



# Federal Emergency Management Agency

## REGION VII

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### GUIDANCE ON MANUFACTURED HOMES IN SPECIAL FLOOD HAZARD AREAS

This document provides guidance on three specific issues on regulating manufactured homes in Special Flood Hazard Areas under the National Flood Insurance Program (NFIP):

*NFIP requirements for manufactured homes to elevate on and anchor to a "permanent foundation;"*

*NFIP substantial damage requirements and manufactured homes; and*

*Replacement of a manufactured home that was evacuated to avoid flooding.*

#### NFIP REQUIREMENTS FOR MANUFACTURED HOMES TO ELEVATE ON AND ANCHOR TO A PERMANENT FOUNDATION

◆**General Guidance:** In general, Sections (§) 60.3(b)(8), (c)(6), and (c)(12) require that manufactured homes in Zones A1-30, AE, AH, AO and A be elevated on and anchored to a **permanent foundation** to resist flotation, collapse, and lateral movement during the base flood. This requirement is intended to be a **general performance criterion** and not a specific design standard. However, the installation of a manufactured home in a Special Flood Hazard Area necessitates certain minimum features that will enable the home to resist flood forces at the site. Generally, a permanent foundation should include the following features:

1. A below-grade footing capable of providing resistance against overturning of the manufactured home (the depth of which takes into account frost depth and expected scour) and sized appropriately for the site's soil bearing capacity;
2. An anchoring system (consisting of a combination of ties, anchors, and anchoring equipment) capable of providing resistance to uplift and overturning of the manufactured home due to flood and wind forces, and able to maintain the required pullout resistance in saturated soil conditions; and
3. Adequate connections between all the components of the foundation and the home such that the foundation acts as a cohesive unit when resisting flood and wind forces. The size, strength, and configuration of each of the components is dependent upon the site conditions (soil type, frost depth, wind exposure, topography) and expected flood conditions (depth, velocity, duration of flooding expected).

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THE LOCAL FLOODPLAIN PERMIT OFFICIAL MUST DETERMINE WHETHER THE PROPOSED FOUNDATION SETUP MEETS THE NFIP PERFORMANCE STANDARD FOR RESISTING FLOOD FORCES AT THE SITE. THE LOCAL OFFICIAL MAY REQUIRE AN ENGINEER TO DETERMINE WHETHER THE PROPOSED FOUNDATION SYSTEM AND CONNECTIONS BETWEEN THE FOUNDATION AND THE HOME WILL RESIST THE FLOOD FORCES AT THE SITE. Many states require an engineer to design or approve the design of foundation systems greater than 36 inches in height.

*NOTE: While the design and construction of manufactured homes are regulated by the U.S. Department of Housing and Urban Development (HUD), siting and installation requirements for manufactured homes are generally a state or local regulatory responsibility and not within the scope of HUD's regulations. The Federal Manufactured Home Construction and Safety Standards (MHCSS) (24 CFR, Part 3280) establish performance requirements for the design and construction of manufactured homes and their foundation components.*

*On July 13, 1994, HUD amended provisions of MHCSS to require manufactured homes to resist higher wind loads in areas subject to hurricane-force winds. These standards are found at 24 CFR § 3280 and § 3282. HUD promulgated these new standards after analyzing the numerous failures of manufactured homes and the missile damage to adjacent structures from the breakup of these homes during Hurricane Andrew. The new rule requires structural components, cladding, and the anchoring/foundation systems of manufactured homes destined for hurricane-prone areas to be designed in accordance with the design wind pressures and wind speeds specified in the American Society of Civil Engineers Standard ASCE 7-88, "Minimum Design Loads for Buildings and Other Structures". The rule identified hurricane-prone areas as Wind Zones II and III, shown on a revised Wind Zone Map taken from the ASCE 7-88 standard.*

*The new higher wind standards will result in stronger foundation and stabilizing system components and increased attention to installation practices in the coastal areas affected by the rule. (Wind design requirements in non-hurricane areas of the U.S. were not changed by the 1994 rule.) While equipment manufacturers must now upgrade their products and provide installation instructions to meet the increased wind load requirements, the manner in which manufactured homes are installed and anchored dictate the ultimate ability of the entire home to withstand forces from natural hazards.*

**◆ Acceptable Foundation Systems:** A site-specific analysis should be undertaken to determine the appropriate foundation system to resist flood forces and conditions expected at the site. Examples of permanent foundation systems that are capable of resisting flood forces include: reinforced piers, posts, piles, and poured concrete, or reinforced block foundation walls. Compacted fill is an elevation technique that can also be used to elevate the home to or above the Base Flood Elevation (BFE).

In addition, FEMA has been made aware of a **post-tensioned dry-stack pier system** that can be designed and installed to meet the performance criterion for resisting flood forces. Given adequate downward tension on the piers through the tie-down and anchoring system, a post-tensioned dry-stack block pier may be used as long as it provides the same or greater resistance to flood forces at the site as a reinforced pier. Generally, the post-tensioned dry-stack pier system can be used only in areas with low flood velocity. As with the above foundation systems, use of a post-tensioned dry-stack system should be determined by site-specific analysis of the flood forces expected at the site to ensure that this foundation approach will meet the NFIP performance criterion.

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The traditional (non-tensioned) dry-stacked block foundation commonly used to install manufactured homes would not be acceptable in a Special Flood Hazard Area. A dry-stacked block pier foundation is dependent on the weight of the manufactured home to keep the foundation in place and provides very little resistance to flood forces. Under flooding conditions, the manufactured home can become buoyant or can be subject to lateral flood forces. This can result in overturning and collapse of the piers and severe damage to the manufactured home.

For seismic and other hazards, additional forces may need to be considered. The community should refer to their State building code or manufactured home installation regulations, or a national building code or standard for further guidance.

### **The following NFIP provisions apply to manufactured homes in A Zones:**

**NFIP Requirements at § 60.3(b)(8):** This provision requires that a manufactured home must be elevated and adequately anchored to a permanent foundation to resist flotation, collapse and lateral movement due to flood forces. While specific methods of anchoring are mentioned in paragraph (b)(8) (over-the-top or frame ties to ground anchors), other anchoring approaches may be used as long as the performance standards for resisting flotation, collapse, and lateral movement are met. The anchoring requirement to resist flood forces is in addition to applicable State and local anchoring requirements for resisting wind forces.

**NFIP Requirements at § 60.3(c)(6):** This provision requires that if the manufactured home is to be placed or substantially improved on sites (i) outside of a manufactured home park; (ii) in a new manufactured home park; (iii) in an expansion to an existing park; or (iv) in an existing park where the home previously occupying the pad on which the new home is to be placed incurred substantial damage as a result of flood, the home must be elevated on a **permanent foundation** such that the lowest floor is to or above the BFE, and must be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement.

**NFIP Requirements at § 60.3(c)(12):** If a manufactured home is to be placed or substantially improved on sites in an existing park or subdivision where the provisions of paragraph (c)(6) do not apply, the manufactured home must be elevated so that either (i) the lowest floor is to or above the BFE; or (ii) the home is elevated on reinforced piers or other foundation elements of at least equivalent strength that are 36 inches or greater in height above grade. (Note: If flood depths are lower than 36 inches, the manufactured home need only be elevated to the BFE.) In either case, the home must be anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement.

The word “reinforced” is intended to emphasize the general requirement that the manufactured home be placed on a **permanent foundation**. Foundations other than reinforced piers may be used, as long as they provide the same or greater resistance to flood forces at the site.

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In addition, the NFIP performance requirement (resisting flotation, collapse, and lateral movement) may not be met in situations where the BFE exceeds the height of the 36 inch reinforced pier. In these situations, the foundation elements should be designed as if the water level is at the top of the manufactured home floor.

**◆ Insurance Implications:** Article 6 - Property Not Covered, paragraph H. of the National Flood Insurance Program, Standard Flood Insurance Policy, Dwelling Form states:

“Certain manufactured homes, meaning a manufactured (i.e., mobile) home located or placed within a FEMA designated Special Hazard Area that is not anchored to a permanent foundation to resist, flotation, collapse, or lateral movement:

- 1) By over-the-top or frame ties to ground anchors; or
- 2) In accordance with manufacturer’s specifications; or
- 3) In compliance with the community’s floodplain management requirements unless it is a manufactured (i.e., mobile) home on a permanent foundation continuously insured by the National Flood Insurance Program at the same site at least since September 30, 1982.”

Eligibility for flood insurance under the NFIP incorporates a broader approach in the types of “permanent” foundations that are acceptable in order to insure existing manufactured homes that pre-date the 1989 Final Rule changes to the NFIP Regulations for manufactured homes (*Federal Register*/Vol. 54. No. 188, September 29, 1989). To be insured, the manufactured home can be on a poured masonry slab, foundation walls, piers, or block supports, any one of which provides support so that no weight is carried by the wheels and axles. Some of these types of “permanent foundation systems”, however, will not meet the performance standards prescribed in the NFIP Floodplain Management Regulations at Section 60.3(b)(8), (c)(6), and (12) due to the expected flood forces and other conditions present at the site.

**◆ Research Underway:** Questions have been raised on the application of the designs and specifications in the publication, Manufactured Home Installation in Flood Hazard Areas, (FEMA-85/September 1985). Note that this document pre-dates the 1989 Final Rule change on manufactured homes. **This document should be used as general technical guidance and does not substitute for a site-specific analysis of the flood forces and conditions expected at the site.**

Research has revealed a fairly institutionalized set of practices inherent to the purchase, financing and installation of manufactured homes. These practices may not always facilitate compliance with the NFIP elevation and performance criteria. Questions raised by State and local officials as to whether a particular foundation system meets NFIP requirements indicates a need for pre-engineered foundation designs that meet the NFIP criteria.

For these reasons, coupled with the need to revisit the information provided in FEMA-85, research is being undertaken to develop a number of pre-engineered manufactured home foundation designs. Once this research is completed, FEMA will determine whether to update this manual or issue a Technical Bulletin.

### **SUBSTANTIAL DAMAGE REQUIREMENT AND MANUFACTURED HOMES**

A question was raised whether a manufactured home damaged by flood in an existing park requires all subsequent placements on that site or pad and all other sites or pads in an existing manufactured home park or subdivision to be elevated to the BFE, or whether this requirement is carried out on a site-by-site basis.

■ Only manufactured homes placed on sites or pads where manufactured homes have incurred substantial damage due to flooding in an existing manufacture home park or subdivision must be elevated to or above the BFE.

■ A manufactured home that was not substantially damaged (less than 50% of the market value), but is adjacent to a home that was substantially damaged, is **not required** to be elevated. If a flooded manufactured home in an existing manufactured home park or subdivision is not substantially damaged, but is replaced with a new manufactured home or is substantially improved, the owner has the option of elevating to the BFE or using a 36-inch foundation, as described in (c)12).

### **REPLACEMENT OF A MANUFACTURED HOME THAT WAS EVACUATED TO AVOID FLOODING**

As a result of flooding in the winter of 1995/1996, questions were raised as to what the NFIP floodplain management requirements are for a manufactured home that was evacuated in order to avoid flooding.

**Evacuated Manufactured Home Returned to Same Site:** When an existing manufactured home is evacuated in order to avoid flooding, and returned to the **same** site or pad, it is not a new placement or replacement. In this case, the manufactured home must either be Pre-FIRM on a site outside a manufactured home park or subdivision, or it must be in an existing manufactured home park or subdivision, one which predates the 1989 Final Rule (September 29, 1989). (This rule revised the requirements for the placement or substantial-improvement of manufactured homes in existing manufactured home parks or subdivisions in Special Flood Hazard Areas.) The manufactured home is allowed to be placed back on the site or pad without having to meet the minimum NFIP floodplain management requirements including elevation so long as it is not enlarged or altered in any way.

The following rationale supports the policy to allow an existing manufactured home to be evacuated to avoid flooding and be returned to the same site or pad without having to meet the NFIP floodplain management requirements:

■ Evacuation of an existing manufactured home before the flood avoids damages and reduces or eliminates the need for disaster assistance payments and flood insurance claims. For this reason, FEMA does not wish to discourage the evacuation of individual manufactured homes where feasible.

■ FEMA recognizes that some communities may have procedures in place for evacuating manufactured homes when there is a threat of flooding and may provide local assistance for the removal of manufactured homes to protect life and property. While FEMA cannot require

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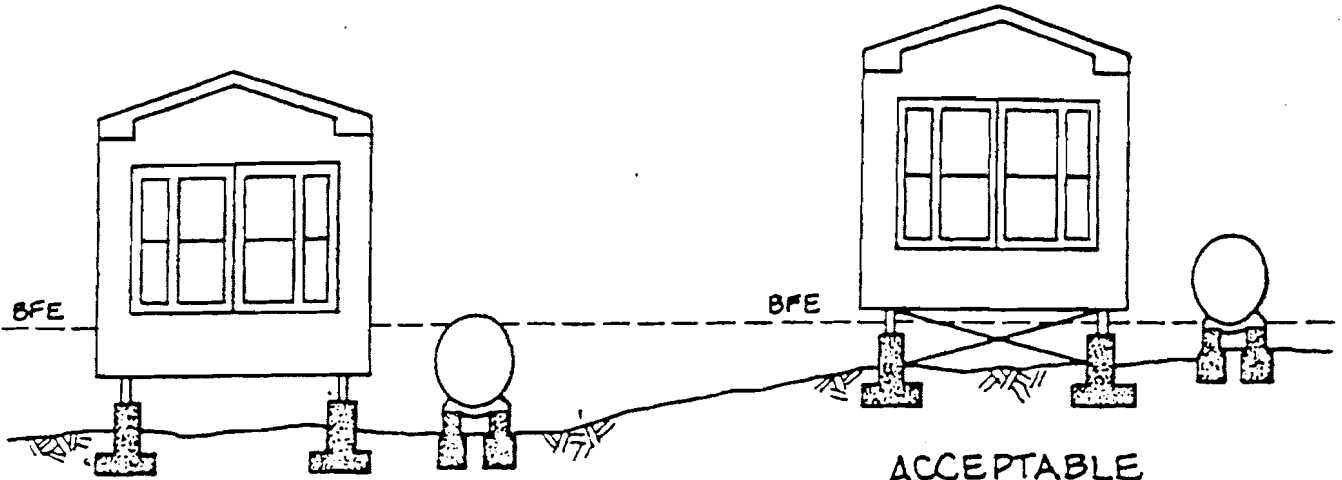
communities to adopt evacuation plans or procedures for the removal of existing manufactured homes, communities can be encouraged to determine whether existing manufactured homes in existing manufactured home parks or subdivisions or on individuals sites in Special Flood Hazard Areas can be safely evacuated, and to develop plans and procedures for removing and temporarily siting these homes in the event of a flood.

■ This approach is consistent with the Flood Insurance Policy which covers a manufactured home while it is located “For 45 days, at another place above ground level or outside of the special flood hazard area, ..., due to the imminent danger of flood.” In addition, the property owner can be reimbursed in an amount not to exceed \$500 for reasonable expenses incurred in moving any of the insured property temporarily away from the peril of flood. (Article 5, C.2. of the Standard Flood Insurance Policy - Dwelling Form)

Communities that allow manufactured homes to be evacuated to avoid flooding should have a tracking/permitting system in place to ensure that the same home is being returned to the same permanent site or pad. If a community has developed an evacuation plan that pre-identifies manufactured homes that would be evacuated in the event of a flood, the plan should include procedures for determining which manufactured homes were actually evacuated and which ones are to be returned to their permanent site or pad. If a community has not developed an evacuation plan or individual manufactured home owners initiate evacuation of their home on their own, the community is still responsible for determining whether the same home is being returned to the same permanent site or pad. The community should issue some type of re-occupancy permit for owners who want to return the home to the same permanent site or pad as a record to distinguish these from new or substantially improved manufactured homes that must meet the community’s floodplain management regulations. A variance under the NFIP Floodplain Management Regulations at 44 CFR 60.6(a) is not required for returning an evacuated manufactured home to the same permanent site or pad because it is not a new placement or a replacement of or substantial improvement to an existing manufactured home.

**Evacuated Manufactured Home Returned to a Different Site or Pad or Substantially Improved:** If the existing manufactured home that was evacuated due to the threat of flooding is placed on a different site or pad in the existing manufactured home park or subdivision or is substantially improved even on the original site or pad, it would have to meet at a minimum §60.3(c)(12) in all Zones (the manufactured home would have to be elevated to the BFE or be elevated at 36 inches in height above grade).

**Evacuated Manufactured Home Placed in a New Manufactured Home Park or Subdivision:** If the manufactured home that was evacuated is placed in a new manufactured home park or subdivision, or in the expanded part of an existing manufactured home park or subdivision, or is located on a site outside a manufactured home park or subdivision, it would have to meet the requirements of §60.3(c)(6) in Zones A1-30, AE, AH (elevate to the BFE).

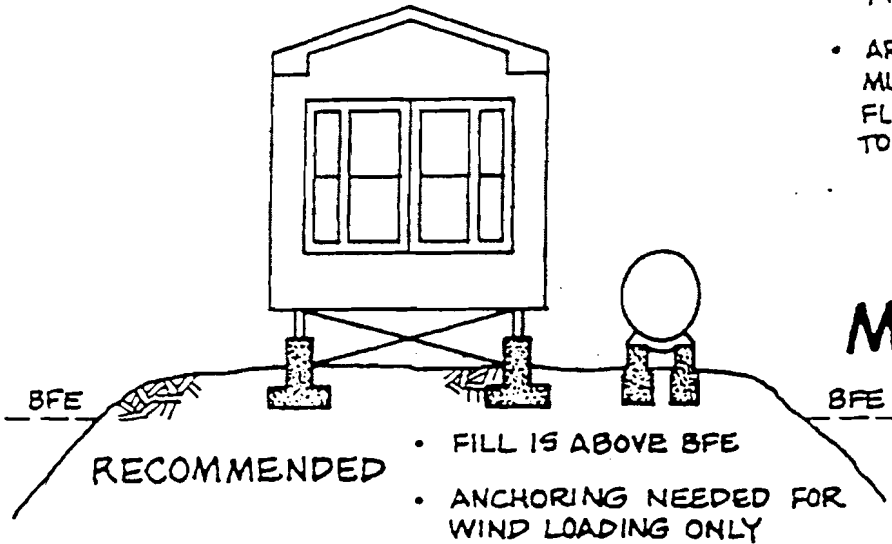


**VIOLATION**

- LOWEST FLOOR BELOW BFE

**ACCEPTABLE**

- LOWEST FLOOR ABOVE BFE
- HOME MUST BE ANCHORED PROPERLY TO RESIST FLOTATION
- AREA BELOW LOWEST FLOOR MUST HAVE OPENINGS TO ALLOW FLOODWATERS TO ENTER AND EXIT TO EQUALIZE PRESSURE



**RECOMMENDED**

- FILL IS ABOVE BFE
- ANCHORING NEEDED FOR WIND LOADING ONLY

**PLACEMENT OF  
MANUFACTURED  
HOMES  
IN THE  
FLOODPLAIN**