National Flood Insurance Program
Community Rating System

CRS Credit for Higher Regulatory Standards

2006

FEMA

Note on this edition: This document was revised to reflect the following changes in the 2006 *CRS Coordinator's Manual*:

- The building code provisions no longer receive credit under foundation protection (FDN).
- The credit for adopting the International Series of building codes (or their equivalent) has been increased.
- The credit for the community's Building Code Effectiveness Grading Schedule classification has been increased.
- Language was added describing how Coastal AE Zone regulation (CAZ) credit is prorated.

It should be noted that communities will continue to receive credit for higher regulatory standards credited under older versions of the *CRS Coordinator's Manual.* At the community's next cycle verification visit, the ISO/CRS Specialist will use the new scoring criteria. If a community wants to take advantage of these higher points and new elements sooner, it may submit a modification as explained in Section 215 of the *CRS Coordinator's Manual*.

A community interested in more information on obtaining flood insurance premium credits through the Community Rating System (CRS) should have the *CRS Application*. This and other publications on the CRS are available at no cost from

Flood Publications
NFIP/CRS
P.O. Box 501016
Indianapolis, IN 46250-1016
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They can also be viewed and downloaded from FEMA's CRS website,
http://training.fema.gov/EMIWeb/CRS/index.htm

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Introduction

The National Flood Insurance Program (NFIP) regulations require that new buildings and substantial improvements to existing buildings are protected from the base flood. However, even with strict adherence to floodplain regulations, the buildings can still experience flood damage because

- Flooding greater than the predicted 100-year flood can occur,
- Increased urbanization and other changes in the watershed can increase flood levels, and
- Special flood-related hazards, such as rising lake levels or ice jams, may be present.

Further, regulations oriented toward minimizing building damage miss many important aspects of floodplain management. Communities are encouraged to address other concerns, such as protecting natural and beneficial floodplain functions, health and safety, and critical facilities.

There are, therefore, a variety of reasons why a community would want to enact regulatory floodplain standards that are higher than the minimum NFIP requirements. The NFIP's Community Rating System (CRS) provides insurance premium rate reductions to encourage communities to do this. More restrictive state or local regulatory standards take precedence and are encouraged by the NFIP regulations (44 *CFR* 60.1(d)).

The CRS: The Community Rating System (CRS) is a part of the National Flood Insurance Program (NFIP). When communities go beyond the minimum standards for floodplain management, the CRS can provide discounts of up to 45 percent off flood insurance premiums for residents in those communities.

Communities apply for a CRS classification and are given credit points that reflect the impact of their activities on reducing flood losses, insurance rating, and promoting the awareness of flood insurance. The Insurance Services Office's ISO/CRS Specialist reviews the community's program and verifies the CRS credit. This includes a review of the written procedures and records of an activity and, in some cases, a visit to sites in the community.

A community applies using the *CRS Application*. CRS credit criteria, scoring, and documentation requirements are explained in the *CRS Coordinator's Manual*. Copies of these publications are available free from the office listed inside the front cover.

430 Higher Regulatory Standards

Activity 430 (Higher Regulatory Standards) is the primary CRS activity for crediting floodplain development regulations that are more restrictive than the NFIP requirements. The basic credit criteria for Activity 430 are explained in the *CRS Coordinator's Manual*. This publication expands on those explanations and provides examples of credited regulatory language and guidance on how to calculate the credit points for Activity 430. The section numbering for this publication matches the system used in the *CRS Application* and the *Coordinator's Manual*.

Regulations Recognized in Activity 430

Activity 430 (Higher Regulatory Standards) has 16 elements that include additional requirements that increase the level of protection provided to floodplain development. These are the most common regulatory requirements that exceed the minimum NFIP requirements for floodplain management. Each element has an acronym that is used in the credit calculation formulae. The acronyms are a shorthand method of referring to the elements. The 16 elements are detailed in subsections a through p in Section 431 of the *Coordinators Manual*.

a. Requiring buildings to be protected to a level higher than the base flood elevation. The extra protection is called **freeboard** and the element appears as "**FRB**" in the calculation formulae.

b. Requiring that fill and building foundations be designed to protect them from damage due to erosion, scour, and settling. The acronym for **foundation protection** is "**FDN**."

c. Requiring that all improvements or repairs are counted cumulatively toward the substantial improvement requirement. This requirement, known as **cumulative substantial improvement**, or "**CSI**," ensures that owners do not evade flood protection measures by making many small improvements that eventually add up to a major or substantial improvement.

d. Using a threshold lower than 50% of the building's value to determine when the substantial improvement requirement takes effect. The acronym for a **lower substantial improvement** threshold is "**LSI**."

e. Requiring that critical facilities, such as hospitals and hazardous materials storage sites, be protected from higher flood levels. "**PCF**" stands for **protection for critical facilities**.

f. Maintaining floodplain storage by prohibiting fill or by requiring compensatory storage. Although floodway regulations preserve flood conveyance, they allow the flood fringe to be filled in. The resulting loss of storage can have a significant effect on downstream flood heights, especially in flat areas. The acronym for **protection of floodplain storage capacity** is "**PSC**."

g. Prohibiting or regulating development that can have an adverse impact on public health or water quality, including alterations to shoreline, channels, and banks. Because such regulations protect the **natural and beneficial functions** of floodplains, the acronym is "**NBR**."

h. Prohibiting building **enclosures** below the base flood elevation (**ENL**).

i. Other regulations that exceed the minimum requirements of the NFIP regulations. The acronym for such **other higher** regulatory **standards** is "**OHS**."

j. Using **land development criteria** and low density zoning (**LD**) to reduce the damage potential within the floodplain and help maintain flood storage and conveyance capacity.

k. Requiring additional regulations in areas subject to special hazards. The NFIP regulations are oriented toward the more common overbank and coastal flooding. **Special hazards regulations** (**SH**) are requirements tailored to the different conditions found in the following situations:

- Closed basin lakes
- Ice jams
- Land subsidence
- Mudflow hazards
- Coastal erosion
- Tsunamis
- Uncertain flow paths (e.g., alluvial fans, moveable bed streams and other floodplains within which the channel moves during a flood).

l. Implementing **state-mandated regulatory standards** (**SMS**) whereby all communities are required to administer a state rule or adopt state development criteria.

m. Having a **Building Code** Effectiveness Grading Schedule classification of 6 or better and/or having adopted all of part of the International **Building Code** series is "**BC**."

n. Having one or more **staff** members certified as floodplain managers or trained through the NFIP (**STF**).

o. Requiring that new and replacement manufactured homes placed in existing **manufactured home parks** be properly elevated and anchored (**MHP**).

p. Adopting construction standards for **Coastal AE Zones** is **"CAZ.**"

Regulations Recognized Elsewhere

The regulations credited in Activity 430 are related to protecting insurable buildings located in the floodplain. Communities may have other regulations related to flooding, stormwater management, or water resources protection. Many of these are credited under other CRS activities, such as the following:

- Requirements for developers or sellers to publicize or disclose the flood hazard on their properties are credited under Activity 340 (Flood Hazard Disclosure).

- Requiring permit applicants to develop base flood elevations or study the impact of their projects on flood heights or velocities in floodplains where such data are not provided by the NFIP is credited under Activity 410 (Additional Flood Data).

- More restrictive floodway mapping, "zero rise floodway," and "full urbanization hydrology" requirements are also covered under Activity 410.

- Prohibiting new buildings in the floodway, V Zone, or other part of the floodplain is credited under Activity 420 (Open Space Preservation). A community can only receive credit for a prohibitory regulation under either Activity 420 or Activity 430, not under both. Activity 420 provides more credit points than Activity 430 does because new buildings are better protected from flooding if they are kept out of the floodplain in the first place. Therefore, most communities opt to credit prohibitory regulations under Activity 420.

- Requiring new developments to provide retention or detention of their stormwater runoff to minimize the increase in flood flows due to watershed urbanization is the subject of Activity 450 (Stormwater Management).

- Erosion and sedimentation control regulations are also covered in Activity 450 because they reduce siltation and the resulting loss of channel-carrying capacity.

- Requiring developers to implement appropriate "best management practices" that will improve the quality of stormwater runoff is credited in Activity 450.

- Regulations on dumping or placing debris in stream channels are credited under Activity 540 (Drainage System Maintenance).

Legal Aspects

For the purposes of this activity, creditable regulations must be legally enforceable requirements placed on floodplain development. They do not have to be enforced by the community but they do have to be legally enforceable by a government agency. For example, state regulations or requirements from a county or regional drainage or flood control district may be credited if these entities have jurisdiction in the community.

In most states, regulations take the form of state statutes, codes or regulations, or local ordinances or by-laws. Plans, such as land use plans and comprehensive plans, are usually recommendations, not regulations. A community that submits a plan for credit under this activity must also submit its attorney's opinion that the plan has the force of law and is enforced by a regulatory office, such as a building or zoning department.

Most floodplain regulations appear in a zoning ordinance, building code, or separate floodplain management ordinance or regulations. They cover construction projects throughout the community or throughout the community's floodplain. Some regulations appear in subdivision ordinances, health regulations, or other special purpose ordinances.

In some cases, an ordinance, especially a subdivision ordinance, will refer to state or local policies, specifications, a design manual, or other separate document. Many local officials have said, "developers don't argue, they follow this manual because we tell them to." Unless the separate policy document is specifically adopted by reference in the ordinance, the community will have to include a statement from its legal counsel that its policies and design standards have the force of law.

Similarly, some regulations state that something "may be required" or that a permit applicant "should" do something. The CRS only credits clear and explicit regulations that require specific actions or standards from a floodplain developer. Generally the word "shall" indicates such a requirement. For example, the following language WOULD NOT be credited.

> *If, in the opinion of the building official, the soils are not suitable for construction, appropriate fill and compaction may be required.*

The following language WOULD be credited.

> *The applicant shall provide a soils engineering report based on the results of one soil boring for each acre where the following soil types are present. . . .*

Generally, statements in the purpose or objective section of an ordinance are not acceptable. The CRS credits the specific requirement, not a statement about a reason for adopting the ordinance. For example, many communities have language that says one of the objectives of the ordinance is "To prevent fraud and victimization of unwary land and home buyers." Nowhere else in the ordinance is there a reference to fraud or a specific disclosure requirement. Therefore, credit under Activity 340 (Flood Hazard Disclosure) has not been provided for that language.

In some cases, state laws provide the authority for a state agency or a community to do something. Usually a state agency will implement regulations or a community will enact an ordinance pursuant to the law. It is the subsequent regulations or local ordinance that must be submitted for CRS credit, not the authorizing or enabling legislation.

Some requirements are meaningless without the definition section of the ordinance or regulation. Instead of requiring buildings to be elevated 1 foot above the base flood elevation, some communities require them to be elevated above a "flood protection elevation." In these cases, the community needs to also submit the ordinance section that defines the "flood protection elevation."

As with all regulatory issues, the opinion of the community's attorney or corporation counsel is most important. If language is not accepted by the ISO/CRS Specialist because it does not appear to be clear, explicit, or consistently enforceable, then the community may submit a letter on its attorney's letterhead stating that the debated item has the force of law. An example of this approach is discussed on page 25.

COMMUNITIES SHOULD BE CAREFUL WHEN USING MODEL ORDINANCES AND THE EXAMPLES IN THIS PUBLICATION. A community should not amend its ordinances solely to earn CRS credit points, nor should it necessarily adopt these examples verbatim. Ordinance language should be carefully written to support the community's goals and the purposes of its regulatory program, to sufficiently respond to the flood hazard facing the community, and to conform with state law. ALL SUCH LANGUAGE SHOULD BE REVIEWED BY THE COMMUNITY'S LEGAL COUNSEL BEFORE ADOPTION.

Verification Visit

During the verification visit, the ISO/CRS Specialist will check records, such as building permit files and elevation certificates, to verify enforcement of the community's ordinance. For Activity 430, a 5-5-5 sampling method, described below, is used. If the verified credit for an element is less than 80%, no credit is given for that element.

Under the 5-5-5 sampling method, the ISO/CRS Specialist selects a sample of five items (e.g., five building permit files). If all items are verified to be correct, full credit is given for that element. If one or more items in the sample does not qualify for credit, the ISO/CRS Specialist will look at five more examples.

If that review finds three or more of the sample of 10 to be deficient (less than 80 % compliance) then five more permits will be reviewed. The final score is based on the sample of 15, provided that at least 12 of them (80% of 15) qualify for the credit.

EXAMPLE: To verify the community's freeboard credit, the ISO/CRS Specialist pulls a sample of five elevation certificates. Four of them show that the buildings were elevated according to the community's freeboard requirement. For the fifth, a variance had been issued allowing the building to be constructed at the base flood elevation with no freeboard.

Because all five sampled certificates did not qualify for freeboard, the ISO/CRS Specialist reviews a second sample of five. All five of the second sample have the freeboard. The verified score is 9/10 or 90% of the score for freeboard.

If the second sample had not resulted in at least 80% of full credit, then a third sample of five would have been reviewed. If at least 80% of all 15 samples had qualified, then the verified score would have been pro-rated appropriately. If less than 80% qualify, then the community would have received no score for the element.

Definitions

There are several terms and acronyms used throughout this publication that need to be clarified. The following are summaries of technical terms that are officially defined in the NFIP regulations.

NFIP Regulations. The rules and regulations of the National Flood Insurance Program (NFIP). To participate in the NFIP, a community must enact and enforce development regulations that meet the minimum requirements of the NFIP regulations. These are found in the *Code of Federal Regulations*, Title 44, Parts 59 and 60. Appropriate sections are quoted in this publication. A complete set of 44 *CFR* Parts 59 and 60 can be obtained from the Regional Offices of the Federal Emergency Management Agency (FEMA), which are listed in Appendix A of the *Coordinator's Manual*. A summary of the NFIP regulations and how they relate to CRS credits can be found in Appendix A.

FIRM. Flood Insurance Rate Map. An official map of a community on which FEMA has delineated the community's Special Flood Hazard Areas (SFHA).

SFHA. Special Flood Hazard Area. The SFHA is the 100-year floodplain that is shown as an A or V Zone on the Flood Insurance Rate Map for the community. The NFIP regulations require that the community regulate new development in the SFHA.

BFE or base flood elevation. The base flood elevation is the elevation of the base or 100-year flood as designated on the community's FIRM. The NFIP regulations require that new buildings and substantial improvements to existing buildings in the SFHA have their lowest floors (including basement) at or above the base flood elevation. Non-residential buildings must be elevated or floodproofed to or above the base flood elevation.

Floodproofed. As used in this document, a building is floodproofed if the walls and floor are watertight and capable of withstanding the hydrostatic and hydrodynamic forces that accompany the base flood. It is synonymous with "dry floodproofed" as used in the *Coordinator's Manual*. The NFIP regulations prohibit new or substantially improved residential buildings from being floodproofed. They must be elevated to or above the base flood elevation.

A Zone. The SFHA (except for coastal V Zones) shown on a community's FIRM. There are five basic types of A Zones:

- A—no base flood elevation provided;
- A numbered (A1 through A30)—e.g., A7 or A13, where base flood elevations are provided;
- AE—the new way to show A1–A30;
- AO—sheet flow, ponding, or shallow flooding; and
- AH—shallow flooding with elevations.

There are two other types of A Zones that are shown on some FIRMs: AR and A99. These are areas that will be protected by a flood control system that was under construction or repair when the map was published. AR and A99 Zones are not considered SFHAs or regulatory floodplains for CRS purposes.

V Zone. The coastal SFHA subject to waves of 3 feet or more. The V Zone is subject to more restrictive regulatory requirements than A Zones. The NFIP regulations require that the lowest horizontal member of new or substantially improved buildings in V Zones be elevated on engineered piles or columns to or above the base flood elevation. There are three types of V Zones: V, V numbered, and VE, and they correspond to the similar A Zone designations.

Substantial damage. Damage of any origin sustained by a building whereby the cost of restoring the building to its before-damage condition would equal or exceed 50% of the market value of the building before the damage occurred. If a building is substantially damaged, the NFIP regulations require that it be treated as a new building and be elevated (non-residential buildings may be floodproofed) to or above the base flood elevation.

Substantial improvement. Any reconstruction, rehabilitation, addition, or other improvement to a building, the cost of which equals or exceeds 50% of the market value of the building before the start of construction of the improvement. If a building is substantially improved, the NFIP regulations require that it be treated as a new building and be elevated (non-residential buildings may be floodproofed) to or above the base flood elevation.

431 Credit Points

This section identifies the 16 elements and corresponding CRS credit points provided under Activity 430. The NFIP regulations are explained to clarify the minimum requirements so the reader knows what is needed to exceed those requirements. The NFIP regulations are shown in boxes with single line borders. As in the *Coordinator's Manual*, the credit criteria of the *CRS Schedule* are shown in shaded boxes with double line borders. Examples of regulatory language are shown as block quotations *in this italicized typeface.* Scoring examples are shown in this typeface.

This section also covers how each element is scored, provides example regulatory language, and identifies some of the more common problems and misunderstandings found in communities' applications to the CRS. As used in this section, the terms "new buildings" or "new construction" also mean substantial improvements to existing buildings or construction and repairs to substantially damaged buildings.

a. Freeboard (FRB)

Freeboard is a term for an extra margin of protection. Ordinances or codes with a freeboard requirement add height above the base flood elevation to account for future flood fringe development, uncertainties inherent with the methods for calculating the expected flood, lack of data, waves or debris that accompany the base flood, and floods higher than the base flood. In a floodplain management ordinance, a freeboard requirement means that new buildings will be protected to a level higher than the NFIP's base flood elevation.

For CRS credit, freeboard must be applied not just to the elevation of the lowest floor or floodproofing level, but also to the level of protection provided to ALL COMPONENTS OF THE BUILDING. All building utilities, including ductwork, must be elevated or protected to the freeboard level and all portions of the building below the freeboard level must be constructed using materials resistant to flood damage. If the garage floor is below the freeboard level, the garage must meet the opening requirements for enclosures.

Two excellent references on these requirements are *Protecting Building Utilities from Flood Damage*, FEMA-348 and *Flood Resistant Materials Requirements*, FIA-TB-2 (see pages 63 and 64).

NFIP Requirement

In A Zones where base flood elevations have been established, the NFIP rules require that

- The lowest floor, including basements, of residential structures be elevated to or above the base flood elevation (44 *CFR* 60.3(c)(2))
- Non-residential structures be elevated or floodproofed to or above the base flood elevation (44 *CFR* 60.3(c)(3))
- Attached garages and ALL UTILITIES (including electrical, heating, ductwork, ventilating, plumbing and air conditioning equipment) be protected to the base flood elevation (44 *CFR* 60.3 (a)(3)).

In coastal high hazard areas (V Zones), a community must require that all new construction and substantial improvements be elevated on pilings and columns. This is done so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level. In addition, as with A Zones, ALL UTILITIES must be protected to the base flood elevation.

In an AO zone the community must require that all new construction and substantial improvements of

- Residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least 2 feet if no depth number is specified) (44 *CFR* 60.3(c)(7)); and
- Non-residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least 2 feet if no depth number is specified), or together with attendant utility and sanitary facilities be completely floodproofed to that level. (44 *CFR* 60.3(c)(8)).

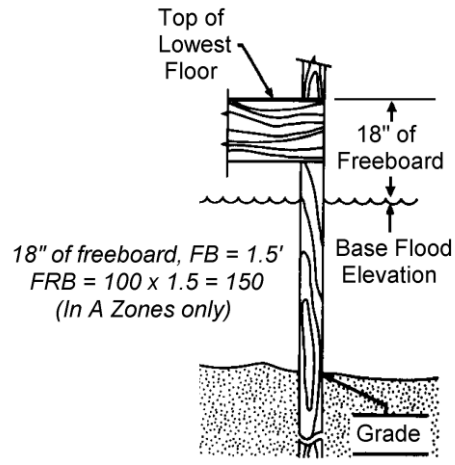
Scoring (maximum credit: 300 points)

The CRS credit calculations have two acronyms: "FB" is the number of feet of freeboard and "FRB" is the score for the freeboard credit. FRB is calculated with the following seven formulae.

1. FRB = 100 x FB.
2. For FB of 3.0 feet or more, FRB = 300.

In the case of 1 foot of freeboard, FB = 1.0 so FRB = 100 x 1.0 = 100. If the freeboard requirement is 18 inches, FB = 1.5 and FRB = 100 x 1.5 = 150. The maximum score for FRB is 300.

NOTE: *In A Zones the lowest floor is measured from the top of the floor. In V Zones, the elevation requirement is measured from the bottom of the lowest horizontal structural member. If the illustration to the right were for a V-Zone building, the freeboard would be measured from the bottom of the floor joist.*



Calculating credit for 1½ foot of freeboard

3. If the ordinance uses the encroached elevation, add 0.5 to FB.

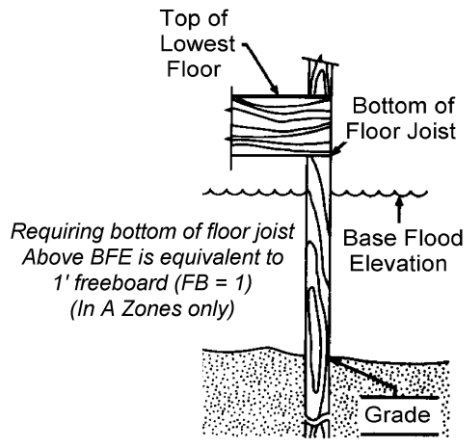
Detailed riverine flood studies that produce a floodway provide a flood elevation based upon the floodway encroachment. These elevations are listed in the "With Floodway" column in the Floodway Data Table in the community's Flood Insurance Study. They are generally higher than the "Without Floodway" or "Regulatory" flood elevations. For example, if the community requires that the lowest floor be at least 1 foot above this encroached or "with floodway" elevation, FB = 1.0 + 0.5 = 1.5 and FRB = 100 x 1.5 = 150.

4. For FRB credit, the 500-year flood elevation is considered to be 1 foot higher than the base flood elevation, unless the community demonstrates that it is higher. If freeboard is based upon the 500-year flood, add 1.0 to FB.

Elevating to the 500-year flood provides more protection than elevating to the base flood elevation. Section 431.a.5 provides credit equivalent to 1 foot of freeboard. For example, if the community requires that buildings be elevated to the 500-year flood level, FB = 1.0 and FRB = 100 x 1.0 = 100.

Base flood and 500-year flood elevations can be found in the community's Flood Insurance Study profiles. If the difference is greater than 1 foot, then the community should calculate the difference. For example, if the ordinance requires 1 foot of freeboard above the 500-year flood and the profiles show that the 500-year flood averages 1.5 feet above the 100-year flood, then FB = 1.0 + 1.5 = 2.5 and FRB = 100 x 2.5 = 250.

5. For FRB credit outside of V Zones, if the ordinance uses “lowest horizontal structural member” or similar language instead of “lowest floor,” add 1.0 to FB.



Freeboard credit based on the bottom of the floor joists.

The minimum NFIP requirement outside of coastal high hazard areas (V Zones) is that the top of the lowest floor must be at or above the base flood elevation. Some communities require that any beams, floor joists, or other horizontal structural members be elevated to or above the base flood elevation. Since this requirement will generally result in the top of the lowest floor being approximately 1 foot above the base flood elevation, the CRS provides credit equivalent to 1 foot of freeboard.

This credit is not available in coastal high hazard areas because it is a minimum NFIP requirement in V Zones. Communities that enforce this requirement in both A and V Zones must use the impact adjustment to pro-rate the credit points.

6. A community may use the following to receive more credit in AO1, AO2, and AO3 Zones:

   (a) In AO1 and AO2 Zones, add 2.0 to FB.

   (b) In AO3 Zones, add 1.0 to FB.

AO Zones are floodplains subject to shallow flooding. The number after “AO” is the depth of flooding expected. Waves and other problems are minimal in such areas, so a little freeboard provides a relatively larger margin of protection. Section 431.a.6 increases the freeboard credit points in such areas.

In AO Zones, base flood depths are provided instead of base flood elevations in relation to mean sea level. Where depths are not provided, the NFIP regulations require new buildings to be elevated 2 feet above grade. Some communities misinterpret this requirement as 2 feet of freeboard. Elevating 2 feet above the base flood elevation is a creditable freeboard requirement. Elevating 2 feet above grade in an AO Zone where no base flood elevation is provided is a minimum requirement of the NFIP and is not eligible for credit.

A community with a relatively large area of AO Zone may want to use the impact adjustment to calculate different values for FRB in different areas. For example, if the community has a 1-foot freeboard requirement, FB=1 therefore FRB = 100 x 1 = 100. However, if some of its floodplain is AO1 Zone, 2 is added to the FB, therefore FRB = 100 x (1 + 2) = 300. The community can receive 300 points for the area in AO1 and 100 points for the remainder of its floodplain. The impact adjustment is discussed in Section 432 beginning on page 57.

7. If the requirement for freeboard is limited to areas where there are base flood elevations, or otherwise does not apply to all new construction, then an impact adjustment must be made using Option 2 or 3 (see Sections 432.b and 432.c).

If the freeboard requirement does not affect all buildings, then the Option 2 or Option 3 impact adjustment must be used. For example, many ordinances require freeboard only where a base flood elevation is provided. Others require freeboard only for elevated buildings (non-residential buildings may be floodproofed to the base flood elevation without freeboard). In these cases, the community can use Option 2 or identify and measure the areas affected for Option 3. Impact adjustments are discussed in Section 432.

If the community has different freeboard standards in different areas, it may use the lowest value for FRB for all areas. This may eliminate the need for an Impact Adjustment Map and separate calculations for various values of FRB.

8. If the community requires that electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork) be elevated or made of flood-resistant materials above the base flood elevation, but does not require these facilities to be elevated or protected to the freeboard level, FB is multiplied by 0.75. If the community does not require that these facilities (including ductwork) be elevated or protected to or above the base flood elevation, there is no credit for FRB.

Many communities have focused on elevating the top of the lowest floor, but have allowed utilities, especially ductwork, to hang below the floor joists and be subject to flood damage. Flooded ductwork can add thousands of dollars to a flood insurance claim. This is primarily a concern for buildings on crawlspaces. Buildings on slab foundations, on pilings, and in V zones normally have the utility facilities waterproofed or elevated to an appropriate level.

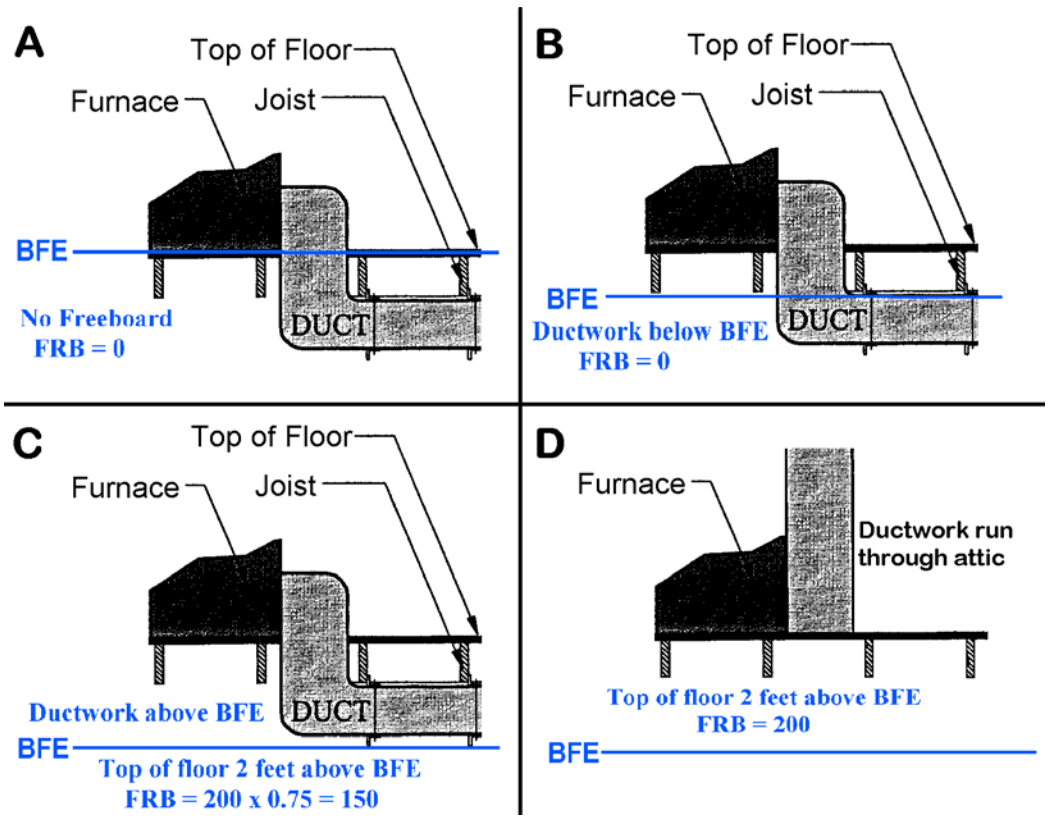
The final freeboard credit will be adjusted if utilities and ductwork are not above the freeboard elevation. The illustration below shows four examples:

A. No credit—floor is not above freeboard level.

B. No credit—floor is above freeboard level but utilities and/or ductwork are below base flood elevation (BFE).

C. 75% credit—floor is above freeboard, but utilities and ductwork are only above the BFE.

D. Full credit—floor and all utilities and ductwork are above the freeboard level.



Adjusting freeboard credit based on the location of ductwork in a crawlspace

Example Regulatory Language

CRS credit for freeboard is based on how high new buildings and substantial improvements must be elevated or floodproofed. Freeboard language is in the section of the ordinance or law that addresses construction standards for new buildings.

EXAMPLE 1: Many model ordinances require the lowest floor to be elevated to the base flood elevation plus 1 or more feet. Often "plus 1 foot" is in parentheses because the model ordinance's authors wanted the community to insert its own level of freeboard. Some communities have adopted the following language, parentheses and all, not realizing that it was an optional requirement more restrictive than the NFIP regulations.

Residential Construction. New construction or substantial improvement of any residential building (or manufactured home) shall have the lowest floor, including basement mechanical and utility equipment, and ductwork, elevated no lower than (one feet) above the base flood elevation.

Non-Residential Construction. New construction or substantial improvement of any commercial, industrial, or non-residential building (or manufactured home) shall:

a. Have the lowest floor, including basement, mechanical and utility equipment, and ductwork, elevated no lower than (one feet) above the level of the base flood elevation or

b. Be floodproofed to a level no lower than (one feet) above the level of the base flood elevation, provided that all areas of the building (including mechanical and utility equipment) below the required elevation are watertight with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy.

Using formula 1, the credit is FB = 1.0, FRB = 100 x 1.0 = 100.

EXAMPLE 2: The other common approach is to establish a "flood protection elevation," "regulatory protection level," or some similar elevation. The level is set at a certain number of feet above the base flood elevation in the definitions section of the ordinance. The section on standards for new buildings then simply requires protection to the "flood protection elevation" and there is no reference to a base flood elevation. If the community uses this approach, it must submit the ordinance language for both the definition and the new construction standards.

Definitions: . . .

"FPE" or "Flood Protection Elevation" means: the elevation of the base flood plus two feet at any given location in the floodplain.

Standards for new construction:

All new residential buildings shall be elevated so the lowest floor, including basement, mechanical and utility equipment, and ductwork are at or above the FPE. All new non-residential buildings shall be either elevated above the FPE or floodproofed to the FPE.

Using formula 1, the credit is FB = 2.0, FRB = 100 x 2.0 = 200.

EXAMPLE 3: This example is based on formula 5. The ordinance language refers to the bottom of the floor being at or above the base flood elevation, which results in the top of the first floor being 1 foot above the base flood elevation, essentially creating a one-foot freeboard.

All buildings or structures that are erected within an A zone shall be elevated so that the lowest portion of all horizontal structural members that support floors, including floor

slabs, mechanical and utility equipment, and ductwork, but excluding footings, pile caps, and pilings, are located at or above the base flood elevation.

Using formula 5, the credit is FB = 0.0 + 1.0= 1.0, FRB = 100 x 1.0 = 100.

Records Needed for Verification

In addition to the ordinance language, the permit office will need to show how the freeboard requirement is enforced. A verbal explanation will help, but there must be permit records, such as elevation certificates, that show new construction built to the freeboard level.

The best record to document freeboard is the FEMA Elevation Certificate. It shows the certified, surveyed elevations of new buildings, including mechanical and utility equipment. For floodproofed buildings, the FEMA Floodproofing Certificate shows the level to which a building is protected. These forms must be kept in order for the community to meet the basic prerequisite for participation in the CRS.

If buildings are constructed on crawlspaces or otherwise elevated on foundations other than fill, the community's ordinance, permit records, or enforcement procedures need to show how ductwork is addressed. Is it specifically elevated above the freeboard level? Is it located in the attic? See the discussion on pages 13–14.

Common Problems

Some ordinances have the flood protection requirements located in several different places. There may be a section on construction of residential buildings, another one on non-residential buildings, one on manufactured housing, and a fourth section with standards for AO or V Zones. Full credit for freeboard is dependent on the requirement being applied to all buildings and in all areas of the floodplain.

The most common problem found in applications for FRB credit has been that the requirement was only put in the section that deals with elevating new buildings. Most ordinances have another section that allows non-residential buildings to be floodproofed to the base flood elevation. Because this problem likely was an oversight by the authors of a model ordinance, it can be rectified by amending the ordinance to include freeboard for floodproofing.

If only elevated buildings are required to have freeboard, then the community cannot assure that non-residential buildings will have freeboard. Freeboard is more critical for floodproofed buildings because of the catastrophic results when the floodproofing is overtopped. Accordingly, where freeboard is only required for elevated buildings, an impact adjustment must be made (see example page 58).

Another problem results when a community adopts a model ordinance without checking to see if all the sections are locally applicable. For example, most models include sections on

manufactured housing, whether or not they are allowed in the floodplain's zoning districts.

If the manufactured housing language does not meet the FRB credit criteria, the community may show the ISO/CRS Specialist that that section from a model ordinance does not apply locally. Similarly, the community may not have any V or AO Zones on its FIRM.

Most ordinances only require buildings to be elevated where there is an established base flood elevation. Regulations in approximate A Zones may not require that new buildings be protected to or above a base flood elevation and, therefore, there may not be a freeboard requirement. In such cases, the impact adjustment must use Option 2 or 3 unless the community can show that a base flood elevation is always provided and that buildings must be elevated above that level, plus freeboard, in all floodplains.

A different problem occurs when freeboard for buildings is confused with freeboard for levees or channel banks. Levee freeboard is discussed in Activity 620 (Levee Safety). There is no CRS credit for a freeboard requirement for new or modified channels.

b. Foundation Protection (FDN)

The NFIP regulations require that structures be elevated to or above the base flood elevation AND anchored to resist flotation, collapse, and lateral movement. In V Zones and for floodproofed buildings, an engineer or architect must certify that the structure meets the NFIP requirements. In other situations, the regulations do not provide specific guidance as to how the performance standards are met.

Buildings elevated on pilings, crawlspaces, or other foundations may be damaged if the foundations are not properly designed for the soil and flood conditions of the site. Fill can be eroded during a flood, undermining the structure. Structural damage can also result from the settling of a building placed on improperly compacted fill or organic soils.

Foundation protection (FDN) credit is provided to encourage communities to require site-specific foundation construction standards. FDN credit is not available in coastal high hazard areas because the minimum NFIP regulations require engineered foundations in V Zones (44 *CFR* 60.3(e)(4)).

NFIP Requirement

The NFIP regulations do not specifically require that foundations or fill be protected from erosion, scour, or settling. However, this requirement is implicit in the performance standard of Section 60.3(a)(3), which requires that the community make sure that buildings are properly designed and anchored to resist flood damage.

NFIP regulations require that a building elevated on solid foundation walls have openings in the walls to allow passage of floodwater to equalize hydrostatic pressure on the walls (60.4(c)(5)). Floodproofed buildings must have an engineer's certification (60.3(b)(4)).

Because these regulations relate to foundations and because they require architect or engineer certificates, some communities have confused these minimum requirements with

FDN credit. FDN credit is related to the compaction of the supporting soils and protection of the soils or supporting members from erosion, scour, settling, and related hazards that accompany floods.

Scoring (maximum credit: 35 points)

This credit is not available in V Zones because foundation protection is a minimum NFIP requirement in V Zones.

1. FDN = 35, if ALL new buildings must be constructed on foundations that are approved by a licensed professional engineer; OR

2. FDN = 35, if ALL new buildings must be constructed on properly designed and compacted fill (ASTM D-698 or equivalent) that extends beyond the building walls before dropping below the base flood elevation and has appropriate protection from erosion and scour. The design of the fill or the fill standard must be approved by a licensed professional engineer.

To receive the full 35 points, the regulations must address all new buildings on all types of foundations, e.g., on fill, crawlspaces, piers, etc. All new buildings must be built on either engineered fill or engineered supports.

ASTM (American Society for Testing and Materials) Standard D-698 requires compaction to 95% of the maximum density obtainable using the Standard Proctor Test method.

If the community has adopted an engineered standard and requires compliance with that standard, FDN credit can be provided. In such cases, an engineer's certificate is not needed for each structure, although records of compaction tests, etc., would be needed for each structure.

2. FDN = 20, if ALL new buildings built on fill must be

   (a) constructed on properly designed and compacted fill (ASTM D-698 or equivalent),

   (b) that extends at least five feet beyond the building walls before dropping below the base flood elevation, AND

   (c) the fill has appropriate protection from erosion and scour.

This credit is for regulations that only address buildings on fill. Twenty points are provided, even though there are no special requirements for buildings on crawlspaces, piers, etc. If the regulations require that ALL new and substantially improved buildings be built on engineered fill, then FDN = 35 under Section 430.b.2.

Unless credit is requested under Section 430.b.1, an engineer's certificate is not needed for each structure, although records of compaction tests, etc., would be needed for each structure. If the community has adopted an engineered standard and requires compliance with that standard, FDN credit is provided.

Example Regulatory Language

Buildings on Fill. A residential or non-residential building may be constructed on permanent land fill in accordance with the following:

a. The lowest floor (including basement) of the building or addition shall be at or above the flood protection elevation.

b. The fill shall be placed in layers no greater than one foot deep before compacting and should extend at least ten feet beyond the foundation of the building before sloping below the base flood elevation.

c. The top of the fill shall be above the base flood elevation. However, the ten foot minimum may be waived if a structural engineer certifies an alternative method to protect the building from damage due to erosion, scour and other hydrodynamic forces.

d. The fill shall not adversely affect the flow or surface drainage from or onto neighboring properties

FDN = 20

Records Needed for Verification

In addition to the ordinance language, the permit office will need to show how the foundation protection requirement is enforced. A verbal explanation will help, but there should be some examples of engineering certificates, as-built grading plans, or soil testing or compaction reports, depending on the regulatory standard.

Common Problems

The most common reason for denial of FDN credit has been submittal of ordinance language that was adopted to meet the minimum NFIP requirements. Because these regulations relate to foundations and because they require architect, engineer, or surveyor certificates, some communities have confused these minimum requirements with FDN credit.

Some communities have excellent compaction and erosion protection standards for placing fill in the floodplain. However, this requirement does not apply to buildings built on elevated foundations without fill. Instead of providing the full 35 points credit, FDN = 20.

c. Cumulative Substantial Improvement Rules (CSI)

Floodplain management regulations are most effective in reducing flood damage to new construction. Buildings built before adoption of the regulations are often subject to repeated flooding, repeated damage, and repeated flood insurance claims and federal disaster assistance payments. The NFIP regulations address a portion of this problem by requiring that substantially damaged and substantially improved buildings be brought up to the same standards as new buildings. However, only a small percentage of the existing buildings are substantially damaged or substantially improved and subject to these requirements.

Communities can reduce flood damage by counting improvement and repair projects cumulatively so that buildings will be brought into compliance with flood protection standards sooner. The CRS provides credit for communities that do this. Credit is provided under CSI for enforcing a cumulative substantial improvement rule.

NFIP Requirement

Substantial improvements are treated as new construction in Section 60.3(c)(2) and (3). A single large improvement or repair project is clearly a substantial improvement no matter how many separate permits are issued.

However, the NFIP regulations do not require that smaller individual improvements made over a period of years and that add up to 50% be considered a substantial improvement. Theoretically, property owners could "beat the system" by applying for a 40% improvement project one year and applying for another 40% project the next year.

FEMA has published additional guidelines on substantial improvement regulations in *Answers to Questions about Substantially Damaged Buildings*, FEMA-213, 1991 (see page 63).

Scoring (maximum credit: 110 points)

This element provides credit to communities that ensure that the total value of all improvements permitted over the years does not exceed 50% of the value of the structure. If it does, the original building must be protected according to the NFIP requirements for new buildings.

Scoring allows for separate regulatory requirements for improvements and repairs. If the community requires both to be counted cumulatively, it receives the total for Section 430.c.1 and c.2. It can also add the credit for c.3, which covers all additions, regardless of size.

Credit is the total of the following points:

1. One of the following:

   (a) 45, if the regulations require that improvements, modifications, and additions to existing buildings are counted cumulatively for at least ten (10) years, or

   (b) 25, if the regulations require that improvements, modifications, and additions to existing buildings are counted cumulatively for at least five (5) years.

2. One of the following:

   (a) 45, if the regulations require that reconstruction and repairs to damaged buildings are counted cumulatively for at least ten (10) years, or

   (b) 25, if the regulations require that reconstruction and repairs to damaged buildings are counted cumulatively for at least five (5) years, or

   (c) 20, if the community adopts regulatory language that qualifies properties for Increased Cost of Compliance insurance coverage for repetitive losses.

Increased Cost of Compliance (ICC) coverage is a provision in flood insurance policies that helps pay for bringing a substantially damaged flooded building into compliance with the local ordinance. It is possible that a building deemed substantially damaged by an ordinance that qualifies for CSI would not qualify for an ICC payment. ICC and example regulatory language are discussed separately in the boxes on the next two pages.

3. 20, if the regulations require that any addition to a building be protected from damage from the base flood.

This third approach, worth 20 points, makes every addition, regardless of size, a substantial improvement. Additions within the footprint of the original building would have to be on a floor above the base flood elevation. Additions outside that footprint would have to be elevated (or, for non-residential structures, floodproofed) above the base flood elevation.

Increased Cost of Compliance

On June 1, 1997, the NFIP began offering "Increased Cost of Compliance" (ICC) coverage for buildings covered under the Standard Flood Insurance Policy. ICC coverage provides for the payment of a claim to help pay for the cost to comply with community floodplain management ordinances after a flood in which a building has been declared substantially damaged or repetitively damaged.

When an insured building is damaged by a flood and the community declares the building to be substantially or repetitively damaged, ICC will help pay for the cost to elevate, floodproof, demolish, or relocate the building up to a maximum of $30,000. This coverage is in addition to the building coverage for the repair of actual physical damage from flood under the policy. An ICC claim can be filed whether or not a community has received a Presidential disaster declaration.

The following conditions must be met for a substantially damaged building to be eligible for an ICC claim: A building is eligible for an ICC claim payment if it is in a Special Flood Hazard Area and if the community determines it has been damaged by a flood whereby the cost of restoring the building to its before-damaged condition would equal or exceed 50% of the market value of the building before the damage occurred, as determined by the community. All NFIP communities must have, at a minimum, a substantial damage provision in their floodplain management ordinance in accordance with the NFIP criteria.

The Flood Insurance Reform Act of 2004 expanded the definition of what qualifies as substantial damage for the purposes of an ICC claim. Section 105(b)(4) of the Act reads, "the term 'substantially damaged structure' means a structure covered by a contract for flood insurance that has incurred damage for which the cost of repair exceeds an amount specified in any regulation promulgated by the Director, or by a community ordinance, whichever is lower." After FEMA regulations are published to implement this provision, regulations with substantial damage thresholds lower than 50% that qualify for LSI credit may also be able to trigger ICC claim payments. Communities with LSI credit should check with their FEMA Regional Offices to confirm this.

The following conditions must be met for a repetitively damaged building to be eligible for an ICC claim payment: A building is eligible for an ICC claim payment if it is in a Special Flood Hazard Area and is a repetitive loss structure and is subject to a community floodplain management ordinance. Two conditions must be met for an ICC claim to be paid under the SFIP for a repetitive loss structure:

1. The state or community must have adopted and be currently enforcing a repetitive loss provision or a cumulative substantial damage provision requiring action by the property owner to comply with the community's floodplain management ordinance, and

2. The building must have a history of NFIP claim payments that satisfies the statute's definition of "repetitive loss structure". A repetitive loss structure means "a building covered by a contract for flood insurance that has incurred flood-related damage on 2 occasions during a 10-year period ending on the date of the event for which a second claim is made, in which the cost of repairing the flood damage, on the average, equaled or exceeded 25% of the market value of the building at the time of each such flood event." *Note that this statutory ICC definition is not the same as the CRS definition of a repetitive loss property.*

Increased Cost of Compliance (cont.)

The date on which the first loss occurred is immaterial to eligibility for an ICC claim payment, even if the loss occurred before June 1, 1997, as long as the state or community enforced a repetitive loss or cumulative substantial damage requirement on the building and the insured building satisfies the definition of a "repetitive loss structure" defined above.

CRS NOTE: *Communities receiving CSI credit for a cumulative substantial improvement regulation must be aware that there may be instances in which the community's criteria may require compliance with its floodplain management ordinance, but the building may not qualify for an ICC claim payment (e.g., if a building is damaged three times, with each flood averaging 20% damage).*

Below are two options for ordinance language that is consistent with the definition of "repetitive loss structure" under the NFIP. The language would receive 20 points under CSI—fewer points than the more restrictive language of Section 431.c.1(a) and (b).

Additional guidance on ICC coverage can be found in the National Flood Insurance Program Increased Cost of Compliance Coverage: Guidance for State and Local Officials—Increased Cost of Compliance Coverage, FEMA 2003 and at FEMA's website: http://www.fema.gov/library/lib06.htm.

Option 1:

A. Adopt the Following Definition:

"Repetitive loss" means flood-related damage sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25% of the market value of the structure before the damage occurred.

B. And modify the "substantial improvement" definition as follows:

"Substantial improvement" means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "repetitive loss" or "substantial damage," regardless of the actual repair work performed.

Option 2: Modify the "substantial damage" definition as follows:

"Substantial Damage" means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damage condition would equal or exceed 50% of the market value of the structure before the damage occurred. Substantial damage also means flood-related damage sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25% of the market value of the structure before the damage occurred.

NOTE: *An ICC claim payment is ONLY made for flood-related damage. The substantial damage part of the definition must still include "damage of any origin" to be compliant with the minimum NFIP floodplain management regulations.*

Example Regulatory Language

Most ordinances use the NFIP definition for substantial improvement.

> *"Substantial improvement" means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed. . . . [44* ***CFR*** *59.1]*

The underlining in the following example shows how language can be added to the definition to clarify that both repairs and improvements are counted cumulatively.

> *"Substantial improvement" means any <u>combination of repairs,</u> reconstruction, rehabilitation, addition, or other improvement of a structure <u>taking place during the life of the structure</u> the <u>cumulative</u> cost of which equals or exceeds fifty percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed. . . .*
>
> CSI = 45 + 45 = 90.
>
> If "*during the life of the structure*" was replaced with "*during a period of five years*," then CSI = 25 + 25 = 50.
>
> If the words "*repairs, reconstructions*" were not included in the first example, CSI = 45. If not included in the second example, CSI = 25.

Records Needed for Verification

The permit office must demonstrate that it has a system for keeping track of improvements to each floodprone property. If a permit is applied for, the office must routinely check its files for past improvements, additions, and repairs, and calculate the cumulative effect of the proposed project.

The records must show the value of building additions, improvements, and repairs and the building's value. A community should not rely solely on the applicant's estimate of the cost, especially if permit fees or tax assessments are based on the estimated cost. The cost should be double checked based on the building department's knowledge of area construction costs or standard formulae based on square footage or type of project.

Each time someone applies for a permit in the SFHA, the building's records must be checked. The percentage of the cost of the project for which a permit is being requested plus the cost of all projects constructed since the cumulative substantial improvement requirement went into effect must be compared to the building's value. If all the projects add up to 50% or more of the building's value, then the project applied for is considered a substantial improvement.

The community must keep a running total of the costs or percentages of past improvements. An example of a paper record is on the next page. Each project is recorded and the percentage value of the improvement or repair is calculated. If the total percentage to date equals or exceeds 50%, the project is considered a substantial improvement and the building is subject to the community's regulations for new construction.

Common Problems

As with foundation protection, the most common problem with this element is submittal of ordinance language based on the minimum requirements of the NFIP. Many ordinances use the very same language from Section 59.1 quoted on page 23. The following is from a frequently used model ordinance.

> *"Substantial improvement" means any reconstruction, rehabilitation, addition, or other improvement of a structure the cost of which equals or exceeds fifty percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.*
>
> CSI = 0

As it is written, the above language would NOT receive any credit under CSI because it does not clearly state that improvements are counted cumulatively. However, many communities use this ordinance language but have been enforcing cumulative rules. CSI credit has been granted when the community submits a legal opinion or directive from the community's legal counsel stating how the ordinance is to be interpreted.

The following is an example from a letter from a city attorney to the permit office.

> *It is my opinion that [the last sentence in the above ordinance] is significant in terms of evidencing an intent on the part of the drafters of such provision that all alterations, beginning with the first alteration of the structure are to be considered in arriving at a determination of whether a substantial improvement, under the regulation, has occurred. Accordingly, it is my opinion that substantial improvement requires a consideration of all improvements to the premises occurring subsequent to the effective date of application of the provisions within the City. . . .*
>
> CSI = 45 + 45 = 90

Another problem is keeping track of improvements over time. The system used to enforce this and the other credited elements is reviewed by the ISO/CRS Specialist during the verification visit. Some communities throw out permit records one year after the certificate of occupancy is issued. Others file them in a basement and cannot get to them readily.

Building Improvement Record

Property address: *421 Addington Dr.* PIN: *16-321-417-83-2*

Type of project: *Room addition*

Permit number: *89-313* Date: *9/20/89* Cost of project:[1] $ *18,000*

Assessed value of building: $ *50,000* Market value:[2] $ *100,000*

Cost of project divided by market value: *18* %

Type of project: *Repairs of fire damage*

Permit number: *91-114* Date: *3/6/91* Cost of project:[1] $ *25,000*

Assessed value of building: $ *55,000* Market value:[2] $ *110,000*

Cost of project divided by market value: *23* % Total percentage to date:[3] *41* %

Type of project: *Remodeling, install fireplace, move walls*

Permit number: *94-16* Date: *6/2/94* Cost of project:[1] $ *6,000*

Assessed value of building: $ *58,500* Market value:[2] $ *117,000*

Cost of project divided by market value: *5* % Total percentage to date:[3] *46* %

Type of project: _____

Permit number: _____ Date: _____ Cost of project:[1] $ _____.

Assessed value of building: $_____ Market value:[2] $ _____.

Cost of project divided by market value: ____% Total percentage to date:[3] ____%

1. The cost of the project must be the true cost, including the value of donated materials, owner's labor, etc., based on prevailing construction costs and wages in the area. The cost of repairing a damaged building must be the cost to return it to its pre-damaged condition, regardless whether the owner intends to repair or rebuild everything that was damaged.
2. In this community, buildings are assessed at 50% of their market value. Therefore, market value = assessed value x 2. Market value calculated by a professional appraiser shall take precedence over this approach to basing market value on assessed value.
3. Total percentage to date is the sum of the cost of the project divided by market value for all previous projects. When the total percentage to date equals or exceeds 50%, the project is considered a substantial improvement.

The community needs to maintain permit records by parcel number or address, so that the history of improvements to a particular structure can be checked before the next permit is issued. For example, at the time of permit application, the address could be checked in a computer-based tracking system to see what previous permits had been issued.

To receive full credit of 45 points, the community must have a system that will keep track of improvements for at least 10 years. Less credit (25 points) is provided if records are accessible for at least five years.

d. Lower Substantial Improvement Threshold (LSI)

Another way to bring more buildings into compliance with the standards for new construction is to use a lower number than 50% in the substantial improvement requirement. A community's buildings are more likely to be brought up to code sooner if it uses a threshold of, say, 25% to trigger a determination that an improvement or repair project is substantial.

NFIP Requirement

The NFIP requirement of 50% is part of the definition of "substantial improvement" in Section 59.1 (see page 23).

Scoring (maximum credit: 90 points)

LSI credit is based upon the regulatory threshold. Use only one of the following:

1. 90, if the regulatory threshold is less than 10%;
2. 70, if the regulatory threshold is 10% to 24%;
3. 50, if the regulatory threshold is 25% to 39%;
4. 30, if the regulatory threshold is 40% to 44%;
5. 10, if the regulatory threshold is 45% to 49%; or
6. 20, if the regulatory threshold is no more than 25% of the bulk or square footage of the building's first floor.
7. If the lower substantial improvements threshold applies to EITHER improvements, modifications, and additions OR reconstruction and repairs, but not both, the value for LSI is multiplied by 0.5.

If a community lowered the threshold only for repairs and reconstruction or only for improvements, modifications and additions, then the value for LSI is halved. For example,

if a community had the basic NFIP substantial improvement language but required that if the value of repairs to a flooded building is greater than 25% of the pre-flood value of the building, then the building is considered substantially damaged, LSI = 50 x 0.5 = 25

Example Regulatory Language

Since communities participating in the NFIP already have a threshold, it is only necessary to change "50%" in the example language provided in the previous section to a lower number. The following is alternative language for cumulative substantial improvements (CSI), which also has a lower threshold (LSI).

> *A non-conforming building in a Flood Plain District may be altered, enlarged, or extended, on a one-time-only basis, provided the cost of such alterations, enlargements, or extensions does not equal or exceed 40 percent of its pre-improvement market value, unless such building is permanently changed to a conforming structure.*
>
> *Any non-conforming building in a Flood Plain District that is damaged by flood, fire, explosion, Act of God, the public enemy or other cause may be restored to its original dimensions and conditions, provided the cost of restoring the building to its before damage condition does not exceed 40 percent of its pre-damage market value, excluding the value of the land.*
>
> Threshold = 40%, LSI = 30 CSI = 90

Records Needed for Verification

The permit office must demonstrate that it has a system for checking improvements to each floodprone property. The records must show the value of building additions, improvements, and repairs and the building's value. If the project's value equals or exceeds the LSI threshold, then the project applied for is considered a substantial improvement.

A community should not rely solely on the applicant's estimate of the cost, especially if permit fees or tax assessments are based on the estimated cost. The cost should be double-checked based on the building department's knowledge of area construction costs or standard formulae based on square footage or type of project.

Common Problems

Some states do not allow a more restrictive threshold. A community must be sure that a minimum threshold is not set by state law before it adopts a lower one.

Some ordinances appear to have a threshold of zero because they prohibit all improvements. However, they often have language that allows minor projects (e.g., valued at less than 10%) over a 12-month period. In those cases, the credit for LSI is zero because, without a cumulative substantial improvement requirement, the building could be more than 50% improved in six years.

e. Protection for Critical Facilities (PCF)

A critical facility is any property that, if flooded, would result in severe consequences to public health and safety. A list of facilities that should be included in a definition is provided in Section 130, Glossary, in the *Coordinator's Manual*. The list includes, but is not limited to

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

Wastewater treatment plants are critical facilities that are often located in floodplains

A higher level of protection for critical facilities serves several purposes: it reduces damage to vital public facilities, it reduces pollution of flood waters by hazardous materials, and it ensures that the facilities will be operable during most flood emergencies. Therefore, the CRS provides credit for regulations that protect critical facilities from the 500-year flood.

On older FIRMs, the 500-year floodplain is shown as a B Zone. Ordinance language can simply specify the types of facilities that are prohibited from or protected within the A, V, and B Zones. On newer FIRMs the 500-year floodplain is the shaded X Zone. Flood Insurance Study profiles should provide 500-year flood elevations.

NFIP Requirement

The NFIP regulations do not have any provisions for critical facilities other than that all buildings must be protected from damage by the 100-year flood. However, guidelines for implementing federal Executive Order 11988 set the 500-year flood as the standard for protecting "critical actions." This is the source of the CRS credit criteria.

Scoring (maximum credit: 100 points)

The score for PCF is based on how critical facilities are protected from the 500-year flood. There are two options:

1. 100, if new critical facilities are prohibited from the 500-year floodplain; OR
2. 50, if new and substantially improved critical facilities must be protected from damage and loss of access as a result of the 500-year flood or the flood of record, whichever is higher.

If an ordinance prohibits or regulates critical facilities in only part of the 500-year floodplain, such as in the 100-year floodplain, floodway, or V Zone, then the credit points are adjusted through the impact adjustment.

Note that credit is provided only if there is regulatory language that addresses the protection of critical facilities. The fact that there are currently no critical facilities in the regulated floodplain may indicate community policy, but adopted regulations are required for PCF credit.

To receive full credit for this element, the regulations must be enforced throughout the 500-year floodplain. On older FIRMs, the 500-year floodplain is shown as the SFHA plus the B Zone. The ordinance can simply specify the types of facilities prohibited from or protected within the A and B Zones. On newer FIRMs with AE and X Zones, the 500-year floodplain is shown as the SFHA plus the shaded X Zone. In either case, the 500-year flood elevation becomes the "flood protection elevation" for critical facilities. If the community enforces critical facility protection regulations in only part of its flood hazard area, e.g., in the floodway or V Zone, the impact adjustment is based on the area of the 500-year floodplain rather than aRF, the area of the regulatory floodplain.

Example Regulatory Language

Critical facilities shall be constructed on properly compacted fill and have the lowest floor (including basement) elevated at least one foot above the elevation of the 500-year flood. A critical facility shall have at least one access road connected to land outside the 500-year floodplain that is capable of supporting a 4,000-pound vehicle. The top of the road must be no lower than six inches (6") below the elevation of the 500-year flood.

PCF = 50

Records Needed for Verification

In addition to the ordinance language, the permit office will need to show how the critical facility protection requirement is enforced. A written explanation might also include examples of standard permit records, including elevation certificates, that document the

protection standards required of critical facilities. An Impact Adjustment Map must also be provided if the community enforces critical facility protection regulations in only part of its 500-year floodplain.

Common Problems

Some communities have submitted regulatory language that prohibits hazardous materials storage or one other type of critical facility. These have not received full PCF credit because they do not include the majority of critical facilities.

f. Protection of Floodplain Storage Capacity (PSC)

Although a building constructed on fill and elevated above the base flood elevation meets the NFIP regulations, filling a substantial portion of the floodplain reduces storage for flood water and tends to increase peak flows downstream. Prohibiting fill, or requiring that if fill is placed in the floodplain, an equal volume of storage be made available, will reduce this problem.

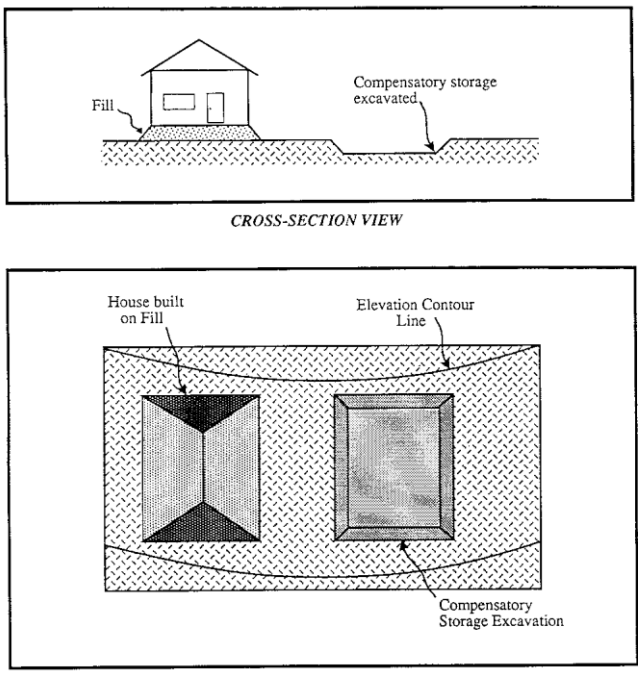


Illustration from the explanation of the King County, Washington, compensatory storage requirement. If fill is placed in the floodplain, an equal amount must be removed from the same elevation to provide "a hydraulically equivalent volume of excavation."

NFIP Requirement

The basic NFIP requirement in riverine situations is that new development must not restrict conveyance of floodwaters. A floodway is adopted to identify the area needed to convey the base flood and that area is kept free of obstructions (Sections 60.3(c)(10) and (d)(2) and (3)).

The balance of the floodplain, the fringe, may be filled or otherwise developed. Although the NFIP requirement has an important impact on future flood heights, it does not account for the loss of floodplain storage caused by allowing the fringe to be filled.

Storage is especially important in flat areas with wide floodplain fringes. Much of the slow-moving flood water is held in the fringe during a flood. Filling or constructing a levee that removes the storage capacity of the fringe means more water will be sent downstream,

resulting in increased flood heights. On the other hand, in many places, building on fill is the safest form of floodplain construction, so communities should not summarily enact a prohibition just for CRS credit.

Scoring (maximum credit: 80 points)

Floodplain storage capacity can be preserved in two ways. The first is to simply prohibit fill, the major cause for loss of storage. Prohibiting fill will also prevent most floodplain development and will help preserve the natural and beneficial functions of the floodplain.

The other method is to require compensatory storage, i.e., the developer must compensate for each cubic foot of fill, building, or other item that is displacing flood water. Generally, this is done by removing an equal volume of fill from the lot, usually at the same elevation to maintain the same hydraulic conditions.

The credit for PSC is based on which approach is used.

1. 80, where regulations prohibit fill within floodplains or flood fringes, including construction of buildings on fill; or

2. 70, where regulations require that new developments provide compensatory storage at hydraulically equivalent sites.

Credit is not provided for protection of storage capacity in floodways only. Credit is not provided in coastal floodplains.

Example Regulatory Language

Whenever any portion of a floodplain is authorized for development, the volume of space occupied by the authorized fill or structure below the base flood elevation shall be compensated for and balanced by a hydraulically equivalent volume of excavation taken from below the base flood elevation. All such excavations shall be constructed to drain freely to the watercourse. No area below the waterline of a pond or other body of water can be credited as a compensating excavation.

PSC = 70

[Another example can be found on page 61.]

Records Needed for Verification

Prohibiting fill is verified by a review of site and grading plans. For compensatory storage, permit records are checked for engineering calculations showing the amount of compensatory storage needed and the site from which it is taken.

Common Problems

Some communities submit the section in their floodplain management ordinance that prohibits encroachments, including fill, from the floodway. This language is the minimum NFIP requirement from Section 60.3 (d)(3). Therefore, no credit is provided.

Further, credit is not provided for protection of storage capacity in floodways only. The minimum NFIP requirement that prohibits encroachments in floodways generally preserves the storage that floodways provide. PSC is primarily effective in the fringe areas of riverine floodplains. Similarly, credit is not provided in coastal floodplains where flood storage has no impact on flood heights.

g. Natural and Beneficial Functions Regulations (NBR)

Although regulations that protect natural and beneficial floodplain functions do not protect insurable buildings directly, they do have an indirect flood protection benefit and they also have a direct impact on related floodplain management concerns, such as water quality. Accordingly, the CRS recognizes three types of regulations related to protecting natural and beneficial functions:

1. Regulations that protect public health or water quality;
2. Regulations that protect shorelines, channels, and banks from disruption and erosion; and
3. Regulations adopted pursuant to a Habitat Conservation Plan.

Many communities protect natural and beneficial functions by prohibiting development in sensitive areas, such as wetlands, riparian areas, or habitats, or by requiring setbacks from channels or sensitive areas. Regulations that prohibit development from certain areas usually receive more credit points under Activity 420 (Open Space Preservation). Regulations that allow development but have additional requirements related to protecting natural and beneficial functions are credited under this activity.

NFIP Requirement

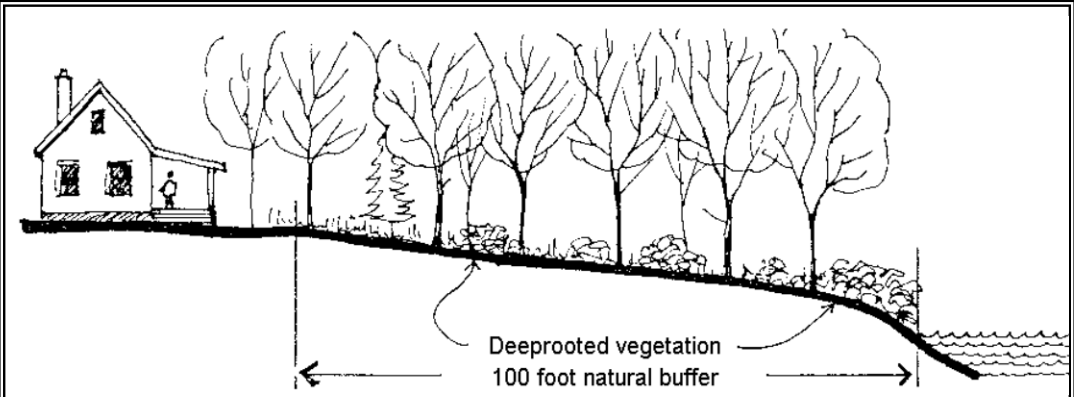
There is no NFIP requirement to protect water quality or to minimize disruption to shorelines, channels, and banks. There is a requirement, Section 60.3(b)(6) and (7), that a community notify adjacent communities and the State NFIP Coordinating Office before altering a watercourse and that channel capacity within the altered section be maintained. Because communities are required by the NFIP regulations to do this, a local requirement to maintain the carrying capacity of channels is not eligible for CRS credit.

Scoring (maximum credit: 40 points)

There are three bases for credit points for NBR:

1. Prohibiting activities that are hazardous to public health or safety,

2. Protecting shorelines and stream banks, and
3. Regulating pursuant to a Habitat Conservation Plan.



Requiring a vegetated buffer strip can qualify for NBR credit.
Source: *Environmental Management: A Guide for Town Officials,*
Maine Department of Environmental Protection, 1992

The points are cumulative, so a community can receive up to 40 points for doing all three:

1. (a) 10, if regulations prohibit ALL activities in the floodplain that may be hazardous to public health or water quality; OR

   (b) 5, if regulations prohibit one or two specific activities in the floodplain that may be hazardous to public health or water quality, such as sanitary landfills or septic systems.

Under Section 431.g.1(a), 10 points are provided for prohibiting all hazards to public health or water quality. Under 1(b), half of the credit, 5 points, is provided for prohibiting only some of those hazards, such as septic systems or sanitary landfills. Prohibiting hazardous materials, such as chemical storage, is credited under Section 431.e., Protection for Critical Facilities.

2. 15, where regulations require new floodplain development to avoid or minimize disruption to shorelines, stream channels, and their banks.

Section g.2. credits allowing development but preventing channel modifications and other disturbances to river, stream, or ditch channels and lake and ocean shores. A setback requirement that prevents development from an area adjacent to a channel or shoreline should receive more credit under Activity 420 (Open Space Preservation). It may also receive credit under stormwater management master planning (SMP) under Activity 450 (Stormwater Management).

EITHER:

15, for regulations adopted pursuant to a Habitat Conservation Plan or similar plan that has been credited under Section 511.b., OR

10, for regulations that protect aquatic or riparian habitat from new development.

Section 511.b in Activity 510 (Floodplain Management Planning) provides CRS credit for adopting a plan to protect threatened aquatic or riparian species. If the community receives credit for such a plan in Activity 510, and enacts development regulations recommended by that plan, it would receive the 15 points under g.3.

The plan must explain and recommend actions to protect rare, threatened, or endangered aquatic or riparian species. The plan must have been adopted by the community's governing board and there must be documentation that the plan is being implemented. The plan must identify

- The species in need of protection,
- The impact of new development on its habitat,
- Alternative actions that could be taken to protect that habitat,
- What actions are recommended to protect that habitat and why they were selected from the alternatives, and
- How the recommendations will be funded.

Ten points are provided if the community has regulatory language that protects habitat, but was not prepared or adopted pursuant to a plan.

Example Regulatory Language

Only those activities listed below are allowed within the floodplain district:

(a) Public flood control structures and other public works relating to the control of drainage, flooding, erosion, or water quality or habitat for fish and wildlife . . .

(c) Storm sewer and drainage ditch outfalls . . .

(e) Public open space and recreational facilities (without buildings or restrooms) . . .

NBR = 10 if there is a specific list of allowed or permitted activities that does not include uses that are hazardous to public health or water quality. Note that if the regulatory language prohibits all buildings and filling, it could qualify for more points under Activity 420 (Open Space Preservation). If so, NBR = 0, because the same provision cannot be credited twice.

For all activities involving construction within 25 feet of the channel, the following criteria shall be met:

(a) A nat *of the mear*

(b) Whe *of an appro* *letion of cons*

(c) The *ss through this b*

NBR = 15

This house was properly elevated when built. Some time after the permit was issued, the owner improved the lower area and subsequently suffered flood damage. This shows the benefit of requiring lower areas to stay open.

Records Ne

A list of proj ether hazardous m ts and site plans should show any setback requirements.

Credit for a h n, a copy of the governing ted pursuant to the plan, a stered.

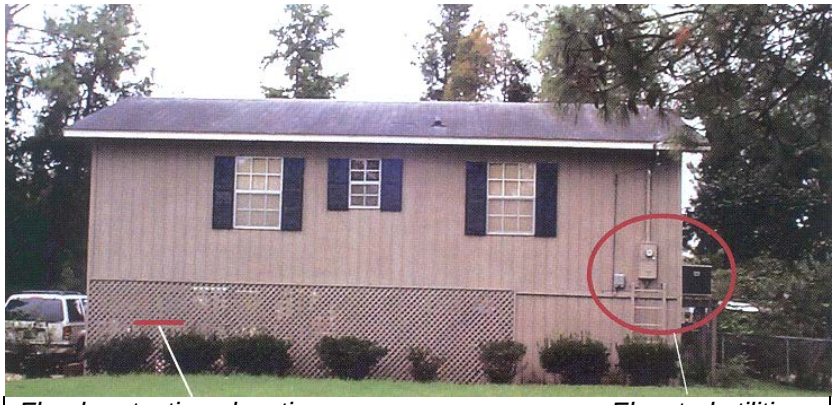
This house was elevated and the lower area was not enclosed. There was no flood damage to the structure.

h. Enclos

Most new bu s on an elevated foun e kept open to allow flood v walls. Where flood depths above grade. This allows t

In coastal high hazard areas (V Zones), new buildings must be elevated on open foundations to present the minimum obstruction to breaking waves. Owners are allowed to have “breakaway walls,” i.e., walls that will be knocked down by waves rather than remain in place and consequently transfer the impact of the waves to the structure.

One problem that has arisen is that owners enclose the lower areas of elevated buildings and put materials in them that are subject to flood damage. Owners forget (or new owners are not aware of) the reason for keeping the lower areas open and free of items that can be damaged by a flood. The open areas become enclosed or the breakaway walls become solid and the interior is converted to family rooms, bedrooms, and even bathrooms.



The lower area is surrounded by open lattice work and would qualify for ENL credit of 300 points.

Some communities and states know that this will happen and have adopted regulatory language that prevents enclosing the area below the regulatory flood elevation. These regulations can prohibit all enclosures, limit enclosures to small areas reserved for building access, limit walls to a percentage of the surface area, or allow only transparent walls, such as screening and open lattice-work.

Regulations to limit enclosures below the base flood elevation have two objectives. First, they minimize a potential source of debris that may hit other buildings. Second, they discourage finishing the area below the base flood elevation and storing valuable or hazardous items there.

The community may opt to enforce these enclosure limits only where the lowest floor is over five feet above grade. Where the lowest floor is less than five feet above grade, a crawlspace with the proper openings may be more appropriate than an open area elevated on columns or piles. With less than five feet of height, the lower area is not likely to be improved or modified into a livable space and the enclosure limits are not needed.

NFIP Requirement

The NFIP prohibits all enclosures except breakaway walls in coastal high hazard areas (V Zones), according to Section 60.3(e)(5). In non-coastal areas, the lower area of a building may be enclosed provided that it has openings large enough to allow free passage of flood water (Section 60.3(c)(5)).

Scoring (maximum credit: 300 points)

CRS credit is provided for regulations that exceed the above requirements. There are three ways the requirement can be scored.

1. 300, if regulations prohibit any building enclosures, including breakaway walls, below the base flood elevation; or

2. The total of the following points:

   a. 100, if regulations prohibit enclosures of areas greater than 300 square feet, including breakaway walls, below the base flood elevation. The area enclosed must still meet all NFIP requirements for openings, anchoring, and flood-resistant materials.

   b. 50, if regulations require that the owner of a building sign a nonconversion agreement, promising not to improve, finish, or otherwise convert the area below the lowest floor and granting the community the right to inspect the enclosed area.

The prohibition includes prohibiting breakaway walls. They are enclosures that obstruct the vision of anyone who needs to verify whether the lower area has been modified. If prohibiting breakaway walls in V Zones is the only basis for credit, the area affected (the V Zone) must be reflected in the score for the impact adjustment (see page 57).

Example Regulatory Language

New construction or substantial improvements of elevated buildings that include enclosed areas formed by foundation and other exterior walls shall be designed to preclude finished living space below the base flood elevation by providing openings in each wall having a total net area of not less than 50% of the total wall area subject to flooding. At least one opening per wall shall be no higher than one foot above grade to allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on the exterior walls.

This requirement calls for keeping the walls at least 50% open. “Openings” mean permanent openings, such as vents. Windows, doors, and garage doors do not qualify as “openings.” Generally, this requirement is met by using lattice-work.

ENL = 300

<u>Elevated Buildings</u>. New construction or substantial improvements of elevated buildings that include fully enclosed areas formed by foundation and other exterior walls below the base flood elevation shall be designed to preclude finished living space and designed to allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on exterior walls.

- *(a) Designs for complying with this requirement must either be certified by a professional engineer or architect or meet the following minimum criteria:*
  - *(i) Provide a minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding;*
  - *(ii) The bottom of all openings shall be no higher than one foot above grade; and*
  - *(iii) Openings may be equipped with screens, louvers, valves, or other coverings or devices provided they permit the automatic flow of floodwaters in both directions.*
- *(b) Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment used in connection with the premises (standard exterior door) or entry to the living area (stairway or elevator).*
- *(c) The interior portion of such enclosed area shall not be partitioned or finished into separate rooms.*
- *(d) The total floor area of all such enclosed areas shall not exceed 300 square feet.*

ENL = 100. In the above example, all but section (d) is in a commonly used model ordinance. Section (d) limits the size of enclosures.

NONCONVERSION AGREEMENT
FOR CERTAIN STRUCTURES IN THE FLOODPLAIN

Application has been made for a Permit from the City of _____, _____*[state]*.

Permit # _____
Property Owner _____

Address _____
Deed dated _____, Recorded _____
Tax map _____, block _____, parcel _____

Base Flood Elevation at the site is _____ feet (NGVD).
Map Panel Number _____, effective date _____

In consideration for the granting of a permit for the above structure, the property owner agrees to the following:

1. That the enclosed area below the base flood elevation shall be used solely for parking of vehicles, limited storage, or access to the building and will never be used for human habitation without first becoming fully compliant with the flood damage prevention ordinance in effect at the time of conversion.
2. That all interior walls, ceilings, and floors below the base flood elevation shall be unfinished or constructed of flood-resistant materials.
3. That mechanical, electrical, or plumbing devices shall not be installed below the base flood elevation.
4. The walls of the enclosed areas below the base flood elevation shall be equipped with at least two vents which permit the automatic entry and exit of floodwater with total openings of at least one square inch for every square foot of enclosed area below flood level. The vents shall be on at least two different walls, and the bottoms of the vents shall be no more than 1 foot above grade.
5. That any variation in construction beyond what is permitted shall constitute a violation of this agreement and Section ____of Ordinance #_____ .
6. That this Nonconversion Agreement becomes part of Permit # _____.

_____
Signature of Property Owner Witness
Date
_____

At a minimum, the following has been recorded on the deed to the above property**:** "This structure has received special permission to be constructed in the Special Flood Hazard Area. The lowest floor shall not be finished or converted to a habitable space unless the enclosed area below the Base Flood Elevation becomes fully compliant with Ordinance #_____ in effect at the time of conversion. At this site, the Base Flood Elevation is ____ feet, National Geodetic Vertical Datum."

_____
Signature, Recorder of Deeds Date

Records Needed for Verification

Permit records, including building plans, should clearly state that there will be no enclosed lower area. Elevation certificates should show only diagrams number 5 or 6 for new buildings not elevated on fill. If the community is seeking 100 points for limiting enclosures to less than 300 square feet, the building plans need to show the dimensions. If the community is seeking 50 points for a nonconversion agreement, each permit file should have a copy of the signed agreement. The ISO/CRS Specialist will tour the floodplain to field-check a sample of recently constructed buildings.

i. Other Higher Standard (OHS)

This element provides communities with credit for regulations that are not included elsewhere. Each submittal for credit is individually reviewed and scored.

NFIP Requirements

Parts 59 and 60 of Title 44 of the *Code of Federal Regulations* set the NFIP minimum requirements. Any regulatory requirement that is more restrictive than Parts 59 and 60 and that reduces flood losses or protects natural and beneficial floodplain functions can receive credit under this element.

A complete set of the current regulations in 44 *CFR* Parts 59 and 60 can be found at http://www.access.gpo.gov/nara/cfr/waisidx_00/44cfrv1_00.html.
They are also summarized in Appendix A of this document.

Scoring (maximum credit: 100 points)

The credit points for each standard can vary from 1 to 25, depending on the regulations. There is a maximum of 100 points for all the other higher standards. Each submittal is scored by FEMA.

> OHS = up to 100 points for higher regulatory standards that prevent flood losses or protect natural and beneficial floodplain functions that are not otherwise credited in another element. The community's regulatory language is reviewed by FEMA to determine the credit points.

Examples of submittals that have been credited include

- Requiring that all non-residential buildings be elevated (i.e., not allowing any new buildings to be floodproofed) (10 points).
- Requiring all new subdivisions to provide streets that will be no more than six inches under water during the base flood (10 points).

- Restricting enclosures in A Zones below elevated floors to less than 300 square feet (25 points).
- Prohibiting habitable structures in areas where the product of depth times velocity is greater than 18 (25 points).
- Prohibiting residential structures and substantial improvements in floodways (25 points). If ALL structures and filling were prohibited, more credit would be provided under Activity 420 (Open Space Preservation).

Records Needed for Verification

The records needed will depend on the regulatory requirement. Usually permit records, including site plans, will show how the other regulatory standard is being enforced.

j. Land Development Criteria (LD)

Most communities have undeveloped areas that are not preserved as open space. However, there are many tools that can encourage the owners to keep the floodplain open when a site is developed. 430LD (Land Development Criteria) provides credit for those tools—it recognizes regulations that minimize construction of buildings in the floodplain.

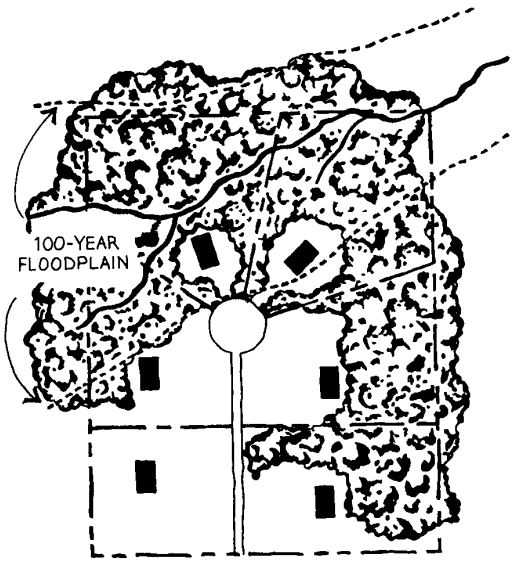
There are two parts to LD:

- LDC—Land development criteria that encourage developers to avoid or minimize development in floodplains.
- LZ—Low density zoning credit for limiting development to no more than one building per acre.

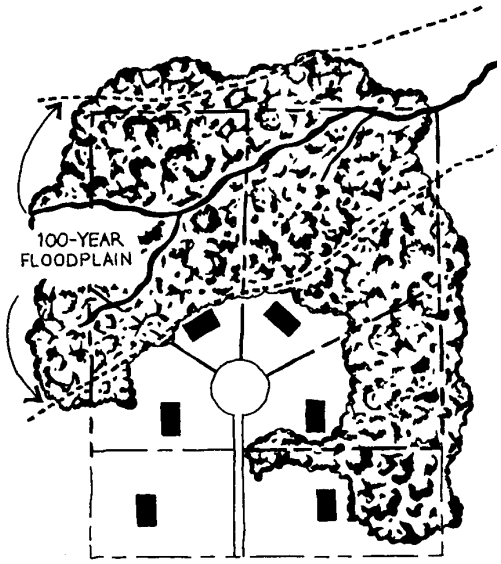
Land Development Criteria (LDC)

There is a variety of approaches to avoid or minimize the number of buildings allowed in a floodplain that would be credited under this element. *Subdivision Design in Flood Hazard Areas* (see page 64) describes the following:

- Density transfers,
- Transfers of development rights (TDRs),
- Bonuses for avoiding the floodplain,
- Open space subdivision design,
- Mandating more than one site plan, one of which must avoid the floodplain entirely,
- Planned unit development (PUD),
- Cluster development,
- Greenway and setback rules, and
- Open space ratio credits for open space in the floodplain.



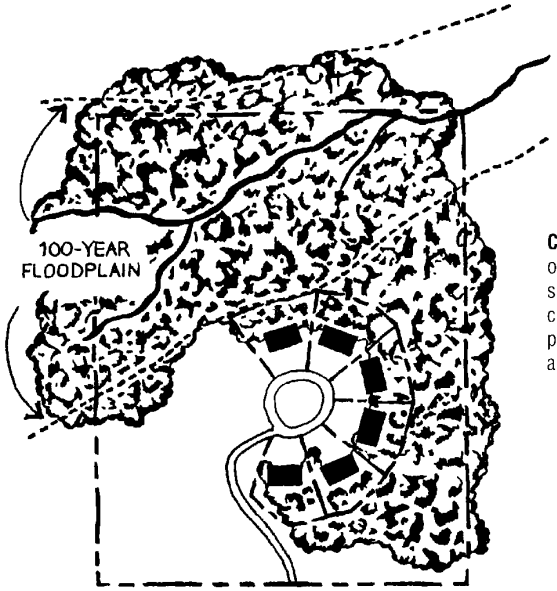
CONVENTIONAL PLAN A



CONVENTIONAL PLAN B

Conventional Plan A: All land on site is subdivided into lots; some lots partially or entirely in floodplain; some homesites in floodplain.

Conventional Plan B: All land on site is subdivided into lots; some lots partially in floodplain; homesites restricted to natural high ground; setbacks and sideyard restrictions modified to accommodate structures out of floodplain.



Cluster Plan: All floodplain lands and other sensitive lands kept as open space; net density remains equal to conventional plans; lot sizes reduced to protect natural features; all homesites are on natural high ground.

CLUSTER PLAN

Examples of subdivisions that avoid floodplain development.
Source: *Subdivision Design in Flood Hazard Areas*, page 19.

These approaches may be administered differently, but they can have a similar result: developers are required, encouraged, or rewarded for keeping buildings out of floodprone areas. Buildings, streets, and other damage-prone infrastructure are grouped on high ground (or the area of shallowest flooding) while the more hazardous floodplain is used for open space or recreational land.

These regulations do not have to be enacted for floodplain management purposes. Many communities have adopted them for farmland preservation, protection of sensitive areas, and even for economic reasons. For example, developments such as the example cluster plan on the previous page have shorter streets, resulting in lower maintenance, cleaning, and snow plowing costs for the community.

If a community's program uses an approach to minimize the amount of development or disturbance in the floodplain that is not described here, it should be submitted to the ISO/CRS Specialist for scoring. If a community's regulatory program effectively prohibits new buildings from the floodplain, the community should apply for open space preservation credit under Activity 420.

NFIP Requirement

There are no requirements in the NFIP regulations that specify land development criteria, although the NFIP encourages avoidance of the floodplain.

Scoring (maximum credit: 100 points)

1. Prerequisite: The community must have vacant floodprone areas where the regulations will have a benefit. A community with a completely developed regulatory floodplain is not eligible for this credit.

2. LDC is the total of the following points:

   (a) 100, if the regulations require new subdivisions and other development to set aside all floodprone lands as open space, drainage or flowage easements, or back yards, or otherwise keep them free from development. This credit is pro-rated based on the percentage of floodplain kept open by the regulations.

   (b) 75, if the regulations require that each lot in a new subdivision provide a building site that is on natural high ground, out of the regulatory floodplain. This credit is not provided if filling the floodplain (or cutting and filling) is allowed to meet the building site requirement.

(c) 50, if the regulations provide for incentives, such as density transfers, bonuses, or other mechanisms to encourage developers to avoid developing in the regulatory floodplain.

(d) 25, if the regulations require developers to submit more than one site plan and one of those alternative plans must keep buildings out of the regulatory floodplain.

(e) 10, if the community's zoning or subdivision regulations allow cluster development or other alternatives to traditional subdivision patterns.

(f) 10, if the community has a land use plan that recommends open space use or low density development of floodprone areas.

To qualify for this credit, the community must have vacant floodprone areas where the regulations will have a benefit. A community with a completely developed regulatory floodplain is not eligible for LDC credit.

Records Needed for Verification

Because this credit is for ENCOURAGING developers to avoid the floodplain, some developments will not participate and permit records will not reflect the regulatory language. Records of plan commission meetings or other reviews that show that the developer was encouraged to pursue the benefits of staying out of the floodplain should be provided.

Low Density Zoning (LZ)

Low density zoning, like open space preservation, reduces the potential for flood damage by limiting the amount of development in the floodplain. It can also enhance natural and beneficial functions and maintain floodplain storage capacity.

Under this element, credit is provided for limiting development to no more than one building per acre. The credit increases as the allowable density decreases to one building per 10 acres. This credit is available for undeveloped land within low density zoning districts as well as for areas that are already developed in accordance with the density requirements.

Zoning an area for agriculture, conservation, or large residential lots preserves more open space than allowing more intensive development. For this element, it does not matter why an area is zoned for low density; what counts is the minimum lot size allowed in the zoning district. The credit is based upon the traditional zoning approach of setting minimum lot sizes for different zoning districts. The bigger the lot size, the less dense the floodplain development.

NFIP Requirement

There is no requirement in the NFIP regulations related to the density of land development.

Scoring (maximum credit: 600 points)

Up to 600 points is given for low density zoning. Credit is given for those portions of the floodplain subject to zoning rules that require a minimum of 1 acre per building or unit. Maximum credit is provided for a 10-acre or larger minimum lot size.

s = the minimum lot size in acres.

LZs = 60 x s

Credit is given for those portions of the floodplain subject to zoning rules that require a minimum of 1 acre per building or unit. Maximum credit is provided for a 10-acre or larger minimum lot size. In agricultural zones, the requirement may be calculated in terms of one residence per lot instead of one building per lot.

For credit calculation, density is measured in terms of acres per building. A zoning district with a minimum lot size of 2 acres allows a density of 2 acres per building. In this example, s = 2, so LZ2 = 60 x 2 = 120. The area would be designated "LZ2" on the Impact Adjustment Map and the total points would be pro-rated based on how much of the floodplain is zoned for 2 acres per building.

A minimum lot size required by a public health ordinance for septic tanks is not counted toward low density zoning. For example, an area with a zoning density of five structures per acre, where development is restricted due to lack of a sanitary sewer, may develop to its full potential if a sewer is installed. Credit is limited to areas that actually have a legal restriction on the density of development.

Except in areas zoned for single-family residential use, lot coverage must not exceed 10%, including buildings and fill. An industrial subdivision might allow only one structure per acre, but it might allow 90% lot coverage. This type of development would not meet the objectives of CRS credit for low density zoning.

Example Regulatory Language

There are a variety of low density zones in many zoning ordinances. These may be conservation, agricultural, floodplain, "rural residential," "rural estates," or other zoning districts. The key part of the ordinance is the section on density or number of dwelling units per acre. Often this appears in a table or matrix that lists all the zones and the various setback, bulk, and density requirements for each.

Records Needed for Verification

Final plats for subdivisions would show the density of allowed development. The ISO/CRS Specialist will tour the floodplain to verify that actual construction has not exceeded the zoning ordinance's criteria.

k. Special Hazards Regulations (SH)

CRS credit is provided for regulations that protect future development from seven special hazards:

- Closed basin lakes
- Ice jams
- Coastal erosion
- Land subsidence
- Mudflow hazards
- Tsunamis
- Uncertain flow paths (e.g., alluvial fans, moveable bed streams and other floodplains within which the channel moves during a flood)

The credit is detailed in publications identified in Appendix E of the *CRS Coordinator's Manual*. The points are transferred to the formula for Activity 430.

l. State-Mandated Regulatory Standards (SMS)

This element recognizes the benefit received by the NFIP for a state-required measure that is implemented in both CRS and non-CRS communities in that state. State-mandated regulations also benefit from better training for the staff and better state oversight than other regulatory provisions.

NFIP Requirement

There is no requirement in the NFIP regulations related to state standards, although the NFIP encourages active state programs and more restrictive state standards.

Scoring (maximum credit: 45 points)

The credit is the sum of 10% of the verified points the community receives for the regulatory standard (before the impact adjustment) and any credit for insurance agent training.

Credit is the sum of the points under 1 and 2, below.

1. Floodplain management regulatory standards (maximum credit: 25 points):

   0.1 x the equivalent credit for each state-mandated regulation credited in the 400 series of CRS activities.

2. Insurance agent training (maximum credit: 20 points):

   (a) 5, if the state mandates that property insurance agents must attend at least one hour of training per year on flood insurance as a condition of obtaining or maintaining their licenses;

   (b) 10, if the mandate is for two hours of flood insurance training; or

   (c) 20, if the mandate is for three or more hours of flood insurance training.

The credit applies differently to different communities within a state, depending on the requirement. For example, only coastal communities receive SMS credit for a state requirement for a coastal setback line. The ISO/CRS Specialist is the best source of information on the SMS credit for a particular community.

Each submittal for credit is individually reviewed and scored with a value of 1 to 25 points. There is no credit if the activity is not verified locally. Examples of possible submittals include, but are not limited to

- State-mandated freeboard (10% of the community's score for FRB)
- State floodway mapping standards (10% of the score for elements in Activity 410 (Additional Flood Data)
- State coastal setback regulations (10% of the credit under Activity 420 for preserving for open space along the coast)

Example Regulatory Language

Because the credit is for mandated state regulatory standards, communities cannot adopt new regulatory language. The community must already have the standard incorporated in its ordinance. If the community has the option of adopting a state standard, it is not eligible for credit.

Records Needed for Verification

The statutory or state regulatory requirement documents the state mandate and the 10% multiplier. The community must receive credit for the initial element. That is verified independently.

EXAMPLE: A state requires 1 foot of freeboard. The ISO/CRS Specialist has a copy of the statute. When freeboard is verified, the ISO/CRS Specialist reviews the records described on page 16 and will verify the credit. The 10% SMS multiplier is multiplied by the verified score for freeboard.

The credit for insurance agent training is verified at the state level. All communities in the state receive the credit.

m. Building Code (BC)

FEMA and the insurance industry have found that communities with building codes have better mitigation programs than those that do not have them. New construction is better protected from natural hazards and local regulatory programs are better managed.

CRS provides credit for building codes in two ways: crediting the community's Building Code Effectiveness Grading Schedule (BCEGS) classification and recognizing communities that have adopted the current International Building Code series (I-Codes).

BCEGS was developed and is operated by the Insurance Services Offices, Inc. (ISO), the same organization that verifies community CRS activities. After it evaluates a community's building code and enforcement activities, ISO assigns each community a BCEGS grade of 1 (best) to 10 (no recognized program). When a smaller community's code enforcement program is administered by a larger jurisdiction, the smaller community will receive the larger jurisdiction's classification.

There are two ratings for each jurisdiction, commercial and personal (residential). If they are different, this CRS element's credit is based on the lower of the two ratings. For example, if a community has a class 6 commercial BCEGS rating and a class 5 residential rating, the CRS considers it a class 6 BCEGS community.

I-Codes: The International Building Code series (I-Codes) addresses the administrative, building, and manufactured housing provisions of the NFIP. Appendix G of the I-Codes includes the non-building provisions of the NFIP requirements. They also have provisions for other natural hazards, such as earthquakes, high winds, and severe winter storms.

Because of the advantages of incorporating the I-codes into the community's floodplain management program and addressing other hazards, the CRS provides up to 60 points for adoption of the complete series. Adoption of Appendix G is optional for CRS credit, provided the community has other regulations that meet all the NFIP requirements.

NFIP Requirement

There is no NFIP regulation that a community have a building code.

Scoring (maximum credit: 190 points)

There are two bases for credit under this element: the community's BCEGS classification and whether all or portions of the I-Code have been adopted. The scores are added for the total points for BC.

The credit is the sum of 1 and 2:

1. 15 x (7 – BCEGS) where BCEGS is the class attained by the community under the Building Code Effectiveness Grading Schedule. There is no credit for BCEGS classes 7, 8, 9, or 10.

The first credit is determined by subtracting the BCEGS class from 7 and multiplying the result by 15. There is no credit for BCEGS classes 7, 8, 9, or 10. For example, if a community has a BCEGS class 4, BC = 15 x (7 – 4) = 15 x 3 = 45.

2. Up to 100 points for adopting the complete set of the codes. This credit is the sum of the following points:

   (a) 40, if the community has adopted the current edition of the International Building Code, the National Fire Protection Association's Building Construction and Safety Code (NFPA 5000), or their equivalent.

   (b) 40, if the community has adopted the current edition of the International Residential Code, the National Fire Protection Association's Building Construction and Safety Code (NFPA 5000), or their equivalent.

   (c) 20, if the community has adopted the current edition of all of the following codes (or their equivalent):

   (1) International Plumbing Code or Uniform Plumbing Code,

   (2) International Mechanical Code or Uniform Mechanical Code,

   (3) International Fuel Gas Code, and

   (4) International Private Sewage Disposal Code

Because of the advantages of incorporating the I-Codes into the community's floodplain management program and addressing other hazards, the CRS provides up to 100 points for adoption of the complete series. To receive full credit, the entire code must be adopted by the community. If the following sections are not adopted (or are adopted with amendments), the language will be reviewed to determine the credit:

- International Building Code: Chapters 3–7, 14–18, and 21–24.
- International Residential Code: Chapters 3–6, 8, and 9.

Example Regulatory Language

Because the credit is based the community's BCEGS classification and adopting the International Building Code series or its equivalent, this element does not have example regulatory language.

Records Needed for Verification

Records are not needed for CRS credit for the community's BCEGS classification. ISO has already verified the class. Credit for the building codes is verified by a review of the codes adoption ordinance and permit files that show the codes are being enforced.

n. Staffing (STF)

This element recognizes the benefit of having staff trained in floodplain management. Credit is provided if the person responsible for floodplain permits has graduated from the "Managing Floodplain Development through the National Flood Insurance Program" course taught at FEMA's Emergency Management Institute (EMI), the five-day field-deployed version of this course, the home study version, or other equivalent training.

More information on this course can be obtained from the Emergency Management Institute (800/238-3358) or the state emergency management agency's training office. EMI courses are also explained at http://training.fema.gov/EMIWeb/. Coastal communities' staff may be credited for graduating from the EMI "Residential Coastal Construction Course."

The Association of State Floodplain Managers (ASFPM) and several states have created floodplain manager certification programs with requirements similar to the Emergency Management Institute course graduation criteria. More points are available if staff members have been certified by ASFPM or by a state certification program that has been accredited by ASFPM, because they have a continuing education requirement.

This credit is removed if the staff person leaves the community or does not maintain his or her certification.

NFIP Requirement

There is no requirement in the NFIP regulations that a community have staff that is trained to a certain level.

Scoring (maximum credit: 50 points)

The credit can vary from 5 points to a maximum of 50 points, depending on staff training and certification:

1. 50, if all staff involved in reviewing plans and issuing permits for floodplain development or conducting field inspections are certified floodplain managers (CFMs); or

2. 25, if all proposed development projects in the floodplain and all final inspections and project approvals are reviewed and approved by a CFM; or

3. 5, for each CFM or graduate of an approved course on managing floodplain development through the NFIP employed in the office that regulates floodplain development. The maximum credit for this item is 25 points. If a CFM also graduated from the NFIP course it is counted once as 5 points.

Credit for the first two items is dependent on Certified Floodplain Managers' being directly involved in permit review. A CFM must review each project in the floodplain before it is permitted and must conduct an inspection or review inspection reports before a certificate of occupancy is issued. The CFM may be a consultant, employee of a regional agency, etc., as long as no floodplain development project is used or occupied without his or her review and approval.

If the head of the regulatory office is (1) responsible for all permits issued, (2) is a CFM, and (3) establishes procedures that ensure that all floodplain development projects are properly constructed, then the community would qualify for the 25 points under item 2. Otherwise, if some members of the regulatory staff are CFMs, but some floodplain development projects are approved by non-CFMs, then five points is provided for each CFM on staff.

The credit for training is based on the number of courses taken. If two people take the "Managing Floodplain Development" course, it is worth 10 points, the same credit provided if one person took both the "Managing Floodplain Development" and coastal construction courses.

Records Needed for Verification

If credit is based on graduation from an Emergency Management Institute course, a copy of the certificate of graduation must be provided. It should be noted that an Emergency Management Institute certificate of ATTENDANCE is not sufficient. A CERTIFICATE OF GRADUATION is provided only if the student passes the final examination.

Credit for staff members' CFM status is verified with the Association of State Floodplain Managers.

o. Manufactured Home Parks (MHP)

An "existing manufactured home park or subdivision" is a park or subdivision that was established before the adoption of floodplain management regulations by the community. The minimum criteria of the NFIP allow communities to site manufactured homes in existing manufactured home parks or subdivisions so the lowest floor is 3 feet above grade.

In some cases this results in manufactured homes' being elevated above the base flood elevation, but where flooding is deeper than 3 feet, it exposes them to substantial damage. This element credits regulations that do not differentiate between manufactured homes and

conventional "stick built" buildings or between existing and new manufactured home parks and subdivisions—all must be elevated above the base flood elevation (plus the community's freeboard).

This credit is limited to those communities that have existing manufactured home parks where the base flood is more than 3 feet deep. In other words, the credit is only for those communities where these regulations will have an impact.

NFIP Requirement

The NFIP regulations (44 *CFR* 60.3(c)(12)) allow communities to site manufactured homes in existing manufactured home parks or subdivisions on reinforced piers or other foundation elements that are not less than 36 inches above grade. Manufactured housing located OUTSIDE existing parks or subdivisions must be elevated above the base flood elevation.

Scoring (maximum credit: 50 points)

1. Prerequisites:

   (a) The community has one or more existing manufactured home parks or subdivisions in its regulatory floodplain; and

   (b) Base flood elevations are greater than 3 feet deep in the parks or subdivisions.

2. MHP = 50, if regulations require that new and replacement manufactured homes placed in existing manufactured home parks or subdivisions be properly anchored and elevated to or above the base flood elevation plus any required freeboard.

Example Regulatory Language

Credit is provided not for having special regulatory language, but for allowing no exemption for existing manufactured home parks or subdivisions. In other words, the community's ordinance makes no mention of manufactured home parks or subdivisions and all manufactured homes, no matter where they are located, must meet the same elevation requirements of conventional housing.

Such ordinance language was a requirement of the NFIP before 1989. When communities were given the option of the 3-foot standard, many kept the higher standard and did not revise their regulations.

The creditable language is also included in the new International Building Code. Therefore, it is possible that a community's current ordinance already has the language that is credited by this element.

Records Needed for Verification

The prerequisites are verified by a review of flood elevation data in existing manufactured home parks or subdivisions. The elevation of individual manufactured homes is verified by a review of the FEMA Elevation Certificates for them.

p. Coastal AE Zones (CAZ)

FEMA concluded that its criteria for construction in A Zones do not provide adequate protection in Coastal AE Zones subject to wave effects, velocity flows, erosion, scour, or combinations of these forces. Wave tank studies conducted by FEMA show that breaking waves less than 3 feet high (the criterion used to designate VE Zones) can cause considerable damage.

Post-disaster evaluations and insurance claims data also support this conclusion, particularly for those buildings with enclosures below the elevated floor. FEMA's new *Coastal Construction Manual* strongly encourages use of some or all of the VE Zone construction methods in Coastal AE Zones, depending on the hazard.

NFIP Requirement

The minimum coastal construction requirements are limited to mapped V Zones in 44 *CFR* 60.3(e). This credit is for adopting and enforcing those requirements farther inland.

Scoring (maximum credit: 650 points)

1. A maximum credit of 650 points is available to communities that meet the following prerequisites:

   (a) The community must have a coastal floodplain on the Atlantic, Gulf of Mexico, Pacific, or Great Lakes coasts.

   (b) This credit is not available in a V Zone because it credits regulatory standards that are minimum NFIP requirements for V Zones.

   (c) The community must map or otherwise designate its Coastal AE Zone. The Coastal AE Zone is the coastal SFHA that is not mapped as V Zone. A community may declare all of its coastal SFHA inland from the V Zone as Coastal AE Zone (as may be the case for a barrier island) or it may use some other standard, such as identifying all areas where breaking waves are more than 1 foot high.

2. The credit for this element is in addition to the community's credit for enclosure limits (ENL) under Section 431.h.

(a) 500, if all new buildings in the Coastal AE Zone must meet the requirements for buildings in V Zones and for openings in A Zones (44 *CFR* 60.3(e) and 60.3(c)(5)). If only some of the V-Zone regulations are enforced in the Coastal AE Zone, the points are prorated according to the following schedule:

(1) 225, if all of the following V-Zone foundation standards (found in 44 *CFR* 60.3(e)) are required by the community:

((a)) New construction and substantial improvements are elevated on piles and columns (60.3(e)(4));

((b)) The pile or column foundation and the structure attached thereto are anchored to resist floatation, collapse, and lateral movement due to the effects of wind and water loads (60.3(e)(4)(ii));

((c)) New construction and substantial improvements have the space below the lowest floor free of obstruction or enclosed with non-supporting breakaway walls, open lattice-work, or insect screening (60.3(e)(5)), and have openings (60.3(c)(5)); and

((d)) Use of fill for structural support is prohibited (60.3(e)(6)).

(2) 100, if the bottom of the lowest horizontal structural member and the electrical and mechanical equipment servicing the building must be elevated to or above the base flood elevation (60.3(e)(4)(i)).

(3) 125, if a registered professional engineer or architect must develop or review the structural design and the methods of construction to be used meet accepted standards of practice for meeting the provisions of (60.3(e)(4)(i)) and breakaway walls (60.3(e)(5)).

(4) 25, provided all new construction is located landward of the reach of mean high tide (60.3(e)(3)). These points are available only if the designated area includes a shoreline.

(5) 25, if the community prohibits the human alteration of ANY sand dunes or mangroves that would increase flood damage (60.3(e)(7)). These points are available only if the designated areas include sand dunes or mangroves.

(b) Either

(1) 150, if regulations prohibit any building enclosures, including solid breakaway walls, below the base flood elevation; or

(2) 50, if regulations prohibit enclosures of areas greater than 300 square feet, including breakaway walls, below the base flood elevation. The area enclosed must still meet all NFIP requirements for openings, anchoring, and flood-resistant materials.

Example Regulatory Language

Most coastal communities already have language for construction in the V Zone. For this credit, the definition of the area subject to V-Zone requirements would include areas further inland, e.g., “all lands seaward of Ocean Boulevard” or “all Special Flood Hazard Areas where the breaking waves are higher than 1 foot.” Care must be taken to ensure that the A-Zone requirement for openings (44 *CFR* 60.3(c)(5)) still applies to the Coastal A Zone.

Regulatory language for ENL credit is discussed on page 39. CAZ credit is a multiplier of ENL credit, so additional regulatory language is not needed.

Records Needed for Verification

In addition to the ordinance language, the permit office will need to show how the Coastal AE Zone requirements are enforced. The explanation should include elevation certificates, V-Zone certificates, site plans, and as-built surveys. The ISO/CRS Specialist will conduct a field check of new construction, as is done for other credit such as enclosure limits (ENL).Unless the entire regulatory floodplain is subject to Coastal AE Zone regulations, a map showing the regulated area will be needed.

432 Impact Adjustment

The objective of the impact adjustment is to modify the credit points for an element that does not cover all of the community's flood problem. For Activity 430, the flood problem is considered to be the regulatory floodplain. The regulatory floodplain is the SFHA shown as A and/or V Zones on the FIRM and any areas outside the SFHA that are subject to floodplain regulations. In most communities the regulatory floodplain is the SFHA.

The impact adjustment reduces an element's credit points if it is not enforced throughout the floodplain. It also allows accurate scoring where different areas of the floodplain are subject to different regulatory standards. For example, a community could have different requirements for freeboard in coastal floodplains than it does in riverine floodplains, or different requirements for residential and non-residential buildings.

There is no impact adjustment for four elements:

- State-mandated regulatory standards (SMS),
- Building code (BC),
- Staffing (STF), and
- Manufactured home parks (MHP).

A community has three options for determining the values of the impact adjustment ratio. A community may use one option for some elements and another option for other elements. Options may not be mixed within an element.

a. Option 1

In most communities, most regulatory standards are enforced uniformly throughout the SFHA or the regulatory floodplain. Properties in different locations are not treated differently. In these cases, Option 1 should be used for the impact adjustment. Under Option 1, the credit points for an element are multiplied by 1.0, i.e., there is no reduction in credit points.

If a community applies for credit for Activity 420 (Open Space Preservation), it is saying that certain areas are preserved from development. Higher regulatory standards have no impact in those open space areas. Therefore, the impact adjustment ratios for these elements cannot be 1.0. The area affected by a regulatory standard must exclude all areas designated as open space that are receiving OS credit under Activity 420 (Open Space Preservation).

For example, if a community enforces its freeboard requirement throughout the regulatory floodplain, then the impact adjustment for FRB is 1.0.

If the community applied for open space credit under Activity 420 and showed that 20% of the floodplain is open space, the impact adjustment for that element is 0.2. The resulting

Option 1 impact adjustment for FRB is 1.0 – 0.2 = 0.8. In this example, the impact adjustment reflects the fact that 20% of the floodplain is open space so freeboard has no impact on future development.

b. Option 2

Where the higher regulatory standard is enforced in only some of the regulatory floodplain, the community must use either Option 2 or Option 3. These two options provide an impact adjustment of less than 1.0 because the element does not affect the entire floodplain.

Option 2 provides an automatic or default value for the impact adjustment. In this activity, the default value is 0.25 (except for CAZ, which is 0.1). This means that no matter how large or small an area is covered by the regulatory standard, the credit points assume that 25% of the floodplain is affected. There is no modification to the impact adjustment if the community is receiving OS credit for preserving open space.

Option 2 is often used when a community does not want to calculate the areas affected using Option 3 or when the area affected is less than 25% of the floodplain. In the former case, the ISO/CRS Specialist can help figure an estimated value for Option 3 at the verification visit.

c. Option 3

Option 3 provides the most accurate impact adjustment for those elements that do not cover the entire floodplain. The impact adjustment ratio is calculated by dividing the area that the element affects by the area of the regulatory floodplain. Option 3 calculations can be estimated by the ISO/CRS Specialist and agreed to by the community.

Where an element applies differently to different areas, the impact adjustment ratios for each area must be computed separately. As with Option 1, the area affected by a regulatory standard must exclude areas designated as open space that are receiving credit under Activity 420 (Open Space Preservation).

Freeboard Example

It is not uncommon for an ordinance to require freeboard only for elevated buildings. Because there is no freeboard requirement for floodproofed buildings, the credit is reduced under the impact adjustment. There are two impact adjustments possible when freeboard is not required for all new buildings: Options 2 and 3.

Under Option 2 the value for FRB is multiplied by 0.25 and the result is 25% of the full credit.

If the community can show that more than 25% of its floodplain will be developed with residential buildings (where elevation is required), then it can use the Option 3 impact adjustment to receive more than 25% credit.

For example, if the community's zoning ordinance shows that 80% of the floodplain is zoned for residential use, 10% is zoned commercial, and 10% is public parks and other preserved open space, then the freeboard is in effect in 80% of the floodplain. The impact adjustment will result in 80% credit instead of 25% credit.

433 Credit Calculation

In this section, the credit points for each element are multiplied by its impact adjustment. The resulting values are then added with the special hazards credit to produce the total score for Activity 430.

Using the freeboard example above, 2 feet of freeboard receives 200 points. Since the requirement only affects 80% of the regulatory floodplain, the actual credit is 200 x 0.8 = 160 points.

434 Credit Documentation

For a community's first application for a CRS classification, worksheet pages 29 and 30 of the *CRS Application* are submitted along with the documentation described below.

Subsequent requests for credit are called modifications. Modifications include the activity worksheets AW-430, AW-431, and AW-432, along with the documentation described below. These worksheets are also used by the ISO/CRS Specialist to calculate the community's verified credit.

A community may also opt to use the *CRS Calculation Software,* which calculates the points and prints the worksheets. The *CRS Application,* the software and the paper activity worksheets can be ordered using the form in Appendix E of the *Coordinator's Manual* (or by contacting the office listed on the inside of the front cover of this publication).

Section 434 on the *CRS Application* worksheet page 30 and on AW-432 is a checklist for the documentation needed in addition to the worksheet. One item is needed with an application or modification—a copy of the regulatory language. Up to three other items are needed for the verification visit.

If a modification includes a request for credit for land development criteria or low density zoning, then AW-430LD, AW-431LD, and AW-432LD are submitted. If a modification includes a request for credit for one of the special hazards, then the activity worksheets for that special hazard are used. The special hazards worksheets are found at the end of the publication on each hazard.

a. Copy of Regulatory Language

In order to verify the community's activity, the community must submit a copy of the state or local law or ordinance language that adopts the regulatory standard. A photocopy of the appropriate page(s) of the ordinance is sufficient and should be attached to the activity worksheet. The appropriate acronym(s) (FRB, FDN, etc.) must be marked in the margins of the sections of the ordinance that apply to the element. An example of this appears on the next page.

For CRS credit, the regulatory language must be adopted and in full force at the time of the CRS application. The Chief Executive Officer's application certification is considered to include a certification that the ordinance or statute has been enacted and is being enforced (see Section 212.a in the *Coordinator's Manual*).

• • •

(d) Structures and all improvements to the land or to a structure shall be designed to cause the least possible impediment to the flow of floodwater and debris.

(e) No outdoor storage of such material shall be permitted which would tend to be floated by floodwaters and cause obstructions downstream.

PSC

(f) Any reduction in the water-holding capacity of the floodplain caused by any structures, improvements to the land or to a structure, filling or regrading of land shall be compensated for such that no increase in water surface elevation nor increase in peak discharge or velocity shall occur either upstream of downstream of the development site, for all storm events up to and including the one-hundred-year storm.

(g) The standards as set forth in Sections 60.1, 60.2 and 60.3 and the variance procedure as set forth in Section 60.6 of the Rules and Regulations of the National Flood Insurance Program, Title 44 of the Code of Federal Regulations, as may be amended from time to time, are incorporated herein by reference.

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An example of how to mark regulatory language (PSC = 70)

b. Impact Adjustment Map

The other items of documentation that are needed are not sent in with the application. Instead, they are made available to the ISO/CRS Specialist during the verification visit. If the community wants to use Option 3, it must have an Impact Adjustment Map. Each area for which an impact adjustment ratio is calculated must be designated on the Impact Adjustment Map and in the map's key. Preparing an Impact Adjustment Map is explained in Section 403 of the *Coordinator's Manual*.

If the community wants help on the Impact Adjustment Map and it does not need a lot of points from this activity for a modification to produce a class change, then it may want to use Option 2 for its submittal. During the verification visit, the ISO/CRS Specialist can help prepare the map and calculate the verified credit points under Option 3.

c. Enforcement Procedures

During the verification visit, the community will need to explain the procedures it follows for enforcing each regulatory standard and also will need to produce permit records. Enforcement can be accomplished by denying a certificate of occupancy when the final inspection finds noncompliance. However, this approach is often not as effective in correcting a problem because the building is already built. Periodic inspections during construction and correcting violations before the building is completed are more effective approaches.

Each element is reviewed differently. For example, low density zoning is verified with a field trip to a sample of the low density districts.

Examples of the types of records that are needed are discussed on the previous pages for each element under the section entitled "Records Needed for Verification."

d. Staff Training

If the community is applying for credit under Staffing (STF) for having trained or certified staff, it needs to provide documentation. This could include the graduation certificate from the Emergency Management Institute, the home study course, or other FEMA-approved equivalent NFIP training.

If a staff member qualified as a Certified Floodplain Manager, no local documentation is needed. The ISO/CRS Specialist confirms the certification by checking directly with the Association of State Floodplain Managers.

435 For More Information

a. Most State NFIP Coordinating offices have prepared model ordinances with provisions that exceed the minimum NFIP standards. More help on regulatory provisions may be available from state planning or community affairs agencies and regional planning commissions.

b. The following documents are available from FEMA Publications by calling 800/480-2520 or faxing a request to 301/362-5335.

- *User's Guide to Technical Bulletins*, FIA-TB-0, 1993. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/guide01.pdf).
- *Openings in Foundation Walls*, FIA-TB-1, 1993. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/job2.pdf).
- *Flood-Resistant Materials Requirements*, FIA-TB-2, 1993. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/job2.pdf).
- *Non-Residential Floodproofing—Requirements and Certification*, FIA-TB-3, 1993. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/job6.pdf).
- *Elevator Installation*, FIA-TB-4, 1993. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/job8.pdf).
- *Free-of-Obstruction Requirements*, FIA-TB-5, 1993. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/job10.pdf).
- *Below-Grade Parking Requirements*, FIA-TB-6. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/job12.pdf).
- *Wet Floodproofing Requirements*, FIA-TB-7, 1993. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/job14.pdf).
- *Corrosion Protection for Metal Connections in Coastal Areas*, FIA-TB-8, 1996. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/corr.pdf).
- *Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Building*, FIA-TB-9, 1999 (Also available from FEMA's website at http://www.fema.gov/pdf/fima/job15.pdf).
- *Ensuring That Structures Built on Fill in or near Special Flood Hazard Areas Are Reasonably Safe from Flooding*, FIA-TB-10, 2001 (Also available from FEMA's website at http://www.fema.gov/pdf/fima/tb1001.pdf).
- *Crawlspace Construction for Buildings Located in Special Flood Hazard Area*, FIA-TB-11, 2001. (Also available from FEMA's website at http://www.fema.gov/pdf/fima/tb1101.pdf).
- *Answers to Questions about Substantially Damaged Buildings*, FEMA-213, May 1991. (Also available from FEMA's website at http://www.fema.gov/hazard/flood/pubs/lib213.shtm).

- *Reducing Losses in High Risk Flood Hazard Areas—A Guidebook for Local Officials*, FEMA-116, 1987.
- *Increased Cost of Compliance Coverage: Guidance for State and Local Officials*, FEMA, 2003.
- *Coastal Construction Manual*, FEMA-55, Third Edition, 2000 (available in three-volume hard copy or on CD) http://www.fema.gov/pdf/plan/prevent/nhp/nhp_fema55.pdf
- Protecting Building Utilities from Flood Damage, FEMA-348, 2000. (Also available from FEMA's website at http://www.fema.gov/hazards/floods/pbuffd.shtm.)
- *National Flood Insurance Program (NFIP) Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials*, FEMA 480, February 2005. (Also available from FEMA's website at http://www.fema.gov/plan/prevent/floodplain/fm_sg.shtm.)

c. FEMA's regulations can be found at http://www.access.gpo.gov/nara/cfr/waisidx_99/44cfrv1_99.html

   The NFIP regulations for communities are in parts 59 through 73. The primary regulations for local floodplain management are in parts 59 and 60.

d. The following can be ordered free from the office listed on the inside of the front cover:

   Special Hazards Supplement to the CRS Coordinator's Manual
   CRS Credit for Management of Coastal Erosion Hazards
   CRS Credit for Management of Tsunami Hazards

e. The Emergency Management Institute is a FEMA training center located in Emmitsburg, Maryland. Stipends to cover travel, registration, and rooms are usually available from FEMA. For more information, call EMI at 800/238-3358 or contact the state emergency management agency's training office.

f. More information on building codes, including the International Codes, can be obtained from the International Code Council (founded by the three former national model code organizations) and from the other code organizations. Contact information is listed below.

   International Code Council
   5203 Leesburg Pike, Suite 600
   Falls Church, VA 22041-3401
   (888) 422-7233
   Fax: 703-379-1546
   http://www.iccsafe.org

National Fire Protection Association
1 Batterymarch Park
Quincy, Massachusetts 02169-7471
(617) 770-3000
Fax: 617-770-0700
http://www.nfpa.org

The International Association of Plumbing and Mechanical Officials (IAPMO)
5001 E. Philadelphia St.
Ontario, CA 91761
(909) 472-4100
Fax: 909-472-4150
http://www.iapmo.org

g. *Reducing Flood Losses through the International Code Series*, 2000, was published jointly by the model code organizations, FEMA, the Association of State Floodplain Managers, and the American Society of Civil Engineers. Hard copies can be ordered for $15.00 from the International Code Council at http://www.iccsafe.org/dyn/prod/7320S1.html. It can also be downloaded free from http://www.fema.gov/hazard/flood/pubs/fldlossesb.shtm

h. For more information on floodplain manager certification, contact the Association of State Floodplain Managers at (608) 274-0123 or http://www.floods.org.

i. *Subdivision Design in Flood Hazard Areas*, Planning Advisory Service Report # 473. Copies can be ordered for $32 from

American Planning Association
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Appendix A. NFIP Requirements and CRS Credits

The Community Rating System provides credits for exceeding the minimum requirements of the National Flood Insurance Program (NFIP). Many local officials are not sure whether their regulations exceed the NFIP requirements or just meet them. The minimum NFIP requirements for communities are spelled out in 44 *CFR* Parts 59–General Provisions and 60–Criteria for Land Management and Use. This Appendix compares these minimum requirements with specific CRS credits.

NFIP Requirement	**Related CRS Credit**
Part 59 General Provisions	
Subpart A - General	
59.1 Definitions	"Exceeding" the definitions for substantial improvement and substantial damage is recognized in Sections 431.c and d which credit cumulative substantial improvements (CSI) and lower substantial improvement thresholds (LSI).
59.2 Description of program	N/A
59.3 Emergency program	N/A
59.4 References	N/A
Subpart B - Eligibility Requirements	N/A
Part 60 - Criteria for Land Management and Use	
Subpart A - Requirements for Flood Plain Management Regulations	
60.1 Purpose of subpart	
(c) "Nothing in this subpart shall be construed as modifying or replacing the general requirement that all eligible communities must take into account flood, mudslide (i.e., mudflow) and flood-related erosion hazards, to the extent that they are know, in all official actions..."	In other words, the NFIP expects communities to exceed the minimum requirements.

NFIP Requirement	Related CRS Credit
(d) "The criteria set forth in this subpart are minimum standards..."	N/A
60.2 Minimum compliance with flood plain management criteria: describes the procedures for getting the local regulations approved.	N/A
60.3 Flood plain management criteria for flood-prone areas: the requirements in sections (a) - (e) are based on the type of flood data provided by FEMA.	
(a) When no flood data are provided by FEMA, the community shall:	
1. Require permits for development everywhere to determine if it is in a floodprone area.	Section 411.a, new study (NS) credits identifying and regulating additional floodprone areas
2. Make sure proposed developments have permits from other agencies.	N/A
3. Make sure building sites will be reasonably safe from flooding. If in a floodprone area, new buildings and substantial improvements must be anchored, constructed with materials and methods resistant to flood damage, and have their utilities protected.	This NFIP requirement should not be confused with the credit for engineered foundations under Section 431.b (FDN).
4. New subdivisions must meet similar requirements.	N/A
5. New and replacement water systems must be protected.	N/A
6. New and replacement sanitary and septic systems must be protected.	Section 431.g, natural and beneficial functions regulations (NBR), credits prohibiting septic systems in the floodplain.

NFIP Requirement	Related CRS Credit
(b) When FEMA provides a flood map but no flood elevations, the community shall:	
1. Require permits for development in the A Zone.	Section 411.a credits providing regulatory flood elevations where not available (NS). This would mean requiring permits in floodplains outside the SFHA.
2. Require development to meet the requirements in 60.3(a). 2-6.	N/A
3. Require larger subdivisions and developments to produce flood elevations.	Section 411.a (NS) credits providing regulatory flood elevations for all new developments, not just large ones.
4. "Obtain, review and reasonably utilize" available flood elevations.	Section 411.a (NS) credits providing regulatory flood elevations for all new developments, not just those where data are readily available.
5. Obtain and maintain records of the elevations and floodproofing protection levels of new buildings.	Activity 310 (Elevation Certificates) credits keeping the records on the FEMA elevation and floodproofing certificates.
6. Tell the State and other communities if a watercourse will be altered.	This requirement should not be confused with the credit in Section 431.g for stream bank protection (NBR).
7. Assure that the flood carrying capacity of an altered watercourse is maintained.	This requirement should not be confused with the credit in Section 431.g for stream bank protection (NBR).
8. Require that manufactured homes be elevated and anchored.	N/A
(c) When FEMA provides a FIRM with flood elevations, the community shall:	
1. Meet all the requirements of 60.3(b) in all types of A Zones.	N/A

NFIP Requirement	Related CRS Credit
2. Make sure that residential buildings and substantial improvements are elevated to or above the base flood elevation in those A Zones with flood elevations or depths.	Section 411.a credits providing regulatory flood elevations where not available (NS). This results in requiring permits in A Zones without flood elevations or depths. Section 431.a, Freeboard, credits going higher than the base flood elevation.
3. Make sure that non-residential buildings and substantial improvements are elevated or floodproofed in those A Zones with flood elevations or depths.	See (c)2, above
4. Obtain an architect's or engineer's certification for floodproofing non-residential buildings.	Activity 310 credits certifications on FEMA forms. This language does not receive credit for engineered foundations (FDN) under Section 431.b.
5. Make sure that the areas below elevated buildings allow for the entry of water.	This is often confused with the credit for engineered foundations under Section 431.b (FDN), but it is a minimum NFIP requirement. Prohibiting enclosing the lower area is credited under Section 431.h (ENL).
6. Make sure that mobile homes outside of existing mobile home parks are elevated.	N/A
7. Require new and substantially improved residential buildings in AO Zones to be elevated above the specified depth or, where none is specified, 2 feet.	Section 431.a, Freeboard, credits going higher than the base flood depth. Section 431.a.7 notes that the 2 feet language is not eligible for freeboard credit.
8. Require new and substantially improved non-residential buildings in AO Zones to be elevated or floodproofed above the specified depth or, where none is specified, 2 feet.	See (c)7, above.
9. Require the standards of (a)1-4 and (b)5-9 in A99 Zones.	N/A

NFIP Requirement	Related CRS Credit
10. Make sure there is no cumulative increase in flood heights in areas with no floodway designated.	Section 411.a credits new floodway mapping as additional data (NS).
11. Require drainage paths around buildings in AH and AO Zones, areas of shallow flooding without defined channels.	N/A
12. Require mobile homes in existing mobile home parks to be elevated above the base flood elevation or at least 3 feet above grade.	Section 431.n credits higher regulatory standards for existing manufactured home parks (MHP).
13. Apply for a conditional FIRM revision if a development will increase the base flood elevation by more than 1 foot.	Section 411.d credits a floodway standard more restrictive than 1 foot (FWS).
14. Require that recreational vehicles on a site for more than 180 days be treated as a manufactured home.	N/A
(d) When FEMA provides a floodway map, the community shall:	
1. Meet all the requirements of 60.3(c).1-14.	N/A
2. Adopt a regulatory floodway that does not result in increasing the base flood by more than 1 foot.	Section 411.d credits a floodway standard more restrictive than 1 foot (FWS).
3. Prohibit encroachments in the floodway from causing any increase in the base flood.	This is often confused with Section 431.f which credits preserving floodplain storage capacity (PSC), but it is a minimum NFIP requirement.
4. Apply for a conditional FIRM revision if a development in the floodway will increase the base flood elevation.	N/A

NFIP Requirement	Related CRS Credit
(e) When FEMA provides a FIRM that shows the coastal high hazard area (V Zone), the community shall:	
1. Meet all the requirements of 60.3(c).1-14	N/A
2. Keep records of the lowest structural member of new buildings.	Activity 310 (Elevation Certificates) credits keeping the records on the FEMA elevation certificate.
3. Make sure all new buildings are landward of mean high tide.	N/A
4. In V Zones with base flood elevations, require all new buildings to be elevated on pilings and columns so (i) the lowest horizontal structural member is elevated above the base flood level and (ii) an engineer or architect certifies the foundation anchoring.	Section 431.a.6 provides freeboard credit for requiring buildings *outside* of V Zones to have the lowest horizontal member elevated above the base flood. Credit under Section 431.b for engineered foundations (FDN) is not available in V Zones because they are required there. Section 431.o (CAZ) credits extending the V Zone standards to Coastal AE Zones.
5. Make sure that the areas below elevated buildings are open or enclosed with breakaway walls.	Section 431.h (ENL) credits prohibiting *all* enclosures of the lower area.
6. Prohibit fill for structural support in V Zones.	Section 431.f credits prohibition of fill in the floodplain (PSC). It is not available if the community only prohibits fill in V Zones.
7. Prohibit man-made alteration of sand dunes and mangrove stands in V Zones.	*CRS Credit for Management of Coastal Erosion Hazard* credits prohibiting alteration of dunes outside of V Zones and regulations that restrict traffic on dunes.
8. Require mobile homes outside of existing mobile home parks to meet the requirements of (e)2-7 and mobile homes in existing parks to meet the requirements of (c)12.	N/A

NFIP Requirement	Related CRS Credit
9. Require that recreational vehicles on a site for more than 180 days meet the requirements of (b)1 and (e)2-7.	N/A
60.4 Flood plain management criteria for mudslide (i.e., mudflow) -prone areas.	See *Special Hazards Supplement to the CRS Coordinator's Manual*.
60.5 Flood plain management criteria for flood-related erosion-prone areas.	See *CRS Credit for Management of Coastal Erosion Hazards*.
60.6 Variances and exceptions	N/A
60.7 Revisions of criteria for flood plain management regulations.	N/A
60.8 Definitions (references the definitions in Part 59)	N/A
Subpart B - Requirements for State Flood Plain Management Regulations	N/A
Subpart C - Additional Considerations in Managing Flood-Prone, Mudslide (i.e., Mudflow)-Prone, and Flood-Related Erosion-Prone Areas	N/A: These are planning considerations, not requirements. Implementing them would exceed the minimum NFIP requirements.

Regulations Credited by the CRS Not Related to Minimum NFIP Requirements

Regulations credited in Activity 430 (Higher Regulatory Standards):

Section 431.b: Requiring that fill and building foundations be designed to protect them from damage due to erosion, scour and settling (FDN).

Section 431.e: Requiring that critical facilities, such as hospitals and hazardous materials storage sites, be protected from higher flood levels (PCF).

Section 431.f: Maintaining floodplain storage by prohibiting fill or by requiring compensatory storage (PSC). While floodway regulations preserve flood conveyance, they allow the flood fringe to be filled in which can have a significant effect on downstream flood heights.

Section 431.g: Prohibiting or regulating developments that can have an adverse impact on public health or water quality, including alterations to shoreline, channels, and banks (NBR).

Section 431.i: Implementing other regulations that exceed the minimum requirements of the NFIP Regulations (OHS).

Section 431LD: Zoning to minimize the number of buildings in the floodplain to reduce the damage potential and help maintain flood storage and conveyance capacity (LZ).

The NFIP Regulations are oriented toward the more common overbank and coastal flooding. Special hazards regulations ("SH") are requirements tailored to different conditions. They are found in publications on special hazards and coastal hazards (see page 64).

Regulations credited under other activities:

Section 341.b: Requiring developers or sellers to publicize or disclose the flood hazard on their properties (ODR).

Section 421: Prohibiting new buildings in the floodway, V Zone, or other part of the floodplain to preserve open space (OS).

Section 451.a: Requiring new developments to provide retention or detention of their stormwater runoff to minimize the increase in flood flows due to watershed urbanization (SMR).

Section 451.e: Requiring erosion and sedimentation control during construction projects to reduce siltation and the resulting loss of channel carrying capacity (ESC).

Section 451.f: Requiring developers to implement appropriate "best management practices" that will improve the quality of stormwater runoff (WQ).

Section 541.b: Prohibiting dumping or placing debris in stream channels (SDR).