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**G284.3—COMMON NONCOMPLIANCE ISSUES**

**MODULE 3**

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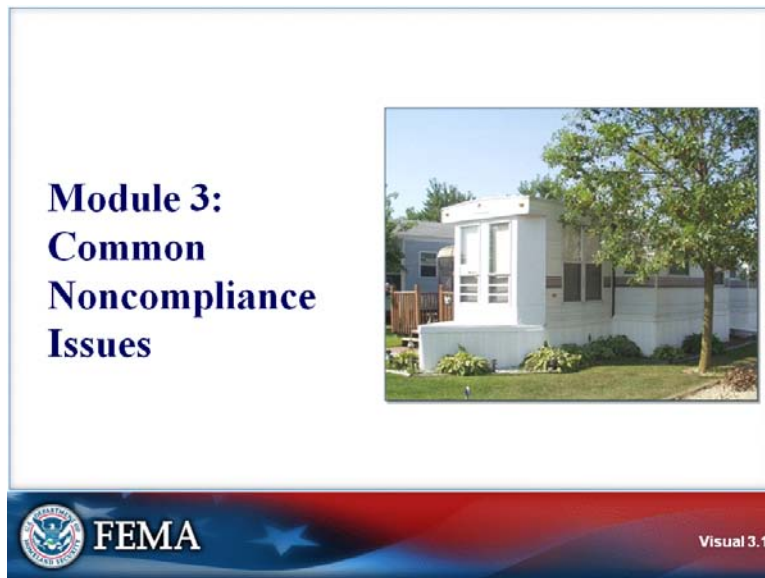


INTRODUCTION

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Visual 3.1

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**Key Points**

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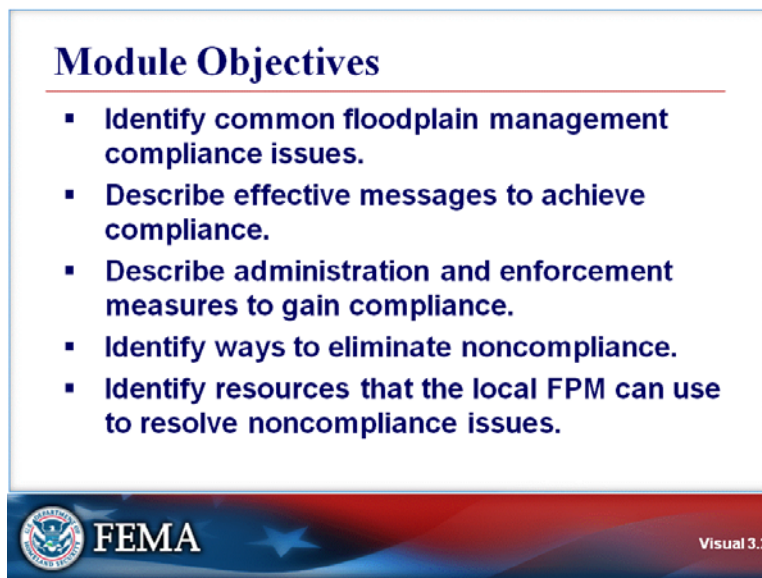
This module will review the most common types of noncompliance with floodplain management regulations, and suggest ways that communities can avoid noncompliance to begin with and effectively resolve problems when they arise.

### INTRODUCTION

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#### Visual 3.2

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**Module Objectives**

- Identify common floodplain management compliance issues.
- Describe effective messages to achieve compliance.
- Describe administration and enforcement measures to gain compliance.
- Identify ways to eliminate noncompliance.
- Identify resources that the local FPM can use to resolve noncompliance issues.

FEMA Visual 3.2

#### Key Points

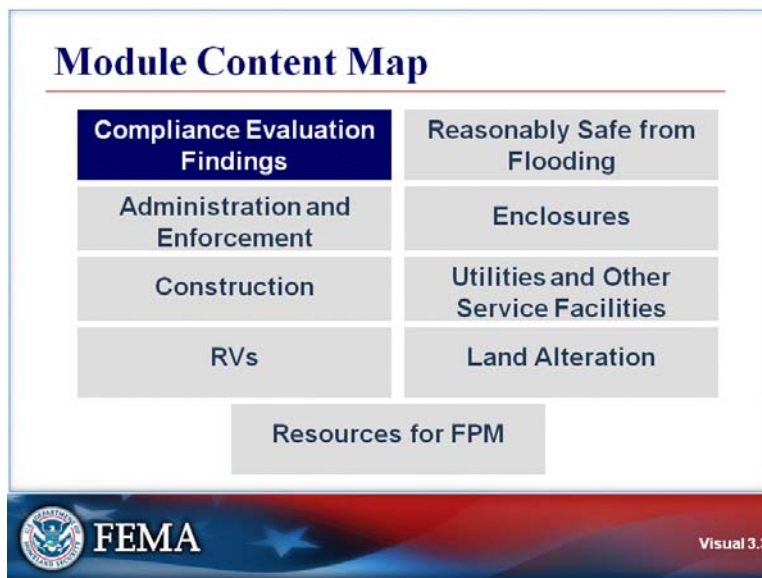
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After completing this module, you will be able to:

- Identify common floodplain management compliance issues.
- Describe effective messages to achieve compliance.
- Describe administration and enforcement measures to gain compliance.
- Identify ways to eliminate noncompliance.
- Identify resources that the local FPM can use to resolve noncompliance issues.

## INTRODUCTION

### Visual 3.3



### Key Points

This module will present the following topics.

- Compliance Evaluation Findings by the American Institutes for Research (AIR)
- Reasonably Safe from Flooding
- Administration and Enforcement
- Enclosures
- Construction
- Utilities and Other Service Facilities
- RVs
- Land Alteration
- Resources for the Floodplain Manager

### COMPLIANCE EVALUATION FINDINGS

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#### Visual 3.4

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**American Institutes for Research Study**

- **Purpose:**  
Evaluate the extent that minimum building requirements are being met.
- **Methodology:**
  - 1,253 buildings built on or after January 1, 1990 surveyed in 50 communities in 10 clusters.
  - Clusters were selected to represent geographical areas with large concentrations of post-FIRM buildings.
  - Communities within the clusters and buildings were randomly selected.

FEMA Visual 3.4

#### Key Points

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The American Institutes for Research conducted a study of compliance with floodplain regulations. The report is titled “An Evaluation of Compliance with the National Flood Insurance Program Part B: Are Minimum Building Requirements Being Met?”

- Part B of the study quantitatively addressed the percentage of buildings located in a Special Flood Hazard Area (SFHA) that are in compliance with the NFIP floodplain management regulations.
- Ten clusters of either a metropolitan area or a group of closely located counties or communities with large concentrations of post-FIRM buildings were first selected.
- Within these 10 clusters, 50 communities were randomly selected.
- About 25 buildings in each community were surveyed.
- The approach consisted of an inspection of the community’s permit files and actual survey of elevations for each building.

Although the study found that only 63 percent of buildings surveyed were fully compliant, little risk of significant damage was reported. Reasons cited are:


- Communities are generally successfully meeting the elevation requirements of the Program.
- The types of violations identified are not likely to result in significant damage to a building during the Base Flood.

## COMPLIANCE EVALUATION FINDINGS

### Visual 3.5

### Findings: Lowest Floor

- 89% of all buildings surveyed had their lowest floor at or above BFE or within 6 inches the BFE.
- 9.9% of all buildings surveyed have their lowest floor more than 6 inches below BFE (for most 1 – 3 feet below the BFE).
- 5.3% have their main living floor below BFE.
- 4.3% have their main living floor above BFE, but have a basement or finished enclosure.
- 0.2% have their lowest horizontal structural member in a VE zone below BFE.
- For 1.1% of all buildings lowest floor compliance could not be determined (mostly in AO-Zones).


Visual 3.5

### Key Points

The study found that 89 percent of buildings had their lowest floor at or above the BFE or within 6 inches of the BFE.

Of this group, many (3.3 percent of all buildings) are only 1 to 2 inches below BFE. The study put this group of buildings in a separate category for a number of reasons:

- Many will be rounded up to BFE for flood insurance rating purposes.
- Some are likely to result from minor survey errors or differences in interpolating BFEs from profiles or maps, and are probably thought to be compliant by communities.
- Some could be slight errors by study surveyors, although the survey used GPS technology and is thought to be very accurate. Builders evidently were trying to establish their lowest floors exactly at BFE. Use of freeboard would get these buildings above BFE.
- The finished area of most of the enclosures was relatively small compared to the footprint of the building. For example buildings had finished entryways, or they had small finished rooms behind the garage in townhouse-type construction.

After the field work was completed it was determined that not enough survey data was collected to determine compliance by AO-Zone buildings. Most appear to have sloping driveways and are probably compliant, but highest adjacent grade could not be determined from the data available.

### COMPLIANCE EVALUATION FINDINGS


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#### Visual 3.6

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#### Findings: Violations

- Only 63% of buildings surveyed were fully compliant.
- Most common violations were:
  - Mechanical and utility equipment located on the ground below the BFE.
  - Flood openings that did not meet the NFIP requirement (no openings, not enough area, or bottom elevation too high).
- Percent of fully compliant buildings has significantly increased over time.



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#### Key Points

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Only 63 percent of the buildings surveyed were fully compliant with floodplain regulations.

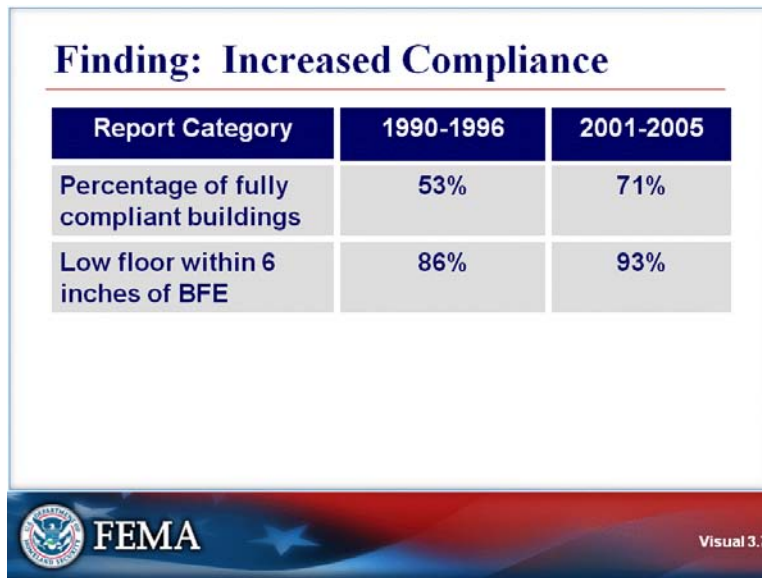
- Buildings with inadequate flood openings comprised 13 percent of all buildings, a surprisingly high proportion, considering that most buildings did not require openings.
- Buildings with mechanical and utility equipment below BFE also comprised about 13 percent of all buildings.

Findings from the period of 1990 through 1996 were compared with results from 2001 through 2005. Compliance increased significantly between the two periods.



## COMPLIANCE EVALUATION FINDINGS

## Visual 3.7



## Key Points

There was an increase in compliance over time as measured over a different time period with different data.

The percent of buildings that are fully compliant increased from 53.1 in 1990 through 1996 to 71.3 in 2001 through 2005.

Buildings with low floors above or within 6 inches of BFE increased from 86.3 percent to 93.2 percent.

In overall data from 1990 to 2005, the percent of fully compliant buildings increased from 53 percent to 63 percent. In the time period 2001 through 2005, 71 percent were fully compliant.


### COMPLIANCE EVALUATION FINDINGS

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#### Visual 3.8

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### Other Findings



- The percentage of fully compliant buildings is strikingly similar between CRS and non-CRS communities.
- A few CRS communities had large numbers of noncompliant buildings.
- Record retention by communities was often poor.
- Overall compliance was highest in AO-Zones and for slab-on-grade buildings.



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Visual 3.8

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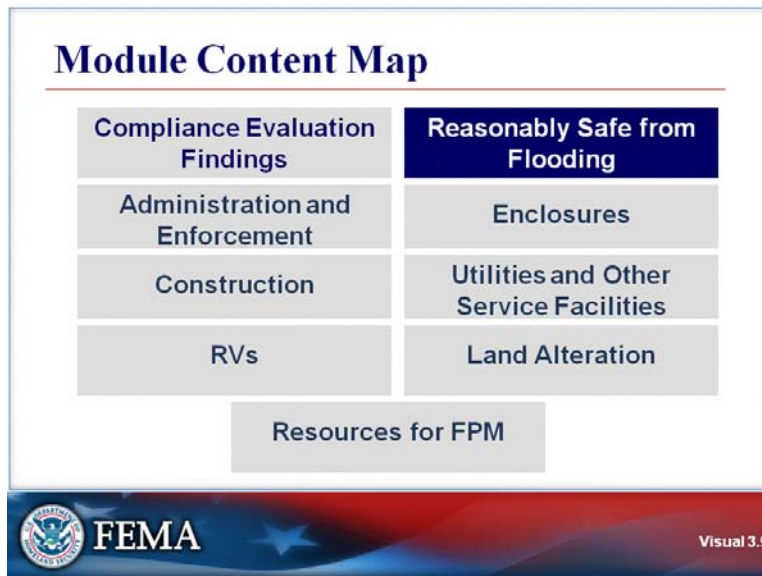
#### Key Points

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It may seem surprising that CRS communities were not relatively more compliant than non-CRS communities.

Although there was not enough data to determine compliance with lowest floor elevation requirements in AO-Zones, overall compliance among all issues surveyed was higher in AO-Zones than in other flood zones.

Elevations associated with AO-Zone are represented on the FIRM as whole foot depth numbers. The report speculates that existence of a whole foot flood depth elevation on the FIRM may increase the accuracy of the flood elevation determined and placement of fill or the lowest floor.

**REASONABLY SAFE FROM FLOODING****Visual 3.9****Key Points**


The next topic will explore the regulatory definition of the phrase “reasonably safe from flooding.”


**REASONABLY SAFE FROM FLOODING**

**Visual 3.10**

**Reasonably Safe From Flooding**

- **44 CFR §60.3(a): Review permit applications to determine whether proposed development sites are reasonably safe from flooding.**
- **How are you ensuring that proposed development is reasonably safe from flooding?**



 **FEMA** Visual 3.10

**Key Points**

44 CFR §60.3(a)(3) states that the community shall “Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding.”

The regulation continues with the basic requirements for anchoring, materials resistant to flood damage, construction methods that minimize flood damages, and utilities and other service facilities designed or located to prevent water from entering into their components during flooding.

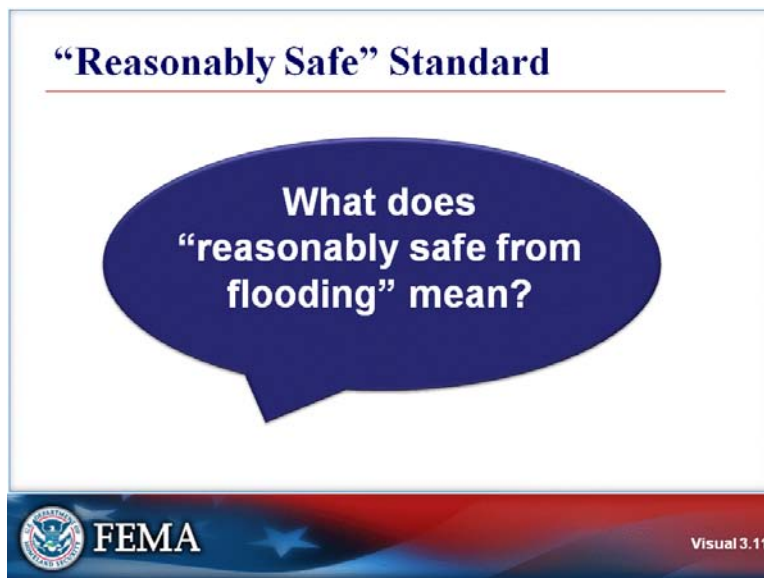
To meet the “reasonably safe” requirement, the local official also should make sure that the structure is protected, which may require elevation.

REASONABLY SAFE FROM FLOODING

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Visual 3.11

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**Key Points**

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**Discussion Question:** What does “reasonably safe from flooding” mean?

### REASONABLY SAFE FROM FLOODING

#### Visual 3.12

### Community Certifications

- **Community Acknowledgement Form: MT-1 form, LOMR-F certification**
- **Make sure you understand what you're signing:**
  - **Verify that development meets community ordinance requirements.**
  - **Require supporting data.**
  - **Comply with ESA requirements.**



 **FEMA** Visual 3.12

#### Key Points

The Community Acknowledgement Form (CAF) in the LOMR-F MT-1 form certification section requires the local official to certify that the structure or property is reasonably safe from flooding. The official who signs the certification should be aware of the implications of his or her signature.

44 CFR §65.2 applies to the LOMR-F “Reasonably safe from flooding” requirement.

Consider the following situation:

- An area was removed from the floodplain by placing fill. The property owner applied for a Letter of Map Revision - Based on Fill (LOMR-F), and the community official signed the form.
- The property owner subsequently built a structure with a full below-grade parking area, with a ramp that extended beyond the fill area.
- Maps were updated, and the original LOMR-F was not revalidated.
- The community signed the certification again without any documentation supporting the claim that the structure was reasonably safe from flooding.

44 CFR §65.2(c) defines “reasonably safe from flooding” as “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.”

**REASONABLY SAFE FROM FLOODING**

Similar problems include:

- A developer received a full LOMR-F and left some lots undeveloped. A lot was sold to a subsequent owner, who built a home that includes a basement.
- In a related example, a property owner was removed from the floodplain by a LOMR-F, and then proceeded to add a walk-out lower floor below BFE.

The community needs to consider the possible consequences of certifying a site as “reasonably safe from flooding.”

Requests for Letters of Map Change must satisfy the Endangered Species Act (ESA) requirements independent of FEMA review.

Refer to [www.fema.gov/plan/prevent/fhm/gs\\_esa.shtm](http://www.fema.gov/plan/prevent/fhm/gs_esa.shtm) for further details.

**REASONABLY SAFE FROM FLOODING**

Below is the portion of the Community Acknowledgement Form signed by the local official.

<p><b>A. REQUESTS INVOLVING THE PLACEMENT OF FILL</b></p> <p>As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision Based on Fill (LOMR-F) or Conditional LOMR-F request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirement that no fill be placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a Conditional LOMR-F, will be obtained. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by DHS-FEMA, all analyses and documentation used to make this determination. For LOMR-F requests, we understand that this request is being forwarded to DHS-FEMA for a possible map revision. For LOMR-F or Conditional LOMR-F requests that have the potential to impact an endangered species, documentation will be submitted to show that we have complied with Sections 9 and 10 of the Endangered Species Act (ESA). Section 9 of the ESA prohibits anyone from "taking" or harming an endangered species. If an action might harm an endangered species, a permit is required from U.S. Fish and Wildlife Service or National Marine Fisheries Service under Section 10 of the ESA. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted.</p> <p>Community Comments:</p>		
Community Official's Name and Title: <i>(Please Print or Type)</i>		Telephone No.:
Community Name:	Community Official's Signature: <i>(required)</i>	Date:

There are both simplified and detailed engineering approaches that can be used to support a LOMR-F application.

Data on soil type and compaction should be available when the application is submitted. The fill should meet geotechnical standards.

The LOMR-F application is raising issues.

The MT-1 form has changed, allowing property owners to receive a LOMR-F based only on the Lowest Adjacent Grade (LAG). An Elevation Certificate (EC) is not required, but can be submitted as a supplemental document.

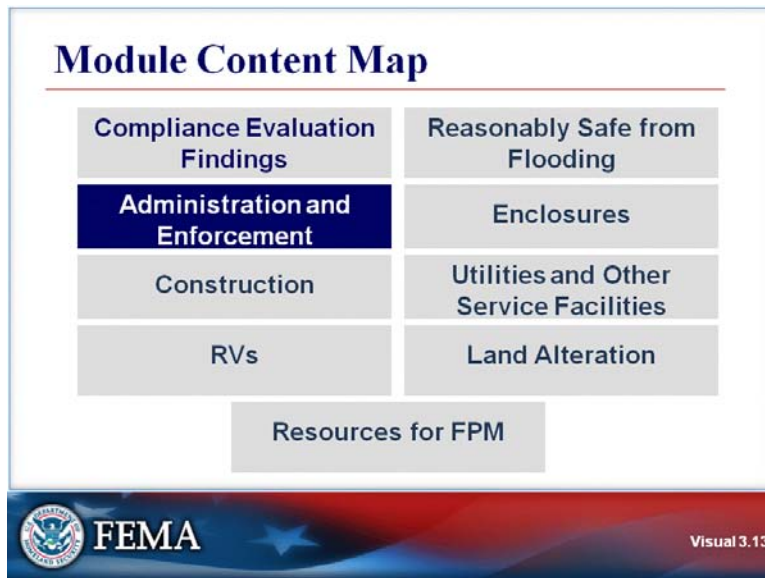
If the applicant includes an EC, and the lowest floor is shown to be below BFE, the application is flagged as a potential violation.

Communication about the application usually is between a FEMA Headquarters contractor and the applicant's engineer and FEMA Headquarters. The State usually is not involved, except those States that require State permits.



ADMINISTRATION AND ENFORCEMENT

Visual 3.13

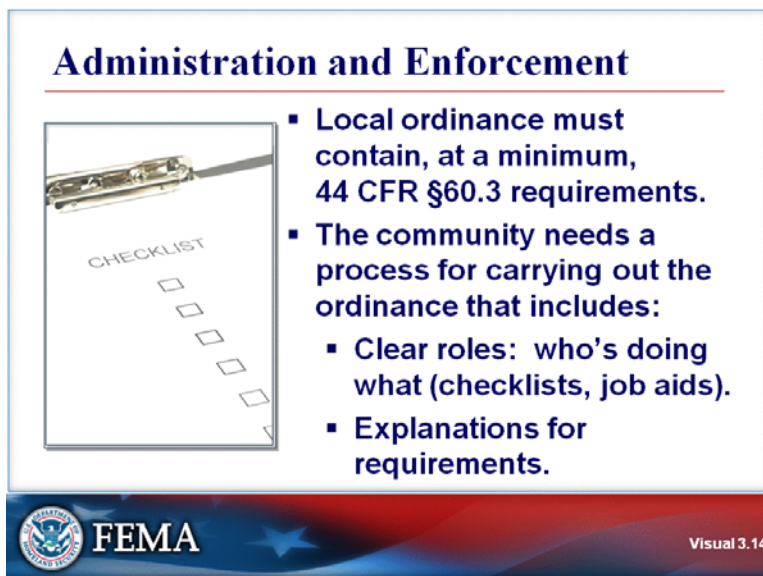


Key Points

The next topic in this module is Administration and Enforcement.

**ADMINISTRATION AND ENFORCEMENT**

**Visual 3.14**



**Administration and Enforcement**

- Local ordinance must contain, at a minimum, 44 CFR §60.3 requirements.
- The community needs a process for carrying out the ordinance that includes:
  - Clear roles: who's doing what (checklists, job aids).
  - Explanations for requirements.

FEMA

Visual 3.14

**Key Points**

The local ordinance is required to meet, at a minimum, NFIP standards contained in 44 CFR §60.3, the terms of which are defined in §59.1.

- One problem is that many local officials don't know the contents of their community's floodplain management ordinance.
- For example, one local government gave out many variances, despite adoption of a strict ordinance that should have prevented most variances.

The community's process needs to be clear, with roles and procedures defined. The Floodplain Manager should be able to explain ordinance requirements to elected officials and citizens.

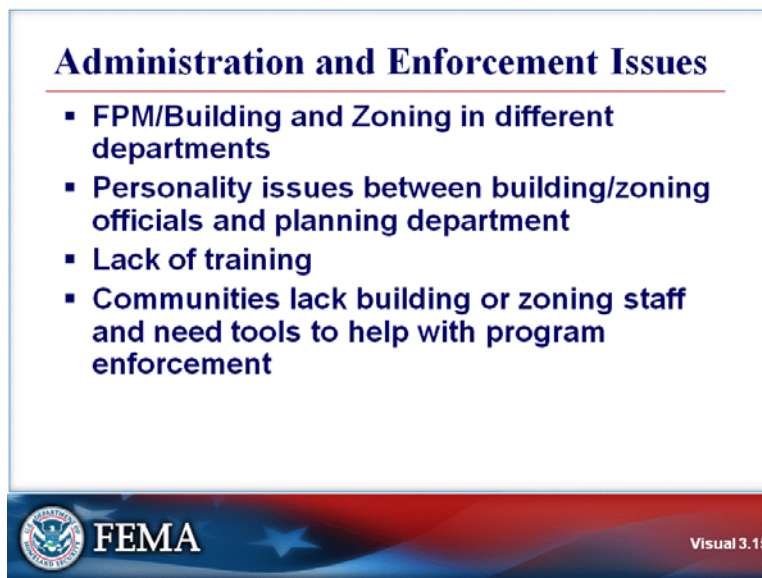
As a general rule, when noncompliance is discovered, the Floodplain Manager should informally contact the property owner to resolve the situation. A formal notification letter can be sent afterward if the initial attempt failed or if it is legally required.

## ADMINISTRATION AND ENFORCEMENT

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### Visual 3.15

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### Key Points

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Many local government organizations place building inspectors in one department, and the Floodplain Manager in a different department.

Departments may not communicate fully about separate actions relating to the same property.

- Typically, the building inspector priority is to enforce the building code. The floodplain management code may be ignored.
- Planning staff and building and zoning staff tend to have different outlooks and personalities that present hurdles to working well together.

Local government staff may need training. Staff time and resources for training may not be available.


Communities without building or zoning staff are hampered in their ability to enforce the floodplain management program. Tools are available to help local officials, but effective enforcement will remain a challenge.

### ADMINISTRATION AND ENFORCEMENT

#### Visual 3.16

### Administration and Enforcement Issues

- Grants-funded projects: Compliance with all regulations
- Agriculture: Pressure for exemptions
- More restrictive State requirements
- Other Federal requirements



 **FEMA** Visual 3.16

#### Key Points

Compliance is required with all regulations, regardless of funding source. Issues may arise with conflicting regulations, especially with environmental and historic preservation regulations and local and State environmental laws. All required permits should be obtained before issuing a floodplain development permit.

Hazard Mitigation Assistance grants should be monitored to assure that all required permits are obtained. A mindset sometimes develops after a grant award that permission for the project is implied and permits are not needed.

One suggestion is to require grant applicants to obtain an EC before a grant is awarded.

Agriculture is not exempt from floodplain regulation. Farmers have lobbied to have agricultural activities exempted from zoning and other regulations. When tested against exemption claims, floodplain regulations have been upheld. States that tried to exempt agriculture from all requirements need to be reminded that the exemptions may not withstand legal challenges.

- Missouri and Kansas have stated that agriculture is not exempt from floodplain regulation.
- Minnesota also specifically denies agricultural exemptions in statutes 16B.62, Subd 1.

One State allowed residential structures that serve agricultural purposes in the floodway. Among restrictions was the requirement that construction could only replace an existing structure. Specific requirements relate to certain agricultural structures, including wet floodproofing requirements and openings requirements specific to those structures.

In Washington State, fish passage enhancement structures are not exempt from floodplain management regulations.

**ADMINISTRATION AND ENFORCEMENT**

Mississippi is an example of a State with separate floodplain management ordinances for private buildings and State floodplain management ordinances for State and other government buildings.


In Minnesota, some watersheds are subject to more restrictive regulations. There are more stringent restrictions on storage, and a 2-foot freeboard is required. In many cases, the ordinances of affected cities were not consistent with the watershed restrictions.


### ADMINISTRATION AND ENFORCEMENT

#### Visual 3.17

### Selling Compliance

- Political support is needed.
- Health and safety issues lead to legal liability.
- Lawsuits are increasingly successful against communities that fail to follow procedures.
- Selling point to the community: Lower your risks, lower your insurance cost.



 **FEMA** Visual 3.17

#### Key Points

The Floodplain Manager needs to convince officials and citizens of the importance of compliance with floodplain management regulations.

The most potent message for local officials is to avoid legal liability. There has been an increase in successful lawsuits against communities that fail to follow floodplain management procedures, or do not apply regulations uniformly.

Another important point is that lowering flood risk results in affordable insurance rates for property owners. Part of gaining compliance is emphasizing the message about the impact on the structure's insurance rating.

It can be effective to review the expenses that the community incurs when homes and businesses are flooded, including:

- Preparing, including moving possessions and sandbagging.
- Cleaning up mud and debris.
- Rebuilding.
- Interrupting commerce and employment.

Some communities have invited local swift water rescue crews to community meetings to talk about their experiences and demonstrate use of their equipment.


Success stories can illustrate how the mess, expense, and danger can be avoided.


## ADMINISTRATION AND ENFORCEMENT

### Visual 3.18

### Benefits of Floodplain Management

- Reduced loss of life and property damage
- Safer community
- Enhanced resilience to disasters
- Reduced Federal expenditures
- Preservation of natural and beneficial functions





**FEMA**

Visual 3.18

### Key Points

Communities that better manage their floodplain development realize important benefits.

- Flooding is the most frequent disaster in the United States.
- Flood losses can be reduced, and the community made safer, by implementing floodplain management measures.

Preparation for disasters has become increasingly important as recent disasters demonstrated.

Countries that adopted and implemented effective building codes are better able to withstand potential hazards and recover more quickly after disasters. For example, earthquakes in Haiti and Chile had very different impacts. The earthquake in Chile was far stronger than the one that struck Haiti. Yet, the death toll in Haiti was magnitudes higher.

- Chile was more disaster-resistant, probably because of recent experiences with earthquakes. Chile was better prepared due to a long history of seismic events that caused development of a robust emergency management system. Chile also implemented strict building codes.
- Haiti was completely unprepared. The last earthquake in the Caribbean had been centuries ago, and the possibility of future earthquakes and the need to protect against earthquakes were not considered in building design and construction.

### **ADMINISTRATION AND ENFORCEMENT**

Floodplains serve the following natural and beneficial functions:

- Naturally store and convey floodwaters.
- Maintain water quality.
- Recharge groundwater aquifers and naturally regulate flows into rivers and lakes.
- Support large and diverse populations of plants, birds, and animals.
- Provide historical, scientific, recreational, and economic benefits to communities.

Preservation of floodplains is a valuable community goal.



## ADMINISTRATION AND ENFORCEMENT

### Visual 3.19

### I-Code Adoption



- I-Codes:
  - Are consistent with NFIP regulations
  - May not address all NFIP requirements
- Publication: Reducing Flood Losses Through the International Codes



**FEMA**

Visual 3.19

### Key Points

The floodplain management code is consistent with I-Codes, including the International Building Code (IBC) and the International Residential Code (IRC) standard used throughout the community.

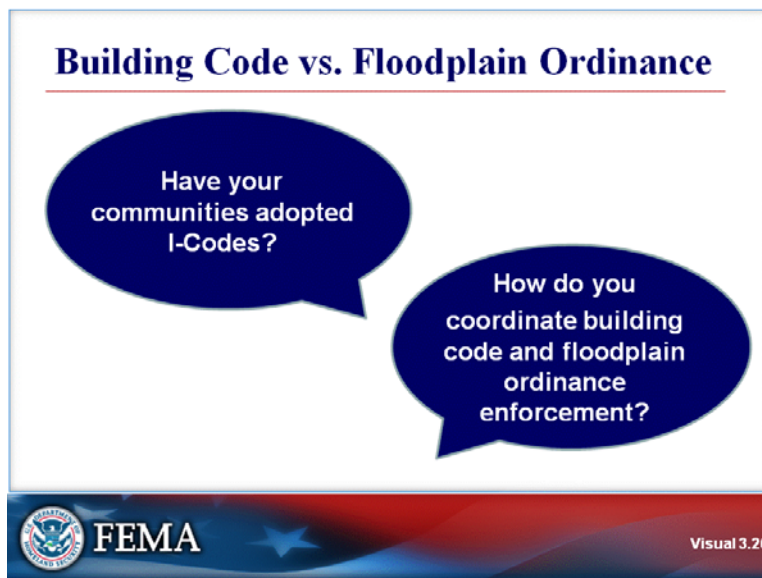
The I-Codes may not address all NFIP requirements.

One frequent problem is reconciling stem wall construction in a crawlspace with flood openings requirements. References include:

- FEMA publication: “Reducing Flood Losses Through the International Codes: Meeting the Requirements of the National Flood Insurance Program”, 2<sup>nd</sup> ed., 2005.
- A publication of the American Society of Civil Engineers (ASCE), Minimum Design Loads for Buildings and Other Structures, ASCE 7, 2010.
- A publication of the American Society of Civil Engineers (ASCE), Flood-Resistant Design and Construction, ASCE/SEI 24-05, 2006.

**ADMINISTRATION AND ENFORCEMENT**

**Visual 3.20**



**Key Points**

**Discussion Question: Have your communities adopted I-Codes?**

**Discussion Question: How do you coordinate building code and floodplain ordinance enforcement?**

**ADMINISTRATION AND ENFORCEMENT****Visual 3.21**

**Common Noncompliance Issues**

- Enclosures (including flood openings)
- Construction
- Utilities and other service facilities
- RV issues
- Land alteration



 **FEMA**  Visual 3.21

**Key Points**

Common noncompliance issues that communities deal with include the following:

- Enclosures below the lowest floor, which should only be used for parking of vehicles, building access, and storage.
- Construction issues, including lack of or inadequate anchoring, illegal additions, sheds, and fences.
- Utilities and other service facilities issues, which primarily consist of failure to elevate to or above BFE, or otherwise protected from intrusion of floodwaters
- RV issues, including RV parks in the floodway and regulating status.
- Land alteration includes development activities such as fill placement and altering sand dunes and mangroves.
- Development activities that are not building-related.

**ADMINISTRATION AND ENFORCEMENT**

**Visual 3.22**

**CLOMR-LOMR Requirements**



- **Problem:** Communities lack a CLOMR-LOMR requirement in their ordinances.
- A CLOMR-LOMR process is required, and is the community's responsibility.
- Communities should specify ordinance language to require supporting documentation for CLOMR-LOMR requests.

 **FEMA** Visual 3.22

**Key Points**

NFIP regulations require a CLOMR for two situations:

- (1) When a proposed development in floodway causes a rise in the BFE; and
- (2) When there is no floodway designated, the proposed development causes more than one foot of rise in the BFE.

Communities can require a CLOMR for additional situations by incorporating appropriate provisions in their floodplain management ordinances.

Communities need to understand their responsibilities to require Conditional Letters of Map Revision (CLOMRs) and follow-up Letters of Map Revision (LOMRs) in their ordinances.


Applicants should submit requests to the local Floodplain Manager for evaluation.



The requirement needs to be added if not currently in the ordinance. Ordinance language should specify that supporting documentation is required to support CLOMR-LOMR requests.

**ADMINISTRATION AND ENFORCEMENT****Visual 3.23**

### Ordinance Penalty Clause

- All floodplain ordinances must include penalties for noncompliance.
- Examples:
  - Stop-work orders
  - Fine
  - Make noncompliance a misdemeanor
  - Withhold the Certificate of Occupancy
  - Cut off utilities
  - Condemn the structure for lack of utilities.



 **FEMA**  Visual 3.23

**Key Points**

Many local governments and States prosecute floodplain ordinance violations as misdemeanors. Examples are:

- Pascagoula, MS
- Minnesota

Other measures used by Pascagoula:

- If the property owner doesn't correct the violation, the Certificate of Occupancy is withheld.
- Utilities are cut off to the structure.
- The structure is condemned for lack of utilities.

### ADMINISTRATION AND ENFORCEMENT

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#### Visual 3.24

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**Probation and Suspension**

- Noncompliance can lead to:
  - Probation
  - Suspension
- Potential consequences:
  - Lack of flood insurance
  - Lack of Federally-insured loans
  - Ineligibility for disaster assistance
  - Lender calling loan off
  - Reduced salability
  - Foreclosure

 **FEMA** Visual 3.24

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#### Key Points

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Communities should be aware that probation and suspension may be the price paid for noncompliance.

Circumstances when probation is imposed are:

- The FEMA Regional Office and/or State has identified one or more possible violations or program deficiencies.
- A Community Assistance Visit (CAV) has been conducted by FEMA or State.
- Attempts to resolve problems through community assistance or consultation have failed.
- The community has failed to take corrective action within the 90-days specified in the probation letter.

The provision of 44 CFR Section 59.24(c) establishes the procedures for placing and suspending a community. A community is placed on suspension when:

- All attempts to resolve problems have failed.
- Violations are multiple and substantive.
- The community is already on probation.
- The community has failed to take corrective action within the timeframe established.
- The community has failed to adopt new FIS/FIRM prior to their effective date.

**ADMINISTRATION AND ENFORCEMENT**

The provisions of 44 CFR Part 59.24 establish three grounds for suspension. The community:

- (1) Repealed its floodplain management regulations;
- (2) Allowed regulations to lapse; and
- (3) Amended the regulations so they no longer meet the NFIP requirements.

Reinstatement is granted after the community has corrected all program deficiencies and violations to the maximum extent possible. The community may be extended on a probationary level until the Region is satisfied by the way the program is being implemented.

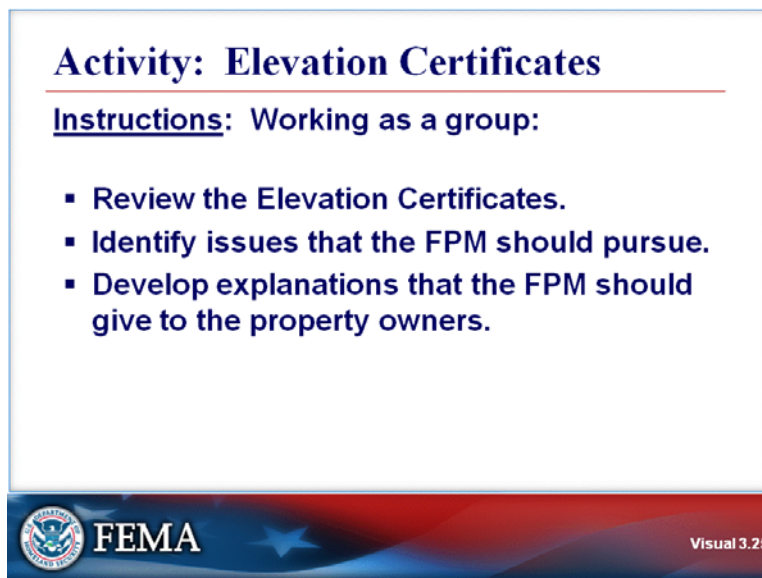
If a community is reinstated after suspension, pre-FIRM buildings lose flood insurance grandfather rights. However, grandfather rights for insurance on post-FIRM buildings are reinstated. Grandfather rights may be lost if a post-FIRM building is altered.

**ADMINISTRATION AND ENFORCEMENT**

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**Visual 3.25**

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The slide features a white background with a blue border. At the top, the title "Activity: Elevation Certificates" is written in a bold, dark blue font. Below the title, the text "Instructions: Working as a group:" is written in a bold, dark blue font. Underneath, there are three bullet points, each starting with a dark blue square symbol. The first bullet point reads "Review the Elevation Certificates." The second reads "Identify issues that the FPM should pursue." The third reads "Develop explanations that the FPM should give to the property owners." At the bottom of the slide, there is a decorative banner with a red and blue background. On the left side of the banner is the FEMA logo, which includes the text "FEDERAL EMERGENCY MANAGEMENT AGENCY" around a circular emblem. To the right of the logo, the word "FEMA" is written in a large, white, sans-serif font. Further to the right, the text "Visual 3.25" is written in a small, white, sans-serif font.

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**Key Points**

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**Activity Purpose:** This activity will enable your group to identify common errors on Elevation Certificates.

**Instructions:**

1. Work with your assigned group.
2. Review the Elevation Certificates.
3. Recommend what the Floodplain Manager should do in each case.
4. Develop an explanation that the Floodplain Manager should give to the property owner.

**Time:** 15 minutes

The elevation certificates begin on the following page.



**ADMINISTRATION AND ENFORCEMENT**

**Elevation Certificate 1**

A4. Building Use (e.g. Residential, Non-Residential, Addition, Accessory, etc.) Residential  
 A5. Latitude/Longitude: Lat. 41.9037° Long-81.7909° Horizontal Datum     NAD 1927 NAD 1983  
 A7. Building Diagram Number 1  
 A8. For a building with a crawlspace or enclosure(s)  
     a) Square footage of crawl space or enclosures      sq. ft.  
     b) No. of permanent flood openings in the crawlspace or enclosure(s) within 1.0 ft above adjacent grade 0  
     c) Total net area of flood openings in A8b 0  
     d) Engineered flood openings? Yes  No  
 A9. For a building with an attached garage  
     a) Square footage of attached garage      sq ft  
     b) No. of permanent flood openings in the attached garage within 1.0 foot above adjacent grade  
     c) Total net area of flood openings in A9.b      sq in  
     d) Engineered flood openings? Yes  No  


---

 B8. Flood Zone(s)      B9. Base Flood Elevation(s) (Zone AO, use base flood depth) 692  
 B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9.  
    FIS Profile FIRM     Community Determined     Other (Describe)  
 B11. Indicate elevation datum used for BFE in Item 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

C1. Building elevations are based on:     Construction drawings     Building Under Construction Finished Construction  
 C2. Benchmarks utilized PBM 5 -Elev=688.726 Vertical Datum NAVD 88  
     a) Top of bottom floor (including basement, crawlspace, or enclosure floor) 688.68 X feet  
     b) Top of the next higher floor 698.02 X feet  
     c) Bottom of the lowest horizontal structural member (V Zones only)  
     d) Attached garage (top of slab) 688.60 X feet  
     e) Lowest elevation of machinery or equipment servicing the building 698.02 X feet  
     f) Lowest adjacent (finished) grade next to building (LAG) 688.20 X feet  
     g) Highest adjacent (finished) grade next to building (HAG) 688.86 X feet  
     h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support

**Elevation Certificate 2**

A4. Building Use (e.g. Residential, Non-Residential, Addition, Accessory, etc.) Residential  
 A5. Latitude/Longitude: Lat.      Long.      Horizontal Datum     NAD 1927     NAD 1983  
 A7. Building Diagram Number       
 A8. For a building with a crawlspace or enclosure(s)  
     a) Square footage of crawl space or enclosures 1040 sq. ft.  
     b) No. of permanent flood openings in the crawlspace or enclosure(s) within 1.0 ft above adjacent grade 9  
     c) Total net area of flood openings in A8b 1152 sq in  
     d) Engineered flood openings? Yes  No  
 A9. For a building with an attached garage  
     a) Square footage of attached garage      sq ft  
     b) No. of permanent flood openings in the attached garage within 1.0 foot above adjacent grade  
     c) Total net area of flood openings in A9.b      sq in  
     d) Engineered flood openings? Yes  No  


---

 B8. Flood Zone(s) A10 B9. Base Flood Elevation(s) (Zone AO, use base flood depth) 692  
 B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9.  
    FIS Profile FIRM     Community Determined     Other (Describe)  
 B11. Indicate elevation datum used for BFE in Item 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

C1. Building elevations are based on:     Construction drawings     Building Under Construction Finished Construction  
 C2. Benchmarks utilized MN DOT Station Sutliff MN 163 Vertical Datum NGVD 1929  
     a) Top of bottom floor (including basement, crawlspace, or enclosure floor) 683.35 X feet  
     b) Top of the next higher floor 693.75 X feet  
     c) Bottom of the lowest horizontal structural member (V Zones only)  
     d) Attached garage (top of slab) Detached garage 692.30 X feet  
     e) Lowest elevation of machinery or equipment servicing the building 693.75 X feet  
     f) Lowest adjacent (finished) grade next to building (LAG) 691.10 X feet  
     g) Highest adjacent (finished) grade next to building (HAG) 693.50 X feet  
     h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support

**ADMINISTRATION AND ENFORCEMENT**

**Elevation Certificate 3**

A4. Building Use (e.g. Residential, Non-Residential, Addition, Accessory, etc. .) Residential  
 A5. Latitude/Longitude: Lat. 22-06-19.6 Long. 91-07-39.6 Horizontal Datum      NAD 1927  NAD 1983  
 A7. Building Diagram Number 7  
 A8. For a building with a crawlspace or enclosure(s)  
 a) Square footage of crawl space or enclosures      sq. ft.  
 b) No. of permanent flood openings in the crawlspace or enclosure(s) within 1.0 ft above adjacent grade       
 c) Total net area of flood openings in A8b       
 d) Engineered flood openings? Yes      No       
 A9. For a building with an attached garage  
 a) Square footage of attached garage 541 sq ft  
 b) No. of permanent flood openings in the attached garage within 1.0 foot above adjacent grade 3  
 c) Total net area of flood openings in A9.b 600 sq in  
 d) Engineered flood openings?      Yes  No  
 B8. Flood Zone(s) AE B9. Base Flood Elevation(s) (Zone AO, use base flood depth) 7  
 B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9.  
 FIS Profile  FIRM  Community Determined  Other (Describe)       
 B11. Indicate elevation datum used for BFE in Item 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  
 C1. Building elevations are based on:  Construction drawings  Building Under Construction  Finished Construction  
 C2. Benchmarks utilized Vertical Datum 1929

- a) Top of bottom floor (including basement, crawlspace, or enclosure floor) 6.60 X feet
- b) Top of the next higher floor 19.43 X feet
- c) Bottom of the lowest horizontal structural member (V Zones only) N/A X feet
- d) Attached garage (top of slab) 6.88 X feet
- e) Lowest elevation of machinery or equipment servicing the building 6.28 X feet
- f) Lowest adjacent (finished) grade next to building (LAG) 5.59 X feet
- g) Highest adjacent (finished) grade next to building (HAG) 6.81 X feet
- h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support N/A

**Building Photographs**

**Front View**

**Date Taken: 04-21-10**



**ADMINISTRATION AND ENFORCEMENT**

**Building Photographs**

**Rear View**

**Date Taken: 04-21-10**



**Side View**

**Date Taken: 04-21-10**



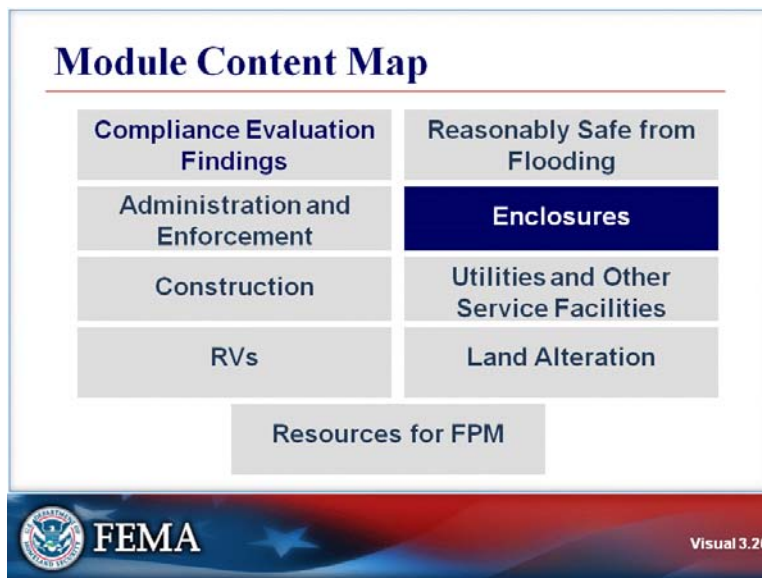
**ADMINISTRATION AND ENFORCEMENT**

**Building Photographs**

**Side View**

**Date Taken: 04-21-10**



**ENCLOSURES****Visual 3.26****Key Points**

The next section of this module will deal with enclosures, and with flood openings required in enclosures.

ENCLOSURES

Visual 3.27

### What is an Enclosure?

- An area created by a crawlspace or solid walls that fully encloses areas below the lowest floor.
- An enclosure:
  - May be under an elevated structure.
  - May be a crawlspace.
  - Is not a basement.

**DIAGRAM 8**

All buildings elevated on a crawlspace with the floor of the crawlspace 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 crawlspace is with or without openings present in the walls of the crawlspace. Indicate information about crawlspace size and openings in Section A - Property Information.

Visual 3.27

**Key Points**

An enclosure is an area created by a crawlspace or solid walls that fully encloses areas below the lowest floor. Refer to the NFIP Technical Bulletin 1, Openings in Foundation Walls and Walls of Enclosures (2008), which is applicable to A-Zones' structures.

An enclosure is not a basement, which is any area of a building having its floor subgrade (below ground level) on all sides.

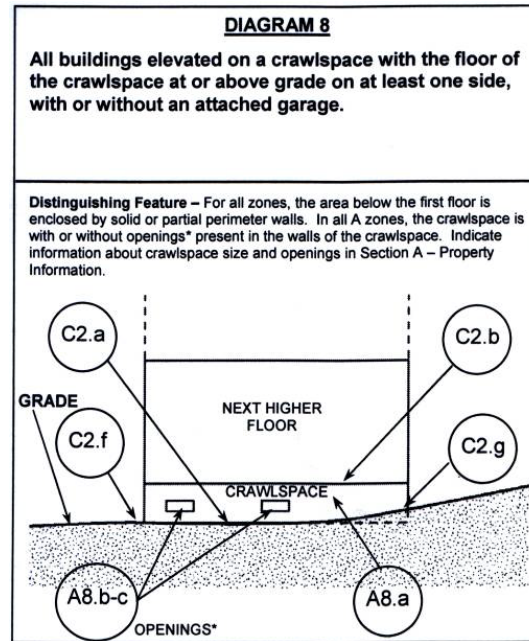
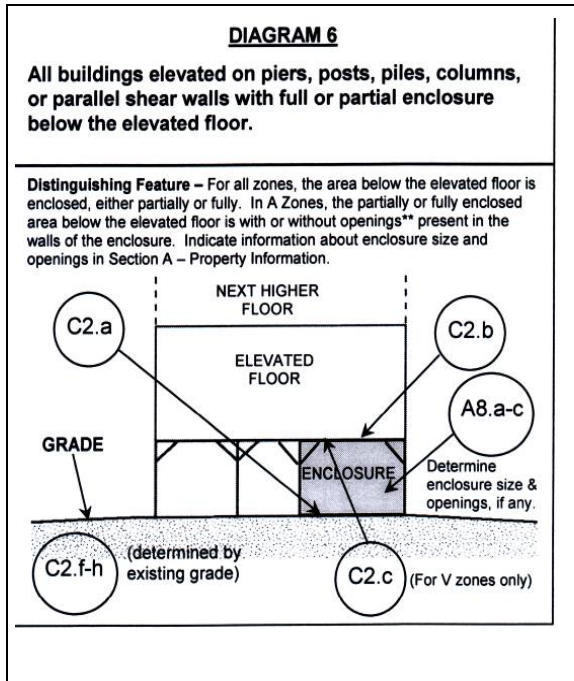
Insurance guidance defines enclosures and crawlspaces separately. For insurance purposes, an enclosure is always under an elevated building.

Enclosures under elevated buildings that are subject to flooding can only be used for:

- Storage
- Parking of vehicles
- Building access

**ENCLOSURES**

An enclosure may be either under an elevated structure, or be a crawlspace, as illustrated by diagrams 6 and 8 from the Elevation Certificate, respectively.



Guidance for enclosures under an elevated V-Zone structure is provided in:

- NFIP Technical Bulletin 5, Free-of Obstruction Requirements (2008)
- NFIP Technical Bulletin 9, Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings (2008)

Guidance for both elevated structures and crawlspaces is provided in NFIP Technical Bulletin 1.

### ENCLOSURES

#### Visual 3.28

### Enclosure Issues

- Conversion to an illegal use
- Lack of flood openings
- Inadequate flood openings
- Improper materials
- Breakaway wall issues
- Unprotected M/E below BFE
- Lack of required certifications



FEMA

Visual 3.28

#### Key Points

Floodplain Managers may encounter the following issues with enclosures:

- Conversion to uses other than Storage, Parking, and Access, which is illegal for floodprone enclosures below the lowest floor.
- Raised enclosures such as enclosed staircases.
- Use of materials that are not flood-resistant.
- Breakaway walls that are improperly designed or installed.

Utilities and other service facilities not elevated or protected also are frequent problems in enclosures. These issues will be covered later in this module.

A swimming pool, toilet, or shower does not meet the use criteria.

Examples of illegal enclosures include elevated high-rise buildings that contain:

- A swimming pool enclosed with rigid walls.
- Recreational water parks for children.
- Bars with sinks, tables, chairs, and bathrooms.
- Entertainment areas.





## ENCLOSURES

## Visual 3.29

### Avoiding Conversion to Illegal Uses

- Require non-conversion agreements
- Take pictures of building to show status on inspection date
- Limit enclosure size
- Prohibit enclosures
- Prohibit solid walls




FEMA
Visual 3.29

## Key Points

Tools to combat conversion to uses other than Storage, Parking, and Access, include:

- Use non-conversion agreements.
- Emphasize insurance costs. Most people make a decision, for example to enclose the space under an elevated structure in the V-Zone, only to discover later that the decision has drastically increased their insurance cost.
- Limit enclosure size or prohibit enclosures. CRS points are awarded for either option. Nags Head, NC, is a community that prohibited enclosures.
- Prohibit solid walls.
- Set up an inspection program every time a structure is sold or utilities change. If an illegal enclosure is found, remove it and prepare a non-conversion agreement.

Inspections at the point of sale provide consumer protection to buyers, who may be unaware of enclosure requirements. This type of measure may need to be enacted at the State level.

Changes to utilities raise issues of building code compliance, structure maintenance, and possible conversion to illegal uses.

**ENCLOSURES**

Property owners use various tactics to disguise illegal enclosures.

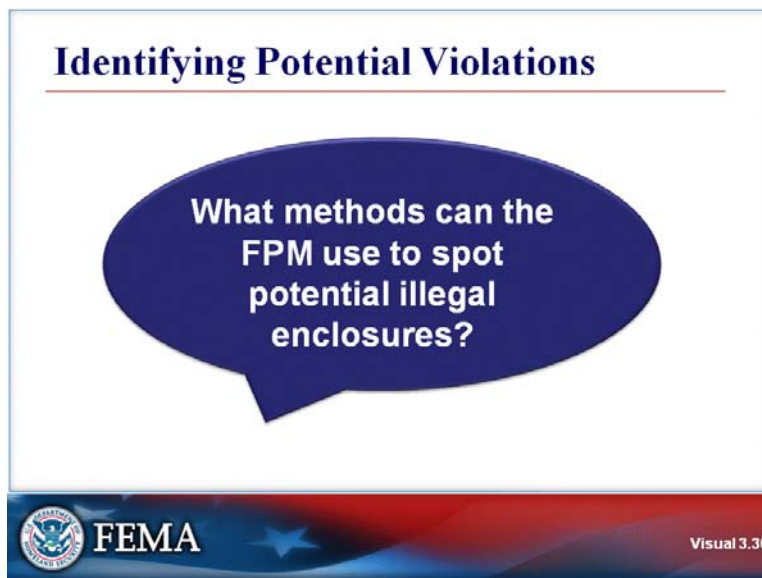
- Flood openings may be closed behind a finished wall.
- Fiberglass may be placed behind lattice work.

Such measures can be difficult to see when driving by the property.

## ENCLOSURES

### Visual 3.30

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### Key Points

**Discussion Question:** What methods can the FPM use to spot potential illegal enclosures?

**ENCLOSURES**

**Visual 3.31**

**Identifying Potential Violations**

- Drive-bys during day and at night:
  - Unable to see through lattice-work during the day
  - Blue lights from TVs at night
- Window finishings (curtains, blinds)
- Landscaping in front of doors
- Covered flood openings
- Presence of dumpsters and building materials
- Window AC units

FEMA Visual 3.31

**Key Points**

This visual shows additional indicators that may not have been mentioned.

Many people will put curtains or blinds in windows purely for decorative effect from the outside. They may indicate that the structure needs a closer look.

## ENCLOSURES

### Visual 3.32

**Remedies to Illegal Uses**

- Expected to remedy to maximum extent possible
- Life safety and structure damage priorities
- Example: Shady Cove, OR
  - Non-conversion agreements
  - Installing adequate openings
  - Removal



 **FEMA** Visual 3.32

### Key Points

Illegal uses of enclosures are a life safety priority. Also, an illegally constructed enclosure can result in significant damage to the elevated portion of the building. Noncompliance should be remedied to the maximum extent possible.

The Shady Cove, Oregon, example includes a remedy.

- There is now a compliance program in place. All structures in the area are being inspected, and the Floodplain Manager is working with owners to rectify potential violations.
- Compliance measures include getting non-conversion agreements, installing adequate openings, and removing features such as bars, pool tables, and bathrooms.

**ENCLOSURES**

**Visual 3.33**

**Large Enclosures**

- **Much higher insurance premium for enclosures  $\geq$  300 sq. ft. in V-Zones**
- **CRS credits:**
  - **Enclosure (100 points for < 300 sq. ft.)**
  - **Prohibition of enclosures (300 points)**
  - **Non-conversion agreements (50 points)**

FEMA Visual 3.33

**Key Points**

There are adverse consequences to both property owners and the community for large enclosures.

For the property owner, flood insurance costs skyrocket.

The community can gain Community Rating System (CRS) credits based on local ordinance size limitations:


- (1) 300 square feet, if all enclosures (including breakaway wall) are prohibited, or
- (2) The total of the following:
  - a. 100, if enclosures greater than or equal to 300 square feet are prohibited, and meet all NFIP requirements.
  - b. 50, if a non-conversion agreement is required:
    - i. not to improve, finish or otherwise convert to an illegal use, and
    - ii. the community is granted the right to inspect.


## ENCLOSURES

## Visual 3.34

### Improper Materials

- **TB-2: Flood-Resistant Materials Requirements**
- **Applies to all construction below BFE**
- **Enclosures:**
  - **Staircase/elevators (access)**
  - **Parking of vehicles**
  - **Storage**




FEMA
Visual 3.34

## Key Points

Use of improper materials in below-BFE enclosures is a common problem. All construction below BFE should be flood-resistant.

An enclosed stairway may be built below BFE leading to the entrance of the elevated building. The enclosed stairway should be flood-resistant.

NFIP Technical Bulletin 2, Flood Damage-Resistant Materials Requirements (2006), classifies materials by flood-resistance for use in floors, walls, and ceilings.

Flood resistance categories range from 1 through 5.

- Materials in categories 1 through 3 are not acceptable for construction requiring flood-resistant materials.
- Materials in categories 4 and 5 are acceptable.

In below-BFE applications, materials that meet life-safety code requirements and have maximum resistance to damage from flood inundation should be used. This applies to the flood-resistant requirements only.


In Zones V, VE, and V 1 – V 30, the installation of such materials may create an obstruction. Because obstructions in V-Zones could result in structural failure of the building, they represent a life-safety issue and shall therefore take precedence over local building codes. Refer to Technical Bulletin 5, “Free of Obstruction Requirements,” for further information.


### ENCLOSURES

#### Visual 3.35

### Breakaway Wall Issues

- Utilities run through walls
- Walls not truly breakaway
- FPM may catch:
  - During plans review
  - During field inspections
- Detection problems:
  - Breakaway walls not in plans
  - Conversions (weekend warriors)



 **FEMA** Visual 3.35

#### Key Points

According to 44 CFR §60.3(e)(5), enclosures below the lowest floor in V-Zones are required to collapse under smaller loads than are expected during the base flood.

The regulation states that areas below elevated structures be: "...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."

Insect screen and wood-lattice usually perform well, but breakaway walls present design, construction, and performance challenges. Details include assuring that external finishes are scored to break away with the wall, and will not damage other exterior finishes above them.

Breakaway walls have encountered problems such as placing electrical, water, and other utility lines on the breakaway walls, or attaching meters to walls. As a result, the walls become obstructions rather than breaking away.

To solve this problem, utilities should be placed by the landward side of pilings rather than attached to the walls.



**ENCLOSURES**

Another problem is that some enclosure walls are not built to be breakaway, or that breakaway walls are not correctly designed, and will not collapse. The local official may not identify problems because:

- Plans submitted with the floodplain permit application didn't show the enclosure walls.
- Owners do work during weekends to create enclosures without applying for permits.
- A community may cover a large geographic area that is difficult to monitor in its entirety.

Large area walls with exceptionally large dimensions may become entangled in the building supports, or may cause damage to elevated portions of the structure or to adjoining structures.

Numerous post-flood disaster damage assessments indicate that improperly constructed ground-level enclosures significantly increase damages to buildings in both Zones A and V. Hurricane Alicia was a Category 3 hurricane when it made landfall on Galveston Island, Texas, on August 18, 1983. Among the findings from an onsite post-hurricane assessment of damages: severe structural damage occurred to buildings with ground-level enclosures when the storm surge hit non-breakaway walls in the areas where wave velocity was significant.

Even if an enclosed area is constructed with breakaway walls, if mechanical and electrical utilities are attached to these walls, the walls may not break away as they are designed, because they would be obstructed by the mentioned services within the walls (i.e., water and sewer pipes, electrical wire and conduits, ductwork, and the fixtures themselves). Obstructions to walls intended to break away can cause excess flood loads to be transferred to either the foundation or structure above and contribute to structural failure or collapse.

Hurricane Opal struck Florida in October, 1995. A Building Performance Assessment issued in August 1996 documented the failure of breakaway walls to break cleanly from an elevated structure during the hurricane because utilities servicing the building were attached to the breakaway walls.

**ENCLOSURES**

**Visual 3.36**

**Activity: Enclosure Issues**

**Instructions: Working as a group:**

- Discuss each of the scenarios.
- Identify the noncompliance issue.
- Recommend what the Floodplain Manager should do.

FEMA logo and "Visual 3.36" text are visible at the bottom of the slide.

**Key Points**

**Activity Purpose:** This activity will enable your group to identify possible solutions to enclosure issues.

**Instructions:**

1. Work within your assigned group.
2. Discuss each of the scenarios below with your group.
3. Determine what the Floodplain Manager should do in each case.

**Time:** 15 minutes

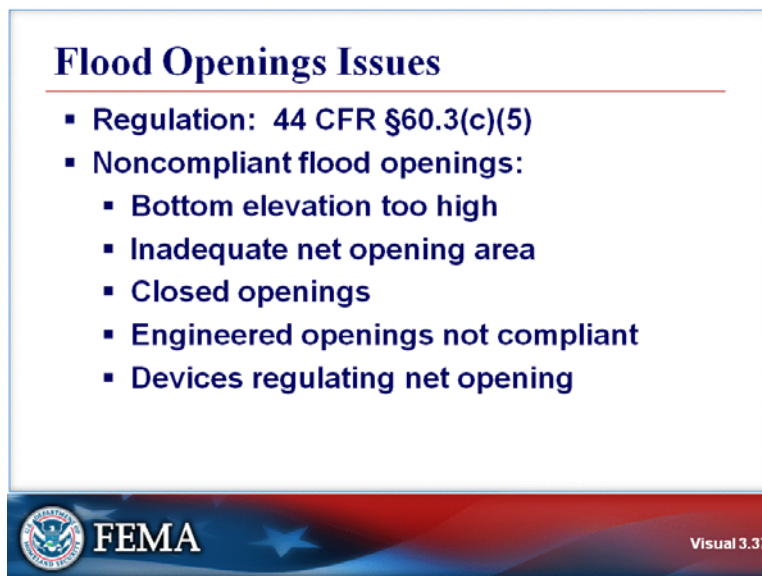
**Scenarios:**

1. A building inspector noticed curtains in the window of an enclosure below an elevated house, and sent an email to the Floodplain Manager with the address.
  - What should the Floodplain Manager conclude?
  - What steps should he or she take?
  - What ordinance provisions would be helpful in pursuing the matter?



### ENCLOSURES

#### Visual 3.37



#### Key Points

Flood openings are required for floodprone enclosures below the lowest floor (e.g. crawlspaces, attached garages) in all A-Zones. The purpose of openings is to allow floodwater to flow through an enclosure to prevent buildup of hydrostatic forces.

Problems with noncompliant flood openings are among the most common violations identified in the American Institutes for Research study on compliance that was reviewed at the beginning of this module.

Noncompliance issues with flood openings include:

- Bottom elevation of the opening is higher than 1 foot above the adjacent interior or exterior grade level, whichever is the higher, which prevents the opening from fully serving its intended purpose.
- The net opening area is the portion of the opening that consists of openings as opposed to slats or other solid obstructions. An inadequate net opening area restricts flow into and out of the enclosure.
- Openings that are blocked or have an open/close latch. Openings should work without human intervention.
- Engineered openings that lack required certification by the licensed professional.
- Engineered openings that fail to document calculations and design requirements.

Flood openings have to be on more than one wall for flood insurance purposes, while regulations do not have any such specification.

## ENCLOSURES

### Visual 3.38

**Bottom of Opening Too High**

- Needs to be within 1 foot of:
  - Interior or exterior adjacent grade, whichever is higher, or
  - Slab floor immediately below opening
- Stem walls with backfill: Flood openings not required



 **FEMA**  Visual 3.38

### Key Points

The bottom of each flood opening needs to be within 1 foot of interior or exterior grade (whichever is higher) or the slab floor immediately below the opening. If the interior level is below the exterior lowest adjacent grade, it is considered a basement.

Ground levels change over time.

- The ground on the outside will rise as vegetation, dirt, and debris collect on the site.
- The ground on the inside typically compacts.

ENCLOSURES

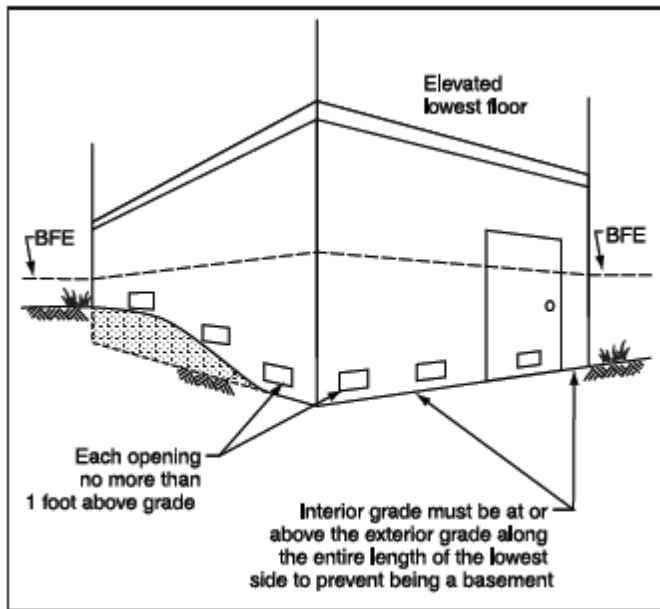


Figure 11 from Technical Bulletin 1 shows a grade going up a sloping site with flood openings.

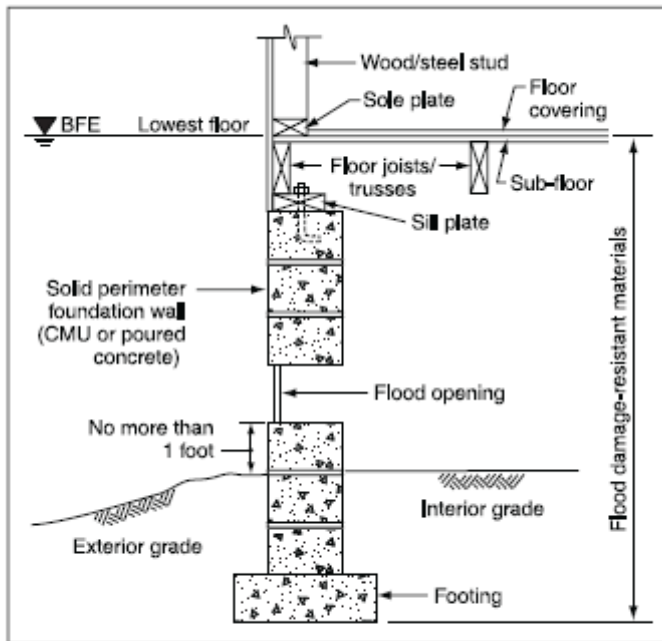


Figure 1 from Technical Bulletin 2, Flood Damage-Resistant Materials Requirements, shows an example of a flood opening in a foundation wall.

## ENCLOSURES

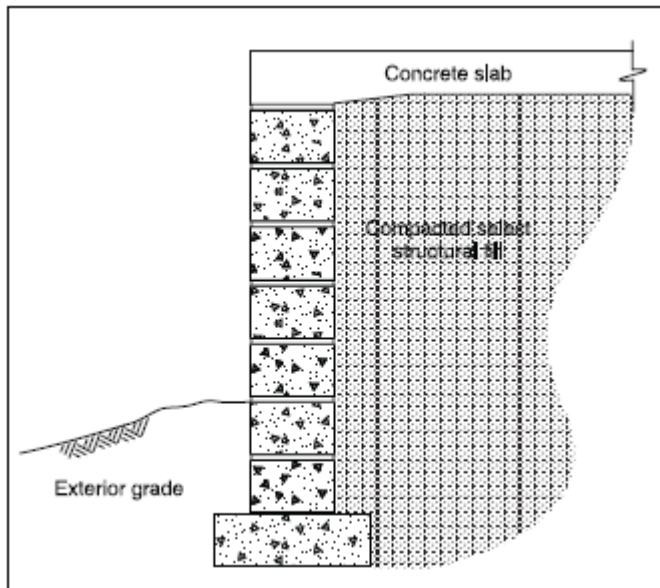


Figure 8 from Technical Bulletin 1 shows stem walls with backfill, which does not require floor openings as the exterior flood hydrostatic forces are balanced by the interior soil pressure.

**ENCLOSURES**

**Visual 3.39**



**Key Points**

Note that the flood opening probably is at least six inches high, and that it is positioned more than twice the measure of its own height above the ground. The bottom of the opening probably is more than one foot above the ground.

Also, gladiolus usually grows three to four feet high at its full growth, which would place the openings considerably above one foot.



**ENCLOSURES****Visual 3.40****Key Points**

The elevation of the bottom of this flood opening is obviously more than 1 foot above the ground. Note the use of the dollar bill as a measuring device. A dollar bill is slightly more than 6 inches long.

In this situation, the owner added fill at the base of the building to bring the flood openings into compliance. However, the danger is that the floor of enclosure/crawlspace becomes a basement, and thus the building's lowest floor. The building becomes noncompliant with both local regulations and those of the NFIP.



Before reaching a solution to the noncompliant flood openings, it is important to find out what is behind the wall by looking at the building plans. The building may be on a slab, or the foundation may have a block wall.

## ENCLOSURES

### Visual 3.41

### Openings Requirements

- Regulation: 44 CFR §60.3(c)(5)
- Requirements: Professionally designed and certified, or:
  - At least 2 in number
  - Bottom elevation  $\leq$  1 foot above grade
  - Provide a minimum of 1 sq. in. of net opening for each sq. ft. of enclosed area
  - Must function automatically, if fitted with louvers or other devices



FEMA

Visual 3.41

### Key Points

The net opening area must be at least 1 square inch for every square foot of the enclosed area. There must be at least two openings. They must function automatically if they are fitted with screens, louvers, or other devices.

Openings must be large enough not to get clogged. The International Code Council requires openings to pass a 3-inch sphere; a requirement is also in Technical Bulletin 1. Pre-engineered commercial products that meet the requirement are available.

Decorative elliptical or cast iron openings may cover up most of the area and thus provide little flood protection. Effective openings can be installed on the back and/or sides of the structure to meet openings requirements.

For insurance purposes, the property owner needs documentation such as the Elevation Certificate and certification by a registered professional engineer or an architect for professionally designed openings indicating that all requirements have been met.

Air vents may not meet flood openings requirements as their intended purpose is different from that of flood openings.

## ENCLOSURES

### Visual 3.42

**Engineered Openings**

- Regulation: 44 CFR §60.3(c)(5)
- Individual certification by registered design professional required
- Kept in community's permanent permit files
- Documentation provided for flood insurance

FEMA Visual 3.42

### Key Points

Engineered openings (or covers and devices) require an individual certification submitted by a registered architect or engineer.

Consider a marina in Minnesota, a functionally dependent structure located next to a lake. The following issues need to be addressed:

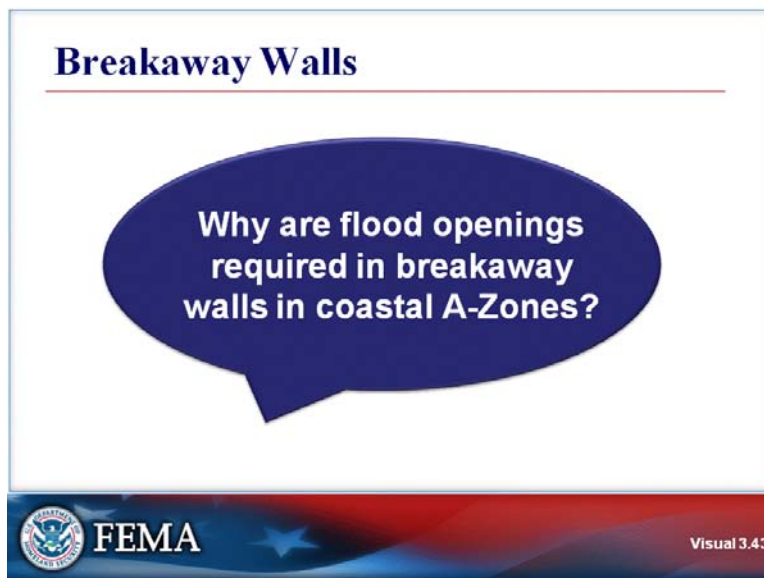
- How many rooms are on the first floor? Must each room be provided with openings?
- What kind of insulation is in the walls? In Minnesota, the structure would be heated.
- How many square feet are enclosed?

In this example, a 1,350-square foot area is to be enclosed, and eight engineered openings should provide net opening area, if each engineered opening furnishes 200 sq. in. of net opening.

Non-flood-resistant insulation is not allowed.

**ENCLOSURES**

**Visual 3.43**



**Key Points**

**Discussion Question: Why are openings required in breakaway walls in coastal A-Zones?**

## ENCLOSURES

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### Visual 3.44


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**Activity: Openings**

---

**Instructions:** Working as a group:

- Discuss each of the situations that involve flood openings.
- Recommend what actions the FPM should take.
- Be prepared to report your conclusions.



The bottom of the slide features the FEMA logo on the left, a decorative banner with a blue and red wave pattern and a white star in the center, and the text 'Visual 3.44' on the right.

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### Key Points

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**Activity Purpose:** This activity will enable your group to identify possible solutions to flood opening issues.

**Instructions:** Working as a group:

1. Discuss each of the situations that involve flood openings.
2. Recommend what actions the FPM should take.
3. Be prepared to report your conclusions.

**Time:** 15 minutes

The situations begin on the following page.

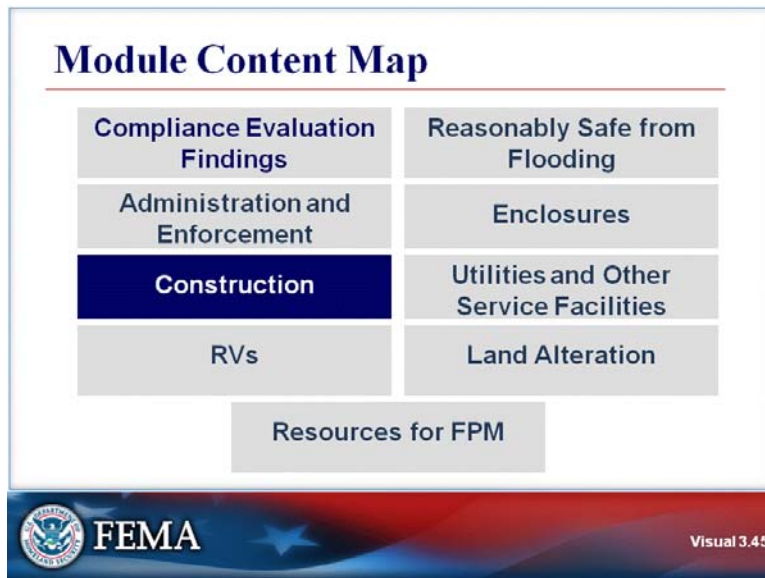
### ENCLOSURES

#### Situations:

1. Although flood openings are installed in the enclosure, closer inspection reveals that the openings do not penetrate through the entire enclosure wall.
2. Decorative wrought-iron opening covers on a building obviously have small net opening areas. The net openings are not adequate for the building area. The owner is concerned that more functional vents will detract from the home's appearance.
3. Openings have manual controls. When observed, the openings were in the shut position.
4. A crawlspace area has no openings. The owner fears that vermin will enter if openings are installed.
5. A building has engineered openings, but the openings were installed 15 inches above ground level. Opening specifications indicate the net opening area is inadequate.

**CONSTRUCTION**

**Visual 3.45**

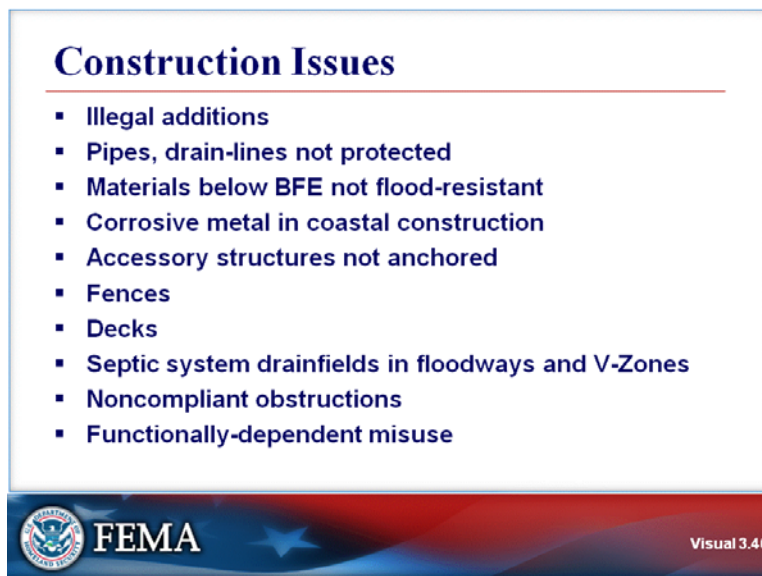


**Key Points**

The next section of this module will deal with noncompliance related to construction.

### CONSTRUCTION

#### Visual 3.46



#### Key Points

Construction issues include:

- Illegal additions such as sheds and decks.
- Pipes and drain-lines not protected from flood velocity.
- Materials below the BFE not flood-resistant.
- Use of corrosive metal connectors for coastal construction.
- Accessory structures such as sheds not anchored.
- Fences that could be obstructions.
- Decks that could be obstructions.
- Septic system above-ground drain fields, especially in the floodway and V-Zones.
- Noncompliant obstructions such as roads and bridges, often constructed by transportation agencies and conduits under driveways by property owners.
- Functionally-dependent uses, such as docks for loading and unloading cargo and passengers, shipbuilding and ship repair must be located in close proximity to water. A seafood restaurant is not a functionally-dependent use.

A construction-related issue may arise due to failure to enforce the Substantial Improvement/Substantial Damage portion of the local ordinance.

For example, instead of repairing damage to pre-damaged condition, the property owner may repair and also undertake an improvement; i.e., by installing more expensive cabinets and countertops to replace those that were damaged. This type of violation can be difficult to detect, especially in cases where the building footprint remains the same.

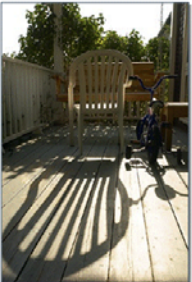


## CONSTRUCTION

### Visual 3.47

### Illegal Additions and Improvements

- Adding decks
  - First step to enclosing the space
  - New post ground elevation may be an issue
  - Development may invalidate LOMR-F or LOMA
  - If in floodway, leads to encroachments
- Enclosing decks and porches
- Installing sheds and other accessory buildings
- Finishing lower-level enclosures





**FEMA**

Visual 3.47

### Key Points


Types of illegal additions and improvements include:

- Adding decks to structures.
  - Once a deck is built, the owner often proceeds to enclose the space.
  - New posts placed to support the deck may alter lowest adjacent grade, for a Letter of Map Change (LOMC) request.
  - The development may invalidate a Letter of Map Revision – Based on Fill (LOMR-F) or Letter of Map Amendment (LOMA).
- Enclosing decks and porches.
- Installing or constructing sheds and other accessory buildings.
- Finishing previously unfinished, lower-level enclosures may violate NFIP regulations regarding flood damage-resistant materials.


### CONSTRUCTION

#### Visual 3.48

### Preventing Illegal Construction



- Ordinance language
- Non-conversion agreements
- Public awareness/information
- Building inspector/contractor awareness
- Photographic evidence kept on file with ECs
- Permits required for all development



FEMA

Visual 3.48

#### Key Points

Options to prevent illegal construction may include:

- Adopt ordinance language that allows for stiff penalties and inspections when violations appear likely, even after issuing the Certificate of Occupancy (CO).
- Require non-conversion agreements for enclosures, which often include agreements to allow inspections.
- Make sure the public is aware that specific types of construction in the floodplain are illegal, and boost awareness of the need to obtain floodplain development permits. To meet requirements of the Endangered Species Act (ESA), encourage construction on piles and columns, and discourage use of fill.
- Make sure that local building inspectors and contractors are aware of floodplain management regulations.
- Get photographic evidence to document the current condition of structures to file with elevation certificates. Photographs also are required for insurance.


Another measure is to work with the county appraiser to be notified of increased appraisals due to improvements resulting in increased property taxes. Many communities use the cost of proposed construction in building permits to adjust property tax appraisals.



Elevations on fill avoid the issue of enclosures, but may raise other land alteration issues related to drainage issues and habitat for endangered species.

**CONSTRUCTION****Visual 3.49**

**Pipes and Drain-Lines**

- Related to utilities servicing the building
- Include sanitary and water supply systems
- Need protection from:
  - High velocity waves
  - Potential debris in A-Zones
- Should be located on landward side of pilings



 **FEMA**  Visual 3.49

**Key Points**

Pipes and drain lines are components of utilities servicing the building, including sanitary and water supply systems.

Pipes and drain lines need to be protected from high velocity waves in V-Zones and from potential debris in A-Zones.

### CONSTRUCTION

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#### Visual 3.50

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#### Key Points

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Technical Bulletin 2, Flood Damage-Resistant Materials Requirements, categorizes construction materials for flood resistance. Studies are being conducted that will expand the knowledge of how floodwaters and materials interact. TB-2 only includes materials that were current at time of issuance.

New construction materials continue to be developed. Examples are paperless drywall and Greenboard and Durock wall panels used for internal and external partitions.

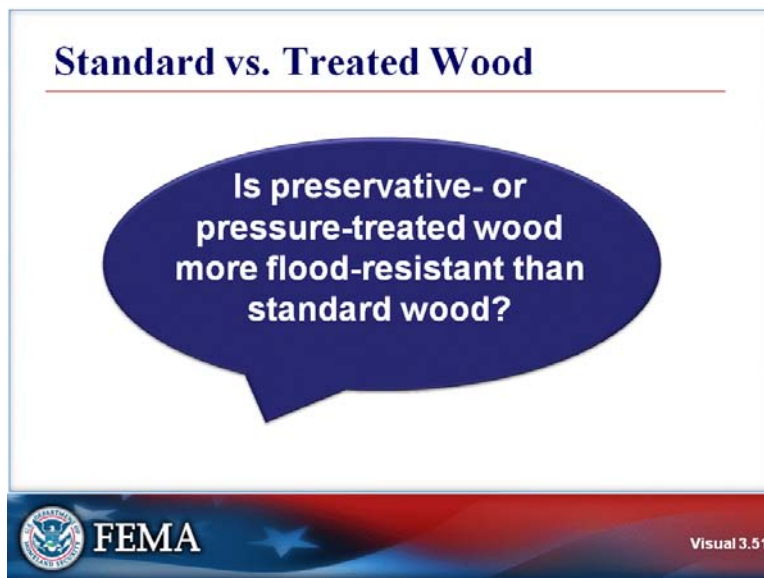
Durock is:

- Cement board.
- Protects against moisture and mold.

Guidance is being developed to cover these and other new construction materials.

CONSTRUCTION

Visual 3.51



Key Points

**Discussion Question:** Is preservative- or pressure-treated wood more flood-resistant than standard wood?

**CONSTRUCTION**

**Visual 3.52**

**Non-Corrosive Materials On Coast**

- Resources:
  - Technical Bulletin 8
  - Coastal Construction Manual
- Only acceptable connectors:
  - Stainless steel
  - Hot-dipped galvanized steel



 **FEMA** Visual 3.52

**Key Points**

Following Hurricane Andrew in Florida in 1992, Mitigation Assessment Teams (MATs) identified and reported the problem of metal connectors that corroded and caused failure in coastal structures.

The following resources offer guidance on preventing corrosion:

- NFIP Technical Bulletin 8: Corrosion Protection for Metal Connectors in Coastal Areas, provides guidance on metal connectors.
- FEMA 55: Coastal Construction Manual: Principles and Practices of Planning, Siting, Designing, Constructing, and Maintaining Residential Buildings in Coastal Areas (3rd ed.)

The only acceptable connectors in coastal areas are stainless steel and hot-dipped galvanized steel. Also, the nails/screws must be corrosion-resistant.

CONSTRUCTION

Visual 3.53



Key Points

**Discussion Question:** What can be an accessory structure?

**CONSTRUCTION**

**Visual 3.54**

**Regulating Accessory Structures**

- **Require permits**
- **Keep out of the floodway**
- **Anchor to resist flotation, collapse, and lateral movement**
- **Prohibit dry-stack blocks**
- **Require flood openings if below BFE**



 **FEMA** Visual 3.54

**Key Points**

Regulate accessory or appurtenant structures, regardless of size and value, through the following measures:

- Require permits for accessory structures. Many property owners will construct or install accessory structures without ever considering the need for a permit. Outreach and education can help to build awareness.
- Keep accessory structures such as sheds out of the floodway.
- Anchor structures to resist flotation, collapse, and lateral movement, for example by using anchoring straps or ground anchors.
- Prohibit the use of dry-stack blocks as structure foundations, because blocks are easily toppled by floodwater.
- Require flood openings for structures below BFE.

The Floodplain Manager needs to be cognizant of possible adverse effects when regulating accessory structures, and devote time and attention to those that have the most potential impact. Some accessory structures are huge and present significant safety issues. If fill is being hauled in to install an accessory structure, a Letter of Map Revision – Based on Fill (LOMR-F) may be needed.

Property owners can transfer up to 10 percent of flood insurance policy coverage from the principal structure to a detached garage used for storage and parking. Separate flood insurance policies can be purchased for other accessory or appurtenant structures.



CONSTRUCTION

Visual 3.55



Key Points

**Discussion Question:** How do you deal with accessory structures in your community?

### CONSTRUCTION

#### Visual 3.56

### Fences



- Considered floodplain development
- Regulating fences requires judgment
- Fences may or may not be obstructions:
  - Parallel to flow.
  - Perpendicular to flow.
  - If in floodway, may require no-rise certification.
- The community's other ordinances may address fences.

 **FEMA**  Visual 3.56

#### Key Points

While fences are not considered structures, they do constitute development.

It is important to use judgment when regulating fences.

- Most people will not recognize the need for permits to build fences.
- Fences can become a sore point in rural communities. Farmers are liable to ridicule the idea that they need permits to install and repair their fences.

As a Floodplain Manager, focus on public safety and property damage issues. For example, your community's biggest area of concern might be fences and other accessory structures in the floodway. Know why obstructions in the floodway are regulated, and be able to explain the consequences as needed.

In general, fences should have openings. Chain link, barbed wire, and some picket fences aligned with the flow of water may not pose any issues.

In the floodway, advise property owners that fences do constitute encroachment into a floodway. Point out that water velocity will flatten a privacy fence. They require a no-rise certification regardless of their size, alignment, configuration, and materials.

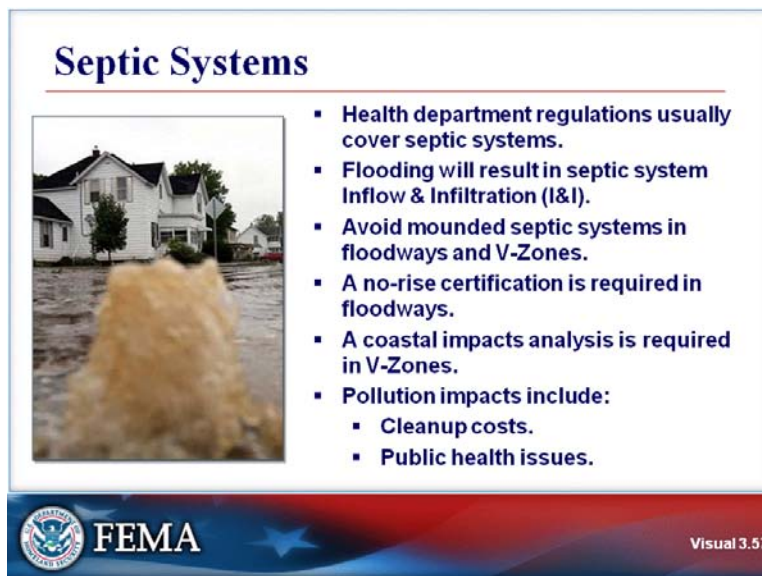
**CONSTRUCTION**

Examples of fences that may need regulation include:

- Fences perpendicular to the flow of water (these block debris and form solid obstructions).
- Stone fences, especially if built across the floodplain to form a dam.

It may be helpful to notify neighbors of possible adverse consequences to their properties.

If the community's other ordinances regulate fences, know how they may affect base flood elevations.

**CONSTRUCTION****Visual 3.57**

**Septic Systems**

- Health department regulations usually cover septic systems.
- Flooding will result in septic system Inflow & Infiltration (I&I).
- Avoid mounded septic systems in floodways and V-Zones.
- A no-rise certification is required in floodways.
- A coastal impacts analysis is required in V-Zones.
- Pollution impacts include:
  - Cleanup costs.
  - Public health issues.

FEMA Visual 3.57

**Key Points**

In all cases, communities must be mindful of pollution cleanup costs due to flooded septic systems as well as their effect on public health following flood disasters.

NFIP regulation (44 CFR §60.3(a)(6)) states that the community shall:

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.

State and local health department regulations usually address septic systems. Property owners usually are required to get a septic compliance inspection permit along with other permits. Most health departments do not allow septic systems in the floodway.

Any flooding will result in septic system inflow and infiltration, because the components are not waterproof.

A mounded septic system includes a drainfield constructed above ground level.

- This type of septic system should be avoided in the floodway.
- In some situations, if there is no alternative, the drainfield must be mounded in the floodway, which requires no-rise certification.
- For mounded drainfields in V-Zones, coastal analysis may be needed to evaluate their impacts on flood elevations.
- A common septic system problem is tank buoyancy. Tanks need to be anchored to stay in place.

## CONSTRUCTION

The major issues that must be addressed are sewage backup and damage to the septic system caused by flooding.

- As long as the tank, distribution pipes, and seepage beds, pits, or trenches are buried sufficiently deep to prevent exposure of the system from erosion or scour, the infiltration of floodwater into the system is by its nature minimal and typically does little damage.
- Additionally, flotation will not typically occur unless the tank is pumped out during saturated conditions (which should not be undertaken).
- Wall penetrations, septic tank/manhole access covers, and inspection pipes should be designed and constructed to be watertight.

Key considerations with respect to designing septic systems in the SFHA include:

- The design flood elevation (higher than or equal to the BFE);
- Expected flow velocities at the site;
- The duration of flooding;
- Soil type and permeability; and water table depth.

Septic systems in floodplains with high flow velocities (e.g. V-Zones, A-Zones with flow velocity of  $\geq 5$  fps) can experience erosion and scour that removes the soil cover and thereby exposes and/or damages the tank and drainage field components. Similarly, the duration of flooding at the site affects the time and extent to which the soil surrounding the system will become saturated.

The longer the soil is saturated, the greater the potential for the septic tank and/or drainfield pipes will be damaged from the overbearing weight of saturated soils. Further, longer saturation periods can impair the treatment process.

Because of the complexities and site-specific factors discussed above, the design of septic systems in the SHFA may require the services of a qualified sanitary engineer who is familiar with soil and flooding conditions at the site and applicable health and safety regulations and building codes.

Additionally, septic systems are often regulated by State and/or local public health or sanitary regulations that specifically prohibit or limit the installation of septic systems in floodplains primarily due to environmental reasons, such as the potential impacts on groundwater (depending on the depth of the water table at the site).

Further, more stringent State and/or local floodplain management ordinances than the NFIP requirements can prohibit construction of septic systems in the SFHA. In such cases, the health and safety regulations or more restrictive floodplain management ordinances would take precedence over the NFIP regulations.

Similarly, many jurisdictions adopt all or portions of model building codes and standards. If a jurisdiction has adopted a building code, such as the International Private Sewage Disposal Code (IPSDC) that has more stringent requirements for septic systems in floodplains, those requirements would take precedence over the NFIP requirements. It is our understanding that the State of Illinois has not adopted the IPSDC.

### CONSTRUCTION

There has been an ongoing issue regarding septic systems for properties recently flooded along the Mississippi River in Shady Oaks Subdivision in Jersey County, Illinois. According to the version of the floodplain ordinance (dated March 13, 2007) posted on the County's Web site, Section 9, Public Health and Other Standards states:

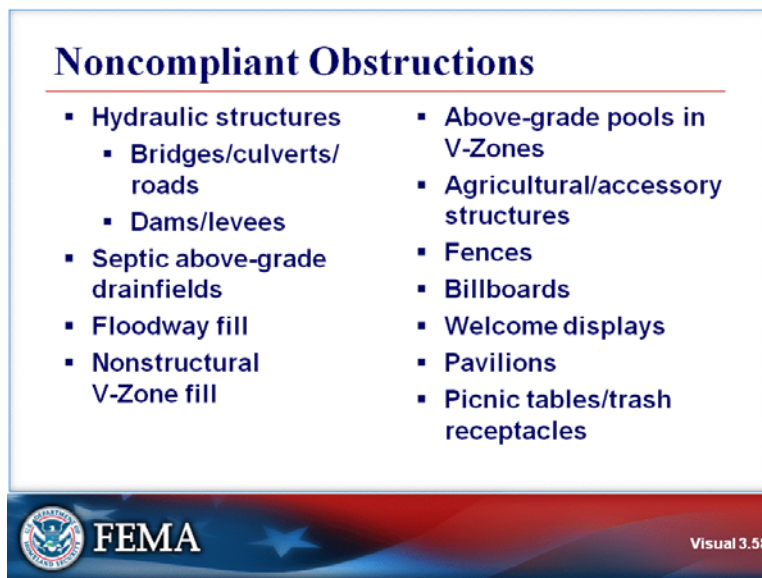
*“New and replacement on-site sanitary sewer lines or waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during flooding. Manholes or other above ground openings located below the flood protection shall be watertight.”*

It appears that county officials in the area of concern are requiring that the replacement systems for the damaged homes be flood proofed. This could be due to hazards presented to septic systems from long flooding duration experienced along the Mississippi River.

The EPA Fact Sheet, “Septic Systems - What to Do After the Flood” ([http://www.epa.gov/safewater/faq/pdfs/fs\\_whattodoafteraflood\\_septic\\_eng.pdf](http://www.epa.gov/safewater/faq/pdfs/fs_whattodoafteraflood_septic_eng.pdf)) provides additional guidance on flooded septic systems.

## CONSTRUCTION

### Visual 3.58



### Key Points

Noncompliant obstructions include the examples shown in the visual.

Obstructions may be placed by:

- Local, State, and Federal agencies, especially transportation agencies. These agencies often fail to coordinate with local governments, and do not realize that local permits are needed.
- State universities.
- Quasi-government authorities, such as airport authorities, port authorities, wastewater districts, utilities, levee districts, railroads, and the U.S. Postal Service. Levee districts tend to create obstructions by storing materials in the floodway.
- Individual property owners who construct private driveways and bridges.
- Agricultural property owners.

Individual and agricultural property owners are generally easier to deal with than governmental and quasi-governmental agencies, which may challenge the right of the local community to regulate the floodplain.

### CONSTRUCTION

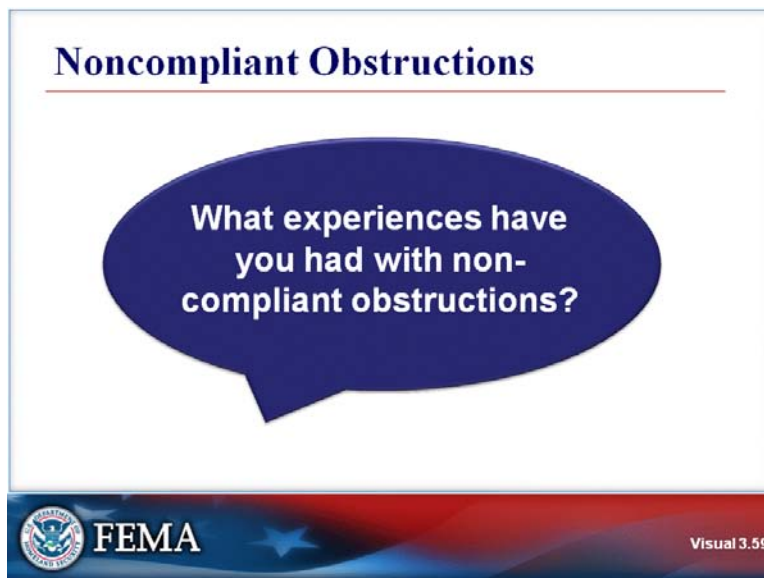
Examples of States that deal with noncompliant obstructions are:

- Minnesota: The State Floodplain Management Office set up a system to notify the State Department of Transportation of noncompliant obstructions. If the department fails to consult local officials, a letter is sent to the Department of Transportation to document the situation.
- Mississippi: The State University of Mississippi tried to build in the floodplain. The State halted construction.



CONSTRUCTION

Visual 3.59




Key Points

**Discussion Question:** What experiences have you had with noncompliant obstructions?


**CONSTRUCTION**

**Visual 3.60**

**Functionally Dependent Uses**



- **Examples of functionally dependent structures are:**
  - **Port facilities**
  - **Boat docking facilities**
  - **Ship building or repair facilities**
- **Distinguish between building and contents:**
  - **Functionally dependent use area can be below BFE.**
  - **All other requirements must be met.**
- **Does not include:**
  - **Long-term storage facilities**
  - **Manufacturing facilities**

 **FEMA** Visual 3.60

**Key Points**

44 CFR §59.1 defines “functionally dependent use”:

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.

Functionally dependent structures need to be next to or near the water to serve their intended functions.

For example:

- Ports obviously cannot function unless there are docks and other facilities to serve vessels.
- Ship building or restoration facilities need to be able to receive and launch vessels.

**CONSTRUCTION**

Regulations that apply to functionally-dependent structures include:

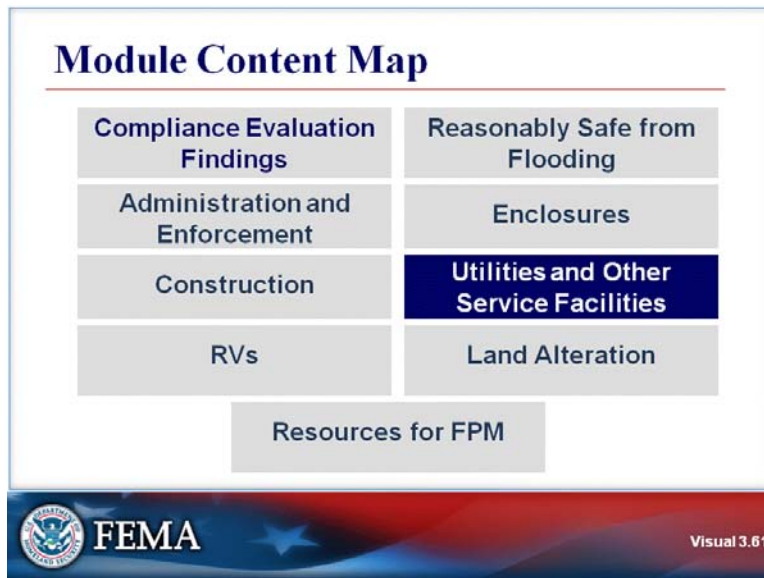
- Making fueling facilities reasonably safe from flooding by using buoys and other construction methods. Fueling facilities are regulated by the Environmental Protection Agency (EPA). There should be little spillage if facilities are properly constructed.
- Construction materials should be resistant to flood damage. Wet floodproofing might be appropriate in A-Zones for enclosures used for parking vehicles, storage, and building access.

While the functionally-dependent use can be below BFE, other parts of the structure should be above BFE.

- Offices and restrooms must be elevated.
- Utilities, transformers, and Heating, Ventilation, and Air Conditioning (HVAC) equipment must be elevated.

UTILITIES AND OTHER SERVICE FACILITIES

Visual 3.61



**Key Points**

The next section of this module will cover noncompliance issues with utilities and other service facilities.

## UTILITIES AND OTHER SERVICE FACILITIES

### Visual 3.62

### Utilities

- **NFIP regulations require:**
  - **Elevated above BFE and anchored, or**
  - **Protected from floodwaters.**
- **Lighting:**
  - **Safety issues**
  - **Separate circuits with Ground Fault Interrupt (GFI) device**




**FEMA**
Visual 3.62

### Key Points

With utilities elevated/anchored or protected, buildings are more likely to stay operational during and after a disaster. Families and businesses can begin recovering more quickly.

All utilities and other service facilities must be elevated above BFE or be protected from floodwaters.

Local building codes may mandate some equipment below BFE to meet safety requirements. For example, the building code may require:

- Grade-level electrical receptacles to prevent use of extension cords.
- An electrical receptacle within 10 feet of an air conditioner compressor.
- A switch operated light fixture in every room, including in below-BFE enclosures.

In such cases, the building code should prevail.

Another issue is that electric and gas meters often are owned by power companies. Meter installation height may be an issue. Also, electrical code requirements may apply. A good practice is to work with power companies toward converting to automatic readings, or using devices that access meter data remotely.

The following excerpt from FEMA 348 provides guidance on power-handling equipment. Power-handling equipment generally consists of bare, weatherproof, or pre-assembled cables, direct-buried or raceway-installed underground cables, transformers, switchboards, meters, distribution panels, large switches, and circuit breakers.

**UTILITIES AND OTHER SERVICE FACILITIES****3.3.3 Power-Handling Equipment**

Power handling equipment in residential applications typically consists of meters, distribution panels, large switches and circuit breakers. These items are the largest components of the electrical system and are typically the most expensive to replace. In addition, these components typically provide the link between the electric service provider and the building. Therefore, the protection of these components is particularly important. Power handling equipment in commercial applications typically consists of the same components that are used in residential applications, but additional switches, distribution panels, and even transformers may be added to regulate the larger demand.

**Elevation**

The most effective flood-resistant design of electrical systems in new and substantially improved buildings in flood-prone areas is elevation of all electrical components to levels at or above the Design Flood Elevation (DFE). Elevation gives the most assurance possible that, during a flood, the electrical system components would not be inundated by floodwaters. In some situations, the maximum elevation of a component, relative to the floor, is specified. If a component cannot be located above the DFE without exceeding the maximum elevation stipulated by code, it must be relocated to a higher floor within the structure. Or, as an alternative, installation of a platform with stairs to provide access to the elevated electrical components may also meet local code requirements.

**Relocation**

If raising the equipment above the DFE is not practical, the power handling equipment can be moved to a utility shed that is above the DFE. Relocation of the equipment is an expensive option, but it can be effective in providing elevation of all the equipment. It is used in substantially damaged/improved structures where there is no room to relocate all the electrical equipment and appliances into the main structure above the DFE. In order to elevate the equipment above the DFE a separate structure is built just for housing the electrical equipment. From the separate structure a line is run into a breaker box located in the main structure. The connecting cable between the substructure and the main structure must be above the DFE.

**Component Protection**

If it is not possible or practical to raise power-handling equipment above the DFE, measures can be taken to protect the equipment at elevations below the DFE. For example, a watertight enclosed wall can be built around the electrical equipment that is located below the DFE. The top of the enclosure must be at or above the DFE and there must be dry access to the equipment for maintenance.

**UTILITIES AND OTHER SERVICE FACILITIES**

If electrical components that are supplied power by the distribution panel must remain below the DFE, they can be isolated using the distribution panel. The only electrical components that are permitted below the DFE are the minimum necessary for life/safety. Examples include smoke detectors, simple light fixtures, and switches and receptacles required for areas used for building access, parking, or storage. This design approach groups all of the components that lie beneath the DFE together on Ground Fault Interrupt Circuit (GFIC) breakers. These breakers should be clearly marked so that they can be disconnected in the event of rising floodwaters. This approach leaves other portions of the electrical system to function normally.

The major component that a building owner may not be able to properly locate above the DFE is the meter. It should be noted that communities may have limited regulatory authority over locations of meters. Often utility companies want the meter located close to the ground so it is readily accessible for their inspection. Consult the local electrical utility company. Determine if the local electrical utility will permit the meter to be elevated above the DFE with access provided by a stairway and platform. If the company does not permit this, the meter can be located below the DFE, but must be elevated as high as the company permits.

ASCE 24 in Section 7.2.3 Electric Meters (which extends to the Building Code) states that electric meters shall be located above the BFE unless the connection between the meter and electric lines extending vertically from the meter is within a waterproof enclosure.

**Air Conditioning Units**

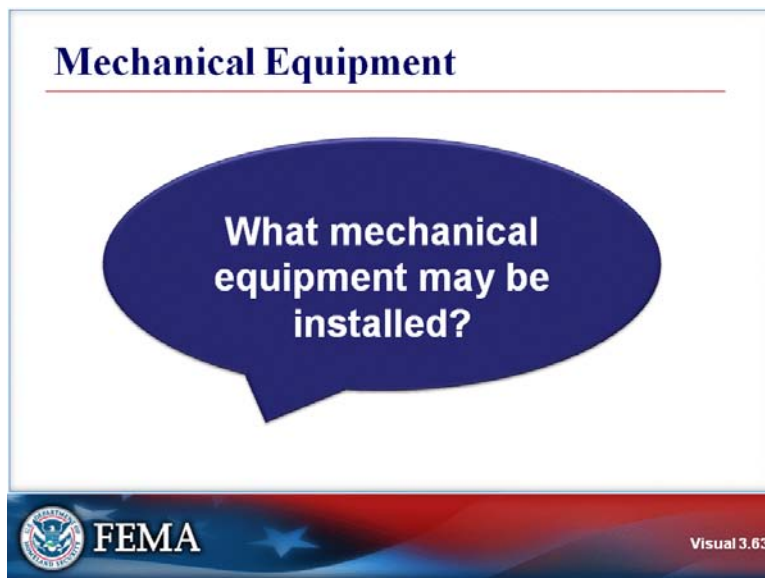
Air conditioning units present a flood insurance issue. A unit below BFE is a floodplain ordinance violation, but flood insurance does not significantly increase the premium.

- The insurance load is minimal.
- If the property is rated improperly for flood insurance, the property owner is not identified as noncompliant.

External propane tanks that are not properly anchored also are an issue, especially in rural areas. They become floating debris and may explode upon impact with bridges, culverts, or dams.

**UTILITIES AND OTHER SERVICE FACILITIES**

**Visual 3.63**



**Key Points**

**Discussion Question: What mechanical equipment may be installed?**



## UTILITIES AND OTHER SERVICE FACILITIES


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### Visual 3.64

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### Mechanical Elements

- Regulation: 44 CFR §60.3(a)(3)(iv)
- References:
  - FEMA 348, Protecting Utilities from Flood Damage
  - Anchoring Fuel Storage Tanks: Advanced Floodplain Management Concepts, Module 2

The slide features a blue and red decorative banner at the bottom. On the left is the FEMA logo, which includes the text 'FEDERAL EMERGENCY MANAGEMENT AGENCY' around a central emblem. To the right of the logo is the word 'FEMA' in large white letters. Further right is a white star on a blue background. On the far right of the banner, the text 'Visual 3.64' is displayed in white.

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### Key Points

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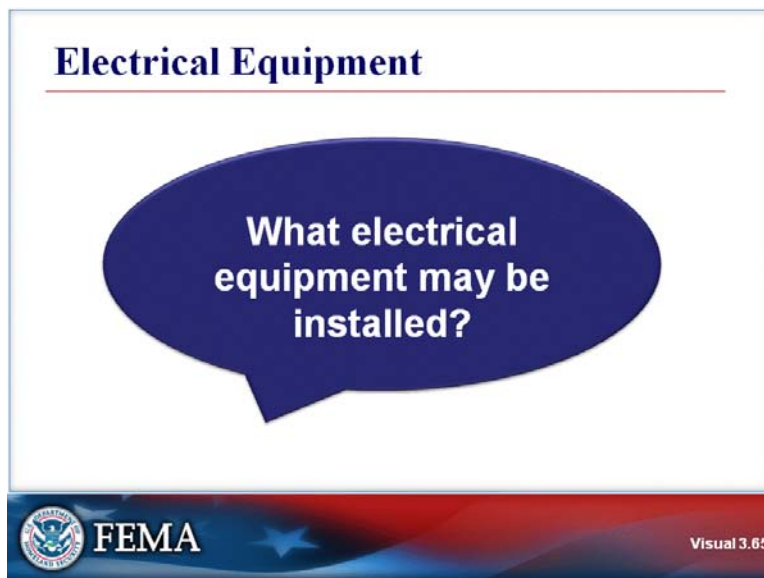
Authorities and references for mechanical elements include:

- 44 CFR §60.3(a)(3)(iv)
- FEMA 348, Protecting Utilities from Flood Damage, November 1999. Given the date of the publication, information about more current technology is missing.
- Anchoring Fuel Storage Tanks: Advanced Floodplain Management Concepts, Module 2 Instructor Guide, pages 57 through 63.

New guidance is being developed for mechanical and electrical equipment.

**UTILITIES AND OTHER SERVICE FACILITIES**

**Visual 3.65**



**Key Points**


**Discussion Question: What electrical equipment may be installed?**


## UTILITIES AND OTHER SERVICE FACILITIES

### Visual 3.66

### Mechanical/Electrical Oversights

- HVAC units too low
- Ductwork below BFE
- Hot water heaters too low
- HVAC power source below BFE





**FEMA**

Visual 3.66

### Key Points

The most common oversight reported in the American Institutes of Research NFIP compliance study was HVAC units placed on concrete pads on the ground next to slab-on-grade buildings.

- The units generally were six or fewer inches below the BFE, and should survive the base flood with little or no damage.
- If an air conditioner compressor is less than a foot below BFE, a wheelbarrow full of gravel would make the unit compliant. A shallow, single-brick wall may also be built to protect it from floodwaters.

However, exercise caution and remember that flood heights can exceed BFE. Always include freeboard.

HVAC units placed on the ground next to other types of foundations often were 1 to 3 feet below BFE, and will sustain significant damages during a base flood.

Other mechanical and electrical oversights include:

- Ductwork below BFE. The lowest floor elevation shown on the elevation certificate needs to be checked against the BFE. Ductwork below BFE would need to be protected from floodwaters to be compliant, but waterproof ductwork is uncommon. Metal/plastic sleeves that protect ductwork are available, but more expensive. Note that the community gains CRS points by requiring that ductwork be above the BFE.
- Hot water heaters too low.
- The HVAC unit power source below BFE. Note that if an electrical receptacle is required within 10 feet of the unit, the receptacle could be located 10 feet above the unit.

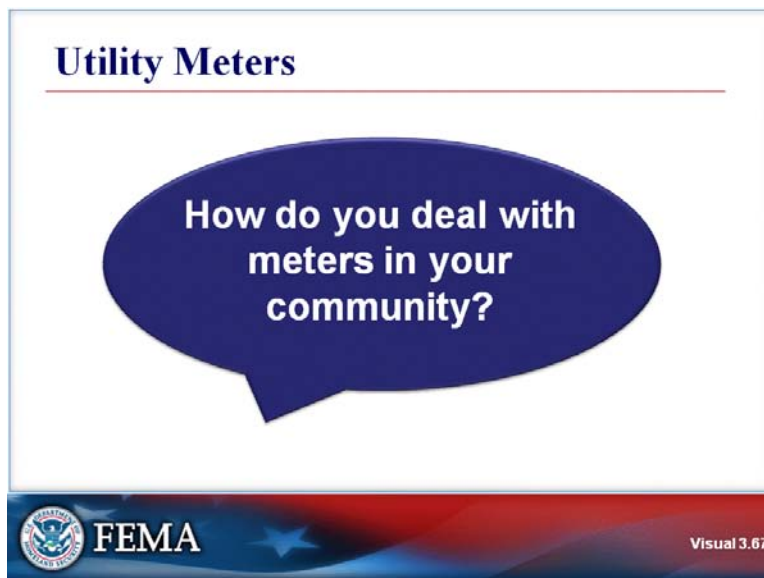
**UTILITIES AND OTHER SERVICE FACILITIES**

Maintenance should be considered in the design and installation of elevated supports for air conditioner units. A unit in an elevated cage could be difficult to service. If units are caged, the railings should either be removable or the platform made sufficiently large to allow service to the unit. Be aware of toxic fumes when considering enclosing the units.

Take time to educate HVAC contractors to understand what is expected: Units should be on the same level as the lowest floor.

UTILITIES AND OTHER SERVICE FACILITIES

Visual 3.67

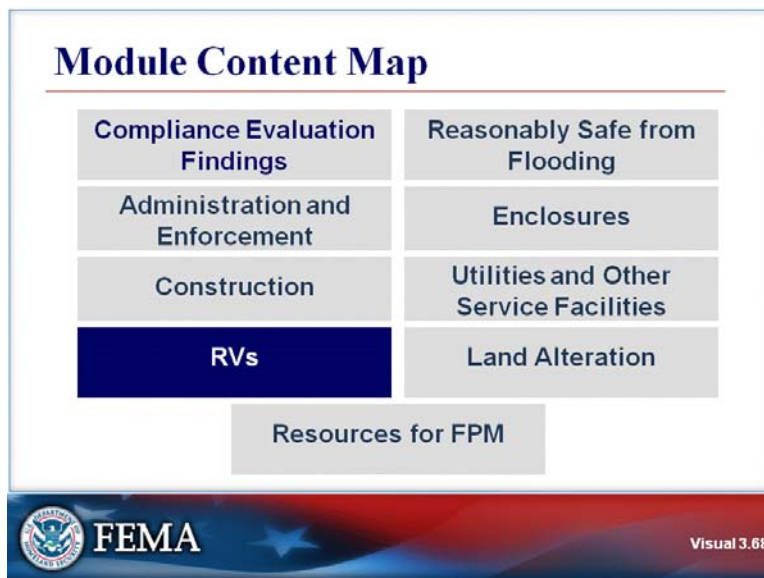


Key Points

**Discussion Question:** How do you deal with meters in your community?

**RVs**

**Visual 3.68**



**Key Points**

The next section of this module addresses noncompliance issues with RVs.

## RVs

## Visual 3.69

### RV Requirements

- NFIP regulations require either:
  - On site fewer than 180 days,
  - Fully licensed and ready for highway use, or
  - Meet NFIP requirements for manufactured homes.
- Park models: Unlikely to meet either option






**FEMA**



Visual 3.69

## Key Points

44 CFR §59.1 defines a recreational vehicle as a vehicle that 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.

44 CFR §63.3(c)(14) provides alternatives for communities to regulate RVs placed on sites in the floodplain for short-term, seasonal use.

The recreational vehicles must either:

- 1) Be on the site for fewer than 180 consecutive days;
- 2) Be fully licensed and ready for highway use; or
- 3) Meet NFIP requirements for manufactured homes.

An RV that fails to meet the first option above is subject to the same elevation, foundation, and anchoring requirements as a manufactured home.



Park models, which are unlikely to meet the first option above, should be subject to manufactured home regulations.

### RVs

#### Visual 3.70

### RV Issues

- Additions (decks, porches, walls, utilities)
- Permanent connection to utilities
- Not maintained in road-ready state:
  - Licensed
  - Tires inflated
  - Quick-disconnect utilities
  - Ability to attach to a trailer hitch (light duty truck)
- Political consequences



FEMA

Visual 3.70

#### Key Points

Issues with RVs include:

- Additions such as decks, porches, walls, and utilities.
- Permanent connections to utilities.
- Not road-ready, which requires being licensed, having inflated tires, and being able to hook up to a trailer hitch, so it can be driven away within the flood warning time for the site.

Attempts to regulate RVs or evict people from RV parks may face political issues. RV parks may be providing low- to moderate-income housing.

The local housing authority should be notified when occupants are to be evacuated from RV parks. RVs may be providing low-income housing, and residents may need resources to avoid homelessness.

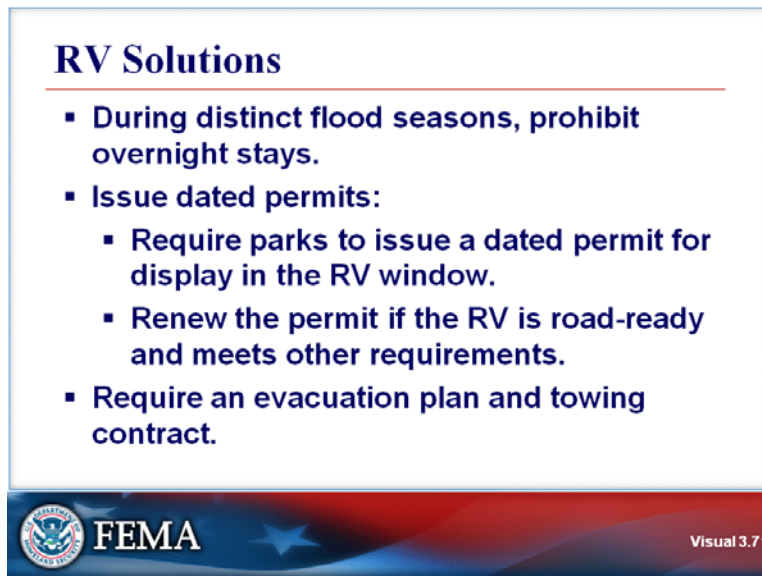
RV parks in the floodway can be a big issue. In Florida, there is a 20-acre existing RV park in a floodway.

In addition, construction trailers can present issues, especially when located in the floodway.



## RVs

## Visual 3.71

A presentation slide titled "RV Solutions" with a red horizontal line under the title. The slide contains a bulleted list of solutions. At the bottom of the slide is the FEMA logo and the text "Visual 3.71".

**RV Solutions**

- During distinct flood seasons, prohibit overnight stays.
- Issue dated permits:
  - Require parks to issue a dated permit for display in the RV window.
  - Renew the permit if the RV is road-ready and meets other requirements.
- Require an evacuation plan and towing contract.

FEMA Visual 3.71

**Key Points**

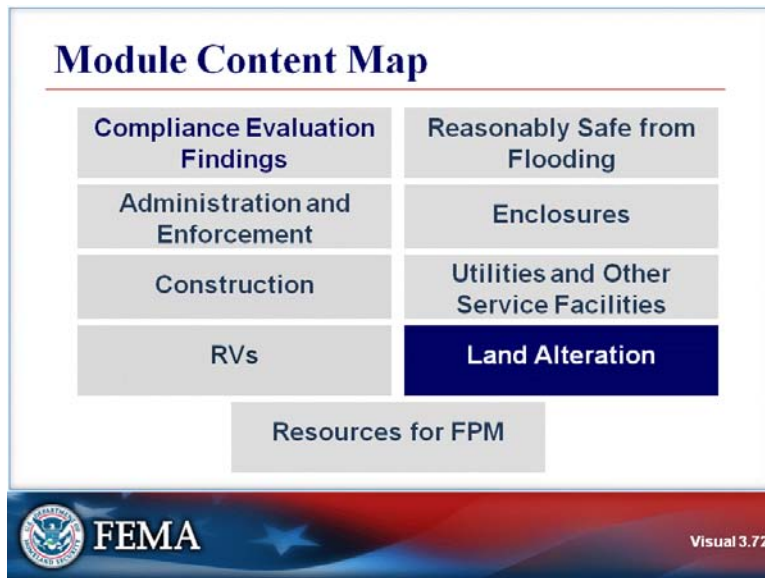
Possible solutions to RV issues include:

- Require parks to issue a permit that must be displayed in the vehicle's front window. The permit would include the date that the RV was placed and an end date no later than 180 consecutive days from the placement date. The permit may be renewed if the vehicle is road-ready, the license has not expired, and other requirements are met.
- Require the community to have an evacuation plan, especially if RVs are allowed for longer than 180 days. In addition, there should be a towing contract in place that includes:
  - A backup to the primary contractor.
  - Keys to all vehicles.
  - The location where the RVs will be towed.

Evacuation and towing must be achieved within flood warning time for the site.

**LAND ALTERATION**

**Visual 3.72**



**Key Points**

The next section of this module will address noncompliant land alteration, which includes placing fill, altering sand dunes, altering mangroves, and shoreline alterations such as placement of riprap or concrete blocks. It can also include above-ground septic drainfields and non-structural V-Zone fill.

## LAND ALTERATION


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### Visual 3.73

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### Land Alteration

- **Fill:**
  - Structural (A-Zones)
  - Nonstructural (V-Zones)
- Alterations to sand dunes and mangroves
- Shoreline alterations:
  - Riprap
  - Concrete blocks
  - Seawalls



 **FEMA** Visual 3.73

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### Key Points

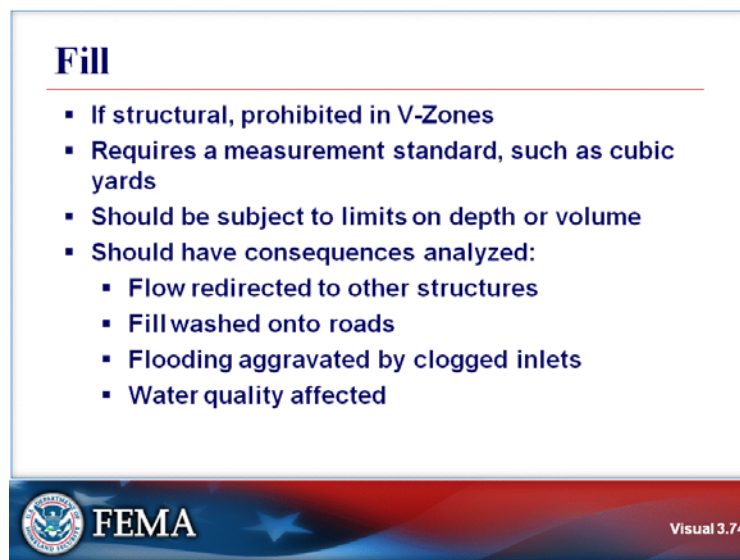
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Noncompliant types of land alteration include:

- Structural fill in V-Zones, which is prohibited.
- Alterations to sand dunes and mangroves.
- Shoreline alterations such as placement of riprap or concrete blocks, building seawalls, and adding to the height of existing seawalls.

### LAND ALTERATION

#### Visual 3.74



#### Key Points

Structural fill is prohibited in V-Zones to prevent scour from high-velocity wave action.

TB-5, Free-of-Obstruction Requirements, provides guidance on non-structural fill, including compaction and clearance between fill and lowest horizontal structural members.

Monitoring fill placement can be challenging.

- Placement of fill is considered development, which requires permits.
- Property owners should be required to apply for LOMR-Fs for significant amounts of fill.
- A measurement standard, such as cubic yards, needs to be applied, and permits issued for cumulative placement to prevent fill being placed in stages.
- Limits should be imposed on depth or volume of fill.

Local and State requirements may also set limits. For example:

- Minnesota has State shoreline management regulations.
- Snoquamie, Washington, has a restrictive ordinance that allows no fill in the floodplain.

Consequences of fill placement should be considered. For example, fill placed for landscaping purposes:

- Could affect water quality by introducing different microorganisms and suspended solid particles of hard metals such as nickel, cadmium, and mercury.
- Could redirect flow to other structures.
- May wash into roads.
- Could aggravate flooding by clogging stormwater inlets.

**LAND ALTERATION**

The Floodplain Manager may have to explain to a property owner that it is not feasible to place 4 feet of fill on a 50-foot lot because the steep slopes would create additional runoff for neighbors.

Remember that NFIP regulations require provision of adequate drainage to reduce exposure to flood hazards (44 CFR §60.3(a)(4)(iii)).

### LAND ALTERATION

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#### Visual 3.75

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**Shoreline Alteration**

- Concrete blocks
- Riprap
- Engineered coastal protection structures
- Alteration of:
  - Sand dunes
  - Mangroves
  - Endangered species habitat
- Resource: FEMA Region X pamphlet: **Engineering with Nature: Alternative Techniques to Riprap and Bank Stabilization**

FEMA Visual 3.75

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#### Key Points

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FEMA Region X developed a pamphlet titled “Engineering with Nature: Alternative Techniques to Riprap and Bank Stabilization” that provides useful information to property owners and community officials.

Concrete blocks and riprap on a shoreline may heat the water, which affects fish spawning areas.

Shorelines may be altered through placement of riprap, which consists of placement of rocks, or by using other materials and methods to stabilize the shorelines, but only after their impacts are evaluated by appropriate coastal analyses.

Property owners may construct engineered coastal protection structures, which require permits.

Remember that in habitat areas for endangered species, the applicant must receive a permit from, or approval by, the U.S. Department of the Interior, Fish and Wildlife Service.

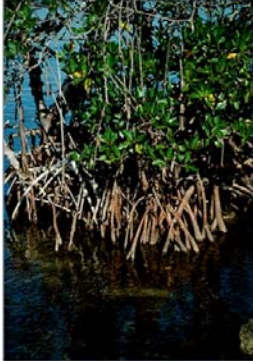
Alterations to sand dunes and mangroves are prohibited if they cause adverse impacts (e.g. Endangered Species habitat, increased flood elevations). Again, appropriate coastal analyses must be conducted and all requisite permits and approvals obtained.

## LAND ALTERATION

### Visual 3.76

**Alterations: Sand Dunes and Mangroves**

- **Sand dunes:**
  - **Build on**
  - **Move/Rearrange**
  - **Cut through**
- **Mangroves:**
  - **Build seawalls**
  - **Cut down to create views**
  - **Cut down to create waterways**





**FEMA**

Visual 3.76

### Key Points

44 CFR §60.3(e)(7) requires protection of sand dunes and mangrove stands.

The following references provide guidance on altering sand dunes and mangroves:

- FEMA 480, National Flood Insurance Program (NFIP) Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials
- FEMA 55: Coastal Construction Manual: Principles and Practices of Planning, Siting, Designing, Constructing, and Maintaining Residential Buildings in Coastal Areas (3rd ed.)

Types of sand dune alterations include:

- Building on dunes
- Moving or rearranging dunes
- Cutting through dunes

Mangroves may be altered by:

- Building seawalls
- Clearing mangroves to create views
- Clearing mangroves to create waterways

### LAND ALTERATION

Alterations to sand dunes and mangroves:

- Remove flood protection
- Increase erosion
- Could require permits or approvals from other State and Federal agencies such as:
  - U.S. Army Corps of Engineers
  - Fish and Wildlife Service
  - State Departments of Environmental Protection and Natural Resources
  - National Marine Fisheries Service

Examples of noncompliant alterations of sand dunes include:

- In North Carolina, the CRS task force discovered that someone had cut a pass through a sand dune, which eroded the remainder of the dune.
- In New Jersey, a massive house with a basement was built on a sand dune. Accessory structures were located behind the house.

An example of the beneficial effects of vegetation is Hancock County, Mississippi.

A FEMA mapping team performed an assessment in Hancock County when the coastal area had been barren of vegetation.

The team identified BFEs that were relatively high. The county challenged the transect data in the study, because the transect locations, formerly bare, now had vegetation. Upon restudy of the transect data, BFEs were lowered by as much as 2 feet because of the protective effect of the vegetation.



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**LAND ALTERATION**

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**Visual 3.77**


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**Activity: Land Alteration Issues**

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**Instructions:** Working as a group:

- Discuss each of the scenarios.
- Identify the issues.
- Recommend solutions.

The bottom of the slide features the FEMA logo on the left, which includes the text 'FEDERAL EMERGENCY MANAGEMENT AGENCY' around a central emblem. To the right of the logo is the word 'FEMA' in large, bold, white letters. Further right is a stylized American flag graphic with stars and stripes. In the bottom right corner of the slide, the text 'Visual 3.77' is displayed.

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**Key Points**

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**Activity Purpose:** This activity will enable your group to identify actions that will be effective in preventing and halting noncompliant land alterations.

**Instructions:** Working as a group:

1. Discuss each of the scenarios that involve land alteration.
2. Recommend what actions the FPM should take.
3. Be prepared to report your conclusions.

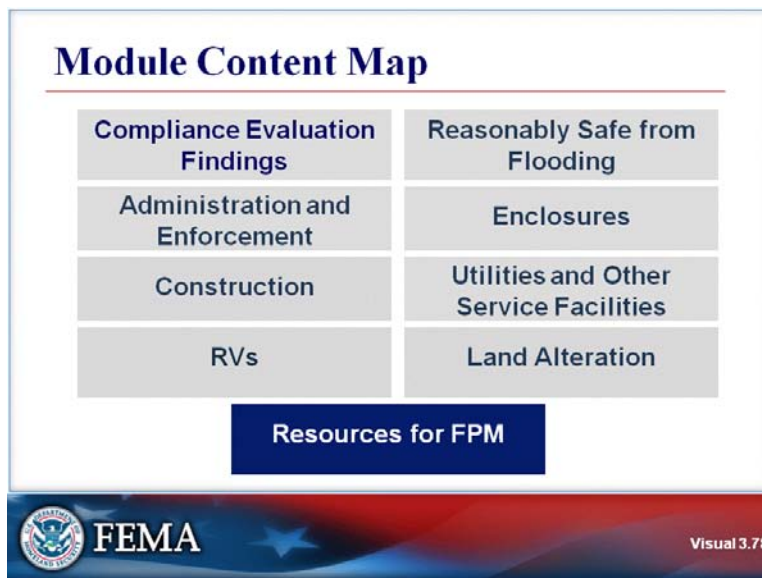
**Time:** 15 minutes

The scenarios begin on the following page.

### LAND ALTERATION

#### Scenarios:

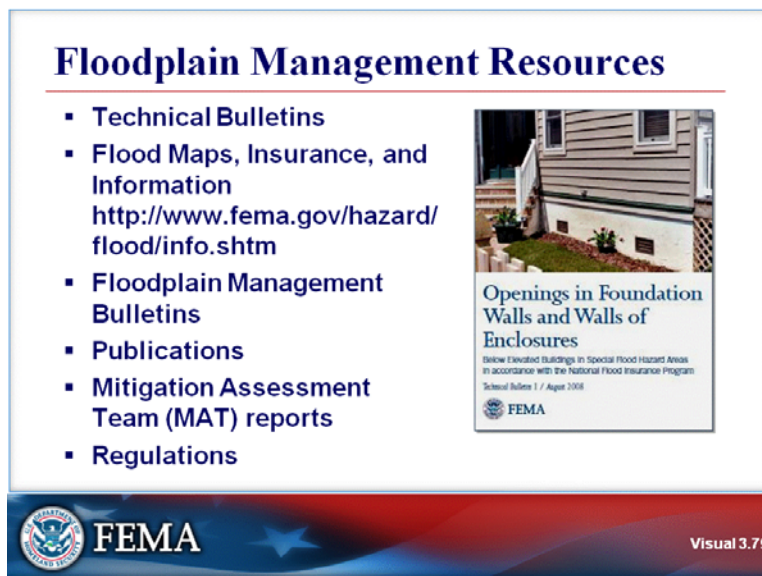
1. Neighbors have complained that the owner of a lakeside home has encased the property shoreline in concrete to stem bank erosion. Neighbors on either side complain that their shorelines have been eroding rapidly since the concrete was placed.
2. Dump trucks with loads of dirt have been noted driving into a shoreline property in the V-Zone.
3. An application for a floodplain permit indicates that the property owner is in the process of constructing a home on top of a sand dune.
4. Neighbors report that a property owner has built a seawall that projects several feet above ground level, and makes beach walks difficult.
5. Earthmovers have been observed cutting a road through a sand dune in a V-Zone.

**RESOURCES FOR FPM****Visual 3.78****Key Points**

The final portion of this module will present resources that the local Floodplain Manager can use when dealing with noncompliance issues.

## RESOURCES FOR FPM

### Visual 3.79



**Floodplain Management Resources**

- Technical Bulletins
- Flood Maps, Insurance, and Information  
<http://www.fema.gov/hazard/flood/info.shtm>
- Floodplain Management Bulletins
- Publications
- Mitigation Assessment Team (MAT) reports
- Regulations

**Openings in Foundation Walls and Walls of Enclosures**  
Below Elevated Buildings in Special Flood Hazard Areas  
in accordance with the National Flood Insurance Program  
Technical Bulletin 1 / August 2008  
FEMA

FEMA Visual 3.79

### Key Points

Technical Bulletins are an important resource for identifying and solving noncompliance issues.

The following Technical Bulletins are available on the FEMA Web site:

- Technical Bulletin 0, **User's Guide to Technical Bulletins**
- Technical Bulletin 1, Openings in Foundation Walls and Walls of Enclosures
- Technical Bulletin 2, Flood Damage-Resistant Materials Requirements
- Technical Bulletin 3, Non-Residential Floodproofing—Requirements and Certification
- Technical Bulletin 4, Elevator Installation for Buildings Located in Special Flood Hazard Areas
- Technical Bulletin 5, Free-of-Obstruction Requirements
- Technical Bulletin 6, Below-Grade Parking Requirements for Buildings Located in Special Flood Hazard Areas
- Technical Bulletin 7, Wet Floodproofing Requirements
- Technical Bulletin 8, Corrosion Protection for Metal Connectors in Coastal Areas
- Technical Bulletin 9, Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings
- Technical Bulletin 10-01, Ensuring that Structures Built on Fill In or Near Special Flood Hazard Areas are Reasonably Safe from Flooding
- Technical Bulletin 11, Crawlspace Construction for Buildings Located in Special Flood Hazard Areas

**RESOURCES FOR FPM**

Other resources include:

FEMA 55, Coastal Construction Manual

FEMA 348, Protecting Building Utilities from Flood Damage

FEMA 85, Protecting Manufactured Homes from Floods and Other Hazards

The following link serves as a gateway to flood hazard information on the FEMA Web site:

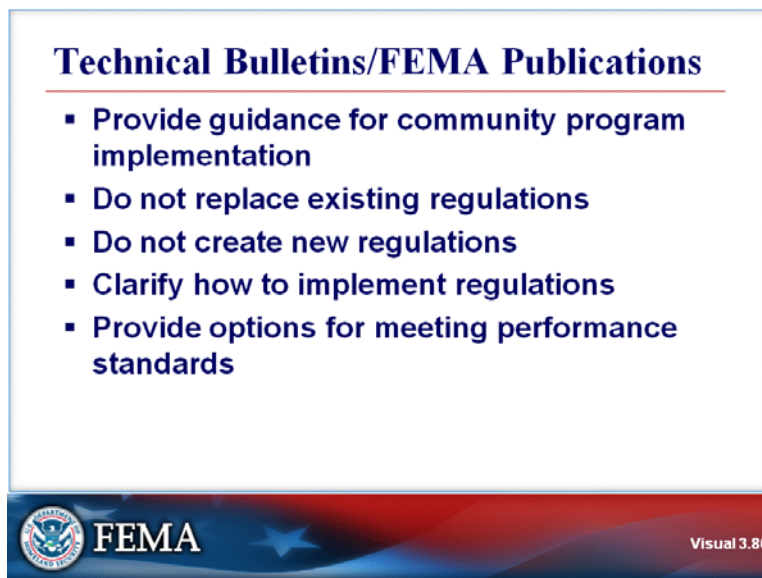
<http://www.fema.gov/hazard/flood/info.shtm>

### RESOURCES FOR FPM

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#### Visual 3.80

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#### Key Points

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Technical Bulletins do not replace existing regulations nor create new ones, but provide additional information for Floodplain Managers to interpret floodplain regulations.

The Technical Bulletins provide alternative approaches for dealing with specific situations.

The Floodplain Manager can refer citizens and contractors to Technical Bulletins appropriate for their situations, and review the pertinent content.

Property owners and building contractors then can use Technical Bulletins as guides to build compliant structures, and to correct noncompliance.

It is critical to remember that the regulations always take precedence if there is any conflict.

## RESOURCES FOR FPM

### Visual 3.81

### Other FPM Resources

- Mitigation Assessment Team (MAT) reports
- Regional Office guidance documents
- Association of State Floodplain Managers (ASFPM)
- State Floodplain Managers
- Floodplain Managers Associations
- Other Federal/State agencies




FEMA

Visual 3.81

### Key Points

Mitigation Assessment Team reports can be accessed on the FEMA Web site. Assessment reports were issued after major disasters. The reports include photographs of disaster damage and show consequences of different types of noncompliance with floodplain management regulations. Assessments evaluate causes of damages and identify mitigation successes.

FEMA 549, Hurricane Katrina in the Gulf Coast, can serve as an especially effective education tool for Floodplain Managers in coastal communities. There are pictures of post-disaster damage, such as corroded connectors and rebars, and damage caused by rocks blown off roofs.

Check with Regional Offices for guidance documents. For example, Region X has a pamphlet describing how the Endangered Species Act (ESA) relates to floodplain management.

The Association of State Floodplain Managers' (ASFPM) Web site, [www.floods.org](http://www.floods.org), contains a wealth of information regarding floodplain management, no adverse impact, and legal issues in floodplain management.

Every State has a designated Floodplain Manager. They are a great resource regarding State-specific floodplain management regulations (e.g. Florida Coastal Construction Control Line, FLDEP regulations).

There are also many Floodplain Managers Associations in the nation, including State chapters of the ASFPM.

Several other Federal and State agencies also can assist in floodplain management and hazard mitigation, including, but not limited to, USACE, USGS, NOAA/NWS, State Departments of Natural Resources and Environmental Protection.


**RESOURCES FOR FPM**



**Visual 3.82**

**Resource: Other Floodplain Managers**

Floodplain Managers in other communities may:

- Face similar issues.
- Share ideas.
- Help resolve common problems.



 **FEMA**  Visual 3.82

**Key Points**

Other Floodplain Managers in nearby communities can be a valuable resource for sharing ideas and solving problems.

Forming partnerships with counterparts in neighboring jurisdictions may be productive.

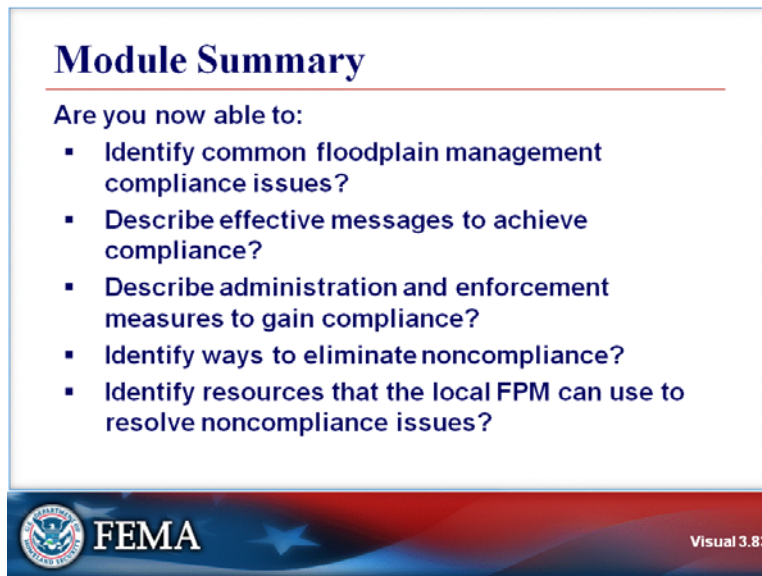


**MODULE SUMMARY**

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**Visual 3.83**

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**Module Summary**

Are you now able to:

- Identify common floodplain management compliance issues?
- Describe effective messages to achieve compliance?
- Describe administration and enforcement measures to gain compliance?
- Identify ways to eliminate noncompliance?
- Identify resources that the local FPM can use to resolve noncompliance issues?

FEMA

Visual 3.83

**Key Points**

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After completing this module, are you able to:

- Identify common floodplain management compliance issues?
- Describe effective messages to convince the property owners to comply?
- Describe administration and enforcement measures to gain compliance?
- Identify ways to eliminate noncompliance?
- Identify resources that the local FPM can use effectively to resolve noncompliance issues?

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