6 Factors to Consider and Illustrations of Substantial Improvement and Repair of Substantial Damage

6.1 Overview

This chapter describes the factors to be considered when evaluating permit applications for improvements and repairs to buildings and includes, in Section 6.4, illustrations of several types of improvements and repairs that could trigger SI/SD determinations. Section 6.3 describes all aspects of the NFIP floodplain management requirements that must be considered when bringing SI/SD buildings into compliance. Section 6.5 describes how certain types of buildings are addressed, including historic structures, manufactured homes, accessory structures, and certain agricultural structures. And finally, Section 6.6 explains the NFIP flood insurance implications related to SI/SD.

6.2 Factors to Consider When Evaluating Permit Applications for Improvements and Repairs

Several factors must be considered when local officials evaluate permit applications for repairs and improvements to buildings:

- Whether the building is pre-FIRM or post-FIRM (Section 6.2.1).
- Whether the building is in an A zone or a V zone (Section 6.2.2).
- Whether the building is located in more than one flood zone (Section 6.2.3).
- Whether the building is residential or non-residential (Section 6.2.4).
- The nature of the proposed repairs and improvements; Section 6.4 illustrates examples of various types of improvements and repairs and how they must meet NFIP requirements.

> It is important to emphasize that all work must be included in an SI/SD determination. For example, if a small addition by itself is not a substantial improvement, but if other work on the building is undertaken at the same time, the combined work might be a substantial improvement (see Section 5.6.1).

6.2.1 Pre-FIRM or Post-FIRM

This chapter presents some examples of common improvements and repairs, along with descriptions of measures to comply with the NFIP floodplain management requirements. For purposes

of explaining these examples, this Desk Reference uses the terms "pre-FIRM" and "post-FIRM," which are described below.

Buildings that were constructed before the date of a community's flood hazard map are called "pre-FIRM" because they pre-date the initial FIRM. They are referred to as "existing construction" or existing buildings. They generally pre-date the date of the community's first floodplain management regulations. Most flood-prone, pre-FIRM buildings were built by individuals who did not have sufficient knowledge of the hazard to make informed decisions about the flood risk. Thus, most pre-FIRM buildings were not built with specific measures that reduce exposure to flooding, such as elevating the floor a certain height above the flood level.

Buildings that were constructed after the date of the initial FIRM are called "post-FIRM." These buildings were generally constructed after adoption of the community's first floodplain management regulations and thus should have been built in compliance with the NFIP floodplain management requirements that were in effect at the time of construction.

A building constructed after the date of the initial FIRM is considered new construction (see definition in Chapter 3). All new construction must be built in accordance with the NFIP requirements. Regardless of the size or costs of improvements or repairs made to post-FIRM buildings, the building must remain fully compliant.

All subsequent work on a post-FIRM building must be performed in a manner that ensures the building's continued compliance. Work shall not be allowed if it would make the building non-compliant with the floodplain management requirements that had to be met when the building was constructed.

In summary, how proposals to make improvements or repairs must be evaluated as a function of whether buildings are pre-FIRM or post-FIRM is as follows:

- If a building is pre-FIRM, any proposed improvements or repairs must be evaluated to determine whether the work is a substantial improvement or repair of substantial damage.
- If a building is post-FIRM, any proposed improvements or repairs must be evaluated to ensure that the improvements or repairs comply with the applicable NFIP floodplain management requirements and to ensure that the improvements or repairs do not alter any aspect of the building that would make it non-compliant.

6.2.2 A Zone or V Zone

The term "A zone" includes all zones shown on FIRMs as Zones A, AE, A1-A30, AR, AO, A99, and AH. A zones are shown along riverine bodies of water and along tidally-influenced bodies of water, typically inland of V zones. V zones are flood hazard areas with high velocity wave action where wave heights of 3 feet or more are anticipated. The term "V zone" includes all zones shown on FIRMs as Zones V, VE, and V1-V30. The basic NFIP floodplain management requirements for the design and construction of buildings in A zones and V zones differ somewhat. Some of the key differences are:

- A zone: the lowest floor, including basement, is elevated to or above the BFE.
- V zone: the bottom of the lowest horizontal structural member of the lowest floor is elevated to or above the BFE.

- A zone: enclosures below elevated buildings must have flood openings.
- V zone: the areas below elevated buildings are either free-of-obstructions or enclosed with insect screening, latticework, or breakaway walls.
- A zone: non-residential buildings may be dry floodproofed.
- V zone: dry floodproofing is not allowed for non-residential buildings.
- V zone: new buildings must be located landward of the reach of the mean high tide.

6.2.3 More Than One Flood Zone

Buildings that are located in more than one zone must comply with the requirements of the more restrictive zone. For example, a building that is a substantial improvement that is in both a V zone and an A zone must be designed and constructed to meet the V zone requirements. In riverine A zones, similar situations may occur. A building that is affected by more than one BFE must be elevated to the higher BFE, and a floodway analysis is required even if only a portion of a building encroaches into the floodway.

6.2.4 Residential or Non-Residential

As noted in Section 6.2.2, the requirements for non-residential buildings vary depending on flood zone. In A zones, non-residential buildings may be elevated or dry floodproofed. Section 6.4.1 describes dry floodproofing as a possible method of protecting non-residential buildings in A zones that are substantially improved or substantially damaged. In V zones, substantially-improved non-residential buildings must have the bottom of the lowest horizontal structural member of the lowest floor elevated to or above the BFE.

6.3 Bringing Substantially Improved and Substantially Damaged Buildings into Compliance

If a local official determines that improvements or repairs to a building constitute SI/SD, then the building must be brought into compliance with the NFIP floodplain management requirements for new construction in SFHAs. The key aspects of the NFIP requirements for new construction and SI/SD include:

- Lowest floor elevations (Section 6.3.1)
- Enclosures (Section 6.3.2)
- Basements (Section 6.3.3)
- Utility and building service equipment (Section 6.3.4)
- Flood damage-resistant materials (Section 6.3.5)
- Making buildings reasonably safe from flooding (Section 6.3.6)

For several reasons, owners may decide to demolish existing buildings. If a property owner chooses to construct a new building on the same site, the work is treated as new construction and all requirements for new construction must be met.

The sections below describe these requirements. The examples given below each NFIP requirement describe measures that can be used to bring SI/SD buildings into compliance. These examples are not an exhaustive list of possible ways to meet the NFIP requirements.

6.3.1 Lowest Floor Elevations

For SI/SD buildings that have lowest floors below the BFE, the lowest floor must be elevated to bring the buildings into compliance. In A zones, the lowest floor must be at or above the BFE (non-residential buildings may be dry floodproofed to or above the BFE), and in V zones, the bottom of the lowest horizontal structural member of the lowest floor must be at or above the BFE.

Measures to bring a building into compliance may include meeting a combination of requirements. For example, elevating a building on a new foundation may also require reinforcing the continuous load path and filling in below-grade areas.

There are several solutions that can achieve compliance.
The solution selected for any given building will depend on several factors such as flood zone, the type of foundation, feasibility, and whether the building is residential or non-residential.

Below are examples of measures that can be taken to meet NFIP requirement to bring SI/SD buildings into compliance:

- **Elevation-in-place (A and V zones).** This measure involves detaching the building from its foundation and raising it onto a compliant foundation. Elevation-in-place is most effective for buildings that are on crawlspaces, pilings, or columns. Buildings with basements also may be elevated (see Section 6.3.3 for measures to bring basements into compliance). Slab-on-grade buildings have been elevated-in-place, although the process is more complicated and costly (these buildings may be better candidates for conversion of the ground level to become a compliant enclosure, described below).

An easy-to-read publication that illustrates three elevation options is *Above the Flood: Elevating Your Floodprone House* (FEMA 347).

A more technical document that describes additional options is *Engineering Principles and Practices for Retrofitting Flood-Prone Residential Structures* (FEMA 259).

- **Conversion of the ground level to a compliant enclosure (typically in A zones).** There are instances, typically in A zones, where the first (ground) floor is subject to flooding, but the next higher floor is above the BFE. In these cases, it may be feasible to modify the ground level so that it becomes an enclosure that complies with the NFIP requirements. (This option is unlikely to be applied in V zones because the vertical structural members (piers, pilings, or columns) of older buildings rarely extend high enough.) This option requires that the structure meet all applicable NFIP requirements, including limitations on use of enclosures (parking of vehicles, building access, and storage). Because owners lose living area, conversions usually are combined with the addition of an upper story or an elevated lateral addition (Section 6.4.2).
- **Extend walls upward and raise the floor (A zones only).** This measure leaves the building on its original slab-on-grade foundation. To achieve the necessary elevation of the lowest floor, the roof is removed and the walls are extended high enough to allow a new floor system to

be constructed on top of the slab, with the new floor surface at or above the BFE. The work also may require the windows and doors to be shifted upward. In addition to replacing the roof, the work also involves retrofitting the newly-created "crawlspace" or under-floor space (the space between the original slab and the new floor) to be a compliant enclosure by installing flood openings. In some cases, rather than adding a new floor system, it may be feasible to simply add sufficient thickness to the slab to raise the floor surface to or above the BFE.

- **Conversion of walkout basement to a compliant enclosure (A zones only).** This measure is particularly appealing if the elevation of the floor above the walkout basement is at or above the BFE. If that is the case, converting the walkout basement to a compliant enclosure can be done by limiting the use of the area to parking of vehicles, building access, or storage; removing finish materials; retrofitting the enclosure walls with flood openings; and elevating equipment and utility service. To prevent the enclosure from being a basement as defined by the NFIP, particular attention must be paid to ensuring that the enclosure has at least one side that is at or above grade, which may require lowering the ground surface by re-grading along one or more of the exterior foundation walls.
- **Dry floodproofing modifications (A zone only, non-residential only).** Dry floodproofing measures must be designed and certified by a qualified registered professional engineer or architect. Designers must consider many factors when determining whether a building can be dry floodproofed, including the strength of the building, whether it will be subject to buoyancy once it is made watertight, whether all possible paths for water to enter the building can be properly sealed (floor drains, plumbing fixtures, openings through exterior walls through which utility service is provided, etc.), and whether there is adequate warning time if human intervention is necessary (e.g., to install barriers or closing valves). For guidance, see ASCE 24-05, *Flood Resistant Design and Construction* and FEMA FIA-Technical Bulletin 3, *Non-Residential Floodproofing – Requirements and Certification for Buildings Located in Special Flood Hazard Areas.*

6.3.2 Enclosures

The NFIP regulations allow enclosed areas below elevated buildings provided the enclosures meet certain requirements. The NFIP regulations for enclosures under buildings in A zones are in 44 CFR § 60.3(c)(5), and in § 60.3(e)(5) for enclosures under buildings in V zones. Requirements in these sections include:

- **Limited use.** In all flood zones, the use of enclosures must be limited to parking of vehicles, building access, and storage. Crawlspaces are treated as enclosures.
- **Flood damage-resistant materials.** All construction materials used below the BFE must be flood damage-resistant materials (see FEMA Technical Bulletin 2, *Flood Damage-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas*). Materials necessary to meet fire protection code requirements are acceptable.
- **Elevated or protected utility equipment and service.** Given the limitations on use, only the minimum utility equipment and service connections necessary should be located in enclosures under elevated buildings.

- **Flood openings.** In A zones, the walls of enclosed areas must have flood openings to allow for the automatic entry and exit of floodwaters to minimize the potential for damage caused by hydrostatic pressure (see FEMA Technical Bulletin 1, *Openings in Foundation Walls and Walls of Enclosures Below Elevated Buildings in Special Flood Hazard Areas*).
- **Breakaway walls.** In V zones, the walls of enclosed areas must be non-supporting breakaway walls (see FEMA Technical Bulletin 9, *Design and Construction Guidance for Breakaway Walls Below Elevated Buildings Located in Coastal High Hazard Areas*).

6.3.3 Basements

Under the NFIP, new buildings and substantially improved buildings must have their lowest floors (including basements) elevated to or above the BFE (non-residential buildings may have dry-floodproofed basements below the BFE). The NFIP regulations define a basement as "any area of the building having its floor subgrade (below ground level) on all sides." If a local official determines that work constitutes SI/SD of any building that has a basement, the building must be brought into compliance, which includes eliminating the below-grade area.

Measures to eliminate basements below the BFE will, in part, depend on the nature of the basement and surrounding ground elevations. Below are examples of measures that can be taken to meet the requirement:

- **Fill in below-grade areas.** This option is effective only if the elevation of the floor above the below-grade area is at or above the BFE. Compliance is achieved by filling in the below-grade area and converting the remaining headroom to a compliant enclosure.
- **Convert walkout basements to compliant enclosures.** Section 6.3.1 describes how a walkout basement can be modified to become a compliant enclosure (A zone only).
- **Floodproof below-grade areas (A zone, non-residential only).** The NFIP regulations allow non-residential buildings in A zones to have areas that are below-grade on all sides (basements) only if the areas are dry floodproofed. Careful evaluation of the structural integrity of a building must be undertaken to determine if dry floodproofing measures are feasible. For guidance, see FEMA FIA-Technical Bulletin 3, *Non-Residential Floodproofing – Requirements and Certification for Buildings Located in Special Flood Hazard Areas.*

6.3.4 Utility and Building Service Equipment

The NFIP requires that new buildings and substantially improved buildings have utilities, equipment, and appliances elevated to or above the BFE, or be designed to prevent water from entering or accumulating within the equipment components (see 44 CFR § 60.3(a)(3) provided in Section 3.3). This means that SI/SD buildings with utility and building service equipment that is below the BFE must have the equipment either elevated or replaced with components that are designed and installed to be flood damage-resistant. Minimal electric service is allowed below the BFE if it is required to address life safety and electric code requirements for building access and storage.

Below are examples of measures that can be taken to meet NFIP requirements for utility and service equipment:

- **Relocate to elevated areas.** Equipment and utility service must be relocated or elevated when buildings are elevated-in-place or if ground floors are converted to compliant enclosures. When a basement is eliminated, any equipment that was in the basement will be relocated to the elevated portion of the building or to an elevated addition.
- **Elevate on outside platforms.** Equipment located outside of the building, such as heat pumps and air conditioning units, must be elevated on platforms at or above the BFE. Platforms may be independently supported or cantilevered from the foundation.
- **Elevate on platforms inside enclosures.** If a substantially improved building in an A zone has a compliant enclosure, utility equipment (e.g., water heaters, water treatment systems, and heat pumps) may be installed on platforms that raise the equipment to or above the BFE. Note that appliances such as washers, dryers, and freezers should not be installed in enclosures (even if elevated) because they are not compatible with the allowable uses (parking of vehicles, building access, and storage) and they do not meet the mechanical service equipment requirement at 44 CFR § 60.3(a)(3).
- **Provide component protection.** Equipment that must be located on the floor of a compliant enclosure in an A zone may be protected with a barrier to keep water away from the equipment. Typical barriers are constructed of masonry or concrete to a height that is equal to or higher than the BFE and have specially designed doors or panels that are put in place to keep water from entering. This approach is feasible in non-residential buildings provided there is sufficient warning time.

More detail on compliant installations can be found in *Protecting Building Utilities from Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems* (FEMA 348).

6.3.5 Flood Damage-Resistant Materials

The NFIP requires that flood damage-resistant materials be used below the BFE. If a building will be elevated-in-place, materials used below the BFE must meet this requirement, including materials used to build an enclosure. For guidance on materials, see FEMA Technical Bulletin 2, *Flood Damage-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas.*

Minimal use of certain materials that are not flood damage-resistant materials is allowed below the BFE if specifically required to address life safety and electric code requirements for building access and storage areas.

6.3.6 Making Buildings Reasonably Safe from Flooding

In all flood zones, substantially improved buildings must be "adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy" (see 44 CFR § 60.3(a)(3)(i) provided in Section 3.3). In addition, in V zones structures must be "anchored to resist flotation, collapse,

and lateral movement due to the effects of wind and water loads acting simultaneously on all building components" (see 44 CFR § 60.3(e)(4)(ii) provided in Section 3.3). The compliance solution selected for any given building will depend on several factors such as the flood zone in which it is located, the type of foundation, and whether the building is residential or non-residential.

Below are examples of measures that can be taken to meet the NFIP requirement that buildings be reasonably safe from flooding:

- **Continuous load path.** Provide for a continuous load path by connecting the building to the foundation and connecting the roof to the walls. If existing connectors (bolts, nails, screws, straps, etc.) that attach the building to the foundation are inadequate, they should be replaced, reinforced, or augmented to address the requirement that the building be stable under base flood conditions.
- **Foundation bracing.** Pile- or post-supported buildings may require additional bracing. In V zones, bracing that is perpendicular to the approach of waves is an obstacle to the passage of waves and water under the building, and may need to be modified to meet the NFIP requirement to be "free-of-obstruction."

Work that does not require a permit is generally considered to be repairs of normal wear and tear or routine maintenance. Property owners or contractors should check with local officials to determine when work requires a permit.

Once the requirement for a permit is triggered, all work is to be included in the SI/SD determination, even work that would otherwise not require a permit.

6.4 Illustrations of Improvements and Repairs

The following sections and Tables 6-1a and 6-1b present some examples of common improvements and repairs, along with descriptions of measures to comply with the NFIP floodplain management requirements. Several of the examples describe and illustrate a specific type of work or combinations of work that may trigger the SI/SD requirements. Examples are also given of improvements and repairs to pre-FIRM and post-FIRM buildings and what must be done to comply with the new construction requirements of the NFIP. Examples of work include:

- Rehabilitation and remodeling (Section 6.4.1)
- Lateral additions (Section 6.4.2)
- Vertical additions (Section 6.4.3)
- Repair, reinforce, or replace foundations (Section 6.4.4)
- Repair of damaged buildings (Section 6.4.5)
- Reconstruction of demolished or destroyed buildings (Section 6.4.6)
- Work on post-FIRM buildings (Section 6.4.7)
- Work on buildings where flood maps have been revised (Section 6.4.8)

Table 6-1a. Compliance Matrix (A Zones)

Types of Work	Building is Pre-FIRM	Building is Post-FIRM
Rehabilitation (renovate or remodel), not SI	Compliance not required	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance
Rehabilitation (renovate or remodel), SI	Building required to comply	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance (see Note below table)
Lateral addition and Rehabilitation, SI	Addition required to comply; building required to comply	Addition required to comply; building required to comply (see Note below table)
Lateral addition, not SI	Addition not required to comply	Addition required to be elevated to at least the elevation of the existing lowest floor
Lateral addition, SI, not structurally connected	Addition required to comply; building not required to comply	Addition required to comply
Lateral addition, SI, structurally connected	Addition required to comply; building required to comply	Addition required to comply; building required to comply (see Note below table)
Vertical addition above building, not SI	Compliance not required	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance
Vertical addition above building, SI	Building required to comply	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance (see Note below table)
Repair foundation, not SI	Compliance not required	Repairs shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance
Repair foundation, SI	Building required to comply	Building required to comply (see Note below table)
Replace/extend foundation, SI (including "elevate-in-place")	Building required to comply	Building required to comply (see Note below table)
Repair damage, SD	Building required to comply	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance (see Note below table)
Reconstruct new building on existing or new foundation, SI	Reconstructed building required to comply	Reconstructed building required to comply (see Note below table)

Note: If a map revision has resulted in a higher BFE, a post-FIRM building must comply based on the new BFE.

Table 6-1b. Compliance Matrix (V Zones)

Types of Work	Building is Pre-FIRM	Building is Post-FIRM
Rehabilitation (renovate or remodel), not SI	Compliance not required	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance
Rehabilitation (renovate or remodel), SI	Building required to comply	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance (see Note below table)
Lateral addition and Rehabilitation, SI	Addition required to comply; building required to comply	Addition required to comply, and rehabilitation work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance (see Note below table)
Lateral addition, not SI	Addition not required to comply	Addition required to comply
Lateral addition, SI, not structurally connected	Addition required to comply; building required to comply	Addition required to comply (see Note below)
Lateral addition, SI, structurally connected	Addition required to comply; building required to comply	Addition required to comply; building required to comply (see Note below table)
Vertical addition above building, not SI	Compliance not required	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance
Vertical addition above building, SI	Building required to comply	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance (see Note below table)
Repair foundation, not SI	Compliance not required	Repairs shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance
Repair foundation, SI	Building required to comply	Building required to comply (see Note below table)
Replace/extend foundation, SI (including "elevate-in-place")	Building required to comply	Building required to comply (see Note below table)
Repair damage, SD	Building required to comply	Work shall comply and shall not be allowed to make the building non-compliant with any aspect of the building that was required for compliance (see Note below table)
Reconstruct new building on existing or new foundation, SI	Reconstructed building required to comply	Reconstructed building required to comply (see Note below table)

Note: If a map revision has resulted in a higher BFE, a post-FIRM building must comply based on the new BFE.

6.4.1 Rehabilitation and Remodeling

The NFIP considers rehabilitation and remodeling to include improvements to a building that do not affect the external dimensions nor expand the total area of the building. Rehabilitation may or may not involve structural modification of the building. The local official must review all work proposed for rehabilitation or remodeling to determine whether it constitutes a

substantial improvement. If the work constitutes a substantial improvement, the building must be brought into compliance.

Rehabilitation of pre-FIRM buildings (residential)

Residential buildings that are substantially improved through rehabilitation or remodeling must comply with all applicable NFIP floodplain management requirements for the specific flood zone. Figure 6-1 illustrates the rehabilitation of a residential building that is located in an A zone. The figure illustrates elevation on a solid perimeter wall (crawlspace). Other types of foundations may be used in A zones, including pilings, columns, slabs on fill, and stem walls. Open foundations (pilings and columns) are required in V zones.

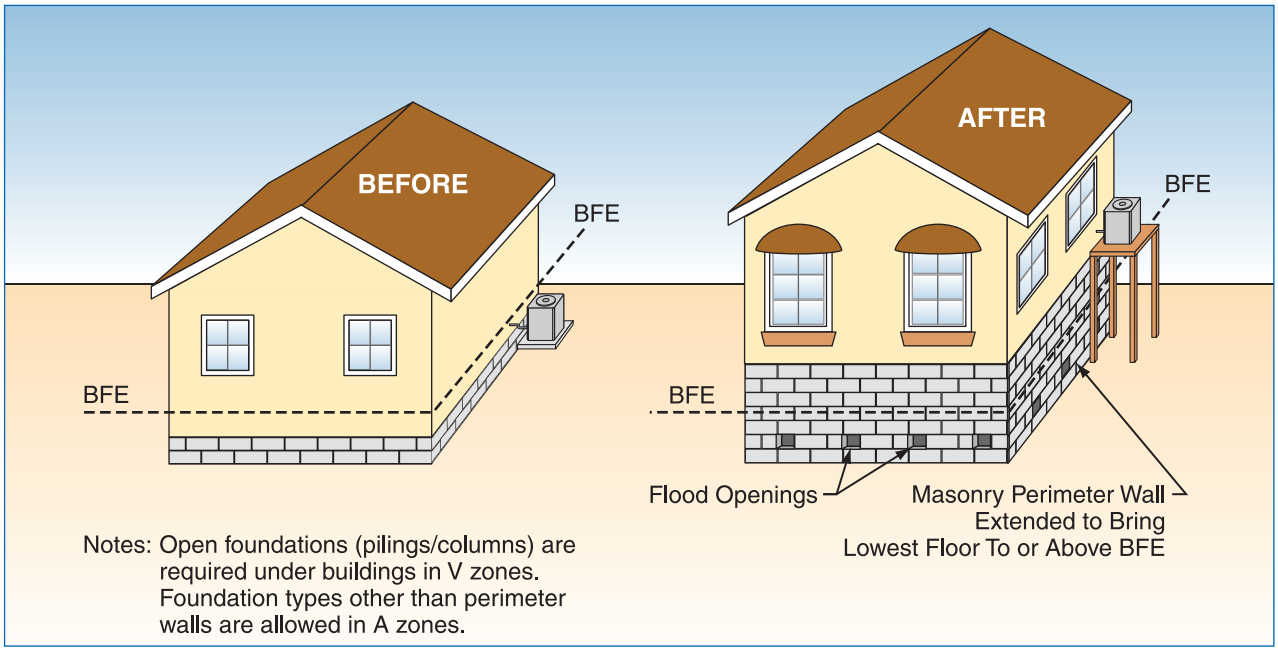

Figure 6-1. Rehabilitation or remodel (no increase in footprint) of residential building in an A zone – the proposed work was determined to be a substantial improvement. The building is brought into compliance by elevating it on an extended perimeter foundation wall, installing flood openings, and raising the HVAC equipment onto a platform.

Rehabilitation of pre-FIRM buildings (non-residential)

Rehabilitation or remodeling work on a non-residential building that is SI/SD triggers the requirement that the lowest floor be elevated (in A and V zones) or dry floodproofed (only in A zones).

Figure 6-2 illustrates the rehabilitation of a non-residential structure in an A zone where a structural engineering analysis indicates the building can be retrofitted with dry floodproofing measures in compliance with the NFIP requirements that require certification of the design by a registered design professional. For additional guidance, see FEMA FIA-Technical Bulletin 3, *Non-Residential Floodproofing – Requirements and Certification for Buildings Located in Special Flood Hazard Areas*. Communities that enforce building codes that refer to ASCE 24-05 for design and construction of buildings in flood hazard areas should be aware that ASCE 24-05 establishes

some specific limitations for floodproofing, including limitations on warning time and the availability of adequate labor to implement floodproofing measures.

Depending on the type of foundation and other constraints, non-residential structures that are located in A zones may be elevated on raised foundations. In this instance, the building must be brought into compliance with all of the applicable floodplain management requirements, including the type of foundation, limitations on use of enclosed areas, installation of openings in any enclosed areas, elevation of utilities and mechanical equipment, and use of flood damage-resistant materials.

In V zones, the only compliance option for non-residential buildings is elevation on open foundations. Dry floodproofing is not allowed in V zones.

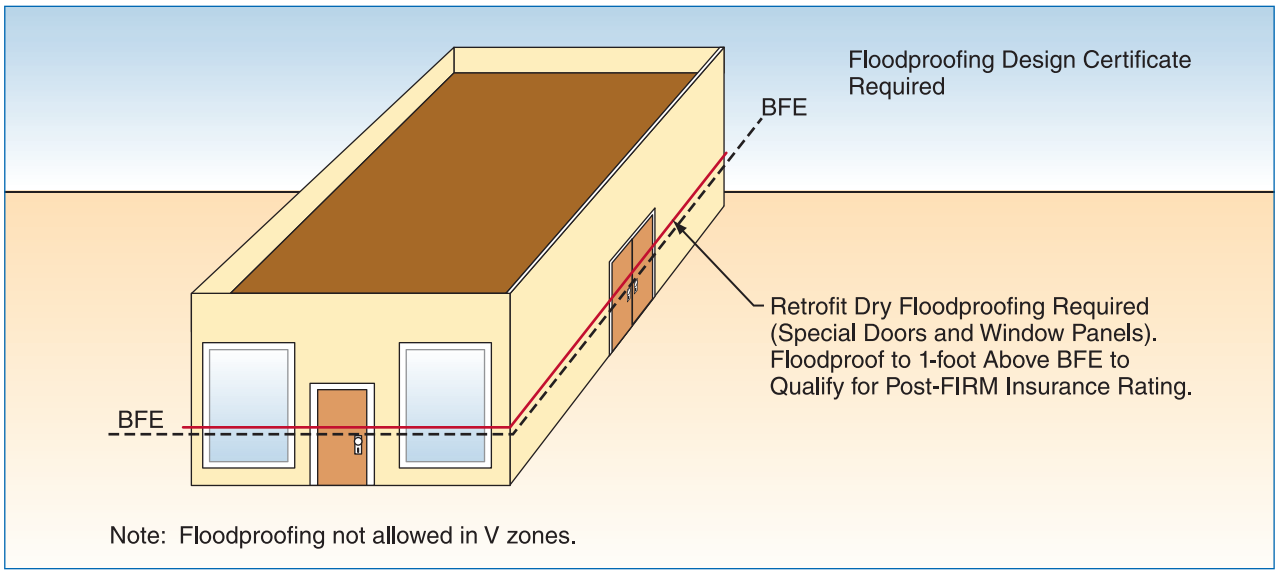

Figure 6-2. Rehabilitation or remodel (no increase in footprint) of non-residential building in an A zone – the proposed work was determined to be a substantial improvement. The building is brought into compliance by retrofit dry floodproofing measures (certification of design by registered design professional is required).

Rehabilitation/repair of a post-FIRM building

Any repairs or improvements associated with the rehabilitation or remodeling of a post-FIRM building must comply with the NFIP requirements and not alter the building in any way that violates those requirements.

If a revised, higher BFE goes into effect and the local official determines that rehabilitation constitutes SI/SD, the entire post-FIRM building must be brought into compliance with the elevation requirement based on the revised BFE.

6.4.2 Lateral Additions

A lateral addition expands the floor area of the building. A lateral addition that involves no alteration of the load-bearing structure of the building, is attached to the building with minimal

connection, and that has a doorway as the only modification to the common wall is considered to be "not structurally connected." A lateral addition that has its load-bearing structure connected to the load-bearing structure of the base building, which typically involves significant alternation of the common wall, is considered "structurally connected."

If a lateral addition is proposed along with other work on the original building, all the work must be considered in the SI/SD determination, regardless of the size or cost of the addition by itself and the cost of improvements to the original building.

As described below and summarized in Tables 6-1a and 6-1b, lateral additions depend on four factors:

- Whether the building is pre-FIRM or post-FIRM,
- Whether the common wall with the original building is modified structurally by more than installing a doorway,
- Whether the addition itself is a substantial improvement, and
- The applicable flood zone.

Structurally Connected and Not Structurally Connected. A noncompliant addition that is below the BFE and "structurally connected" would transfer flood loads imposed on it to the existing building.

An addition that is below the BFE and "not structurally connected" is expected to sustain damage, but should not transfer loads to the existing building.

Lateral additions to pre-FIRM buildings (A zone, residential)

For a project that involves only a lateral addition (i.e., there will be no improvements to the original building, the addition will not be structurally connected to the original building, and only a doorway will be installed in the common wall between the addition and the original building):

- If the cost of the addition compared to the value of the original building constitutes a substantial improvement, only the lowest floor of the addition must be elevated to comply with NFIP requirements (Figure 6-3).
- If the addition is determined to not be substantial improvement, the addition is not required to be elevated. Owners should be reminded that the addition will be subject to flooding and encouraged to consider measures to reduce vulnerability to damage (Section 5.8).

If a proposed lateral addition project also includes rehabilitation or remodeling of the existing building, then the local official must consider the whole project as a combination of work. If the local official determines that the combined cost of the project constitutes substantial improvement, then both the original building and the addition must be elevated and meet all other applicable requirements (Figure 6-4).

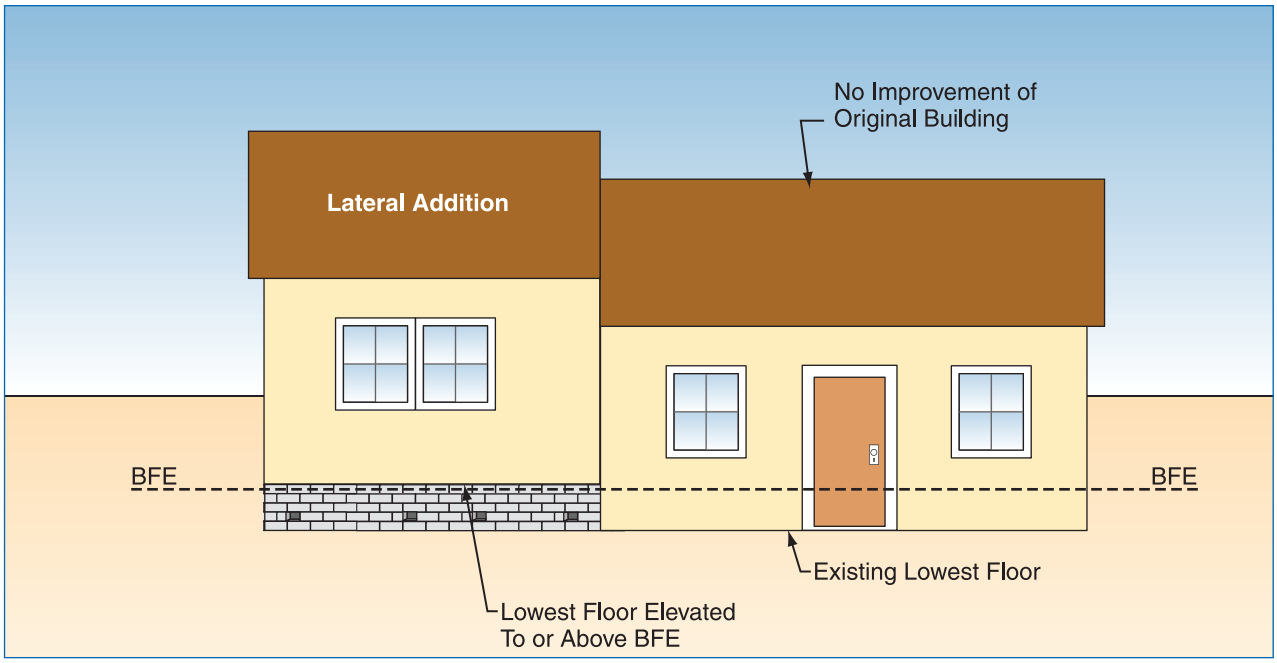

Figure 6-3. Lateral addition to a pre-FIRM building in an A zone – the proposed work is only the addition (no work was performed on the original building and no structural modification was made to the common wall or roof). The addition constitutes a substantial improvement and it complies with all NFIP requirements.

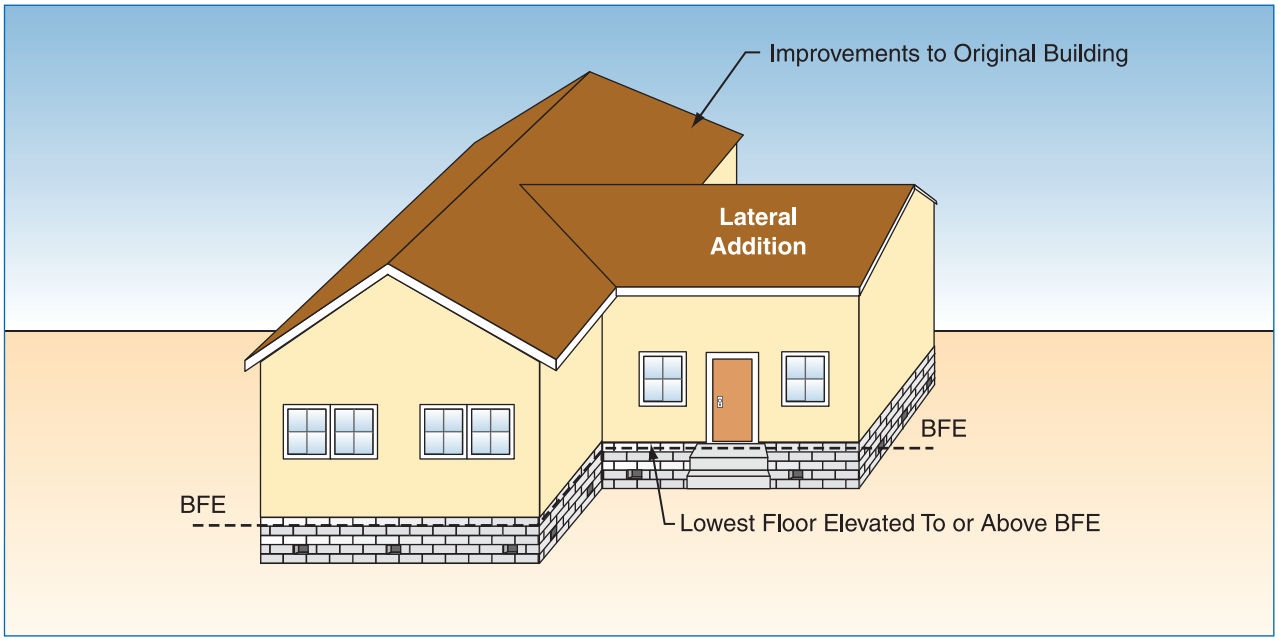

Figure 6-4. Lateral addition to a pre-FIRM building in an A zone – the proposed work includes an addition and work on the original building, including structural modification of the common wall or roof. The proposed work was determined to be a substantial improvement. The addition complies with all requirements and the building is brought into compliance by elevating it on a compliant foundation.

Lateral additions to pre-FIRM buildings (V zone, residential)

Lateral additions to pre-FIRM buildings in V zones are treated differently than additions to buildings in A zones. If a proposed addition (or combination of an addition and other improvements) to a V zone building constitutes a substantial improvement, then the lowest floor of both the original building and the addition must be elevated (Figure 6-5). The pertinent NFIP requirement for elevating both is the "free of obstruction" requirement. The original building must be elevated so that it will not obstruct floodwaters and waves that may damage the addition. For more guidance, see FEMA Technical Bulletin 5, *Free-of-Obstruction Requirements for Buildings Located in Coastal High Hazard Areas.*

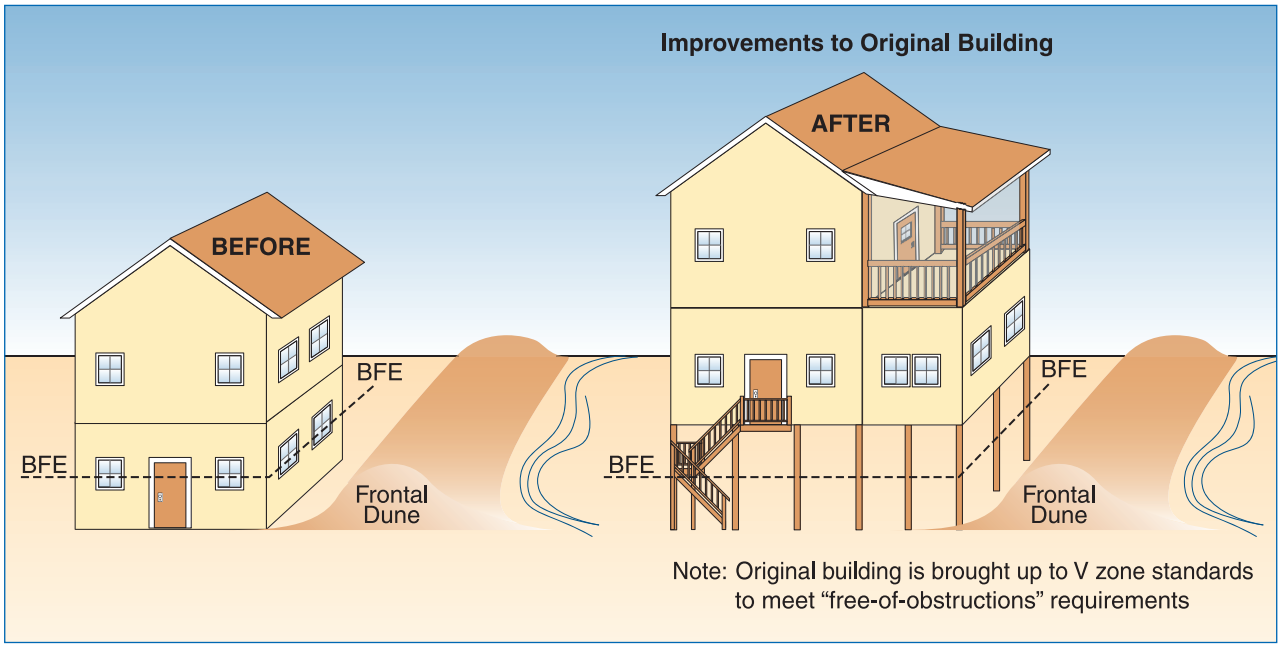

Figure 6-5. Lateral addition to a residential building in a V zone – the proposed work includes work on the original building. The lateral addition and improvements constitute substantial improvement. Both the addition and the original building are brought into compliance by elevating to or above the BFE on an open foundation.

Lateral additions to pre-FIRM manufactured homes

Lateral additions are common improvements to manufactured homes and local officials must determine whether the proposed work constitutes substantial improvement. Costs associated with typical porches and sunrooms may not exceed 50 percent of the market value of the home. However, proposed additions that will be walled with siding, insulated, and used year-round require close examination to determine whether the addition constitutes a substantial improvement.

If a proposed addition to a manufactured home constitutes a substantial improvement, the local official must determine the applicable NFIP elevation requirements; the requirements depend on several factors that are described in Section 6.5.2.

Figure 6-6 illustrates a lateral addition to a pre-FIRM manufactured home – the proposed work includes improvements to the existing home. The existing home in this illustration is located outside a manufactured home park or subdivision and the work constitutes a substantial improvement. Both the addition and the home must be elevated on compliant foundations.

All substantial improvements must be carefully constructed, supported, and anchored to resist flotation, collapse, and lateral movement during base flood conditions so as not to impose unanticipated loads on the original homes. Otherwise, the presence of additions could increase vulnerability to flood loads imposed on supporting piers and anchoring, leading to damage. For more detailed guidance on the installation of manufactured homes in SFHAs, see FEMA P-85, *Protecting Manufactured Homes from Floods and Other Hazards: A Multi-Hazard Foundation and Installation Guide.*

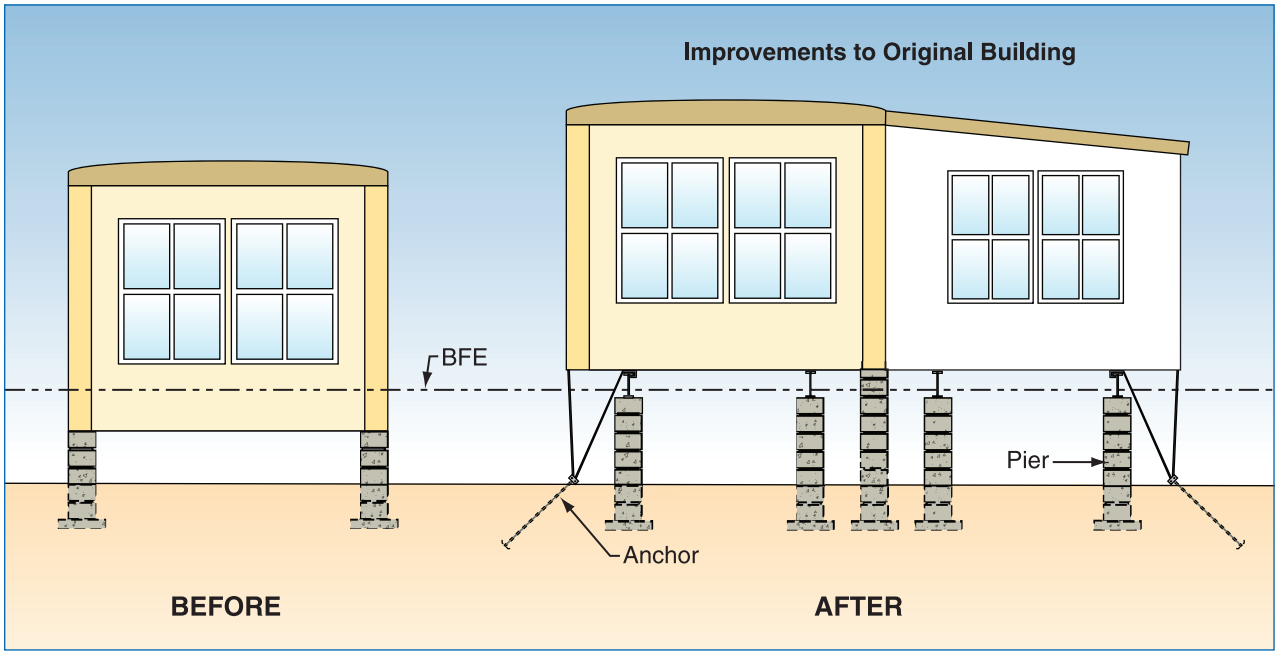

Figure 6-6. Lateral addition to a pre-FIRM manufactured home in an A zone – the proposed work includes improvements to the existing home. The work constitutes substantial improvement. The addition and the home are elevated to or above the BFE.

Lateral additions to pre-FIRM buildings (A zone, non-residential)

If a proposed lateral addition to a non-residential building is determined to be a substantial improvement, but there is no work proposed for the original building and the common wall is modified only by the installation of a door, only the addition must be brought into compliance. The addition must meet NFIP requirements either by elevating the lowest floor to or above the BFE or by dry floodproofing to that elevation (Figure 6-7). If the addition is dry floodproofed, the common wall must also be made watertight.

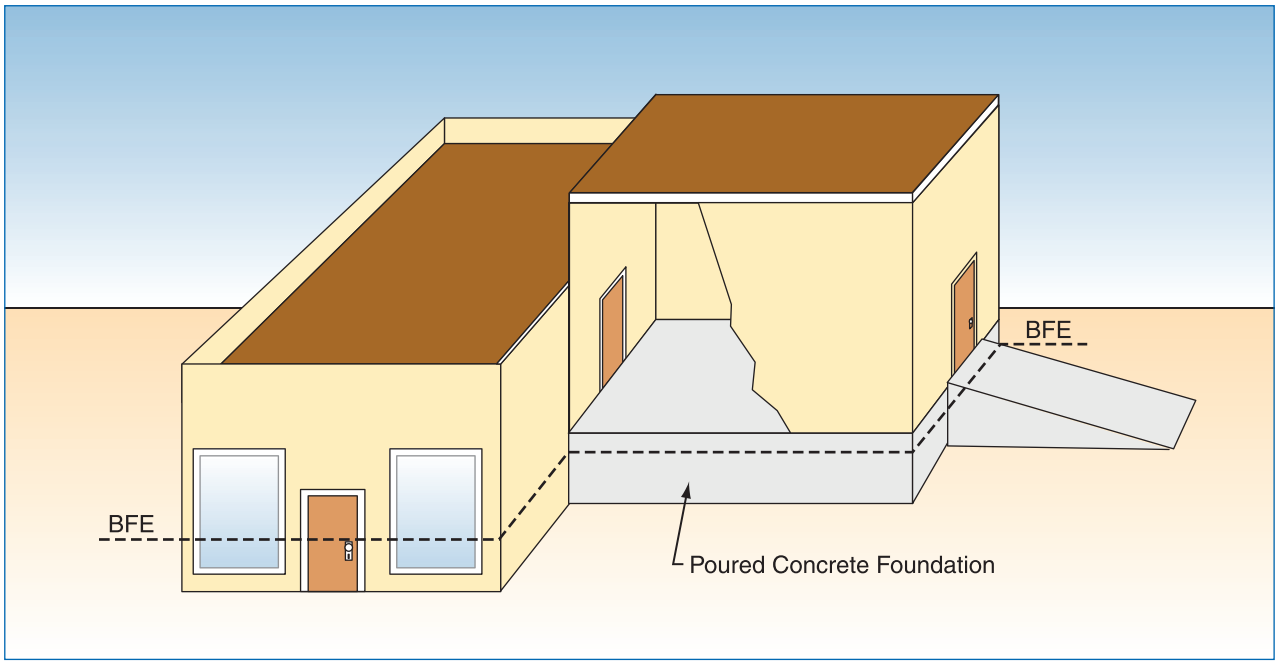

Figure 6-7. Lateral addition to a non-residential building in an A zone – the proposed work is only the addition (no work on the existing building and no structural modification of the common wall or roof). The work constitutes substantial improvement. The addition is elevated to or above the BFE (an alternative would be to dry floodproof only the addition, including the common wall).

Lateral additions to post-FIRM buildings (any zone, residential or non-residential)

Lateral additions to post-FIRM buildings are new construction and must comply with the NFIP requirements, including elevation. If the addition does not comply, then the original building will become non-compliant. Lateral additions must not alter any aspect of the building that had to be met when the building was constructed in compliance with the community's floodplain management regulations. A lateral addition, regardless of its value or size, must be elevated to at least the height of the post-FIRM building. The following summarizes these points:

- In any zone, if the BFE is unchanged, the addition must be elevated and comply with other applicable NFIP requirements, regardless of whether it is SI/SD (Figure 6-8).
- In any zone, if a revised, higher BFE is in effect, a lateral addition that is not a substantial improvement must be elevated at least as high as the original building.
- In any zone, if a lateral addition is a substantial improvement (and structurally connected), both the addition and the building must be brought into compliance. If a revised, higher BFE is in effect, both the original building and the addition must be elevated.
- In A zones, if the lateral addition is a substantial improvement (and not structurally connected), it must be elevated to the effective BFE. The effective BFE may be higher than the BFE in effect when the building was built (Figure 6-9).
- In V zones, if a lateral addition is a substantial improvement (and not structurally connected), both the addition and the original post-FIRM building must be elevated if a revised, higher BFE is in effect, otherwise the free-of-obstruction requirement is not met.

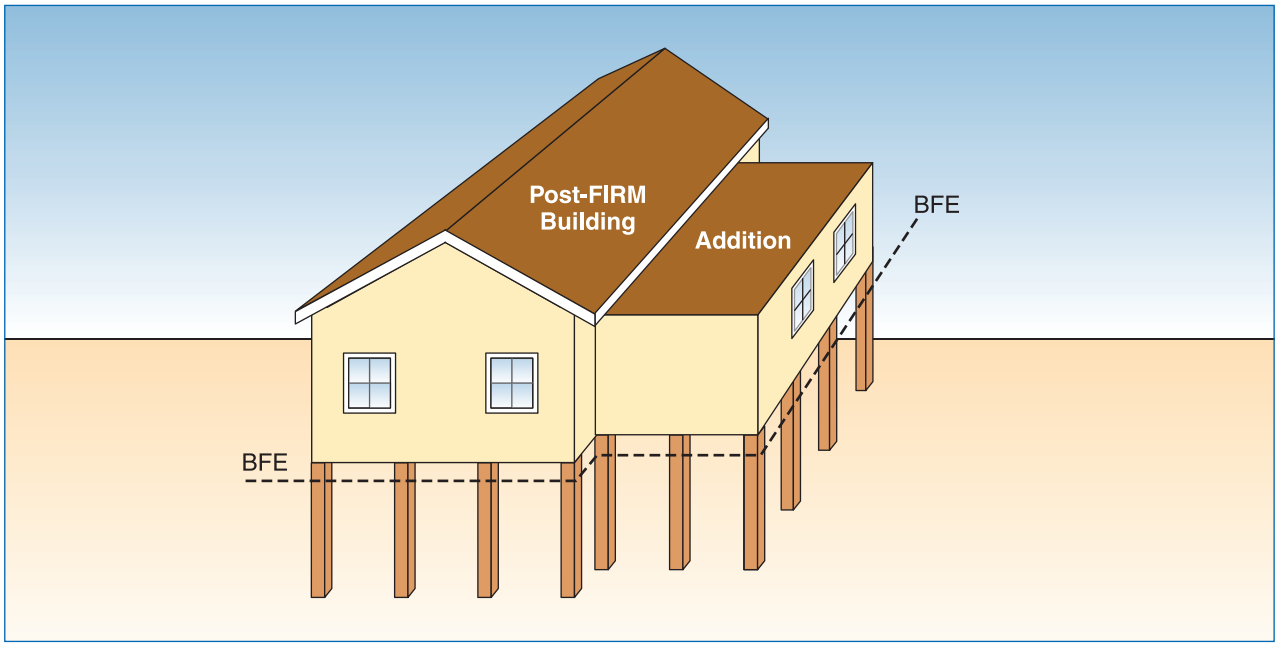

Figure 6-8. Lateral addition to a post-FIRM building in any flood zone (map revision has not changed the effective BFE). All improvements or repairs to a post-FIRM building must comply with the NFIP requirements regardless of the value of that work, and the work shall not compromise any of the NFIP requirements that the building was required to meet when it was initially built.

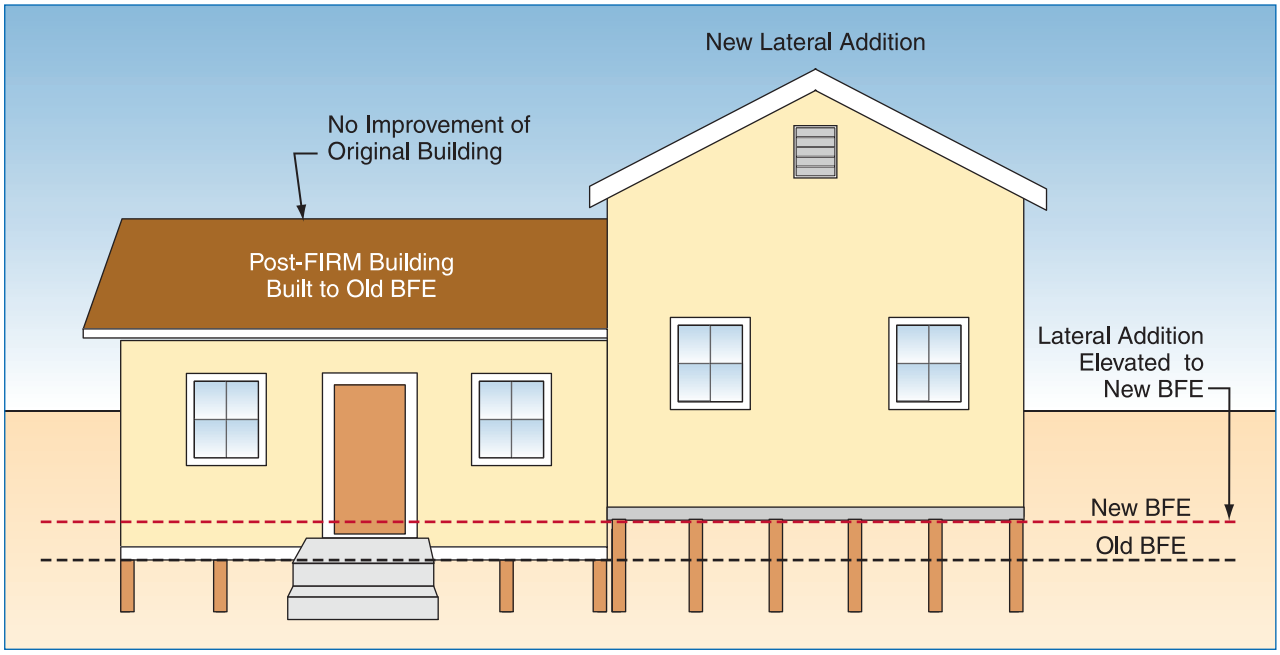

Figure 6-9. Lateral addition to a post-FIRM building in an A zone (a map revision has increased the BFE). The proposed work is a lateral addition with no work in the original building and no structural modification of the common wall or roof. The work constitutes a substantial improvement. Because there is no structural modification, only the addition must comply with the effective BFE which is higher than the BFE when the building was built. If instead the proposed work includes work in the original building or structural modification, the addition and the building must comply with the effective BFE.

6.4.3 Vertical Additions

A vertical addition expands the floor area of a building by either adding an upper story above the original building (Figure 6-10) or elevating the original building and constructing a new story beneath it (Figure 6-11). In both cases, it is likely that work on the load-bearing foundation will be required to carry the added load. Vertical additions may be smaller than the building footprint, such as a loft or bedroom, but the local official must still make an SI/SD determination.

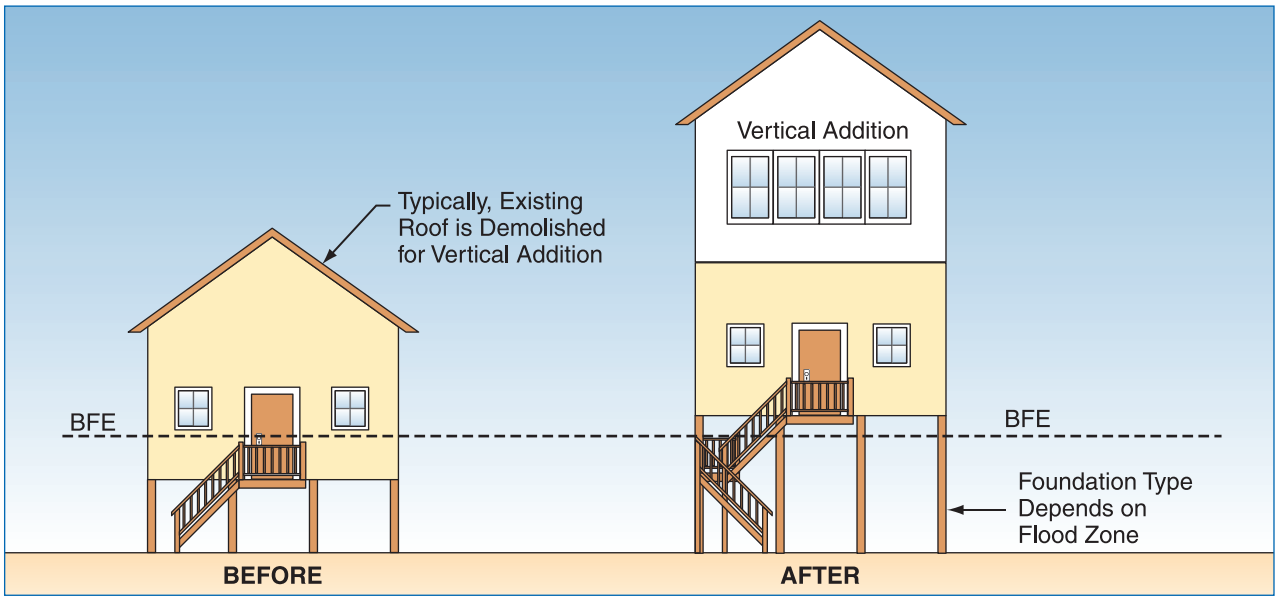

Figure 6-10. Vertical addition to a pre-FIRM residential building (in any zone) – the proposed work is a new upper story that involves structural modification. The work is a substantial improvement. The building is elevated to or above the BFE on a compliant foundation.

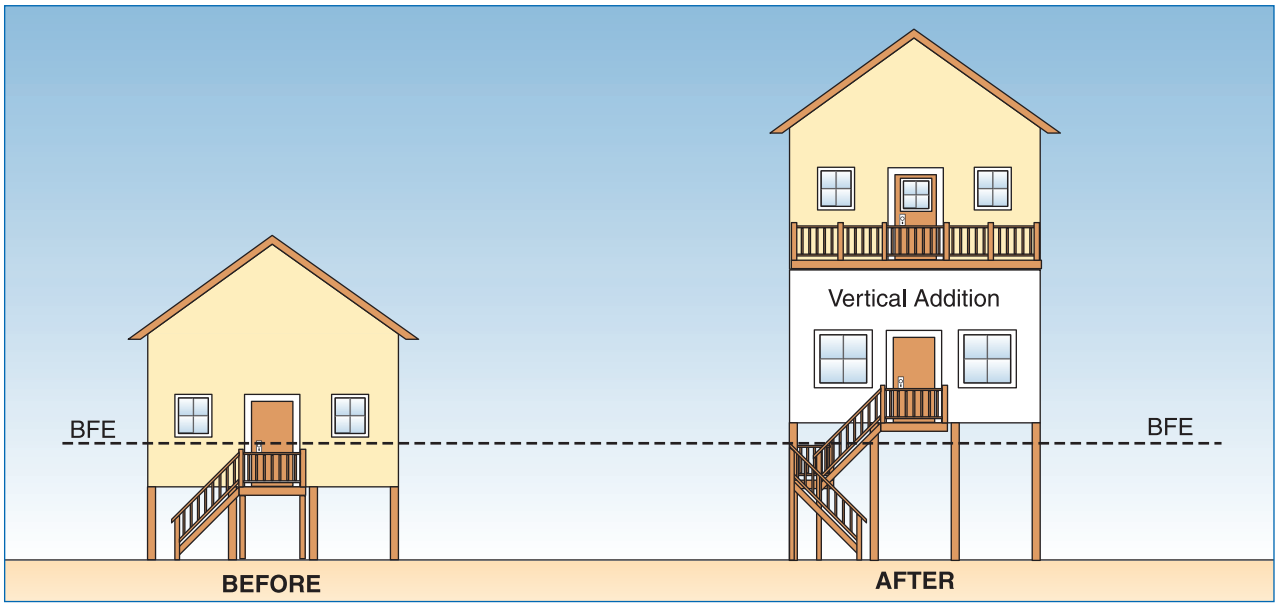

Figure 6-11. Vertical addition to a pre-FIRM residential building (in any zone) – the proposed work is a new lower story that involves structural modification. The work constitutes a substantial improvement. The building and the new lower story are elevated on a compliant foundation.

Vertical additions to pre-FIRM buildings (residential)

If a vertical addition to a pre-FIRM residential building constitutes a substantial improvement, the original building must be elevated to or above the BFE. In addition, the foundation must be modified or reconstructed (and below-grade areas filled in) to be compliant with applicable NFIP requirements based on the flood zone.

Vertical additions to pre-FIRM buildings (non-residential)

Vertical additions may involve adding an upper story above a non-residential building (Figure 6-12). If a vertical addition constitutes a substantial improvement, the original building must be elevated to or above the BFE or dry-floodproofed to the BFE (A zone only). In addition, the foundation must be modified or reconstructed (and below-grade areas filled in) to be compliant with applicable NFIP requirements based on the flood zone.

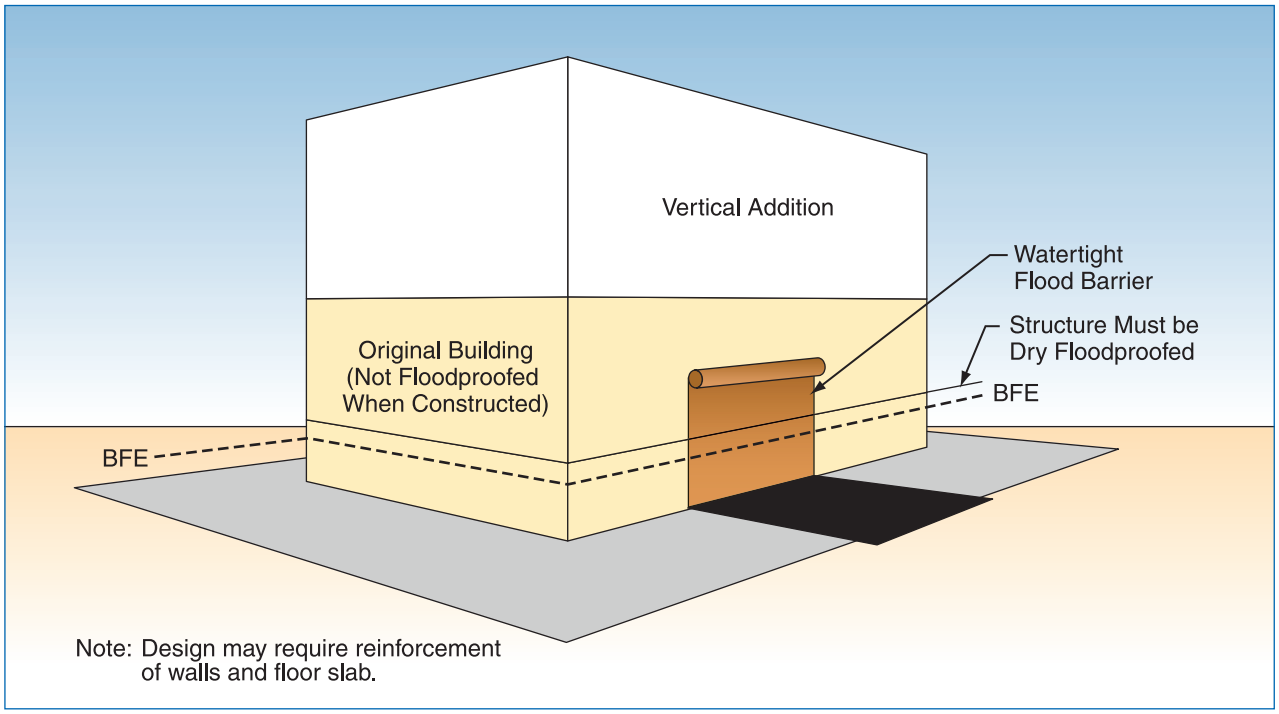

Figure 6-12. Vertical addition to a pre-FIRM, non-residential building in an A zone. The work constitutes a substantial improvement. The building is brought into compliance by retrofit dry-floodproofing measures (certification of design by registered design professional is required). Non-residential buildings can also be brought into compliance by elevation (not shown).

Vertical additions to post-FIRM buildings

Whether a local official will need to evaluate a vertical addition to a post-FIRM building to determine if it is a substantial improvement is related to whether the FIRM has been revised. If a revised, higher BFE is in effect, or if the flood zone changed (or floodway boundary changed), a vertical addition that is a substantial improvement will require that the entire building be elevated to the higher, effective BFE and comply with other applicable NFIP requirements based on the flood zone.

6.4.4 Repair, Reinforce, or Replace Foundations

It is common to repair, reinforce, or replace foundations, especially for older buildings. Foundation work also includes repair of damaged foundations, regardless of whether the damage is caused by a single event (such as a flood or earthquake) or due to deterioration over time.

Work performed on a foundation, either by itself or in combination with other work on a building, may constitute SI/SD. If the work is not a substantial improvement, the structure does not have to be elevated. However, any owner contemplating the replacement of a foundation should investigate the potential savings on the cost of NFIP flood insurance if the building is elevated and the new foundation complies with all of the applicable NFIP requirements. Many owners elect to elevate flood-prone buildings to reduce flood damage. The incremental cost to both replace a foundation and elevate a structure properly to the effective BFE may be offset by the reduction in future damage and annual flood insurance premiums.

In some cases, property owners may elect to elevate a structure, but not to the BFE. The cost to elevate a structure in this fashion must be included when making the SI/SD determination.

Foundation work on pre-FIRM buildings (residential)

If foundation work is determined to be SI/SD, then the building must be elevated in accordance with all applicable NFIP requirements, depending on the flood zone. Figure 6-13 illustrates the construction of a compliant foundation under an existing home.

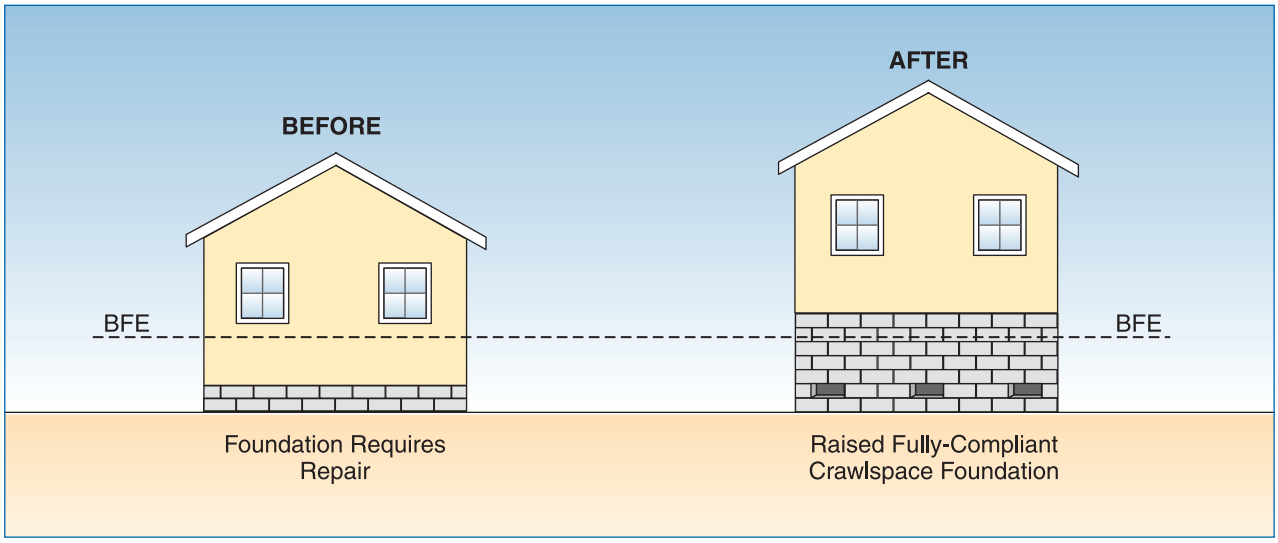

Figure 6-13. New foundation or repair of foundation under a pre-FIRM (in an A zone) residential building. The work was determined to be a substantial improvement. The building is brought into compliance by elevating on a compliant foundation.

Foundation work on pre-FIRM buildings (non-residential)

If the foundation work on a non-residential building is determined to be SI/SD, then the building must be elevated in accordance with all applicable NFIP requirements, depending on the flood zone.

As part of foundation work, owners of non-residential buildings in A zones may propose to retrofit with compliant dry-floodproofing measures. Such proposals must be supported with structural engineering analyses that indicate whether the buildings can be dry floodproofed in compliance with the NFIP requirements. The analyses must be prepared or reviewed by a registered design professional who must sign and seal the dry floodproofing designs. For guidance, see FEMA FIA-Technical Bulletin 3, *Non-Residential Floodproofing – Requirements and Certification for Buildings Located in Special Flood Hazard Areas*. The technical bulletin includes planning considerations regarding warning time, safety of personnel responsible for implementing the measures, and the importance of having an emergency operations plan and a plan for regular inspection and maintenance. ASCE 24-05, the standard for flood damage-resistant design and construction that is referenced by the model building codes, also includes similar requirements and limitations on measures that require human intervention.

6.4.5 Repair of Damaged Buildings

The NFIP requirements for repair of substantially damaged buildings are the same as those described for rehabilitation and remodeling (Section 6.4.1). However, if a proposal for repair also includes an addition to a damaged property, the cost of the addition must be included in the SI/SD determination. If the combination of work is a substantial improvement, then both the addition and the original building must be brought into compliance with the NFIP requirements, depending on the flood zone.

6.4.6 Reconstruction of Demolished or Destroyed Buildings

Any project that involves complete reconstruction, such as rebuilding on the same foundation, is new construction that must comply with all applicable NFIP floodplain management requirements. A building that is totally destroyed or so significantly damaged that it cannot be repaired is a substantially damaged building. Sometimes an owner elects to demolish the building. In these circumstances, if the decision is to reconstruct using the existing foundation, the reconstructed building must meet NFIP requirements for new construction.

6.4.7 Work on Post-FIRM Buildings

All repairs, improvements or modifications to a post-FIRM building are considered new construction (see definition in Chapter 3). Work on a post-FIRM building must not be allowed if it would make the building non-compliant with the floodplain management requirements that had to be met when the building was constructed. Tables 6-1a (A zones) and 6-1b (V zones) identify types of work on post-FIRM buildings and the compliance requirements that apply. In some cases when an addition is involved, the original building has to be brought into compliance.

6.4.8 Work on Buildings Where Flood Maps Have Been Revised

Section 5.6.11 explains that many communities have had revisions to their flood hazard maps. The following illustrate how map revisions that change flood zone designations or modify or add floodway delineations must be taken into consideration:

- If the FIRM has been revised and the SFHA has widened to include more area, that area is now subject to the NFIP requirements. For example, areas that were previously designated X zone may now be shown as A zone or V zone. Improvements and repairs to buildings that were outside of the SFHA but are now in the revised SFHA must be evaluated to determine if the work is SI/SD.
- If the FIRM has been revised and the flood zone or BFE changed, a determination that work is a substantial improvement requires that the building meet NFIP requirements for new construction based on the revised flood zone and revised BFE.
- If the FIRM has been revised and either the floodway boundaries are changed or a floodway is newly delineated, a determination that improvements or repairs to a building are SI/SD may require an encroachment analysis.

6.5 Requirements for Certain Structures

This section describes how SI/SD is addressed for certain types of buildings in accordance with the NFIP floodplain management requirements, including:

- Historic structures (Section 6.5.1)
- Manufactured homes (Section 6.5.2)
- Accessory structures and certain agricultural structures (Section 6.5.3)

6.5.1 Historic Structures

The NFIP gives special consideration to the unique value of designated historic buildings and structures. Provided such structures retain their designations, communities do not have to require them to be brought into compliance if they will be substantially improved or have been substantially damaged. Section 3.4.1 includes the NFIP's definition for "historic structures." The term includes structures that are: (1) listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; (2) certified or preliminarily determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as a registered historic district; or (3) designated as historic site under a State or local historic preservation program that is approved by the Secretary of the U.S. Department of Interior. The definition does not include structures that are merely old, those that residents refer to as historic, or those that happen to be located in historic districts.

The NFIP floodplain management requirements contain two provisions that are intended to provide relief for historic structures located in SFHAs:

(1) The NFIP definition of "substantial improvement" includes the following exclusion for historic structures: "*Any alteration of a 'historic structure,' provided that the alteration will not preclude the structure's continued designation as an 'historic structure'*." The exclusion also applies to historic structures that have been substantially damaged. This provision allows communities to exempt historic structures from the SI/SD requirements of the NFIP.

(2) The other provision of the NFIP floodplain management regulations that provides relief for historic structures" is the variance criteria at 44 CFR § 60.6(a). This provision states: "*Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.*" This provision allows communities to handle applications for work on historic structures by issuing variances.

To address the unique needs of preserving historic structures, communities may elect to use one of the two approaches, either granting variances or exempting historic structures from the SI/SD requirements. Whichever approach is selected, it must be used in all cases when improvements or repairs are proposed for historic structures.

Using the variance option allows communities to evaluate individual requests and place conditions on the variance to make historic buildings more flood damage-resistant and to minimize flood damage. However, such conditions should not affect the historic character and design of the building.

It is important to note that additions to historic structures that are located in floodways require additional attention. While additions may not have to meet the substantial improvement requirements, they must still satisfy the NFIP requirements related to floodway encroachments. A floodway encroachment analysis must be provided to demonstrate that an addition will not cause any increase in the BFE (Section 5.6.8).

Applications for improvements to historic structures should be accompanied by two pieces of evidence: (1) documentation that confirms the building is designated an historic structure; and (2) documentation that confirms the proposed work will not preclude the structure's continued designation. Applicants can ask the appropriate qualified entity that makes such designations to review their construction plans. A copy of the findings should be kept in the community's permanent records.

Although compliance is not required for substantial improvement of historic structures, owners should carefully consider the benefits of implementing measures to minimize flood damage. State historic preservation agencies may have resources to help owners evaluate feasible measures. Historic buildings can be elevated on raised foundations, relocated to sites outside of SFHAs, or retrofitted with measures that reduce risk from flooding. FEMA's *Floodplain Management Bulletin: Historic Structures* (FEMA P-467-2) provides guidance for communities and owners of historic structures.

6.5.2 Manufactured Homes

Communities that participate in the NFIP must issue permits for the placement of manufactured homes in SFHAs. This includes the placement of new manufactured homes, replacement of existing manufactured homes, substantial improvement of manufactured homes, and repair of substantially damaged manufactured homes. This requirement applies even if the community does not otherwise regulate the installation of manufactured homes.

The NFIP regulations define the following terms pertaining to manufactured homes:

- **"Manufactured home"** means *a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term 'manufactured home' does not include a 'recreational vehicle.'*
- **"Manufactured home park or subdivision"** means *a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.*
- **"New manufactured home park or subdivision"** means *a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by a community.*
- **"Expansion to an existing manufactured home park or subdivision"** means *the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).*
- **"Existing manufactured home park or subdivision"** means *a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of floodplain management regulations adopted by a community.*

A **manufactured home park** is usually owned by a single owner who rents pads and/or units.

A **manufactured home subdivision** is similar to traditional subdivisions in that each lot is individually owned.

As described below, most manufactured home placements and substantial improvements are subject to the same NFIP performance standards that apply to typical, site-built residential structures. A limited exception to the elevation requirements also is described below: under certain conditions, the exception applies to the placement of manufactured homes in existing manufactured home parks or subdivisions.

In AE, A1-30, and AH zones, the NFIP minimum requirement at 44 CFR § 60.3(c)(6) requires manufactured homes (including substantially improved homes) to be placed on permanent foundations such that their lowest floors are elevated to or above the BFE. In AO zones, the requirement is for lowest floors to be elevated above the highest adjacent grade at least as high as the depth number specified on the FIRM. Manufactured homes must be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.

In V zones, the NFIP minimum requirement at 44 CFR § 60.3(e)(8) requires manufactured homes (including substantially improved homes) to be placed on permanent foundations such that the lowest horizontal structural members (generally the bottom of the chassis frame) are elevated to or above the BFE. Manufactured homes must be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement. And, as with other buildings in V zones, foundations must be designed to withstand flood forces.

In both A zones and V zones, the above-described requirements apply to sites that are:

- Outside of a manufactured home park or subdivision (individually owned parcels),
- In a new manufactured home park or subdivision,
- In an expansion to an existing manufactured home park or subdivision, or
- In an existing manufactured home park or subdivision on which a home has incurred substantial damage as a result of a flood.

The exception in the NFIP regulations allows an alternative to the requirement to elevate the lowest floors of manufactured homes to the BFE [44 CFR § 60.3(c)(12) and § 60.3(e)(8)]. The exception is applicable only for placements or substantial improvements on lots in existing manufactured home parks and subdivisions. It allows the chassis of a manufactured home to be elevated on reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade. Although the NFIP allows this exception, communities should consider requiring full elevation in flood hazard areas where the floodwaters are known to be swift or more than 3 feet deep because these conditions pose greater risk to vulnerable manufactured homes and their occupants.

NFIP requirements for the substantial improvement of manufactured homes are the same as for residential structures. Specifically, a lateral addition that is determined to be a substantial improvement is illustrated in Figure 6-6. In this case, both the addition and the existing manufactured home must be elevated.

For additional information on the placement and substantial improvement of manufactured homes in SFHAs, see FEMA P-85, *Protecting Manufactured Homes from Floods and Other Hazards: A Multi-Hazard Foundation and Installation Guide.*

6.5.3 Accessory Structures and Certain Agricultural Structures

Floodplain management requirements, including the elevation and SI/SD requirements, apply to accessory structures and agricultural structures. Whether improvements, repairs, or additions to agricultural structures are proposed, local officials must make determinations based on costs and market values. If the work is SI/SD, the requirements apply and accessory structures and agricultural structures must be brought into compliance.

FEMA recognizes that wet floodproofing may be appropriate for accessory structures (garages and sheds only) and certain types of agricultural structures. Certain agricultural structures that qualify for this treatment are those located in wide, expansive floodplains, including farm storage buildings, grain bins, corn cribs, and general purpose barns. All other agricultural structures must comply with the NFIP requirements for non-residential structures, Homes that are built on farms are not agricultural structures and they must fully comply with the NFIP

Wet floodproofing means permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding by allowing water to enter the structure. For specifics, see FEMA FIA-Technical Bulletin 7, *Wet Floodproofing Requirements for Structures Located in Special Flood Hazard Areas.*

requirements. For additional guidance, see FEMA FIA-Technical Bulletin 7, *Wet Floodproofing Requirements for Structures Located in Special Flood Hazard Areas.*

In accordance with the requirements for issuance of variances (Section 5.6.7), communities may grant variances for substantial improvement of accessory structures and certain agricultural structures to allow the use of wet floodproofing measures in lieu of elevation. However, such variances may be granted only if the following conditions are satisfied:

- For certain agricultural structures, the structure is used solely for the parking of agricultural vehicles and machinery, the storage of crops, or the temporary sheltering of livestock;
- For accessory structures, the structure is used only for parking of vehicles and storage;
- The structure is designed and built in such a manner that results in minimal damage to the structure and its contents, including being anchored to resist flotation, collapse, and lateral movement;
- Flood damage-resistant materials must be used below the BFE;
- Mechanical and utility equipment must be elevated or floodproofed to or above the BFE;
- If in the floodway, the floodway encroachment requirements must be satisfied; and
- There will be no additional threats to public safety.

Communities should carefully evaluate improvements made to accessory structures and agriculture structures. If a property owner intends to change the use of the structure to a residential use or other non-residential use, then the work proposed must be evaluated to determine whether it is a substantial improvement.

6.6 NFIP Flood Insurance Implications

The flood insurance rating structure used by the NFIP uses three primary factors:

- Flood zone (A zone or V zone);
- Date of construction (pre-FIRM or post-FIRM), including the date of construction of substantial improvements; and
- For post-FIRM buildings, the elevation of the lowest floor compared to the BFE as evidenced by surveyed elevation data (or for floodproofed non-residential buildings, the height of the floodproofing relative to the BFE).

Rates used for pre-FIRM structures are called "subsidized" or discounted rates. An NFIP policy can be purchased without providing elevation data that are obtained by a survey.

Rates used for post-FIRM structures (and pre-FIRM structures that are substantially improved) are called "elevation" rates because they depend on the elevation of the lowest floor relative to the BFE. Elevation rates are considered to be "actuarial." To be properly rated, surveyed elevation data are required.

The NFIP requires that substantially improved or substantially damaged buildings be brought into compliance. NFIP flood insurance policies on those buildings are written using rates based on elevation. In most cases, the premium will decrease when a pre-FIRM building is substantially improved and

brought into compliance. The building becomes a post-FIRM building and premiums are calculated using elevation rates.

When questions arise concerning how a proposed improvement might affect a flood insurance policy, it is always best to encourage property owners to obtain a cost estimate from an insurance agent. Table 6-2 indicates how compliance with the SI/SD requirements affects how policies are rated. Figure 6-14 illustrates an example of how the cost of an NFIP policy will vary, depending on how a substantially damaged home is repaired.

Table 6-2. Substantial Improvement and NFIP Flood Insurance Implications

	Description of Work	NFIP Flood Insurance Implications
Pre-FIRM	Interior renovation only, work constitutes SI; whole building brought into compliance by elevating the lowest floor at or above the BFE. *Or* Structurally-connected lateral addition or second story addition, work constitutes SI; whole building brought into compliance.	Policy is written using post-FIRM elevation rates based on a survey of new lowest floor elevation at or above the BFE.
Pre-FIRM	Interior renovation only, work constitutes SI; building is NOT elevated in compliance with the requirements (i.e., it is a violation). *Or* Second story addition, work constitutes SI; building is NOT elevated in compliance with the requirements (i.e., it is a violation).	Policy is written using post-FIRM elevation rates based on a survey of new lowest floor below the BFE, which may result in a significantly higher flood insurance premium. *Or* If the owner refuses to address the violation and bring the building into compliance, the community may cite the structure as a violation in accordance with Sec. 1316 of the National Flood Insurance Act of 1968, which allows the NFIP to deny flood insurance on all insurable buildings on the property (Section 5.6.13).
Pre-FIRM	Lateral addition not structurally connected (connecting door only), work constitutes SI and only the addition is elevated.	Policy is written using subsidized rates because the original building is unchanged.
Post-FIRM	Lateral addition, regardless of value; addition is not elevated, thus, the building is not in compliance (i.e., it is a violation).	Policy is written using elevation rates based on the elevation of the lowest floor of the addition, which may result in a significantly higher flood insurance premium.

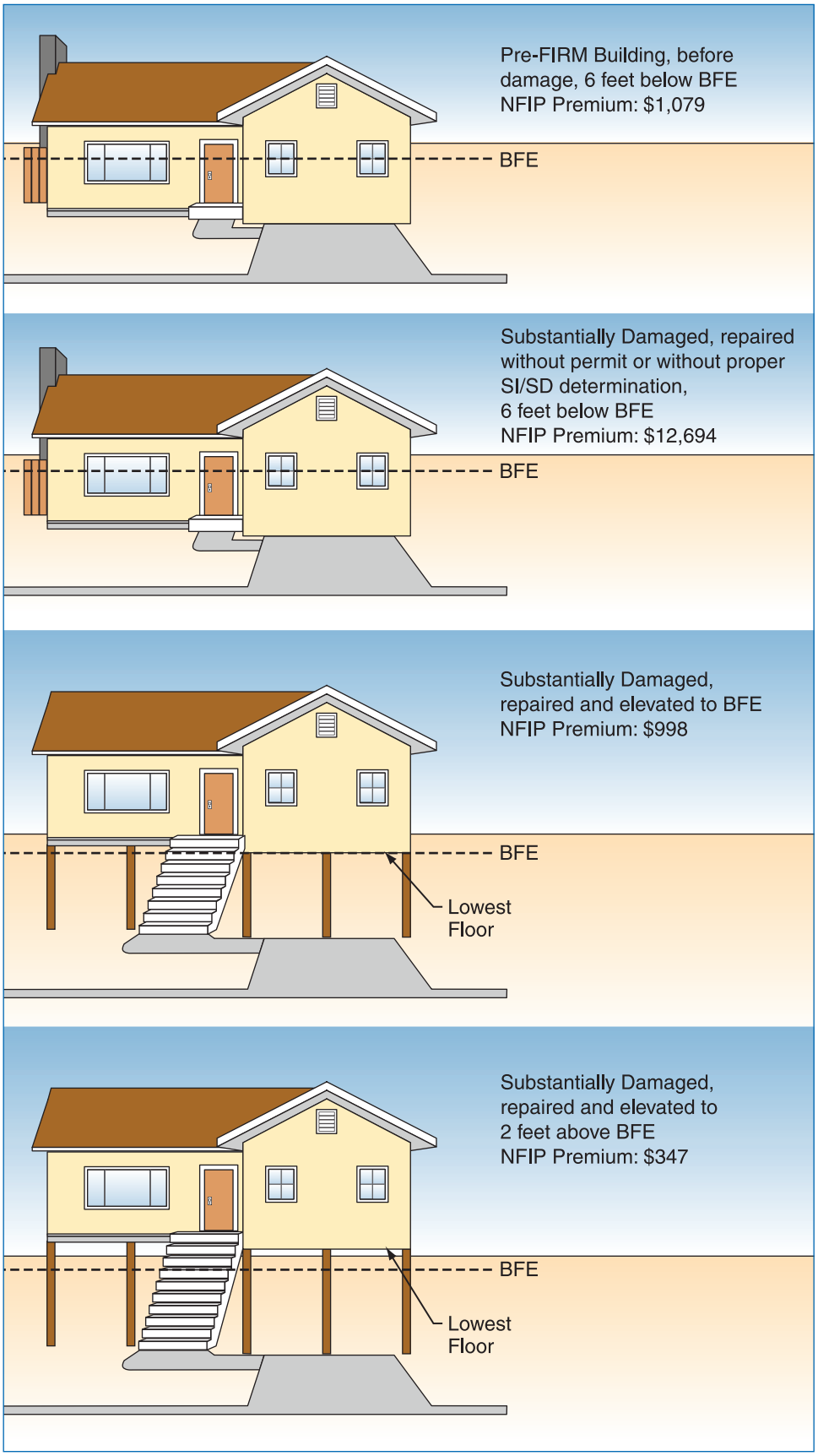

Figure 6-14. The cost of NFIP flood insurance policy varies depending on how a substantially damaged building is repaired. This illustration is for $150,000 in structure coverage with the rates as of October 2009. The figure is for comparison purposes only.