Regulatory Standards* for example regulatory language.

## Post-FIRM buildings

The rules do not address only pre-FIRM buildings—they cover *all* buildings, post-FIRM ones included.

In most cases, a post-FIRM building will be properly elevated or otherwise compliant with regulations for new construction. However, sometimes a map change results in a higher BFE or change in FIRM zone. A substantial improvement to a post-FIRM building may require that the building be elevated to protect it from the new, higher, regulatory BFE.

It should be remembered that all additions to a post-FIRM building must be elevated at least as high as the BFE in effect when the building was built. (You can't allow a compliant building to become noncompliant by allowing additions at grade.) If a new, higher BFE has been adopted since the building was built, additions that are substantial improvements must be elevated to the new BFE.

## THE FORMULA

A project is a substantial improvement if:

$$\frac{\text{Cost of improvement project}}{\text{Market value of the building}} \geq 50 \text{ percent}$$

For example, if a proposed improvement project will cost $30,000 and the value of the building is $50,000:

$$\frac{\$30{,}000}{\$50{,}000} = 0.6 \text{ (60 percent)}$$

The cost of the project exceeds 50 percent of the building's value, so it is a substantial improvement. The floodplain regulations for new construction apply and the building must meet

the post-FIRM construction requirements. If the project is an addition, only the addition has to be elevated (see the examples later in this section).

The formula is based on the cost of the project and the value of the building. These two numbers must be reviewed in detail.

## Project cost

The cost of the project means all structural costs, including

- all materials
- labor
- built-in appliances
- overhead
- profit
- repairs made to damaged parts of the building worked on at the same time

A more detailed list is included in Figure 8-1.

To determine substantial improvement, you need a detailed cost estimate for the project, prepared by a licensed general contractor, professional construction estimator or your office.

Your office must review the estimate submitted by the permit applicant. To verify it, you can use your professional judgment and knowledge of local and regional construction costs, or you can use building code valuation tables published by the major building code groups. These tables can be used for determining estimates for particular replacement items if the type of structure in question is listed in the tables.

There are two possible exemptions you should be aware of: 1) improvements to correct code violations do not have to be included in the cost of an improvement or repair project and 2) historic buildings can be exempted from substantial improvement requirements. These are explained in more detail later on.

## Market value

In common parlance, market value is the price a willing buyer and seller agree upon. The market value of a structure reflects its original quality, subsequent improvements, physical age of building components and current condition.

However, market value for property can be different than that of the building itself. Market value of developed property varies widely due to the desirability of its location. For example, two houses of similar size, quality and condition will have far different prices if one is on the coast, or in the best school district, or closer to town than the other—but the value of the building materials and labor that went into both houses will be nearly the same.

For the purposes of determining substantial improvement, market value pertains only to the structure in question. It does not pertain to the land, landscaping or detached accessory structures on the property. Any value resulting from the location of the property should be attributed to the value of the land, not the building.

**Items to be included**

— All structural elements, including:
— Spread or continuous foundation footings and pilings
— Monolithic or other types of concrete slabs
— Bearing walls, tie beams and trusses
— Floors and ceilings
— Attached decks and porches
— Interior partition walls
— Exterior wall finishes (brick, stucco, siding) including painting and moldings
— Windows and doors
— Reshingling or retiling a roof
— Hardware
— All interior finishing elements, including:
— Tiling, linoleum, stone, or carpet over subflooring
— Bathroom tiling and fixtures
— Wall finishes (drywall, painting, stucco, plaster, paneling, marble, etc.)
— Kitchen, utility and bathroom cabinets
— Built-in bookcases, cabinets, and furniture
— Hardware
— All utility and service equipment, including:
— HVAC equipment
— Plumbing and electrical services
— Light fixtures and ceiling fans
— Security systems
— Built-in kitchen appliances
— Central vacuum systems
— Water filtration, conditioning, or recirculation systems
— Cost to demolish storm-damaged building components
— --- Labor and other costs associated with moving or altering undamaged building components to accommodate improvements or additions
— --- Overhead and profits

**Items to be excluded**

— Plans and specifications
— Survey costs
— Permit fees
— Post-storm debris removal and clean up
— Outside improvements, including:
— Landscaping
— Sidewalks
— Fences
— Yard lights
— Swimming pools
— Screened pool enclosures
— Detached structures (including garages, sheds and gazebos)
— Landscape irrigation systems

**Figure 8-1. Items included in calculating cost of the project**

Acceptable estimates of market value can be obtained from these sources:

- An independent appraisal by a professional appraiser. The appraisal must exclude the value of the land and not use the "income capitalization approach" which bases value on the use of the property, not the structure.
- Detailed estimates of the structure's actual cash value— the replacement cost for a building, minus a depreciation percentage based on age and condition. For most situations, the building's actual cash value should approximate its market value. Your community may prefer to use actual cash value as a substitute for market value, especially where there is not sufficient data or enough comparable sales.
- Property values used for tax assessment purposes with an adjustment recommended by the tax appraiser to reflect current market conditions (adjusted assessed value).
- The value of buildings taken from NFIP claims data (usually actual cash value).
- Qualified estimates based on sound professional judgment made by the staff of the local building department or tax assessor's office.

Some market value estimates are often used only as screening tools (i.e., NFIP claims data and property appraisals for tax assessment purposes) to identify those structures where the substantial improvement ratios are obviously less than or greater than 50 percent (i.e., less than 40 percent or greater than 60 percent). For structures that fall in the 40 percent to 60 percent range, more precise market value estimates are sometimes necessary.

## SUBSTANTIAL IMPROVEMENT EXAMPLES

### Example 1. Minor rehabilitation

A rehabilitation is defined as an improvement made to an existing structure which does not affect the external dimensions of the structure.

If the cost of the rehabilitation is less than 50 percent of the structure's market value, the building does not have to be elevated or otherwise protected. However, it is advisable to incorporate methods to reduce flood damage, such as use of flood-resistant materials and installation of electrical, heating and air conditioning units above the BFE.

Figure 8-2 shows a building that had a small rehabilitation project. Central air conditioning was installed and the electrical system was upgraded. The value of the building before the project was $60,000. The value of the project was $12,000:

$\frac{\$12,000}{\$60,000} = 0.2$ (20 percent) The project costs less than 50 percent of the building, so this is not a substantial improvement.

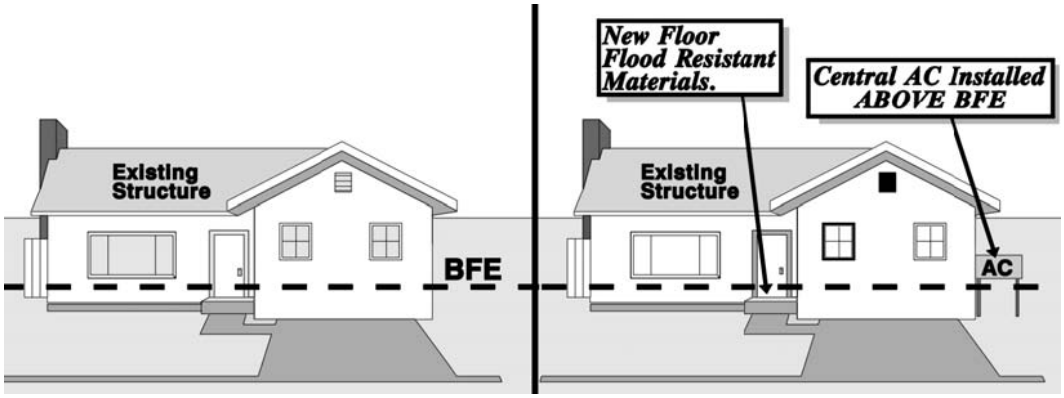



**Figure 8-2. Minor rehabilitations use flood-resistant methods and materials**

Neither structure would benefit from post-FIRM flood insurance rates because they are not elevated.

Note: To gauge what happens to flood insurance premiums if a substantially improved building is not brought up to post-FIRM standards, see Figures 7-7 through 7-12.

## Example 2. Substantial rehabilitation

If the rehab costs more than 50 percent of the value of the building, your ordinance requires that an existing structure be elevated and/or the basement filled to meet the elevation standard.

Figure 8-3 shows a building that has been allowed to run down. It's market value is $35,000. To rehab it will require gutting the interior and replacing all wallboard, built-in cabinets, bathroom fixtures and furnace. The interior doors and flooring will be repaired. The house will get new siding and a new roof. The cost of this rehab will be $25,000:

$\frac{\$25,000}{\$35,000}$ = 71.4 percent

Because total cost of the project is greater than 50 %the rehab is a substantial improvement

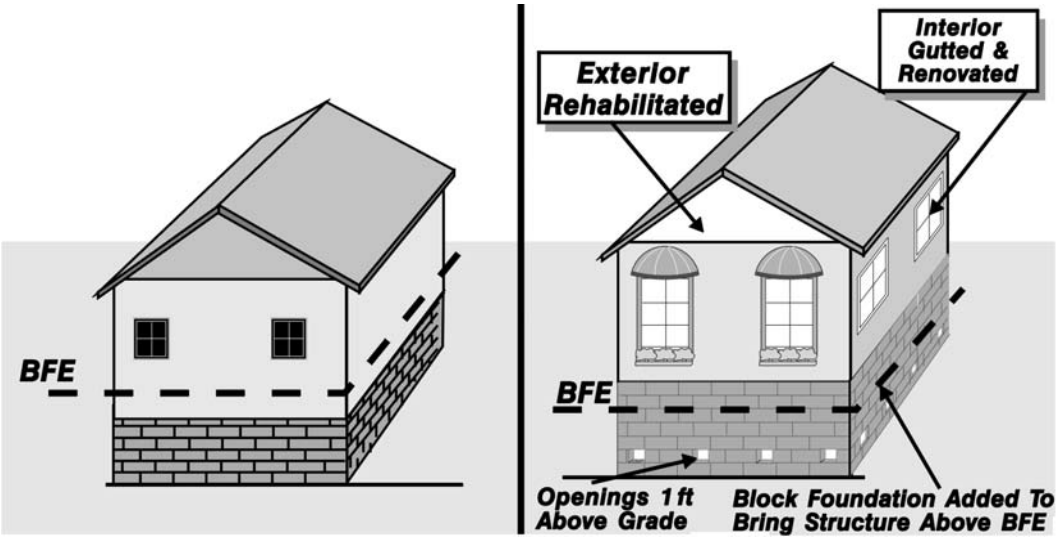



**Figure 8-3. substantially rehabilitated building elevated above the BFE.**

In A Zones, elevation may be on fill, crawlspace, columns, etc. In V Zones, only pilings, columns or other open foundations are allowed. The new structure would benefit from post-FIRM flood insurance rates.

## Example 3. Lateral addition—residential

Additions are improvements that increase the square footage of a structure. Commonly, this includes the structural attachment of a bedroom, den, recreational room garage or other type of addition to an existing structure. Note that if one building is attached to another through a covered breezeway or similar connection, it is a separate building and not an addition.

When an addition is a substantial improvement, the addition must be elevated or floodproofed, providing that improvements to the *existing* structure are minimal. Figures 8-4 and 8-5 illustrate lateral additions that are compliant.

Depending on the flood zone and details of the project, the existing building may not have to be elevated. The determining factors are the common wall and what improvements are made to the existing structure. If the common wall is demolished as part of the project, then the entire structure must be elevated. If only a doorway is knocked through it and only minimal finishing is done, then only the addition has to be elevated.

In A Zones only, if significant improvements are made to the existing structure (such as a kitchen makeover), both it and the addition must be elevated and otherwise brought into compliance. Some states and many communities require that both the existing structure and lateral additions be elevated in all cases.

In V Zones, the existing structure always has to be elevated, placed on an engineered foundation system, etc., when an addition is proposed that constitutes a substantial improvement. This is due to the "free-of obstruction" standard whereby the lower existing structure would obstruct the storm surge, causing damage to the addition.

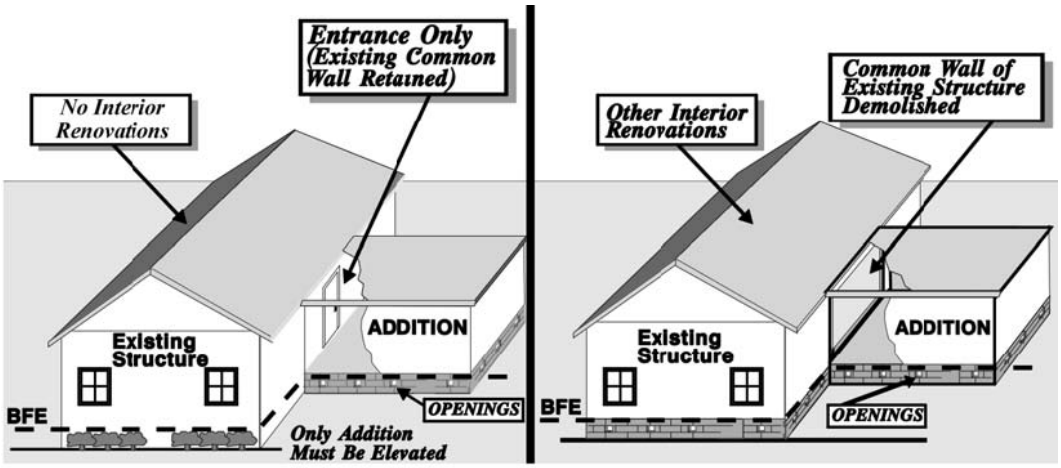



**Figure 8-4. Lateral additions to a residential building in an A Zone.**

In V Zones, the entire building must be elevated on pilings, columns or other open foundations. The

structure on the left would not benefit from post-FIRM flood insurance rates because it was not elevated.

## Example 4. Lateral addition—nonresidential

A substantial improvement addition to a nonresidential building may be either elevated or floodproofed. Otherwise, all the criteria for residential buildings reviewed in Example 3 must be met.

If floodproofing is used, the builder must ensure that the wall between the addition and the original building is floodproofed. Floodproofing is not allowed as a construction measure in V Zones.

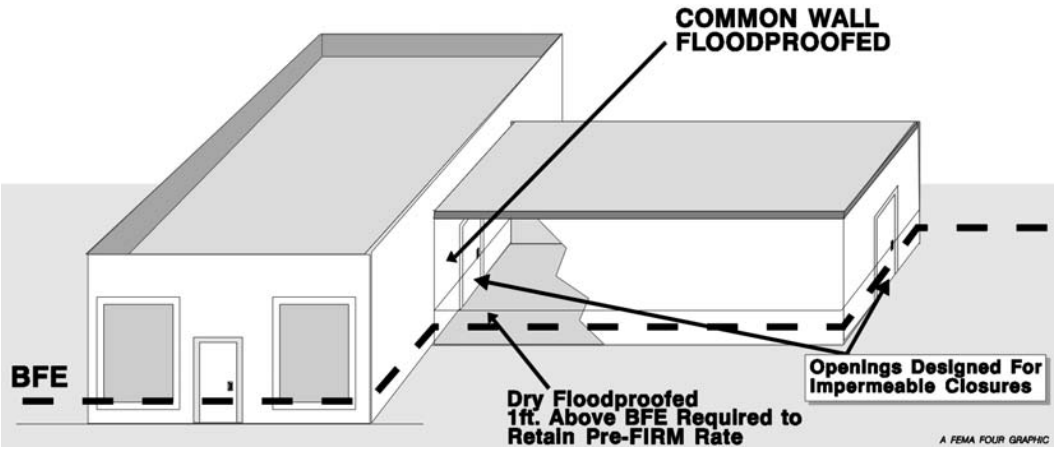



**Figure 8-5. Lateral addition to a nonresidential building in an A Zone.**

This approach is not allowed in V Zones. The structure would *not* benefit from post-FIRM flood insurance rates because the original building was not elevated or flood-proofed.

## Example 5. Vertical addition—residential

When the proposed substantial improvement is a full or partial second floor, the entire structure must be elevated (Figure 8-6). In this instance, the existing building provides the foundation for the addition. Failure of the existing building would result in failure of the addition, too.

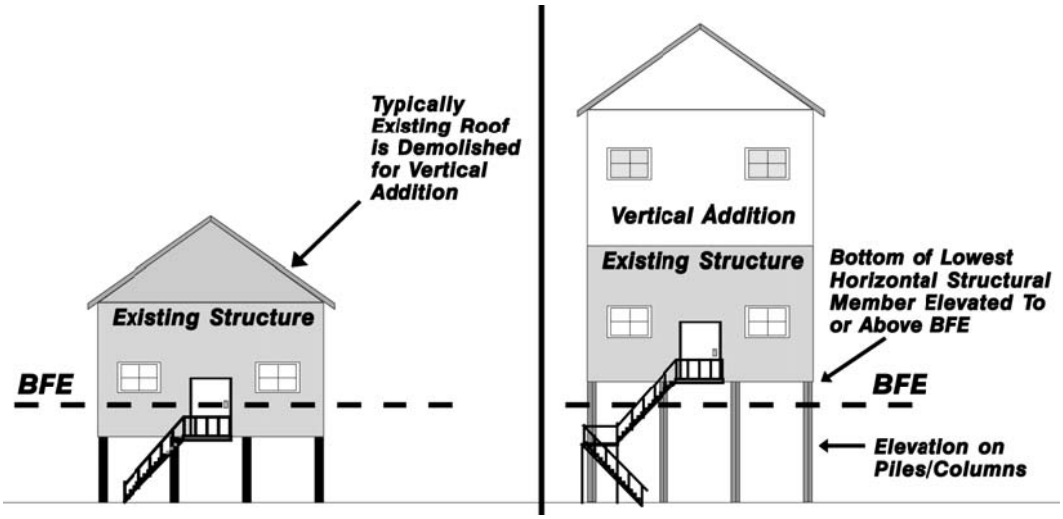



**Figure 8-6. Vertical addition to a residential building in a V Zone.**

The new structure would benefit from post-FIRM flood insurance rates.

## Example 6. Vertical addition—nonresidential

When the proposed substantial improvement is a full or partial second floor, the entire structure must be elevated or floodproofed (Figure 8-7).

The owner could obtain post-FIRM rates on the building if it is floodproofed to one foot above the BFE and he has a floodproofing certificate signed by a registered engineer. An optional approach is to elevate the entire building and obtain an elevation certificate.

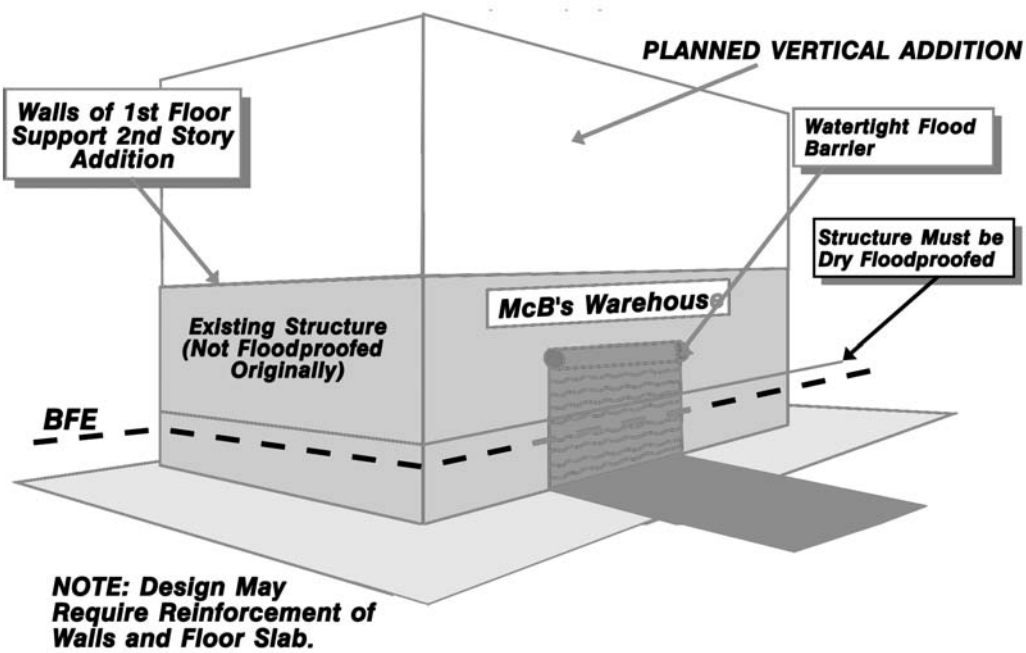



**Figure 8-7. Vertical addition to a nonresidential building in an A Zone.**

The new floodproofed structure would benefit from post-FIRM flood insurance rates.

## Example 7. Post-FIRM building—minor addition

All additions to post-FIRM buildings are defined as new construction and must meet the requirements of your floodplain management ordinance regardless of the size or cost of the addition (Figure 8-8). A small addition to a residential structure that is not a substantial improvement must be elevated at least as high as the BFE in effect when the building was built. Minor additions to nonresidential structures can be floodproofed to the BFE.

If a map revision has taken place and the BFE has increased, only additions that are substantial improvements have to be elevated to the new BFE or flood-proofed (nonresidential buildings only).

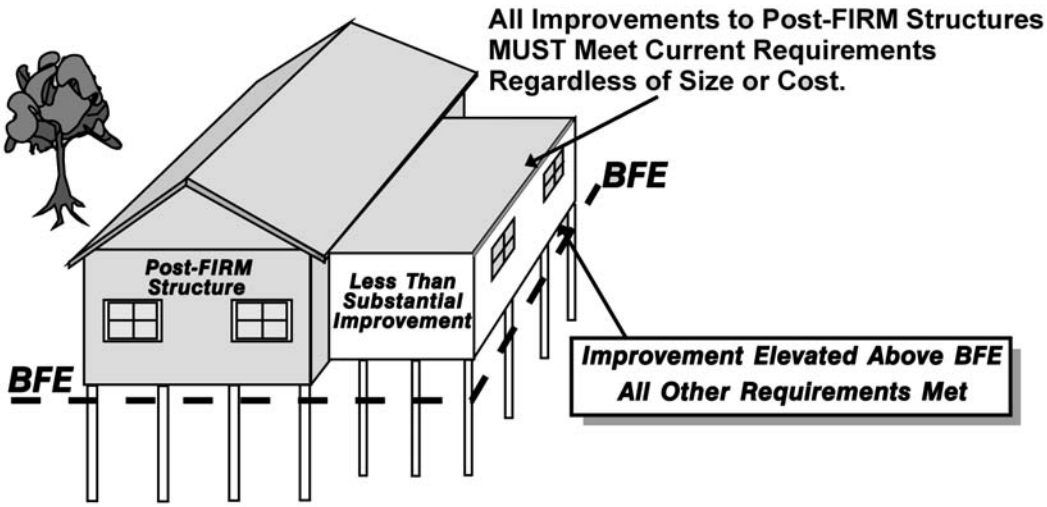



**Figure 8-8. Small additions to post-FIRM buildings must be elevated.**

## Example 8. Post-FIRM building—substantial improvement

Substantial improvements made to a post-FIRM structure must meet the requirements of the current ordinance. Figure 8-9 shows a lateral addition made after a map revision took place and the BFE was increased.

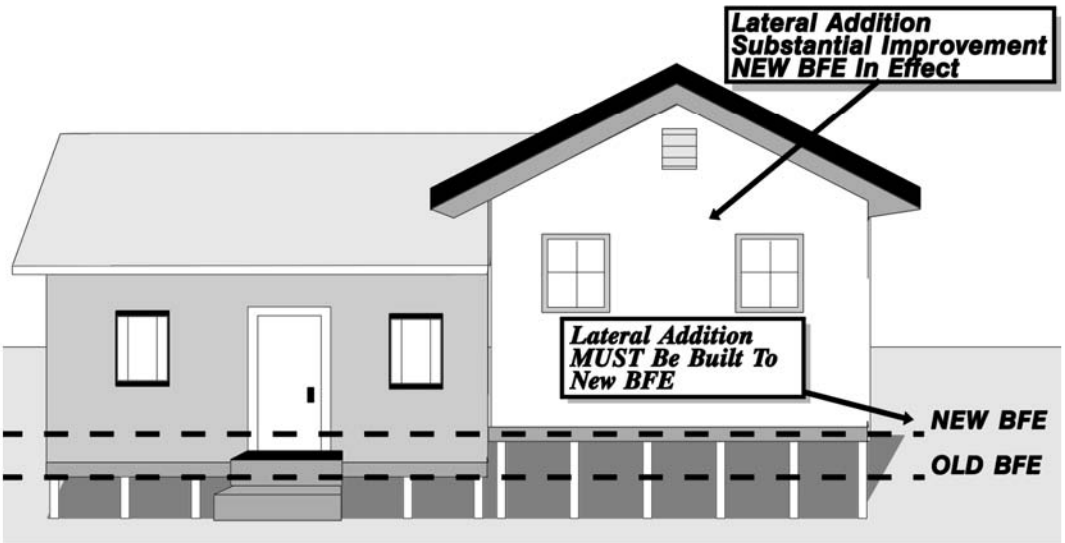



**Figure 8-9. Substantial improvements to post-FIRM buildings must be elevated above the new BFE. Nonresidential buildings may be floodproofed**

# B. SUBSTANTIAL DAMAGE

**44 CFR 59.1.** *Definitions: "Substantial damage" means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.*

Two key points:

- The damage can be from any cause—flood, fire, earthquake, wind, rain, or other natural or human-induced hazard.
- The substantial damage rule applies to all buildings in a flood hazard area, regardless of whether the building was covered by flood insurance.

The formula is essentially the same as for substantial improvements:

$$\frac{\text{Cost to repair}}{\text{Market value of the building}} \geq 50 \text{ percent}$$

Market value is calculated in the same way as for substantial improvements. Use the pre-damage market value.

## COST TO REPAIR

Notice that the formula uses "cost *to* repair," not "cost *of* repairs." The cost to repair the structure must be calculated for full repair to the building's before-damage condition, even if the owner elects to do less. It must also include the cost of any improvements that the owner has opted to include during the repair project.

The total cost to repair includes the same items listed in Figure 8-1. As shown in Example 2 below, properly repairing a flooded building can be more expensive than people realize. The owner may opt not to pay for all of the items needed. The owner may:

- Do some of the work, such as removing and discarding wallboard.
- Obtain some of the materials free.
- Have a volunteer organization, such as the Mennonites, do some of the work.
- Decide not to do some repairs, such as choosing to nail down warped flooring rather than replace it.

**Basic rule:** *Substantial damage is determined regardless of the actual cost to the owner. You must figure the true cost of bringing the building back to its pre-damage condition using qualified labor and materials obtained at market prices.*

The permit office and the owner may have serious disagreements over the total list of needed repairs and their cost, as the owner has a great incentive to show less damage than actually occurred in order to avoid the cost of bringing the building into compliance. Here are four things that can help you:

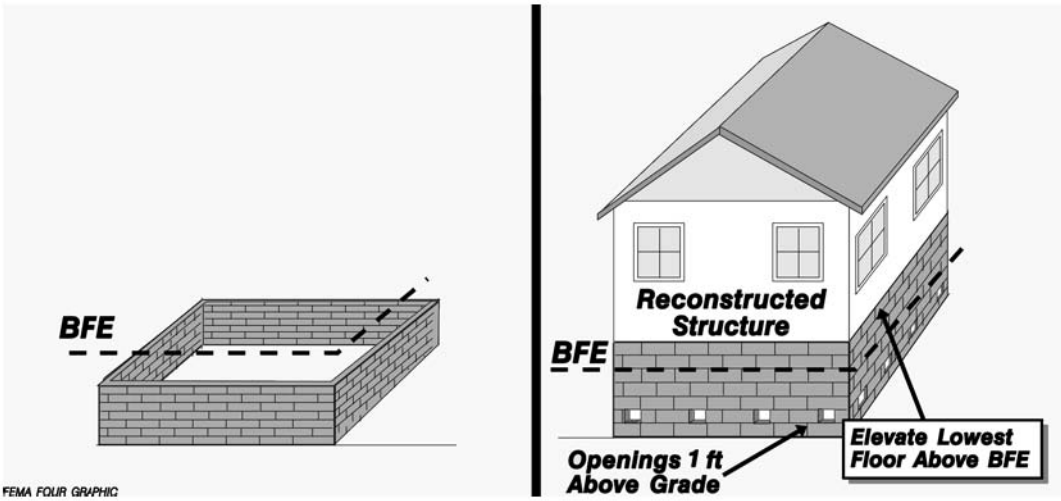
- Get the cost to repair from an objective third-party or undebatable source, such as:
  - A licensed general contractor.
  - A professional construction estimator.
  - Insurance adjustment papers (exclude damage to contents).
  - Damage assessment field surveys conducted by building inspection, emergency management or tax assessment agencies after a disaster.
  - Your office.
- Even if your office does not prepare the cost estimate, it needs to review the estimate submitted by the permit applicant. You can use your professional judgment and knowledge of local and regional construction costs. Or, you can use building code valuation tables published by the major building code groups.
- Use an objective system that does not rely on varying estimates of market value or different opinions of what needs to be repaired. The Substantial Damage Estimator Program discussed later in this section will do this.
- Publicize the need for the regulations and the benefits of protecting buildings from future flooding. A well-educated public won't argue as much as one that sees no need for the requirement.
- Help the owner find financial assistance to meet the extra cost of complying with the code. If there was a disaster declaration, there may be sources of financial assistance as discussed in the next unit. If the owner had flood insurance and the building was substantially damaged by a flood, the new Increased Cost of Compliance coverage will help (see next section).

## SUBSTANTIAL DAMAGE EXAMPLES

### Example 1. Reconstruction of a destroyed building

Reconstructions are cases where an entire structure is destroyed, damaged, purposefully demolished or razed, and a new structure is built on the old foundation or slab. The term also applies when an existing structure is moved to a new site.

Reconstructions are, quite simply, "new construction." They must be treated as new buildings.




Razed or "totaled" building with remaining foundation

Reconstruction on existing foundation

**Figure 8-10. A reconstructed house is new construction.**

This example is for A Zones only. A new building in the V Zone must be elevated on piles or columns.

## Example 2. Substantially damaged structure

To determine if a damaged structure meets the threshold for substantial damage, the cost of repairing the structure to its before-damaged condition is compared to the market value of the structure prior to the damage. The estimated cost of the repairs must include all costs necessary to fully repair the structure to its before-damaged condition.

If equal to or greater than 50 percent of that structure's market value before damage, then the structure must be elevated (or floodproofed if it is nonresidential) to or above the level of the base flood, and meet other applicable local ordinance requirements. This is the basic requirement for substantial damage.

Figure 8-11 graphically illustrates the amount of damage that can occur to a building flooded only four feet deep. Even though the structure appears sound and there are no cracks or breaks in the foundation, the total cost of repair can be significant.

The cost of repair after a flood that simply soaked the building will typically include the following structural items:

— Remove all wallboard and insulation.
— Install new wallboard and insulation.
— Tape and paint.
— Remove carpeting and vinyl flooring.
— Dry floor, replace warped flooring.
— Replace cabinets in the kitchen and bathroom.
— Replace built-in appliances.
— Replace hollow-core interior doors.
— Replace furnace and water heater.
— Clean and disinfect duct work.
— Repair porch flooring and front steps.
— Clean and test plumbing (licensed plumber may be required).
— Replace outlets and switches, clean and test wiring (licensed electrician may be required).

Note: See also Figures 7-7 through 7-12 for what happens to flood insurance premiums if a substantially damaged building is granted a variance and is not brought up to post-FIRM standards.

**Figure 8-11. Even slow moving floodwater can cause substantial damage.**

## SUBSTANTIAL DAMAGE SOFTWARE

FEMA has developed a software program to help local officials make substantial damage determinations. The software is based on Microsoft Access, but is self-contained and does not require any software in addition to a Windows operating system.

The software comes with a manual, *Guide on Estimating Substantial Damage Using the NFIP Residential Substantial Damage Estimator*, FEMA 311. This includes a user's manual and worksheets that allow the calculations to be done manually.

Contact your FEMA Regional Office for a copy of the software package and help in using it. Following a major disaster declaration, training sessions and technical assistance may be available.

## INCREASED COST OF COMPLIANCE

On June 1, 1997, the NFIP began offering additional coverage to all holders of structural flood insurance policies. This coverage is called Increased Cost of Compliance or ICC.

The name refers to cases where the local floodplain management ordinance requires elevation or retrofitting of a substantially damaged building. Under ICC, the flood insurance policy will not only pay for repairs to the flooded building, it will pay up to $30,000 to help cover the additional cost of complying with the ordinance. This is available for any flood

insurance claim and, therefore, is not dependent on the community receiving a disaster declaration.

There are some limitations to ICC:

- It's only available if there was a flood insurance policy on the building before the flood.
- It covers only damage caused by a flood.
- Claims are limited to $30,000 per structure.
- Claims must be accompanied by a substantial damage determination by the floodplain ordinance administrator.

It should also be mentioned that a portion of the rest of the claim payment may help meet the cost of bringing the building up to code. For example, if there was foundation damage, the regular claim will pay for the cost of repairing or replacing the foundation. The ICC funds would only be needed for the extra costs of raising the foundation higher than it was before.

An ICC claim cannot be paid unless the community has determined the building to be substantially damaged and requires that the building comply with local ordinance requirements. For further information on how ICC coverage works and how you can help policyholders in your community qualify for the coverage, refer to *National Flood Insurance Program's Increased Cost of Compliance Coverage: Guidance for State and Local Officials, FEMA 301*.

In certain cases, an ICC claim can be filed if the building is repetitively flooded, and has had two or more claims averaging 25% or more of building value within a ten-year period, provided the community has language in the flood damage ordinance that implements the substantial damage rule in these cases.

Figure 8-12 has example ordinance language. This language exceeds the minimum NFIP requirements, but would be needed if you wanted to trigger the ICC provision for repetitively damaged buildings.

The Community Rating System credits keeping track of improvements to enforce a cumulative substantial improvement requirement. The 1999 *CRS Coordinator's Manual* credits the ordinance language in Figure 8-12. These credits are found under Activity 430, Section 431.c in the *CRS Coordinator's Manual* and the *CRS Application.*

***Option 1***

***A. Adopt the Following Definition:***

*"Repetitive Loss" means flood-related damage sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25 percent of the market value of the structure before the damage occurred.*

***B. And modify the "substantial improvement" definition as follows:***

*"Substantial Improvement" means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "repetitive loss" or "substantial damage", regardless of the actual repair work performed.*

---

***Option 2***

***Modify the substantial damage definition as follows:***

*"Substantial Damage" means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the dam-age occurred. Substantial damage also means flood-related damage sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25 percent of the market value of the structure before the damage occurred.*

---

*NOTE 1: Communities need to make sure that these definitions are tied to the floodplain management requirements for new construction and substantial improvements and to any other requirements of the ordinance, such as the permit requirements, in order to enforce this provision.*

*NOTE 2: An ICC Claim Payment is ONLY made for flood-related damage. The substantial damage part of the definition must still include "damage of any origin" to be compliant with the minimum NFIP Floodplain Management Regulations.*

**Figure 8-12. Sample ordinance language for ICC repetitive loss definitions**

Source: -- *Increased Cost of Compliance Coverage: Guidance for State and Local Officials*, FEMA-301, September 2003. This language is only needed to trigger an ICC payment for a repetitive loss. No ordinance changes are needed for the ICC coverage for substantial damage.

# C. SPECIAL SITUATIONS

As explained in previous sections, the substantial improvement and substantial damage requirements affect all buildings regardless of the reason for the improvement or the cause of the damage. There are three special situations you should be aware of: exempt costs, historic buildings and corrections of code violations.

## EXEMPT COSTS

Certain costs related to making improvements or repairing damaged buildings do not have to be counted toward the cost of the improvement or repairs. These include:

- Plans and specifications.
- Surveying costs.
- Permit fees.
- Demolition or emergency repairs made for health or safety reasons or to prevent further damage to the building.
- Improvements or repairs to items outside the building, such as the driveway, fencing, landscaping and detached structures.

## HISTORIC STRUCTURES

Historic structures are exempted from the substantial improvement requirements subject to the criteria listed below. The exemption can be granted administratively if the current NFIP definitions of substantial improvement and historic structure are included in your ordinance, or they can be granted through a variance procedure.

In either case, they are usually granted subject to conditions.

If the improvements to a historic structure meet the following three criteria and are approved by the community, the building will not have to be elevated or floodproofed. It can also retain its pre-FIRM flood insurance rating status.

**1. The building must be a bona fide "historic structure."** Figure 7-13 has the definition that must be followed.

**2. The project must maintain the historic status of the structure.** If the proposed improvements to the structure will result in it being removed from or ineligible for the National Register or federally-certified state or local inventory, then the proposal cannot be granted an exemption from the substantial improvement rule.

The best way to make such determinations is to seek written review and approval of proposed plans by the local historic preservation board, if it is federally-certified, or by the state historic preservation office. If the plans are approved, you can grant the exemption. If not, no exemption can be permitted.

**3. Take all possible flood damage reduction measures.** Even though the exemption to the substantial improvement rule means the building does not have to be elevated to or above BFE, or be renovated with flood-resistant materials that are not historically sensitive, many things can and should be done to reduce the flood damage potential. Examples include:

- Locating mechanical and electrical equipment above the BFE or flood-proofing it.
- Elevating the lowest floor of an addition to or above the BFE with the change in floor elevation disguised externally.

## CORRECTIONS OF CODE VIOLATIONS

The NFIP definition of substantial improvement includes another exemption:

***44 CFR 59.1 Definitions:*** *"Substantial improvement" means …. The term does not, however, include … Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions*

Note the key words in this exemption: *correct* existing violations, *identified* by the local official, and *minimum* necessary to assure safe conditions. This language was included in order to avoid penalizing property owners *who had no choice* but to make improvements to their buildings or face condemnation or revocation of a business license.

This exemption was intended for *involuntary* improvements or violations that existed before the improvement permit was applied for or before the damage occurred—for example, a restaurant owner who must upgrade the wiring in his kitchen in order to meet current local and state health and safety codes.

You can only exempt the items specifically required by code. For example, if a single stair tread was defective and had to be replaced, do not exempt the cost of rebuilding the entire stairway. Similarly, count only replacement in like kind and what is minimally necessary. If the

owner chooses to upgrade the quality of a code-required item, the extra cost is not exempt from the formula—it's added to the true cost of the improvement or repairs.

Unfortunately, many property owners and builders pressure local building official to exclude "code violation corrections" from their voluntary improvement proposals. There are "code violations" in all structures built before the current code was enacted. In many cases, those elements must be brought up to code as part of an improvement project.

This is very different from a code violation citation that forces a property owner to correct those violations and make improvements that were otherwise not planned. The building official must know about and document the violations before or at the time the permit is issued.

## Example

A small business in a 40-year old building was damaged by a fire. The building's pre-fire market value was $100,000. The insurance adjuster and the permit office concluded that the total cost to repair would be $45,000.

However, the community's building code states that whenever an applicant applies for a permit to modify or improve a building, the building must be brought up to code. This building would need the following additional work:

- Replace unsafe electrical wiring.
- Install missing fire exit signs, smoke detectors and emergency lighting.
- Widen the front door and install a ramp to make the business accessible to handicapped and mobility-impaired people.

The total cost of these code requirements would be $8,000. However, since these were required by the code before the fire occurred, they would not have to be counted toward the cost to repair. Based on the basic formula:

$$\frac{\$45{,}000}{\$100{,}000} = 0.45 \text{ or } 45\%$$

The building is not declared substantially damaged

In this example, the building can be repaired without elevating or floodproofing. However, the permit office should strongly recommend incorporating flood protection measures and flood resistant materials in the repair project (as in the example in Figure 8-2).

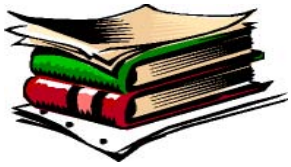
# UNIT 9:
# FLOOD INSURANCE AND FLOOD MANAGEMENT

## In this unit

While you are probably not an insurance agent, you should be aware of the close relationship between floodplain management and flood insurance. Decisions made by the builder or property owner during the construction process can have substantial impacts on flood insurance premiums and coverages for the building.

This unit reviews:

- What a flood insurance policy covers,
- When a policy must be purchased,
- How flood insurance rates are determined,
- How the Community Rating System can reduce flood insurance premiums in communities that do more than the minimum NFIP regulations, and
- The special rules that apply in the Coastal Barriers Resources System



## Materials needed for this unit

Additional information can be found in *Answers to Questions about the National Flood Insurance Program.*

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# A. FLOOD INSURANCE POLICIES

This section is devoted to flood insurance policies: what's covered, what's not covered, when a policy must be bought, and other rules. This is important information for the local permit administrator to know because some construction decisions affect what is eligible for insurance coverage.

If you have additional questions:

- *Answers to Questions about the National Flood Insurance Program*, questions 21 – 66 covers the topics in this unit.
- Local insurance agents should have additional references, including FEMA's *Flood Insurance Manual.*

These publications can be found on FEMA's web site.

As noted in Unit 2, 97% of the communities in the NFIP are in the Regular Phase. Only a few communities with minor flood problems or which have just recently joined the NFIP are still in the Emergency Phase. This section only discusses the Regular Phase provisions. The only major difference is that Emergency Phase policies have limited amounts of coverage available.

## WHO'S INVOLVED

Flood insurance policies are obtained through local property insurance agents. The agents may sell a policy from one of the Write Your Own insurance companies or a "direct" policy through FEMA. Both approaches will result in the issuance of a "Standard Flood Insurance Policy" that meets all the requirements and rates set by FEMA.

If an insured property is flooded, the property owner contacts his or her insurance agent. The agent arranges for an adjuster to review the damage and work with the insured to settle a claim.

Property owners always work through their insurance agents – they do not need to deal with FEMA.

## COVERAGE

Flood insurance coverage is provided for insurable buildings and their contents to property owners in NFIP communities.

## Building coverage

Building coverage is for the structure. This includes all things that typically stay with the building when it changes ownership, including:

- Utility equipment, such as a furnace or water heater
- Carpet permanently installed over unfinished flooring
- Built-in appliances
- Wallpaper and paneling

Ten percent of a dwelling's building coverage may be applied to a detached garage. Residential detached garages used, or held in use, for residential business or farming are not covered under the dwelling policy. These detached garages and other appurtenant structures must be insured under a separate policy.

## "Building" defined

A "building" is defined as a walled and roofed structure, including a manufactured home that is principally above ground and affixed to a permanent site. This definition has three parts:

- "Walled and roofed" means it has in place two or more exterior rigid walls and the roof fully secured so that the building will resist flotation, collapse and lateral movement.
- "Manufactured (mobile) home" is a building 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.
- "Principally above ground" means a building that has at least 51 percent of its actual cash value, including machinery and equipment (but not land value), above ground.

A travel trailer, without wheels, built on a chassis and affixed to a permanent foundation that is regulated under the community's floodplain management and building ordinances or laws is also a building and can be insured.

This definition is similar to, but not quite the same as, the definition for "building" or "structure" used for floodplain management and defined in Unit 5, Section E.

Buildings in the course of construction that have yet to be walled and roofed are eligible for coverage except when construction has been halted for more than 90 days and/or if the lowest floor used for rating purposes is below the BFE. Materials or supplies intended for use in such

construction, alteration, or repair are not insurable unless they are contained within the enclosed building on the premises or adjacent to the premises.

Examples of things that are not considered insurable buildings include:

- Gas or liquid storage tanks,
- A structure with 50 percent or more of its value underground, such as an underground pumping station, well or septic tank,
- Tents,
- Tennis and swimming pool bubbles,
- Swimming pools,
- Fences, docks, driveways,
- Open pavilions for picnic tables and bleachers,
- Detached carports with open sides,
- Recreational vehicles,
- Sheds on skids that are moved to different construction sites,
- Licensed vehicles, campers and travel trailers (unless permanently attached to the site),
- A building declared in violation of a state or local law (see Unit 7, Section E on Section 1316),
- Buildings over water or seaward of mean high tide which were built after October 1, 1982, and
- Landscaping, crops, and other items outside of a building.

## Contents coverage

Contents coverage is for the removable items inside an insurable building. A renter can take out a policy with contents coverage, even if there is no structural coverage.

Certain contents are not insurable. These include:

- Animals and livestock,
- Licensed vehicles,

- Jewelry, artwork, furs and similar items valued at more than $2,500,
- Money or valuable papers, and
- Personal property that is not secured to prevent flotation located in a building that is not fully enclosed (such as an open carport).

## Basements

A basement is defined as any area of the building, including any sunken room or sunken portion of a room, having its floor below ground level (subgrade) on all sides. There is limited coverage for basements:

- Building coverage is not extended to wallpaper, carpeting and similar finishings.
- The only contents kept in a basement that are covered are air conditioning units (portable or window type), clothes washers and dryers, food freezers, other than walk in, and food in food freezers.

Despite these limitations on coverage, it is advisable for property owners with basements to obtain flood insurance. Hydrostatic pressure from flood waters can cause structural damage to the walls and floor of the basement that can be costly to repair. In some cases structural damage can occur to the elevated portion of the building as a result of the failure of basement walls or floors even though flood waters never reach the first floor of the building.

## Enclosures

There is limited coverage in enclosures below the lowest floor of an elevated post-FIRM building (including a manufactured home) located in SFHAs:

- There is no contents coverage in these enclosures.
- The only structural coverage is for the required utility connections and the foundation and anchoring system required to support the building.

The permit official should make sure that property owners are aware that flood insurance coverage in these areas is limited. This lack of coverage may discourage property owners from modifying these enclosures later so that they become noncompliant.

## Amount of coverage

Insurance rates for all buildings are based on a two-tiered system: a first or basic layer of coverage and a second or additional layer. The maximum amounts available under each layer are shown in Figure 9-1.

| | EMERGENCY PROGRAM | REGULAR PROGRAM | | |
|---|---|---|---|---|
| | | Basic Insurance Limits | Additional Insurance Limits | Total Insurance Limits |
| **BUILDING COVERAGE** | | | | |
| Single Family Dwelling | $ 35,000 * | $ 50,000 | $200,000 | $250,000 |
| 2-4 Family Dwelling | $ 35,000 * | $ 50,000 | $200,000 | $250,000 |
| Other Residential | $100,000** | $150,000 | $100,000 | $250,000 |
| Non-Residential | $100,000** | $150,000 | $350,000 | $500,000 |
| **CONTENTS COVERAGE** | | | | |
| Residential | $ 10,000 | $ 20,000 | $ 80,000 | $100,000 |
| Non-Residential | $100,000 | $130,000 | $370,000 | $500,000 |

* In Alaska, Guam, Hawaii, and U.S. Virgin Islands, the amount available is $50,000.
** In Alaska, Guam, Hawaii, and U.S. Virgin Islands, the amount available is $150,000.

**Figure 9-1. Amount of Insurance Available**

Note: This table is for communities in the Regular Phase of the NFIP. If your community has a Flood Insurance Rate Map and is participating in the NFIP, it is in the Regular Phase. Coverage amounts are as of May, 2004.

## Waiting period

A 30-day waiting period follows the purchase of a flood insurance policy before it goes into effect. There are exceptions to the 30-day waiting period for policies purchased in connection with the making, increasing, extending, or renewing a loan or certain map changes.

The objective of this waiting period is to encourage people to keep a policy at all times. FEMA does not want folks to wait for the river to rise before they buy their coverage. Also, to be on a sound financial basis, the NFIP needs everyone at risk to pay their share of the premiums.

Many people have found out about the waiting period the hard way. Your community would be wise to publicize availability of flood insurance so residents can be protected when a flood comes.

## The Mandatory Purchase Requirement

The Flood Disaster Protection Act of 1973 added a key requirement to the NFIP: if a community participates in the program, flood insurance is a prerequisite for receiving grants or

loans for the acquisition or construction of buildings in a designated floodplain from a federal agency or through a federally-related loan program.

## Where it applies

The mandatory purchase requirement applies to all forms of federal or federally related financial assistance for buildings located in Special Flood Hazard Areas (SFHAs). This requirement affects loans and grants for the purchase, construction, repair, or improvement of any publicly or privately owned building in the SFHA, including machinery, equipment, fixtures, and furnishings contained in such buildings.

Financial assistance programs affected include loans and grants from agencies such as the Department of Veterans Affairs, USDA Rural and Housing Services, Federal Housing Administration, Small Business Administration, and Federal Emergency Management Agency.

The requirement applies to secured mortgage loans from financial institutions, such as commercial lenders, savings and loan associations, savings banks, and credit unions that are regulated, supervised or insured by Federal agencies such as the Federal Deposit Insurance Corporation and the Office of Thrift Supervision.

The requirement comes into play if a loan is made, increased, renewed or extended – at any of those steps, the lender must check to see if the building is in an SFHA at that time. For example, a building in an X Zone when the original mortgage was taken out would be affected if the area is remapped in the SFHA and the loan is later refinanced.

The requirement also applies to all mortgage loans purchased by Fannie Mae or Freddie Mac in the secondary mortgage market.

## How it works

Before a person can receive a loan or other financial assistance from one of the affected agencies or lenders, there must be a check to see if the building is in an SFHA on the Flood Insurance Rate Map (FIRM). It is the agency's or the lender's responsibility to check the FIRM to determine if the building is in an SFHA, although many communities provide assistance.

Usually, the lender will have the determination done by a third party flood hazard determination company that provides a guarantee that the determination is correct. The lender must document the determination and whether flood insurance is required on a Standard Flood Hazard Determination Form (FEMA Form 81-93). The lender will notify the borrower if flood insurance is required.

If the building is in an SFHA, the agency or lender is required by law to require the recipient to purchase a flood insurance policy on the building. The requirement is for building coverage equal to the value of building (not the land),

the amount of the loan (or other financial assistance) or the maximum amount of flood insurance available, whichever is less.

***Note:*** *Many people who were required to get building coverage do not realize that their contents are not covered unless they voluntarily purchase contents coverage. A local public information program would help residents by informing them of this and other basic facts, such as the 30-day waiting period and the availability of insurance for properties outside the floodplain.*

The mandatory purchase requirement does not affect loans or financial assistance for items that are not covered by a flood insurance policy, such as vehicles, business expenses, landscaping, and vacant lots.

It does not affect loans for buildings that are not in the floodplain, even though a portion of the lot may be floodprone. While not mandated by law, a lender may require a flood insurance policy as a condition of a loan for a property in any zone on a FIRM.

### *Flood Insurance for your Community*

As a recipient of federal financial assistance, your community may have been required to purchase flood insurance under the mandatory purchase requirement. You should determine if there are any insurable publicly owned buildings in your floodplain. If so, see if they received federal aid in the past. Likely prospects include:

- A wastewater treatment plant (which are always located near a body of water), which received a grant from the Environmental Protection Agency.
- Public housing or neighborhood center funded with help from the Department of Housing and Urban Development or the Community Development Block Grant.
- Any facility that received disaster assistance after a flood or other disaster declaration.

Whether there was a requirement to buy insurance or not, you should advise your risk manager or other appropriate office about the buildings exposed to flooding. Many agencies find out too late that their “all risk” insurance policies don’t cover flooding.

Over the last few years, Congress has taken steps to encourage public agencies and private property owners to purchase flood insurance instead of relying on disaster assistance for help after a flood. Disaster assistance for a public building will be reduced by the amount of insurance coverage a community should carry on the building (regardless whether the community is carrying a policy).

In effect, disaster assistance for public agencies now has a very large deductible equal to the insurance policy it should carry. Why wait for the disaster to be caught short? You should advise the appropriate people of the need to purchase flood insurance coverage on your community’s buildings.

# B. RATING BUILDINGS

The insurance agent calculates the premium for a flood insurance policy on a property. The premiums on new buildings are based on the risk of flooding and flood damage. If a building is built incorrectly, the owner may be faced with very high premiums or insufficient coverage. On the other hand, if a building is built properly, the owner will pay less than what it costs to insure a pre-FIRM building under the "subsidized" rates.

The two aspects of the NFIP – insurance and regulations – reinforce each other. How well local floodplain management regulations are enforced affects the flood insurance rates paid by the citizens of your community. Consequently, it is important for you to know how flood insurance rates are set for new and substantially improved buildings.

As noted earlier, 97% of the communities in the NFIP are in the Regular Phase. Only a few communities with minor flood problems are still in the Emergency Phase. This section only discusses the Regular Phase rates. Emergency Phase policies are rated similarly to pre-FIRM policies.

## RATING PRE-FIRM BUILDINGS

Pre-FIRM buildings are those built before the effective date of your first Flood Insurance Rate Map (FIRM). This means they were built before detailed flood hazard data and flood elevations were provided to the community and usually before your community enacted comprehensive regulations on floodplain construction.

Pre-FIRM buildings are rated using "subsidized" rates that, for most pre-FIRM buildings are significantly less than actuarial rates that fully reflect their risk of flooding. They are designed to help people afford flood insurance even though their buildings were not built with flood protection in mind and were an incentive for communities to join the NFIP.

The "subsidy" in the subsidized rate is really premium income that is foregone by the NFIP and is not being funded by taxpayers. In the short term, it is funded through an insurance mechanism called cross-subsidization. Surpluses from premiums paid by Post-FIRM SFHA and B, C and X Zone policyholders are, in effect, being borrowed to help their Pre-FIRM counterparts obtain affordable flood insurance coverage. The NFIP also has statutory authority to borrow a specified amount of money from the U.S. Treasury and exercises this authority to even out good years and bad. However, this borrowing must be paid back with interest. If catastrophic

flooding occurred over several years and the NFIP exceeded its statutory borrowing authority, the program may have to obtain an appropriation from Congress to pay back this "subsidy".

The Pre-FIRM building rates are shown in Table 2 reproduced from the NFIP *Flood Insurance Manual.* They are based on the building type and FIRM zone and not on the building's elevation in relation to the BFE. If there is an Elevation Certificate for the building and it is in a Regular Program community, the building can be rated using Post-FIRM rates at the option of the policyholder. If the building has its lowest floor at or above the BFE, Post-FIRM rates on the building will generally be lower than Pre-FIRM rates.

If a Pre-FIRM building has been substantially damaged or substantially improved, it becomes Post-FIRM and is rated using Post-FIRM rates. Some Pre-FIRM buildings that have lateral additions that are substantial improvements may continue being rated as Pre-FIRM if certain conditions are satisfied (determining substantial damage and substantial improvement is explained in Unit 8).

Rates are per $100 coverage. The two numbers under each category (Building or Contents) reflect the rates for the basic and additional layers of coverage explained in Table 2. The FIRM zones designations are explained in Figure 3-10.

Table 2. Regular Program – Pre-FIRM Construction Rates[1]
Annual Rates Per $100 of Coverage
(Basic/Additional)

**FIRM ZONES A, AE, A1-A30, AO, AH, D**

| OCCUPANCY | | Single Family | | 2-4 Family | | Other Residential | | Non-Residential | |
|---|---|---|---|---|---|---|---|---|---|
| | | Building | Contents | Building | Contents | Building | Contents | Building | Contents |
| Building Type | No Basement/Enclosure | .76 / .34 | .96 / .60 | .76 / .34 | | | | .83 / .60 | |
| | With Basement | .81 / .50 | .96 / .50 | .81 / .50 | | | | .88 / .56 | |
| | With Enclosure | .81 / .60 | .96 / .60 | .81 / .50 | | | | .88 / .74 | |
| | Manufactured (Mobile) Home2 | .76 / .34 | .96 / .60 | | | | | .83 / .60 | |
| Construction Location | Basement & Above | | | | .96 / .50 | | .96 / .50 | | 1.62 / 1.00 |
| | Enclosure & Above | | | | .96 / .60 | | .96 / .60 | | 1.62 / 1.20 |
| | Lowest Floor Only - Above Ground Level | | | | .96 / .60 | | .96 / .60 | | 1.62 / .51 |
| | Lowest Floor Above Ground Level and Higher Floors | | | | .96 / .41 | | .96 / .41 | | 1.62 / .51 |
| | Above Ground Level - More than One Full Floor | | | | .35 / .12 | | .35 / .12 | | .24 / .12 |
| | Manufactured (Mobile) Home2 | | | | | | | | 1.62 / .51 |

**FIRM ZONES V, VE, V1-V30**

| OCCUPANCY | | Single Family | | 2-4 Family | | Other Residential | | Non-Residential | |
|---|---|---|---|---|---|---|---|---|---|
| | | Building | Contents | Building | Contents | Building | Contents | Building | Contents |
| Building Type | No Basement/Enclosure | .99 / .88 | 1.23/1.58 | .99 / .88 | | .99/1.58 | | 1.10 / 1.68 | |
| | With Basement | 1.06 / 1.34 | 1.23/1.33 | 1.06 / 1.34 | | 1.06/2.49 | | 1.16 / 2.49 | |
| | With Enclosure | 1.06 / 1.58 | 1.23/1.58 | 1.06 / 1.58 | | 1.06/2.79 | | 1.16 / 2.79 | |
| | Manufactured (Mobile) Home2 | .99 / 4.18 | 1.23/1.58 | | | | | 1.10 / 7.03 | |
| Construction Location | Basement & Above | | | | 1.23/1.33 | | 1.23 / 1.33 | | 2.14 / 2.95 |
| | Enclosure & Above | | | | 1.23/1.58 | | 1.23 / 1.58 | | 2.14 / 3.21 |
| | Lowest Floor Only - Above Ground Level | | | | 1.23/1.58 | | 1.23 / 1.58 | | 2.14 / 2.67 |
| | Lowest Floor Above Ground Level and Higher Floors | | | | 1.23/1.39 | | 1.23 / 1.39 | | 2.14 / 2.28 |
| | Above Ground Level - More than One Full Floor | | | | .47/.29 | | .47 / .29 | | .45 / .39 |
| | Manufactured (Mobile) Home2 | | | | | | | | 2.14 / 6.53 |

**FIRM ZONES A99, B, C, X**

| OCCUPANCY | | Single Family | | 2-4 Family | | Other Residential | | Non-Residential | |
|---|---|---|---|---|---|---|---|---|---|
| | | Building | Contents | Building | Contents | Building | Contents | Building | Contents |
| Building Type | No Basement/Enclosure | .58 / .14 | .94 / .25 | .58 / .14 | | .52 / .14 | | .52 / .14 | |
| | With Basement | .66 / .20 | 1.07 / .35 | .66 / .20 | | .71 / .20 | | .71 / .20 | |
| | With Enclosure | .66 / .22 | 1.07 / .38 | .66 / .22 | | .71 / .22 | | .71 / .22 | |
| | Manufactured (Mobile) Home2 | .58 / .31 | .94 / .25 | | | | | .71 / .29 | |
| Construction Location | Basement & Above | | | | 1.26 / .46 | | 1.26 / .46 | | 1.30 / .50 |
| | Enclosure & Above | | | | 1.26 / .51 | | 1.26 / .51 | | 1.30 / .47 |
| | Lowest Floor Only - Above Ground Level | | | | .94 / .48 | | .94 / .48 | | .73 / .29 |
| | Lowest Floor Above Ground Level and Higher Floors | | | | .94 / .25 | | .94 / .25 | | .73 / .25 |
| | Above Ground Level - More than One Full Floor | | | | .35 / .12 | | .35 / .12 | | .22 / .12 |
| | Manufactured (Mobile) Home2 | | | | | | | | .81 / .39 |

1 Start of construction or substantial improvement on or before 12/31/74, or before the effective date of the initial Flood Insurance Rate Map (FIRM). If FIRM Zone is unknown, use rates for Zones A, AE, A1-A30, AO, AH, D.
2 The definition of Manufactured (Mobile) Home includes travel trailers. See page APP 3.

## RATING NEW BUILDINGS

The flood insurance premium rates for Post-FIRM construction are actuarial, meaning that they are based on a building's risk of flooding. In those zones where base flood elevations (BFEs) have been established, Post-FIRM Rates are determined based on the elevation of the lowest floor (including basement) of the building in relation to the BFE. In zones where BFEs have not been established, the rates are based on the overall loss experience and expected damages for all buildings within that zone.

Several of the rate tables from the NFIP *Flood Insurance Manual* are reproduced on the following pages. The entire NFIP *Flood Insurance Manual* can be viewed on FEMA's website at www.fema.gov. You cannot rate a building using just these tables since there are other rules and factors that must be applied to the building besides the elevation of its lowest floor. However, they do illustrate the differences in rates for various building types, zones and building elevations.

Table 3A shows the Post-FIRM rates for buildings in Zones A99, B, C, X, and D and in Zones AO and AH zones. Since no BFEs are available, buildings in these zones are not rated based on elevation. Policyholders in Zones B, C, and X zones can also obtain a Preferred Risk Policies at lower rates provided that they have had a favorable loss experience.

Table 3B shows the rates for Post-FIRM buildings in Zones AE and A1-30. Note that the rates are significantly lower for buildings built to elevations one foot or more above BFE. Requiring freeboard in your ordinance (elevation to one foot or more above BFE) will lower insurance rates on buildings in your community. These lower rates will offset any additional costs of construction. Buildings with their lowest floors below the BFE are charged significantly higher flood insurance rates. In fact, rates for buildings 2 feet or more below BFE are not published in the *Flood Insurance Manual* since these buildings must be individually rated due to their high risk of flooding.

Table 3E shows the Post-FIRM rates for elevated buildings in Zones VE and V 1-30 that have no obstructions (such as enclosures) below the elevated floor. These rates are higher than rates in Zones AE and A1-30 because of the greater damages that can be caused by wave impacts. Table 3F shows the same rates for buildings that have enclosures below their elevated floors that are less than 300 square feet. The rates for buildings with enclosures are higher than those without enclosures due to the increased loads placed on the building's foundation when waves impact on the enclosure. Buildings with enclosures 300 square feet or greater have an even higher risk and must be individually rated by the insurance company or FEMA.

## TABLE 3A. REGULAR PROGRAM – POST-FIRM CONSTRUCTION RATES
## ANNUAL RATES PER $100 OF COVERAGE
## (BASIC/ADDITIONAL)

### FIRM ZONES A99, B, C, X

| OCCUPANCY | | Single Family | | 2-4 Family | | Other Residential | | Non-Residential | |
|---|---|---|---|---|---|---|---|---|---|
| | | Building | Contents | Building | Contents | Building | Contents | Building | Con-tents |
| | No Basement/Enclosure | .58/.14 | .94/.25 | .58/.14 | | .52/.14 | | .52/.14 | |
| | With Basement | .66/.20 | 1.07/.35 | .66/.20 | | .71/.20 | | .71/.20 | |
| | With Enclosure | .66/.22 | 1.07/.38 | .66/.22 | | .71/.22 | | .71/.22 | |
| | Manufactured (Mobile) Home[1] | .58/.31 | .94/.25 | | | | | .71/.29 | |
| | Basement & Above | | | | 1.26/.46 | | 1.26/.46 | | 1.30/.50 |
| | Enclosure & Above | | | | 1.26/.51 | | 1.26/.51 | | 1.30/.47 |
| | Lowest Floor Only – Above Ground Level | | | | .94/.48 | | .94/.48 | | .73/.29 |
| | Lowest Floor Above Ground Level and Higher Floors | | | | .94/.25 | | .94/.25 | | .73/.25 |
| | Above Ground Level – More than One Full Floor | | | | .35/.12 | | .35/.12 | | .22/.12 |
| | Manufactured (Mobile) Home[1] | | | | | | | | .61/.39 |

*** SUBMIT FOR RATING

### FIRM ZONE D

| OCCUPANCY | | Single Family | | 2-4 Family | | Other Residential | | Non-Residential | |
|---|---|---|---|---|---|---|---|---|---|
| | | Building | Contents | Building | Contents | Building | Contents | Building | Contents |
| | No Basement/Enclosure | .76/.32 | .96/.57 | .76/.32 | | .63/.57 | | .63/.57 | |
| | With Basement | *** | *** | *** | | *** | | *** | |
| | With Enclosure | *** | *** | *** | | *** | | *** | |
| | Manufactured (Mobile) Home[1] | 1.00/.62 | 1.09/.66 | | | | | 1.86/.77 | |
| | Basement & Above | | | | *** | | *** | | *** |
| | Enclosure & Above | | | | *** | | *** | | *** |
| | Lowest Floor Only – Above Ground Level | | | | .96/.57 | | .96/.57 | | 1.62/.52 |
| | Lowest Floor Above Ground Level and Higher Floors | | | | .96/.39 | | .96/.39 | | 1.62/.49 |
| | Above Ground Level – More than One Full Floor | | | | .35/.12 | | .35/.12 | | .24/.12 |
| | Manufactured (Mobile) Home[1] | | | | | | | | 1.62/.52 |

| | Building | | Contents | |
|---|---|---|---|---|
| OCCUPANCY | 1-4 Family | Other Res & Non-Res | Residential | Non-Residential |
| With Certification of Compliance[3] (AOB,AHB) | .25/.06 | .21/.06 | .34/.11 | .21/.11 |
| Without Certification of Compliance or Elevation Certificate[4] | .77/.17 | .84/.30 | .97/.20 | 1.63/.25 |

[1] The definition of Manufactured (Mobile) Home includes travel trailers. See page APP 3.
[2] Zones AO, AH Buildings With Basement/Enclosure: Submit for Rating
[3] "With Certification" rates are to be used when the Elevation Certificate shows that the lowest floor is equal to or greater than the community's elevation requirement.
[4] "Without Certification" rates are to be used only on Post-FIRM structures without an Elevation Certificate or when the Elevation Certificate shows that the lowest floor elevation of a Post-FIRM structure is less than the community's elevation requirement.

*** SUBMIT FOR RATING

[1] The definition of Manufactured (Mobile) Home includes travel trailers. See page APP 3.
[2] Zones AO, AH Buildings With Basement/Enclosure: Submit for Rating
[3] "With Certification" rates are to be used when the Elevation Certificate shows that the lowest floor is equal to or greater than the community's elevation requirement.
[4] "Without Certification" rates are to be used only on Post-FIRM structures without an Elevation Certificate or when the Elevation Certificate shows that the lowest floor elevation of a Post-FIRM structure is less than the community's elevation requirement.

## TABLE 3B. REGULAR PROGRAM – POST-FIRM CONSTRUCTION RATES
## ANNUAL RATES PER $100 OF COVERAGE
## (BASIC/ADDITIONAL)

**FIRM ZONES AE, A1-A30 – BUILDING RATES**

| Elevation of Lowest Floor Above or Below BFE[1] | One Floor, No Basement/Encl | | More than One Floor No Basement/Encl | | More than One Floor, With Basement/Encl | | Manufactured (Mobile) Home[2] | |
|---|---|---|---|---|---|---|---|---|
| | 1-4 Family | Other Residential & Non-Residential | 1-4 Family | Other Residential & Non-Residential | 1-4 Family | Other Residential & Non-Residential | Single Family | Non-Residential |
| +4 | .24 / .08 | .20 / .08 | .24 / .08 | .20 / .08 | .24/ .08 | .20 / .08 | .24 / .08 | .20 / .08 |
| +3 | .24 / .08 | .20 / .08 | .24 / .08 | .20 / .08 | .24 / .08 | .20 / .08 | .25 / .08 | .22 / .08 |
| +2 | .32 / .08 | .26 / .08 | .24 / .08 | .20 / .08 | .24 / .08 | .20 / .08 | .31 / .08 | .25 / .08 |
| +1 | .59 / .08 | .45 / .10 | .38 / .08 | .28 / .08 | .29 / .08 | .22 / .08 | .66 / .09 | .72 / .08 |
| 0 | .98 / .08 | .88 / .20 | .70 / .08 | .54 / .16 | .51 / .08 | .45 / .16 | 1.52 /.09 | 1.47 / .08 |
| -13 | 2.40 / .95 | 3.48 / 1.29 | 2.17 / .86 | 2.80 / .69 | 1.19 / .49 | 1.33 / .70 | *** | *** |
| -2 | *** | *** | *** | *** | *** | *** | *** | *** |

**FIRM ZONES AE, A1-A30 -- CONTENTS RATES**

| Elevation of Lowest Floor Above or Below BFE[1] | Lowest Floor Only --Above Ground Level (No Basement/Encl.) | | Lowest Floor Above Ground & Higher Floors (No Basement/Encl.) | | More than One Floor With Basement/Enclosure | | Manufactured (Mobile) Home [2] | |
|---|---|---|---|---|---|---|---|---|
| | Residential | Non-Residential | Residential | Non-Residential | Residential | Non-Residential | Single Family | Non-Residential |
| +4 | .38 / .12 | .22 / .12 | .38 / .12 | .22 / .12 | .38 / .12 | .22 / .12 | .38 / .12 | .22 / .12 |
| +3 | .38 / .12 | .23 / .12 | .38 / .12 | .22 / .12 | .38 / .12 | .22 / .12 | .38 / .12 | .22 / .12 |
| +2 | .38 / .12 | .24 / .12 | .38 / .12 | .24 / .12 | .38 / .12 | .22 / .12 | .38 / .12 | .31 / .14 |
| +1 | .59 / .12 | .33 / .18 | .41 / .12 | .28 / .12 | .38 / .12 | .22 / .12 | .59 / .12 | .48 / .20 |
| 0 | 1.10 / .12 | .68 / .45 | .72 / .12 | .48 / .27 | .40 / .12 | .29 / .12 | 1.21 / .12 | 1.01 / .64 |
| -13 | 3.01 / .75 | 1.94 / 1.26 | 1.78 / .58 | 1.37 / .77 | .48 / .12 | 1.06 / .12 | *** | *** |
| -2 | *** | *** | *** | *** | *** | *** | *** | *** |

**FIRM ZONES AE, A1-A30 - CONTENTS RATES**

| Elevation of Lowest Floor Above or Below BFE[1] | Above Ground Level More than One Full Floor | | | |
|---|---|---|---|---|
| | Single Family | 2-4 Family | Other Residential | Non-Residential |
| +4 | | .35 / .12 | .35 / .12 | .22 / .12 |
| +3 | | .35 / .12 | .35 / .12 | .22 / .12 |
| +2 | | .35 / .12 | .35 / .12 | .22 / .12 |
| +1 | | .35 / .12 | .35 / .12 | .22 / .12 |
| 0 | | .35 / .12 | .35 / .12 | .22 / .12 |
| -1 | | .35 / .12 | .35 / .12 | .22 / .12 |
| -2 | | .35 / .12 | .37 / .12 | .24 / .12 |

[1]If LowestFloor is –1 because of attached garage, submit application for special consideration. Rate may be lower.

[2]The definition of Manufactured (Mobile) Home includes travel trailers. See page APP 3.
[3]Use Submit-for-Rate guidelines if the enclosure below the lowest elevated floor of an elevated building or if the crawl space (under-floor space) that has its interior floor within 2 feet below grade on all sides, which is used for rating, is 1 or more feet below BFE.
***SUBMIT FOR RATING**

TABLE 3E. REGULAR PROGRAM – POST-FIRM CONSTRUCTION RATES
ANNUAL RATES PER $100 OF COVERAGE

**1981 POST-FIRM V1-V30, VE ZONE RATES[1]**

| Elevation of the lowest floor above or below BFE adjusted for wave height[2] | | Elevated Buildings Free of Obstruction[3] | | | |
|---|---|---|---|---|---|
| | | Contents | | Building | |
| | Residential | Non-Residential | Replacement Cost Ratio .75 or More [4] | Replacement Cost Ratio .50 to .74[4] | Replacement Cost Ratio Under .50[4] |
| +4 or more | .30 | .30 | .50 | .67 | 1.00 |
| +3 | .30 | .30 | .60 | .80 | 1.20 |
| +2 | .42 | .44 | .75 | 1.00 | 1.50 |
| +1 | .73 | .78 | 1.08 | 1.44 | 2.02 |
| 0 | 1.12 | 1.20 | 1.39 | 1.86 | 2.61 |
| -1 | 1.62 | 1.68 | 1.83 | 2.42 | 3.14 |
| -2 | 2.26 | 2.38 | 2.41 | 3.16 | 4.03 |
| -3 | 3.10 | 3.30 | 3.10 | 4.15 | 5.26 |
| -4 or below | *** | *** | *** | *** | *** |

[1] **Policies for 1975 through 1981 Post-FIRM and Pre-FIRM buildings in Zones VE and V1-V30 will be allowed to use the Post- '81 V Zone rate table if the rates are more favorable to the insured. See instructions on page RATE 23 for V Zone Optional Rating.**

[2] Wave height adjustment is not required in those cases where the Flood Insurance Rate Map indicates that the map includes wave height.

[3] Free of Obstruction -- The space below the lowest floor must be completely free of obstructions or any attachment to the building or may have:
(1) Insect screening (provided that no additional supports are required for the screening), or
(2) Open wood constructed lattice "breakaway walls" (at least 40 percent of the lattice construction must be open). These walls must be designed and installed to collapse under stress without jeopardizing the structural support of the building so that the impact on the building of abnormally high tides or wind driven water is minimized.

[4] These percentages represent building replacement cost ratios, which are determined by dividing the amount of building coverage being purchased by the replacement cost. See page RATE 20 for more details.

***** SUBMIT FOR RATING**

TABLE 3F. REGULAR PROGRAM – POST-FIRM CONSTRUCTION RATES
ANNUAL RATES PER $100 OF COVERAGE

**1981 POST-FIRM V1-V30, VE ZONE RATES[1,2]**

| Elevation of the lowest floor above or below BFE adjusted for wave height[3] | Elevated Buildings With Obstruction[4] | | | | |
|---|---|---|---|---|---|
| | Contents | | | Building | |
| | Residential | Non-Residential | Replacement Cost Ratio .75 or More [5] | Replacement Cost Ratio .50 to .74[5] | Replacement Cost Ratio Under .50[5] |
| +4 or more | .40 | .40 | 1.10 | 1.48 | 2.20 |
| +3 | .40 | .40 | 1.22 | 1.61 | 2.45 |
| +2 | .50 | .50 | 1.38 | 1.80 | 2.75 |
| +1 | .85 | .90 | 1.60 | 2.15 | 3.10 |
| 0 | 1.21 | 1.28 | 1.88 | 2.58 | 3.50 |
| -1[6] | 1.68 | 1.78 | 2.24 | 2.97 | 4.00 |
| -2[6] | 2.33 | 2.48 | 2.79 | 3.66 | 4.75 |
| -3[6] | 3.18 | 3.38 | 3.58 | 4.66 | 6.00 |
| -4 or below | *** | *** | *** | *** | *** |

[1] **Policies for 1975 through 1981 Post-FIRM and Pre-FIRM buildings in Zones VE and V1-V30 will be allowed to use the Post- '81 V Zone rate table if the rates are more favorable to the insured. See instructions on page RATE 23 for V Zone Optional Rating.**
[2] Rates provided are only for elevated buildings. Use the *Specific Rating Guidelines* document for non-elevated buildings.
[3] Wave height adjustment is not required in those cases where the Flood Insurance Rate Map indicates that the map includes wave height.
[4] With Obstruction -- The space below has an area of less than 300 square feet with breakaway solid walls or contains equipment below the BFE. If the space below has an area of 300 square feet or more or if any portion of the space below the elevated floor is enclosed with non-breakaway walls, submit for rating.
[5] These percentages represent buliding replacement cost ratios, which are determined by dividing the amount of building coverage being purchased by the replacement cost. See page RATE 20 for more details.
[6] For buildings with obstruction, use Submit-for-Rate guidelines if the enclosure below the lowest elevated floor of an elevated building, which is used for rating, is one or more feet below BFE.

***** SUBMIT FOR RATING**

## Submit for rate

Certain properties at high flood risk, because of peculiarities in their exposure to flooding, do no lend themselves to preprogrammed rates. Rates for these properties are not included in the *Flood Insurance Manual.* These risks require an indepth underwriting analysis and must be submitted to the NFIP or WYO Insurance Company for an individual (specific) rate. Examples include buildings with their lowest floors two feet or more below BFE, buildings with below grade crawlspaces, certain buildings with enclosures 2 feet or more below BFE, some buildings in unnumbered A zones, and similar risks.

Since a submit-for-rate policy often is an indicator of the property owner's noncompliance with a community's regulations, the community's failure to enforce its regulations, or the result of a variance action, these cases are forwarded to the appropriate FEMA Regional Office for investigation.

## Elevation certificates

Elevation Certificates are required to rate most Post-FIRM Buildings. The Elevation Certificate provides the data the insurance agent or company needs to determine the lowest floor of the building and calculate the flood insurance premium using the appropriate rates from the preceding pages. The Elevation Certificate is discussed in Unit 7, Section G.

## Floodproofing

A floodproofed nonresidential building is rated based on the elevation of its lowest floor, unless it is floodproofed to one foot above the BFE. Then, one foot is subtracted from the flood protection level. Thus, a building must be floodproofed to one foot above the BFE in order to get the same rates as a building elevated to the BFE.

If a building is only floodproofed to the BFE or lower, this floodproofing credit cannot be used and it will be rated based on the floor elevation. If the lowest floor is two or more feet below the BFE, it will be a submit to rate.

Buildings that are floodproofed need floodproofing certificates, as explained in Unit 7, Section G.

# RATING UNNUMBERED A ZONES

Unnumbered A Zones are floodplains that are mapped on the FIRM using approximate methodologies that do not have BFEs. Unnumbered A Zones are sometimes referred to as approximate A Zones. The approximate studies used to designate these areas are discussed in

Unit 3, Section E. A Post-FIRM building in an unnumbered A Zone cannot be rated using tables like Table 3B.

A Post-FIRM single-family home in an unnumbered A Zone will be subject to a rate of $2.43/1.15 for building coverage and $3.26/1.70 for contents coverage. This rate is much higher than the rates in Tables 2 and 3B. This can be a real disincentive for people to buy flood insurance on Post-FIRM buildings in unnumbered A Zones.

There are two ways to obtain lower rates in unnumbered A Zones. In either case, an elevation certificate is needed.

If the community provides a locally developed BFE and the building is elevated to or above that BFE, the rates are comparable to those for buildings in AE Zones. Communities are encouraged to do this, as explained in Unit 5, Section B.

If there is no base flood elevation from any source, rates can be set based on the height of the building above its highest adjacent grade. Rates are reduced for buildings 1 foot, 2 feet and 5 or more feet above grade (the higher the building, the lower the rate). For buildings built at or below grade, the submit for rate approach is used.

## PREMIUMS

A policy holder's total payment is calculated by:

Multiplying the amount of building coverage desired times the rate (done once for the basic coverage and again for the additional limits),

Multiplying the amount of contents coverage times the rate desired (done once for the basic coverage and again for the additional limits),

Applying the deductible factor,

Adding the premium for Increased Cost of Construction coverage (which varies from $4 to $75, depending on the type of building and FIRM zone. See Unit 8, Section B on ICC coverage),

Adding the Federal policy fee (currently $30 to help pay for administrative costs, such as floodplain mapping).

The rates can vary based on the community's floodplain management program. If the community has not properly enforced its floodplain management ordinance, it could be put on

probation. Under probation, all policies have an additional $50 surcharge. If a community does not take remedial or corrective measures while on probation, it can be suspended.

Conversely, a community that has an exemplary program that includes floodplain management activities above and beyond the minimum NFIP criteria may apply for a Community Rating System (CRS) classification. Residents in CRS communities can receive up to 45% insurance discounts. The CRS is explained in more detail in the next section.

# C. THE COMMUNITY RATING SYSTEM

The Community Rating System (CRS) is one of the best programs around for encouraging and recognizing broadbased local flood hazard mitigation programs.

The CRS provides a reduction in flood insurance premium rates of up to 45 percent for communities that implement activities above and beyond the minimum requirements of the NFIP. The CRS provides credits for a variety of community flood protection activities.

To receive a CRS flood insurance premium reduction, a community can apply to its FEMA Regional Office or the Insurance Services Office, Inc. (ISO) which manages the program for FEMA. This involves application worksheets and presentation of appropriate documentation to demonstrate that the community has undertaken activities that go beyond NFIP minimum requirements. The ISO/CRS Specialist can assist in preparing the application and reviews the application for FEMA to determine the community's classification and flood insurance discount. An ISO/CRS Specialist will visit the community and verify that the activities are being implemented as described in the application.

The ISO/CRS Specialist is kept abreast of any changes in the community's program and conducts periodic visits to verify continued implementation.

## BENEFITS

The CRS offers some non-financial benefits. First, the community's flood program would receive recognition from a national evaluation program.

Second, technical assistance in designing and implementing some activities is available at no charge from ISO.

Third, the CRS keeps track of the community's floodplain management program. If future governing boards consider eliminating a flood-related program or reducing the regulatory requirements for new developments, it could affect the community's CRS status. This may give them second thoughts about reducing the community's flood protection efforts.

A similar system used in fire insurance rating has had a strong impact on the level of support local governments give their fire protection programs. In other words, the CRS encourages communities to keep their flood programs going during times of drought and diminished interest.

## CRS ACTIVITIES

The *CRS Coordinator's Manual* describes the 18 floodplain management activities credited by the Community Rating System and the documentation required to receive credit for each activity. The credits and formulae used to calculate credits are also included.

The CRS *Application* provides a simpler summary of the activities and the initial steps needed to apply for credit.

These activities are divided into four categories, or series:

- 300 Public information
- 400 Mapping and regulations
- 500 Flood damage reduction
- 600 Flood preparedness

The activities' credit points can be increased if they are part of a comprehensive floodplain management or flood hazard mitigation plan. Special credits are provided for activities that affect special hazards, such as coastal erosion and alluvial fan flooding, that aren't reflected in the NFIP mapping or regulatory standards.

The activities do not all have to be implemented at local expense. Many communities can qualify for "uniform minimum credit" whereby a state or regional agency can apply for a CRS activity that it is implementing on behalf of its communities.

Communities can receive credit for retrofitting projects funded by the owners, regulatory programs administered by the state or a regional district, or similar projects or programs implemented by another agency or organization. What counts to the CRS is what happens in the community, not who does it.

### Public information activities

This series credits programs that advise people about the flood hazard, flood insurance and ways to reduce flood damage. These activities also provide data needed by insurance agents for accurate flood insurance rating:

- 310 (Elevation Certificates) Maintain FEMA elevation certificates for new construction in the floodplain. Keeping certificates after the date of CRS application is required of all CRS communities.

- 320 (Map Information) Respond to inquiries about what FIRM zone a property is in and publicize this service.
- 330 (Outreach Projects) Send information about the flood hazard, flood insurance and flood protection measures to residents.
- 340 (Hazard Disclosure) Advise potential purchasers of floodprone property about the flood hazard or require a notice of the flood hazard. ♦ 350 (Flood Protection Library) The public library maintains references on flood insurance and flood protection.
- 360 (Flood Protection Assistance) Give inquiring property owners technical advice on how to protect their buildings from flooding and publicize this service.

## Mapping and regulation activities

This series credits programs that provide increased protection to new development. The credit points for the activities in this series are increased for growing communities:

- 410 (Additional Flood Data) Develop new flood elevations, floodway delineations, wave heights or other regulatory flood hazard data for an area that was not mapped in detail by the flood insurance study; or have the flood insurance study based on a higher state or local standard.
- 420 (Open Space Preservation) Guarantee that currently vacant floodplain lands will be kept free from development; additional credit is given for areas still in, or restored to, their natural state.
- 430 (Higher Regulatory Standards) Require freeboard; require engineered foundations; require compensatory storage; zone the floodplain for minimum lot sizes of one acre or larger; have regulations to protect critical facilities, or have other standards for new construction that exceed the minimum NFIP requirements.
- 440 (Flood Data Maintenance) Keep flood and property data on computer records; use better base maps; or maintain elevation reference marks.
- 450 (Stormwater Management) Regulate new development throughout the watershed to ensure that post-development runoff is no worse than pre-development runoff and/or protects or improves water quality.

## Flood damage reduction activities

This series credits programs for areas in which existing development is at risk. There is no CRS credit for new structural flood control measures because greater reductions in flood insurance rates are provided through the FIRM revision process.

- 510 (Floodplain Management Planning) Prepare, adopt and implement a comprehensive plan that addresses the community's flood problem, and evaluate and revise the plan annually.
- 520 (Acquisition and Relocation) Acquire and/or relocate floodprone buildings so that they are out of the floodplain.
- 530 (Retrofitting) Protect floodprone buildings through elevation, on-site barriers, or floodproofing.
- 540 (Drainage System Maintenance) Conduct periodic inspections of all channels and retention basins, and remove debris as needed. \

## Flood preparedness activities

This series is oriented toward preparing for and responding to a flood due to natural causes, a levee failure or a dam breach. The community's emergency manager usually coordinates these activities:

- 610 (Flood Warning Program) Provide early flood warnings to the public and have a detailed flood response plan keyed to flood crest predictions.
- 620 (Levee Safety) Maintain levees that are not reflected on the FIRM as providing base flood protection.
- 630 (Dam Safety) All communities in a state with an approved dam safety program receive credit.

## Publications

Even if you are not in the CRS, its publication series can be helpful. It includes the references on ordinance language and planning mentioned in other sections of this course. CRS publications are free. They can also be downloaded from the web site for the CRS Resource Center by clicking on the following link: http://training.fema.gov/EMI/Web/CRS

A CRS publications order form is on the next page. The key document for nonparticipating communities is the *CRS Application.* CRS and non-CRS communities are welcome to order any of the publications that will assist their floodplain management programs.

# COMMUNITY RATING SYSTEM PUBLICATIONS

The following publications can be obtained free by folding and mailing this form (to the address on the back) or faxing it to (317) 848-3578. If you want more than one copy, call (317) 848-2898. All of the "General and Application" and "Specific Activities" publications are available for downloading from FEMA's website, http://www.fema.gov, or on an IBM-compatible compact disk.

_____Check here if you would prefer a paper copy of individual documents instead of the CD.

**General and Application**
_____*CRS Coordinator's Manual*
_____*CRS Activity Worksheets*
_____*CRS Application*
_____*The National Flood Insurance Program's Community Rating System* (color brochures)
_____*CRS Record Keeping Guidance*

**Specific Activities**
_____*CRS Credit for Drainage System Maintenance*
_____*CRS Credit for Flood Warning Programs CRS*
_____*Credit for Outreach Projects*
_____*CRS Credit for Higher Regulatory Standards*
_____*CRS Credit for Stormwater Management*
_____*Example Plans*

**Software**
_____ "Computerized Calculations for the Community Rating System" (IBM-compatible compact disk)
_____ "Computerized Format for FEMA Elevation Certificates" (IBM-compatible compact disk)

**Special Hazards**
_____*CRS Credit for Management of Areas Subject to Uncertain Flow Path Hazards*
_____*CRS Credit for Management of Areas Adjacent to Closed Basin Lake Hazards*
_____*CRS Credit for Management of Ice Jam Hazards*
_____*CRS Credit for Management of Floodprone Areas Subject to Land Subsidence Hazards*
_____*CRS Credit for Protecting Coastal Dunes and Beaches*
_____*CRS Credit for Management of Mudflow Hazards*
_____*CRS Credit for Management of Coastal Erosion Hazards*
_____*CRS Credit for Management of Tsunami Hazards*

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Please send these publications to (please specify a street address, not a post office box):

Name: _____

Address: _____

City: _____State:_____Zip:_____

Community Name: _____

# D. THE COASTAL BARRIERS RESOURCES SYSTEM

The Coastal Barriers Resources Act of 1982 (CBRA) and later amendments, removed the Federal government from financial involvement associated with building and development in undeveloped portions of coastal barriers such as barrier islands, spits, and similar land forms. These areas were mapped and designated as units of the Coastal Barrier Resources System (CBRS). In 1990 additional units were added to the CBRS and Otherwise Protected Areas (OPAs) were designated. OPAs are portions of coastal barriers that are owned by Federal, State or local governments or by certain non-profit organizations and used primarily for natural resources protection. CBRS units can be found on the Atlantic and Gulf Coasts and on the Great Lakes CBRS and OPA units are colloquially called CBRA zones.

Any Federal program which may have the effect of encouraging development on coastal barrier islands is restricted by CBRA. These include "any form of loan, grant, guarantee, insurance, payment, rebate, subsidy or any other form of direct or indirect Federal assistance" with specific and limited exceptions. For example, Federal disaster assistance is limited to emergency relief – there are no loans or grants to repair or rebuild buildings in CBRS or OPA areas.

CBRA also banned the sale of NFIP flood insurance for structures built or substantially improved on or after a specified date. For the initial CBRS designations, this date is October 1, 1983. For all subsequent designations, this date is the date the CBRS or OPA was identified. CBRS and OPA areas and their identification dates are shown on Flood Insurance Rate Maps. Flood insurance can be written in OPAs on some new structures that support conservation uses.

If an owner of a building in a CBRS or OPA area wanted to buy flood insurance, he or she would need a copy of the building permit showing that the building was built before the designation date and a signed statement from the floodplain ordinance administrator that it had not been substantially damaged or improved since then. The insurance agent would provide more information on the format for this documentation.

The boundaries of a CBRS or OPA area cannot be revised through the Letter of Map Amendment or Revision (LOMA/LOMR) process. They can only be revised by the following:

- Congressional action,
- Interpretation of boundaries by the U. S. Department of the Interior, Fish and Wildlife Service, or
- Cartographic modifications by FEMA to correct errors in the transcription of the

Department of the Interior maps onto FIRMs.

If an NFIP policy is issued in error in a CBRS or OPAs area, it will be cancelled and the premium refunded. No claim can be paid, even if the mistake is not found until a claim is made.

If a grand fathered building with flood insurance is substantially improved or substantially damaged, the policy will be cancelled. Determining substantial improvements and substantial damage is covered in Unit 8.

Banks can make conventional loans in the CBRS, but are hesitant to do so because of the uninsured risk and because conventional loans are often sold to the secondary loan market, and that transfer will require flood insurance. Although some private flood insurance is available, it is generally far more expensive than NFIP coverage. While lenders cannot require NFIP flood insurance on newer buildings in CBRS or OPA areas since none is available, they are required to notify borrowers of the flood hazard and the lack of disaster assistance.

# UNIT 10: DISASTER OPERATIONS AND HAZARD MITIGATION

## In this unit

Floodplain managers agree: It's not *if* your community will be flooded.

It's *when*.

Those who have been hit by a flood or other disaster usually regret they were unprepared. Whether it's your house or your community, you can take steps to be ready for the inevitable.

This unit covers three ways to get ready:

- Develop a disaster operations/recovery plan so you will be ready to respond to a disaster immediately,
- Prepare and adopt a hazard mitigation plan, and
- Know the sources of assistance to implement your mitigation plan.

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# A. DISASTER OPERATIONS

After a disaster you can expect everyone to want you to respond quickly and efficiently, without regard to other priorities. You will have to take on emergency post-disaster responsibilities, often at the expense of not performing your normal duties.

In addition, you may, yourself, have suffered damage or loss. So, while you are at work helping others, you may not be getting the help you need yourself. Add to this the need to be available at least 12 hours a day, with few trained helpers.

There may be pressure from the public and elected officials to waive normal procedures and regulations in order to help people return to normal as fast as possible. This is sometimes done in spite of the fact that "back to normal" means people and buildings exposed to the type of flooding that may have caused the disaster in the first place.

In short, your residents and businesses are primarily concerned with getting back to normal. Your stress level is high, patience can be low, the environment is unfamiliar, and there is never enough time or money.

To help you prepare for this scenario, it is strongly recommended that your permit office prepare procedures that will ensure full and fair enforcement of your regulations during this time of stress, confusion and controversy.

## EMERGENCY OPERATIONS

Remember, the emergency manager is responsible for disaster and emergency response activities, such as evacuation, rescue, sandbagging and coordination with the county, state and federal emergency management agencies. Once the disaster proves to be big enough, the emergency manager will open up the Emergency Operations Center (EOC).

You may have a role during the emergency. The permit office usually is expected to have a representative in the EOC during the disaster. While you work through this unit, you should meet with the emergency manager to review what he or she expects you to do before, during and after the disaster.

At some time you will move from the emergency phase to the recovery phase. That is where this section picks up. You also should review with the emergency manager what your office needs to be doing to help your community recover, and at what point you and your staff are free to pursue the activities covered in this section.

## BUILDING CONDITION SURVEY

A ***building condition survey*** is conducted to help the permit office manage time and resources most efficiently. The survey determines:

- If any building is so dangerous that it should not be reentered without a careful inspection.
- Which buildings will need a building permit before they can be repaired or reoccupied.

When possible, the building condition survey is done in conjunction with the emergency manager's initial damage assessment. If the area affected is relatively small, the survey may be skipped and the permit office can immediately begin inspecting damaged buildings.

### High water marks

High water marks are very valuable records. They will help residents relate the last flood to the regulatory protection level. For example, if the flood was estimated to be two feet below the base flood, people can be told that if they were substantially damaged, they will have to elevate their homes at least two feet above the high water marks

High water marks are also important for recording the extent of the flood and adding to the hydrologic record. Someone, usually the community's engineer, should be responsible for obtaining readings from stream gauges and other high water marks as they are reported. Using these high water marks, the engineer should prepare a flood boundary map and estimate a flood recurrence interval.

### Work maps

You should have work maps of the floodplain that show buildings, addresses and elevation contour lines. They should be sized for use during the survey. Made in advance of a disaster, they should be on letter or legal size paper for easy use in a vehicle.

Before the survey, you should review the work maps for the affected area(s) and, using the high water mark data, determine which areas are worst hit. This can be done by plotting known flood boundaries or matching high water marks to the elevation contour lines.

Any area where the flood crest was two feet or more above the buildings' adjacent grade should be outlined on the map and designated as the first priority for the building condition survey.

## Conduct

The building condition survey is conducted from outside all buildings, usually from a vehicle. Depending on the severity and duration of flooding, the survey may be conducted concurrently with the emergency manager's initial damage assessment.

On your work maps, code each building with an "A," "B" or "C" for the three categories of building condition:

*A - Apparently safe*: No exterior signs of structural damage. People can be allowed back in, but they will need building permits for repairs.

*B - Building obviously substantially damaged*: The flood swept the building away, it has collapsed or it is missing one or more walls. The building cannot be reoccupied without major structural work.

*C - Could be substantially damaged:* The building may be substantially damaged, but such damage is not obvious. Any building with more than two feet of water over its first floor falls in this category.

When the field work is done, summarize the survey findings and plot them on a master mitigation map. Use color coding, so areas coded B and C—those that are or may be substantially damaged—will stand out.

## Notice to owners

Upon completing the survey, hand-deliver a letter to each property surveyed, including those assessed as apparently safe. Each letter should include the building's address and, where known, the owner's name. A sample letter is in Figure 10-1.

Keep copies in the permit office and start a file on each property designated as "B—Building obviously substantially damaged" or "C—Could be substantially damaged."

With the letter include a copy of the FEMA/Red Cross book, *Repairing Your Flooded Home.* You can get supplies of them from FEMA or the Red Cross.

If too few copies are available, you may reproduce your own and even include your community's name on the cover. FEMA and the Red Cross encourage this, as it will make the book more pertinent to local readers.

Dear [Name]

The permit office conducted a windshield survey of flooded buildings in your neighborhood. A review of your building from the outside indicates that the structure was affected by the recent flood. Here are some things you should know:

1. Repairs to your building require a permit from the City's permit office. Before you remove, alter, or replace any of the following items, you MUST obtain a building permit: the roof, walls, siding, wallboard, plaster, insulation, paneling, cabinets, flooring, electrical system, plumbing, heating, or air conditioning.

2. The permit office will conduct a complimentary inspection of the damage to your building. This inspection will help you identify what needs to be repaired. It will also identify if a permit is needed and if your building could be substantially damaged. There is no cost for this inspection but it must be taken before you begin your repairs or reconstruction. We will contact you when we plan to do the inspection. If you have a preferred time, please call us to arrange an appointment.

3. You may proceed with clean up activities and temporary emergency repairs without a permit. These include:

-- Removing and disposing of damaged contents, carpeting, wallboard, insulation, etc.
-- Hosing, scrubbing, or cleaning floors, walls, ductwork, etc.
-- Covering holes in roofs or walls and covering windows to prevent the weather from inflicting further damage.
-- Removing sagging ceilings, shoring up broken foundations, and other actions to make the building safe to enter.

4. Some day in the future, your area will flood again. There are things you can do during repair and reconstruction to reduce damage from the next flood. Many of these are discussed in the attached book, *Repairing Your Flooded Home*. We'll be glad to talk to you about protecting your property from future flooding. If we receive a disaster declaration, there may be some financial assistance to help pay for making your property safer than it was before. In the meantime, read Step 8 in *Repairing Your Flooded Home* for some ideas.

5. In order to screen out possible opportunists from taking advantage of the current situation, any contracted work must be done by a firm licensed to work in the City. Furthermore, residents are cautioned and warned *not* to sign blank contracts, agree to have work performed without first seeing the contractor's registration card, or allow work or alterations not authorized by the City permit office.

For further information, please contact the permit office at _____.

Sincerely,

[Name], Director
Permit Office

Attachment: Repairing Your Flooded Home

**Figure 10-1: Sample letter to flood damaged property owner. (Reword for other types of disaster.)**

## PERMIT REQUIREMENTS

As soon as possible after the flood, you should contact your state NFIP coordinator and FEMA Regional Office to review reconstruction regulatory requirements and to see if there are any new guidance documents.

### Permit required

A permit is needed for each building that will be repaired by removing, altering or replacing the roof, walls, siding, wallboard, plaster, insulation, paneling, cabinets, flooring, electrical system, plumbing, heating or air conditioning. These repair/reconstruction projects must meet your building code and flood protection ordinance.

The requirement for a permit cannot be waived, although your governing board may opt to waive permit fees. The board may not amend or ignore the NFIP substantial damage requirement.

### Clean up and emergency repairs

You may allow cleanup and temporary emergency repairs to proceed without a permit. These include:

- Removing and disposing of damaged contents, carpeting, wallboard, insulation, etc.
- Hosing, scrubbing or cleaning floors, walls, ductwork, etc.
- Covering holes in roofs or walls and covering windows to prevent weather from inflicting further damage.
- Making the building safe to enter by removing sagging ceilings, shoring up broken foundations, and other actions.

You may want to identify which buildings may need emergency work and review with the owner the benefits of having professional contractors do some of it.

Structural alterations—such as removing floors or studs, or replacing a furnace—are not allowed without a permit.

Owners of potentially substantially damaged buildings should be advised against making major repairs unless the building presents a safety hazard, because their buildings may be purchased, modified and/or demolished later.

## ENFORCEMENT

You took your first step in enforcing the repair permit requirement when you delivered the notices to property owners after the building condition survey and started a file on each property.

### Initial inspection

As soon as possible after the notice is delivered, your office should inspect each flooded property to review needed repairs and determine if a permit is needed.

Use a checklist to make the inspection quick and consistent. A sample checklist is shown in Figure 10-2. Give a copy of the completed inspection to the property owner, along with safety, health and repair information.

### Posting

Upon completion of the inspection, you should post the appropriate sign on the front of the building so it is clearly visible from the street. Appropriate colored signs can be obtained in volume from the model code organizations. The ones shown here are from the Building Officials and Code Administrators (BOCA).

If the building needs repairs that do not require a permit, post “Safe for Occupancy” and “Approved to Connect” (utilities) signs.

If a permit to make repairs is needed, post the “Habitable—Repairs Necessary” sign.

If it is not safe to clean up or work on the building without major structural repairs, post a “Keep Out—Uninhabitable” sign.

*Only a representative of the permit office may remove or replace a sign after permits have been issued and repairs are made. The “safe for occupancy” signs may be removed by the owners in accordance with instructions issued by the community (for example, the permit office may want all signs posted until all inspections have been completed).*

Property address:_____ Date: _____

Owner: _____ Phone:_____

Check the appropriate column. Column 1 items note that the damage is minor, column 2 items can be expensive to repair, and column 3 items are indicators of substantial damage. Do not count clean up costs or damage to contents (including plug-in appliances) and other items not part of the building's structure (detached structures, fences, sidewalks, swimming pools, etc.).

| 1 | 2 | 3 | |
|---|---|---|---|
| | | | **General condition** |
| ___ | | | Building appears sound and safe to enter, needs minor work to make habitable |
| | ___ | | Apparently safe to enter, needs extensive cleaning/repairs |
| | | ___ | Foundation, floor, wall or ceiling damage such that building not safe to enter |
| | | | **Depth of water** |
| ___ | | | In crawlspace, <2" in unfinished basement, not in building |
| ___ | | | In unfinished basement, only affected contents and utilities |
| | ___ | | < 3' in finished basement or over first floor |
| | | ___ | ≥ 3' over first floor or in finished basement |
| | | | **Foundation** |
| | | | Type of foundation: ___ Slab ___ Basement/split level ___ Crawlspace |
| ___ | | | No signs of cracks or settling. |
| | ___ | | Cracks in basement or crawlspace walls |
| | | ___ | Buckling of slab or basement floor, broken crawlspace or basement wall |
| | | | **Exterior** |
| | | | Type of exterior walls: ___ Masonry ___ Wood/aluminum/vinyl siding |
| ___ | | | No signs of cracks or swelling, doors/windows stick but work |
| | ___ | | Some swelling or warping of walls, doors/windows may need to be replaced |
| | ___ | | Deck, porch, balcony damaged |
| | | ___ | Shifting of wall on foundation, wall broken |
| | | | **Floors** |
| ___ | | | Concrete/tile/bare wooden floors: no signs of damage |
| ___ | | | Tile//vinyl/linoleum coming loose, can be cleaned and reglued |
| | ___ | | Carpeting/vinyl/linoleum soaked, needs to be replaced |
| | | ___ | Wooden floor or subfloor warped, broken, or needs replacement |
| | | | **Interior** |
| ___ | | | Water did not reach any wallboard, paneling or insulation, doors stick but work |
| | ___ | | First four feet of wallboard, paneling or insulation must be replaced |
| | ___ | | All wallboard, paneling or insulation in the lowest floor must be replaced |
| | ___ | | Doors/molding/built-in bookcases swollen, warped, need to be replaced |
| | | ___ | Studs/walls broken, shifted |
| | | ___ | Ceiling sagging/collapsing |

**Figure 10-2a. Sample checklist for initial inspection of a flooded building**

| 1 | 2 | 3 | |
|---|---|---|---|
| | | | **Heating & central air conditioning** |
| | | | Type of system: ___ Forced air ___ Electric baseboard ___ Other:_____ |
| ___ | | | Water did not reach any electrical parts, gas jets, or ductwork |
| | ___ | | Ductwork needs to be disassembled and cleaned or replaced |
| | ___ | | Gas jets and/or electrical parts need to be cleaned or replaced |
| | ___ | | Propane/fuel tank needs to be reconnected and/or anchored |
| | | | **Electrical** |
| ___ | | | Water did not reach any outlets, switches, meters, or fuse or breaker boxes |
| | ___ | | Outlets, switches, breakers, lights or other fixtures need to be replaced |
| | ___ | | Meter or service box need to be repaired or replaced by a professional |
| | | | **Plumbing** |
| ___ | | | Drains and sewers need to be cleared |
| ___ | | | Sump pump needs to be repaired or replaced |
| | ___ | | Water heater needs to be replaced *[need a permit or licensed plumber?]* |
| | ___ | | Water softener needs to be replaced *[need a permit or licensed plumber?]* |
| | | | **Kitchen and bath** |
| ___ | | | Kitchen and bath(s) only need to be cleaned up |
| ___ | | | Built-in appliances, ovens, etc. need cleaning by a professional |
| | ___ | | Built-in appliances, ovens, etc. need to be replaced |
| | ___ | | Cabinets/counters warped or otherwise need to be replaced |
| | ___ | | Plumbing fixtures cracked, broken or need to be replaced |
| ___ | ___ | ___ | Number of checks in each column |
| | | | Completed by: _____ |

If all checks are in column 1, no building permit is needed. If there are any checks in columns 2 or 3, a building permit must be applied for and a repair/reconstruction estimate (prepared and signed by a licensed contractor) must be submitted.

Except where professional cleaning is needed, any items checked in columns 1 or 2 can be performed by the owner.

A licensed contractor may charge for the repair/reconstruction estimate, especially if the owner intends to do the work.

Any item checked in column 3 and any alteration to the electrical or plumbing systems must be performed by a licensed contractor.

The owner should read *Repairing Your Flooded Home*, page 15-29 for clean up and repair guidance and pages 39-41 for mitigation suggestions to incorporate into the repairs.

For further information, please contact the Permit Office at _____.

**Figure 10-2b. Sample checklist for initial inspection of a flooded building**

## Follow up

Here are some things to help with enforcement:

- As you develop procedures, check with your utility companies and appropriate community utility departments. Advise them of your enforcement procedures.
- If not in place, establish a policy that utilities may not turn service back on unless there is an "Approved to Connect" sign posted on the building. This will help greatly in getting people to comply with the regulations after a disaster and prevent accidents.

- Instruct police and other departments about the permit requirements and ask them to report to you any construction projects under way without posted permit signs.
- Within a week of issuing the notices to the owners, visit the notified properties to ensure that the owners are abiding by the requirements.
- Keep a master list or map to track your survey, inspection and permit application findings.

## Flooded buildings

Flooded buildings are harder to inspect that those damaged by other means. Much of the damage is hidden behind walls or under floors, so the owner may not recognize the long term effects of water, moisture and mold.

You should require that the wallboard/plaster and insulation be removed from a flooded building. Once the owner says the framing members are dry, conduct an inspection. Check the cleanliness and moisture content before allowing the walls to be recovered. If the studs are too wet, tell the owner to allow them to dry more before they are covered over.

The best way to measure the level of moisture in wood is with a moisture meter. You can get a moisture meter through woodworking specialty companies. It needs to have a probe that can be stuck into the wood.

If the wood's moisture content exceeds normal levels for your area of the country (usually 10% - 15%), it is too wet to be covered by paint or wallboard. Reinspect it later after it is allowed to dry some more. If the owner is anxious to rebuild, make sure he or she has a copy of *Repairing Your Flooded Home.* Step 4 of that book reviews how to speed up the drying process.

## Contractor quality control

After a disaster, not-so-honest or unqualified contractors offer to help disaster victims, sometimes offering cut rates or special deals. Your community may want to control this by requiring that certain construction and reconstruction work be done by qualified and licensed people.

If you do license contractors, advise property owners of this requirement through the news media. You can also provide handouts on dealing with contractors and what to do in case of a dispute (for some good language, see Pages 41-43 in *Repairing Your Flooded Home*).

If you receive a sufficient number of complaints, you should relieve a contractor of his or her license to do business. You also can report bad contractors to state licensing agencies and/or the consumer protection division of the state attorney general's office.

Your work does not have to be a series of confrontations with contractors. They can be your best ally when telling a property owner why things have to be done a certain way. They also can help encourage property owners to retrofit and take additional steps to protect themselves from the next flood.

You may want to conduct workshops for contractors on flood repairs, mitigation measures, funding opportunities, etc.

## ADMINISTRATION

### Permit forms

If a permit is required, the property owner should be given the forms needed and told what repairs, if any, can proceed before the permit is issued. Keep these forms in the property's file:

- Notice to the owner (Figure 10-1).
- Initial inspection checklist (Figure 10-2).
- Permit application.
- Repair/reconstruction estimate.
- Substantial damage worksheets
- Inspection records.
- FEMA Elevation or Floodproofing Certificate, if the building is required to be elevated or floodproofed.
- Certificate of occupancy.

### Public information

You community should tell residents about the regulatory requirements and the need to carefully clean and rebuild. You should issue news releases and/or distribute materials to advise property owners about:

- Activities that need a permit.
- Activities that do not need a permit (The language in Figure 10-1 could form the basis for a news release.)

- The substantial damage rule.
- The benefits of Increased Cost of Compliance flood insurance coverage (see Unit 8, Section B).
- The need for licensed contractors, if required in your community.
- The information provided in steps 2, 3 and 4 in *Repairing Your Flooded Home*, such as taking pictures for insurance and disaster assistance claims before throwing things away, how to drain a basement without breaking the walls, and health and safety precautions.
- The need to include property protection measures as part of repairing homes or businesses. People need to recognize that "returning to normal" means returning to a building that is subject to another flood.

## Technical assistance

Many technical issues can arise during post-disaster permit operations, but you have many sources of assistance:

- Call your state NFIP coordinator and FEMA Regional Office first. If there was a disaster declaration, they may be able to provide technical assistance staff or workshops to clarify things.
- Check with your state building code agency and the model building code organizations for publications and example forms for post-disaster operations.
- Ask your local or state health department for site-specific guidance on how to ensure that a building is fit for reoccupancy, well water is drinkable, etc.

Most states' Cooperative Extension Services have post-disaster materials and can provide advice on technical matters. They are usually located with your land grant university's agriculture school.

Some communities require that a contractor certify that a building has been properly cleaned. This should be allowed only if the contractor is qualified to do so.

Two organizations certify repair contractors. They can tell you who in your area are certified and what qualifications they have.

International Institute for Cleaning and Restoration Certification (IICRC)
2715 E. Mill Plain Blvd.
Vancouver, WA 98661
Phone: 360/693-5675

Association of Specialists in Cleaning and Restoration (ASCR)
10830 Annapolis Junction Road
Suite 312
Annapolis Junction, MD 20701
Phone: 301/604-4411

## Staff assistance

If the disaster affected many properties, you likely will need more people to perform survey and inspection work. Staff assistance can come from:

- A mutual aid agreement with neighboring communities. There may already be some agreements with neighbors on sharing staff from other offices. If you don't have any, work with your emergency manager on procedures and agreement language.
- Other communities willing to offer help; check with your state NFIP coordinator.
- The building officials association, which may know of members available to help.

If there was a disaster declaration, check with your emergency manager. You may be able to get temporary hires, with part of the cost reimbursed through disaster assistance.

Disaster assistance may also reimburse your community for inspectors to conduct habitability inspections and to determine if buildings are substantially damaged.

# B. HAZARD MITIGATION

While this course has focused on regulations directed toward new construction in the floodplain, many communities are more concerned about existing flood problems. This section tackles the bigger issue—reducing flood losses and making sure other activities don't make things worse.

Many communities deal with flooding with only one or two activities. Every community in the NFIP regulates new development to make sure things do not get worse. Many communities tackle their local drainage problems with storm sewer or drainage construction projects. Communities in high hazard areas usually have flood warning and evacuation programs.

However, many communities do not realize how many other flood protection activities they could implement. Nor to do they know of all the other federal, state, local and private agencies or organizations that can help them with a flood problem.

While flooding cannot always be stopped—and in many cases, should not be prevented—flood hazards can be reduced. As their definitions attest, the words "hazard mitigation" mean taking measures that minimize or reduce the impacts of flooding on human development.

## MITIGATION MEASURES

For the purposes of this course, ***flood hazard mitigation*** is defined as all actions that can be taken to reduce property damage and the threat to life and public health from flooding."

"All" is the critical word. Each community should consider *all* possible measures for mitigating flood hazards, and each community should seek support from as many programs and agencies as possible.

Each mitigation measure is appropriate in different situations. Structural flood control projects can be the most efficient way to protect an existing critical facility or a concentration of damage-prone buildings. But in developing areas, regulations and acquisition make more sense, as they are inexpensive ways to prevent creation of flood problems.

"All actions" is an all-encompassing definition. To make "all actions" more manageable, flood hazard mitigation measures can be categorized under six basic strategies.

## Prevention

***Preventive measures*** are designed to keep the problem from occurring or getting worse. They ensure that future development does not increase flood damage. Preventive measures are usually administered by building, zoning, planning and/or code enforcement offices. They include:

- Planning and zoning.
- Open space preservation.
- Floodplain development regulations.
- Stormwater management.
- Drainage system maintenance.
- Dune and beach maintenance.

## Property protection

Property protection measures are used to modify buildings subject to flood damage rather than to keep floodwaters away. Your community may find these to be inexpensive measures because often they are implemented by or cost-shared with property owners.

Many of the measures do not affect a building's appearance or use, making them particularly appropriate for historical sites and landmarks. These measures include:

- Acquisition.
- Relocation.
- Building elevation.
- Floodproofing.
- Sewer backup protection.
- Insurance.

## Natural resource protection

Water quality and natural habitats may be improved, and flood losses reduced, by preserving or restoring natural areas or the natural functions of floodplain and watershed areas.

These activities usually are implemented by environmental or code enforcement agencies. In addition to these measures, zoning or preserving open space also can protect natural resources.

- Wetland protection
- Erosion and sediment control
- “Best management practices” for stormwater runoff

## Emergency services

Emergency services measures protect people during and after a flood. Most counties and many cities have emergency management offices to coordinate warning, response and recovery during a disaster. Emergency services measures include:

- Flood warning.
- Flood response.
- Critical facilities protection.
- Health and safety maintenance.

## Structural projects

***Structural flood control projects*** are used to prevent floodwaters from reaching properties. These measures are “structural” because they involve construction of man-made structures to control water flows. There are six common types of projects:

- Reservoirs.
- Levees/floodwalls/seawalls.
- Channel modifications.
- Enlarging culverts or bridge openings.
- Diversions.
- Storm sewers.
- Beach nourishment.

Structural projects can be very expensive. Their other shortcomings include:

- Disturbing the land and disrupting natural water flows, often destroying habitats.
- Requiring regular maintenance, which if neglected can have disastrous consequences.
- Being built to a flood protection level that larger floods can exceed, causing extensive damage.
- Creating a false sense of security, as people protected by a project often believe that

no flood will ever reach them.

## Public information

Public information activities advise property owners, potential property owners and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of floodplains.

Usually implemented by a public information office, they can include:

- Map information.
- Outreach projects.
- Real estate disclosure.
- Library.
- Technical assistance.
- Environmental education.

# MITIGATION PLANNING

Different departments in a community may implement activities that are not coordinated or that may even conflict with one another. Some examples:

- The street P habitat.

## Benefits of planning

Floodplain residents and property owners are not always aware of things that are being done to protect them from flooding, nor are they aware of things they can do to protect themselves, or how they can contribute to community efforts. Developing a flood hazard mitigation plan is one of the best ways to correct these shortcomings.

The objective of planning is to produce a program of activities that will best tackle the community's flood problem and meet other community needs. A well-prepared plan will:

- Ensure that all possible activities are reviewed and implemented so that the most appropriate and efficient solutions are used to address the local flood problem.
- Link floodplain management policies to specific activities.
- Ensure that activities are coordinated with each other and with other community

goals, objectives and activities, preventing conflicts and reducing the costs of implementing individual activities.

- Educate residents about the flood hazard, flood loss reduction measures, and the natural and beneficial functions of floodplains.
- Build public and political support for projects that prevent new flood problems, reduce flood losses and protect the natural and beneficial functions of floodplains.
- Fulfill planning requirements for state or federal assistance programs.
- Facilitate implementation of floodplain management activities through an action plan that has specific tasks, staff assignments and deadlines.

A well-prepared plan will guide your community's flood, stormwater and related activities so that they are implemented more economically and in ways more attuned to the needs and objectives of your community and its residents.

A well-prepared plan also will reduce flood losses and improve protection of the floodplain's natural and beneficial functions, to the benefit of both your community and the NFIP.

## The planning process

The planning process includes getting input from everyone who has relevant information, everyone who is affected by flooding and everyone who will participate in implementing the plan. It works for all types of plans, such as those for land use plans, capital improvement, neighborhood redevelopment and hazard mitigation.

A hazard mitigation plan can take many forms, using a variety of formats and organizational styles. The format and organization of a plan is not what is important.

Dwight D. Eisenhower said, "Plans are worthless. Planning is essential." This simple phrase says it all: The paper document is not as important as the *process* of planning. Because each community is different, each floodplain management plan will be different. However, the process they follow should be similar.

FEMA recommends a 10-step planning process, summarized in Figure 10-3. This process provides a framework with which local officials, residents, engineers, technical experts and others can work out the details and reach agreement on what should be done to mitigate the flood hazard.

1. Organize to prepare the plan.
2. Involve the public.
3. Coordinate with other agencies.
4. Assess the hazard.
5. Assess the problem.
6. Set goals.
7. Review possible activities.
8. Draft an action plan.
9. Adopt the plan.
10. Implement, evaluate and revise.

**Figure 10-3. The 10-step mitigation planning process**

The 10-step planning process is credited under the Community Rating System, Activity 510 Floodplain Management Planning, in the *CRS Coordinator's Manual* and the *CRS Application*. It is explained in more detail in *Example Plans*. Plans developed according to this process are a prerequisite for funding under other FEMA programs (see Section C in this unit).

## DISASTER MITIGATION ACT OF 2000 PLANNING REQUIREMENTS

The Disaster Mitigation Act of 2000 modified the Robert T. Stafford Disaster Relief and Emergency Management Act to establish new mitigation planning requirements. The Act continues the requirement for a State Hazard Mitigation Plan as a condition of disaster assistance and provides for States to receive increased Hazard Mitigation Program Grant (HMGP) funding if they have in effect a FEMA-approved Enhanced State Mitigation Plan. More importantly for communities, the Act establishes new local mitigation planning requirements. After November 1, 2004 communities must have a FEMA-approved mitigation plan in place in they want to receive HMGP funding or funding for projects under the new Pre-Disaster Mitigation Program. See the FEMA website or contact you State Emergency Management Agency or FEMA Regional Office for further information on this requirement.

## MULTI-OBJECTIVE MANAGEMENT

Because water does not respect property lines or city limits, solutions to your community's flood problem will involve not just people who suffered damage most recently, but also the neighborhood, your community and even the rest of the watershed.

A single-minded approach will not lead to a solution to a flood problem. Other interests are out there, and if everyone focuses only on his or her own concerns, everyone will simply compete—and no one wins.

On the other hand, there is a proven approach to reduce flood losses and simultaneously address other community concerns. Called multi-objective management or M-O-M, it succeeds because using it builds alliances among interest groups.

M-O-M uses existing financial and other resources to look at the whole watershed affecting the flooding problem. In the end, your community will have coordinated flood loss reduction with reaching some of its other goals and needs. By using M-O-M, solutions to flooding will be more effective, more sensitive to the environment, have broader support, be part of a more comprehensive program and accomplish more than one objective.

## M-O-M guidelines

There is nothing magical about multi-objective management. The idea is to bring together everyone with a concern or problem that has the potential to affect or be affected by the flood problem. It requires communication among groups, and it capitalizes on the help government agencies and private organizations offer.

Multi-objective management has six guidelines:

**1. Keep the effort locally based.** Solutions must be acceptable to residents, their neighbors and others in the area. They must fit in with other local concerns and goals.

**2. Understand the flood problem and its relation to the watershed.** The problem is not isolated; neither is it limited to one stream or one neighborhood. If people think in terms of the whole watershed, they will come up with more possible solutions—and the solutions will not cause problems for someone else.

**3. Think broadly about possible solutions to reduce the flood problem.** There are more ways to do things than conventional wisdom may suggest. Don't get locked into wanting a floodwall or other single-purpose project without first checking out alternatives.

**4. Identify the other community concerns and goals that could have a bearing on the flood problem.** People who are interested in those other concerns should meet and brainstorm possible solutions that can reach more than one of their objectives.

**5. Obtain expert advice and assistance from government agencies and private organizations.** Planners should find out what financial assistance and advice are available. They

should not put all their eggs in one basket and wait for that big “cure-all” project that may never be funded; there are literally hundreds of programs out there.

**6. Build a partnership among the private and public groups and individuals that can be enlisted to work on the objectives.** More minds and hands mean that better ideas will result, people will be more likely to follow through, and more people will be available to do the work.

Using the systematic 10-step process will help greatly in developing a mitigation plan that coordinates and includes the other community objectives and interests. Preparing a written plan helps keep people get organized, clarifies solutions and formalizes everyone's participation.

## Benefits

If you have a flood problem, you may ask, “Why bother with this M-O-M stuff? Why not just stop the flooding?”

This is not as easy as it sounds, especially if you are on a large river.

Structures to "stop" or control floods can be expensive to build and maintain; take a long time to plan, fund, and build; and can cost more than the value of the property they would protect. They may adversely affect other properties, the environment and other people’s plans for the area. As shown by the Great Flood of 1993, they don't always work, especially if a flood is larger than anticipated.

If you have only one objective—“stop the flooding”—you may spend a lot of time and money on your one problem, in the process creating problems for other people. You will be competing with other communities that want funds for expensive structural projects. You will even be competing with others in your community who have different goals in mind.

The M-O-M approach helps you take charge of your future by looking at all the things your community needs and seeing how they can be combined with possible ways to reduce flood losses. Your eggs are not all in one basket, you are less dependent on outside agencies, and you have more sources of funding and technical advice.

With M-O-M, you join forces with other people who are just as devoted to their goals—be they parks and recreation, economic development, tourism or environmental education. You can all reach your objectives in a cheaper, faster and less disruptive manner by using M-O-M, and get more permanent, less expensive flood loss reduction than by trying to control the natural forces that cause floods.

One reason M-O-M gets such good results is that by using it, you treat the river's floodplain and its watershed as a resource. The floodplain need not be just a place with a flood hazard; it is also an area that is important to your community and to plant and animal life.

The M-O-M process makes sure that flood projects don't undermine other community objectives and the need to protect the natural environment.

For more information on M-O-M, see Using Multi-Objective Management to Reduce Flood Losses in Your Watershed.

Kampsville, Illinois

Kampsville, Illinois, is a town of 400 residents on the Illinois River. Its residents could have continued to endure flooding, wait for a flood control project that would not be built, or look for alternative ways to reduce flood losses. They chose the third option, and it paid off during the 1993 flood.

After Kampsville was flooded in 1979 and again in 1982, residents and local officials decided to do something. They knew they would not stop the Illinois River from flooding, and that to build a large enough levee would require removing many of the buildings they wanted to protect. So they began a systematic planning process to review alternative ways to reduce flood losses.

One of the first things they did was ask for help. The Illinois Department of Natural Resources provided staff support, and during a series of planning meetings, other agencies were invited to explain their ideas and tell how they could help.

It became apparent that the best solution was to purchase and relocate the worst-hit buildings. Because this would leave the town with a large open area, folks started talking about what they would do with it.

They also were concerned that they would lose some businesses when the floodprone properties were bought out. During this process, they realized that they had to think about more than just flooding; they had to consider the future of their town and its economic base. They expanded their planning process to encompass other goals, including redeveloping the acquired area, designing a park and building a base for tourism.

Taking the plan to various funding sources, Kampsville eventually received more than $1 million to buy 50 properties and convert flooded and dilapidated buildings to open space. The money was used also to elevate some buildings that were not flooded very deeply, to floodproof the water treatment plant and to relocate the fire station. A new ferry landing and all-weather access into town were also built.

Pursuing its other objectives, the village started sponsoring recreation activities, including an annual celebration that brings in hundreds of people. They now view the riverfront as a resource, not a problem area.

In all, financial assistance was provided by three state agencies, two federal agencies and the town's largest employer. Although it took almost 10 years to plan, fund and complete, Kampsville's approach paid off during the 1993 Midwest flood. The town suffered some damage because floodwaters exceeded the base flood elevation, but Kampsville did not make the news because its damage was relatively minor compared to that of its neighbors.

**Figure 10-4. A M-O-M example**

# C. MITIGATION ASSISTANCE PROGRAMS

A variety of federal, state, local and private sources offer assistance in mitigation activities. Help is limited only by your community's imagination.

This section reviews the more common programs.

## Technical Assistance

Help with mitigation planning may be available from a local, regional or state planning agency or a private organization. For example, the National Park Service's Rivers, Trails and Conservation Assistance Program provides staff support for local planning under certain conditions. If they can't help with the whole thing, they may be able to help with some tricky parts, like providing a facilitator for an all-day community input workshop.

Another source of assistance is a private consultant. Planning and engineering firms usually have personnel skilled in the various flood loss reduction measures and the planning process.

These flood-related agencies and organizations may help in providing technical assistance or in implementing mitigation activities that benefit your community:

- The soil and water conservation district.
- Agencies of the U.S. Department of Agriculture that work with watershed property owners, such as the Natural Resources Conservation and Cooperative Extension services.
- Watershed, stormwater management or flood control districts.
- Regional or metropolitan water, sewer or sanitary districts.
- The state or county emergency management or civil defense agency.
- The state natural resources or water resources agency.
- Local watershed councils or associations.
- The district office of the U.S. Army Corps of Engineers.

More references and contacts in floodplain management agencies and programs can be obtained through your state NFIP coordinator (see Appendix B), the Association of State Floodplain Managers ((608) 274-0123)) and the Floodplain Management Resource Center ((303) 492-6818)).

An excellent source of information is the *M.O.M. Resource Directory* prepared jointly by FEMA and the National Park Service. A computer program that lists more than 300 government and private programs, the Windows-based software is easy to install and use.

It is available free from:

Rivers, Trails and Conservation Assistance
National Park Service
P.O. Box 25287 IMFA-RM-S
Denver, CO 80225-0287
Phone: (303) 969-2781
Fax: 303-987-6676

Assistance on wetlands issues can be obtained by calling the USEPA Wetlands Information Hotline at (800) 832-7828.

## PROPERTY OWNERS

Many times, a community does not have to look beyond the beneficiaries of hazard mitigation to find help for a mitigation activity.

For an activity that directly affects a property, such as a retrofitting project, the owner should be asked to chip in. One example is using the owner's insurance claim to help pay for a project related to repairing a damaged building. The Increased Cost of Compliance coverage in the flood insurance policy was specifically created for mitigation purposes. It is discussed in more detail in Unit 8, Section B.

Owners who recognize that they have a real flood problem are willing to pay a large part of the cost. In one project in Denham Springs, Louisiana, homeowners paid up to $40,000 as the 50/50 match to elevate their homes above flood levels. In the Chicago area, some communities found that a rebate for as little as 20 percent or 25 percent of the total project cost can be a real motivator to get property owners to implement retrofitting projects. Over 400 projects have been implemented with the owners paying the bulk of the cost.

For more information on these and other local funding sources, see the Corps of Engineers' *Local Flood Proofing Programs*.

## FLOOD MITIGATION ASSISTANCE PROGRAM

The National Flood Insurance Reform Act of 1994 authorized FEMA to provide grants to states and communities for planning assistance and for mitigation projects that reduce the risk of

flood damage to structures covered by flood insurance. The overall goal of the Flood Mitigation Assistance (FMA) program is to fund cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes and other insurable structures.

FMA will pay 75 percent of the cost of these measures under its planning grants, project grants and technical assistance grants. Each state receives annual funding for planning and project grants. States distribute the planning grants at their discretion, in accordance with each grant's limitations. All funding applications must go through the state to be accepted by FEMA.

Technical assistance grants are given to state agencies that provide assistance to communities, so only the other two funding sources are covered here.

## Planning grants

The purpose of a planning grant is to develop or update a Flood Mitigation Plan. To be eligible for an FMA project grant, an eligible applicant must develop, and have approved by the FEMA regional director, a Flood Mitigation Plan which "will articulate a comprehensive strategy for implementing technically feasible flood mitigation activities for the area affected by the plan."

The regulations note that "existing plans, such as those credited through the Community Rating System ... may meet the requirements of FMA with few or no modifications."

At a minimum, plans must include these elements, all of which are part of the 10-step hazard mitigation planning process that was discussed in the previous section:

- A description of the planning process and public involvement, which may include workshops, public meetings or public hearings.
- A description of the existing flood hazard and identification of the flood risk, including estimates of the number and type of structures at risk, repetitive loss properties and the extent of flood depth and damage potential.
- The applicant's floodplain management goals for the area covered by the plan.
- Identification and evaluation of cost-effective and technically feasible mitigation actions that were considered.
- Presentation of the strategy for reducing flood risks and continued compliance with the NFIP, and procedures for ensuring implementation, reviewing progress and recommending revisions to the plan.
- Documentation of formal plan adoption by the legal entity submitting the plan.

### Project grants

The following types of projects are eligible for funding through FMA, providing they meet all other eligibility criteria:

- Acquisition of insured structures and underlying real property in fee simple and easements restricting real property to open space uses.
- Relocation of insured structures from acquired or restricted real property to nonhazard-prone sites.
- Demolition and removal of insured structures from acquired or restricted real property.
- Elevation of insured residential structures in accordance with NFIP standards.
- Elevation or dry floodproofing of insured nonresidential structures in accordance with NFIP standards.
- Other activities that bring an insured structure into compliance with the NFIP's floodplain management requirements.
- Minor physical flood mitigation projects that reduce localized flooding problems and do not duplicate the flood prevention activities of other Federal agencies.
- Beach nourishment activities.

To be eligible a project grant, a project must be:

- In conformance with the Flood Mitigation Plan. The type of project being proposed must be identified in the plan.
- Cost-effective, not costing more than the anticipated value of the reduction in both direct damages and subsequent negative impacts to the area if future floods were to occur. Both costs and benefits are computed using net-present value.
- In conformance with federal regulations on floodplain management, protection of wetlands, seismic safety and applicable environmental laws and regulations.
- Technically feasible.
- In conformance with the minimum standards of the NFIP.
- Located physically in a participating NFIP community that is not on probation or must benefit such community directly by reducing future flood damage.

## PRE-DISASTER MITIGATION PROGRAM

The Pre-Disaster Mitigation (PDM) Program was authorized by Section 203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act. Beginning in Fiscal Year 2003 Congress appropriated funds for the Pre-Disaster Mitigation Program to fund mitigation plans and projects by States and communities. Currently the program is funded at approximately $150 million per year. PDM funds are made available to States and communities through a national competition. There is a 75% Federal cost-share. Although funding is available for mitigation plans and projects that address all hazards, it is expected that a significant portion of the funding will be for projects that reduce flood damages. The latest information on how to apply for these funds and on the criteria that will be used to rank projects can be found on FEMA's website at http://fema.gov/fima/pdm.

## DISASTER ASSISTANCE

If your community is hit by a disaster and the area subsequently receives a presidential disaster declaration, a variety of programs can provide mitigation assistance. Most of them are authorized by the Robert T. Stafford Disaster Relief and Emergency Act, known as the ***Stafford Act***.

First, a disaster field office will be established under the guidance of a state coordinating officer and a federal coordinating officer. They will be supported by mitigation staff, directed by a deputy federal coordinating officer for mitigation and a state hazard mitigation officer.

Two types of help will be provided: technical assistance and financial assistance. The federal-state team will distribute up-to-date materials about these programs; this section provides a brief overview of them. Note that they may be slightly different when implemented in your area in the future.

### Technical assistance

The disaster assistance staff should be able to spend time with your community's mitigation planners. They can review mitigation measures, techniques and funding sources.

One of their prime concerns will be proper regulation during reconstruction (see Section A of this unit). They can help analyze damage to identify areas prime for acquisition and clearance and help develop mitigation plans.

The disaster team may also provide technical assistance to property owners. Information on repairing and retrofitting is given through public meetings, handouts and news releases. Sometimes mitigation tables are set up in disaster service centers, or separate Reconstruction

Information Centers are opened. They house architects, engineers and other specialists who can work closely with owners to help design appropriate flood protection measures.

## Financial assistance

FEMA will widely publicize the assistance programs that are made available after a disaster declaration. Three main types of assistance are available, each of which can fund mitigation measures:

**1. Public/Infrastructure Assistance,** formerly known as the Public Assistance Program, it can provide 75 percent of the cost of repairing or restoring facilities owned by public agencies and certain private nonprofit organizations. If an applicant prefers to relocate a facility out of the floodplain rather than replace it, FEMA will still provide funds, but at a reduced share.

FEMA takes the first step in obtaining Public/Infrastructure Assistance funding by completing a Damage Survey Report (DSR) for each facility. The community should have a representative on each DSR team to provide local input into the repair or replacement design for damaged facilities.

The local DSR representative should be aware that this program provides an opportunity to incorporate hazard mitigation features while replacing some damaged property. FEMA can provide funding above and beyond the cost of repairing or replacing a public facility, if it can be demonstrated that the proposed mitigation measure is technically feasible, cost-effective and required by a state or local regulation.

*Mitigation Example:* A flood washes out a culvert that used to back up every time there was a 2-inch rain. FEMA and the state will estimate the cost to repair or replace it as it was. If someone points out that (1) a larger culvert can save more money than it costs by reducing flood damage to other properties and (2) floodplain regulations prohibit obstructions in the floodway, then FEMA may share the expense of replacing the lost culvert with a larger one.

Similarly, funds from this program can be used to protect or relocate damaged water and sewer lines, floodproof pumping stations or replace bridges with clear spans.

*Insurance note:* Public/Infrastructure Assistance grants for public buildings are subject to a "deductible." Under the Stafford Act, Federal disaster assistance for a flooded public building will be reduced by the amount of flood insurance coverage the community <u>should</u> have on that building.

It does not matter whether the building is insured; FEMA will still only provide assistance for damage that exceeded the level of available insurance.

*Example:* The maximum amount of flood insurance available for a non-residential building is $500,000. Floodville's $2 million city hall is flooded and receives $600,000 in damage. If the city hall is in an SFHA, the disaster assistance program will assume it's insured for $500,000. Federal aid to repair or rebuild the city hall will be 75% of $100,000 ($600,000 - $500,000).

Floodville will receive $75,000 in disaster assistance for a building that suffered $600,000 in damage. If the city hall was not insured, Floodville's taxpayers are going to have to come up with the balance. If it was insured, the city will have $575,000 ($500,000 in insurance claim and $75,000 from disaster assistance) toward repairs and reconstruction.

Flood insurance is also a good idea because not every flood warrants a Federal disaster declaration. The moral of the story is to make sure that all publicly owned buildings subject to flooding have flood insurance.

**2. Human services programs** provide resources to assist residents and business owners, such as temporary housing, unemployment aid, food stamps, grants and loans. Many of these were formerly called the Individual Assistance Program.

Temporary housing can be particularly helpful in providing homes for people waiting to find out if their homes can be reoccupied or if they will be acquired and cleared.

The Individual and Family Grants (IFG) program is designed to help disaster victims pay for "unmet needs," such as those that are not funded by other programs. It is a grant to individuals, usually people who cannot qualify for a loan or cannot get a loan to cover all of their expenses.

Sometimes IFG can be used to fund minor property protection projects, such as elevating a furnace, water heater, washer or electrical service box above the flood level. These grants can be especially useful in areas with lower income or fixed income families that are subject to shallow or basement flooding.

**3. Hazard mitigation programs** provide financial resources to help reduce susceptibility to damage from a future disaster. Section 404 of the Stafford Act makes money available to assist eligible applicants after a Presidential disaster declaration. Section 404's Hazard Mitigation Grant Program will pay up to 75 percent of the cost of such mitigation projects.

To be eligible, the projects should be consistent with the recommendations of the state’s mitigation plans and strategies. Projects must be shown to be cost-effective, and they may mitigate hazards other than the one that caused the disaster.

Eligible projects include acquisition of floodprone properties and reversion to open space, elevation of floodprone buildings and minor drainage improvements.

Traditionally, the program has most often been used to acquire floodplain properties. In some communities, the property owners volunteered to help pay the local share of the cost.

Even if your community did not receive a disaster declaration, you may be able to receive a Hazard Mitigation Grant. In 1997, FEMA ruled that the funds could be spent on appropriate projects throughout a state that received a disaster declaration.

**4. Small Business Administration Disaster Loan Program,** provides loans to disaster victims that meet the ability to repay, income qualifications. In addition to borrowing enough funds to repair damages, the SBA Disaster Loan Program will provide additional loan amounts in order for the repairs to comply with local codes. Also, SBA will allow an additional 15% for incorporating mitigation measures during the repair process.

# APPENDIX A:
# FEMA REGIONAL OFFICES

**Region I**
(Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont)
FEMA Region I
99 High Street
6th Floor
Boston, MA 02110
(617) 223-9540

**Region II**
(New Jersey, New York, Puerto Rico, Virgin Islands)
FEMA Region II
26 Federal Plaza, Suite 1307
New York, NY 10278-0001
Phone: (212) 680-3600
FAX: (212) 680-3681

**Region III**
(Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia)
FEMA Region III
615 Chestnut Street
Philadelphia, PA 19106
Phone: (215) 931-5608

**Region IV**
(Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee)
FEMA Region IV
3003 Chamblee-Tucker Road
Atlanta, GA 30341
Phone: (770) 220-5200

**Region V**
(Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin)
FEMA Region V
536 South Clark Street
Chicago, IL 60605
Phone: (312) 408-5500

**Region VI**
(Arkansas, Louisiana, New Mexico, Oklahoma, Texas)
FEMA Region VI
Federal Regional Center
800 North Loop 288
Denton, TX 76209
Phone: (940) 898-5399

**Region VII**
(Iowa, Kansas, Missouri, Nebraska)
FEMA Region VII
2323 Grand Boulevard, Suite 900
Kansas City, MO 64108
Phone: (816) 283-7061

**Region VIII**
(Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming)
FEMA Region VIII
Building 710, Box 25267
Denver, CO 80225-0267
Phone: (303) 235-4800
FAX: (303) 235-4976

**Region IX**
(Arizona, California, Hawaii, Nevada)
FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607
Phone: (510) 627-7100

**Region X**
(Alaska, Idaho, Oregon, Washington)
FEMA Region X
130 228th Street, SW
Bothell, WA 98021
Phone: (425) 487-4600

# APPENDIX B:
# STATE CONTACTS

**For an up to date list of State Hazard Mitigation Officers and NFIP Coordinators see FEMA's web site at http://www.fema./gov.**

| STATE HAZARD MITIGATION OFFICERS | NFIP COORDINATORS |
|---|---|
| **Alabama**:<br>Debbie Peery<br>AL Emergency Management Agency<br>5898 County Road 41<br>P.O. Drawer 2160<br>Clanton, AL 35046<br>Phone: 205-280-2476 | **Alabama:**<br>Charles Sanders, CFM<br>ADECA/OWR/NFID<br>P.O. Box 5690,<br>Montgomery, AL 30103-5690<br>Phone: 334-353-1966<br>Fax: 334-242-0776<br>chuck@adeca.stayte.al.us |
| **Alaska**:<br>Gary Brown<br>Alaska Emergency Services<br>P.O. Box 5750<br>Fort Richardson, AK 99505<br>Phone: 907-428-7036 | **Alaska:**<br>Christy Miller,<br>CFM Dept. of Community and Economic Development<br>550 West 7th Avenue, Suite 1770<br>Anchorage, AK 99501-3510<br>Phone: 907-269-4567<br>Fax: 907-269-4563<br>christy_miller@dced.state.ak.us |
| **American Samoa**:<br>Ufuti Fa'Afetai T. Leremia<br>Territorial Emergency Management<br>P.O. Box 1086<br>Pago Pago, American Samoa 96799<br>Phone: 011-684/633-2497/2331 | **American Samoa:**<br>Nicky Salomonia<br>Economic Development Planning Office<br>Pago Pago, AS 96799<br>Phone: 684-633-5155<br>Fax: 684-633-4196 |
| **Arizona**:<br>Barbara Corsette<br>Arizona Emergency Management<br>5636 East McDowell Road<br>Phoenix, AZ 85008<br>Phone: 602-392-7518 | **Arizona:**<br>Brian Cosson<br>Engineering Division Arizona Department of Natural Resources 500 North 3rd Street Phoenix, AZ 85004<br>Phone: 602-417-2400 xt.7197 Fax: 602-417-2423<br>btcosson@adwr.state.az.us |
| **Arkansas**:<br>Terry Gray<br>Department of Emergency Management<br>PO Box 758<br>Conway, AR 72033<br>Phone: 501-730-9798 | **Arkansas:**<br>Jason Donham, CFM, BS<br>Land Resources Specialist Arkansas Soil and Water Conservation Comm.<br>101 East Capital, Suite 350<br>Little Rock, AR 72201<br>Phone: 501-682-3907<br>Fax: 501-682-3991<br>Jason_donham@aswcc.state.ar.us |

| STATE HAZARD MITIGATION OFFICERS | NFIP COORDINATORS |
|---|---|
| **California**:<br>John Rowden<br>California Office of Emergency Services<br>11030 White Rock Road<br>P.O. Box 419023, Suite 110<br>Rancho Cordova, California 95741-9023<br>Phone:916-464-2609 | **California:**<br>Ricardo Pineda, PE CFM<br>California Department of Water Resources<br>1416 9th Street, Room 1623<br>Sacramento, CA 95814<br>Phone: 916-574-0611<br>Fax: 916-653-363 |
| **Colorado**:<br>Marilyn Gally<br>Colorado Office of Emergency Management<br>15075 South Golden Road<br>Golden, CO 80401-3979<br>Phone:303-273-1775 | **Colorado:**<br>Kevin Houch, P.E.<br>Colorado Water Conservation Board<br>State Centennial Building, Room 721<br>1313 Sherman Street<br>Denver, CO 80203<br>Phone: 303-866-3441<br>Fax: 303-866-4474<br>Kevin.houch@state.co.us |
| **Connecticut**:<br>Alphonse Letendre<br>Dept. of Environmental Protection<br>79 Elm Street, 3rd Floor<br>Hartford, CT 06106<br>Phone: 860-424-3876 | **Connecticut**:<br>Diane Ifkovic<br>Dept. of Environmental Protection<br>79 Elm Street, State Office Building<br>Hartford, CT 06106<br>Phone: 860-424-3537<br>Fax: 860-424-4075<br>diane.ifkovic@po.state.ct.us |
| **Delaware**:<br>Lloyd Stoebner<br>Delaware Emergency Management Agency<br>165 Brick Store Landing Road<br>Smyrna, DE 19977<br>Phone: 302-659-2246 | **Delaware**:<br>Michael Powell, CFM<br>Delaware Dept. Natural Resources<br>89 Kings Highway<br>Dover, DE 19901<br>Phone: 302-739-4411<br>Fax: 302-739-6724<br>mpowell@state.de.us |
| **Florida**:<br>Eric Poole<br>FL Division of Emergency Management<br>555 Shumard Oak Boulevard<br>Tallahassee, FL 32399-2100<br>Phone: 850-413-9947<br>Fax: 904-413-9857 | **Florida:**<br>Charles Speights<br>Florida Comm Affairs Emerg. Mgmt.<br>2555 Shumard Oak Blvd.<br>Tallahassee, FL 32399-2100<br>Phone: 850-413-9959<br>Fax: 850-410-1582<br>charles.speights@dca.state.fl.us |
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| **Hawaii**:<br>Larry Kanda<br>State of Hawaii Dept. of Defense<br>3949 Diamond Head Road<br>Honolulu, HI 96816-4495<br>Phone: 808-733-4300 | **Hawaii:**<br>Carol Tyay-Beam<br>Dept. of Land & Natural Resources<br>PO Box 373<br>Honolulu, HI 96809<br>Phone: 808-587-0267<br>Fax: 808-587-0283<br>carol.l.tyau@hawaii.gov |
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| **Iowa**:<br>Dennis Harper<br>Iowa Division of Emergency Management Division<br>Hoover State Office Building<br>Level A<br>Des Moines, IA 50319<br>Phone: 515-281-3231 | **Iowa**:<br>Bill Cappuccio<br>Iowa Dept. of Nat. Resources<br>Wallace State Office Building<br>Des Moines, IA 50319<br>Phone: 515-281-8942<br>Fax: 515-281-8895<br>bill.cappuccino@dnr.state.ia.us |

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| **Louisiana**:<br>Dan Falanga<br>Louisiana Office of Emergency Preparedness<br>625 N. 4th Street<br>Baton Rouge, LA 70804<br>Phone: 225-324-6701 | **Louisiana**:<br>Cindy O'Neal<br>Louisiana Dept. of Transportation & Devel.<br>PO Box 94245, Room 430<br>Baton Rouge, LA 70804-9245<br>Phone: 225-274-4354<br>Fax: 225-274-4351<br>coneal@dotdmail.dotd.state.la.us |
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| **Massachusetts**:<br>Richard Thibedeau<br>Massachusetts Dept. of Environmental Management<br>251 Causeway Street, Suite 700<br>Boston, MA 02114-2150<br>Phone: 617-973-8781 | **Massachusetts**:<br>Richard Zingarelli<br>MA Dept. of Conservation & Recreation<br>Flood Hazard Mgmt.<br>251 Causeway Street, Suite 700<br>Boston, MA 02114<br>Phone: 617-626-1406<br>Fax: 617-626-1349<br>richard.zingarelli@state.ma.us |

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| **Montana**:<br>Larry Akers<br>Montana Disaster & Emergency Services<br>1100 North Last Change Gulch<br>P.O. Box 4789<br>Helena, MT 59604<br>Phone: 406-841-3960 | **Montana:**<br>Karl Christians, CFM<br>Montana Floodplain Mgmt. Program<br>P.O. Box 201601<br>48 N. Last Chance Gulch<br>Helena, MT 59620<br>Phone: 406-444-6654<br>Fax: 406-444-0533<br>kchristians@state.mt.us |
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| **New Jersey**:<br>Anthony S. Mangeri<br>New Jersey Office of Emergency Management<br>PO Box 7068 Old River Road<br>West Trenton, NY 08628-0068<br>Phone: 609-538-6009 | **New Jersey:**<br>Clark Gilman, P.E.<br>New Jersey Dept. of Environmental Protection<br>PO Box 419<br>Trenton, NJ 08625<br>Phone: 609-292-2296<br>Fax: 609-984-1908<br>cgilman@dep.state.nj.us |
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| **Northern Mariana Islands**:<br>Robert A. Guerrero<br>Emergency Management Office<br>PO Box 10007<br>Saipan, MP 96950 | |
| **Ohio**:<br>Patricia Beck<br>Ohio Emergency Management Agency<br>2825 W. Granville Road<br>Columbus, OH 43235-<br>Phone: 614-889-7179 | **Ohio:**<br>Cindy Crecelius, CFM<br>Ohio Dept. of Natural Resources<br>Floodplain Management Unit<br>1939 Fountain Square Drive<br>Columbus, OH 43224<br>Phone: 614-265-6750<br>Fax: 614-447-9503<br>cindy.crecelius@dnr.state.oh.us |
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| **Rhode Island**:<br>Joseph Almeida, Jr.<br>Rhode Island Emergency Management Agency<br>645 New London Avenue<br>Cranston, RI 02920-3003<br>Phone:401-946-9996 | **Rhode Island**:<br>Pam Pogue<br>RI Emergency Management Agency<br>645 New London Avenue<br>Cranston, RI 02920<br>Phone: 401-946-9996<br>Fax: 401-944-1891<br>PogueP@ri.ngb.army.mil |
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| **Washington**:<br>Martin E. Best<br>Washington State Military Department Emergency Management Division<br>Building 20<br>Camp Murray, Washington 98430-5122<br>Phone: 253-512-7073 | **Washington:**<br>Daniel Sokol<br>Washington Department of Ecology<br>PO Box 47775<br>Olympia, WA 98504-7775<br>Phone: 360-407-7253<br>Fax: 360-407-2305<br>dsok461@ecy.wa.gov |
| **Washington, DC:**<br>Patrice White<br>District of Columbia Emergency Management Agency<br>2000 14th Street N.W., 8th Floor<br>Washington, DC 20009<br>Phone: 202-673-2101, ext 1163<br>Fax: 202-673-2290 | **Washington, DC:**<br>Timothy Karikari<br>Department of Health<br>51 N Street, NE, 5th Floor, Room 5021<br>Washington, DC 20002<br>Phone: 202-535-2248<br>Fax: 202-535-1364<br>timothy.karikari@dc.gov |

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| **Wisconsin:**<br>Roxanne K. Gray<br>Department of Military Affairs<br>Wisconsin Division of Emergency Management<br>2400 Wright Street<br>PO Box 7865<br>Madison, WI 53707<br>Phone: 608-242-3211 | **Wisconsin:**<br>Robert Watson<br>Wisconsin Dept. of Natural Resources<br>101 S. Webster<br>Madison, WI 53702<br>Phone: 608-266-8039<br>Fax: 608-264-9200<br>robert.watson@dnr.state.wi.us |
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# APPENDIX C: REFERENCES

Most of the documents listed here are available for free. Order FEMA publications by calling 800/480-2520 or faxing your order to 301/497-6378.

U.S. Army Corps of Engineers publications can be ordered from:

U.S. Army Corps of Engineers ATTN: CECW-PF 20 Massachusetts Avenue, NW Washington, DC 20314

Community Rating System publications can be ordered using the order form at the end of Unit 9.

Other publications can be ordered as noted.

*A Unified National Program for Floodplain Management.* Federal Interagency Floodplain Management Task Force. FEMA 248. 1994.

*Addressing Your Community's Flood Problems: A Guide for Elected Officials.* Association of State Floodplain Managers, Inc., joint project with the Federal Interagency Floodplain Management Task Force. 1996

*Alluvial Fans: Hazards and Management. Federal Emergency Management Agency.* FEMA-165. 1989

*Answers to Questions about Substantially Damaged Buildings.* Federal Emergency Management Agency. Federal Insurance Administration, National Flood Insurance Program Community Assistance Series. FEMA 213. 1991

*Answers to Questions about the National Flood Insurance Program.* Federal Emergency Management Agency. FIA 2. 1990

*Below-Grade Parking Requirements for Buildings Located in Special Flood Hazard Areas in Accordance with the National Flood Insurance Program.* Federal Emergency Management Agency. Technical Bulletin 6-93, FIA-TB-6. 1993

*Coastal Construction Manual.* Federal Emergency Management Agency. FEMA 55. May 2000.

*Code of Federal Regulations: Title 44—Emergency Management and Assistance. Chapter 1—Federal Emergency Management Agency.* Special Edition of the Federal Register. 1997 Order from FEMA. (See also Appendix E)

*Corrosion Protection for Metal connectors in Coastal Areas for Structures Located in Special Flood Hazard Areas in Accordance with the National Flood Insurance Program.* Federal Emergency Management Agency. Technical Bulletin 8-96, FIA-TB-8. 1996

*Crawlspace Construction for Buildings Located in Special Flood Hazard Areas: National Flood Insurance Program Interim Guidance.* Federal Emergency Management Agency. Technical Bulletin 11-01, FIA-TB-11, 2001.

*CRS Credit for Higher Regulatory Standards.* Federal Emergency Management Agency. National Flood Insurance Program/Community Rating System. 1996. To order, see the order form at the end of Unit 9.

*CRS Credit for Stormwater Management. Federal Emergency Management Agency.* National Flood Insurance Program/Community Rating System. 1996. To order, see the order form at the end of Unit 9.

*Design Guidelines for Flood Damage Reduction.* Federal Emergency Management Agency. FEMA 15. 1981

*Design Manual for Retrofitting Flood-prone Residential Structures.* Federal Emergency Management Agency. FEMA 114. 1986

*Elevated Residential Structures.* Federal Emergency Management Agency. FEMA 54. 1984

*Elevator Installation for Buildings Located in Special Flood Hazard Areas in Accordance with the National Flood Insurance Program.* Federal Emergency Management Agency. Technical Bulletin 4-93, FIA-TB-4. 1993

*Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings.* Federal Emergency Management Agency. FEMA 259. 1995

*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.* Federal Emergency Management Agency. Technical Bulletin 10-01, FIA-TB-10, 2001.

*Example Plans. Federal Emergency Management Agency.* National Flood Insurance Program/Community Rating System. 1996. To order, see the order form at the end of Unit 9.

*Flood Proofing Programs, Techniques and References.* U.S. Army Corps of Engineers. 1996

*Flood Proofing Regulations.* U.S. Army Corps of Engineers, EP 1165-2-314. 1992

*Floodplain Management 1995: State and Local Programs.* Association of State Floodplain Managers. 1995

*Floodplain Management in the United States: An Assessment Report.* Federal Interagency Floodplain Management Task Force. FIA-18. 1992. Order from FEMA.

*Floodproofing Non-Residential Structures. Federal Emergency Management Agency.* FEMA 102. 1986

*Flood-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas in Accordance with the National Flood Insurance Program.* Federal Emergency Management Agency. Technical Bulletin 2-93, FIA-TB-2. 1993

*Floods, Floodplains and Folks.* National Park Service, Rivers, Trails and Conservation Assistance Program. 1996.

*Free-of-Obstruction Requirements for Buildings Located in Coastal High Hazard Areas in Accordance with the National Flood Insurance Program.* Federal Emergency Management Agency. Technical Bulletin 5-93, FIA-TB-5. 1993

*Guidance on Estimating Substantial Damage Using the NFIP Residential Substantial Damage Estimator.* Federal Emergency Management Agency. 1997.

*How to Use a Flood Map to Determine Flood Risk for a Property: A Guide for Interested Private Citizens, Property Owners, Community Officials, Lending Institutions, and Insurance Agents.* Federal Emergency Management Agency. FEMA 258. 1995

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# APPENDIX D: GLOSSARY

These technical terms are described in more detail in the unit and section noted. In some cases definitions used in NFIP regulations have been shortened or simplified. See the NFIP regulations in Appendix E for the complete definitions.

A Zone: See Zone A.

Accrete: To build up a shoreline by depositing sand, either by nature or human actions. Unit 1, Section A.

Actual cash value: The replacement cost for a building, minus a depreciation percentage based on age and condition. Unit 8, Section A.

Alluvial fan: An area at the base of a valley where the slope flattens out, allowing the floodwater to decrease in speed and spread out, dropping sediment and rock over a fan-shaped area. Unit 1, Section A.

Amendment: A change to a FEMA floodplain map that removes an area that was inadvertently included in the Special Flood Hazard Area. Unit 4, Section D.

Approximate studies: Flood hazard mapping done using *approximate* study methods that show the *approximate* outline of the base floodplain. An approximate study does not produce a base flood elevation. Unit 3, Section A.

B Zone: See Zone B.

Base flood depth: A measurement of the base flood in feet above ground, used for shallow flooding. Unit 3, Section D.

Base flood: The flood having a 1% chance of being equaled exceeded in any given year. Also referred to as the 100-year flood. The base flood is used by the NFIP as the basis for mapping, insurance rating, and regulating new construction. Unit 3, Section A.

Basement: Any area of the building having its floor subgrade (below ground level) on all sides. Unit 5, Section E.

Base floodplain: The area of water and land inundated by the base flood. Unit 3, Section A.

Basin: See watershed.

Bathymetry: The measurement of depths of water in the ocean or lakes. Unit 3, Section C.

Bench marks: Monuments on the ground that show the elevation of the spot above sea level. Unit 3, Section B.

Building: A walled and roofed structure including a gas or liquid storage tank that is principally above ground as well as a manufactured home. In this study guide, the term is the same as the term "structure" in the federal regulations (44 CFR 59.1). Unit 5, Section E.

Building condition survey: A windshield survey conducted to obtain a preliminary evaluation of the extent and severity of damage to buildings after a disaster. Unit 10, Section A.

C Zone: See Zone C.

CAP: Community Assistance Program

Catchment area: See watershed.

Cfs: Cubic feet per second, the unit by which discharges are measured (a cubic foot of water is about 7.5 gallons). Unit 3, Section B.

Channel: Defined landforms that carry water. Unit 1, Section A.

CLOMA: Conditional Letter of Map Amendment.

CLOMR: Conditional Letter of Map Revision.

Closed basin lake: A lake that has either no outlet or a relatively small one, where rainfall or groundwater can cause the lake's level to rise faster than it can drain. Unit 1, Section A.

Coastal high hazard area: That part of the coastal floodplain extending from offshore to the inland limit of the primary coastal dune along an open coast and any other area subject to high velocity wave action from storms and seismic sources. Wave heights during the base flood will generally be three feet or more in height above the stillwater elevation. Unit 3, Section C.

CBRA: The Coastal Barrier Resources Act which identified undeveloped portions of coastal barriers. Unit 9, Section D and Unit 3, Section F.

Community Assistance Program: A FEMA program that funds state activities that help communities in the NFIP. Unit 2, Section C.

Community Rating System: A program that provides a flood insurance premium rate reduction based on a community's floodplain management activities. Unit 10, Section D.

Community: A city, county, township, Indian tribe or authorized tribal organization, Alaska Native village or authorized native organization, or other local government with the statutory authority to adopt and enforce floodplain regulations and participate in the National Flood Insurance Program. Unit 2, Section C.

Conditional Letter of Map Amendment: A statement from FEMA that if a project is constructed as planned, a Letter of Map Amendment can be issued later. Unit 4, Section D.

Conditional Letter of Map Revision: A statement from FEMA that if a project is constructed as planned, a Letter of Map Revision can be issued later. Unit 4, Section D.

Contour map: A topographic map that shows points with the same elevation as connected by a contour line. Unit 3, Section B.

Contour: A line of equal elevation on a topographic (contour) map.

Conveyance shadow: An area upstream or downstream of an existing obstruction to flood flows. Unit 5, Section B.

Cross section: Surveyed information that describes the stream and the floodplain at a particular point along the stream. Unit 3, Section B.

CRS: Community Rating System

Dam breach inundation area: The area flooded by a dam failure. Unit 6, Section D.

Damage Survey Report: A form completed by disaster assistance staff to determine the repair and reconstruction needs of public and private nonprofit facilities. Unit 10, Section C.

Datum: A common vertical elevation reference point, usually in relation to sea level. Unit 3, Section B.

Detailed studies: Flood hazard mapping studies that are done use hydrologic and hydraulic methods that produce base flood elevations, floodways, and other pertinent flood data. Unit 3, Section A.

Development: 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 and materials. Unit 5, Section C.

Discharge: The amount of water that passes a point in a given period of time. Rate of discharge is usually measured in cubic feet per second (cfs). Unit 3, Section B.

DSR: Damage survey report.

Elevation reference marks: See bench marks.

Emergency Operations Center: A facility that houses communications equipment that is used to coordinate the response to a disaster or emergency. Unit 10, Section A.

Eminent domain: Governmental power to acquire a property without the owner's consent. Unit 6, Section A.

Enabling legislation: State laws that authorize communities to perform governmental activities, such as enacting and enforcing regulations. Unit 7, Section A.

Encroachment review: An analysis to determine if a project will increase flood heights or cause increased flooding downstream. Unit 5, Section D.

EOC: Emergency Operations Center

EO 11988: Executive Order 11988 Floodplain Management. A directive by the President that sets procedures Federal agencies must follow before they take or fund an action in the floodplain. Unit 6, Section E.

FBFM: Flood Boundary Floodway Map. An official map of a community, on which the Federal Emergency Management Agency has delineated the regulatory floodway. Recent Flood Insurance Studies show the floodway on the FIRM and do not include an FBFM. Unit 3, Section F.

FEMA: Federal Emergency Management Agency. Most of the National Flood Insurance Program field work and community coordination are done by the 10 FEMA Regional Offices, which are listed in Appendix A.

FHBM: Flood Hazard Boundary Map. An official map of a community published by FEMA that delineates the approximate boundary of the floodplain. An FHBM is generally the initial map provided the community and is eventually superceded by a FIRM. Unit 3, Section F.

FIA: Federal Insurance Administration. FIA was the part of the Federal Emergency Management Agency that administered the National Flood Insurance Program. This is now the responsibility of FEMA's Mitigation Division.

FIRM: Flood Insurance Rate Map. An official map of a community, on which the Federal Emergency Management Agency has delineated both the Special Flood Hazard Areas and the risk premium zones applicable to the community. Unit 3, Section F.

Flash flood: A flood in hilly and mountainous areas that may come scant minutes after a heavy rain. One can also occur in urban areas where pavements and drainage improvements speed runoff to a stream. Unit 1, Section A.

Flood: A general and temporary condition of partial or complete inundation of normally dry land areas. Unit 2, Section B.

Flood fringe: The portion of the floodplain lying outside of the floodway. Unit 3, Section B

Flood hazard mitigation: All actions that can be taken to reduce property damage and the threat to life and public health from flooding. Unit 10, Section B.

Flood Insurance Study: A report published by FEMA for a community issued along with the community's Flood Insurance Rate Map (FIRM). The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM.

Flood Mitigation Assistance: A grant program that supports plans and projects for mitigating losses to insured buildings funded by the National Flood Insurance Program. Unit 10, Section C.

Flood of record: The highest known flood level for the area, as recorded in historical documents. Unit 5, Section B.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. Unit 1, Section A.

Floodproofing: Protective measures added to or incorporated in a building that is not elevated above the base flood elevation to prevent or minimize flood damage. "Dry floodproofing" measures are designed to keep water from entering a building. "Wet floodproofing" measures minimize damage to a structure and its contents from water that is allowed into a building.

Floodway: The channel of a river or other watercourse and that portion of the adjacent floodplain that must remain open to permit passage of the base flood without cumulatively increasing the water surface elevation more than a designated height (usually one foot). Unit 3, Section B.

FMA: Flood Mitigation Assistance.

Freeboard: A margin of safety added to the base flood elevation to account for waves, debris, miscalculations, or lack of data. Unit 6, Section C.

Functionally dependent use: A use which cannot perform its intended purpose unless it is carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo, and ship building and ship repair facilities.. Unit 7, Section F.

Geographic information system: Computer based map systems that allow the user to keep a map updated easily and to correlate geographic information with other data, such as tax records on properties. Unit 3, Section F.

GIS: Geographic information system

Hazard Mitigation Grant Program: A FEMA disaster assistance grant that funds mitigation projects. Unit 10, Section C.

HEC-2: A computer model used to conduct a hydraulic study, which produces flood elevations, velocities and floodplain widths. Unit 3, Section B.

HEC-RAS: A computer model used to conduct a hydraulic study, which produces flood elevations, velocities and floodplain widths. Unit 3, Section B.

Home rule: A community authorized to do anything that is not prohibited by statute. Unit 7, Section A.

Human intervention: Actions that must be taken by one or more persons before floodwaters arrive in order for a building to be floodproofed. Unit 5, Section E.

Hydrodynamic force: The force of moving water, including the impact of debris and high velocities. Unit 1, Section B.

Hydrologic cycle: The natural cycle that circulates water throughout the environment to maintain an overall balance between water in the air, on the surface and in the ground. Unit 1, Section A.

Hydrology: The science dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.

Hydrostatic pressure: The pressure put on a structure by the weight of standing water. The deeper the water, the more it weighs and the greater the hydrostatic pressure. Unit 1, Section B.

ICC: Increased Cost of Compliance

Ice floe: Large chunks of ice that can cause a great deal of damage when a frozen river or lake begins to melt and break up. Unit 1, Section A.

Ice jam: Flooding that occurs when warm weather and rain break up frozen rivers and the broken ice floats downriver until it is blocked by an obstruction, creating an ice dam that blocks the channel and causes flooding upstream. Unit 1, Section A.

IFG: Individual and Family Grants

Increased Cost of Compliance: An additional claim payment made to a flood insurance policy holder to help cover the cost of bringing a substantially damaged or repetitively damaged building into compliance with the community's floodplain management ordinance. Unit 9, Section B.

Individual and Family Grants: A disaster assistance grant that helps people with their unmet needs (i.e., needs not helped by other disaster assistance programs. Unit 10, Section C.

Inverse condemnation: See "taking." Unit 6, Section A.

ISO: The Insurance Services Office, Inc., an insurance organization that provides support to FEMA on implementation of the Community Rating System. Unit 9, Section C.

Lateral pressure: The amount of pressure imposed sideways by standing water. Deeper water exerts more lateral pressure than shallower water. Unit 1, Section B.

Letter of Map Amendment (LOMA): An official revision to a FEMA map done by describing the property affected. LOMAs are generally issued when properties have been inadvertently included in the floodplain. Unit 4, Section D.

Letter of Map Change (LOMC): A Letter of Map Amendment or a Letter of Map Revision. Unit 4, Section D.

Letter of Map Revision (LOMR): An official revision to a FEMA map done by describing the property affected. Unit 4, Section D.

Limited Map Maintenance Project: A small-scale restudy of a Flood Insurance Study. Unit 4, Section D.

LOMA: Letter of Map Amendment

LOMR: Letter of Map Revision

Lowest Floor: The lowest floor of the lowest enclosed area (including basement) of a building. Unit 5, Section E

Manufactured home: A building that is 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. It includes mobile homes and “double wides.” Unit 5, Section E.

Market value: The price a willing buyer and seller agree upon. Unit 8, Section A.

Meander: A curve in a river. Unit 1, Section A.

Mitigation Division: The FEMA office that sets national policy for the NFIP and administers the mapping program. Unit 2, Section B.

M-O-M: Multi-objective management.

Movable bed streams: A type of flooding that features uncertain flow paths. Unit 1, Section A.

Mudslide (i.e., mudflow): A condition where there is a river, flow or inundation of liquid mud down a hillside. Unit 1, Section A.

Mudflow: See mudslide.

Multi-objective management: An approach to planning and funding local programs that in volves a variety of local interests and concerns. Unit 10, Section B.

NEPA: The National Environmental Policy Act, a Federal law that requires agencies to evaluate the environmental impact of a proposed project. Unit 6, Section E.

NGVD: National Geodetic Vertical Datum of 1929, the national datum used by the National Flood Insurance Program. NGVD is based on mean sea level. It was known formerly as the "Mean Sea Level Datum of 1929 (MSL)." Unit 3, Section B.

No-rise Certification: A certification by an engineer that a project will not cause a set increase in flood heights. Unit 7, Section G.

Non-structural flood protection measures: Administrative tools for controlling flooding and flood damage, including regulations on development, building codes, property acquisition and structure relocation, and modification of existing buildings. Unit 1, Section B.

Ordinance: The generic term for a law passed by a local government. Unit 7, Section A.

Overbank flooding: Flooding that occurs when downstream channels receive more rain or snowmelt from their watershed than normal, or a channel is blocked by an ice jam or debris. Excess water overloads the channels and flows out onto the floodplain. Unit 1, Section A.

Planned unit development: A regulatory approach that allows a developer to design the entire area while individual requirements may be relaxed to allow for open space, mixed land uses, and other variances to traditional zoning rules. Unit 6, Section C.

Ponding: Runoff that collects in depressions and cannot drain out, creating a temporary pond. Unit 1, Section A.

Post-FIRM building: For insurance rating purposes, a post-FIRM building was constructed or substantially improved after December 31, 1974, or after the effective date of the initial Flood Insurance Rate Map of a community, whichever is later. For a community that participated in the NFIP when its initial FIRM was issued, post-FIRM buildings are the same as new construction and must meet the National Flood Insurance Program's minimum floodplain management standards.

Pre-FIRM building: For insurance rating purposes, a pre-FIRM building was constructed or substantially improved on or before December 31, 1974, or before the effective date of the initial Flood Insurance Rate Map of the community, whichever is later. Most pre-FIRM buildings were constructed without taking the flood hazard into account.

Probability: A statistical term having to do with the size of a flood and the odds of that size of flood occurring in any year. Unit 3, Section A.

Profile: A graph that shows elevations of various flood events. Unit 3, Section B.

Public/Infrastructure Assistance: A disaster assistance grant that helps public agencies and nonprofit organizations finance repairs and reconstruction of public infrastructure. Unit 10, Section C.

PUD: Planned unit development.

Q3 Flood Data Product: A graphical representation of certain features of a FIRM in digital format. Unit 3, Section F.

Recreational vehicle: A vehicle designed to be self propelled or permanently towable by a light duty truck that is designed for use as temporary living quarters for recreational, camping, travel, or seasonal use. Unit 5, Section E.

Reconstruction: Building a new structure on the old foundation or slab of a structure that was destroyed, damaged, purposefully demolished or razed. The term also applies when an existing structure is moved to a new site. Unit 8, Section B.

Regular Program: Also called the Regular Phase. The phase of community participation in the National Flood Insurance Program that begins on the date of the Flood Insurance Rate Map or when the community adopts an ordinance that meets the minimum requirements of the NFIP and adopts the technical data provided with the FIRM, whichever is later. Nearly all communities participating in the NFIP are in the Regular Program.

Rehabilitation: An improvement made to an existing structure which does not affect its external dimensions. Unit 8, Section A.

Restudy: A new Flood Insurance Study for all or part of a community that has already had a Flood Insurance Study. Unit 4, Section D.

Retrofitting: Retrofitting techniques include floodproofing, elevation, construction of small levees, and other modifications made to an existing building or its yard to protect it from flood damage.

Revision: A change to a floodplain map based on new data submitted to FEMA. Unit 4, Section D.

Riverine: Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains. Unit 1, Section A.

Roughness: A measure related to ground surface conditions that reflects changes in floodwater velocity due to ground friction. Unit 3, Section B.

Runoff: Rainfall and snowmelt that reaches a stream. Unit 3, Section B.

SFHA: Special Flood Hazard Area

Sheet flow: Floodwater that spreads out over a large area that does not have defined channels at a somewhat uniform depth. Unit 1, Section A.

Special Flood Hazard Area: the base floodplain displayed on FEMA maps. It includes the A and V zones. Unit 3, Section A.

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 as amended which authorizes FEMA's current disaster assistance programs and the Hazard Mitigation Grant Program. The Disaster Mitigation Act of 2000 made extensive changes to the Stafford Act. Unit 10, Section C.

Stationing: Determining the distance along a stream. Unit 3, Section B and Unit 4, Section B.

Statutory authority: The powers granted to a local government by state law. Unit 7, Section A.

Stillwater flood elevations show the elevations of various coastal floods, not counting waves. Unit 3, Section C.

Storm surge: Water that is pushed toward shore by persistent high wind and changes in air pressure. Storm surges can result from hurricanes and other coastal storms. Unit 1, Section A.

Stormwater management: Efforts to reduce the impact of increased runoff that results from new development. Unit 6, Section C.

Stormwater detention, Storing stormwater runoff for release at a restricted rate after the storm subsides. Unit 6, Section C.

Stormwater retention: Storing stormwater runoff for later use in irrigation or groundwater recharge, or to reduce pollution. Unit 6, Section C.

Structural flood control: Measures that control floodwaters by construction of barriers or storage areas or by modifying or redirecting channels. Unit 1, Section C.

Submit to rate: a process used when an insurance agent cannot complete the rate calculation for a flood insurance policy. The application is sent to the WYO Company or FEMA to be individually rated. Unit 9, Section B.

Substantial damage: Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. Unit 8, Section B.

Substantial improvement: Any reconstruction, rehabilitation, addition or other improvement to a structure, the total cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. The definition of "substantial improvement" includes buildings that have incurred "substantial damage" regardless of the actual repair work performed. Unit 8, Section A.

Taking: Obtaining private property with or without compensating the owner. The term also includes reducing the value of private property to such an extent that the owner is deprived of all economic interest. Unit 6, Section A.

Thalweg: The bottom of a river channel. Unit 1, Section A.

Topographic map: See contour map.

Transect: a survey of topographic conditions used in coastal flood studies. Unit 3, Section C.

Tsunami: A large wave caused by an underwater earthquake or volcano which can raise water levels as much as 15 feet. Unit 1, Section A.

V Zone: See "Zone V."

Variance: A grant of relief by a community from the terms of a land use, zoning or building code regulation. Unit 7, Section F.

Velocity: The speed of moving water, a force that is measured in feet per second. Unit 1, Section A.

Watershed,: An area that drains into a lake, stream or other body of water. Unit 1, Section A.

Wave runup occurs when waves hit the shore and water is moving with such force that it keeps traveling inland. Unit 3, Section C.

Wet floodproof: Protecting a building from flood damage by using flood-resistant materials below the flood level and elevating things subject to flood damage above the flood level. Unit 5, Section E.

Write Your Own: An insurance company that has agreed to sell flood insurance policies on behalf of the NFIP. Unit 9, Section A.

WYO: Write Your Own.

X Zone: See "Zone X."

Zone A: The Special Flood Hazard Area (except coastal V Zones) shown on a community's Flood Insurance Rate Map. Unit 3, Section F. There are five types of A Zones:

A: SFHA where no base flood elevation is provided.

A1-30: Numbered A Zones (e.g., A7 or A14), SFHA where the FIRM shows a base flood elevation in relation to NGVD.

AE: SFHA where base flood elevations are provided. AE Zone delineations are now used on new FIRMs instead of A# Zones.

AO: SFHA with sheet flow, ponding, or shallow flooding. Base flood depths (feet above grade) are provided.

AH: Shallow flooding SFHA. Base flood elevations in relation to NGVD are provided.

Zone B: Area of moderate flood hazard, usually depicted on Flood Insurance Rate Maps as between the limits of the base and 500-year floods. B Zones are also used to designate base floodplains of little hazard, such as those with average depths of less than 1 foot. Unit 3, Section F.

Zone C: Area of minimal flood hazard, usually depicted on Flood Insurance Rate Maps as above the 500-year flood level. B and C Zones may have flooding that does not meet the criteria to be mapped as a Special Flood Hazard Area, especially ponding and local drainage problems. Unit 3, Section F.

Zone D: Area of undetermined but possible flood hazard. Unit 3, Section F.

Zone V: The Special Flood Hazard Area subject to coastal high hazard flooding. There are three types of V Zones: V, V1-30, and VE, and they correspond to the A Zone designations. Unit 3, Section F.

Zone X: Newer Flood Insurance Rate Maps show Zones B and C (see above) as Zone X. Unit 3, Section F.

# APPENDIX E: NFIP REGULATIONS

This Appendix contains the text of the Code of Federal Regulations (CFR) for the National Flood Insurance Program: 44 CFR Parts 59, 60, 65, and 70.

**TITLE 44--EMERGENCY MANAGEMENT AND ASSISTANCE**

**CHAPTER I--FEDERAL EMERGENCY MANAGEMENT AGENCY, DEPARTMENT OF HOMELAND SECURITY**

**PART 59--GENERAL PROVISIONS – Table of Contents**

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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.
Authority: 42 U.S.C. 4001 et seq.; Reorganization Plan No. 3 of 1978, 43 FR 41943, 3 CFR, 1978 Comp., p. 329; E.O. 12127 of Mar. 31, 1979, 44 FR 19367, 3 CFR, 1979 Comp., p. 376.

**Subpart A--General**

**§ 59.1 Definitions.**

As used in this subchapter—
"Act" means the statutes authorizing the National Flood Insurance Program that are incorporated in 42 U.S.C. 4001-4128.
"Actuarial rates"--see "risk premium rates".
"Administrator" means the Federal Insurance Administrator.
"Agency" means the Federal Emergency Management Agency, Washington DC.
"Alluvial fan flooding" means flooding occurring on the surface of an alluvial fan or similar landform which originates at the apex and is characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and, unpredictable flow paths. "Apex" means a point on an alluvial fan or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and alluvial fan flooding can occur.
"Applicant" means a community which indicates a desire to participate in the Program.
"Appurtenant structure" means a structure which is on the same parcel of property as the principal structure to be insured and the use of which is incidental to the use of the principal structure.
"Area of future-conditions flood hazard" means the land area that would be inundated by the 1percent-annual-chance (100-year) flood based on future-conditions hydrology.
"Area of shallow flooding" means a designated AO, AH, AR/AO, AR/AH, or VO zone on a community's Flood Insurance Rate Map (FIRM) with a 1 percent or greater annual chance of flooding to an average depth of 1 to 3 feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.
"Area of special flood-related erosion hazard" is the land within a community which is most likely to be subject to severe flood-related erosion losses. The area may be designated as Zone E on the Flood Hazard Boundary Map (FHBM). After the detailed evaluation of the special flood-related erosion hazard area in preparation for publication of the FIRM, Zone E may be further refined.

“Area of special flood hazard” is the land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year. The area may be designated as Zone A on the FHBM. After detailed ratemaking has been completed in preparation for publication of the flood insurance rate map, Zone A usually is refined into Zones A, AO, AH, A1-30, AE, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, or V1-30, VE, or V. For purposes of these regulations, the term ``special flood hazard area'' is synonymous in meaning with the phrase ``area of special flood hazard''.

“Area of special mudslide (i.e., mudflow) hazard” is the land within a community most likely to be subject to severe mudslides (i.e., mudflows). The area may be designated as Zone M on the FHBM. After the detailed evaluation of the special mudslide (i.e., mudflow) hazard area in preparation for publication of the FIRM, Zone M may be further refined.

“Base flood” means the flood having a one percent chance of being equalled or exceeded in any given year.

“Basement”' means any area of the building having its floor subgrade (below ground level) on all sides.

“Breakaway wall” means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

“Building” - see structure.

“Chargeable rates” mean the rates established by the Administrator pursuant to section 1308 of the Act for first layer limits of flood insurance on existing structures.

“Chief Executive Officer of the community (CEO)” means the official of the community who is charged with the authority to implement and administer laws, ordinances and regulations for that community.

“Coastal high hazard area” means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

“Community” means any State or area or political subdivision thereof, or any Indian tribe or authorized tribal organization, or Alaska Native village or authorized native organization, which has authority to adopt and enforce flood plain management regulations for the areas within its jurisdiction.

“Contents coverage” is the insurance on personal property within an enclosed structure, including the cost of debris removal, and the reasonable cost of removal of contents to minimize damage. Personal property may be household goods usual or incidental to residential occupancy, or merchandise, furniture, fixtures, machinery, equipment and supplies usual to other than residential occupancies.

“Criteria” means the comprehensive criteria for land management and use for flood-prone areas developed under 42 U.S.C. 4102 for the purposes set forth in part 60 of this subchapter.

“Critical feature” means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

“Curvilinear Line” means the border on either a FHBM or FIRM that delineates the special flood, mudslide (i.e., mudflow) and/or flood-related erosion hazard areas and consists of a curved or contour line that follows the topography.

“Deductible” means the fixed amount or percentage of any loss covered by insurance which is borne by the insured prior to the insurer's liability.

“Developed area” means an area of a community that is:

(a) A primarily urbanized, built-up area that is a minimum of 20 contiguous acres, has basic urban infrastructure, including roads, utilities, communications, and public facilities, to sustain industrial, residential, and commercial activities, and

(1) Within which 75 percent or more of the parcels, tracts, or lots contain commercial, industrial, or residential structures or uses; or

(2) Is a single parcel, tract, or lot in which 75 percent of the area contains existing commercial or industrial structures or uses; or

(3) Is a subdivision developed at a density of at least two residential structures per acre within which 75 percent or more of the lots contain existing residential structures at the time the designation is adopted.

(b) Undeveloped parcels, tracts, or lots, the combination of which is less than 20 acres and

contiguous on at least 3 sides to areas meeting the criteria of paragraph (a) at the time the designation is adopted.

(c) A subdivision that is a minimum of 20 contiguous acres that has obtained all necessary government approvals, provided that the actual "start of construction" of structures has occurred on at least 10 percent of the lots or remaining lots of a subdivision or 10 percent of the maximum building coverage or remaining building coverage allowed for a single lot subdivision at the time the designation is adopted and construction of structures is underway. Residential subdivisions must meet the density criteria in paragraph (a)(3).

"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..

"Director" means the Director of the Federal Emergency Management Agency.

"Eligible community or participating community" means a community for which the Administrator has authorized the sale of flood insurance under the National Flood Insurance Program.

"Elevated building" means, for insurance purposes, a nonbasement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns.

"Emergency Flood Insurance Program or emergency program" means the Program as implemented on an emergency basis in accordance with section 1336 of the Act. It is intended as a program to provide a first layer amount of insurance on all insurable structures before the effective date of the initial FIRM.

"Erosion" means the process of the gradual wearing away of land masses. This peril is not per se covered under the Program.

"Exception" means a waiver from the provisions of part 60 of this subchapter directed to a community which relieves it from the requirements of a rule, regulation, order or other determination made or issued pursuant to the Act.

"Existing construction" means for the purposes of determining rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date.

"Existing construction"' may also be referred to as "existing structures."

"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 a community.

"Existing structures" - see existing construction.

"Expansion to an existing manufactured home park or subdivision" means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufacturing homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

"Federal agency" means any department, agency, corporation, or other entity or instrumentality of the executive branch of the Federal Government, and includes the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation.

"Federal instrumentality responsible for the supervision, approval, regulation, or insuring of banks, savings and loan associations, or similar institutions" means the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation, the Comptroller of the Currency, the Federal Home Loan Bank Board, the Federal Savings and Loan Insurance Corporation, and the National Credit Union Administration.

"Financial assistance" means any form of loan, grant, guaranty, insurance, payment, rebate, subsidy, disaster assistance loan or grant, or any other form of direct or indirect Federal assistance, other than general or special revenue sharing or formula grants made to States.

"Financial assistance for acquisition or construction purposes" means any form of financial assistance which is intended in whole or in part for the acquisition, construction, reconstruction, repair, or improvement of any publicly or privately owned building or mobile home, and for any machinery, equipment, fixtures, and furnishings contained or to be contained therein, and shall include the purchase or subsidization of mortgages or mortgage loans but shall exclude assistance pursuant to the Disaster Relief Act of 1974 other than assistance under such Act in connection with a flood. It includes only financial assistance insurable under the Standard Flood Insurance Policy.

“First-layer coverage” is the maximum amount of structural and contents insurance coverage available under the Emergency Program.

“Flood” or “Flooding” means:

(a) A general and temporary condition of partial or complete inundation of normally dry land areas from:

(1) The overflow of inland or tidal waters.

(2) The unusual and rapid accumulation or runoff of surface waters from any source.

(3) Mudslides (i.e., mudflows) which are proximately caused by flooding as defined in paragraph (a)(2) of this definition and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current.

(b) The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph (a)(1) of this definition.

“Flood elevation determination” means a determination by the Administrator of the water surface elevations of the base flood, that is, the flood level that has a one percent or greater chance of occurrence in any given year.

“Flood elevation study” means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.

“Flood Hazard Boundary Map (FHBM)” means an official map of a community, issued by the Administrator, where the boundaries of the flood, mudslide (i.e., mudflow) related erosion areas having special hazards have been designated as Zones A, M, and/or E.

“Flood insurance” means the insurance coverage provided under the Program.

“Flood Insurance Rate Map (FIRM)” means an official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.

“Flood Insurance Study” - see flood elevation study.

“Flood plain or flood-prone area” means any land area susceptible to being inundated by water from any source (see definition of “flooding").

“Flood plain management” means the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and flood plain management regulations.

“Flood plain management regulations” means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a flood plain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

“Flood protection system” means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the area within a community subject to a “special flood hazard'” and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

“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.

“Flood-related erosion” means the collapse or subsidence of land along the shore of a lake or other body of water as a result of undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as a flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding.

“Flood-related erosion area or flood-related erosion prone area” means a land area adjoining the shore of a lake or other body of water, which due to the composition of the shoreline or bank and high water levels or wind-driven currents, is likely to suffer flood-related erosion damage.

“Flood-related erosion area management” means the operation of an overall program of corrective and

preventive measures for reducing flood-related erosion damage, including but not limited to emergency preparedness plans, flood-related erosion control works, and flood plain management regulations.

"Floodway" - see regulatory floodway.

"Floodway encroachment lines" mean the lines marking the limits of floodways on Federal, State and local flood plain maps.

"Freeboard" means a factor of safety usually expressed in feet above a flood level for purposes of flood plain management. "Freeboard'" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

"Functionally dependent use" means a use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

"Future-conditions flood hazard area, or future-conditions floodplain"--see Area of future-conditions flood hazard.

"Future-conditions hydrology" means the flood discharges associated with projected land-use conditions based on a community's zoning maps and/or comprehensive land-use plans and without consideration of projected future construction of flood detention structures or projected future hydraulic modifications within a stream or other waterway, such as bridge and culvert construction, fill, and excavation.

"General Counsel" means the General Counsel of the Federal Emergency Management Agency.

"Highest adjacent grade" means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

"Historic Structure" means any structure that is:

(a) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;

(b) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

(c) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or

(d) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:

(1) By an approved state program as determined by the Secretary of the Interior or

(2) Directly by the Secretary of the Interior in states without approved programs.

"Independent scientific body" means a non-Federal technical or scientific organization involved in the study of land use planning, flood plain management, hydrology, geology, geography, or any other related field of study concerned with flooding.

"Insurance adjustment organization" means any organization or person engaged in the business of adjusting loss claims arising under the Standard Flood Insurance Policy.

"Insurance company or insurer" means any person or organization authorized to engage in the insurance business under the laws of any State.

"Levee" means a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

"Levee System" means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

"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 Sec. 60.3.

"Mangrove stand" means an assemblage of mangrove trees which are mostly low trees noted for a copious development of interlacing adventitious roots above the ground and which contain one or more of the following species: Black mangrove (Avicennia Nitida); red mangrove (Rhizophora Mangle); white

mangrove (Languncularia Racemosa); and buttonwood (Conocarpus Erecta).

“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 home park or subdivision'” means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

“Map” means the Flood Hazard Boundary Map (FHBM) or the Flood Insurance Rate Map (FIRM) for a community issued by the Agency.

“Mean sea level” means, for purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

“Mudslide “(i.e., mudflow) describes a condition where there is a river, flow or inundation of liquid mud down a hillside usually as a result of a dual condition of loss of brush cover, and the subsequent accumulation of water on the ground preceded by a period of unusually heavy or sustained rain. A mudslide (i.e., mudflow) may occur as a distinct phenomenon while a landslide is in progress, and will be recognized as such by the Administrator only if the mudflow, and not the landslide, is the proximate cause of damage that occurs.

“Mudslide (i.e., mudflow) area management” means the operation of an overall program of corrective and preventive measures for reducing mudslide (i.e., mudflow) damage, including but not limited to emergency preparedness plans, mudslide control works, and flood plain management regulations.

“Mudslide (i.e., mudflow) prone area” means an area with land surfaces and slopes of unconsolidated material where the history, geology and climate indicate a potential for mudflow.

“New construction” means, for the purposes of determining insurance rates, structures for which the ``start of construction'' commenced on or after the effective date of an initial FIRM or after December 31, 1974, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, new construction means structures for which the start of construction commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.

“New 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 on or after the effective date of floodplain management regulations adopted by a community.

“100-year flood” - see base flood.

“Participating community”, also known as an eligible community, means a community in which the Administrator has authorized the sale of flood insurance.

“Person” includes any individual or group of individuals, corporation, partnership, association, or any other entity, including State and local governments and agencies.

“Policy” means the Standard Flood Insurance Policy.

“Premium” means the total premium payable by the insured for the coverage or coverages provided under the policy. The calculation of the premium may be based upon either chargeable rates or risk premium rates, or a combination of both.

“Primary frontal dune” means a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

“Principally above ground” means that at least 51 percent of the actual cash value of the structure, less land value, is above ground.

“Program” means the National Flood Insurance Program authorized by 42 U.S.C. 4001 through 4128.

“Program deficiency” means a defect in a community's flood plain management regulations or administrative procedures that impairs effective implementation of those flood plain management regulations or of the standards in Sec. 60.3, 60.4, 60.5, or 60.6.

“Project cost” means the total financial cost of a flood protection system (including design, land acquisition, construction, fees, overhead, and profits), unless the Federal Insurance Administrator determines a given ``cost'' not to be a part of such project cost.

“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.
“Reference feature” is the receding edge of a bluff or eroding frontal dune, or if such a feature is not present, the normal high-water line or the seaward line of permanent vegetation if a high-water line cannot be identified.
“Regular Program” means the Program authorized by the Act under which risk premium rates are required for the first half of available coverage (also known as ``first layer'' coverage) for all new construction and substantial improvements started on or after the effective date of the FIRM, or after December 31, 1974, for FIRM's effective on or before that date. All buildings, the construction of which started before the effective date of the FIRM, or before January 1, 1975, for FIRMs effective before that date, are eligible for first layer coverage at either subsidized rates or risk premium rates, whichever are lower. Regardless of date of construction, risk premium rates are always required for the second layer coverage and such coverage is offered only after the Administrator has completed a risk study for the community.
“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.
“Remedy a violation” means to bring the structure or other development into compliance with State or local flood plain management regulations, or, if this is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of the ordinance or otherwise deterring future similar violations, or reducing Federal financial exposure with regard to the structure or other development.
“Risk premium rates” mean those rates established by the Administrator pursuant to individual community studies and investigations which are undertaken to provide flood insurance in accordance with section 1307 of the Act and the accepted actuarial principles. ”Risk premium rates" include provisions for operating costs and allowances.
“Riverine” means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.
“Sand dunes” mean naturally occurring accumulations of sand in ridges or mounds landward of the beach.
“Scientifically incorrect”. The methodology(ies) and/or assumptions which have been utilized are inappropriate for the physical processes being evaluated or are otherwise erroneous.
“Second layer coverage” means an additional limit of coverage equal to the amounts made available under the Emergency Program, and made available under the Regular Program.
“Servicing company” means a corporation, partnership, association, or any other organized entity which contracts with the Federal Insurance Administration to service insurance policies under the National Flood Insurance Program for a particular area.
“Sheet flow area”- see area of shallow flooding.
“60-year setback” means a distance equal to 60 times the average annual long term recession rate at a site, measured from the reference feature.
“Special flood hazard area”-- see “area of special flood hazard”'.
“Special hazard area” means an area having special flood, mudslide (i.e., mudflow), or flood-related erosion hazards, and shown on an FHBM or FIRM as Zone A, AO, A1-30, AE, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, A99, AH, VO, V1-30, VE, V, M, or E.
“Standard Flood Insurance Policy” means the flood insurance policy issued by the Federal Insurance Administrator, or an insurer pursuant to an arrangement with the Administrator pursuant to Federal statutes and regulations.
“Start of Construction” (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97348)), includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling;

nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

"State" means any State, the District of Columbia, the territories and possessions of the United States, the Commonwealth of Puerto Rico, and the Trust Territory of the Pacific Islands.

State coordinating agency means the agency of the state government, or other office designated by the Governor of the state or by state statute at the request of the Administrator to assist in the implementation of the National Flood Insurance Program in that state.

"Storm cellar" means a space below grade used to accommodate occupants of the structure and emergency supplies as a means of temporary shelter against severe tornado or similar wind storm activity.

"Structure" means, for floodplain 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. Structure, for insurance purposes, means:

(1) A building with two or more outside rigid walls and a fully secured roof, that is affixed to a permanent site;

(2) A manufactured home (``a manufactured home," also known as a mobile home, is a structure: built on a permanent chassis, transported to its site in one or more sections, and affixed to a permanent foundation); or

(3) A travel trailer without wheels, built on a chassis and affixed to a permanent foundation, that is regulated under the community's floodplain management and building ordinances or laws.

For the latter purpose, `"structure" does not mean a recreational vehicle or a park trailer or other similar vehicle, except as described in paragraph (3) of this definition, or a gas or liquid storage tank.

"Subsidized rates" mean the rates established by the Administrator involving in the aggregate a subsidization by the Federal Government.

"Substantial damage" means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

"Substantial improvement" means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred ``substantial damage", regardless of the actual repair work performed. The term does not, however, include either:

(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or

(2) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".

"30-year setback" means a distance equal to 30 times the average annual long term recession rate at a site, measured from the reference feature.

"Technically incorrect". The methodology(ies) utilized has been erroneously applied due to mathematical or measurement error, changed physical conditions, or insufficient quantity or quality of input data.

"V Zone" - see "coastal high hazard area.'"

"Variance" means a grant of relief by a community from the terms of a flood plain management regulation.

"Violation" means the failure of a structure or other development to be fully compliant with the community's flood plain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in Sec. 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.

"Water surface elevation" means the height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929, (or other datum, where

specified) of floods of various magnitudes and frequencies in the flood plains of coastal or riverine areas.

"Zone of imminent collapse" means an area subject to erosion adjacent to the shoreline of an ocean, bay, or lake and within a distance equal to 10 feet plus 5 times the average annual long-term erosion rate for the site, measured from the reference feature.

[41 FR 46968, Oct. 26, 1976]

Editorial Note: For Federal Register citations affecting Sec. 59.1, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO access.

**§ 59.2 Description of program.**

(a) The National Flood Insurance Act of 1968 was enacted by title XIII of the Housing and Urban Development Act of 1968 (Pub. L. 90448, August 1, 1968) to provide previously unavailable flood insurance protection to property owners in flood-prone areas. Mudslide (as defined in Sec. 59.1) protection was added to the Program by the Housing and Urban Development Act of 1969 (Pub. L. 91-152, December 24, 1969). Flood-related erosion (as defined in Sec. 59.1) protection was added to the Program by the Flood Disaster Protection Act of 1973 (Pub. L. 93-234, December 31, 1973). The Flood Disaster Protection Act of 1973 requires the purchase of flood insurance on and after March 2, 1974, as a condition of receiving any form of Federal or federally-related financial assistance for acquisition or construction purposes with respect to insurable buildings and mobile homes within an identified special flood, mudslide (i.e., mudflow), or flood-related erosion hazard area that is located within any community participating in the Program. The Act also requires that on and after July 1, 1975, or one year after a community has been formally notified by the Administrator of its identification as community containing one or more special flood, mudslide (i.e., mudflow), or flood-related erosion hazard areas, no such Federal financial assistance, shall be provided within such an area unless the community in which the area is located is then participating in the Program, subject to certain exceptions. See FIA published Guidelines at Sec. 59.4(c).

(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.

(c) Minimum requirements for adequate flood plain management regulations are set forth in Sec. 60.3 for flood-prone areas, in Sec. 60.4 for mudslide (i.e., mudflow) areas and in Sec. 60.5 for flood-related erosion areas. Those applicable requirements and standards are based on the amount of technical information available to the community.

[41 FR 46968, Oct. 26, 1976, as amended at 43 FR 7140, Feb. 17, 1978. Redesignated at 44 FR 31177, May 31, 1979, and amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

**§ 59.3 Emergency program.**

The 1968 Act required a risk study to be undertaken for each community before it could become eligible for the sale of flood insurance. Since this requirement resulted in a delay in providing insurance, the Congress, in section 408 of the Housing and Urban Development Act of 1969 (Pub. L. 91-152, December 24, 1969), established an Emergency Flood Insurance Program as a new section 1336 of the National Flood Insurance Act (42 U.S.C. 4056) to permit the early sale of insurance in flood-prone communities. The emergency program does not affect the requirement that a community must adopt adequate flood plain management regulations pursuant to part 60 of this subchapter but permits insurance to be sold before a study is conducted to determine risk premium rates for the community. The program still requires upon the effective date of a FIRM the charging of risk premium rates for all new construction and substantial improvements and for higher limits of coverage for existing structures.

[43 FR 7140, Feb. 17, 1978. Redesignated at 44 FR 31177, May 31, 1979, and amended at 48 FR 44543, Sept. 29, 1983]

**§ 59.4 References.**

(a) The following are statutory references for the National Flood Insurance Program, under which these regulations are issued:
(1) National Flood Insurance Act of 1968 (title XIII of the Housing and Urban Development Act of 1968), Pub. L. 90-448, approved August 1, 1968, 42 U.S.C. 4001 et seq.
(2) Housing and Urban Development Act of 1969 (Pub. L. 91-152, approved December 24, 1969).
(3) Flood Disaster Protection Act of 1973 (87 Stat. 980), Public Law 93-234, approved December 31, 1973.
(4) Section 816 of the Housing and Community Development Act of 1974 (87 Stat. 975), Public Law 93-383, approved August 22, 1974.
(5) Public Law 5-128 (effective October 12, 1977).
(6) The above statutes are included in 42 U.S.C. 4001 et seq.
(b) The following are references relevant to the National Flood Insurance Program:
(1) Executive Order 11988 (Floodplain Management, dated May 24, 1977 (42 FR 26951, May 25, 1977)).
(2) The Flood Control Act of 1960 (Pub. L. 86645).
(3) Title II, section 314 of title III and section 406 of title IV of the Disaster Relief Act of 1974 (Pub. L. 93-288).
(4) Coastal Zone Management Act (Pub. L. 92583), as amended Public Law 94-370.
(5) Water Resources Planning Act (Pub. L. 8990), as amended Public Law 94-112 (October 16, 1975).
(6) Title I, National Environmental Policy Act (Pub. L. 91-190).
(7) Land and Water Conservation Fund Act (Pub. L. 89-578), and subsequent amendments thereto.
(8) Water Resources Council, Principals and Standards for Planning, Water and Related Land Resources (38 FR 24778-24869, September 10, 1973).
(9) Executive Order 11593 (Protection and Enchancement of the Cultural Environment), dated May 13, 1971 (36 FR 8921, May 15, 1971).
(10) 89th Cong., 2nd Session, H.D. 465.
(11) Required land use element for comprehensive planning assistance under section 701 of the Housing Act of 1954, as amended by the Housing and Community Development Act of 1974 (24 CFR 600.72).
(12) Executive Order 11990 (Protection of Wetlands, dated May 24, 1977 (42 FR 26951, May 25, 1977)).
(13) Water Resources Council (Guidance for Floodplain Management) (42 FR 52590, September 30, 1977).
(14) Unified National Program for Floodplain Management of the United States Water Resources Council, July 1976.
(c) The following reference guidelines represent the views of the Federal Insurance Administration with respect to the mandatory purchase of flood insurance under section 102 of the Flood Disaster Protection Act of 1973: Mandatory Purchase of Flood Insurance Guidelines (54 FR 29666-29695, July 13, 1989).
[41 FR 46968, Oct. 26, 1976, as amended at 43 FR 7140, Feb. 17, 1978. Redesignated at 44 FR 31177, May 31, 1979, and amended at 57 FR 19540, May 7, 1992]

**§ 59.2 Description of program.**

(a) The National Flood Insurance Act of 1968 was enacted by title XIII of the Housing and Urban Development Act of 1968 (Pub. L. 90-448, August 1, 1968) to provide previously unavailable flood insurance protection to property owners in flood-prone areas. Mudslide (as defined in Sec. 59.1) protection was added to the Program by the Housing and Urban Development Act of 1969 (Pub. L. 91-152, December 24, 1969). Flood-related erosion (as defined in Sec. 59.1) protection was added to the Program by the Flood Disaster Protection Act of 1973 (Pub. L. 93-234, December 31, 1973). The Flood Disaster Protection Act of 1973 requires the purchase of flood insurance on and after March 2, 1974, as a condition of receiving any form of Federal or federally-related financial assistance for acquisition or construction purposes with respect to insurable buildings and mobile homes within an identified special flood, mudslide (i.e., mudflow), or flood-related erosion hazard area that is located within any community participating in the Program. The Act also requires that on and after July 1, 1975, or one year after a community has been formally notified by the Administrator of its identification as community containing one or more special flood, mudslide (i.e., mudflow), or flood-related erosion hazard areas, no such Federal financial assistance, shall be provided within such an area unless the community in which the area is located is then participating in the Program, subject to certain exceptions. See FIA published Guidelines at Sec. 59.4(c).
(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.

(c) Minimum requirements for adequate flood plain management regulations are set forth in Sec. 60.3 for flood-prone areas, in Sec. 60.4 for mudslide (i.e., mudflow) areas and in Sec. 60.5 for flood-related erosion areas. Those applicable requirements and standards are based on the amount of technical information available to the community.

[41 FR 46968, Oct. 26, 1976, as amended at 43 FR 7140, Feb. 17, 1978. Redesignated at 44 FR 31177, May 31, 1979, and amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

**§ 59.4 References.**

(a) The following are statutory references for the National Flood Insurance Program, under which these regulations are issued:

(1) National Flood Insurance Act of 1968 (title XIII of the Housing and Urban Development Act of 1968), Pub. L. 90-448, approved August 1, 1968, 42 U.S.C. 4001 et seq.

(2) Housing and Urban Development Act of 1969 (Pub. L. 91-152, approved December 24, 1969).

(3) Flood Disaster Protection Act of 1973 (87 Stat. 980), Public Law 93-234, approved December 31, 1973.

(4) Section 816 of the Housing and Community Development Act of 1974 (87 Stat. 975), Public Law 93-383, approved August 22, 1974.

(5) Public Law 5-128 (effective October 12, 1977).

(6) The above statutes are included in 42 U.S.C. 4001 et seq.

(b) The following are references relevant to the National Flood Insurance Program:

(1) Executive Order 11988 (Floodplain Management, dated May 24, 1977 (42 FR 26951, May 25, 1977)).

(2) The Flood Control Act of 1960 (Pub. L. 86645).

(3) Title II, section 314 of title III and section 406 of title IV of the Disaster Relief Act of 1974 (Pub. L. 93-288).

(4) Coastal Zone Management Act (Pub. L. 92583), as amended Public Law 94-370.

(5) Water Resources Planning Act (Pub. L. 8990), as amended Public Law 94-112 (October 16, 1975).

(6) Title I, National Environmental Policy Act (Pub. L. 91-190).

(7) Land and Water Conservation Fund Act (Pub. L. 89-578), and subsequent amendments thereto.

(8) Water Resources Council, Principals and Standards for Planning, Water and Related Land Resources (38 FR 24778-24869, September 10, 1973).

(9) Executive Order 11593 (Protection and Enhancement of the Cultural Environment), dated May 13, 1971 (36 FR 8921, May 15, 1971).

(10) 89th Cong., 2nd Session, H.D. 465.

(11) Required land use element for comprehensive planning assistance under section 701 of the Housing Act of 1954, as amended by the Housing and Community Development Act of 1974 (24 CFR 600.72).

(12) Executive Order 11990 (Protection of Wetlands, dated May 24, 1977 (42 FR 26951, May 25, 1977)).

(13) Water Resources Council (Guidance for Floodplain Management) (42 FR 52590, September 30, 1977).

(14) Unified National Program for Floodplain Management of the United States Water Resources Council, July 1976.

(c) The following reference guidelines represent the views of the Federal Insurance Administration with respect to the mandatory purchase of flood insurance under section 102 of the Flood Disaster Protection Act of 1973: Mandatory Purchase of Flood Insurance Guidelines (54 FR 29666-29695, July 13, 1989). [41 FR 46968, Oct. 26, 1976, as amended at 43 FR 7140, Feb. 17, 1978. Redesignated at 44 FR 31177, May 31, 1979, and amended at 57 FR 19540, May 7, 1992]

**Subpart B--Eligibility Requirements § 59.21 Purpose of subpart.**

This subpart lists actions that must be taken by a community to become eligible and to remain eligible for the Program.

[41 FR 46968, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979]

**§ 59.22 Prerequisites for the sale of flood insurance.**

(a) To qualify for flood insurance availability a community shall apply for the entire area within its jurisdiction, and shall submit:

(1) Copies of legislative and executive actions indicating a local need for flood insurance and an explicit desire to participate in the National Flood Insurance Program;

(2) Citations to State and local statutes and ordinances authorizing actions regulating land use and copies of the local laws and regulations cited;
(3) A copy of the flood plain management regulations the community has adopted to meet the requirements of Sec. 60.3, 60.4 and/or Sec. 60.5 of this subchapter. This submission shall include copies of any zoning, building, and subdivision regulations, health codes, special purpose ordinances (such as a flood plain ordinance, grading ordinance, or flood-related erosion control ordinance), and any other corrective and preventive measures enacted to reduce or prevent flood, mudslide (i.e., mudflow) or flood-related erosion damage;
(4) A list of the incorporated communities within the applicant's boundaries;
(5) Estimates relating to the community as a whole and to the flood, mudslide (i.e., mudflow) and flood-related erosion prone areas concerning:
(i) Population;
(ii) Number of one to four family residences;
(iii) Number of small businesses; and
(iv) Number of all other structures.
(6) Address of a local repository, such as a municipal building, where the Flood Hazard Boundary Maps (FHBM's) and Flood Insurance Rate Maps (FIRM's) will be made available for public inspection;
(7) A summary of any State or Federal activities with respect to flood plain, mudslide (i.e., mudflow) or flood-related erosion area management within the community, such as federally-funded flood control projects and State-administered flood plain management regulations;
(8) A commitment to recognize and duly evaluate flood, mudslide (i.e., mudflow) and/or flood-related erosion hazards in all official actions in the areas having special flood, mudslide (i.e., mudflow) and/or flood-related erosion hazards and to take such other official action reasonably necessary to carry out the objectives of the program; and
(9) A commitment to:
(i) Assist the Administrator at his/her request, in his/her delineation of the limits of the areas having special flood, mudslide
(i.e., mudflow) or flood-related erosion hazards;
(ii) Provide such information concerning present uses and occupancy of the flood plain, mudslide (i.e., mudflow) or flood-related erosion areas as the Administrator may request;
(iii) Maintain for public inspection and furnish upon request, for the determination of applicable flood insurance risk premium rates within all areas having special flood hazards identified on a FHBM or FIRM, any certificates of floodproofing, and information on the elevation (in relation to mean sea level) of the level of the lowest floor (including basement) of all new or substantially improved structures, and include whether or not such structures contain a basement, and if the structure has been floodproofed, the elevation (in relation to mean sea level) to which the structure was floodproofed;
(iv) Cooperate with Federal, State, and local agencies and private firms which undertake to study, survey, map, and identify flood plain, mudslide (i.e., mudflow) or flood-related erosion areas, and cooperate with neighboring communities with respect to the management of adjoining flood plain, mud slide (i.e., mudflow) and/or flood-related erosion areas in order to prevent aggravation of existing hazards;
(v) Upon occurrence, 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 FHBM's and FIRM's 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.
(b) An applicant shall legislatively:
(1) Appoint or designate the agency or official with the responsibility, authority, and means to implement the commitments made in paragraph
(a) of this section, and
(2) Designate the official responsible to submit a report to the Administrator concerning the community participation in the Program, including, but not limited to the development and implementation of flood plain management regulations. This report shall be submitted annually or biennially as determined by the Administrator.
(c) The documents required by paragraph (a) of this section and evidence of the actions required by paragraph (b) of this section shall be submitted to the

Federal Emergency Management Agency, Washington DC 20472.
[41 FR 46968, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979 and amended at 48 FR 29318, June 24, 1983; 48 FR 44543 and 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984; 49 FR 33656, Aug. 24, 1984; 50 FR
36023, Sept. 4, 1985]

**§ 59.23 Priorities for the sale of flood insurance under the regular program.**

Flood-prone, mudslide (i.e., mudflow) and flood-related erosion prone communities are placed on a register of areas eligible for ratemaking studies and then selected from this register for ratemaking studies on the basis of the following considerations--
(a) Recommendations of State officials;
(b) Location of community and urgency of need for flood insurance;
(c) Population of community and intensity of existing or proposed development of the flood plain, the mud slide (i.e., mudflow) and the flood-related erosion area;
(d) Availability of information on the community with respect to its flood, mudslide
(i.e., mudflow) and flood-related erosion characteristics and previous losses;
(e) Extent of State and local progress in flood plain, mudslide (i.e., mudflow) area and flood-related erosion area management, including adoption of flood plain management regulations consistent with related ongoing programs in the area.
[41 FR 46968, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979]

**§ 59.24 Suspension of community eligibility.**

(a) A community eligible for the sale of flood insurance shall be subject to suspension from the Program for failing to submit copies of adequate flood plain management regulations meeting the minimum requirements of paragraphs (b), (c), (d), (e) or (f) of Sec.60.3 or paragraph (b) of Sec.60.4 or Sec.60.5, within six months from the date the Administrator provides the data upon which the flood plain regulations for the applicable paragraph shall be based. Where there has not been any submission by the community, the Administrator shall notify the community that 90 days remain in the six month period in order to submit adequate flood plain management regulations. Where there has been an inadequate submission, the Administrator shall notify the community of the specific deficiencies in its submitted flood plain management regulations and inform the community of the amount of time remaining within the six month period. If, subsequently, copies of adequate flood plain management regulations are not received by the Administrator, no later than 30 days before the expiration of the original six month period the Administrator shall provide written notice to the community and to the state and assure publication in the Federal Register under part 64 of this subchapter of the community's loss of eligibility for the sale of flood insurance, such suspension to become effective upon the expiration of the six month period. Should the community remedy the defect and the Administrator receive copies of adequate flood plain management regulations within the notice period, the suspension notice shall be rescinded by the Administrator. If the Administrator receives notice from the State that it has enacted adequate flood plain management regulations for the community within the notice period, the
suspension notice shall be rescinded by the Administrator. The community's eligibility shall remain terminated after suspension until copies of adequate flood plain management regulations have been received and approved by the Administrator.
(b) A community eligible for the sale of flood insurance which fails to adequately enforce flood plain management regulations meeting the minimum requirements set forth in Sec. 60.3,
60.4 and/or 60.5 shall be subject to probation. Probation shall represent formal notification to the community that the Administrator regards the community's flood plain management program as not compliant with NFIP criteria. Prior to imposing probation, the Administrator
(1) shall inform the community upon 90 days prior written notice of the impending probation and of the specific program deficiencies and violations relative to the failure to enforce,
(2) shall, at least 60 days before probation is to begin, issue a press release to local media explaining the reasons for and the effects of probation, and
(3) shall, at least 90 days before probation is to begin, advise all policyholders in the community of the impending probation and the additional premium that will be charged, as provided in this paragraph, on policies sold or renewed during the period of probation. During this 90-day period the community shall have the opportunity to avoid probation by demonstrating compliance with Program

requirements, or by correcting Program deficiencies and remedying all violations to the maximum extent possible. If, at the end of the 90-day period, the Administrator determines that the community has failed to do so, the probation shall go into effect. Probation may be continued for up to one year after the community corrects all Program deficiencies and remedies all violations to the maximum extent possible. Flood insurance may be sold or renewed in the community while it is on probation. Where a policy covers property located in a community placed on probation on or after October 1, 1986, but prior to October 1, 1992, an additional premium of $25.00 shall be charged on each such policy newly issued or renewed during the one-year period beginning on the date the community is placed on probation and during any successive one-year periods that begin prior to October 1, 1992. Where a community's probation begins on or after October 1, 1992, the additional premium described in the preceding sentence shall be $50.00, which shall also be charged during any successive one-year periods during which the community remains on probation for any part thereof. This $50.00 additional premium shall further be charged during any successive one-year periods that begin on or after October 1, 1992, where the preceding one-year probation period began prior to October 1, 1992.

(c) A community eligible for the sale of flood insurance which fails to adequately enforce its flood plain management regulations meeting the minimum requirements set forth in Sec. 60.3, 60.4 and/or 60.5 and does not correct its Program deficiencies and remedy all violations to the maximum extent possible in accordance with compliance deadlines established during a period of probation shall be subject to suspension of its Program eligibility. Under such circumstances, the Administrator shall grant the community 30 days in which to show cause why it should not be suspended. The Administrator may conduct a hearing, written or oral, before commencing suspensive action. If a community is to be suspended, the Administrator shall inform it upon 30 days prior written notice and upon publication in the Federal Register under part 64 of this subchapter of its loss of eligibility for the sale of flood insurance. In the event of impending suspension, the Administrator shall issue a press release to the local media explaining the reasons and effects of the suspension. The community's eligibility shall only be reinstated by the Administrator upon his receipt of a local legislative or executive measure reaffirming the community's formal intent to adequately enforce the flood plain management requirements of this subpart, together with evidence of action taken by the community to correct Program deficiencies and remedy to the maximum extent possible those violations which caused the suspension. In certain cases, the Administrator, in order to evaluate the community's performance under the terms of its submission, may withhold reinstatement for a period not to exceed one year from the date of his receipt of the satisfactory submission or place the community on probation as provided for in paragraph (b) of this section.

(d) A community eligible for the sale of flood insurance which repeals its flood plain management regulations, allows its regulations to lapse, or amends its regulations so that they no longer meet the minimum requirements set forth in Sec. 60.3, 60.4 and/or 60.5 shall be suspended from the Program. If a community is to be suspended, the Administrator shall inform it upon 30 days prior written notice and upon publication in the Federal Register under part 64 of this subchapter of its loss of eligibility for the sale of flood insurance. The community eligibility shall remain terminated after suspension until copies of adequate flood plain management regulations have been received and approved by the Administrator.

(e) A community eligible for the sale of flood insurance may withdraw from the Program by submitting to the Administrator a copy of a legislative action that explicitly states its desire to withdraw from the National Flood Insurance Program. Upon receipt of a certified copy of a final legislative action, the Administrator shall withdraw the community from the Program and publish in the Federal Register underpart 64 of this subchapter its loss of eligibility for the sale of flood insurance. A community that has withdrawn from the Program may be reinstated if its submits the application materials specified in Sec. 59.22(a).

(f) If during a period of ineligibility under paragraphs (a), (d), or (e) of this section, a community has permitted actions to take place that have aggravated existing flood plain, mudslide (i.e., mudflow) and/or flood related erosion hazards, the Administrator may withhold reinstatement until the community submits evidence that it has taken action to remedy to the maximum extent possible the increased hazards. The Administrator may also place the reinstated community on probation as provided for in paragraph

(b) of this section.
(g) The Administrator shall promptly notify the servicing company and any insurers issuing flood insurance pursuant to an arrangement with the Administrator of those communities whose eligibility has been suspended or which have withdrawn from the program. Flood insurance shall not be sold or renewed in those communities. Policies sold or renewed within a community during a period of ineligibility are deemed to be voidable by the Administrator whether or not the parties to sale or renewal had actual notice of the ineligibility.
[41 FR 46968, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, and amended at 48 FR 44543 and 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984; 50 FR 36023, Sept. 4, 1985; 57 FR 19540, May 7, 1992; 59 FR 53598, Oct. 25, 1994; 62 FR 55715, Oct. 27, 1997]

## PART 60--CRITERIA FOR LAND MANAGEMENT AND USE

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

Sec.
60.1 Purpose of subpart.
60.2 Minimum compliance with flood plain management criteria.
60.3 Flood plain management criteria for flood-prone areas.
60.4 Flood plain management criteria for mudslide (i.e., mudflow)-prone areas.
60.5 Flood plain management criteria for flood-related erosion-prone areas.
60.6 Variances and exceptions.
60.7 Revisions of criteria for flood plain management regulations.
60.8 Definitions.

### Subpart B--Requirements for State Flood Plain Management Regulations

Sec.
60.11 Purpose of this subpart.
60.12 Flood plain management criteria for State-owned properties in special hazard areas.
60.13 Noncompliance.

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

Sec.
60.21 Purpose of this subpart.
60.22 Planning considerations for flood-prone areas.
60.23 Planning considerations for mudslide (i.e., mudflow)-prone areas.
60.24 Planning considerations for flood-related erosion-prone areas.
60.25 Designation, duties, and responsibilities of State Coordinating Agencies.
60.26 Local coordination.
Authority: 42 U.S.C. 4001 et seq.; Reorganization Plan No. 3 of 1978, 43 FR 41943, 3 CFR, 1978 Comp., p. 329; E.O. 12127 of Mar. 31, 1979, 44 FR 19367, 3 CFR, 1979 Comp., p. 376.
Source: 41 FR 46975, Oct. 26, 1976, unless otherwise noted. Redesignated at 44 FR 31177, May 31, 1979.

### § 60.1 Purpose of subpart.

(a) The Act provides that flood insurance shall not be sold or renewed under the program within a community, unless the community has adopted adequate flood plain management regulations consistent with Federal criteria. Responsibility for establishing such criteria is delegated to the Administrator.
(b) This subpart sets forth the criteria developed in accordance with the Act by which the Administrator will determine the adequacy of a community's flood plain management regulations. These regulations must be legally-enforceable, applied uniformly throughout the community to all privately and publicly owned land within flood-prone, mudslide (i.e., mudflow) or flood-related erosion areas, and the community must provide that the regulations take precedence over any less restrictive conflicting local laws, ordinances or codes. Except as otherwise provided in Sec. 60.6, the adequacy of such regulations shall be determined on the basis of the standards set forth in Sec. 60.3 for flood-prone areas, Sec. 60.4 for mudslide areas and Sec. 60.5 for flood-related erosion areas.
(c) Nothing in this subpart shall be construed as modifying or replacing the general requirement that all eligible communities must take into account flood, mudslide (i.e., mudflow) and flood-related erosion hazards, to the extent that they are known, in all official actions relating to land management and use.

(d) The criteria set forth in this subpart are minimum standards for the adoption of flood plain management regulations by flood-prone, mudslide (i.e., mudflow)-prone and flood-related erosion-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.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979,
as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

**§ 60.2 Minimum compliance with flood plain management criteria.**

(a) A flood-prone community applying for flood insurance eligibility shall meet the standards of Sec.60.3(a) in order to become eligible if a FHBM has not been issued for the community at the time of application. Thereafter, the community will be given a period of six months from the date the Administrator provides the data set forth in Sec.60.3(b), (c), (d), (e) or (f), in which to meet the requirements of the applicable paragraph. If a community has received a FHBM, but has not yet applied for Program eligibility, the community shall apply for eligibility directly under the standards set forth in Sec.60.3(b). Thereafter, the community will be given a period of six months from the date the Administrator provides the data set forth in Sec.60.3(c), (d), (e) or (f) in which to meet the requirements of the applicable paragraph.

(b) A mudslide (i.e., mudflow)-prone community applying for flood insurance eligibility shall meet the standards of Sec. 60.4(a) to become eligible. Thereafter, the community will be given a period of six months from the date the mudslide (i.e., mudflow) areas having special mudslide hazards are delineated in which to meet the requirements of Sec. 60.4(b).

(c) A flood-related erosion-prone community applying for flood insurance eligibility shall meet the standards of Sec. 60.5(a) to become eligible. Thereafter, the community will be given a period of six months from the date the flood-related erosion areas having special erosion hazards are delineated in which to meet the requirements of Sec. 60.5(b).

(d) Communities identified in part 65 of this subchapter as containing more than one type of hazard (e.g., any combination of special flood, mudslide (i.e., mudflow), and flood-related erosion hazard areas) shall adopt flood plain management regulations for each type of hazard consistent with the requirements of Sec.Sec. 60.3, 60.4 and 60.5.

(e) Local flood plain management regulations may be submitted to the State Coordinating Agency designated pursuant to Sec. 60.25 for its advice and concurrence. The submission to the State shall clearly describe proposed enforcement procedures.

(f) The community official responsible for submitting annual or biennial reports to the Administrator pursuant to Sec. 59.22(b)(2) of this subchapter shall also submit copies of each annual or biennial report to any State Coordinating Agency.

(g) A community shall assure that its comprehensive plan is consistent with the flood plain management objectives of this part.

(h) The community shall adopt and enforce flood plain management regulations based on data provided by the 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.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 29318, June 24, 1983; 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984; 50 FR 36024, Sept. 4, 1985; 59 FR 53598, Oct. 25, 1994; 62 FR 55716, Oct. 27, 1997]

**§ 60.3 Flood plain management criteria for flood-prone areas.**

The Administrator will provide the data upon which flood plain management regulations shall be based. If the Administrator has not provided sufficient data to furnish a basis for these regulations in a particular community, the community shall obtain, review and reasonably utilize data available from other Federal, State or other sources pending receipt of data from the Administrator. However, when special flood hazard area designations and water surface elevations have been furnished by the Administrator, they shall apply. The symbols defining such special flood hazard designations are set forth in Sec. 64.3 of this subchapter. In all cases the minimum requirements

governing the adequacy of the flood plain management regulations for flood-prone areas adopted by a particular community depend on the amount of technical data formally provided to the community by the Administrator. Minimum standards for communities are as follows:

(a) When the Administrator has not defined the special flood hazard areas within a community, has not provided water surface elevation data, and has not provided sufficient data to identify the floodway or coastal high hazard area, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall:

(1) 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;

(2) Review proposed development to assure that all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334;

(3) Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. 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, (ii) be constructed with materials resistant to flood damage, (iii) be constructed by methods and practices that minimize flood damages, and (iv) be 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 the components during conditions of flooding.

(4) 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;

(5) 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

(6) 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.

(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:

(1) Require permits for all proposed construction and other developments including the placement of manufactured homes, within Zone A on the community's FHBM or FIRM;

(2) Require the application of the standards in paragraphs (a) (2),

(3), (4), (5) and (6) of this section to development within Zone A on the community's FHBM or FIRM;

(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 in paragraphs (c)(2), (c)(3), (c)(5), (c)(6), (c)(12), (c)(14), (d)(2) and (d)(3) of this section;

(5) Where base flood elevation data are utilized, within Zone A on the community's FHBM or FIRM:

(i) Obtain the elevation (in relation to mean sea level) of the lowest floor(including basement) of all new and substantially improved structures, and
(ii) Obtain, if the structure has been floodproofed in accordance with paragraph (c)(3)(ii) of this section, the elevation (in relation to mean sea level) to which the structure was floodproofed, and
(iii) Maintain a record of all such information with the official designated by the community under Sec. 59.22 (a)(9)(iii);
(6) 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 Administrator;
(7) Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained;
(8) Require that all manufactured homes to be placed within Zone A on a community's FHBM or FIRM
shall be installed using methods and practices which minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.
(c) When the Administrator has provided a notice of final flood elevations for one or more special flood hazard areas on the community's FIRM and, if appropriate, has designated other special flood hazard areas without base flood elevations on the community's FIRM, but has not identified a regulatory floodway or coastal high hazard area, the community shall:
(1) Require the standards of paragraph (b) of this section within all A1-30 zones, AE zones, A zones, AH zones, and AO zones, on the community's FIRM;
(2) 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, unless the community is granted an exception by the Administrator for the allowance of basements in accordance with Sec. 60.6 (b) or (c);
(3) 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;
(4) 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 Sec. 59.22(a)(9)(iii);
(5) 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.
(6) Require that manufactured homes that are placed or substantially improved within Zones A1-30, AH, and AE on the community's 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 park or subdivision on which a manufactured home has incurred ``substantial damage" as the result of a

flood, be elevated on a permanent foundation such that 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.

(7) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of residential structures 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 (at least two feet if no depth number is specified);

(8) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of nonresidential structures

(i) 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 (at least two feet if no depth number is specified), or

(ii) together with attendant utility and sanitary facilities be completely floodproofed to that level to meet the floodproofing standard specified in Sec. 60.3(c)(3)(ii);

(9) Require within any A99 zones on a community's FIRM the standards of paragraphs (a)(1) through (a)(4)(i) and (b)(5) through (b)(9) of this section;

(10) 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.

(11) Require within Zones AH and AO, adequate drainage paths around structures on slopes, to guide floodwaters around and away from proposed structures.

(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.

(13) Notwithstanding any other provisions of Sec. 60.3, a community may approve certain development in Zones Al-30, AE, and AH, on the community's FIRM which increase the water surface elevation of the base flood by more than one foot, provided that the community first applies for a conditional FIRM revision, fulfills the requirements for such a revision as established under the provisions of Sec. 65.12, and receives the approval of the Administrator.

(14) Require that recreational vehicles placed on sites within Zones A1-30, AH, and AE on the community's FIRM either

(i) Be on the site for fewer than 180 consecutive days,

(ii) Be fully licensed and ready for highway use, or

(iii) Meet the permit requirements of paragraph (b)(1) of this section and the elevation and anchoring requirements for `”manufactured homes” in paragraph (c)(6) of this section.

A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.

(d) When the Administrator has provided a notice of final base flood elevations within Zones A1-30 and/or AE on the community's FIRM and, if appropriate, has designated AO zones, AH zones, A99 zones, and A zones on the community's FIRM, and has provided data from which the community shall designate its regulatory floodway, the community shall:

(1) Meet the requirements of paragraphs (c) (1) through (14) of this section;

(2) Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood, without increasing the water surface elevation of that flood more than one foot at any point;

(3) 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;

(4) Notwithstanding any other provisions of Sec. 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 Sec. 65.12, and receives the approval of the Administrator.

(e) When the Administrator has provided a notice of final base flood elevations within Zones A1-30 and/or AE on the community's FIRM and, if appropriate, has designated AH zones, AO zones, A99 zones, and A zones on the community's FIRM, and has identified on the community's FIRM coastal high hazard areas by designating Zones V1-30, VE, and/or V, the community shall:

(1) Meet the requirements of paragraphs (c)(1) through (14) of this section;

(2) Within Zones V1-30, VE, and V on a community's FIRM, (i ) obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures, and whether or not such structures contain a basement, and (ii) maintain a record of all such information with the official designated by the community under Sec. 59.22(a)(9)(iii);

(3) Provide that all new construction within Zones V1-30, VE, and V on the community's FIRM is located landward of the reach of mean high tide;

(4) 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; 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 paragraphs (e)(4)

(i) and (ii) of this section.

(5) 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 breakway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakway 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:

(i) Breakaway wall collapse shall result from a water load less than that which would occur during the base flood; and,

(ii) 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 (structural and non-structural). 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. Such enclosed space shall be useable solely for parking of vehicles, building access, or storage.

(6) Prohibit the use of fill for structural support of buildings within Zones V1-30, VE, and V on the community's FIRM;

(7) Prohibit man-made alteration of sand dunes and mangrove stands within Zones V1-30, VE, and V on the community's FIRM which would increase potential flood damage.

(8) Require that manufactured homes placed or substantially improved within Zones V1-30, V, and VE on the community's 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 park or subdivision on which a manufactured home has incurred ``substantial damage'' as the result of a flood, meet the standards of paragraphs (e)(2) through (7) of this section and that manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within Zones VI-30, V, and VE on the community's FIRM meet the requirements of paragraph (c)(12) of this section.

(9) Require that recreational vehicles placed on sites within Zones V1-30, V, and VE on the community's FIRM either

(i) Be on the site for fewer than 180 consecutive days,

(ii) Be fully licensed and ready for highway use, or

(iii) Meet the requirements in paragraphs (b)(1) and (e) (2) through (7) of this section.

A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.

(f) When the Administrator has provided a notice of final base flood elevations within Zones A1-30 or AE on the community's FIRM, and, if appropriate, has designated AH zones, AO zones, A99 zones, and A zones on the community's FIRM, and has identified flood protection restoration areas by designating Zones AR, AR/A1-30, AR/AE, AR/AH, AR/AO, or AR/A, the community shall:

(1) Meet the requirements of paragraphs (c)(1) through (14) and (d)(1) through (4) of this section.

(2) Adopt the official map or legal description of those areas within Zones AR, AR/A1-30, AR/AE, AR/AH, AR/A, or AR/AO that are designated developed areas as defined in Sec.59.1 in accordance with the eligibility procedures under Sec.65.14.

(3) For all new construction of structures in areas within Zone AR that are designated as developed areas and in other areas within Zone AR where the AR flood depth is 5 feet or less:

(i) Determine the lower of either the AR base flood elevation or the elevation that is 3 feet above highest adjacent grade; and

(ii) Using this elevation, require the standards of paragraphs (c)(1) through (14) of this section.

(4) For all new construction of structures in those areas within Zone AR that are not designated as developed areas where the AR flood depth is greater than 5 feet:

(i) Determine the AR base flood elevation; and

(ii) Using that elevation require the standards of paragraphs (c)(1) through (14) of this section.

(5) For all new construction of structures in areas within Zone AR/A1-30, AR/AE, AR/AH, AR/AO, and AR/A:

(i) Determine the applicable elevation for Zone AR from paragraphs (a)(3) and (4) of this section;

(ii) Determine the base flood elevation or flood depth for the underlying A1-30, AE, AH, AO and A Zone; and (iii) Using the higher elevation from paragraphs (a)(5)(i) and (ii) of this section require the standards of paragraphs (c)(1) through (14) of this section.

(6) For all substantial improvements to existing construction within Zones AR/A1-30, AR/AE, AR/AH, AR/AO, and AR/A:

(i) Determine the A1-30 or AE, AH, AO, or A Zone base flood elevation; and

(ii) Using this elevation apply the requirements of paragraphs (c)(1) through (14) of this section.

(7) Notify the permit applicant that the area has been designated as an AR, AR/A1-30, AR/AE, AR/AH, AR/AO, or AR/A Zone and whether the structure will be elevated or protected to or above the AR base flood elevation.

[41 FR 46975, Oct. 26, 1976]

Editorial Note: For Federal Register citations affecting Sec. 60.3, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

**§ 60.4 Flood plain management criteria for mudslide (i.e., mudflow)-prone areas.**

The Administrator will provide the data upon which flood plain management regulations shall be based. If the Administrator has not provided sufficient data to furnish a basis for these regulations in a particular community, the community shall obtain, review, and reasonably utilize data available from other Federal, State or other sources pending receipt of data from the Administrator. However, when special mudslide (i.e., mudflow) hazard area designations have been furnished by the Administrator, they shall apply. The symbols defining such special mudslide (i.e., mudflow) hazard designations are set forth in Sec. 64.3 of this subchapter. In all cases, the minimum requirements for mudslide (i.e., mudflow)-prone areas adopted by a particular community depend on the amount of technical data provided to the community by the Administrator. Minimum standards for communities are as follows:

(a) When the Administrator has not yet identified any area within the community as an area having special mudslide (i.e., mudflow) hazards, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall

(1) Require permits for all proposed construction or other development in the community so that it may determine whether development is proposed within mudslide (i.e., mudflow)-prone areas;

(2) Require review of each permit application to determine whether the proposed site and improvements will be reasonably safe from mudslides (i.e., mudflows). Factors to be considered in making such a determination should include but not be limited to (i) the type and quality of soils, (ii) any evidence of ground water or surface water problems, (iii) the depth and quality of any fill, (iv) the overall slope of the site, and (v) the weight that any proposed structure will impose on the slope;

(3) Require, if a proposed site and improvements are in a location that may have mudslide (i.e., mudflow) hazards, that

(i) a site investigation and further review be made by persons qualified in geology and soils engineering, (ii) the proposed grading, excavations, new construction, and substantial improvements are adequately designed and protected against mudslide (i.e., mudflow) damages, (iii) the proposed grading, excavations, new construction and substantial improvements do not aggravate the existing hazard by creating either on-site or off-site disturbances, and (iv) drainage, planting, watering, and maintenance be such as not to endanger slope stability.

(b) When the Administrator has delineated Zone M on the community's FIRM, the community shall:

(1) Meet the requirements of paragraph (a) of this section; and

(2) Adopt and enforce a grading ordinance or regulation in accordance with data supplied by the Administrator which (i) regulates the location of foundation systems and utility systems of new construction and substantial improvements, (ii) regulates the location, drainage and maintenance of all excavations, cuts and fills and planted slopes, (iii) provides special requirements for protective measures including but not necessarily limited to retaining walls, buttress fills, sub-drains, diverter terraces, benchings, etc., and (iv) requires engineering drawings and specifications to be submitted for all corrective measures, accompanied by supporting soils engineering and geology reports. Guidance may be obtained from the provisions of the 1973 edition and any subsequent edition of the Uniform Building Code, sections 7001 through 7006, and 7008 through 7015. The Uniform Building Code is published by the International Conference of Building Officials, 50 South Los Robles, Pasadena, California 91101.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

**§ 60.5 Flood plain management criteria for flood-related erosion-prone areas.**

The Administrator will provide the data upon which flood plain management regulations for flood-related erosion-prone areas shall be based. If the Administrator has not provided sufficient data to furnish a basis for these regulations in a particular community, the community shall obtain, review, and reasonably utilize data available from other Federal, State or other sources, pending receipt of data from the Administrator. However, when special flood-related erosion hazard area designations have been furnished by the Administrator they shall apply. The symbols defining such special flood-related erosion hazard designations are set forth in Sec. 64.3 of this subchapter. In all cases the minimum requirements governing the adequacy of the flood plain management regulations for flood-related erosion-prone areas adopted by a particular community depend on the amount of technical data provided to

the community by the Administrator. Minimum standards for communities are as follows:

(a) When the Administrator has not yet identified any area within the community as having special flood-related erosion hazards, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall

(1) Require the issuance of a permit for all proposed construction, or other development in the area of flood-related erosion hazard, as it is known to the community;

(2) Require review of each permit application to determine whether the proposed site alterations and improvements will be reasonably safe from flood-related erosion and will not cause flood-related erosion hazards or otherwise aggravate the existing flood-related erosion hazard; and

(3) If a proposed improvement is found to be in the path of flood-related erosion or to increase the erosion hazard, require the improvement to be relocated or adequate protective measures to be taken which will not aggravate the existing erosion hazard.

(b) When the Administrator has delineated Zone E on the community's FIRM, the community shall

(1) Meet the requirements of paragraph (a) of this section; and

(2) Require a setback for all new development from the ocean, lake, bay, riverfront or other body of water, to create a safety buffer consisting of a natural vegetative or contour strip. This buffer will be designated by the Administrator according to the flood-related erosion hazard and erosion rate, in conjunction with the anticipated ``useful life'' of structures, and depending upon the geologic, hydrologic, topographic and climatic characteristics of the community's land. The buffer may be used for suitable open space purposes, such as for agricultural, forestry, outdoor recreation and wildlife habitat areas, and for other activities using temporary and portable structures only.

[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

**§ 60.6 Variances and exceptions.**

(a) The Administrator does not set forth absolute criteria for granting variances from the criteria set forth in Sec.. 60.3, 60.4, and 60.5. The issuance of a variance is for flood plain management purposes only. Insurance premium rates are determined by statute according to actuarial risk and will not be modified by the granting of a variance. The community, after examining the applicant's hardships, shall approve or disapprove a request. While the granting of variances generally is limited to a lot size less than one-half acre (as set forth in paragraph (a)(2) of this section), deviations from that limitation may occur. However, as the lot size increases beyond one-half acre, the technical justification required for issuing a variance increases. The Administrator may review a community's findings justifying the granting of variances, and if that review indicates a pattern inconsistent with the objectives of sound flood plain management, the Administrator may take appropriate action under Sec. 59.24(b) of this subchapter. Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure. Procedures for the granting of variances by a community are as follows:

(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 heights, additional threats 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; and

(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 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.

(b)(1) The requirement that each flood-prone, mudslide (i.e., mudflow)-prone, and flood-related erosion prone community must adopt and submit adequate flood plain management regulations as a condition of initial and continued flood insurance eligibility is statutory and cannot be waived, and such regulations shall be adopted by a community within the time periods specified in Sec. 60.3, 60.4 or Sec. 60.5. However, certain exceptions from the standards contained in this subpart may be permitted where the Administrator recognizes that, because of extraordinary circumstances, local conditions may render the application of certain standards the cause for severe hardship and gross inequity for a particular community. Consequently, a community proposing the adoption of flood plain management regulations which vary from the standards set forth in Sec. 60.3, 60.4, or Sec. 60.5, shall explain in writing to the Administrator the nature and extent of and the reasons for the exception request and shall include sufficient supporting economic, environmental, topographic, hydrologic, and other scientific and technical data, and data with respect to the impact on public safety and the environment.

(2) The Administrator shall prepare a Special Environmental Clearance to determine whether the proposal for an exception under paragraph (b)(1) of this section will have significant impact on the human environment. The decision whether an Environmental Impact Statement or other environmental document will be prepared, will be made in accordance with the procedures set out in 44 CFR part 10. Ninety or more days may be required for an environmental quality clearance if the proposed exception will have significant impact on the human environment thereby requiring an EIS.

(c) A community may propose flood plain management measures which adopt standards for floodproofed residential basements below the base flood level in zones A1-30, AH, AO, and AE which are not subject to tidal flooding. Nothwithstanding the requirements of paragraph

(b) of this section the Administrator may approve the proposal provided that:

(1) The community has demonstrated that areas of special flood hazard in which basements will be permitted are subject to shallow and low velocity flooding and that there is adequate flood warning time to ensure that all residents are notified of impending floods. For the purposes of this paragraph flood characteristics must include:

(i) Flood depths that are five feet or less for developable lots that are contiguous to land above the base flood level and three feet or less for other lots;

(ii) Flood velocities that are five feet per second or less; and(iii) Flood warning times that are 12 hours or greater. Flood warning times of two hours or greater may be approved if the community demonstrates that it has a flood warning system and emergency plan in operation that is adequate to ensure safe evacuation of flood plain residents.

(2) The community has adopted flood plain management measures that require that new construction and substantial improvements of residential structures with basements in zones A1-30, AH, AO, and AE shall:

(i) Be designed and built so that any basement area, together with attendant utilities and sanitary facilities below the floodproofed design level, is watertight with walls that are impermeable to the passage of water without human intervention. Basement walls shall be built with the capacity to resist hydrostatic and hydrodynamic loads and the effects of buoyancy resulting from flooding to the floodproofed design level, and shall be designed so that minimal damage will occur from floods that exceed that level. The floodproofed design level shall be an elevation one foot above the level of the base flood where the difference between the base flood and the 500-year flood is three feet or less and two feet above the level

of the base flood where the difference is greater than three feet.
(ii) Have the top of the floor of any basement area no lower than five feet below the elevation of the base flood;
iii) Have the area surrounding the structure on all sides filled to or above the elevation of the base flood. Fill must be compacted with slopes protected by vegetative cover;
(iv) Have a registered professional engineer or architect develop or review the building's structural design, specifications, and plans, including consideration of the depth, velocity, and duration of flooding and type and permeability of soils at the building site, and certify that the basement design and methods of construction proposed are in accordance with accepted standards of practice for meeting the provisions of this paragraph;
(v) Be inspected by the building inspector or other authorized representative of the community to verify that the structure is built according to its design and those provisions of this section which are verifiable.
[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44543 and 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984; 50 FR 36025, Sept. 4, 1985; 51 FR 30308, Aug. 25, 1986; 54 FR 33550, Aug. 15, 1989]

**§ 60.7 Revisions of criteria for flood plain management regulations.**
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.

**§ 60.8 Definitions.**
The definitions set forth in part 59 of this subchapter are applicable to this part.

**Subpart B--Requirements for State Flood Plain Management Regulations**

**§ 60.11 Purpose of this subpart.**
(a) A State is considered a ``community" pursuant to Sec. 59.1 of this subchapter; and, accordingly, the Act provides that flood insurance shall not be sold or renewed under the Program unless a community has adopted adequate flood plain management regulations consistent with criteria established by the Administrator.
(b) This subpart sets forth the flood plain management criteria required for State-owned properties located within special hazard areas identified by the Administrator. A State shall satisfy such criteria as a condition to the purchase of a Standard Flood Insurance Policy for a State-owned structure or its contents, or as a condition to the approval by the Administrator, pursuant to part 75 of this subchapter, of its plan of self-insurance.
[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

**§ 60.12 Flood plain management criteria for State-owned properties in special hazard areas.**
(a) The State shall comply with the minimum flood plain management criteria set forth in Sec.Sec. 60.3, 60.4, and 60.5. A State either shall:
(1) Comply with the flood plain management requirements of all local communities participating in the program in which State-owned properties are located; or(2) Establish and enforce flood plain management regulations which, at a minimum, satisfy the criteria set forth in Sec. 60.3, 60.4, and 60.5.
(b) The procedures by which a state government adopts and administers flood plain management regulations satisfying the criteria set forth in Sec. 60.3, 60.4 and 60.5 may vary from the procedures by which local governments satisfy the criteria.
(c) If any State-owned property is located in a non-participating local community, then the State shall comply with the requirements of paragraph (a)(2) of this section for the property.

**§ Sec. 60.13 Noncompliance.**
If a State fails to submit adequate flood plain management regulations applicable to State-owned properties pursuant to Sec. 60.12 within six months of the effective date of this regulation, or fails to adequately enforce such regulations, the State shall be subject to suspensive action pursuant to Sec. 59.24. Where the State fails to adequately enforce its flood plain management regulations, the Administrator shall conduct a hearing before initiating such suspensive action.
[41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44552, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

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

**§ 60.21 Purpose of this subpart.**

The purpose of this subpart is to encourage the formation and adoption of overall comprehensive management plans for flood-prone, mudslide (i.e., mudflow)-prone and flood-related erosion-prone areas. While adoption by a community of the standards in this subpart is not mandatory, the community shall completely evaluate these standards.

**§ 60.22 Planning considerations for flood-prone areas.**

(a) The flood plain management regulations adopted by a community for flood-prone areas should:

(1) Permit only that development of flood-prone areas which (i) is appropriate in light of the probability of flood damage and the need to reduce flood losses, (ii) is an acceptable social and economic use of the land in relation to the hazards involved, and (iii) does not increase the danger to human life;

(2) Prohibit nonessential or improper installation of public utilities and public facilities in flood-prone areas.

(b) In formulating community development goals after the occurrence of a flood disaster, each community shall consider--

(1) Preservation of the flood-prone areas for open space purposes;

(2) Relocation of occupants away from flood-prone areas;

(3) Acquisition of land or land development rights for public purposes consistent with a policy of minimization of future property losses;

(4) Acquisition of frequently flood-damaged structures;

(c) In formulating community development goals and in adopting flood plain management regulations, each community shall consider at least the following factors--

(1) Human safety;

(2) Diversion of development to areas safe from flooding in light of the need to reduce flood damages and in light of the need to prevent environmentally incompatible flood plain use;

(3) Full disclosure to all prospective and interested parties (including but not limited to purchasers and renters) that

(i) certain structures are located within flood-prone areas,

(ii) variances have been granted for certain structures located within flood-prone areas, and

(iii) premium rates applied to new structures built at elevations below the base flood substantially increase as the elevation decreases;

(4) Adverse effects of flood plain 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 when normal routes are blocked or destroyed by flooding;

(8) Establishment of minimum floodproofing and access requirements for schools, hospitals, nursing homes, orphanages, penal institutions, fire stations, police stations, communications centers, water and sewage pumping stations, and other public or quasi-public facilities already located in the flood-prone area, to enable them to withstand flood damage, and to facilitate emergency operations;

(9) Improvement of local drainage to control increased runoff that might increase the danger of flooding to other properties;

(10) Coordination of plans with neighboring community's flood plain management programs;

(11) The requirement that all new construction and substantial improvements in areas subject to subsidence be elevated above the base flood level equal to expected subsidence for at least a ten year period;

(12) For riverine areas, requiring subdividers to furnish delineations for floodways before approving a subdivision;

(13) Prohibition of any alteration or relocation of a watercourse, except as part of an overall drainage basin plan. In the event of an overall drainage basin plan, provide that the flood carrying capacity within the altered or relocated portion of the watercourse is maintained;

(14) Requirement of setbacks for new construction within Zones V1-30, VE, and V on a community's FIRM;

(15) Requirement of additional elevation above the base flood level for all new construction and substantial improvements within Zones A1-30, AE, V1-30, and VE on the community's FIRM to protect against such occurrences as wave wash and floating

debris, to provide an added margin of safety against floods having a magnitude greater than the base flood, or to compensate for future urban development;
(16) Requirement of consistency between state, regional and local comprehensive plans and flood plain management programs;
(17) Requirement of pilings or columns rather than fill, for the elevation of structures within flood-prone areas, in order to maintain the storage capacity of the flood plain and to minimize the potential for negative impacts to sensitive ecological areas;
(18) Prohibition, within any floodway or coastal high hazard area, of plants or facilities in which hazardous substances are manufactured.
(19) Requirement that a plan for evacuating residents of all manufactured home parks or subdivisions located within flood prone areas be developed and filed with and approved by appropriate community emergency management authorities. [41 FR 46975, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 50 FR 36025, Sept. 4, 1985; 54 FR 40284, Sept. 29, 1989]

**§ 60.23 Planning considerations for mud slide (i.e., mudflow)-prone areas.**

The planning process for communities identified under part 65 of this subchapter as containing Zone M, or which indicate in their applications for flood insurance pursuant to Sec. 59.22 of this subchapter that they have mudslide (i.e., mudflow) areas, should include--
(a) The existence and extent of the hazard;
(b) The potential effects of inappropriate hillside development, including
(1) Loss of life and personal injuries, and
(2) Public and private property losses, costs, liabilities, and exposures resulting from potential mudslide (i.e., mudflow) hazards;
(c) The means of avoiding the hazard including the (1) availability of land which is not mudslide (i.e., mudflow)-prone and the feasibility of developing such land instead of further encroaching upon mudslide (i.e., mudflow) areas, (2) possibility of public acquisition of land, easements, and development rights to assure the proper development of hillsides, and
(3) advisability of preserving mudslide (i.e., mudflow) areas as open space;
(d) The means of adjusting to the hazard, including the (1) establishment by ordinance of site exploration, investigation, design, grading, construction, filing, compacting, foundation, sewerage, drainage, subdrainage, planting, inspection and maintenance standards and requirements that promote proper land use, and
(2) provision for proper drainage and subdrainage on public property and the location of public utilities and service facilities, such as sewer, water, gas and electrical systems and streets in a manner designed to minimize exposure to mudslide (i.e., mudflow) hazards and prevent their aggravation;
(e) Coordination of land use, sewer, and drainage regulations and ordinances with fire prevention, flood plain, mudslide (i.e., mudflow), soil, land, and water regulation in neighboring communities;
(f) Planning subdivisions and other developments in such a manner as to avoid exposure to mudslide (i.e., mudflow) hazards and the control of public facility and utility extension to discourage inappropriate development;
(g) Public facility location and design requirements with higher site stability and access standards for schools, hospitals, nursing homes, orphanages, correctional and other residential institutions, fire and police stations, communication centers, electric power transformers and substations, water and sewer pumping stations and any other public or quasi-public institutions located in the mudslide (i.e., mudflow) area to enable them to withstand mudslide (i.e., mudflow) damage and to facilitate emergency operations; and
(h) Provision for emergencies, including:
(1) Warning, evacuation, abatement, and access procedures in the event of mudslide (i.e., mudflow),
(2) Enactment of public measures and initiation of private procedures to limit danger and damage from continued or future mudslides (i.e., mudflow),
(3) Fire prevention procedures in the event of the rupture of gas or electrical distribution systems by mudslides,
(4) Provisions to avoid contamination of water conduits or deterioration of slope stability by the rupture of such systems,
(5) Similar provisions for sewers which in the event of rupture pose both health and site stability hazards and
(6) Provisions for alternative vehicular access and escape routes when normal routes are blocked or destroyed by mudslides (i.e., mudflow);
(i) The means for assuring consistency between state, areawide, and local comprehensive plans with the plans developed for mudslide (i.e., mudflow)-prone areas;

(j) Deterring the nonessential installation of public utilities and public facilities in mudslide (i.e., mudflow)-prone areas.

**§ 60.24 Planning considerations for flood-related erosion-prone areas.**

The planning process for communities identified under part 65 of this subchapter as containing Zone E or which indicate in their applications for flood insurance coverage pursuant to Sec.
59.22 of this subchapter that they have flood-related erosion areas should include--

(a) The importance of directing future developments to areas not exposed to flood-related erosion;

(b) The possibility of reserving flood-related erosion-prone areas for open space purposes;

(c) The coordination of all planning for the flood-related erosion-prone areas with planning at the State and Regional levels, and with planning at the level of neighboring communities;

(d) Preventive action in E zones, including setbacks, shore protection works, relocating structures in the path of flood-related erosion, and community acquisition of flood-related erosion-prone properties for public purposes;

(e) Consistency of plans for flood-related erosion-prone areas with comprehensive plans at the state, regional and local levels.

**§ 60.25 Designation, duties, and responsibilities of State Coordinating Agencies.**

(a) States are encouraged to demonstrate a commitment to the minimum flood plain management criteria set forth in Sec.Sec. 60.3, 60.4, and 60.5 as evidenced by the designation of an agency of State government to be responsible for coordinating the Program aspects of flood plain management in the State.

(b) State participation in furthering the objectives of this part shall include maintaining capability to perform the appropriate duties and responsibilities as follows:

(1) Enact, whenever necessary, legislation enabling counties and municipalities to regulate development within flood-prone areas;

(2) Encourage and assist communities in qualifying for participation in the Program;

(3) Guide and assist county and municipal public bodies and agencies in developing, implementing, and maintaining local flood plain management regulations;

(4) Provide local governments and the general public with Program information on the coordination of local activities with Federal and State requirements for managing flood-prone areas;

(5) Assist communities in disseminating information on minimum elevation requirements for development within flood-prone areas;

(6) Assist in the delineation of riverine and coastal flood-prone areas, whenever possible, and provide all relevant technical information to the Administrator;

(7) Recommend priorities for Federal flood plain management activities in relation to the needs of county and municipal localities within the State;

(8) Provide notification to the Administrator in the event of apparent irreconcilable differences between a community's local flood plain management program and the minimum requirements of the Program;

(9) Establish minimum State flood plain management regulatory standards consistent with those established in this part and in conformance with other Federal and State environmental and water pollution standards for the prevention of pollution during periods of flooding;

(10) Assure coordination and consistency of flood plain management activities with other State, areawide, and local planning and enforcement agencies;

(11) Assist in the identification and implementation of flood hazard mitigation recommendations which are consistent with the minimum flood plain management criteria for the Program;

(12) Participate in flood plain management training opportunities and other flood hazard preparedness programs whenever practicable.

(c) Other duties and responsibilities, which may be deemed appropriate by the State and which are to be officially designated as being conducted in the capacity of the State Coordinating Agency for the Program, may be carried out with prior notification of the Administrator.

(d) For States which have demonstrated a commitment to and experience in application of the minimum flood plain management criteria set forth in Sec. 60.3, 60.4, and 60.5 as evidenced by the establishment and implementation of programs which substantially encompass the activities described in paragraphs (a), (b), and (c) of this section, the Administrator shall take the foregoing into account when:

(1) Considering State recommendations prior to implementing Program activities affecting State communities;

(2) Considering State approval or certifications of

local flood plain management regulations as meeting the requirements of this part.
[51 FR 30309, Aug. 25, 1986]

**§ 60.26 Local coordination.**
(a) Local flood plain, mudslide (i.e., mudflow) and flood-related erosion area management, forecasting, emergency preparedness, and damage abatement programs should be coordinated with relevant Federal, State, and regional programs;
(b) A community adopting flood plain management regulations pursuant to these criteria should coordinate with the appropriate State agency to promote public acceptance and use of effective flood plain, mudslide, (i.e., mudflow) and flood-related erosion regulations;
(c) A community should notify adjacent communities prior to substantial commercial developments and large subdivisions to be undertaken in areas having special flood, mudslide (i.e., mudflow) and/or flood-related erosion hazards.

**PART 65--IDENTIFICATION AND MAPPING OF SPECIAL HAZARD AREAS-**
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**§ 65.1 Purpose of part.**
42 U.S.C. 4104 authorizes the Director to identify and publish information with respect to all areas within the United States having special flood, mudslide (i.e., mudflow) and flood-related erosion hazards. The purpose of this part is to outline the steps a community needs to take in order to assist the Agency's effort in providing up-to-date identification and publication, in the form of the maps described in part 64, on special flood, mudslide (i.e., mudflow) and flood-related erosion hazards.
[48 FR 28278, June 21, 1983]

**§ 65.2 Definitions.**
(a) Except as otherwise provided in this part, the definitions set forth in part 59 of this subchapter are applicable to this part.
(b) For the purpose of this part, a certification by a registered professional engineer or other party does not constitute a warranty or guarantee of performance, expressed or implied. Certification of data is a statement that the data is accurate to the best of the certifier's knowledge. Certification of analyses is a statement that the analyses have been performed correctly and in accordance with sound engineering practices. Certification of structural works is a statement that the works are designed in accordance with sound engineering practices to provide protection from the base flood. Certification of ``as built'' conditions is a statement that the structure(s) has been built according to the plans being certified, is in place, and is fully functioning.
(c) For the purposes of this part, ``reasonably safe from flooding'' means 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.
[51 FR 30313, Aug. 25, 1986, as amended at 66 FR 22442, May 4, 2001]

**§ 65.3 Requirement to submit new technical data.**
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 submission 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.
[51 FR 30313, Aug. 25, 1986]

**§ 65.4 Right to submit new technical data.**
(a) A community has a right to request changes to any of the information shown on an effective map that does not impact flood plain or floodway delineations or base flood elevations, such as community boundary changes, labeling, or planimetric details. Such a submission shall include appropriate supporting documentation in accordance with this part and may be submitted at any time.
(b) All requests for changes to effective maps, other than those Initiated by FEMA, must be made in writing by the Chief Executive Officer of the community (CEO) or an official designated by the CEO. Should the CEO refuse to submit such a request on behalf of another party, FEMA will agree to review it only if written evidence is provided indicating the CEO or designee has been requested to do so.(c) Requests for changes to effective Flood Insurance Rate Maps (FIRMs) and Flood Boundary and Floodway Maps (FBFMs) are subject to the cost recovery procedures described in 44 CFR part 72. As indicated in part 72, revisions requested to correct mapping errors or errors in the Flood Insurance Study analysis are not to be subject to the cost-recovery procedures.
[51 FR 30313, Aug. 25, 1986, as amended at 57 FR 29038, June 30, 1992; 61 FR 46331, Aug. 30, 1996; 62 FR 5736, Feb. 6, 1997]

Editorial Note: For references to FR pages showing lists of eligible communities, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

**§ 65.5 Revision to special hazard area boundaries with no change to base flood elevation determinations.**
(a) Data requirements for topographic changes. In many areas of special flood hazard (excluding V zones and floodways) it may be feasible to elevate areas with engineered earthen fill above the base flood elevation. Scientific and technical information to support a request to gain exclusion from an area of special flood hazard of a structure or parcel of land that has been elevated by the placement of engineered earthen fill will include the following:
(1) A copy of the recorded deed indicating the legal description of the property and the official recordation information (deed book volume and page number) and bearing the seal of the appropriate recordation official (e.g., County Clerk or Recorder of Deeds).
(2) If the property is recorded on a plat map, a copy of the recorded plat indicating both the location of the property and the official recordation information (plat book volume and page number) and bearing the seal of the appropriate recordation official. If the property is not recorded on a plat map, FEMA requires copies of the tax map or other suitable maps to help in locating the property accurately.
(3) A topographic map or other information indicating existing ground elevations and the date of fill. FEMA's determination to exclude a legally defined parcel of land or a structure from the area of special flood hazard will be based upon a comparison of the base flood elevations to the lowest ground elevation of the parcel or the lowest adjacent grade to the structure. If the lowest ground elevation of the entire legally defined parcel of land or the lowest adjacent grade to the structure are at or above the elevations of the base flood, FEMA will exclude the parcel and/or structure from the area of special flood hazard.
(4) Written assurance by the participating community that they have complied with the appropriate minimum floodplain management requirements under Sec. 60.3. This includes the requirements that:
(i) Existing residential structures built in the SFHA have their lowest floor elevated to or above the base flood;
(ii) The participating community has determined that the land and any existing or proposed structures to be removed from the SFHA are ``reasonably safe from flooding'', and that they have on file, available upon request by FEMA, all supporting analyses and documentation used to make that determination;
(iii) The participating community has issued permits for all existing and proposed construction or other development; and
(iv) All necessary permits have been received from those governmental agencies where approval is required by Federal, State, or local law.
(5) If the community cannot assure that it has complied with the appropriate minimum floodplain management requirements under Sec. 60.3, of this

chapter, the map revision request will be deferred until the community remedies all violations to the maximum extent possible through coordination with FEMA. Once the remedies are in place, and the community assures that the land and structures are ``reasonably safe from flooding," we will process a revision to the SFHA using the criteria set forth in Sec. 65.5(a). The community must maintain on file, and make available upon request by FEMA, all supporting analyses and documentation used in determining that the land or structures are ``reasonably safe from flooding."

(6) Data to substantiate the base flood elevation. If we complete a Flood Insurance Study (FIS), we will use those data to substantiate the base flood elevation. Otherwise, the community may submit data provided by an authoritative source, such as the U.S. Army Corps of Engineers, U.S. Geological Survey, Natural Resources Conservation Service, State and local water resource departments, or technical data prepared and certified by a registered professional engineer. If base flood elevations have not previously been established, we may also request hydrologic and hydraulic calculations.

(7) A revision of floodplain delineations based on fill must demonstrate that any such fill does not result in a floodway encroachment.

(b) New topographic data. A community may also follow the procedures described in paragraphs (a)(1) through (6) of this section to request a map revision when no physical changes have occurred in the area of special flood hazard, when no fill has been placed, and when the natural ground elevations are at or above the elevations of the base flood, where new topographic maps are more detailed or more accurate than the current map.

(c) Certification requirements. A registered professional engineer or licensed land surveyor must certify the items required in paragraphs (a)(3) and (6) and (b) of this section. Such certifications are subject to the provisions under Sec. 65.2.

(d) Submission procedures. Submit all requests to the appropriate address serving the community's geographic area or to the FEMA Headquarters Office in Washington, DC.

[66 FR 22442, May 4, 2001]

**§ 65.6 Revision of base flood elevation determinations.**

(a) General conditions and data requirements.

(1) The supporting data must include all the information FEMA needs to review and evaluate the request. This may involve the requestor's performing new hydrologic and hydraulic analysis and delineation of new flood plain boundaries and floodways, as necessary.

(2) To avoid discontinuities between the revised and unrevised flood data, the necessary hydrologic and hydraulic analyses submitted by the map revision requestor must be extensive enough to ensure that a logical transition can be shown between the revised flood elevations, flood plain boundaries, and floodways and those developed previously for areas not affected by the revision. Unless it is demonstrated that it would not be appropriate, the revised and unrevised base flood elevations must match within one-half foot where such transitions occur.

(3) Revisions cannot be made based on the effects of proposed projects or future conditions. Section 65.8 of this subchapter contains provisions for obtaining conditional approval of proposed projects that may effect map changes when they are completed.

(4) The datum and date of releveling of benchmarks, if any, to which the elevations are referenced must be indicated.

(5) Maps will not be revised when discharges change as a result of the use of an alternative methodology or data for computing flood discharges unless the change is statistically significant as measured by a confidence limits analysis of the new discharge estimates.

(6) Any computer program used to perform hydrologic or hydraulic analyses in support of a flood insurance map revision must meet all of the following criteria:

(i) It must have been reviewed and accepted by a governmental agency responsible for the implementation of programs for flood control and/or the regulation of flood plain lands. For computer programs adopted by non-Federal agencies, certification by a responsible agency official must be provided which states that the program has been reviewed, tested, and accepted by that agency for purposes of design of flood control structures or flood plain land use regulation.

(ii) It must be well-documented including source codes and user's manuals.

(iii) It must be available to FEMA and all present and future parties impacted by flood insurance mapping developed or amended through the use of the program. For programs not generally available from a Federal agency, the source code and user's manuals must be sent to FEMA free of charge, with fully-documented permission from the owner that FEMA

may release the code and user's manuals to such impacted parties.

(7) A revised hydrologic analysis for flooding sources with established base flood elevations must include evaluation of the same recurrence interval(s) studied in the effective FIS, such as the 10-, 50-, 100-, and 500-year flood discharges.

(8) A revised hydraulic analysis for a flooding source with established base flood elevations must include evaluation of the same recurrence interval(s) studied in the effective FIS, such as the 10-, 50-, 100-, and 500-year flood elevations, and of the floodway. Unless the basis of the request is the use of an alternative hydraulic methodology or the requestor can demonstrate that the data of the original hydraulic computer model is unavailable or its use is inappropriate, the analysis shall be made using the same hydraulic computer model used to develop the base flood elevations shown on the effective Flood Insurance Rate Map and updated to show present conditions in the flood plain. Copies of the input and output data from the original and revised hydraulic analyses shall be submitted.

(9) A hydrologic or hydraulic analysis for a flooding source without established base flood elevations may be performed for only the 100year flood.

(10) A revision of flood plain delineations based on topographic Changes must demonstrate that any topographic changes have not resulted in a floodway encroachment.

(11) Delineations of flood plain boundaries for a flooding source with established base flood elevations must provide both the 100- and 500year flood plain boundaries. For flooding sources without established base flood elevations, only 100-year flood plain boundaries need be submitted. These boundaries should be shown on a topographic map of suitable scale and contour interval.

(12) If a community or other party seeks recognition from FEMA, on its FHBM or FIRM, that an altered or relocated portion of a watercourse provides protection from, or mitigates potential hazards of, the base flood, the Administrator may request specific documentation from the community certifying that, and describing how, the provisions of Sec. 60.3(b)(7) of this subchapter will be met for the particular watercourse involved. This documentation, which may be in the form of a written statement from the Community Chief Executive Officer, an ordinance, or other legislative action, shall describe the nature of the maintenance activities to be performed, the frequency with which they will be performed, and the title of the local community official who will be responsible for assuring that the maintenance activities are accomplished.

(13) Notwithstanding any other provisions of Sec. 65.6, a community may submit, in lieu of the documentation specified in Sec. 65.6(a)(12), certification by a registered professional engineer that the project has been designed to retain its flood carrying capacity without periodic maintenance.

(14) The participating community must provide written assurance that they have complied with the appropriate minimum floodplain management requirements under Sec. 60.3 of this chapter. This includes the requirements that:

(i) Existing residential structures built in the SFHA have their lowest floor elevated to or above the base flood;

(ii) The participating community has determined that the land and any existing or proposed structures to be removed from the SFHA are ``reasonably safe from flooding," and that they have on file, available upon request by FEMA, all supporting analyses and documentation used to make that determination;

(iii) The participating community has issued permits for all existing and proposed construction or other development; and

(iv) All necessary permits have been received from those governmental agencies where approval is required by Federal, State, or local law.

(15) If the community cannot assure that it has complied with the appropriate minimum floodplain management requirements under Sec. 60.3, of this chapter the map revision request will be deferred until the community remedies all violations to the maximum extent possible through coordination with FEMA. Once the remedies are in place, and the community assures that the land and structures are ``reasonably safe from flooding," we will process a revision to the SFHA using the criteria set forth under Sec. 65.6. The community must maintain on file, and make available upon request by FEMA, all supporting analyses and documentation used in determining that the land or structures are ``reasonably safe from flooding."

(b) Data requirements for correcting map errors. To correct errors in the original flood analysis, technical data submissions shall include the following:

(1) Data identifying mathematical errors.

(2) Data identifying measurement errors and providing correct measurements.

(c) Data requirements for changed physical conditions. Revisions based on the effects of physical

changes that have occurred in the flood plain shall include:
(1) Changes affecting hydrologic conditions. The following data must be submitted:
(i) General description of the changes (e.g., dam, diversion channel, or detention basin).
(ii) Construction plans for as-built conditions, if applicable.
(iii) New hydrologic analysis accounting for the effects of the changes.
(iv) New hydraulic analysis and profiles using the new flood discharge values resulting from the hydrologic analysis.
(v) Revised delineations of the flood plain boundaries and floodway.
(2) Changes affecting hydraulic conditions. The following data shall be submitted:
(i) General description of the changes (e.g., channelization or new bridge, culvert, or levee).
(ii) Construction plans for as-built conditions.
(iii) New hydraulic analysis and flood elevation profiles accounting for the effects of the changes and using the original flood discharge values upon which the original map is based.
(iv) Revised delineations of the flood plain boundaries and floodway.
(3) Changes involving topographic conditions. The following data shall be submitted:
(i) General description of the changes (e.g., grading or filling).
(ii) New topographic information, such as spot elevations, cross sections grading plans, or contour maps.
(iii) Revised delineations of the flood plain boundaries and, if necessary, floodway.
(d) Data requirements for incorporating improved data. Requests for revisions based on the use of improved hydrologic, hydraulic, or topographic data shall include the following data:
(1) Data that are believed to be better than those used in the original analysis (such as additional years of stream gage data).
(2) Documentation of the source of the data.
(3) Explanation as to why the use of the new data will improve the results of the original analysis.
(4) Revised hydrologic analysis where hydrologic data are being incorporated.
(5) Revised hydraulic analysis and flood elevation profiles where new hydrologic or hydraulic data are being incorporated.
(6) Revised delineations of the flood plain boundaries and floodway where new hydrologic, hydraulic, or topographic data are being incorporated.
(e) Data requirements for incorporating improved methods. Requests for revisions based on the use of improved hydrologic or hydraulic methodology shall include the following data:
(1) New hydrologic analysis when an alternative hydrologic methodology is being proposed.
(2) New hydraulic analysis and flood elevation profiles when an alternative hyrologic or hydraulic methodology is being proposed.
(3) Explanation as to why the alternative methodologies are superior to the original methodologies.
(4) Revised delineations of the flood plain boundaries and floodway based on the new analysis(es).
(f) Certification requirements. All analysis and data submitted by the requester shall be certified by a registered professional engineer or licensed land surveyor, as appropriate, subject to the definition of ``certification" given at Sec. 65.2 of this subchapter.
(g) Submission procedures. All requests shall be submitted to the FEMA Regional Office servicing the community's geographic area or to the FEMA Headquarters Office in Washington, DC, and shall be accompanied by the appropriate payment, in accordance with 44 CFR part 72.
[51 FR 30314, Aug. 25, 1986, as amended at 53 FR 16279, May 6, 1988; 54 FR 33550, Aug. 15, 1989; 61 FR 46331, Aug. 30, 1996; 62 FR 5736, Feb. 6, 1997; 66 FR 22442, May 4, 2001]

**§ 65.7 Floodway revisions.**
(a) General. Floodway data is developed as part of FEMA Flood Insurance Studies and is utilized by communities to select and adopt floodways as part of the flood plain management program required by Sec. 60.3 of this subchapter. When it has been determined by a community that no practicable alternatives exist to revising the boundaries of its previously adopted floodway, the procedures below shall be followed.
(b) Data requirements when base flood elevation changes are requested. When a floodway revision is requested in association with a change to base flood elevations, the data requirements of Sec. 65.6 shall also be applicable. In addition, the following documentation shall be submitted:
(1) Copy of a public notice distributed by the community stating the community's intent to revise the floodway or a statement by the community that it has notified all affected property owners and affected adjacent jurisdictions.

(2) Copy of a letter notifying the appropriate State agency of the floodway revision when the State has jurisdiction over the floodway or its adoption by communities participating in the NFIP.
(3) Documentation of the approval of the revised floodway by the appropriate State agency (for communities where the State has jurisdiction over the floodway or its adoption by communities participating in the NFIP).
(4) Engineering analysis for the revised floodway, as described below:
(i) The floodway analysis must be performed using the hydraulic computer model used to determine the proposed base flood elevations.
(ii) The floodway limits must be set so that neither the effective base flood elevations nor the proposed base flood elevations if less than the effective base flood elevations, are increased by more than the amount specified under Sec. 60.3 (d)(2). Copies of the input and output data from the original and modified computer models must be submitted.
(5) Delineation of the revised floodway on the same topographic map used for the delineation of the revised flood boundaries.
(c) Data requirements for changes not associated with base flood elevation changes. The following data shall be submitted:
(1) Items described in paragraphs (b) (1) through (3) of this section must be submitted.
(2) Engineering analysis for the revised floodway, as described below:
(i) The original hydraulic computer model used to develop the established base flood elevations must be modified to include all encroachments that have occurred in the flood plain since the existing floodway was developed. If the original hydraulic computer model is not available, an alternate hydraulic computer model may be used provided the alternate model has been calibrated so as to reproduce the original water surface profile of the original hydraulic computer model. The alternate model must be then modified to include all encroachments that have occurred since the existing floodway was developed.
(ii) The floodway analysis must be performed with the modified computer model using the desired floodway limits.
(iii) The floodway limits must be set so that combined effects of the past encroachments and the new floodway limits do not increase the effective base flood elevations by more than the amount specified in Sec. 60.3(d)(2). Copies of the input and output data from the original and modified computer models must be submitted.
(3) Delineation of the revised floodway on a copy of the effective NFIP map and a suitable topographic map.
(d) Certification requirements. All analyses submitted shall be certified by a registered professional engineer. All topographic data shall be certified by a registered professional engineer or licensed land surveyor. Certifications are subject to the definition given at Sec. 65.2 of this subchapter.
(e) Submission procedures. All requests that involve changes to floodways shall be submitted to the appropriate FEMA Regional Office servicing the community's geographic area.
[51 FR 30315, Aug. 25, 1986]

**§ 65.8 Review of proposed projects.**
A community, or an individual through the community, may request FEMA's comments on whether a proposed project, if built as proposed, would justify a map revision. FEMA's comments will be issued in the form of a letter, termed a Conditional Letter of Map Revision, in accordance with 44 CFR part 72. The data required to support such requests are the same as those required for final revisions under Sec.Sec. 65.5, 65.6, and 65.7, except as-built certification is not required. All such requests shall be submitted to the FEMA Headquarters Office in Washington, DC, and shall be accompanied by the appropriate payment, in accordance with 44 CFR part 72. [62 FR 5736, Feb. 6, 1997]

**§ 65.9 Review and response by the Administrator.**
If any questions or problems arise during review, FEMA will consult the Chief Executive Officer of the community (CEO), the community official designated by the CEO, and/or the requester for resolution. Upon receipt of a revision request, the Administrator shall mail an acknowledgment of receipt of such request to the CEO. Within 90 days of receiving the request with all necessary information, the Administrator shall notify the CEO of one or more of the following:
(a) The effective map(s) shall not be modified;
(b) The base flood elevations on the effective FIRM shall be modified and new base flood elevations shall be established under the provisions of part 67 of this subchapter;
(c) The changes requested are approved and the map(s) amended by Letter of Map Revision (LOMR);

(d) The changes requested are approved and a revised map(s) will be printed and distributed;
(e) The changes requested are not of such a significant nature as to warrant a reissuance or revision of the flood insurance study or maps and will be deferred until such time as a significant change occurs;
(f) An additional 90 days is required to evaluate the scientific or technical data submitted; or
(g) Additional data are required to support the revision request.
(h) The required payment has not been submitted in accordance with 44 CFR part 72, no review will be conducted and no determination will be issued until payment is received.
[51 FR 30315, Aug. 25, 1986; 61 FR 46331, Aug. 30, 1996, as amended at 62 FR 5736, Feb. 6, 1997]

**§ 65.10 Mapping of areas protected by levee systems.**
(a) General. For purposes of the NFIP, FEMA will only recognize in its flood hazard and risk mapping effort those levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with the level of protection sought through the comprehensive flood plain management criteria established by Sec. 60.3 of this subchapter. Accordingly, this section describes the types of information FEMA needs to recognize, on NFIP maps, that a levee system provides protection from the base flood. This information must be supplied to FEMA by the community or other party seeking recognition of such a levee system at the time a flood risk study or restudy is conducted, when a map revision under the provisions of part 65 of this subchapter is sought based on a levee system, and upon request by the Administrator during the review of previously recognized structures. The FEMA review will be for the sole purpose of establishing appropriate risk zone determinations for NFIP maps and shall not constitute a determination by FEMA as to how a structure or system will perform in a flood event.
(b) Design criteria. For levees to be recognized by FEMA, evidence that adequate design and operation and maintenance systems are in place to provide reasonable assurance that protection from the base flood exists must be provided. The following requirements must be met:
(1) Freeboard. (i) Riverine levees must provide a minimum freeboard of three feet above the water-surface level of the base flood. An additional one foot above the minimum is required within 100 feet in either side of structures (such as bridges) riverward of the levee or wherever the flow is constricted. An additional one-half foot above the minimum at the upstream end of the levee, tapering to not less than the minimum at the downstream end of the levee, is also required.
(ii) Occasionally, exceptions to the minimum riverine freeboard requirement described in paragraph (b)(1)(i) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must evaluate the uncertainty in the estimated base flood elevation profile and include, but not necessarily be limited to an assessment of statistical confidence limits of the 100-year discharge; changes in stage-discharge relationships; and the sources, potential, and magnitude of debris, sediment, and ice accumulation. It must be also shown that the levee will remain structurally stable during the base flood when such additional loading considerations are imposed. Under no circumstances will freeboard of less than two feet be accepted.
(iii) For coastal levees, the freeboard must be established at one foot above the height of the one percent wave or the maximum wave runup (whichever is greater) associated with the 100year stillwater surge elevation at the site.
(iv) Occasionally, exceptions to the minimum coastal levee freeboard requirement described in paragraph (b)(1)(iii) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must evaluate the uncertainty in the estimated base flood loading conditions. Particular emphasis must be placed on the effects of wave attack and overtopping on the stability of the levee. Under no circumstances, however, will a freeboard of less than two feet above the 100year stillwater surge elevation be accepted.
(2) Closures. All openings must be provided with closure devices that are structural parts of the system during operation and design according to sound engineering practice.
(3) Embankment protection. Engineering analyses must be submitted that demonstrate that no

appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability. The factors to be addressed in such analyses include, but are not limited to: Expected flow velocities (especially in constricted areas); expected wind and wave action; ice loading; impact of debris; slope protection techniques; duration of flooding at various stages and velocities; embankment and foundation materials; levee alignment, bends, and transitions; and levee side slopes.

(4) Embankment and foundation stability. Engineering analyses that evaluate levee embankment stability must be submitted. The analyses provided shall evaluate expected seepage during loading conditions associated with the base flood and shall demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability. An alternative analysis demonstrating that the levee is designed and constructed for stability against loading conditions for Case IV as defined in the U.S. Army Corps of Engineers (COE) manual, ``Design and Construction of Levees" (EM 1110-2-1913, Chapter 6, Section II), may be used. The factors that shall be addressed in the analyses include: Depth of flooding, duration of flooding, embankment geometry and length of seepage path at critical locations, embankment and foundation materials, embankment compaction, penetrations, other design factors affecting seepage (such as drainage layers), and other design factors affecting embankment and foundation stability (such as berms).

(5) Settlement. Engineering analyses must be submitted that assess the potential and magnitude of future losses of freeboard as a result of levee settlement and demonstrate that freeboard will be maintained within the minimum standards set forth in paragraph (b)(1) of this section. This analysis must address embankment loads, compressibility of embankment soils, compressibility of foundation soils, age of the levee system, and construction compaction methods. In addition, detailed settlement analysis using procedures such as those described in the COE manual, “Soil Mechanics Design--Settlement Analysis” (EM 1100-2-1904) must be submitted.

(6) Interior drainage. An analysis must be submitted that identifies the source(s) of such flooding, the extent of the flooded area, and, if the average depth is greater than one foot, the water-surface elevation(s) of the base flood. This analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwaters.

(7) Other design criteria. In unique situations, such as those where the levee system has relatively high vulnerability, FEMA may require that other design criteria and analyses be submitted to show that the levees provide adequate protection. In such situations, sound engineering practice will be the standard on which FEMA will base its determinations. FEMA will also provide the rationale for requiring this additional information.

(c) Operation plans and criteria. For a levee system to be recognized, the operational criteria must be as described below. All closure devices or mechanical systems for internal drainage, whether manual or automatic, must be operated in accordance with an officially adopted operation manual, a copy of which must be provided to FEMA by the operator when levee or drainage system recognition is being sought or when the manual for a previously recognized system is revised in any manner. All operations must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP.

(1) Closures. Operation plans for closures must include the following:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials, that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists for the completed operation of all closure structures, including necessary sealing, before floodwaters each the base of the closure.

(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

(iii) Provisions for periodic operation, at not less than one-year intervals, of the closure structure for testing and training purposes.

(2) Interior drainage systems. Interior drainage systems associated with levee systems usually include storage areas, gravity outlets, pumping stations, or a combination thereof. These drainage systems will be recognized by FEMA on NFIP maps for flood protection purposes only if the following minimum criteria are included in the operation plan:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community

officials, that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists to permit activation of mechanized portions of the drainage system.
(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.
(iii) Provision for manual backup for the activation of automatic systems.
(iv) Provisions for periodic inspection of interior drainage systems and periodic operation of any mechanized portions for testing and training purposes. No more than one year shall elapse between either the inspections or the operations.
(3) Other operation plans and criteria. Other operating plans and criteria may be required by FEMA to ensure that adequate protection is provided in specific situations. In such cases, sound emergency management practice will be the standard upon which FEMA determinations will be based.
(d) Maintenance plans and criteria. For levee systems to be recognized as providing protection from the base flood, the maintenance criteria must be as described herein. Levee systems must be maintained in accordance with an officially adopted maintenance plan, and a copy of this plan must be provided to FEMA by the owner of the levee system when recognition is being sought or when the plan for a previously recognized system is revised in any manner. All maintenance activities must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP that must assume ultimate responsibility for maintenance. This plan must document the formal procedure that ensures that the stability, height, and overall integrity of the levee and its associated structures and systems are maintained. At a minimum, maintenance plans shall specify the maintenance activities to be performed, the frequency of their performance, and the person by name or title responsible for their performance.
(e) Certification requirements. Data submitted to support that a given levee system complies with the structural requirements set forth in paragraphs (b)(1) through (7) of this section must be certified by a registered professional engineer. Also, certified as-built plans of the levee must be submitted. Certifications are subject to the definition given at Sec. 65.2 of this subchapter. In lieu of these structural requirements, a Federal agency with responsibility for levee design may certify that the levee has been adequately designed and constructed to provide protection against the base flood.
[51 FR 30316, Aug. 25, 1986]

**§ 65.11 Evaluation of sand dunes in mapping coastal flood hazard areas.**
(a) General conditions. For purposes of the NFIP, FEMA will consider storm-induced dune erosion potential in its determination of coastal flood hazards and risk mapping efforts. The criterion to be used in the evaluation of dune erosion will apply to primary frontal dunes as defined in Sec. 59.1, but does not apply to artificially designed and constructed dunes that are not well-established with long-standing vegetative cover, such as the placement of sand materials in a dune-like formation.
(b) Evaluation criterion. Primary frontal dunes will not be considered as effective barriers to base flood storm surges and associated wave action where the cross-sectional area of the primary frontal dune, as measured perpendicular to the shoreline and above the 100-year stillwater flood elevation and seaward of the dune crest, is equal to, or less than, 540 square feet.
(c) Exceptions. Exceptions to the evaluation criterion may be granted where it can be demonstrated through authoritative historical documentation that the primary frontal dunes at a specific site withstood previous base flood storm surges and associated wave action.
[53 FR 16279, May 6, 1988]

**§ 65.12 Revision of flood insurance rate maps to reflect base flood elevations caused by proposed encroachments.**
(a) When a community proposes to permit encroachments upon the flood plain when a regulatory floodway has not been adopted or to permit encroachments upon an adopted regulatory floodway which will cause base flood elevation increases in excess of those permitted under paragraphs (c)(10) or (d)(3) of Sec. 60.3 of this subchapter, the community shall apply to the Administrator for conditional approval of such action prior to permitting the encroachments to occur and shall submit the following as part of its application:
(1) A request for conditional approval of map change and the appropriate initial fee as specified by Sec. 72.3 of this subchapter or a request for exemption from fees as specified by Sec. 72.5 of this subchapter, whichever is appropriate;
(2) An evaluation of alternatives which would not

result in a base flood elevation increase above that permitted under paragraphs (c)(10) or (d)(3) of Sec. 60.3 of this subchapter demonstrating why these alternatives are not feasible;
(3) Documentation of individual legal notice to all impacted property owners within and outside of the community, explaining the impact of the proposed action on their property.
(4) Concurrence of the Chief Executive Officer of any other communities impacted by the proposed actions;
(5) Certification that no structures are located in areas which would be impacted by the increased base flood elevation;
(6) A request for revision of base flood elevation determination according to the provisions of Sec. 65.6 of this part;
(7) A request for floodway revision in accordance with the provisions of Sec. 65.7 of this part;
(b) Upon receipt of the Administrator's conditional approval of map change and prior to approving the proposed encroachments, a community shall provide evidence to the Administrator of the adoption of flood plain management ordinances incorporating the increased base flood elevations and/or revised floodway reflecting the post-project condition.
(c) Upon completion of the proposed encroachments, a community shall provide as-built certifications in accordance with the provisions of Sec. 65.3 of this part. The Administrator will initiate a final map revision upon receipt of such certifications in accordance with part 67 of this subchapter.
[53 FR 16279, May 6, 1988]

**§ 65.13 Mapping and map revisions for areas subject to alluvial fan flooding.**
This section describes the procedures to be followed and the types of information FEMA needs to recognize on a NFIP map that a structural flood control measure provides protection from the base flood in an area subject to alluvial fan flooding. This information must be supplied to FEMA by the community or other party seeking recognition of such a flood control measure at the time a flood risk study or restudy is conducted, when a map revision under the provisions of part 65 of this subchapter is sought, and upon request by the Administrator during the review of previously recognized flood control measures. The FEMA review will be for the sole purpose of establishing appropriate risk zone determinations for NFIP maps and shall not constitute a determination by FEMA as to how the flood control measure will perform in a flood event.
(a) The applicable provisions of Sec. 65.2, 65.3, 65.4, 65.6, 65.8 and 65.10 shall also apply to FIRM revisions involving alluvial fan flooding.
(b) The provisions of Sec. 65.5 regarding map revisions based on fill and the provisions of part 70 of this chapter shall not apply to FIRM revisions involving alluvial fan flooding. In general, elevations of a parcel of land or a structure by fill or other means, will not serve as a basis for removing areas subject to alluvial fan flooding from an area of special food hazards.
(c) FEMA will credit on NFIP maps only major structural flood control measures whose design and construction are supported by sound engineering analyses which demonstrate that the measures will effectively eliminate alluvial fan flood hazards from the area protected by such measures. The provided analyses must include, but are not necessarily limited to, the following:
(1) Engineering analyses that quantify the discharges and volumes of water, debris, and sediment movement associated with the flood that has a one-percent probability of being exceeded in any year at the apex under current watershed conditions and under potential adverse conditions (e.g., deforestation of the watershed by fire). The potential for debris flow and sediment movement must be assessed using an engineering method acceptable to FEMA. The assessment should consider the characteristics and availability of sediment in the drainage basin above the apex and on the alluvial fan.
(2) Engineering analyses showing that the measures will accommodate the estimated peak discharges and volumes of water, debris, and sediment, as determined in accordance with paragraph (c)(1) of this section, and will withstand the associated hydrodynamic and hydrostatic forces.
(3) Engineering analyses showing that the measures have been designed to withstand the potential erosion and scour associated with estimated discharges.
(4) Engineering analyses or evidence showing that the measures will provide protection from hazards associated with the possible relocation of flow paths from other parts of the fan.
(5) Engineering analyses that assess the effect of the project on flood hazards, including depth and velocity of floodwaters and scour and sediment deposition, on other areas of the fan.

(6) Engineering analyses demonstrating that flooding from sources other than the fan apex, including local runoff, is either insignificant or has been accounted for in the design.

(d) Coordination. FEMA will recognize measures that are adequately designed and constructed, provided that: evidence is submitted to show that the impact of the measures on flood hazards in all areas of the fan (including those not protected by the flood control measures), and the design and maintenance requirements of the measures, were reviewed and approved by the impacted communities, and also by State and local agencies that have jurisdiction over flood control activities.

(e) Operation and maintenance plans and criteria. The requirements for operation and maintenance of flood control measures on areas subject to alluvial fan flooding shall be those specified under Sec. 65.10, paragraphs (c) and (d), when applicable.

(f) Certification requirements. Data submitted to support that a given flood control measure complies with the requirements set forth in paragraphs (c) (1) through (6) of this section must be certified by a registered professional engineer. Also, certified as-built plans of the flood control measures must be submitted. Certifications are subject to the definition given at Sec. 65.2.

(Approved by the Office of Management and Budget under control number 3067-0147)

[54 FR 33551, Aug. 15, 1989]

**§ 65.14 Remapping of areas for which local flood protection systems no longer provide base flood protection.**

(a) General. (1) This section describes the procedures to follow and the types of information FEMA requires to designate flood control restoration zones. A community may be eligible to apply for this zone designation if the Administrator determines that it is engaged in the process of restoring a flood protection system that was:

(i) Constructed using Federal funds;

(ii) Recognized as providing base flood protection on the community's effective FIRM; and

(iii) Decertified by a Federal agency responsible for flood protection design or construction.

(2) Where the Administrator determines that a community is in the process of restoring its flood protection system to provide base flood protection, a FIRM will be prepared that designates the temporary flood hazard areas as a flood control restoration zone (Zone AR). Existing special flood hazard areas shown on the community's effective FIRM that are further inundated by Zone AR flooding shall be designated as a ``dual" flood insurance rate zone, Zone AR/AE or AR/AH with Zone AR base flood elevations, and AE or AH with base flood elevations and Zone AR/AO with Zone AR base flood elevations and Zone AO with flood depths, or Zone AR/A with Zone AR base flood elevations and Zone A without base flood elevations.

(b) Limitations. A community may have a flood control restoration zone designation only once while restoring a flood protection system.

This limitation does not preclude future flood control restoration zone designations should a fully restored, certified, and accredited system become decertified for a second or subsequent time.

(1) A community that receives Federal funds for the purpose of designing or constructing, or both, the restoration project must complete restoration or meet the requirements of 44 CFR

61.12 within a specified period, not to exceed a maximum of 10 years from the date of submittal of the community's application for designation of a flood control restoration zone.

(2) A community that does not receive Federal funds for the purpose of constructing the restoration project must complete restoration within a specified period, not to exceed a maximum of 5 years from the date of submittal of the community's application for designation of a flood control restoration zone. Such a community is not eligible for the provisions of Sec.61.12. The designated restoration period may not be extended beyond the maximum allowable under this limitation.

(c) Exclusions. The provisions of these regulations do not apply in a coastal high hazard area as defined in 44 CFR 59.1, including areas that would be subject to coastal high hazards as a result of the decertification of a flood protection system shown on the community's effective FIRM as providing base flood protection.

(d) Effective date for risk premium rates. The effective date for any risk premium rates established for Zone AR shall be the effective date of the revised FIRM showing Zone AR designations.

(e) Application and submittal requirements for designation of a flood control restoration zone. A community must submit a written request to the Administrator, signed by the community's Chief Executive Officer, for a floodplain designation as a flood control restoration zone. The request must include a legislative action by the community

requesting the designation. The Administrator will not initiate any action to designate flood control restoration zones without receipt of the formal request from the community that complies with all requirements of this section. The Administrator reserves the right to request additional information from the community to support or further document the community's formal request for designation of a flood control restoration zone, if deemed necessary.

(1) At a minimum, the request from a community that receives Federal funds for the purpose of designing, constructing, or both, the restoration project must include:

(i) A statement whether, to the best of the knowledge of the community's Chief Executive Officer, the flood protection system is currently the subject matter of litigation before any Federal, State or local court or administrative agency, and if so, the purpose of that litigation;

(ii) A statement whether the community has previously requested a determination with respect to the same subject matter from the Administrator, and if so, a statement that details the disposition of such previous request;

(iii) A statement from the community and certification by a Federal agency responsible for flood protection design or construction that the existing flood control system shown on the effective FIRM was originally built using Federal funds, that it no longer provides base flood protection, but that it continues to provide protection from the flood having at least a 3percent chance of occurrence during any given year;

(iv) An official map of the community or legal description, with supporting documentation, that the community will adopt as part of its flood plain management measures, which designates developed areas as defined in Sec.59.1 and as further defined in Sec.60.3(f).

(v) A restoration plan to return the system to a level of base flood protection. At a minimum, this plan must:

(A) List all important project elements, such as acquisition of permits, approvals, and contracts and construction schedules of planned features;

(B) Identify anticipated start and completion dates for each element, as well as significant milestones and dates;

(C) Identify the date on which ``as built'' drawings and certification for the completed restoration project will be submitted. This date must provide for a restoration period not to exceed the maximum allowable restoration period for the flood protection system, or;

(D) Identify the date on which the community will submit a request for a finding of adequate progress that meets all requirements of Sec.61.12. This date may not exceed the maximum allowable restoration period for the flood protection system;

(vi) A statement identifying the local project sponsor responsible for restoration of the flood protection system;

(vii) A copy of a study, performed by a Federal agency responsible for flood protection design or construction in consultation with the local project sponsor, which demonstrates a Federal interest in restoration of the system and which deems that the flood protection system is restorable to a level of base flood protection.

(viii) A joint statement from the Federal agency responsible for flood protection design or construction involved in restoration of the flood protection system and the local project sponsor certifying that the design and construction of the flood control system involves Federal funds, and that the restoration of the flood protection system will provide base flood protection;

(2) At a minimum, the request from a community that receives no Federal funds for the purpose of constructing the restoration project must:

(i) Meet the requirements of Sec.65.14(e)(1)(i) through (iv);

(ii) Include a restoration plan to return the system to a level of base flood protection. At a minimum, this plan must:

(A) List all important project elements, such as acquisition of permits, approvals, and contracts and construction schedules of planned features;

(B) Identify anticipated start and completion dates for each element, as well as significant milestones and dates; and

(C) Identify the date on which ``as built'' drawings and certification for the completed restoration project will be submitted. This date must provide for a restoration period not to exceed the maximum allowable restoration period for the flood protection system;

(iii) Include a statement identifying the local agency responsible for restoration of the flood protection system;

(iv) Include a copy of a study, certified by registered Professional Engineer, that demonstrates that the flood protection system is restorable to provide protection from the base flood;

(v) Include a statement from the local agency responsible for restoration of the flood protection system certifying that the restored flood protection system will meet the applicable requirements of Part 65; and

(vi) Include a statement from the local agency responsible for restoration of the flood protection system that identifies the source of funds for the purpose of constructing the restoration project and a percentage of the total funds contributed by each source. The statement must demonstrate, at a minimum, that 100 percent of the total financial project cost of the completed flood protection system has been appropriated.

(f) Review and response by the Administrator. The review and response by the Administrator shall be in accordance with procedures specified in Sec. 65.9.

(g) Requirements for maintaining designation of a flood control restoration zone. During the restoration period, the community and the cost-sharing Federal agency, if any, must certify annually to the FEMA Regional Office having jurisdiction that the restoration will be completed in accordance with the restoration plan within the time period specified by the plan. In addition, the community and the cost-sharing Federal agency, if any, will update the restoration plan and will identify any permitting or construction problems that will delay the project completion from the restoration plan previously submitted to the Administrator. The FEMA Regional Office having jurisdiction will make an annual assessment and recommendation to the Administrator as to the viability of the restoration plan and will conduct periodic on-site inspections of the flood protection system under restoration.

(h) Procedures for removing flood control restoration zone designation due to adequate progress or complete restoration of the flood protection system. At any time during the restoration period:

(1) A community that receives Federal funds for the purpose of designing, constructing, or both, the restoration project shall provide written evidence of certification from a Federal agency having flood protection design or construction responsibility that the necessary improvements have been completed and that the system has been restored to provide protection from the base flood, or submit a request for a finding of adequate progress that meets all requirements of Sec.61.12. If the Administrator determines that adequate progress has been made, FEMA will revise the zone designation from a flood control restoration zone designation to Zone A99.

(2) After the improvements have been completed, certified by a Federal agency as providing base flood protection, and reviewed by FEMA, FEMA will revise the FIRM to reflect the completed flood control system.

(3) A community that receives no Federal funds for the purpose of constructing the restoration project must provide written evidence that the restored flood protection system meets the requirements of Part 65. A community that receives no Federal funds for the purpose of constructing the restoration project is not eligible for a finding of adequate progress under Sec.61.12.

(4) After the improvements have been completed and reviewed by FEMA, FEMA will revise the FIRM to reflect the completed flood protection system.

(i) Procedures for removing flood control restoration zone designation due to noncompliance with the restoration schedule or as a result of a finding that satisfactory progress is not being made to complete the restoration. At any time during the restoration period, should the Administrator determine that the restoration will not be completed in accordance with the time frame specified in the restoration plan, or that satisfactory progress is not being made to restore the flood protection system to provide complete flood protection in accordance with the restoration plan, the Administrator shall notify the community and the responsible Federal agency, in writing, of the determination, the reasons for that determination, and that the FIRM will be revised to remove the flood control restoration zone designation. Within thirty (30) days of such notice, the community may submit written information that provides assurance that the restoration will be completed in accordance with the time frame specified in the restoration plan, or that satisfactory progress is being made to restore complete protection in accordance with the restoration plan, or that, with reasonable certainty, the restoration will be completed within the maximum allowable restoration period. On the basis of this information the Administrator may suspend the decision to revise the FIRM to remove the flood control restoration zone designation. If the community does not submit any information, or if, based on a review of the information submitted, there is sufficient cause to find that the restoration will not be completed as provided for in the restoration plan, the Administrator shall revise the FIRM, in accordance with 44 CFR Part 67, and shall remove the flood control restoration zone designations and shall redesignate those areas as Zone A1-30, AE, AH,

AO, or A.
[62 FR 55717, Oct. 27, 1997]

**§ 65.15 List of communities submitting new technical data.**

This section provides a cumulative list of communities where modifications of the base flood elevation determinations have been made because of submission of new scientific or technical data. Due to the need for expediting the modifications, the revised map is already in effect and the appeal period commences on or about the effective date of the modified map. An interim rule, followed by a final rule, will list the revised map effective date, local repository and the name and address of the Chief Executive Officer of the community. The map(s) is (are) effective for both flood plain management and insurance purposes.

[51 FR 30317, Aug. 25, 1986. Redesignated at 53 FR 16279, May 6, 1988, and further redesignated at 54 FR 33551, Aug. 15, 1989. Redesignated at 59 FR 53599, Oct. 25, 1994]

Editorial Note: For references to FR pages showing lists of eligible communities, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

**§ 65.16 Standard Flood Hazard Determination Form and Instructions.**

(a) Section 528 of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 1365(a)) directs FEMA to develop a standard form for determining, in the case of a loan secured by improved real estate or a mobile home, whether the building or mobile home is located in an area identified by the Director as an area having special flood hazards and in which flood insurance under this title is available. The purpose of the form is to determine whether a building or mobile home is located within an identified Special Flood Hazard Area (SFHA), whether flood insurance is required, and whether federal flood insurance is available. Use of this form will ensure that required flood insurance coverage is purchased for structures located in an SFHA, and will assist federal entities for lending regulation in assuring compliance with these purchase requirements.

(b) The form is available by written request to Federal Emergency Management Agency, PO Box 2012, Jessup, MD 20794; ask for the Standard Flood Hazard Determination form. It is also available by fax-on-demand; call (202) 646-3362, form #23103. Finally, the form is available through the Internet at http://www.fema.gov/nfip/mpurfi.htm.

[63 FR 27857, May 21, 1998]

**§ 65.17 Review of determinations.**

This section describes the procedures that shall be followed and the types of information required by FEMA to review a determination of whether a building or manufactured home is located within an identified Special Flood Hazard Area (SFHA).

(a) General conditions. The borrower and lender of a loan secured by improved real estate or a manufactured home may jointly request that FEMA review a determination that the building or manufactured home is located in an identified SFHA. Such a request must be submitted within 45 days of the lender's notification to the borrower that the building or manufactured home is in the SFHA and that flood insurance is required. Such a request must be submitted jointly by the lender and the borrower and shall include the required fee and technical information related to the building or manufactured home. Elevation data will not be considered under the procedures described in this section.

(b) Data and other requirements. Items required for FEMA's review of a determination shall include the following:

(1) Payment of the required fee by check or money order, in U.S. funds, payable to the National Flood Insurance Program;

(2) A request for FEMA's review of the determination, signed by both the borrower and the lender;

(3) A copy of the lender's notification to the borrower that the building or manufactured home is in an SFHA and that flood insurance is required (the request for review of the determination must be postmarked within 45 days of borrower notification);

(4) A completed Standard Flood Hazard Determination Form for the building or manufactured home, together with a legible hard copy of all technical data used in making the determination; and

(5) A copy of the effective NFIP map (Flood Hazard Boundary Map (FHBM) or Flood Insurance Rate Map (FIRM)) panel for the community in which the building or manufactured home is located, with the building or manufactured home location indicated. Portions of the map panel may be submitted but shall include the area of the building or manufactured home in question together with the map panel title block, including effective date, bar scale, and north arrow.

(c) Review and response by FEMA. Within 45 days after receipt of a request to review a determination, FEMA will notify the applicants in writing of one of the following:
(1) Request submitted more than 45 days after borrower notification; no review will be performed and all materials are being returned;
(2) Insufficient information was received to review the determination; therefore, the determination stands until a complete submittal is received; or
(3) The results of FEMA's review of the determination, which shall include the following:
(i) The name of the NFIP community in which the building or manufactured home is located;
(ii) The property address or other identification of the building or manufactured home to which the determination applies;
(iii) The NFIP map panel number and effective date upon which the determination is based;
(iv) A statement indicating whether the building or manufactured home is within the Special Flood Hazard Area;
(v) The time frame during which the determination is effective.
[60 FR 62218, Dec. 5, 1995]

## PART 70--PROCEDURE FOR MAP CORRECTION

**Mapping Deficiencies Unrelated to Community - Wide Elevation Determinations**

Sec.
70.1 Purpose of part.
70.2 Definitions.
70.3 Right to submit technical information.
70.4 Review by the Director.
70.5 Letter of Map Amendment.
70.6 Distribution of Letter of Map Amendment.
70.7 Notice of Letter of Map Amendment.
70.8 Premium refund after Letter of Map Amendment.
70.9 Review of proposed projects.
Authority: 42 U.S.C. 4001 et seq.; Reorganization Plan No. 3 of 1978, 43 FR 41943, 3 CFR, 1978 Comp., p. 329; E.O. 12127 of Mar. 31, 1979, 44 FR 19367, 3 CFR, 1979 Comp., p. 376.

### § 70.1 Purpose of part.

The purpose of this part is to provide an administrative procedure whereby the Administrator will review the scientific or technical submissions of an owner or lessee of property who believes his property has been inadvertently included in designated A, AO, A130, AE, AH, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE, and V Zones, as a result of the transposition of the curvilinear line to either street or to other readily identifiable features. The necessity for this part is due in part to the technical difficulty of accurately delineating the curvilinear line on either an FHBM or FIRM. These procedures shall not apply when there has been any alteration of topography since the effective date of the first NFIP map (i.e., FHBM or FIRM) showing the property within an area of special flood hazard. Appeals in such circumstances are subject to the provisions of part 65 of this subchapter.
[62 FR 55718, Oct. 27, 1997]

### § 70.2 Definitions.

The definitions set forth in part 59 of this subchapter are applicable to this part.
[41 FR 46991, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979]

### § 70.3 Right to submit technical information.

(a) Any owner or lessee of property (applicant) who believes his property has been inadvertently included in a designated A, AO, A1-30, AE, AH, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE, and V Zones on a FHBM or a FIRM, may submit scientific or technical information to the Administrator for the Administrator's review.
(b) Scientific and technical information for the purpose of this part may include, but is not limited to the following:
(1) An actual copy of the recorded plat map bearing the seal of the appropriate recordation official (e.g. County Clerk, or Recorder of Deeds) indicating the official recordation and proper citation (Deed or Plat Book Volume and Page Numbers), or an equivalent identification where annotation of the deed or plat book is not the practice.
(2) A topographical map showing (i) ground elevation contours in relation to the National Geodetic Vertical Datum (NVGD) of 1929, (ii) the total area of the property in question, (iii) the location of the structure or structures located on the property in question, (iv) the elevation of the lowest adjacent grade to a structure or structures and (v) an indication of the curvilinear line which represents the area subject to inundation by a base flood. The curvilinear line should be based upon information provided by any appropriate authoritative source, such as a Federal Agency, the appropriate state agency (e.g.

Department of Water Resources), a County Water Control District, a County or City Engineer, a Federal Emergency Management Agency Flood Insurance Study, or a determination by a Registered Professional Engineer
(3) A copy of the FHBM or FIRM indicating the location of the property in question;
(4) A certification by a Registered Professional Engineer or Licensed Land Surveyor that the lowest grade adjacent to the structure is above the base flood elevation.
[41 FR 46991, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44544 and 44553, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984; 50 FR 36028, Sept. 4, 1985; 51 FR 30317, Aug. 25, 1986; 53 FR 16280, May 6, 1988; 59 FR 53601, Oct. 25, 1994; 62 FR 55719, Oct. 27, 1997]

**§ 70.4 Review by the Director.**
The Director, after reviewing the scientific or technical information submitted under the provisions of Sec. 70.3, shall notify the applicant in writing of his/her determination within 60 days after we receive the applicant's scientific or technical information that we have compared either the ground elevations of an entire legally defined parcel of land or the elevation of the lowest adjacent grade to a structure with the elevation of the base flood and that:
(a) The property is within a designated A, A0, A1-30, AE, AH, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, V0, V1-30, VE, or V Zone, and will state the basis of such determination; or
(b) The property should not be within a designated A, A0, A1-30, AE, AH, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A,V0, V1-30, VE, or V Zone and that we will modify the FHBM or FIRM accordingly; or
(c) The property is not within a designated A, A0, A1-30, AE, AH, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A,V0, V1-30, VE, or V Zone as shown on the FHBM or FIRM and no modification of the FHBM or FIRM is necessary; or(d) We need an additional 60 days to make a determination.
[66 FR 33900, June 26, 2001]

**§ 70.5 Letter of Map Amendment.**
Upon determining from available scientific or technical information that a FHBM or a FIRM requires modification under the provisions of Sec. 70.4(b), the Administrator shall issue a Letter of Map Amendment which shall state:
(a) The name of the Community to which the map to be amended was issued;
(b) The number of the map;
(c) The identification of the property to be excluded from a designated A, AO, A1-30, AE, AH, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE, or V Zone.
[41 FR 46991, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44553, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984; 50 FR 36028, Sept. 4, 1985; 59 FR 53601, Oct. 25, 1994; 62 FR 55719, Oct. 27, 1997]

**§ 70.6 Distribution of Letter of Map Amendment.**
(a) A copy of the Letter of Map Amendment shall be sent to the applicant who submitted scientific or technical data to the Administrator.
(b) A copy of the Letter of Map Amendment shall be sent to the local map repository with instructions that it be attached to the map which the Letter of Map Amendment is amending.
(c) A copy of the Letter of Map Amendment shall be sent to the map repository in the state with instructions that it be attached to the map which it is amending.
(d) A copy of the Letter of Map Amendment will be sent to any community or governmental unit that requests such Letter of Map Amendment.
(e) [Reserved]
(f) A copy of the Letter of Map Amendment will be maintained by the Agency in its community case file.
[41 FR 46991, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979, as amended at 48 FR 44544 and 44553, Sept. 29, 1983; 49 FR 4751, Feb. 8, 1984]

**§ 70.7 Notice of Letter of Map Amendment.**
(a) The Administrator, shall not publish a notice in the Federal Register that the FIRM for a particular community has been amended by letter determination pursuant to this part unless such amendment includes alteration or change of base flood elevations established pursuant to part 67. Where no change of base flood elevations has occurred, the Letter of Map Amendment provided under Sec. 70.5 and 70.6 serves to inform the parties affected.
(b) [Reserved] Editorial Note: For a list of communities issued under this section and not carried in the CFR see the List of CFR Sections Affected, which appears in the Finding Aids Section of the printed volume and on GPO Access.

**§ 70.8 Premium refund after Letter of Map Amendment.**

A Standard Flood Insurance Policyholder whose property has become the subject of a Letter of Map Amendment under this part may cancel the policy within the current policy year and receive a premium refund under the conditions set forth in Sec. 62.5 of this subchapter. [41 FR 46991, Oct. 26, 1976. Redesignated at 44 FR 31177, May 31, 1979]

**§ 70.9 Review of proposed projects.**

An individual who proposes to build one or more structures on a portion of property that may be included inadvertently in a Special Flood Hazard Area (SFHA) may request FEMA's comments on whether the proposed structure(s), if built as proposed, will be in the SFHA. FEMA's comments will be issued in the form of a letter, termed a Conditional Letter of Map Amendment. The data required to support such requests are the same as those required for final Letters of Map Amendment in accordance with Sec. 70.3, except as-built certification is not required and the requests shall be accompanied by the appropriate payment, in accordance with 44 CFR part 72. All such requests for CLOMAs shall be submitted to the FEMA Regional Office servicing the community's geographic area or to the FEMA Headquarters Office in Washington, DC.

[62 FR 5736, Feb. 6, 1997]

# APPENDIX F: FEMA FORMS

This Appendix includes copies of the following certificates that are mentioned in the Study Course and used in implementing your floodplain management ordinances:

- FEMA Form 81-31, Elevation Certificate and Instructions
- FEMA Form 81-65, Floodproofing Certificate

The following FEMA forms may be of interest to local officials, but are not included in this Appendix:

- FEMA Form 81-92, MT-EZ, Application Form for Single Residential Lot or Structure Amendments to National Flood Insurance Program Maps;
- FEMA Form 81-87, MT-1, Application Forms for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill;
- FEMA Form 81-89, MT-2, Application Forms for Conditional Letters of Map Revision and Letters of Map Revision; and
- Standard Flood Hazard Determination form.

Current copies of all of these certificates and forms can be obtained from the following sources:

- They may be downloaded from FEMA's website at http://www.fema.gov/nfip/forms.shtm;
- They are available on the CD-ROM version of the *National Flood Insurance Program (NFIP) Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials*;
- You may request the forms by calling the FEMA Map Assistance Center (FMAC) toll-free at 1-877-FEMA-MAP (1-877-336-2627); and
- You may request the forms electronically at femamapspecialist@patlive.com.

While some of the forms may have passed their expiration dates, they are still current and should still be used.

They may be reproduced for local use.

FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM

O.M.B. No. 3067-0077
Expires December 31, 2005

# ELEVATION CERTIFICATE

**Important: Read the instructions on pages 1 - 7.**

## SECTION A - PROPERTY OWNER INFORMATION

For Insurance Company Use:
Policy Number
Company NAIC Number

BUILDING OWNER'S NAME

BUILDING STREET ADDRESS (Including Apt., Unit, Suite, and/or Bldg. No.) OR P.O. ROUTE AND BOX NO.

CITY | STATE | ZIP CODE

PROPERTY DESCRIPTION (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)

BUILDING USE (e.g., Residential, Non-residential, Addition, Accessory, etc. Use a Comments area, if necessary.)

LATITUDE/LONGITUDE (OPTIONAL) ( ##° - ##' - ##.##" or ##.#####°)
HORIZONTAL DATUM: ☐ NAD 1927 ☐ NAD 1983
SOURCE: ☐ GPS (Type): ☐ USGS Quad Map ☐ Other:

## SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

| B1. NFIP COMMUNITY NAME & COMMUNITY NUMBER | B2. COUNTY NAME | B3. STATE |
|---|---|---|
| | | |

| B4. MAP AND PANEL NUMBER | B5. SUFFIX | B6. FIRM INDEX DATE | B7. FIRM PANEL EFFECTIVE/REVISED DATE | B8. FLOOD ZONE(S) | B9. BASE FLOOD ELEVATION(S) (Zone AO, use depth of flooding) |
|---|---|---|---|---|---|
| | | | | | |

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in B9.
☐ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other (Describe):
B11. Indicate the elevation datum used for the BFE in B9: ☐ NGVD 1929 ☐ NAVD 1988 ☐ Other (Describe):
B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☐ No Designation Date

## SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☐ Finished Construction
*A new Elevation Certificate will be required when construction of the building is complete.
C2. Building Diagram Number _ (Select the building diagram most similar to the building for which this certificate is being completed - see pages 6 and 7. If no diagram accurately represents the building, provide a sketch or photograph.)
C3. Elevations – Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO
Complete Items C3.-a-i below according to the building diagram specified in Item C2. State the datum used. If the datum is different from the datum used for the BFE in Section B, convert the datum to that used for the BFE. Show field measurements and datum conversion calculation. Use the space provided or the Comments area of Section D or Section G, as appropriate, to document the datum conversion.
Datum Conversion/Comments
Elevation reference mark used Does the elevation reference mark used appear on the FIRM? ☐ Yes ☐ No

☐ a) Top of bottom floor (including basement or enclosure) ___.__ ft. (m)
☐ b) Top of next higher floor ___.__ ft. (m)
☐ c) Bottom of lowest horizontal structural member (V zones only) ___.__ ft. (m)
☐ d) Attached garage (top of slab) ___.__ ft. (m)
☐ e) Lowest elevation of machinery and/or equipment servicing the building (Describe in a Comments area) ___.__ ft. (m)
☐ f) Lowest adjacent (finished) grade (LAG) ___.__ ft. (m)
☐ g) Highest adjacent (finished) grade (HAG) ___.__ ft. (m)
☐ h) No. of permanent openings (flood vents) within 1 ft. above adjacent grade
☐ i) Total area of all permanent openings (flood vents) in C3h sq. in. (sq. cm)

License Number, Embossed Seal, Signature, and Date

## SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information.
*I certify that the information in Sections A, B, and C on this certificate represents my best efforts to interpret the data available.*
*I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.*

CERTIFIER'S NAME | LICENSE NUMBER

TITLE | COMPANY NAME

ADDRESS | CITY | STATE | ZIP CODE

FEMA Form 81-31, January 2003 | See reverse side for continuation. | Replaces all previous editions

SIGNATURE | DATE | TELEPHONE

| IMPORTANT: In these spaces, copy the corresponding information from Section A. | | | For Insurance Company Use: |
|---|---|---|---|
| BUILDING STREET ADDRESS (Including Apt., Unit, Suite, and/or Bldg. No.) OR P.O. ROUTE AND BOX NO. | | | Policy Number |
| CITY | STATE | ZIP CODE | Company NAIC Number |

**SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION (CONTINUED)**

Copy both sides of this Elevation Certificate for (1) community official, (2) insurance agent/company, and (3) building owner.

COMMENTS

☐ Check here if attachments

**SECTION E - BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED) FOR ZONE AO AND ZONE A (WITHOUT BFE)**

For Zone AO and Zone A (without BFE), complete Items E1 through E4. If the Elevation Certificate is intended for use as supporting information for a LOMA or LOMR-F, Section C must be completed.

E1. Building Diagram Number ___ (Select the building diagram most similar to the building for which this certificate is being completed – see pages 6 and 7. If no diagram accurately represents the building, provide a sketch or photograph.)

E2. The top of the bottom floor (including basement or enclosure) of the building is ___ ft. (m) ___ in. (cm) ☐ above or ☐ below (check one) the highest adjacent grade. (Use natural grade, if available).

E3. For Building Diagrams 6-8 with openings (see page 7), the next higher floor or elevated floor (elevation b) of the building is ___ ft. (m) ___ in. (cm) above the highest adjacent grade. Complete items C3.h and C3.i on front of form.

E4. The top of the platform of machinery and/or equipment servicing the building is ___ ft. (m) ___ in. (cm) ☐ above or ☐ below (check one) the highest adjacent grade. (Use natural grade, if available).

E5. For Zone AO only: If no flood depth number is available, is the top of the bottom floor elevated in accordance with the community's floodplain management ordinance?
☐ Yes ☐ No ☐ Unknown. The local official must certify this information in Section G.

**SECTION F - PROPERTY OWNER (OR OWNER'S REPRESENTATIVE) CERTIFICATION**

The property owner or owner's authorized representative who completes Sections A, B, C (Items C3.h and C3.i only), and E for Zone A (without a FEMA-issued or community-issued BFE) or Zone AO must sign here. *The statements in Sections A, B, C, and E are correct to the best of my knowledge.*

PROPERTY OWNER'S OR OWNER'S AUTHORIZED REPRESENTATIVE'S NAME

| ADDRESS | CITY | STATE | ZIP CODE |
|---|---|---|---|
| SIGNATURE | DATE | TELEPHONE | |

COMMENTS

☐ Check here if attachments

**SECTION G - COMMUNITY INFORMATION (OPTIONAL)**

The local official who is authorized by law or ordinance to administer the community's floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. Complete the applicable item(s) and sign below.

G1. ☐ The information in Section C was taken from other documentation that has been signed and embossed by a licensed surveyor, engineer, or architect who is authorized by state or local law to certify elevation information. (Indicate the source and date of the elevation data in the Comments area below.)

G2. ☐ A community official completed Section E for a building located in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.

G3. ☐ The following information (Items G4-G9) is provided for community floodplain management purposes.

| G4. PERMIT NUMBER | G5. DATE PERMIT ISSUED | G6. DATE CERTIFICATE OF COMPLIANCE/OCCUPANCY ISSUED |
|---|---|---|

G7. This permit has been issued for: ☐ New Construction ☐ Substantial Improvement

G8. Elevation of as-built lowest floor (including basement) of the building is: ___ . ___ ft. (m) Datum: ____

G9. BFE or (in Zone AO) depth of flooding at the building site is: ___ . ___ ft. (m) Datum: ____

| LOCAL OFFICIAL'S NAME | TITLE |
|---|---|
| COMMUNITY NAME | TELEPHONE |
| SIGNATURE | DATE |

COMMENTS

FEMA Form 81-31, January 2003 Replaces all previous editions

FEMA

# FEDERAL EMERGENCY MANAGEMENT AGENCY

# NATIONAL FLOOD INSURANCE PROGRAM

# ELEVATION CERTIFICATE

**AND**

## INSTRUCTIONS

# NATIONAL FLOOD INSURANCE PROGRAM
# ELEVATION CERTIFICATE

## PAPERWORK BURDEN DISCLOSURE NOTICE

## FEMA Form 81-31

The public reporting burden for this form is estimated to be 3.0 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472, Paperwork Reduction Project (3067-0077). NOTE: Please do not send your completed form to the above address.

## PURPOSE OF THE ELEVATION CERTIFICATE

The Elevation Certificate is an important administrative tool of the National Flood Insurance Program (NFIP). It is to be used to provide elevation information necessary to ensure compliance with community floodplain management ordinances, to determine the proper insurance premium rate, and to support a request for a Letter of Map Amendment or Revision (LOMA or LOMR-F).

The Elevation Certificate is required in order to properly rate post-FIRM buildings, which are buildings constructed after publication of the Flood Insurance Rate Map (FIRM), for flood insurance Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/AE, AR/A1-A30, AR/AH, and AR/AO. The Elevation Certificate is not required for pre-FIRM buildings unless the building is being rated under the optional post-FIRM flood insurance rules.

As part of the agreement for making flood insurance available in a community, the NFIP requires the community to adopt a floodplain management ordinance that specifies minimum requirements for reducing flood losses. One such requirement is for the community to obtain the elevation of the lowest floor (including basement) of all new and substantially improved buildings and maintain a record of such information. The Elevation Certificate provides a way for a community to comply with this requirement.

Use of this certificate does not provide a waiver of the flood insurance purchase requirement. Only a LOMA or LOMR-F from the Federal Emergency Management Agency (FEMA) can amend the FIRM and remove the Federal mandate for a lending institution to require the purchase of flood insurance. However, the lending institution has the option of requiring flood insurance even if a LOMA/LOMR-F has been issued by FEMA. The Elevation Certificate may be used to support a LOMA or LOMR-F request. Lowest floor and lowest adjacent grade elevations certified by a surveyor or engineer will be required if the certificate is used to support a LOMA or LOMR-F request.

This certificate is used only to certify building elevations. A separate certificate is required for floodproofing. Under the NFIP, non-residential buildings can be floodproofed up to or above the Base Flood Elevation (BFE). A floodproofed building is a building that has been designed and constructed to be watertight (substantially impermeable to floodwaters) below the BFE. Floodproofing of residential buildings is not permitted under the NFIP unless FEMA has granted the community an exception for

residential floodproofed basements. The community must adopt standards for design and construction of floodproofed basements before FEMA will grant a basement exception. For both floodproofed non-residential buildings and residential floodproofed basements in communities that have been granted an exception by FEMA, a floodproofing certificate is required.

## INSTRUCTIONS FOR COMPLETING THE ELEVATION CERTIFICATE

The Elevation Certificate is to be completed by a land surveyor, engineer, or architect who is authorized by law to certify elevation information when elevation information is required for Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/AE, AR/A1-A30, AR/AH, or AR/AO. Community officials who are authorized by law or ordinance to provide floodplain management information may also complete this form. For Zones AO and A (without BFE), a community official, a property owner, or an owner's representative may provide information on this certificate, unless the elevations are intended for use in supporting a LOMA or LOMR-F. Certified elevations must be included if the purpose of completing the Elevation Certificate is to obtain a LOMA or LOMR-F.

In Puerto Rico only, elevations for building information and flood hazard information may be entered in meters.

## SECTION A - PROPERTY OWNER INFORMATION

This section identifies the building, its location, and its owner. Enter the name(s) of the building owner(s), the building's complete street address, and the lot and block number. If the building's address is different from the owner's address, enter the address of the building being certified. If the address is a rural route or a Post Office box number, enter the lot and block numbers, the tax parcel number, the legal description, or an abbreviated location description based on distance and direction from a fixed point of reference. For the purposes of this certificate, "building" means both a building and a manufactured (mobile) home.

A map may be attached to this certificate to show the location of the building on the property. A tax map, FIRM, or detailed community map is appropriate. If no map is available, provide a sketch of the property location, and the location of the building on the property. Include appropriate landmarks such as nearby roads, intersections, and bodies of water. For building use, indicate whether the building is residential, non-residential, an addition to an existing residential or non-residential building, an accessory building (e.g., garage), or other type of structure. Use the Comments area of Section F if needed.

If latitude and longitude data are available, enter them in degrees, minutes, and seconds, or in decimal degrees, taken at the center of the front of the building. Enter arc seconds to two decimal places. Indicate the horizontal datum and the source of the measurement data (for example, taken with GPS, scaled from a USGS Quad Map, etc.).

## SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

Complete the Elevation Certificate on the basis of the FIRM in effect at the time of the certification.

The information for Section B is obtained by reviewing the FIRM panel that includes the building's location. Information about the current FIRM and a pamphlet titled "Guide to Flood Maps" are available from the Federal Emergency Management Agency (FEMA) website at http://www.fema.gov or by calling 1-800-427-4661. If a Letter of Map Amendment (LOMA) or Letter of Map Revision (LOMR-F) has been issued by FEMA, please provide the letter date and case number in the Comments area of Section D or Section G, as appropriate.

**Item B1.** NFIP Community Name & Community Number. Enter the complete name of the community in which the building is located and the associated 6-digit community number. For a building that is in an area that has been annexed by one community but is shown on another community's FIRM, enter the community name and 6-digit number of the annexing community. For a newly incorporated community, use the name and 6-digit number of the new community. Under the NFIP, a "community" is any State or area or political subdivision thereof, or any Indian tribe or authorized native organization, which has authority to adopt and enforce floodplain management regulations for the areas within its jurisdiction. To determine the current community number, see the NFIP *Community Status Book*, available on FEMA's website at http://www.fema.gov or by calling 1-800-427-4661.

Item B2. County Name. Enter the name of the county or counties in which the community is located. For an unincorporated area of a county, enter "unincorporated area." For an independent city, enter "independent city."

Item B3. State. Enter the 2-letter state abbreviation (for example, VA, TX, CA).

Item B4. Map and Panel Number. Enter the 10-digit number shown on the FIRM panel where the building or manufactured (mobile) home is located. The first six digits will not match the NFIP community number: 1) when the sixth digit is a "C," in which case the FIRM panel is in a countywide format; or 2) when one community has annexed land from another community but the FIRM panel has not been updated to reflect this annexation. If the sixth digit is a "C," it is followed by a four-digit map number. For maps not in countywide format, enter the "community panel number" shown on the FIRM.

Item B5. Suffix. Enter the suffix letter shown on the FIRM panel that includes the building's location.

Item B6. FIRM Index Date. Enter the effective date or map revised date shown on the FIRM Index.

Item B7. FIRM Panel Effective/Revised Date. Enter the map effective date or the map revised date shown on the FIRM panel. This will be the latest of all dates shown on the map. The current FIRM panel effective date can be determined by calling 1-800-427-4661.

Item B8. Flood Zone(s). Enter the flood zone, or flood zones, in which the building is located. All flood zones containing the letter "A" or "V" are considered Special Flood Hazard Areas. The flood zones are A, AE, A1-A30, V, VE, V1-V30, AH, AO, AR, AR/A, AR/AE, AR/A1-A30, AR/AH, and AR/AO. Each flood zone is defined in the legend of the FIRM panel on which it appears.

Item B9. Base Flood Elevation(s). Using the appropriate Flood Insurance Study (FIS) Profile, Flood Elevation Table, or FIRM panel, locate the property and enter the BFE (or base flood depth) of the building site. If the building is located in more than one flood zone in Item B8., list all appropriate BFEs in Item B9. BFEs are shown on a FIRM or FIS Profile for Zones A1-A30, AE, AH, V1-V30, VE, AR, AR/A, AR/AE, AR/A1-A30, AR/AH, and AR/AO; flood depth numbers are shown for Zone AO. Use the AR BFE if the building is located in any of Zones AR/A, AR/AE, AR/A1-A30, AR/AH, or AR/AO. In A or V zones where BFEs are not provided on the FIRM, the community may have established BFEs or obtained BFE data from other sources. For subdivisions and other developments of more than 50 lots or 5 acres, establishment of BFEs is required by the community's floodplain management ordinance. If the BFE is obtained from another source, enter the BFE in Item B9.

Item B10. Indicate the source of the BFE that you entered in Item B9.

Item B11. Indicate the elevation datum to which the elevations on the applicable FIRM are referenced.

**Item B12**. Indicate whether the building is located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA). Federal flood insurance is prohibited in designated CBRS areas for buildings or manufactured (mobile) homes built or substantially improved after the date of the CBRS designation. An information sheet explaining CBRS areas may be obtained on FEMA's website at http://www.fema.gov or by calling 1-800-427-4661.

## SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

Complete Section C if the building is located in any of Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/AE, AR/A1-A30, AR/AH, or AR/AO, or if this certificate is being used to support a LOMA or LOMR-F. If the building is located in Zone AO or Zone A (without BFE), complete Section E instead. To ensure that all required elevations are obtained, it may be necessary to enter the building (for instance, if the building has a basement or sunken living room, split-level construction, or machinery and equipment).

Surveyors may not be able to gain access to some crawl spaces to shoot the elevation of the crawl space floor. If access to the crawl space cannot be gained, use the following guidance:

- Use a yardstick or tape measure to measure the floor height to the "next higher floor," and then subtract the crawl space height from the elevation of the "next higher floor."
- Contact the local floodplain administrator of the community that the building is located in. The community may have documentation of the elevation of the crawl space floor as part of the permit issued for the building.
- If the property owner has documentation or knows the height of the crawl space floor to the next higher floor, try to verify this by looking inside the crawl space through any openings or vents.

In all three cases, provide the elevation in the Comments area and a brief description of how the elevation was obtained.

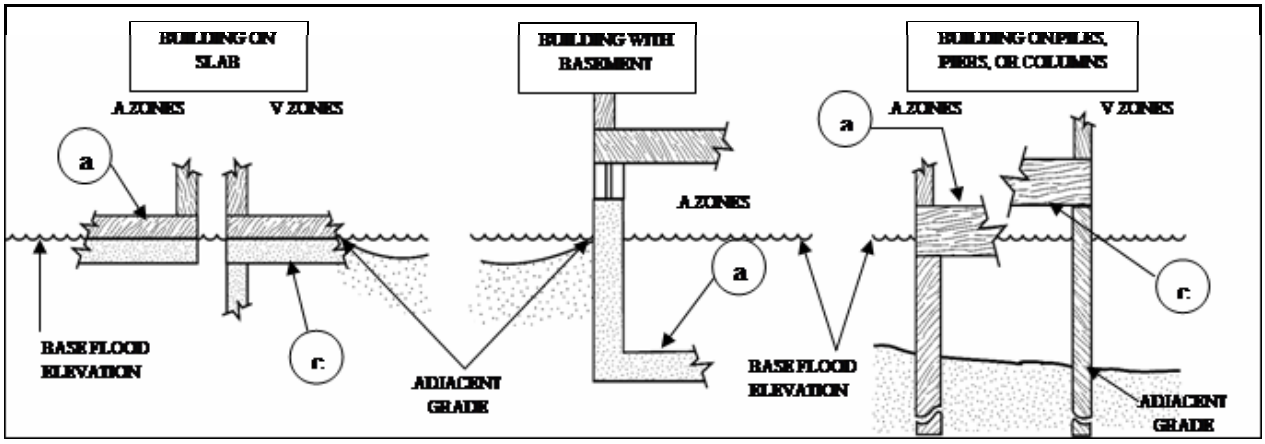
**Item C1.** Indicate whether the elevations to be entered in this section are based on construction drawings, a building under construction, or finished construction. For either of the first two choices, a post-construction Elevation Certificate will be required when construction is complete. If the building is under construction, include only those elevations that can be surveyed in Items C3.a-g. Use the Comments area to provide elevations obtained from the construction plans or drawings. Select "finished construction" only when all machinery and/or equipment—furnaces, hot water heaters, heat pumps, air conditioners, and elevators and their associated equipment—have been installed and the grading around the building is completed.

**Item C2.** Select the diagram on pages 6 and 7 that best represents the building. Then enter the diagram number and use the diagram to identify and determine the appropriate elevations requested in Items C3.a-g. If you are unsure of the correct diagram, select the diagram that most closely resembles the building being certified, or provide a sketch or photograph of the building and enter all elevations in Items C3.a-g.

**Item C3.** Indicate whether the elevation reference mark (benchmark) used during the field survey is an elevation mark on the FIRM. If it is not, indicate the source and datum for the elevation. Vertical

control benchmarks other than those shown on the FIRM are acceptable for elevation determinations. Show the conversion from the field survey datum used to the datum used for the BFE(s) entered in Item B9. All elevations for the certificate must be referenced to the datum on which the BFE is based. Show the datum conversion, if applicable, in this section or in the Comments area of Section D. For property experiencing ground subsidence, the most recently adjusted reference mark elevations must be used for determining building elevations. However, when subsidence is involved, the BFE should not be adjusted. Enter elevations in Items C3.a-g to the nearest tenth of a foot (nearest tenth of a meter, in Puerto Rico).

**Items C3.a-d.** Enter the building elevations (excluding the attached garage) indicated by the selected building diagram (Item C2.) in Items C3.a-c. If there is an attached garage, enter the elevation for top of attached garage slab in Item C3.d. (Because elevation for top of attached garage slab is self-explanatory, attached garages are not illustrated in the diagrams.) If the building is located in a V zone on the FIRM, complete Item C3.c. If the flood zone cannot be determined, enter elevations for all of Items C3.a-g. For buildings in A zones, elevations a, b, d, and e should be measured at the top of the floor. For buildings in V zones, elevation c must be measured at the bottom of the lowest horizontal structural member of the floor (see drawing below). For buildings elevated on a crawl space, Diagram 8, enter the elevation of the top of the crawl space floor in Item C3.a, whether or not the crawl space has openings (flood vents). *If any item does not apply to the building, enter "N/A" for not applicable.*




**Item C3.e**. Enter the lowest elevation of machinery and/or equipment—furnaces, hot water heaters, heat pumps, air conditioners, and elevators and their associated equipment—in an attached garage or enclosure or on an open utility platform that provides utility services for the building. If the machinery and/or equipment is mounted to a wall, pile, etc., enter the platform elevation of the machinery and/or equipment. Indicate machinery/equipment type in the Comments area of Section D or Section G, as appropriate. *If this item does not apply to the building, enter "N/A" for not applicable.*

**Items C3.f-g**. Adjacent grade is defined as the elevation of the ground, sidewalk, patio slab, or deck support immediately next to the building. If the certificate is to be used for a LOMA or LOMR-F, provide in the Comments area the lowest adjacent grade elevation measured at the deck support or stairs if that elevation is lower than the building's lowest adjacent grade. For Zone AO, use the natural grade elevation, if available. This measurement must be to the nearest tenth of a foot (nearest tenth of a meter, in Puerto Rico) if this certificate is being used to support a request for a LOMA or LOMR-F.

**Items C3.h-i**. Enter the number of permanent openings (flood vents) in the walls supporting the building, including the attached garage, that are no higher than 1.0 foot above the adjacent grade. Determine the total area of all such openings in square inches (square cm, in Puerto Rico), and enter the

total in Item C3.i. If the building has no permanent openings (flood vents) within 1.0 foot above adjacent grade, enter "0" (zero) for each of Items C3.h and C3.i. Enter in the Comments area whether the openings are on the foundation walls of the building and/or on the walls of the garage.

## SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

Complete as indicated. This section of the Elevation Certificate may be signed by only a land surveyor, engineer, or architect who is authorized by law to certify elevation information. Place embossed seal and signature in the box next to elevations in Section C. A flat stamp is acceptable only in states that do not authorize use of an embossed seal over the signature of a professional. You are certifying that the information in Sections A, B, and C on this certificate represents your best efforts to interpret the data available and that you understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001. Use the Comments area of Section D, on the back of the certificate, to provide datum, elevation, or other relevant information not specified on the front.

## SECTION E - BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED) FOR ZONE AO & ZONE A (WITHOUT BFE)

Complete Section E if the building is located in Zone AO or Zone A (without BFE). Otherwise, complete Section C instead.

**Item E1.** Select the diagram on pages 6 and 7 that best represents the building; then enter the diagram number. If you are unsure of the correct diagram, select the diagram that most closely resembles the building, or provide a sketch or photograph. Explain in the Comments area if the measurement provided under Item E.2, E.3, or E.4 is based on the "natural grade."

**Item E2.** Enter the height in feet and inches (meters and centimeters, in Puerto Rico) of the top of the bottom floor (as indicated in the applicable diagram) above or below the highest adjacent grade (HAG). For post-FIRM buildings in Zone AO, the community's floodplain management ordinance requires that this value equal or exceed the base flood depth on the FIRM. Buildings in Zone A (without BFE) may qualify for a lower insurance rate if an engineered BFE is developed at the site.

**Item E3.** For Building Diagrams 6-8 with proper openings (see page 7), enter the height in feet and inches (meters and centimeters, in Puerto Rico) of the next higher floor or elevated floor (as indicated in the applicable diagram) above the highest adjacent grade (HAG). Be sure that you have completed Items C3.h and C3.i on the front of the form to show the number of permanent openings (flood vents) within 1 foot above adjacent grade and the total area of the openings.

**Item E4**. Enter the height in feet and inches, in relation to the highest adjacent grade next to the building, of the platform that supports the machinery and/or equipment servicing the building. Indicate machinery/equipment type in the Comments area of Section E. *If this item does not apply to the building, enter "N/A" for not applicable.*

**Item E5.** For those communities where this base flood depth is not available, the community will need to determine whether the top of the bottom floor is elevated in accordance with the community's floodplain management ordinance.

## SECTION F - PROPERTY OWNER (OR OWNER'S REPRESENTATIVE) CERTIFICATION

Complete as indicated. This section is provided for certification of measurements taken by a property owner or property owner's representative when responding to Sections A, B, C (Items C3.h and C3.i only), and E. The address entered in this section must be the actual mailing address of the property owner or property owner's representative who provided the information on the certificate.

## SECTION G - COMMUNITY INFORMATION (OPTIONAL)

Complete as indicated. The community official who is authorized by law or ordinance to administer the community's floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. If the authorized community official completes Sections C, E, or G, complete the appropriate item(s) and sign this section.

Check **Item G1.** if Section C is completed with elevation data from other documentation, including elevations obtained from the Community Rating System Elevation Software, that has been signed and embossed by a licensed surveyor, engineer, or architect who is authorized by law to certify elevation information. Indicate the source of the elevation data and the date obtained in the Comments area of Section G. If you are both a community official and a licensed land surveyor, engineer, or architect authorized by law to certify elevation information, and you performed the actual survey for a building in Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/A1-A30, AR/AE, AR/AH, or AR/AO, you must also complete Section D.

Check **Item G2.** if information is entered in Section E by the community for a building in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.

Check **Item G3.** if the information in Items G4-G9 has been completed for community floodplain management purposes to document the as-built lowest floor elevation of the building. Section C of the Elevation Certificate records the elevation of various building components but does not determine the lowest floor of the building or whether the building, as constructed, complies with the community's floodplain management ordinance. This must be done by the community. Items G4-G9 provide a way to document these determinations.

**Item G4.** Permit Number. Enter the permit number or other identifier to key the Elevation Certificate to the permit issued for the building.

**Item G5.** Date Permit Issued. Enter the date the permit was issued for the building.

**Item G6.** Date Certificate of Compliance Issued. Enter the date that the Certificate of Compliance or Occupancy or similar written official documentation of as-built lowest floor elevation was issued by the community as evidence that all work authorized by the floodplain development permit has been completed in accordance with the community's floodplain management laws or ordinances.

**Item G7.** New Construction or Substantial Improvement. Check the applicable box. "Substantial Improvement" means any reconstruction, rehabilitation, addition, or other improvement of a building, the cost of which equals or exceeds 50 percent of the market value of the building before the start of construction of the improvement. The term includes buildings that have incurred substantial damage, regardless of the actual repair work performed.

**Item G8.** As-built lowest floor elevation. Enter the elevation of the lowest floor (including basement) when the construction of the building is completed and a final inspection has been made to confirm that the building is built in accordance with the permit, the approved plans, and the community's floodplain management laws or ordinances. Indicate the elevation datum used.

**Item G9.** BFE. Using the appropriate FIRM panel, FIS, or other data source, locate the property and enter the BFE (or base flood depth) of the building site. Indicate the elevation datum used.

Enter your name, title, and telephone number, and the name of the community. Sign and enter the date in the appropriate blanks.

The following eight diagrams illustrate various types of buildings. Compare the features of the building being certified with the features shown in the diagrams and select the diagram most applicable. Enter the diagram number in Item C2. and the elevations in Items C3.a-C3.g.

In A zones, the floor elevation is taken at the top finished surface of the floor indicated; in V zones, the floor elevation is taken at the bottom of the lowest horizontal structural member (see drawing in instructions for Section C).

**DIAGRAM 5**

**All buildings elevated on piers, posts, piles, columns, or parallel shear walls. No obstructions below the elevated floor.**

**Distinguishing Feature –** For all zones, the area below the elevated floor is open, with no obstruction to flow of flood waters (open lattice work and/or readily removable insect screening is permissible).

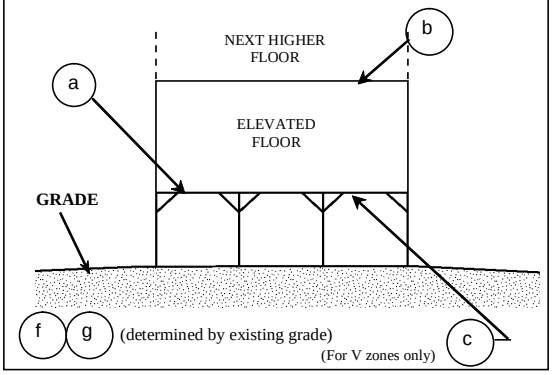



**DIAGRAM 6**

**All buildings elevated on piers, posts, piles, columns, or parallel shear walls with full or partial enclosure below the elevated floor.**

**Distinguishing Feature –** For all zones, the area below the elevated floor is enclosed, either partially or fully. In A Zones, the partially or fully enclosed area below the elevated floor is with or without openings** present in the walls of the enclosure. Indicate information about openings in Section C, Building Elevation Information (Survey Required).

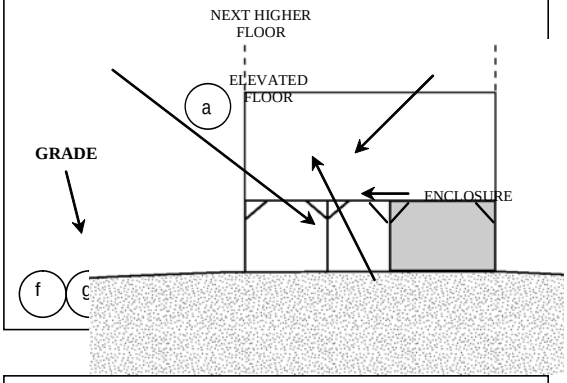



**DIAGRAM 7**

**All buildings elevated on full-story foundation walls with a partially or fully enclosed area below the elevated floor. This includes walkout levels, where at least one side is at or above grade. The principal use of this building is located in the elevated floors of the building.**

**Distinguishing Feature –** For all zones, the area below the elevated floor is enclosed, either partially or fully. In A Zones, the partially or fully enclosed area below the elevated floor is with or without openings** present in the walls of the enclosure. Indicate information about openings in Section C, Building Elevation Information (Survey Required).

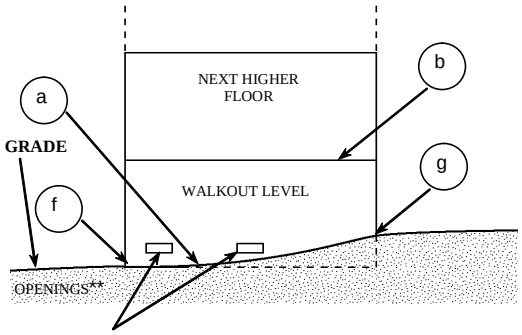
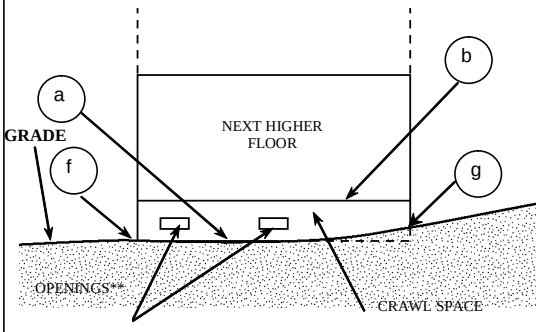



**DIAGRAM 8**

**All buildings elevated on a crawl space with the floor of the crawl space at or above grade on at least one side, with or without an attached garage.**

**Distinguishing Feature –** For all zones, the area below the first floor is enclosed by solid or partial perimeter walls. In all A zones, the crawl space is with or without openings** present in the walls of the crawl space. Indicate information about the openings in Section C, Building Elevation Information (Survey Required).




**An "opening" (flood vent) is defined as a permanent opening in a wall that allows for the free passage of water automatically in both directions without human intervention. Under the NFIP, a minimum of two openings is required for enclosures or crawl spaces with a total net area of not less than one square inch for every square foot of area enclosed. Each opening must be on different sides of the enclosed area. If a building has more than one enclosed area, each area must have openings on exterior walls to allow floodwater to directly enter. The bottom of the openings must be no higher than one foot above the grade underneath the flood vents. Alternatively, you may submit a certification by a registered professional engineer or architect that the design will allow for the automatic equalization of hydrostatic flood forces on exterior walls. A window, a door, or a garage door is not considered an opening

O.M.B. NO. 3067-0077
Expires July 31, 2002

FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM

# FLOODPROOFING CERTIFICATE

**FOR NON-RESIDENTIAL STRUCTURES**

*The floodproofing of non-residential buildings may be permitted as an alternative to elevating to or above the Base Flood Elevation; however, a floodproofing design certification is required. This form is to be used for that certification. Floodproofing of a residential building does not alter a community's floodplain management elevation requirements or affect the insurance rating unless the community has been issued an exception by FEMA to allow floodproofed residential basements. The permitting of a floodproofed residential basement requires a separate certification specifying that the design complies with the local floodplain management ordinance.*

BUILDING OWNER'S NAME

STREET ADDRESS (Including Apt., Unit, Suite, and/or Bldg. Number) OR P.O. ROUTE AND BOX NUMBER

OTHER DESCRIPTION (Lot and Block Numbers, etc.)

| FOR INSURANCE COMPANY USE |
|---|
| POLICY NUMBER |
| COMPANY NAIC NUMBER |

CITY STATE ZIP CODE

## SECTION I FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

Provide the following from the proper FIRM:

| COMMUNITY NUMBER | PANEL NUMBER | SUFFIX | DATE OF FIRM INDEX | FIRM ZONE | BASE FLOOD ELEVATION (In AO Zones, Use Depth) |
|---|---|---|---|---|---|
| | | | | | |

## SECTION II FLOODPROOFING INFORMATION (By a Registered Professional Engineer or Architect)

**Floodproofing Design Elevation Information:**

Building is floodproofed to an elevation of ..... feet NGVD. (Elevation datum used must be the same as that on the FIRM.)

Height of floodproofing on the building above the lowest adjacent grade is ..... feet.

*(NOTE: for insurance rating purposes, the building's floodproofed design elevation must be at least one foot above the Base Flood Elevation to receive rating credit. If the building is floodproofed only to the Base Flood Elevation, then the building's insurance rating will result in a higher premium.)*

## SECTION III CERTIFICATION (By Registered Professional Engineer or Architect)

**Non-Residential Floodproofed Construction Certification:**

*I certify that, based upon development and/or review of structural design, specifications, and plans for construction, the design and methods of construction are in accordance with accepted standards of practice for meeting the following provisions:*

The structure, together with attendant utilities and sanitary facilities, is watertight to the floodproofed design elevation indicated above, with walls that are substantially impermeable to the passage of water.

All structural components are capable of resisting hydrostatic and hydrodynamic flood forces, including the effects of buoyancy, and anticipated debris impact forces.

*I certify that the information on this certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.*

CERTIFIER'S NAME LICENSE NUMBER (or Affix Seal)

TITLE COMPANY NAME

ADDRESS CITY STATE ZIP CODE

SIGNATURE DATE PHONE

Copies should be made of this Certificate for: 1) community official, 2) Insurance agent/company, and 3) building owner.

FEMA Form 81-65, AUG 99 Replaces all previous editions F-056 (8/99)

# APPENDIX G: EMI COURSES

The courses summarized in this Appendix are presented one or more times each year at FEMA's Emergency Management Institute (EMI), located in Emmitsburg, Maryland.

Tuition for these courses is free for State and local government officials and travel stipends are available. For more information, contact the training office of your state emergency management agency, or call 1-800-238-3358 or visit EMI's Website at http://training.fema.gov/EMIWeb.

| Course Name | Course Code | Course Description | Selection Criteria |
|---|---|---|---|
| Managing Floodplain Development Through the National Flood Insurance Program (NFIP) | E273 | This course is designed to provide an organized training opportunity for local officials responsible for administering their local floodplain ordinance. The course will focus on the NFIP and concepts of floodplain management, maps and studies, ordinance administration, and the relationship between floodplain management and flood insurance. | Local officials responsible for administering local floodplain management ordinances, including but not limited to floodplain management administrators, building inspectors, code enforcement/zoning officers, planners, city/county managers, attorneys, engineers, and public works officials. Federal/State/regional floodplain managers also are encouraged to attend. The course is designed for those officials with limited floodplain management experience. Attendance will be limited to two participants from any state for each offering. |
| National Flood Insurance Program/Community Rating System (NFIP/CRS) | E278 | This course covers the CRS, a nationwide initiative of FEMA's NFIP. It describes activities eligible for credit under CRS, how a community applies, and how a community modifies an application to improve its classification. | FEMA regional office staff, NFIP State coordinators, those managing floodplain services for local governments, and others interested in learning about CRS so they can provide technical assistance to communities seeking to apply for CRS credit. Attendance is limited to two participants from any one community per fiscal year. |

| Course Name | Course Code | Course Description | Selection Criteria |
|---|---|---|---|
| Mitigation for Tribal Officials | E344 | This course provides Tribal members and their representatives with an overview of FEMA's mitigation programs, to outline tribal mitigation responsibilities, and to discuss opportunities for achieving mitigation successes. The course will cover mitigation planning, the National Flood Insurance Program (NFIP), and mitigation grant programs. | The course will be limited to federally recognized tribal members and their representatives. |
| Retrofitting Flood-Prone Residential Buildings | E279 | This course is designed to provide engineering and economic guidance on what constitutes proper retrofitting techniques for flood-prone residential structures. The course will focus on the concepts of flood proofing, regulatory framework, controlling parameters, design practices, and benefit, cost, and technical feasibility analysis. There is a case study design exercise and a written examination. | The audience comprises engineers and architects, and building code, floodplain management, hazard mitigation, planning, zoning, and public works officials. This course is intended for those with engineering, architectural, or building science knowledge. |

# APPENDIX H:
# LEARNING CHECKS AND EXERCISES

## *UNIT 1 LEARNING CHECK #1*

1. This unit describes a number of types of floods. Which types occur in your community?
2. What are the three most common types of flooding?
3. Which type of flooding has accounted for the most flood-related deaths in recent history?
4. What is a “meander?”
5. What’s the major cause of coastal flooding?
6. What causes a tsunami?
7. List the five types of special flood hazards covered in this course. Does your community have any of these?
8. List at least three benefits that floodplains, in a relatively undisturbed condition, actually contribute or could contribute to your community.

## *UNIT 1-LEARNING CHECK #2*

1. What two problems result from floodplain development?
2. What does watershed development do to flooding?
3. What is one of the problems with constructing seawalls to protect buildings from flooding or erosion?
4. What are the five main causes of flood damage?
5. Standing water as little as feet deep can collapse the walls of a frame house.
6. What are some of the safety and health hazards that accompany floods?
7. Prior to the 1960's what was the primary way to reduce flood losses?
8. What is the Unified National Program for Floodplain Management's definition of "floodplain management?"
9. What are the two primary goals of floodplain management?

## *UNIT 1-LEARNING EXERCISE*

1. What areas are conducive to flash flooding?
2. Is erosion only a threat in coastal areas?
3. What is “ponding?”
4. Are plants and animals the only beneficiaries of the “natural and beneficial functions” of floodplains?
5. What does filling in a floodplain do?
6. Does moving sand and sand dunes affect flooding?
7. Hydrodynamic forces are caused by _____ water and hydrostatic forces are caused by _____ water.
8. List three materials or household items that are particularly susceptible to flood damage by soaking.
9. What are examples of non-structural flood protection measures?
10. What are the Unified National Program for Floodplain Management’s four main floodplain management strategies?

## *UNIT 1-LEARNING CHECK #1 -ANSWERS*

1. This unit describes a number of types of floods. Which types occur in your community?

   *Depends on the communit.y*

2. What are the three most common types of flooding?

   *Riverine, coastal, shallow.*

3. Which type of flooding has accounted for the most flood-related deaths in recent history?

   *Flash flooding.*

4. What is a "meander?"

   *It's a curve or turn in a river channel.*

5. What's the major cause of coastal flooding?

   *Storm surge.*

6. What causes a tsunami?

   *Underwater earthquakes or volcanoes.*

7. List the five types of special flood hazards covered in this course. Does your community have any of these?

   --Closed basin lakes
   --Uncertain flow paths
   --Dam breaks
   --Ice jams
   --Mudflows

   *If your community has one or more of these hazards, you should become familiar with their natural processes and the appropriate regulatory measures discussed in Unit 6.*

8. List at least three benefits that floodplains, in a relatively undisturbed condition, actually contribute or could contribute to your community.

   *Although this depends on the community, there are a large number of benefits they could potentially provide.*

## *UNIT 1–LEARNING CHECK #2 -ANSWERS*

1. What two problems result from floodplain development?

   - *Development alters the floodplain and the dynamics of flooding.*
   - *Buildings and infrastructure are damaged by periodic flooding.*

2. What does watershed development do to flooding?

   *The increase in impervious surface results in increased runoff and higher flood levels.*

3. What is one of the problems with constructing seawalls to protect buildings from flooding or erosion?

   *It can accelerate erosion on properties at the end of the wall.*

4. What are the five main causes of flood damage?

   *Hydrodynamic forces*
   *Debris impact*
   *Hydrostatic forces*
   *Soaking*
   *Sediment and contaminants*

5. Standing water as little as ____ feet deep can collapse the walls of a frame house.

   *Three feet.*

6. What are some of the safety and health hazards that accompany floods?

   *Disruption of public utilities*
   *Electrocution*
   *Contamination of water supplies*
   *Fire*
   *Animal carcasses, garbage and ponds that can become breeding grounds for germs and mosquitoes.*
   *Mold, mildew and bacteria that grow in damp, flooded areas*
   *Contaminated air from dirty heating ducts*
   *Stress and mental health problems.*

7. Prior to the 1960's what was the primary way to reduce flood losses?

   *Structural flood control projects*

8. What is the Unified National Program for Floodplain Management's definition of "floodplain management?"

   *"A decision-making process that aims to achieve the wise use of the nation's floodplains."*

9. What are the two primary goals of floodplain management?

   *To reduce the loss of life, disruption, and damage caused by floods*
   *To preserve and restore the natural resources and functions of floodplains*

## *UNIT 1–LEARNING EXERCISE -ANSWERS*

1. What areas are conducive to flash flooding?

   *-Hilly areas with steep slopes and narrow valleys*
   *-Urban areas with large amounts of impervious surfaces and storm sewers*
   *-Areas downstream of dams or subject to ice jams*

2. Is erosion only a threat in coastal areas?

   *No. Riverine erosion can move stream channels and undercut structures.*

3. What is "ponding?"

   *Where stormwater runoff collects in depressions and cannot drain out.*

4. Are plants and animals the only beneficiaries of the "natural and beneficial functions" of floodplains?

   *No. People benefit from floodplains through the food they provide, the recreational opportunities they afford and the scientific knowledge gained in studying them. Floodplains also recharge groundwater supplies and their filtering actions help improve water quality.*

5. What does filling in a floodplain do?

   *Filling reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels.*

6. Does moving sand and sand dunes affect flooding?

   *Yes, it may remove a natural barrier that protects inland properties.*

7. Hydrodynamic forces are caused by _____ water and hydrostatic forces are caused by _____ water.

   *Moving, standing*

8. List three materials or household items that are particularly susceptible to flood damage by soaking.

   -*Wood*
   -*Gypsum wallboard*
   -*Furniture and upholstery*
   -*Carpeting*
   -*Mattresses*
   -*Books*
   -*Electrical appliances*
   -*Gasoline engines*

9. What are examples of non-structural flood protection measures?

   -*Regulations to prohibit development in high-hazard areas.*
   -*Building codes requiring flood-resistant construction for new buildings in floodprone areas.*
   -*Acquisition and relocation of buildings in high hazard areas.*
   -*Modifying or retrofitting existing buildings.*
   -*Installing flood warning systems.*
   -*Controlling stormwater runoff.*
   - *Providing self-help advice to property owners.*

10. What are the Unified National Program for Floodplain Management's four main floodplain management strategies?

    -*Modify human susceptibility to flood damage*
    -*Modify the impact of flooding*
    -*Modify flooding itself*
    -*Preserve and restore natural resources*

## *UNIT 2 LEARNING CHECK #1*

1. What are the objectives of the NFIP?

2. What are the three basic parts of the NFIP?

3. Who uses NFIP maps?

4. What should happen to buildings in NFIP communities over time?

## *UNIT 2-LEARNING CHECK #2*

1. What types of governmental bodies are considered to be “communities” by the NFIP?
2. What office is the state coordinating agency for your community?
3. Which FEMA office works directly with communities?
4. What is the Write Your Own Program?
5. When a community applies to join the NFIP, what must it submit?
6. What are the sanctions if a community does not participate in the NFIP?

## *UNIT 2-LEARNING EXERCISE*

1. Where does most of the money come from to pay the expenses of the NFIP?

2. How many communities currently participate in the NFIP?

3. What is a “pre-FIRM” building.

4. Is there any relation between how a community regulates new construction and flood insurance rates?

5. List two things your community committed itself to when it joined the NFIP.

6. Insurance companies set flood insurance rates and coverage rules. True or false?

7. What can FEMA do to encourage a community to adequately enforce its floodplain management regulations?

8. What are the sanctions if a community is suspended from the NFIP?

## *UNIT 2-LEARNING CHECK #1 -ANSWERS*

1. What are the objectives of the NFIP?

   *- The National Flood Insurance Act created the National Flood Insurance Program (NFIP) to:*
   *-Transfer the costs of private property flood losses from the taxpayers to floodplain property owners through flood insurance premiums.*
   *-Provide floodplain residents and property owners with financial aid after floods, especially smaller floods that do not warrant federal disaster aid.*
   *-Guide development away from flood hazard areas.*
   *- Require that new and substantially improved buildings be constructed in ways that would minimize or prevent damage in a flood.*

2. What are the three basic parts of the NFIP?

   *-Mapping*
   *-Insurance*
   *-Regulations*

3. Who uses NFIP maps?

   *-Communities, states and Federal agencies use them as the basis for regulating new floodprone construction,*
   *-Insurance agents use them when rating flood insurance policies, and*
   *-Lenders and Federal agencies use them to determine when flood insurance must be purchased as a condition of a loan or financial assistance.*

4. What should happen to buildings in NFIP communities over time?

   *Over time, exposure to flood damage should be reduced, as the older pre-FIRM buildings are replaced by post-FIRM buildings. Eventually a community should have only post-FIRM building's subject to little or no flood damage.*

## *UNIT 2–LEARNING CHECK #2 –ANSWERS*

1. What types of governmental bodies are considered to be "communities" by the NFIP?

   *These governmental bodies vary from state to state, but can include cities, towns, villages, townships, counties, parishes, special districts, states and Indian nations with the statutory authority to enact and enforce regulations.*

2. What office is the state coordinating agency for your community?

   *See Appendix B.*

3. Which FEMA office works directly with communities?

   *The ten Regional Offices.*

4. What is the Write Your Own Program?

   *An arrangement whereby private insurance companies write and service NFIP flood Insurance policies under their own name.*

5. When a community applies to join the NFIP, what must it submit?

   *A resolution of intent to "maintain in force…adequate land use and control measures" and to cooperate with FEMA*

   *Its adopted floodplain management ordinance.*

6. What are the sanctions if a community does not participate in the NFIP?

   *- Flood insurance will not be available. No resident will be able to purchase a flood insurance policy through the NFIP.*
   *- If the community withdraws or is suspended, existing flood insurance policies will not be renewed.*
   *-No Federal grants or loans for development may be made in identified flood hazard areas under programs administered by Federal agencies such as HUD, EPA, and SBA.*
   *-No Federal disaster assistance may be provided to repair insurable buildings located in identified flood hazard areas for damage caused by a flood.*
   *- No Federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas. This includes policies written by FHA, VA, and others.*
   *-Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazard areas that:*
   *-There is a flood hazard and*
   *- The property is not eligible for Federal disaster relief.*

## *UNIT 2–LEARNING EXERCISE -ANSWERS*

1. Where does most of the money come from to pay the expenses of the NFIP?

   *Premium income. The NFIP has been self-supporting since 1986.*

2. How many communities currently participate in the NFIP?

   *More than 19,000*

3. What is a "pre-FIRM" building?

   *A building built before the effective date of the community's Flood Insurance Rate Map.*

4. Is there any relation between how a community regulates new construction and flood insurance rates?

   *Yes. Buildings built in accordance with the community's regulations have a lower risk of flooding and can be insured at lower rates.*

5. List two things your community committed itself to when it joined the NFIP.

   *-Issuing or denying floodplain development/building permits.*
   *- Inspecting all development to assure compliance with the local ordinance.*
   *- Maintaining records of floodplain development.*
   *-Assisting in the preparation and revision of floodplain maps.*
   *- Helping residents obtain information on flood hazards, floodplain map data, flood insurance and proper construction measures.*

6. Insurance companies set flood insurance rates and coverage rules. True or false?

   *False. Flood insurance rates and coverage rules are set by FEMA's Federal Insurance Administration.*

7. What can FEMA do to encourage a community to adequately enforce its floodplain management regulations?

   *If the community is in the Community Rating System, it can reclassify it to a Class 10 (no insurance premium discount).*
   *The community can be put on probation.*
   *The community can be suspended.*

8. What are the sanctions if a community is suspended from the NFIP?

   *The same as for nonparticipation (see question 6, Learning Check 2). Suspension means the community is no longer a participant in the NFIP.*

## *UNIT 3 LEARNING CHECK #1*

1. As directed by the National Flood Insurance Act of 1968, FEMA conducts flood studies in order to determine _____ and _____ .

2. The base flood is a flood that has a _____ of occurring in any year.

3. The base flood is also called the _____ - year flood.

4. Determine whether the following statements are true or false. Circle T for True and F for False.

| | | |
|---|---|---|
| A 100-year flood will occur only once every 100 years. | T | F |
| A 100-year flood could occur two times in one year. | T | F |
| The 100-year flood might not occur in a 200-year period. | T | F |
| The base flood could occur in two consecutive years in a row. | T | F |

5. On NFIP maps, the base floodplain is called the _____ _____ _____ _____ . (4 words)

6. BFE is the acronym for _____ _____ _____ .

7. What are the components of a Flood Insurance Study?

## *UNIT 3-LEARNING CHECK #2*

1. For purposes of a riverine flood study, _____ is the study of the distribution and circulation of water in the environment, and _____ is the study of fluids in motion and how water will flow through the channel.

2. The rate at which runoff (an amount of water) flows downstream is called the flood _____ .

3. What probable effect does increase in urbanization within a community or upstream of it have on the stream discharges within that community?

4. What consequence on flood water level of a stream would usually occur when a bridge is constructed over a stream?

5. To locate the true elevations at a site, surveyors have established _____ _____ marks also known as _____ marks.

6. Cross sections describe the _____ of the floodplain.

7. What is the datum used for your FIS, FIRM, and profiles?

8. Flood profiles are developed by plotting the flood elevations at the _____ _____ and connecting the plotted points.

9. To make a floodplain map, the base flood elevations are plotted on a _____ map or a _____ map.

10. The _____ is defined as the stream channel and that portion of the adjacent floodplain that must remain open to permit passage of the base flood.

11. A floodway analysis conducted to the minimum NFIP standard allows the fringe to be obstructed until the base flood level is increased by how much?

## *UNIT 3-LEARNING CHECK #3*

1. What causes storm surge?

2. What is wave runup?

3. Instead of cross sections, coastal flood engineers survey _____ .

4. The BFEs for coastal studies are the _____ _____ plus the _____ _____ .

5. The most hazardous part of the coastal floodplain is the _____ _____ _____ area, which is shown on the map as a ____ Zone.

6. What differentiates shallow flooding from riverine flooding?

7. Flood studies that do not identify BFEs are called _____ _____ .

## *UNIT 3-LEARNING CHECK #4*

1. Prior to 1986, the maps published with an FIS were the _____ and the _____ .

2. Since 1986, the map published with an FIS is the _____.

3. Is your community's FIRM a flat or Z-fold map?

4. How many panels does your FIRM have?

5. What is the map scale of your FIRM?

6. What does an elevation reference mark look like on a FIRM?

7. What is an AO Zone?

8. What is the FIRM effective date for your community?

9. How is a floodway shown on the Flood Boundary and Floodway Map?

10. How is a floodway shown on the new format FIRM?

11. A Zone C on an old format FIRM is shown as a Zone ____ on the new format FIRM.

12. CBRA stands for _____ _____ _____ _____

13. What communities' floodplains are shown on a countywide FIRM?

14. Floodways are shown along the _____ toe of a levee on the FIRM.

15. Areas behind recognized levees are designated as _____ _____.

## *UNIT 3-LEARNING EXERCISE*

1. The base flood elevation is the elevation of the ____ - year flood or the ___ % annual chance flood.

2. The Special Flood Hazard Area or SFHA is what the _____ floodplain is called on FEMA maps.

3. The SFHA is shown on a FIRM as a Zone that begins with the letter ___ or ___ .

4. What are the components of a Flood Insurance Study?

5. List three things that a FIRM is used to determine.

6. _____ is the study of a watershed's behavior during and after a storm.

7. Surveyors reference elevation to a common _____ .

8. Most permanent FIS elevation reference marks are referenced to what datum?

9. A hydraulic study uses the hydrology, cross section information, and stream characteristics to determine the flood _____ .

10. Cross sections are shown on which map?

11. Flood profiles are used to determine what?

12. In riverine situations, the floodplain is divided into two separate parts for floodplain management purposes. These parts are the _____ and the _____.

13. Based on the minimum NFIP standard, if the flood fringe were completely filled, how high could the base flood elevation go up?

14. What FIRM zone has wave heights greater than three feet?

15. Instead of using a base flood elevation, some shallow flooding areas are defined using a base flood _____ .

16. An approximate study shows the base _____ but does not show the base flood _____ .

17. How many digits are there in the NFIP community identification number?

18. What is an AH Zone?

19. What was the problem with the way the floodway was shown on the old format Flood Boundary and Floodway Maps?

20. The new format FIRMs include:

_____

_____

_____

21. Do Q3 Flood Data show base flood elevations if they are available?

## *UNIT 3-LEARNING CHECK #1 - ANSWERS*

1. As directed by the National Flood Insurance Act of 1968, FEMA conducts flood studies in order to determine _____ and _____ .

   *flodprone areas and flood risk zones*

2. The base flood is a flood that has a _____ of occurring in any year.

   *one percent chance*

3. The base flood is also called the _____ - year flood.

   *100-year*

4. Answer the following questions (circle T for True and F for False):

   *A 100-year flood will occur only once every 100 years. T___ F___*
   *A 100-year flood could occur two times in one year. T___ F___*
   *The 100-year flood might not occur in a 200-year period. T___ F___*
   *The base flood could occur two consecutive years in a row. T___ F___*

   *F T T T*

5. On NFIP maps, the 100-year floodplain is called the _____ _____ _____ _____ .

   *Special Flood Hazard Area*

6. BFE is the acronym for _____ _____ _____ .

   *base flood elevation*

7. What are the components of a Flood Insurance Study?

   *The FIS — Flood Insurance Study report*
   *The FIRM — Flood Insurance Rate Map*
   *The Flood Boundary and Floodway Map, which is included in studies prepared before 1986 (Since 1986, floodways are shown on the FIRM)*

## *UNIT 3–LEARNING CHECK #2 -ANSWERS*

1. For purposes of a riverine flood study, _____ is the study of the distribution and circulation of water in the environment, and _____ is the study of fluids in motion and how water will flow through the channel.

   *Hydrology, hydraulics*

2. The rate at which runoff flows downstream is called the flood _____ .

   *discharge*

3. What probable effect does increase in urbanization within a community or upstream of it have on the stream discharges within that community?

   *Stream discharges usually will increase as a consequence to the increase in urbanization within a community or upstream of it.*

4. What consequence on flood water level of a stream would usually occur when a bridge is constructed over a stream?

   *A hydraulic analysis is always required to determine the effect of any bridge construction over a stream. However, construction over a stream is considered an obstruction to the flow and therefore may increase the flood water level upstream of the construction.*

5. To locate the true elevations at a site, surveyors have established _____ _____ marks also known as _____ marks.

   *elevation reference, bench*

6. Cross sections describe the of the floodplain.

   *shape*

7. What is the datum used for your community's flood insurance study, FIRM, and profiles?

   *Depends on the community. Check the Legend or Key to your FIRM.*

8. Flood profiles are developed by plotting the flood elevations at the _____ _____ and connecting the plotted points.

   *cross sections*

9. To make a floodplain map, the base flood elevations are plotted on a _____ map or a _____ map.

   *topographic or contour*

10. The _____ is defined as the stream channel and that portion of the adjacent floodplain that must remain open to permit passage of the base flood.

    *Floodway*

11. A floodway analysis conducted to the minimum NFIP standard allows the fringe to be obstructed until the base flood level is increased by how much?

    *one foot*

## *UNIT 3–LEARNING CHECK #3 -ANSWERS*

1. What causes storm surge?

   *Storms that bring air pressure changes and strong winds that "pile" water up against the shore*

2. What is wave runup?

   *When waves hit the shore, water moves with such force that it keeps traveling inland higher than the stillwater flood level.*

3. Instead of cross sections, coastal flood engineers survey _____ .

   *transects*

4. The BFEs for coastal studies are the _____ _____ plus the _____ _____ .

   *stillwater elevations, wave runup*

5. The most hazardous part of the coastal floodplain is the _____ _____ _____ area, which is shown on the map as a ____ Zone.

   *coastal high hazard, V*

6. What differentiates shallow flooding from riverine flooding?

   *Shallow flooding is distinguishable from riverine or coastal flooding because it occurs in areas where there is no channel or identifiable flow path.*

7. Flood studies that do not identify BFEs are called _____ _____ .

   *approximate studies*

## *UNIT 3–LEARNING CHECK #4 -ANSWERS*

1. Prior to 1986, the maps published with an FIS are the _____ and the _____ .
   Since 1986, the map published with an FIS is the _____.

   *old format FIRM, FBFM or Floodway Map*
   *new format FIRM*
   *Is your community's FIRM a flat or Z-fold map?*
   *Depends on the community.*

2. How many panels does your FIRM have?

   *Depends on the community.*

3. What is the map scale of your FIRM?

   *Depends on the community.*

4. What does an elevation reference mark look like on a FIRM? "

   *Locations are identified with a small "x" and the designation "ERM" or "RM" followed by a number.*

5. What is an AO Zone?

   *The area subject to sheet flow, ponding, or shallow flooding.*

6. What is the FIRM effective date for your community?

   *Depends on the community. This is the date of the first FIRM for your community. It is an important date to know as it determines whether buildings are considered pre-FIRM or post-FIRM. If you are unsure of the date, contact your FEMA Regional Office or State NFIP Coordinator.*

7. How is a floodway shown on the Flood Boundary and Floodway Map?

   *It's the white area adjacent to and including the channel.*

8. How is a floodway shown on the new format FIRM?

   *It is a shaded area with diagonal lines.*

9. A Zone C on an old format FIRM is shown as a Zone ____ on the new format FIRM.

   *Zone X*

10. CBRA stands for _____ _____ _____ _____.

    *Coastal Barriers Resources Act*

11. What communities' floodplains are shown on a countywide FIRM?

    *All the communities in the county, even those currently not in the NFIP*.

12. Floodways are shown along the _____ toe of a levee on the FIRM.

    *landside*

13. Areas behind recognized levees are designated as _____ _____.

    *Shaded Zone X*

## *UNIT 3–LEARNING EXERCISE -ANSWERS*

1. The base flood elevation is the elevation of the ____ - year flood or the ___ % annual chance flood.

   *100, 1*

2. The Special Flood Hazard Area or SFHA is how the _____ floodplain is shown on FEMA maps.

   *base flood*

3. The SFHA is shown on a FIRM as a Zone that begins with the letter ___ or ___ .

   *A or V*

4. What are the components of a Flood Insurance Study?

   *Flood Insurance Study report*
   *Flood Insurance Rate Map*
   *Flood Boundary and Floodway Map for studies conducted prior to 1986. In studies conducted since 1986, the floodway data are shown on the FIRM and there is no separate Flood Boundary and Floodway Map.*

5. List three things that a FIRM is used to determine.

   *Whether a property is in the floodplain*
   *The flood insurance zone that applies to a property*
   *The approximate BFE at a site*

6. _____ is the study of a watershed's behavior during and after a storm.

   *hydrology*

7. Surveyors reference elevation to a common _____ .

   *datum*

8. Most permanent FIS elevation reference marks are referenced to what datum?

   *National Geodetic Vertical Datum or NGVD*

9. A hydraulic study uses the hydrology, cross-section information, and stream characteristics to determine the flood _____ .

   *elevations (also velocities and floodplain widths)*

10. Cross sections are shown on which map?

    *Floodway Map*
    *New format FIRM*

11. Flood profiles are used to determine what?

    *Flood elevations along a river or a stream between cross sections*

12. In riverine situations, the floodplain is divided into two separate parts for floodplain management purposes. These parts are the _____ and the _____.

    *floodway, flood fringe*

13. Based on the minimum NFIP standard, if the flood fringe were completely filled, how high could the base flood elevation go up?

    *one foot*

14. What FIRM zone has wave heights greater than three feet?

    *V Zone*

15. Instead of using a base flood elevation, some shallow flooding areas are defined using a base flood _____ .

    *depth*

16. An approximate study shows the base _____ but does not show the base flood _____ .

    *Floodplain, elevation*

17. How many digits are there in the NFIP community identification number?

    *They always have six digits. This is important to avoid confusion with the five-digit countywide FIRM Number. The community identification number does not include the panel number and other numbers that appear near it on the FIRM title block.*

18. What is an AH Zone?

    *Shallow flooding base floodplain with base flood elevations.*

19. What was the problem with the way the floodway was shown on the old format Flood Boundary and Floodway Maps?

    *The white area looked like it was a C Zone outside the floodplain. Also, people who had only a FIRM did not know of the floodway hazard.*

*20.* The new format FIRMs include:

    *floodways and floodplain management information*
    *simplified flood insurance zones*

21. Do Q3 Flood Data show base flood elevations if they are available?

    *No. They are designed primarily to determine if a property is in or out of the SFHA.*

## *UNIT 4- LEARNING CHECK #1*

Using what you have learned so far, use the FIS report and FIRM for Flood County, USA to answer the following questions.

1. What is the base flood discharge on the Rocky River just upstream of Wellington Road?

2. What is the 10-year peak discharge for Cobb Brook?

3. How many cross sections were surveyed for Cobb Brook?

4. What is the width of the floodway for the Rocky River at cross-section G?

5. What is the flood elevation at cross-section G of the Rocky River that you would use for regulating new construction?

6. What is the best source of base flood elevation data for regulatory purposes for a coastal floodplain?

7. In which FIRM Zone is Site F located?

8. What is the regulatory base flood elevation at Site F?

## *UNIT 4-LEARNING CHECK #2*

1. How many feet does one inch on Flood County FIRM panel 38 represent?

2. How many feet does one inch on Flood County FIRM panel 25 represent?

3. Using Flood County FIRM panel 40 and the engineer's scale, what is the width of the floodway at cross-section F on the Rocky River?

4. Using the Floodway Data Table, what is the floodway width at cross-section F on the Rocky River?

5. Using FIRM panel 40 and the engineer's scale, what is the distance between cross-sections F and G on the Rocky River?

6. What is the distance between cross-sections F and G on the Rocky River according to the Floodway Data Table?

7. Site C is within the Town of Floodville. How high is the base flood elevation at Site C?

8. What is the regulatory base flood elevation at cross-section D on the Rocky River?

9. RM 40-2 is located on panel 40 near the intersection of South Road and Dairy Road. How far is RM 40-2 from the closest SFHA?

10. Site E is on panel 25 at the western limit of Cedar Hill Road just north of Dean Lake. What is the base flood elevation at Site E?

11. A 50' x 50' building is located 200 feet south of RM 40-2 on panel 40. Is it in the floodway?

## *UNIT 4-LEARNING CHECK #3*

1. What is the base flood elevation for the Rocky River at cross-section C:

    a. Using the flood profiles in the FIS report?
    b. Using the Floodway Data Table?
    c. If these numbers are different, which BFE should you use?

2. An “I” symbol is plotted 1,910 feet upstream of the confluence with the Rocky River on Flood Profile 01P. What does this symbol represent?

3. Is the footbridge upstream or downstream from the limit of detailed study?

4. Using Flood Profile 03P, determine the BFE on the Rocky River for a site that is 520 feet downstream of Fox Croft Drive.

5. How far is the Fox Croft Drive bridge from cross-section D on the Rocky River?

6. A developer proposes to place a structure 625 feet (0.12) miles upstream from the Martling Way Bridge adjacent to the Rocky River (FIRM panel 38). Using the flood profiles, tell the developer how high the structure would have to be elevated to be above the base flood elevation as well as the 500-year flood elevation.

7. A particular site is 750 feet upstream of Argyle Way adjacent to the Rocky River (FIRM panel 38). What is the base flood elevation here?

## *UNIT 4-LEARNING CHECK #4*

1. What office is the primary repository for your FIS, FIRM, or Floodway Map?

2. How do you get more copies of your FIRM?

3. What are the four types of map changes?

4. Mrs. Murphy says she has a survey that shows that her house is higher than the flood level. What type of map change should she request?

5. For what locations on her property will Mrs. Murphy need elevation data?

6. A builder wants to get a bank loan to develop an area. His plans are to fill some low spots and get all the building sites out of the floodplain. His banker will not grant a loan for the project unless she is reassured that the FIRM will be changed when the project is finished. What type of map change should the builder request?

## *UNIT 4-LEARNING EXERCISE*

1. Using the Flood Insurance Study for Flood County, USA and Incorporated Areas:

2. What is the community number for the unincorporated areas of Flood County?

3. What is the best map to use to determine if a property is in the SFHA?

4. What is the best map to use to determine if a property is in a floodway?

5. What is the effective date of the Flood County FIRM?

6. Is the Flood County FIRM in the old format or new format?

7. Look at the Flood County FIRM Index. Why is there no FIRM panel for the northwest corner of the county?

8. If you measured a distance on the ground as 500 feet, how many inches would it be on the Flood County FIRM panel 25?

9. How many miles of stationing would there be if you measured a distance between two cross sections as 1,050 feet?

10. Marge's house is located at Site F on Flood County FIRM panel 40. How far is her house from the boundary of the nearest coastal barrier?

11. Examining the Atlantic Coastline, what is the highest wave crest elevation shown on the FIRM?

12. What FIRM panel is RM 38-1 on?

13. What is the base flood elevation at the location given orally?

14. If a surveyor wanted to locate RM 38-1 on the ground, what would he or she look for?

15. How high above sea level is RM 40-1?

16. A site is located at the point formed by the intersection of Glebe Way and Foley Drive between Foley Drive and the Rocky River.

17. On which FIRM panel is the site?

18. In which FIRM zone is the site?

19. What is the base flood elevation at the site?

20. The property is in which of the following? (Check those that apply.)

____ 100-year floodplain
____ 100-year floodway
____ 500-year floodplain
____ Coastal High Hazard Area
____ Designated coastal barrier

21. A site is on the banks of Cobb Brook, 100 feet west of Tullamore Lane bridge.

    a. On which FIRM panel is the site?
    b. In which FIRM zone is the site?
    d. What is the base flood elevation at the site using the FIRM?
    e. What is the base flood elevation at the site using the profile?

22. A vacant lot near Site D was recently purchased. The new owners ask for your help in locating the best spot to build a new house. The FIRM shows the entire property in the SFHA. You are handy with a transit, so you survey the proposed building site during a visit to the property. You find that the building site is above the BFE. The owners want you to inform their bank so they won't have to buy flood insurance. What do you say?

23. When the Flood County FIS was completed, the watershed of the Rocky River was relatively undeveloped. Over the last 15 years, there has been a lot of new construction throughout this small watershed. The Town Engineer says that the base flood elevations are probably out of date and underestimate the true flood hazard. What can you do to attempt to get your FIRM updated?

## *UNIT 4-LEARNING CHECK #1 -ANSWERS*

1. What is the base flood discharge on the Rocky River just upstream of Wellington Road?

   *2,610 cubic feet per second (cfs). See Table 3 on page 9 of the Flood County FIS report. This is a tough question if you forgot that the base flood is the same as the 100-year flood.*

2. What is the 10-year peak discharge for Cobb Brook?

   *560 cfs. See Figure 4-1 or Table 3 on page 9 of the Flood County FIS report.*

3. How many cross sections were surveyed for Cobb Brook?

   *3; cross-sections A through C*

4. What is the width of the floodway for the Rocky River at cross-section G?

   *230 feet*

5. What is the flood elevation at cross-section G of the Rocky River that you would use for regulating new construction?

   *11.6 feet. Don't forget to use the "regulatory" base flood water-surface elevation.*

6. What is the best source of base flood elevation data for regulatory purposes for a coastal floodplain?

   *The FIRM*

7. In which FIRM Zone is site F?

   *VE*

8. What is the regulatory base flood elevation at site F?

   *13.4 feet, NGVD (13 feet from the FIRM plus 0.4 foot to make sure that the regulatory elevation will be high enough)*

9. How many feet does one inch on the Flood County FIRM panel 38 represent?

   *500 feet*

10. How many feet does one inch on the Flood County FIRM panel 25 represent?

    *2,000 feet*

11. Using the Flood County FIRM panel 40 and the engineer's scale, what is the width of the floodway at cross-section F on the Rocky River?

    *Approximately 250 feet*

12. Using the Floodway Data Table, what is the floodway width at cross-section F on the Rocky River?

    *270 feet*

13. Using the FIRM panel 40 and the engineer's scale, what is the distance between cross-sections F and G on the Rocky River?

    *Approximately 700 feet (0.13 mile) measured along the stream channel.*

14. What is the distance between cross-sections F and G on the Rocky River according to the Floodway Data Table?

    *668 feet (0.13 mile)*

15. Site C is within the Town of Floodville. How high is the base flood elevation at Site C?

    *11 feet*

16. What is the regulatory base flood elevation at cross-section D on the Rocky River?

    *11.2 feet*

17. RM 40-2 is located on panel 40 near the intersection of South Road and Dairy Road. How far is RM 40-2 from the closest SFHA?

    *Approximately 500 feet to Zone AE to the south*.

18. Site E is on panel 25 at the western limit of Cedar Hill Road just north of Dean Lake. What is the base flood elevation at Site E?

    *We don't know. It's an approximate A Zone.*

19. A 50' x 50' building is located 200 feet south of RM 40-2 on panel 40. Is it in the floodway?

    *No, it is not because the floodway boundary is approximately 600 feet south of RM 40-2.*

## *UNIT 4–LEARNING CHECK #2 -ANSWERS*

1. What is the base flood elevation for the Rocky River at cross-section C:

    a. Using the flood profiles in the FIS report?
    *11.0 feet*

    *b.* Using the Floodway Data Table?
    *10.9 feet*

2. If these numbers are different, which BFE should you use?

    *The BFE provided in the Floodway Data Table is more accurate.*

3. An "I" symbol is plotted 1,910 feet upstream of the confluence with the Rocky River on Flood Profile 01P. What does this symbol represent?

    *A footbridge*

4. Is the footbridge upstream or downstream from the limit of detailed study?

    *Downstream*

5. Using Flood Profile 03P, determine the BFE on the Rocky River for a site that is 520 feet downstream of Fox Croft Drive.

    *11.4 feet. On profile 03P, 5,200 feet is one inch from the x-axis. The site is approximately one inch to the left of the "I" symbol for the Fox Croft Drive bridge.*

6. Using Flood Profile 03P, determine how far the Fox Croft Drive bridge is from cross-section D of the Rocky River.

    *1,980 feet, or 0.38 mile*

7. A developer proposes to place a structure, 625 feet (0.125 miles) upstream from the Martling Way bridge adjacent to the Rocky River (FIRM Panel 38). Using the flood profiles, tell the developer how high the structure would have to be elevated to be protected from the base flood elevation and the 500-year flood elevation.

    *For the base flood, the structure should be elevated above 10.8 feet NGVD. For the 500-year flood, it should be elevated above 11.8 feet NGVD.*

8. A particular site is 750 feet upstream of Argyle Way adjacent to the Rocky River (FIRM panel 38). What is the BFE here?

    *11.2 feet NGVD as seen on Flood Profile 03P.*

## *UNIT 4–LEARNING CHECK #3 -ANSWERS*

1. What office is the primary repository for your FIS, FIRM, and/or Floodway Map?

   *Depends on the community, but it is a local community office.*

2. How do you get more copies of your FIRM?

   *Call or send a mail or fax request to the Map Service Center in Jessup, Maryland.*

3. What are the four types of map changes?

   *A restudy is a new Flood Insurance Study for some or all of the community.*
   *A limited map maintenance project (LMMP) is a small-scale restudy that is limited in size and cost.*
   *An amendment is used to remove an area that was inadvertently included in the SFHA.*
   *A map revision is used for all other cases.*

4. Mrs. Murphy says she has a survey that shows that her house is higher than the flood level. What type of map change should she request?

   *A Letter of Map Amendment (LOMA) is the appropriate way to remove a single lot from the SFHA based on elevation data.*

5. For which locations on her property will Mrs. Murphy need elevation data?

   *The elevation of the lowest grade adjacent to the building.*

6. A builder wants to get a bank loan to develop an area. His plans are to fill some low spots and get all the building sites out of the floodplain. His banker will not grant a loan for the project unless she is reassured that the FIRM will be changed when the project is finished. What type of map change should the builder request?

   *A Conditional Letter of Map Revision based on fill (CLOMR-F).*

## *UNIT 4–LEARNING EXERCISE -ANSWERS*

1. Using the Flood Insurance Study for Flood County, USA and Incorporated Areas:

2. What is the community number for the unincorporated areas of Flood County?

   *990099*

3. What is the best map to use to determine if a property is in the SFHA?

   *FIRM*

4. What is the best map to use to determine if a property is in a floodway?

   *FIRM*

5. What is the effective date of the Flood County FIRM?

   *August 19, 1998*

6. Is the Flood County FIRM in the old format or new format?

   *New format*

7. Look at the Flood County FIRM Index. Why is the FIRM not printed for the northwest corner of the county?

   *There is no SFHA on this panel. The area covered by panel 0030 D is in Zone C.*

8. If you measured a distance on the ground as 500 feet, how many inches would it be on Flood County FIRM panel 25?

   *The scale of panel 25 is 1"=2,000'. 500 feet would be 0.25 inches.*

9. How many miles of stationing would there be if you measured a distance between two cross sections as 1,050 feet?

   *About 0.2 mile. 1,050 feet / 5,280 feet per mile = 0.198 miles, rounded to 0.2.*

10. Marge's house is located at Site F on Flood County FIRM panel 0040. How far is her house from the boundary of the nearest coastal barrier?

    *Approximately 2,900 feet.*

11. Examining the Atlantic Coastline, what is the highest wave crest elevation shown on the FIRM?

    *14 feet*

12. What FIRM panel is RM 38-1 on?

    *0038 D*

13. What is the base flood elevation at the location given orally?

    *The answer depends on location given.*

14. If a surveyor wanted to locate RM 38-1 on the ground, what would he or she look for?

    *A chiseled square in the southwest corner of northwest wing wall of Argyle Way Bridge over the Rocky River. See the Elevation Reference Marks legend on the left border of FIRM panel 38.*

15. How high above sea level is RM 40-1?

    *16.54 feet NGVD.*

16. A site is located at the point formed by the intersection of Glebe Way and Foley Drive between Foley Drive and the Rocky River.

17. On which FIRM panel is the site?

    *0038 D*

18. In which FIRM zone is the site?

    *Zone AE*

19. What is the base flood elevation at the site?

    *10 feet*

20. The property is in which of the following? (Check those that apply.)

    ____ 100-year floodplain *yes*
    ____ 100-year floodway *no*
    ____ 500-year floodplain *yes*

21. (If it's in the 100-year floodplain, it's in the 500-year floodplain too.)

____ Coastal High Hazard Area *no (it's not in the V Zone)*
____ Designated coastal barrier *no*

22. A site is on the banks of Cobb Brook, 100 feet west of Tullamore Lane bridge.

23. On which FIRM panel is the site?

*0038 D*

24. In which FIRM zone is the site?

*Unshaded Zone X*

25. What is the base flood elevation at the site using the FIRM?

*No BFEs in Zone X.*

26. What is the base flood elevation at the site using the profile?

*There are no profiles for Zone X.*

27. A vacant lot near Site D was recently purchased. The new owners ask for your help in locating the best spot to build a new house. The FIRM shows the entire property in the SFHA. You are handy with a transit, so you survey the proposed building site during a visit to the property. You find that the building site is above the BFE. The owners want you to inform their bank so they won't have to buy flood insurance. What do you say?

*It must be noted that banks (and others who must read the FIRM to determine if flood insurance is required) must go by the map. They cannot make on-site interpretations based on data other than the FIRM. However, they may recommend that the property owner submit a request for a letter of map revision or map amendment to FEMA so the map can be officially changed to reflect the more accurate data.*

*28.* When the Flood County FIS was completed, the watershed of the Rocky River was relatively undeveloped. Over the last 15 years, there has been a lot of new construction throughout this small watershed. The Town Engineer says that the base flood elevations are probably out of date and underestimate the true flood hazard. What can you do to attempt to get your FIRM updated?

*Request a restudy or a limited map maintenance project from FEMA.*

## *UNIT 5 LEARNING CHECK #1*

1. What publication has the NFIP requirements for communities?

2. Most of the requirements relative to your community's ordinance are in 44 CFR Parts ____ and ____ .

3. Does your ordinance comply with the latest NFIP requirements?

4. Which part of 44 CFR 60.3 covers the requirements for areas with a FIRM, but no base flood elevations?

5. What is "Basic rule #1" for using maps and data?

6. What map do you use if recently annexed areas do not show up on your community's FIRM?

7. If you find information that shows the ground to be higher than the BFE, can a bank use that data when determining whether a flood insurance policy must be purchased?

8. Site E is in the approximate A Zone of Dean Lake. A developer wants to build a small commercial building on a 3 acre site. Where do you get a base flood elevation for Site E?

9. A developer downstream of Dean Lake wants to build a 40 acre subdivision that crosses Ireland Creek. You need a base flood elevation before you review the plans. What options do you tell the developer he has?

10. A restudy was performed on the Josias River. The preliminary study will not be final for another five months. It shows a new BFE at Site N that is two feet higher than the BFE in your current FIS. Which one do you use to determine the flood protection level for a new home at Site N?

## *UNIT 5-LEARNING CHECK #2*

1. What is basic rule #2 on what needs a permit in the floodplain?

2. Define “development” as the term is used in your ordinance.

3. Does your community only require building permits? If so, does someone who wants to fill a vacant lot need a permit from the community?

4. The State in which Flood County is situated requires a permit from the state Department of Environmental Protection for development on primary sand dunes. A permit applicant wants to build on one near Site F. Department staff informs you that based on the plans they have seen, they will have to deny the state permit. Should the Flood County permit officer issue a floodplain development permit?

5. What is Basic rule #3 as it relates to encroachments in riverine floodplains?

6. An encroachment review should review projects in a floodway for what two things?

7. A farmer wants to build a dairy barn in the floodway. Will he need to provide you with a “no-rise” certification before you can issue the permit?

8. The same farmer wants to build a small addition onto his farmhouse (also in the floodway). Can this be designed so he won’t have to pay for an engineer’s encroachment review?

9. In a riverine AE Zone with a base flood elevation, what must a developer show in order to demonstrate that he is meeting Basic Rule #3?

10. Does your state have a more restrictive standard than allowing flood heights to increase by one foot?

## *UNIT 5-LEARNING CHECK #3*

1. What does Basic rule #4 say about new buildings in A Zones?

2. Where would elevation on piles or columns be preferred?

3. Can a basement be considered the “lowest floor?”

4. If a residence is elevated above the BFE in an A Zone, where do you measure how high the building is?

5. What can be allowed under the lowest floor of an elevated building?

6. Mr. Jones shows you plans for a house elevated on a concrete block crawl-space. The area of the crawlspace will be 1,750 square feet.

   How many standard 8” x 16” openings will be needed?
   How high can they be above ground level?
   Can Mr. Jones put his hot water heater in the crawlspace?

7. Mrs. Smith is elevating a house in the AE Zone 8’ above grade. How can you make sure that the area below the lowest floor won’t be improved, finished or otherwise turned into living space?

8. What three things do you need to check for to ensure that a building is floodproofed?

9. Can a new home in the flood fringe be floodproofed?

10. What’s the NFIP definition of “basement?”

11. If a building is proposed to be located in a riverine floodplain with flood velocities of 8-10 feet per second, what should you ask the builder to provide to assure you that the building won’t get washed away during a flood?

12. The builder of a house to be elevated on concrete columns wants to use wood for the stairway. He is concerned that wood will swell and warp if it gets wet during a flood. Can a portion of the house below the BFE be built of wood?

13. How is a manufactured home outside of a manufactured housing park treated differently from a conventional “stick built” home?

14. How is a 600 square foot motor home that is permanently attached to a reinforced block wall foundation treated differently from a manufactured home?

## *UNIT 5-LEARNING CHECK #4*

1. What does Basic rule #5 say about new buildings in V Zones?

2. Can a new building be built in the V Zone elevated on a crawlspace?

3. Where is the lowest floor measured in a V Zone?

4. What does the permit official do to be sure that a V Zone building will be adequate to resist the wind and water loads?

5. What's the best way to deal with sand dunes in a V Zone development site?

6. If a subdivider makes sure that all building sites are above the BFE, does he need to do anything more to meet the NFIP requirements?

7. How can you protect a sewer system from flooding?

## *UNIT 5-LEARNING EXERCISE*

1. In what part of the Code of Federal Regulations would you find the definition for "development.?"

2. Where do I find the NFIP requirements for areas mapped with V Zones?

3. If a community has a FIRM that shows floodways and V Zones, which parts of 44 CFR 60.3 must it abide by?

4. If your community follows the requirements of 44 CFR 60.3(d), does it have to worry about what's in 44 CFR 60.3(b)?

5. A building official finds it easier to read an old flood map prepared on an aerial photograph by the Corps of Engineers. He doesn't want to use the current FIRM because it doesn't show all the buildings and features that the photograph does. Can he make permit decisions based on the Corps map instead of the FIRM?

6. A developer wants to build in an area mapped as an approximate A Zone on Ireland Creek. He conducts a detailed flood study which is approved by the Town Engineer. It shows that several lots in the A Zone are actually higher than the BFE calculated in the study.

7. Can you issue permits for building on those sites and treat them as C Zone sites?

8. Will the buyers of the properties have to buy flood insurance policies?

9. Joe Hunter wants to build a small hunting cabin on a lake in an approximate A Zone. It will be the only building within two miles. There are no known sources of a base flood elevation. The cabin will cost less than $10,000 and he does not want to pay $2,000 for an engineering study to develop a BFE. What can you do to make sure the property is protected from flooding?

10. Will a developer in an approximate A Zone have to prepare a detailed study to calculate base flood elevations if the development is:

    4 acres?
    60 lots?
    Reserving all the SFHA as open space?

11. A restudy was performed on the Rocky River. The preliminary study will not be final for another five months. It shows a new BFE at Site B that is two feet lower than the BFE in your current FIS. Which one do you use to determine the flood protection level for a new home at Site A?

12. Does dredging a creek to make it deeper to reduce flood levels need a floodplain permit?

13. Does replacing an old manufactured home with a new one on the same foundation need a permit?

14. If an old manufactured home is replaced with a new one on the same foundation, will the new one have to be elevated above the BFE?

15. If a project will involve filling a wetland, is it likely that a federal or state permit will be needed?

16. A builder wants to put a house in the floodway. How much can his project increase the base flood elevation (in feet)?

17. Will paving a dirt street in the floodway need an engineer's "no-rise" certification?

18. A city councilman complains that the NFIP floodway regulations prevent construction of a flood control dam that will protect people from flooding. What can you tell him?

19. Does a substantial improvement to an existing building have to meet the same requirements as construction of a new building?

20. Can a new nonresidential building be built:

    a. On fill in the flood fringe?
    b. On fill in the floodway?
    c. On fill in the V Zone?
    d. At grade, but floodproofed in the flood fringe?
    f. At grade, but floodproofed in the V Zone?

21. A builder wants to build an apartment building on stem walls parallel to the flow of water with the lowest floor 8' above grade. Can the lower area be used as a parking lot?

22. What's the best record to keep to be sure that a house was elevated high enough?

23. How many standard 8" x 16" openings are needed for a building that will have a 2,250 square foot crawlspace?

24. Can the owner store garden tools in a floodable crawlspace?

25. A business on the Mississippi River wants to build a floodproofed warehouse in the flood fringe. The plans are to have the walls built of reinforced concrete up to the BFE. Several garage doors will be open at grade to allow trucks in and out, but the design includes movable shields that can be put in place before floodwaters arrive. There would be no other openings below the BFE. The warehouse will have a 24-hour security force that will be trained on how to install the shields. The design engineer will certify that the building will be floodproofed (with human intervention) up to the base flood elevation. Can you approve these plans?

26. A builder wants to build a “bi-level” house where the lowest floor is three feet below grade. The lowest floor has large windows and includes three bedrooms and a bathroom. Because it is habitable space, the owner does not consider this a “basement.” Does the NFIP consider this a “basement?”

27. The area below a planned elevated house in the V Zone will have a 260 square foot enclosure to house the entryway and storage closets. The builder wants to insulate the area and finish it with wallboard, wallpaper and carpeting. He says it’s OK because the area is under 300 square feet. What do you tell him?

28. Where can you find standards for tying down manufactured homes?

29. A new house is planned to be built in an SFHA marked “Zone AO (depth 3 feet).” How high should the lowest floor be?

30. Why are pilings and posts preferred in V Zones?

## *UNIT 5–LEARNING CHECK #1 -ANSWERS*

1. What publication has the NFIP requirements for communities?

   *Chapter 44 of the Code of Federal Regulations*

2. Most of the requirements relative to your community's ordinance are in 44 CFR Parts ___ and ___.

   *59 and 60*

3. Does your ordinance comply with the latest NFIP requirements?

   *Check with your FEMA Regional Office or State NFIP Coordinator*

4. Which part of 44 CFR 60.3 covers the requirements for areas with a FIRM, but no base flood elevations?

   *44 CFR 60.3(b)*

5. What is "Basic rule #1" for using maps and data?

   *You must use the latest maps and flood data published by FEMA.*

6. What map do you use if recently annexed areas do not show up on your community's FIRM?

   *The FIRM for the county or the community the property used to be in. It is important to note that the community generally must also adapt the map in its ordinance to be legally enforceable.*

7. If you find information that shows the ground to be higher than the BFE, can a bank use that data when determining whether a flood insurance policy must be purchased?

   *No. Insurance agents and lenders must use the current FIRM when setting insurance rates and determining 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. This can be done through a LOMA.*

8. Site E is in the approximate A Zone of Dean Lake. A developer wants to build a small commercial building on a 3 acre site. Where do you get a base flood elevation for Site E?

   *Try these sources (in order of preference):*

   *Check with your state NFIP coordinator, local water-related districts, the Corps of Engineers, etc. to see if there are any existing studies.*

*It is possible that the highway agency did a study of the stream when the Turnpike bridge was built.*

*See if the Town Engineer or the developer's engineer will conduct a study.*

*Use the flood of record plus a margin of protection*

9. A developer downstream of Dean Lake wants to build a 40 acre subdivision that crosses Ireland Creek. You need a base flood elevation before you review the plans. What options do you tell the developer he has?

   *He can conduct a flood study and produce the BFEs at his expense or*
   *He can set the A Zone aside as open space and not conduct a flood study.*

10. A restudy was performed on the Josias River. The preliminary study will not be final for another five months. It shows a new BFE at Site N that is two feet higher than the BFE in your current FIS. Which one do you use to determine the flood protection level for a new home at Site N?

    *The draft revised data should be used unless the community disagrees with the data and intends to appeal it. As noted previously, the community must first legally adapt the preliminary study in their ordinance.*

## *UNIT 5–LEARNING CHECK #2 -ANSWERS*

1. What is basic rule #2 on what needs a permit in the floodplain?

   *A permit is required for all development in the SFHA.*

2. Define "development" as the term is used in your ordinance.

   *Your ordinance should have a definition that reads very much like: "'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."*

3. Does your community only require building permits? If so, does someone who wants to fill a vacant lot need a permit from the community?

   *Depends on the community. If the answer is not "yes," then you need to revise your ordinance and permit procedures.*

4. The state in which Flood County is situated requires a permit from the state Department of Environmental Protection for development on primary sand dunes. A permit applicant wants to build on one near Site F. Department staff informs you that based on the plans they have seen, they will have to deny the state permit. Should the Flood County permit officer issue a floodplain development permit?

   *No. The local permit should not be issued until staff are certain that the other agencies' requirements are met. If it is just a question of time and a state permit is expected to be issued, a local permit could be issued conditioned on obtaining a state permit. However, if it is clear that the project violates the state regulations, a local permit should not be issued until the matter is settled.*

5. What is Basic rule #3 as it relates to encroachments in riverine floodplains?

   *Development must not increase the flood hazard on other properties.*

6. An encroachment review should review projects in a floodway for what two things?

   *You must determine whether the project will obstruct flood flows and cause an increase in flood heights upstream or adjacent to the project site and*

   *You should determine whether the project will result in increases in downstream flooding by removing an existing obstruction. While you are not required to do this by NFIP minimum requirements, these changes can cumulatively cause significant increases in downstream flooding.*

7. A farmer wants to build a dairy barn in the floodway. Will he need to provide you with a "no-rise" certification before you can issue the permit?

   *Yes*

8. The same farmer wants to build a small addition onto his farmhouse (also in the floodway). Can this be designed so he won't have to pay for an engineer's encroachment review?

   *Yes, if it is located in the conveyance shadow of the farmhouse.*

9. In a riverine AE Zone with a base flood elevation, what must a developer show in order to demonstrate that he is meeting Basic Rule #3?

   *He must conduct an encroachment review that demonstrates 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.*

10. Does your state have a more restrictive standard than allowing flood heights to increase by one foot?

    *Depends on the state. Some states have more restrictive encroachment standards, such as 0.5' or 0.1'.*

## *UNIT 5–LEARNING CHECK #3 -ANSWERS*

1. What does Basic rule #4 say about new buildings in A Zones?

   *New, substantially improved or substantially damaged buildings must be protected from damage by the base flood.*

2. Where would elevation on piles or columns be preferred?

   *In areas where flooding is likely to have high velocities or waves.*

3. Can a basement be considered the "lowest floor?"

   *Yes.*

4. If a residence is elevated above the BFE in an A Zone, where do you measure how high the building is?

   *At the top of the lowest floor.*

5. What can be allowed under the lowest floor of an elevated building?

   *Only building access, vehicle parking, and storage.*

6. Mr. Jones shows you plans for a house elevated on a concrete block crawl-space. The area of the crawlspace will be 1,750 square feet.

   How many standard 8" x 16" vents will be needed?
   *1,750 divided by 128 = 13.67, rounded up to 14 vents*

   How high can they be above ground level?
   *The bottom of the vents must be no higher than one foot above grade.*

   Can Mr. Jones put his hot water heater in the crawlspace?
   *No. Unless the water heater can be entirely above the BFE.*

7. Mrs. Smith is elevating a house in the AE Zone 8' above grade. How can you make sure that the area below the lowest floor won't be improved, finished or otherwise turned into living space?

   *Require that the lower area must be kept open or require the owner to sign a nonconversion agreement (requiring large openings will also help).*

8. What three things do you need to check for to ensure that a building is floodproofed?

   *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.*

9. Can a new home in the flood fringe be floodproofed?

   *No. Elevation is the only method allowed for new residential buildings in the SFHA.*

10. What's the NFIP definition of "basement?"

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

11. If a building is proposed to be located in a riverine floodplain with flood velocities of 8-10 per second, what should you ask the builder to provide to assure you that the building won't get washed away during a flood?

    *A statement from an architect or engineer that the design of the building includes "anchoring adequate to prevent flotation, collapse and lateral movement" during the base flood. These are hazardous velocities and you should discourage development in these areas.*

12. The builder of a house to be elevated on concrete columns wants to use wood for the stairway. He is concerned that wood will swell and warp if it gets wet during a flood. Can a portion of the house below the BFE be built of wood?

    *Yes, provided it is pressure treated (.40 CCA minimum), naturally decay resistant lumber or marine grade plywood*

13. How is a manufactured home outside of a manufactured housing park treated differently from a conventional "stick built" home?

    *They are both treated the same. They must meet the same construction and elevation requirements.*

14. How is a 600 square foot motor home that is permanently attached to a reinforced block wall foundation treated differently from a manufactured home?

    *They are both treated the same. They must meet the same construction and elevation requirements.*

## *UNIT 5–LEARNING CHECK #4 -ANSWERS*

1. What does Basic rule #5 say about new buildings in V Zones?

   *There are special building requirements in addition to the building protection requirements for buildings in A Zones.*

2. Can a new building be built in the V Zone elevated on a crawlspace?

   *No. It can only be elevated on pilings, posts, piers or columns to avoid obstructions to the wave action.*

3. Where is the lowest floor measured in a V Zone?

   *At the bottom of the lowest horizontal structural member.*

4. What does the permit official do to be sure that a V Zone building will be adequate to resist the wind and water loads?

   *Have an engineer certify that the design and planned methods of construction are in accordance with accepted standards of practice to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components.*

5. What's the best way to deal with sand dunes in a V Zone development site?

   *Don't touch them. They provide important flood protection by breaking waves during coastal storms. If they are to be disturbed, the permit applicant should have an engineer's or geologist's report that their removal will not increase flood damage.*

6. If a subdivider makes sure that all building sites are above the BFE, does he need to do anything more to meet the NFIP requirements?

   *The subdivider also needs to make sure that:*
   *All public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage, and*
   *Adequate drainage is provided to reduce exposure to flood hazards;*

7. How can you protect a sewer system from flooding?

   *Through careful system design. Manholes should be raised above the 100year flood level or equipped with seals to prevent leakage. Pumping stations should have electrical panels elevated above the BFE.*

## *UNIT 5–LEARNING EXERCISE -ANSWERS*

1. In what part of the Code of Federal Regulations would you find the definition for "development.?"

   *44 CFR 59.1 Definitions*

2. Where do I find the NFIP requirements for areas mapped with V Zones?

   *44 CFR 60.3(e)*

3. If a community has a FIRM that shows floodways and V Zones, which parts of 44 CFR 60.3 must it abide by?

   *All parts up through 60.3(e)*

4. If your community follows the requirements of 44 CFR 60.3(d), does it have to worry about what's in 44 CFR 60.3(b)?

   *Yes. The requirements are cumulative in Section 60.3.*

5. A building official finds it easier to read an old flood map prepared on an aerial photograph by the Corps of Engineers. He doesn't want to use the current FIRM because it doesn't show all the buildings and features that the photograph does. Can he make permit decisions based on the Corps map instead of the FIRM?

   *No. The community must use the latest maps and data provided by FEMA. If the other map shows a higher BFE and a larger floodplain, the community may adopt it in its ordinance as the regulatory floodplain and exceed the minimum NFIP requirements. The map must be approved by the FEMA Regional Office before this is done.*

6. A developer wants to build in an area mapped as an approximate A Zone on Ireland Creek. He conducts a detailed flood study which is approved by the Town Engineer. It shows that several lots in the A Zone are actually higher than the BFE calculated in the study.

7. Can you issue permits for building on those sites and treat them as C Zone sites?

   *-Yes, as long as the Town Engineer assures you that the developer's study*
   *-Reasonably reflects flooding conditions expected during the base flood,*
   *-Is technically correct, and*
   *-Represents the best data available.*

8. Will the buyers of the properties have to buy flood insurance policies?

   *Yes, unless a map amendment or Letter of Map Amendment (LOMA) is issued by FEMA.*

9. Joe Hunter wants to build a small hunting cabin on a lake in an approximate A Zone. It will be the only building within two miles. There are no known sources of a base flood elevation. The cabin will cost less than $10,000 and he does not want to pay $2,000 for an engineering study to develop a BFE. What can you do to make sure the property is protected from flooding?

   *Require that the lowest floor of the cabin be at least five feet above grade.*

10. Will a developer in an approximate A Zone have to prepare a detailed study to calculate base flood elevations if the development is:

| | |
|---|---|
| 4 acres? | *No* |
| 60 lots? | *Yes* |
| Reserving all the SFHA as open space? | *No* |

11. A restudy was performed on Rocky River. The preliminary study will not be final for another five months. It shows a new BFE at Site B that is two feet lower than the BFE in your current FIS. Which one do you use to determine the flood protection level for a new home at Site B?

    *When the BFE in the new study is lower than the BFE in the existing study, the existing FIS data should be used until the new study is final.*

12. Does dredging a creek to make it deeper to reduce flood levels need a floodplain permit?

    *Yes. It is considered development and all development needs a permit.*

13. Does replacing an old manufactured home with a new one on the same foundation need a permit?

    *Yes*

14. If an old manufactured home is replaced with a new one on the same foundation, will the new one have to be elevated above the BFE?

    *Yes, unless it is in an existing manufactured home park. Then the owner has the option of elevating either above the BFE or 36" above grade on reinforced piers.*

15. If a project will involve filling a wetland, is it likely that a federal or state permit will be needed?

    *Yes. The U.S. Army Corps of Engineers requires a Section 404 permit for most wetland filling activities. A local permit should not be issued until it is clear that the project does not violate Section 404 rules.*

16. A builder wants to put a house in the floodway. How much can his project increase the base flood elevation (in feet)?

*Zero. A project in a floodway is not allowed to cause any increase in floodwaters.*

17. Will paving a dirt street in the floodway need an engineer's "no-rise" certification?

    *No, as long as the grade of the street is no higher than it was before the paving project.*

18. A city councilman complains that the NFIP floodway regulations prevent construction of a flood control dam that will protect people from flooding. What can you tell him?

    *The community can apply for a conditional letter of map revision if it can provide the following:*

    *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.*

19. Does a substantial improvement to an existing building have to meet the same requirements as construction of a new building?

    *Yes*

20. Can a new nonresidential building be built:

    On fill in the flood fringe? *Yes*

21. On fill in the floodway? Probably not. It would be hard to show that the fill does not cause an increase in flood heights.

    | | |
    |---|---|
    | On fill in the V Zone? | *No* |
    | At grade, but floodproofed in the flood fringe? | *Yes* |
    | At grade, but floodproofed in the V Zone? | *No* |

22. A builder wants to build an apartment building on stem walls parallel to the flow of water with the lowest floor 8’ above grade. Can the lower area be used as a parking lot?

    *Yes*

23. What’s the best record to keep to be sure that a house was elevated high enough?

    *A FEMA Elevation Certificate. Any surveyor’s or engineer’s record of the elevation of the lowest floor meets the NFIP requirements, but the FEMA form is recommended.*

24. How many standard 8” x 16” openings are needed for a building that will have a 2,250 square foot crawlspace?

    *2,250 divided by 128 = 17.57, rounded up to 18.*

25. Can the owner store garden tools in a floodable crawlspace?

    *Yes, if there is enough warning time to move it.*

26. A business on the Mississippi River wants to build a floodproofed warehouse in the flood fringe. The plans are to have the walls built of reinforced concrete up to the BFE. Several garage doors will be open at grade to allow trucks in and out, but the design includes movable shields that can be put in place before floodwaters arrive. There would be no other openings below the BFE. The warehouse will have a 24-hour security force that will be trained on how to install the shields. The design engineer will certify that the building will be floodproofed (with human intervention) up to the base flood elevation. Can you approve these plans?

    *Yes, assuming there is adequate warning time to install the shields, which there probably is on the Mississippi River.*

27. A builder wants to build a “bi-level” house where the lowest floor is three feet below grade. The lowest floor has large windows and includes three bedrooms and a bathroom. Because it is habitable space, the owner does not consider this a “basement.” Does the NFIP consider this a “basement?”

    *Yes and the lowest floor (i.e., the basement) must be above the BFE.*

28. The area below a planned elevated house in the V Zone will have a 260 square foot enclosure to house the entryway and storage closets. The builder wants to insulate the area and finish it with wallboard, wallpaper and carpeting. He says it’s OK because the area is less than 300 square feet. What do you tell him?

    *It’s not OK. Any enclosed space below the lowest floor must be built of flood resistant materials and free of obstruction, or constructed with non-supporting breakaway walls, open wood latticework or insect screening.*

29. Where can you find standards for tying down manufactured homes?

    *Check first to see if there are state regulations. If not, see FEMA's Manufactured Home Installation in Flood Hazard Areas, FEMA-85.*

30. A new house is planned to be built in an SFHA marked "Zone AO (depth 3 feet)." How high should the lowest floor be?

    *At least 3 feet above the highest adjacent grade.*

31. Why are pilings and posts preferred in V Zones?

    *They can better withstand the wind and water loads*.

## *UNIT 6 LEARNING CHECK #1*

1. What NFIP program recognizes local regulatory standards that are more restrictive than the minimum NFIP regulations?

2. If a regulatory requirement prohibits an owner from any use of his land, it is referred to by the legal term _____ .

3. In how many court cases have the NFIP regulations been overruled as un-constitutional?

4. If a state requirement is more restrictive than the NFIP requirements, which set of rules must a community follow?

5. Does your community's ordinance have any provisions that are more restrictive than the minimum NFIP requirements?

6. Name two higher regulatory standards that can be used to encourage building sites completely out of the floodplain?

7. What is freeboard?

8. What is the preferred flood protection approach for critical facilities?

9. How does compensatory storage work?

10. What is "stormwater management?"

## *UNIT 6-LEARNING CHECK #2*

1. Is your community subject to any of the following flood hazards of special concern?

   Coastal erosion
   Tsunamis
   Closed basin lakes
   Uncertain flow paths or alluvial fans
   Upstream dams
   Ice jams
   Mudflows

2. If so, have you enacted any additional regulatory provisions to better protect future development from damage?

3. Since there are several federal agencies that regulate wetland development, protect rare and endangered species, etc., is there any need for your community to consider any additional environmental protection measures?

4. Name three types of regulations that can protect natural resources in your floodplains.

## *UNIT 6-LEARNING EXERCISE*

1. Does the NFIP allow communities to enact more restrictive regulatory standards?

2. Can a floodplain regulation ever prohibit new buildings from a portion of the floodplain?

3. Name two types of floodprone areas where many communities prohibit development.

4. What's the advantage of requiring dry land access if buildings are protected from flooding?

5. How could a developer of an 80-acre subdivision reduce the amount of runoff that leaves the property during a storm?

6. Do Federal agencies have to meet any floodplain development rules similar to the NFIP requirements?

## *UNIT 6-LEARNING CHECK #1 -ANSWERS*

1. What NFIP program recognizes local regulatory standards that are more restrictive than the minimum NFIP regulations?

   *The Community Rating System (CRS)*

2. If a regulatory requirement prohibits an owner from any use of his land, it is referred to by the legal term _____ .

   *Taking*

3. In how many court cases have the NFIP regulations been overruled as un-constitutional?

   *None*.

4. If a state requirement is more restrictive than the NFIP requirements, which set of rules must a community follow?

   *The more restrictive state requirement.*

5. Does your community's ordinance have any provisions that are more restrictive than the minimum NFIP requirements?

   *Depends on the community*.

6. Name two higher regulatory standards that can be used to encourage building sites completely out of the floodplain?

   *Subdivision design that encourages cluster development on high ground*
   *Low density zoning that gives owners large lots large enough to avoid small floodplains*

7. What is freeboard?

   *An additional height requirement above the base flood elevation that provides a margin of safety against extraordinary or unknown risks.*

8. What is the preferred flood protection approach for critical facilities?

   *Keep them out of the 500-year floodplain. The next best approach is to protect them to the 500-year flood level.*

9. How does compensatory storage work?

   *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.*

10. What is “stormwater management?”

    *Efforts that reduce the impact of increased runoff that results from new development in the watershed.*

## *UNIT 6-LEARNING CHECK #2 -ANSWERS*

1. Is your community subject to any of the following flood hazards of special concern?

   Coastal erosion
   Tsunamis
   Closed basin lakes
   Uncertain flow paths or alluvial fans
   Upstream dams
   Ice jams
   Mudflows

   *Depends on the community.*

2. If so, have you enacted any additional regulatory provisions to better protect future development from damage?

   *Depends on the community.*

3. Since there are several federal agencies that regulate wetland development, protect rare and endangered species, etc., is there any need for your community to consider any additional environmental protection measures?

   *Probably. Federal programs may not address the particular needs of your locality.*

4. Name three types of regulations that can protect natural resources in your floodplains.

   *Wetland protection regulations*
   *Habitat protection regulations*
   *Restrictions on on-site sewage disposal*
   *Water quality regulations and rules on stormwater runoff (non point sources of pollution)*
   *Designating unique or valuable areas for special protection*

## *UNIT 6–LEARNING EXERCISE -ANSWERS*

1. Does the NFIP allow communities to enact more restrictive regulatory standards?

   *Yes. ".. 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." (44 CFR 60.1(d))*

2. Can a floodplain regulation ever prohibit new buildings from a portion of the floodplain?

   *Yes, if the area is sufficiently dangerous and/or there is a clear relationship between the prohibition and protecting the public from the hazard created by the development.*

3. Name two types of floodprone areas where many communities prohibit development.

   *High hazard areas, such as flash flood areas and very deep floodways*
   *Natural or sensitive areas, such as wetlands*

4. What's the advantage of requiring dry land access if buildings are protected from flooding?

   *It protects people by allowing them to evacuate when floodwaters come up and allows emergency service vehicles to protect the properties during a flood.*

5. How could a developer of an 80-acre subdivision reduce the amount of runoff that leaves the property during a storm?

   *Include stormwater detention or retention basins to hold or delay the runoff from the site.*

6. Do Federal agencies have to meet any floodplain development rules similar to the NFIP requirements?

   *Yes. The National Environmental Policy Act (NEPA) and Executive Order 11988 require Federal agencies to meet the same or more restrictive development standards.*

## *UNIT 7 - LEARNING CHECK #1*

1. Review your floodplain regulations and identify where the following provisions are found.

   Purpose statement
   Definitions of

   __base flood elevation
   __building or structure
   __development
   __floodway
   __lowest floor
   __substantial improvement
   __substantial damage

   Adoption of the FIRM or other floodplain map
   Adoption of the Flood Insurance Study
   Requirement for a permit for all development in the floodplain
   Construction standards:

   __floodway construction (if applicable)
   __encroachment analysis where floodways are not mapped
   __building elevation criteria
   __floodproofing criteria
   __anchoring requirements
   __ standards for manufactured (mobile) homes
   __standards for manufactured home parks
   __construction standards in V Zones
   __construction standards peculiar to the zones in your community
   __standards for subdivisions
   __standards for water and sewer service
   __rules on water course alterations

   Designation of administrator
   Duties of the administrator
   Appeals process
   Enforcement procedures and penalties
   Abrogation and greater restriction
   Severability

2. Check your community's other regulatory ordinances to determine if there are any inconsistencies between them and your floodplain construction standards.

## *UNIT 7-LEARNING CHECK #2*

1. What activities are exempt from regulation under your floodplain ordinance?

2. Does your community have a permit application form that makes sure things like a floodway encroachment analysis or V Zone certification are not missed?

3. What five items need to be checked to ensure an application for a permit is complete?

4. What departments or offices in your community should review a permit application before it is approved?

5. During your permit review, you find that the applicant's site plan shows that the ground is currently higher than the BFE. Should you continue to treat this as a floodplain development permit?

6. What's the best way to make sure the applicant's engineering certifications are sufficient?

7. What are the key items you need to check when reviewing the plans for a new house to be built on pilings in the V Zone?

8. Match the list of proposed projects with the documents that will be needed in order to determine if the project should be built in the floodplain.

   -New shopping center parking lot in the floodway
   -New house in the fringe
   -New business in the V Zone
   -Reconstruction of a state highway bridge
   -New house built over a floodable, but enclosed garage
   -Floodplain development permit application
   -Site and/or building plans
   -Floodway encroachment analysis
   -Floodproofing certification
   -Non-conversion agreement
   -V Zone certification

## *UNIT 7-LEARNING CHECK #3*

1. When is the best time to make the first site inspection?

2. When should you make the second inspection of a building on a slab foundation?

3. What are your two options for making sure a new building is high enough before you allow construction to proceed after the second inspection?

4. What should you check for during the third inspection?

5. If a project meets all of the ordinance requirements and is built according to the approved plans, what does the owner get after the final inspection?

## *UNIT 7-LEARNING CHECK #4*

1. If a FEMA staff person finds a project in violation of the FEMA NFIP requirements in your community, who is responsible for correcting the violation?

2. You discover that Mrs. Murphy has ordered five truckloads of fill to raise her back yard in the floodway. She never asked for a permit. What is the recommended first step to dealing with this situation?

3. If a project is found underway in the floodplain, what is the first step you should take?

4. What legal recourses do you and your attorney have to bring a violation into compliance?

5. What are the NFIP procedures for submitting an appeal to your Board of Appeals?

6. Mr. Wilson wants to build a new house at grade instead of to the BFE, six feet above grade. You tell him he will need a variance. Which of the following are good and sufficient causes for granting him a variance?

7. An elevated house will look bad

8. Mrs. Wilson is old and has trouble with stairs

9. It will cost more money than the builder can afford

10. The builder has a contract with the bank to have it completed and sold in four months and changing plans will prevent meeting that deadline.

11. No one has ever seen a flood on that site.

12. Mr. Wilson is applying for a variance to build his house below the BFE. What two things must you tell him (in writing)?

## *UNIT 7-LEARNING CHECK #5*

1. Why should you keep permit records?

2. What records should be kept in your permit file?

3. Who is responsible for ensuring that the elevation certificate is completed correctly?

4. What are the four situations when a record of an engineer's or surveyor’s certification is needed?

5. A property has been annexed from the county into your city, but the FIRM has not been revised to reflect the annexation. What is the NFIP community number that is recorded in Item 1, Section B of the FEMA Elevation Certificate?

6. Is a V Zone Certification needed for a residential building?

7. Where do you get a Biennial Report to send in to FEMA?

## *UNIT 7-LEARNING EXERCISE*

1. Does your community have formal written permit review procedures to ensure that a development proposal is properly reviewed and inspected?

2. What are the four situations where a certification will be needed before a floodplain development permit can be issued?

3. A development plan proposes to fill and re-grade an area of the fringe to give most of the lots building sites that are above the BFE. The developer says “then we won’t have the banks telling people my subdivision is in the floodplain.” What do you tell the developer?

4. What are the key items you need to check when reviewing the plans for a new house to be built on a slab foundation on fill in the fringe?

5. You deny an application to build a house in the floodplain because the plans show a proposed basement 6’ below the BFE. What recourses does the applicant have now?

6. What should you check for during the first site inspection?

7. When should you make the second inspection for a building to be elevated on a crawlspace or columns?

8. If you use a level to verify the elevation of a building during the second inspection, will the builder still need to provide an as-built elevation certificate?

9. When is the best time to see if a crawlspace has adequate openings?

10. During the second inspection, you find that the builder wants to build the lowest floor three feet below the BFE in order to save on construction costs. What repercussions would the owner face if the community issued a certificate of occupancy for the building and did not pursue any enforcement action?

11. If the third inspection reveals that the builder of an apartment house has made a change to the structure that results in a major violation of your floodplain regulations, what can you do?

12. How can Section 1316 help a local permit official faced with a subdivider who refuses to build houses in compliance with the floodplain regulations?

13. Can a community grant a variance to allow a project in the floodway that will cause a ½ foot increase in flood heights.

14. Name two situations where special exceptions may be granted for a variance.

15. Permit records should be kept systematically. Your system should be keyed so you can retrieve permit files by:

16. What are the advantages of using the FEMA Elevation Certificate as a record of a building's lowest floor elevation?

17. Can a surveyor sign a Floodproofing Certificate?

18. What is needed to support a No-rise certification?

## *UNIT 7-LEARNING CHECK #1 -ANSWERS*

1. This learning check is a review of where the various NFIP requirements appear in your own ordinance. There are no correct answers, only the need to make sure that all the items listed in the learning check are covered.

## *UNIT 7-LEARNING CHECK #2 -ANSWERS*

2. What activities are exempt from regulation under your floodplain ordinance?

   *Depends on the community. Small projects and activities by other governmental agencies may be exempt. Check with your State NFIP Coordinator to verify that any exempt activities are either covered by other regulations or are too small to be of concern.*

3. Does your community have a permit application form that makes sure things like a floodway encroachment analysis or V Zone certification are not missed?

   *Depends on the community. If not, you'll find Figure 7-4 very helpful.*

4. What five items need to be checked to ensure an application for a permit is complete?

   *All forms are completed and signed*
   *Site, grading, building, etc. plans are complete*
   *All necessary certifications are provided*
   *All necessary state and federal permits are being obtained*
   *Copies of the application are forwarded to other departments for review*

5. What departments or offices in your community should review a permit application before it is approved?

   *Depends on the community. This is a very important procedure to check to be sure that a project will meet all of your community's development requirements.*

6. During your permit review, you find that the applicant's site plan shows that the ground is currently higher than the BFE. Should you continue to treat this as a floodplain development permit?

   *You do not have to. It's still a good idea to encourage the applicant to incorporate flood protection measures in case a future flood is higher than the predicted BFE (e.g., don't build any homes with basements).*

7. What's the best way to make sure the applicant's engineering certifications are sufficient?

   *Have your community's engineer review them.*

8. What are the key items you need to check when reviewing the plans for a new house to be built on pilings in the V Zone?

   *The proposed elevation of the lowest floor*
   *Whether there will be any enclosures below the elevated floor*
   *The V Zone certification signed by a registered professional architect or engineer.*
   *The materials used in the area below the BFE.*

9. Match the list of proposed projects with the documents that will be needed in order to determine if the project should be built in the floodplain.

   __New shopping center parking lot in the floodway *a, b, c*
   __New house in the fringe *a, b*
   __New business in the V Zone *a, b, f*
   __Reconstruction of a state highway bridge see below
   __New house built over a floodable, but enclosed garage *a, b, e*

   *a.* Floodplain development permit application
   *b.* Site and/or building plans
   *c.* Floodway encroachment analysis
   *d.* Floodproofing certification
   *e.* Non-conversion agreement
   *f.* V Zone certification

*The state highway department may be exempt from local regulations. However, it is a good idea to talk to the State NFIP Coordinator to ensure that the project meets all state floodplain management requirements.*

## *UNIT 7–LEARNING CHECK #3 -ANSWERS*

1. When is the best time to make the first site inspection?

   *After the site is staked out and before permanent foundation work has begun.*

2. When should you make the second inspection of a building on a slab foundation?

   *When the forms are in place, but before the concrete is poured.*

3. What are your two options for making sure a new building is high enough before you allow construction to proceed after the second inspection?

   *Have the builder provide an elevation certificate*
   *Check the elevation yourself during the second inspection*

4. What should you check for during the third inspection?

   *Ensure that the foundation and floor elevation have 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.*

5. If a project meets all of the ordinance requirements and is built according to the approved plans, what does the owner get after the final inspection?

   *A certificate of occupancy, certificate of compliance, use permit or other official document that allows the building to be occupied or used.*

## *UNIT 7–LEARNING CHECK #4 –ANSWERS*

1. If a FEMA staff person finds a project in violation of the FEMA NFIP requirements in your community, who is responsible for correcting the violation?

   Your local permit official.

2. You discover that Mrs. Murphy has ordered five truckloads of fill to raise her back yard in the floodway. She never asked for a permit. What is the recommended first step to dealing with this situation?

   Talk to Mrs. Murphy and explain why a permit is needed and why it is important not to fill in the floodway. You should get voluntary compliance.

3. If a project is found underway in the floodplain, what is the first step you should take?

   Advise the owner to stop work and tell him or her (in writing) that the project is in violation and what should be done to correct it.

4. What legal recourses do you and your attorney have to bring a violation into compliance?

   A fine (that can increase for each day the violation continues)
   Recording the violation in the property's deed records
   A court injunction to stop work

5. What are the NFIP procedures for submitting an appeal to your Board of Appeals?

   There are none, or, more correctly, they are whatever your ordinance specifies.

6. Mr. Wilson wants to build a new house at grade instead of to the BFE, six feet above grade. You tell him he will need a variance. Which of the following are good and sufficient causes for granting him a variance?

7. An elevated house will look bad

8. Mrs. Wilson is old and has trouble with stairs

9. It will cost more money than the builder can afford

10. The builder has a contract with the bank to have it completed and sold in four months and changing plans will prevent meeting that deadline.

11. No one has ever seen a flood on that site.

    None of these. They do not show an exceptional hardship, they are not unique to the property, nor do they pertain to the land, not the owners.

12. Mr. Wilson is applying for a variance to build his house below the BFE.
    What two things must you tell him (in writing)?

    (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.

## *UNIT 7–LEARNING CHECK #5 -ANSWERS*

1. Why should you keep permit records?

   *Records do the following:*
   *Show what you approved and what you told the developer.*
   *Form a paper trail needed for administrative or legal proceedings.*
   *Give future owners information about the property.*
   *Are checked by FEMA or the state to determine if your community is in full compliance with the NFIP.*

2. What records should be kept in your permit file?

   *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 break away 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.*

3. Who is responsible for ensuring that the elevation certificate is completed correctly?

   *The permit official*

4. What are the four situations when a record of an engineer's or surveyor's certification is needed?

   *Elevation certificate: needed for new or substantially improved buildings that are elevated in the SFHA*
   *Floodproofing certificate: needed for new or substantially improved nonresidential buildings that are floodproofed.*
   *V Zone certification: needed for new or substantially improved buildings in V Zones*
   *No-rise certification: needed for development projects in floodways (or its equivalent in riverine floodplains where the floodway has not been mapped)*

5. A property has been annexed from the county into your city, but the FIRM has not been revised to reflect the annexation. What is the NFIP community number that is recorded in Item 1, Section B of the FEMA Elevation Certificate?

   *Your city's NFIP number. The county NFIP number is entered in Item 2 of Section B.*

6. Is a V Zone Certification needed for a residential building?

   *Yes. It is needed for all buildings and substantial improvements in the V Zone.*

7. Where do you get a Biennial Report to send in to FEMA?

   *Don't worry. FEMA sends it to the community every two years.*

## *UNIT 7–LEARNING EXERCISE -ANSWERS*

1. Does your community have formal written permit review procedures to ensure that a ! proposal is properly reviewed and inspected?

   *The answer should be "yes," although there is no NFIP requirement for written procedures. You are responsible for ensuring that your ordinance is legally enforceable and that will require that you be able to demonstrate that you have adequate administrative procedures.*

2. What are the four situations where a certification will be needed before a floodplain development permit can be issued?

   *Floodway encroachment analysis*
   *Engineer's certification of floodproofing design*
   *Non-conversion agreement for enclosed lower areas*
   *V Zone design certification*

3. A development plan proposes to fill and re-grade an area of the fringe to give most of the lots building sites that are above the BFE. The developer says "then we won't have the banks telling people my subdivision is in the floodplain." What do you tell the developer?

   *While the permit office 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 Revision (LOMR) in order to have the FIRM reflect the better data.*

4. What are the key items you need to check when reviewing the plans for a new house to be built on a slab foundation on fill in the fringe?

   *The proposed elevation of the lowest floor*
   *Your building code should also require you to make sure the fill will be properly compacted and protected from erosion and will not cause local drainage problems on neighboring properties.*

5. You deny an application to build a house in the floodplain because the plans show a proposed basement 6' below the BFE. What recourses does the applicant have now?

   *He can drop the idea and withdraw the application*
   *He can redesign the house so the lowest floor (including basement) is above the required flood protection level.*
   *He can appeal to the Board of Appeals if he thinks you misread or misinterpreted the requirements*
   *He can apply for a variance to allow the basement.*

6. What should you check for during the first site inspection?

   *The location of the floodplain and floodway boundaries.*
   *Setbacks from lot lines, channel banks, etc.*
   *Floodway encroachments, if applicable.*

7. When should you make the second inspection for a building to be elevated on a crawlspace or columns?

   *After the foundation is completed, so you can check if it is high enough before the lowest floor is built.*

8. If you use a level to verify the elevation of a building during the second inspection, will the builder still need to provide an as-built elevation certificate?

   *Yes*

9. When is the best time to see if a crawlspace has adequate openings?

   *During the second inspection, before the floor is built. This will allow the builder to install the needed openings with a minimum of disruption to the structure.*

10. During the second inspection, you find that the builder wants to build the lowest floor three feet below the BFE in order to save on construction costs. What repercussions would the owner face if the community issued a certificate of occupancy for the building and did not pursue any enforcement action?

    *Even though the certificate of occupancy says the owner had a "legal" building, the flood insurance rates would be based on the elevation of the lowest floor. The annual insurance premium would be very high. A few years of such premiums would likely be more expensive than the extra cost of meeting the ordinance's elevation requirement.*

11. If the third inspection reveals that the builder of an apartment house has made a change to the structure that results in a major violation of your floodplain regulations, what can you do?

    *Withhold the certificate of occupancy. (This assumes that you have an ordinance that states that utilities cannot be turned on and/or apartments cannot be rented until the certificate is issued.)*

12. How can Section 1316 help a local permit official faced with a subdivider who refuses to build houses in compliance with the floodplain regulations?

    *It authorizes FEMA to deny flood insurance to a property declared in violation of the community's ordinance. Among other things, this will prevent the property from receiving any federal grants and loans and may limit mortgages from federally regulated or insured lending institutions.*

13. Can a community grant a variance to allow a project in the floodway that will cause a ½ foot increase in flood heights.

    *No. "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…" (44 CFR 60.6(a)1.)*

14. Name two situations where special exceptions may be granted for a variance.

    *Historic buildings and functionally dependent uses.*

15. Permit records should be kept systematically. Your system should be keyed so you can retrieve permit files by:

    *Geographical identifier, such as street address*

16. What are the advantages of using the FEMA Elevation Certificate as a record of a building's lowest floor elevation?

    *It includes all the data needed for NFIP compliance It meets the requirements of the Community Rating System It is needed by insurance agents to write a policy.*

17. Can a surveyor sign a Floodproofing Certificate?

    *No, it must be signed by a registered professional engineer.*

*18.* What is needed to support a No-rise certification?

    *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.*

## *UNIT 8 - LEARNING CHECK #1*

1. What is the basic rule on improvements and repairs to existing buildings in the floodplain?

2. Mrs. Murphy got a permit two months ago to remodel her living room and kitchen. Now she wants a permit to remodel three bedrooms and two bathrooms. Should you check each of these separately to determine if each project is a substantial improvement?

3. What is the substantial improvement formula?

4. Which of the following items must be included when calculating the cost of an improvement project?

   ___Attached deck
   ___Plumbing
   ___Permit fees
   ___Contractor's overhead and profit
   ___Architect's plans
   ___Landscaping
   ___Built-in bookcases

5. What factors are considered when determining market value?

6. What are three good sources for obtaining the market value of a house?

7. Mr. Jones proposes a $50,000 addition to his $80,000 home in the floodplain. Is this a substantial improvement?

8. If Mr. Jones' project will be a substantial improvement, what do you need to check to see if the whole house has to be elevated or just the addition?

## *UNIT 8-LEARNING CHECK #2*

1. What is the formula for determining substantial damage?

2. What is the basic rule on calculating the cost of the damage?

3. A tornado swept through town and substantially damaged 25 buildings in the floodplain. How can you help the property owners comply with the floodplain ordinance's substantial damage regulations?

4. Mr. Johnson prepared a list of everything he has to do to repair his flooded home. Which of the following items are counted toward the cost of repairs when determining substantial damage? What is the dollar amount that should be counted?

   ___Clearing broken trees and debris away from the house ($2,500)
   ___Replacing the warped flooring ($3,000)
   ___New doors ($1,000) to replace old ones (worth $500)
   ___Replacing the old kitchen cabinets (valued at $5,000) with custom hardwood cabinets valued at $15,000.
   ___New wall to wall carpeting ($1,800)
   ___New furniture ($12,000)
   ___New wiring ($2,000) to bring the building up to current code (This is a standard requirement of the community. The building was not cited as having a code violation.)
   ___Permit fee ($500)
   ___Clean out and test the furnace (done free as a public service by the utility company, but otherwise worth $250 if done by a private contractor)
   ___New bushes and replacement fence ($1,500)

5. What's the best way to determine if a building is "historic" and eligible for exemption from the substantial improvement requirement?

## *UNIT 8-LEARNING EXERCISE*

1. What kind of projects need a permit so you can check to see if they would be substantial improvements?

2. A home was built to post-FIRM standards in 1990. The lowest floor was elevated four feet above grade, to the BFE in effect at that time. In 1995, a new FIRM went into effect. The new BFE is now six feet above grade at that site.

   How high would a small (less than substantial) addition have to be elevated?

   How high would a large (substantial) addition have to be elevated?

3. Mrs. Murphy bought her property for $100,000 last year. Is this a good basis for determining its market value?

4. Based on tax assessor's records, the market value of 123 Main Street is $75,000. The owner wants to replace the HVAC and plumbing, remodel the kitchen and both bathrooms and convert his basement to a finished family room. His total cost is $20,000 for supplies. If a contractor were to do the job, the total cost would be $45,000. However, since he is a handyman and will do all the work himself, the total cost of his project is $20,000. What is your response?

5. Mrs. Smith wants a new second story that will double the size and value of her house. The floor of the new story will be above the BFE. Will the old first floor have to be elevated?

6. The substantial damage regulations only apply if the building was damaged by a flood. True or false?

7. A flooded property owner has a brother who is a plumbing contractor. His brother's repair estimate shows the damage at 48% of the building's value. You think it should be higher. What can you do to prevent an argument over who's numbers are right?

8. Mrs. McGillicudy is on a fixed income. Her home was flooded and substantially damaged. Her flood insurance policy will pay for the repairs. When told that she will also have to elevate her house, she thinks she should apply for a variance due to the financial hardship. What do you tell her?

9. Before the flood, Mr. Johnson had been cited by the community for a code violation. The paint on his garage door had been peeling, which was a violation of the local housing maintenance code. Since the flood left mud up to the high water line, he decided to repaint the whole house. Can he claim exemption of the cost of the painting because it had been cited as a code violation?

## *UNIT 8-LEARNING CHECK #1 -ANSWERS*

1. What is the basic rule on improvements and repairs to existing buildings in the floodplain?

   *If the cost of improvements or the cost to repair the damage exceeds 50 percent of the market value of the building, it must be brought up to current floodplain management standards.*

2. Mrs. Murphy got a permit two months ago to remodel her living room and kitchen. Now she wants a permit to remodel three bedrooms and two bathrooms. Should you check each of these separately to determine if each project is a substantial improvement?

   *No. They should be counted as one project and their total cost combined.*

3. What is the substantial improvement formula?

   *A project is a substantial improvement if:*

   *Cost of improvement project > 50 percent*
   *Market value of the building*

4. Which of the following items must be included when calculating the cost of an improvement project?

| | |
|---|---|
| ___Attached deck | *yes* |
| ___Plumbing | *yes* |
| ___Permit fees | *no* |
| ___Contractor's overhead and profit | *yes* |
| ___Architect's plans | *no* |
| ___Landscaping | *no* |
| ___Built-in bookcases | *yes* |

5. What factors are considered when determining market value?

   *"The price a willing buyer and seller agree upon." Factors to consider are the building's original quality, subsequent improvements, age and current condition.*

6. What are three good sources for obtaining the market value of a house?

   *An independent appraisal by a professional appraiser.*
   *Detailed estimates of the structure's actual cash value (the replacement cost for a building, minus a depreciation percentage based on age and condition).*
   *Property appraisals used for tax assessment purposes with an adjustment recommended by the tax appraiser to reflect market conditions (adjusted assessed value).*
   *The value of buildings taken from NFIP claims data (usually actual cash value).*
   *Qualified estimates based on sound professional judgment made by the staff of the local building department or tax assessor's office.*

7. Mr. Jones proposes a $50,000 addition to his $80,000 home in the floodplain. Is this a substantial improvement?

   *Yes, 50,000 divided by 80,000 = 0.625, more than 50%*

8. If Mr. Jones' project will be a substantial improvement, what do you need to check to see if the whole house has to be elevated or just the addition?

   *Check the extent of work on the common wall and the existing building. If the common wall is demolished as part of the project, the existing building and the addition must be elevated.*

## *UNIT 8–LEARNING CHECK #2 -ANSWERS*

1. What is the formula for determining substantial damage?

   *A building was substantially damaged if:*
   *Cost to repair > 50 percent*
   *Market value of the building*

2. What is the basic rule on calculating the cost of the damage?

   *Substantial damage is determined regardless of the actual cost to the owner. You must figure the true cost of bringing the building back to its pre-damage condition using qualified labor and materials obtained at market prices.*

3. A tornado swept through town and substantially damaged 25 buildings in the floodplain. How can you help the property owners comply with the floodplain ordinance's substantial damage regulations?

   *Help the owner obtain financial assistance. Many programs are available after a disaster declaration.*

4. Mr. Johnson prepared a list of everything he has to do to repair his flooded home. Which of the following items are counted toward the cost of repairs when determining substantial damage? What is the dollar amount that should be counted?

   ___Clearing broken trees and debris away from the house ($2,500) *$0*
   ___Replacing the warped flooring ($3,000) *$3,000*
   ___New doors ($1,000) to replace old ones (worth $500) *$1,000*
   ___Replacing the old kitchen cabinets (valued at $5,000) with custom hardwood cabinets valued at $15,000. *$15,000*
   ___New wall to wall carpeting ($1,800) *$1,800*
   ___New furniture ($12,000) *$0 (not part of the structure)*
   ___New wiring ($2,000) to bring the building up to current code (This is a standard requirement of the community. The building was not cited as having a code violation.) *$2,000*
   ___Permit fee ($500) *$0*
   ___Clean out and test the furnace (done free as a public service by the utility company, but otherwise worth $250 if done by a private contractor) *$250*
   ___New bushes and replacement fence ($1,500) *$0 (not part of the structure)*

5. What's the best way to determine if a building is "historic" and eligible for exemption from the substantial improvement requirement?

   *See if it's on an approved list of historic structures (see Figure 7-13)*

## *UNIT 8–LEARNING EXERCISE -ANSWERS*

1. What kind of projects need a permit so you can check to see if they would be substantial improvements?

   *Remodeling projects.*
   *Rehabilitation projects.*
   *Building additions.*

2. A home was built to post-FIRM standards in 1990. The lowest floor was elevated four feet above grade, to the BFE in effect at that time. In 1995, a new FIRM went into effect. The new BFE is now six feet above grade at that site.

   a. *How high would a small (less than substantial) addition have to be elevated?*
      *To at least four feet above grade.*
   b. *How high would a large (substantial) addition have to be elevated?*
      *To at least six feet above grade.*

3. Mrs. Murphy bought her property for $100,000 last year. Is this a good basis for determining its market value?

   *It's a start, but the true market value may be different this year, depending on the local housing market. You also need to subtract the value of the land, landscaping, and detached structures that would have been in the purchase price for the property.*

4. Based on tax assessor's records, the market value of 123 Main Street is $75,000. The owner wants to replace the HVAC and plumbing, remodel the kitchen and both bathrooms and convert his basement to a finished family room. His total cost is $20,000 for supplies. If a contractor were to do the job, the total cost would be $45,000. However, since he is a handyman and will do all the work himself, the total cost of his project is $20,000. What is your response?

   *The total cost of the project must be the true cost, including the cost of labor and donated materials. This project will be a substantial improvement.*

5. Mrs. Smith wants a new second story that will double the size and value of her house. The floor of the new story will be above the BFE. Will the old first floor have to be elevated?

   *Yes. The project should be a substantial improvement and the entire building will need to be elevated in this situation.*

6. The substantial damage regulations only apply if the building was damaged by a flood. True or false?

   *False, the damage can be from any cause.*

7. A flooded property owner has a brother who is a plumbing contractor. His brother's repair estimate shows the damage at 48% of the building's value. You think it should be higher. What can you do to prevent an argument over who's numbers are right?

   *Get the cost to repair from an objective third-party or undebatable source, such as:*
   *A licensed general contractor.*
   *A professional construction estimator.*
   *Insurance adjustment papers (exclude damage to contents).*
   *Damage assessment field surveys conducted by building inspection, emergency management or tax assessment agencies after a disaster.*

8. Mrs. McGillicudy is on a fixed income. Her home was flooded and substantially damaged. Her flood insurance policy will pay for the repairs. When told that she will also have to elevate her house, she thinks she should apply for a variance due to the financial hardship. What do you tell her?

   *Her flood insurance policy has Increased Cost of Compliance coverage that will help pay for the cost of meeting the ordinance's requirement to elevate. Your office may be able to help her find financial assistance to pay for the rest of the cost, if needed.*

9. Before the flood, Mr. Johnson had been cited by the community for a code violation. The paint on his garage door had been peeling, which was a violation of the local housing maintenance code. Since the flood left mud up to the high water line, he decided to repaint the whole house. Can he claim exemption of the cost of the painting because it had been cited as a code violation?

   *No. Only exempt the items specifically required by the citation and what is minimally necessary to comply.*

## *UNIT 9 - LEARNING CHECK #1*

1. Where does a property owner go to buy a flood insurance policy?

2. Can I buy a flood insurance policy with building coverage on the following?

   - An apartment building
   - A septic tank
   - An open sided park pavilion
   - A motor home
   - A boat dock
   - A mobile home on a foundation in a mobile home park
   - A flower garden

3. What is the maximum amount of contents coverage I can get for a single family dwelling?

4. Can I wait and buy a flood insurance policy after I hear the National Weather Service issue a flood warning?

5. Which of the following programs is likely to require a flood insurance policy as a condition of financial assistance?

   - Department of Veterans Affairs mortgage loan guarantees
   - HUD Community Development Block Grants
   - Federal disaster assistance
   - Home improvement loans from a bank participating in FDIC
   - Mortgage from a federal credit union

6. Does your local government have flood insurance coverage on the buildings it owns in the floodplain?

7. Do I need an elevation certificate to purchase a flood insurance policy on a pre-FIRM building?

8. Is there much of a cost savings on flood insurance if the lowest floor of a Post-FIRM building is one foot above the BFE instead of at the BFE?

9. Can I get a good flood insurance rate on a building in an AE Zone that is floodproofed to the base flood elevation?

10. What's the best way to get a good flood insurance rate for a new building in an approximate A Zone?

## *UNIT 9-LEARNING CHECK #2*

1. What are some of the benefits of joining the Community Rating System?
2. Does your community implement any of the 18 activities credited by the CRS?
3. What is a CBRS zone?
4. Can I request a LOMA to get my property out of a CBRS zone?
5. Are there any CBRS zones in Flood County?

## *UNIT 9 LEARNING EXERCISE*

1. Who sets the rates and coverage rules for flood insurance policies, FEMA or private insurance companies?

2. What are the two types of flood insurance coverage available?

3. Can I get flood insurance coverage for furniture in a basement?

4. Can a bank require flood insurance for a property outside the SFHA shown on the latest FIRM?

5. What are the two key factors in rating Post-FIRM buildings?

6. How do I know how much a flood insurance policy will cost for a Post-FIRM building with the lowest floor four feet below the BFE?

7. How can your community help its residents get lower flood insurance rates?

8. Can a community get CRS credit for activities implemented by a state agency on behalf of the community?

9. Can non-CRS communities obtain and benefit from CRS publications?

10. RM 38-1 is located near Site A on Flood County's FIRM. Is RM 38-1 in an SFHA?

11. Is RM 38-1 in a CBRS zone?

12. Mrs. Murphy's Chowder House was built at the east end of Vassar Road on panel 38 in 1994. The restaurant got flooded last month. Which of the following can help Mrs. Murphy rebuild her damaged restaurant?

    - An NFIP flood insurance policy
    - A FEMA disaster assistance grant
    - A Small Business Administration disaster loan

## *UNIT 9-LEARNING CHECK #1 -ANSWERS*

1. Where does a property owner go to buy a flood insurance policy?

   *To any licensed casualty insurance agent.*

2. Can I buy a flood insurance policy with building coverage on the following?

   An apartment building *yes*
   A septic tank *no*
   An open sided park pavilion *no*
   A motor home *no, unless it's permanently attached to a foundation*
   A boat dock *no*
   A mobile home on a foundation in a mobile home park *yes*
   A flower garden *no*

3. What is the maximum amount of contents coverage I can get for a single family dwelling?

   *$100,000*

4. Can I wait and buy a flood insurance policy after I hear the National Weather Service issue a flood warning?

   *Yes, but no claim can be paid. There is a 30-day waiting period before coverage takes effect.*

5. Which of the following programs is likely to require a flood insurance policy as a condition of financial assistance?

   - *Department of Veterans Affairs mortgage loan guarantees yes*
   - *HUD Community Development Block Grants yes*
   - *Federal disaster assistance yes*
   - *Home improvement loans from a bank participating in FDIC yes*
   - *Mortgage from a federal credit union yes*

6. Does your local government have flood insurance coverage on the buildings it owns in the floodplain?

   *Depends on the community. This is an important thing to check because flood insurance may be the only source of funds to rebuild and repair those buildings after a flood.*

   Do I need an elevation certificate to purchase a flood insurance policy on a Pre-FIRM building?

   *No. However, if you have one that shows the building to be at or above the BFE, you can get a Post-FIRM actuarial rate that is lower than the rate for Pre-FIRM buildings.*

7. Is there much of a cost savings on flood insurance if the lowest floor of a Post-FIRM building is one foot above the BFE instead of at the BFE?

   *Yes. For example, the rate for the first layer of building coverage for a single family building located in an AE Zone goes from $.89/$100 coverage to $..55, a savings of nearly 40%.*

8. Can I get a good flood insurance rate on a building in an AE Zone that is floodproofed to the base flood elevation?

   *Probably not. Unless the building is floodproofed to at least one foot above the BFE, the rate will be based on the elevation of the lowest floor. If the lowest floor is two or more feet below the BFE, it will be a submit for rate.*

9. What's the best way to get a good flood insurance rate for a new building in an unnumbered A Zone?

   *Obtain or develop a base flood elevation for the site and require the building to be elevated above it.*

## *UNIT 9–LEARNING CHECK #2 -ANSWERS*

1. What are some of the benefits of joining the Community Rating System?

   *Residents get reduced flood insurance premiums*
   *The community's flood program receives recognition from a national evaluation program.*
   *Technical assistance in designing and implementing some activities is available at no charge from ISO.*
   *It encourages the community to maintain its program during times of diminished interest in flood issues.*

2. Does your community implement any of the 18 activities credited by the CRS?

   *Depends on the community. If your community implements five or more of the activities listed, it may be worth your while to obtain a copy of the CRS Application or contact the ISO/CRS Specialist for your area. Call 317/848-2898, your State NFIP Coordinator or your FEMA Regional Office for the name and phone number of your ISO/CRS Specialist.*

3. What is a CBRS zone?

   *An undeveloped coastal barrier (barrier island, sand spit, or similar land form) that is designated as part of the Coastal Barriers Resources System.*

4. Can I request a LOMA to get my property out of a CBRS area ?

   *No. The U.S. Fish and Wildlife Services can interpret the boundaries and FEMA can correct map errors, but only Congress can change the designation.*

5. Are there any CBRS area in Flood County?

   *Yes. Panels 38 and 40 of Flood County contain CBRS areas designated in 1983 and after 1990.*

## *UNIT 9–LEARNING EXERCISE -ANSWERS*

1. Who sets the rates and coverage rules for flood insurance policies, FEMA or private insurance companies?

   *FEMA*

2. What are the two types of flood insurance coverage available?

   *Building and contents coverage*

3. Can I get flood insurance coverage for furniture in a basement?

   *No*

4. Can a bank require flood insurance for a property outside the SFHA shown on the latest FIRM?

   *Yes. Any lender can require flood insurance wherever it wants (Federal law doesn't give lenders a choice for properties in the SFHA).*

5. What are the two key factors in rating Post-FIRM buildings?

   *FIRM Zone and the lowest floor's elevation in relation to the BFE*

6. How do I know how much a flood insurance policy will cost for a Post-FIRM building with the lowest floor four feet below the BFE?

   *The insurance agent has to send information on the building in for a special individualized rating known as "submit for rate."*

7. How can your community help its residents get lower flood insurance rates?

   *Join the Community Rating System (CRS)*

8. Can a community get CRS credit for activities implemented by a state agency on behalf of the community?

   *Yes*

9. Can non-CRS communities obtain and benefit from CRS publications?

   *Yes*

10. RM 38-1 is located near Site A on Flood County's FIRM. Is RM 38-1 in an SFHA?

    *Yes*

11. Is RM 38-1 in a CBRS zone?

    *No*

12. Mrs. Murphy's Chowder House was built at the east end of Vassar Road on panel 38 in 1994. The restaurant got flooded last month. Which of the following can help Mrs. Murphy rebuild her damaged restaurant?

    *An NFIP flood insurance policy*
    *A FEMA disaster assistance grant*
    *A Small Business Administration disaster loan*
    *None of these programs are available because the building was built in a CBRS area 4 years after it was designated as such.*

## *UNIT 10 - LEARNING CHECK #1*

1. Who is responsible for disaster and emergency response activities in your community?

2. Is there a written emergency response plan that identifies your department's duties during and after a disaster?

3. What are the objectives of a building condition survey?

4. What are the three categories of building condition that are determined during the building condition survey?

5. What is one of the best guides you can give to owners and residents of flooded buildings?

6. Can your community waive the requirement for a development permit so people can repair their flooded homes more quickly?

7. When you inspect a flooded building to determine if the structure is substantially damaged, which of the following items should you check?

   Walls and ceiling
   Foundation
   Deck or porch
   Molding and built-in bookcase
   Ductwork
   Water heater
   Kitchen cabinets

8. Does your community or state license contractors or have procedures to prevent "fly by night" unqualified contractors from preying on disaster victims?

9. What sources of assistance are there to help your post-disaster permit operations?

## *UNIT 10 -LEARNING CHECK #2*

1. What's a good definition of "flood hazard mitigation?"

2. What are the six basic strategies of flood hazard mitigation measures?

3. What are some of the benefits of preparing a mitigation plan?

4. What are the guidelines of multi-objective management?

5. Where can you get technical help in planning and implementing a mitigation program?

6. List some of the sources of financial assistance that are available for a mitigation program.

7. Could my community be eligible for a Section 404 Hazard Mitigation Grant even if it did not receive a disaster declaration?

## *UNIT 10 - LEARNING EXERCISE*

1. The Building condition survey identifies three categories of building condition. Which two need permits?

2. What type of work may not need a permit after a flood?

3. Once you advise an owner that a permit may be necessary, do you need to inspect the building or can you save time and just wait for a permit application?

4. Who can help you make sure people don't reoccupy damaged buildings before they have passed an inspection?

5. Can constructing a levee and maintaining sand dunes be considered flood hazard mitigation measures?

6. What's more important: a plan document or the planning process?

7. Which of the following are benefits of multi-objective management?

   It helps look at all possible solutions
   It coordinates flood issues with other community concerns.
   The cost of implementing programs is shared with others.
   The floodplain and watershed are treated as resources.

8. What are the two types of grants available through the Flood Mitigation Assistance Program?

9. If a flood is bad enough to result in a Presidential disaster declaration, why should my city need flood insurance policies on the buildings it owns in the floodplain?

## *UNIT 10 - LEARNING CHECK #1 -ANSWERS*

1. Who is responsible for disaster and emergency response activities in your community?

   *Each community may have a different name for the emergency manager. Get to know yours.*

2. Is there a written emergency response plan that identifies your department's duties during and after a disaster?

   *Depends on the community. There should be one that clearly identifies what is expected of your office.*

3. What are the objectives of a building condition survey?

   *To determine if any building is so dangerous that it should not be reentered without a careful inspection, and*
   *To determine which buildings will need a floodplain development permit before they can be repaired or reoccupied.*

4. What are the three categories of building condition that are determined during the building condition survey?

   *Apparently safe: No exterior signs of structural damage. People can be allowed back in, but they will need building permits for repairs.*
   *Building obviously substantially damaged: The flood swept the building away, it has collapsed or it is missing one or more walls. The building cannot be reoccupied without major structural work.*
   *Could be substantially damaged: The building may be substantially damaged, but such damage is not obvious.*

5. What is one of the best guides you can give to owners and residents of flooded buildings?

   *Repairing Your Flooded Home*

6. Can your community waive the requirement for a development permit so people can repair their flooded homes more quickly?

   *No. You can waive the permit fee, but you must require permits to see if the buildings could be substantially damaged and subject to your floodplain ordinance's requirements.*

7. When you inspect a flooded building to determine if the structure is substantially damaged, which of the following items should you check?

   *Walls and ceiling*
   *Foundation*
   *Deck or porch*
   *Molding and built-in bookcase*
   *Ductwork*
   *Water heater*
   *Kitchen cabinets*
   *All of the above need to be checked because the NFIP considers all of them part of the building's structure.*

8. Does your community or state license contractors or have procedures to prevent "fly by night" unqualified contractors from preying on disaster victims?

   *Depends on the community. It's worth checking out before the disaster happens.*

9. What sources of assistance are there to help your post-disaster permit operations?

   *State NFIP coordinator*
   *FEMA Regional Office*
   *State building code agency*
   *Model building code organization*
   *Local or state health department*
   *Cooperative Extension Service*
   *Other communities willing to provide mutual aid*
   *Building officials association*

## *UNIT 10 – LEARNING CHECK #2 -ANSWERS*

1. What's a good definition of "flood hazard mitigation?"

   *All actions that can be taken to reduce property damage and the threat to life and public health from flooding.*

2. What are the six basic strategies of flood hazard mitigation measures?

   *Prevention*
   *Property protection*
   *Natural resource protection*
   *Emergency services*
   *Structural projects*
   *Public information*

3. What are some of the benefits of preparing a mitigation plan?

   *Preparing a plan will:*
   *Ensure that all possible activities are reviewed and implemented.*
   *Link floodplain management policies to specific activities.*
   *Ensure that activities are coordinated.*
   *Educate residents*
   *Build public and political support*
   *Fulfill planning requirements for state or federal assistance programs.*
   *Facilitate implementation of floodplain management activities*

4. What are the guidelines of multi-objective management?

   *Keep the effort locally based.*
   *Understand the flood problem and its relation to the watershed.*
   *Think broadly about possible solutions to reduce the flood problem.*
   *Identify the other community concerns and goals that could have a bearing on the flood problem.*
   *Obtain expert advice and assistance from government agencies and private organizations.*
   *Build a partnership among the private and public groups and individuals that can be enlisted to work on the objectives.*

5. Where can you get technical help in planning and implementing a mitigation program?

   *National Park Service's Rivers, Trails and Conservation Assistance Program*
   *The soil and water conservation district.*
   *Natural Resources Conservation Service*
   *Cooperative Extension Service*
   *Watershed, stormwater management or flood control districts.*
   *Regional or metropolitan water, sewer or sanitary districts.*
   *Regional planning commissions and councils of government*
   *The state or county emergency management or civil defense agency (see Appendix B).*
   *The state natural resources or water resources agency.*
   *Local watershed councils or associations.*
   *U.S. Army Corps of Engineers.*
   *Association of State Floodplain Managers.*
   *Floodplain Management Resource Center*

6. List some of the sources of financial assistance that are available for a mitigation program.

   *Property owners willing to cost share on projects that help them FEMA's Flood Mitigation Assistance Program FEMA's Public/Infrastructure Program FEMA's Human Services programs FEMA's Hazard Mitigation Grant Program*

5. Could my community be eligible for a Section 404 Hazard Mitigation Grant even if it did not receive a disaster declaration?

   *Yes, under a 1997 FEMA ruling, all communities in the state are eligible after the disaster declaration.*

## *UNIT 10 – LEARNING EXERCISE -ANSWERS*

1. The Building condition survey identifies three categories of building condition. Which two need permits?

   Building obviously substantially damaged: The flood swept the building away, it has collapsed or it is missing one or more walls. The building cannot be reoccupied without major structural work.

   Could be substantially damaged: The building may be substantially damaged, but such damage is not obvious.

2. What type of work may not need a permit after a flood?

   Cleanup and temporary emergency repairs

3. Once you advise an owner that a permit may be necessary, do you need to inspect the building or can you save time and just wait for a permit application?

   As soon as possible after the notice is delivered, your office should inspect each flooded property to review needed repairs and determine if a permit is needed.

4. Who can help you make sure people don't reoccupy damaged buildings before they have passed an inspection?

   Make sure that utility companies won't turn service back on unless there is an "Approved to Connect" sign posted on the building.
   Instruct police and other departments about the permit requirements and ask them to report to you any construction projects under way without posted permit signs.
   Get the news media to help spread the word on the requirements and why they are needed.

5. Can constructing a levee and maintaining sand dunes be considered flood hazard mitigation measures?

   Yes

6. What's more important: a plan document or the planning process?

   The process.

7. Which of the following are benefits of multi-objective management?

   It helps look at all possible solutions
   It coordinates flood issues with other community concerns.
   The cost of implementing programs is shared with others.

The floodplain and watershed are treated as resources.
All of these are benefits of M-O-M.

8. What are the two types of grants available through the Flood Mitigation Assistance Program?

   Planning grants to help develop or update a flood mitigation plan
   Project grants to implement projects in conformance with the flood mitigation plan

9. If a flood is bad enough to result in a Presidential disaster declaration, why should my city need flood insurance policies on the buildings it owns in the floodplain?

   Federal disaster assistance for a flooded public building will be reduced by the amount of flood insurance coverage the community should have on that building. It does not matter whether the building is insured; FEMA will still only provide assistance for damage that exceeded the level of insurance.