



NFIP Requirements for Manufactured Housing



AAFM Fall Conference
October 16, 2014
Auburn, AL

Objectives and Summary

Objectives:

- *To provide information for a better understanding of NFIP requirements for manufactured housing.*
- *To show what the standards are for compliant installation of manufactured housing.*
- *To provide information on some best practices and guidance for the installation of manufactured housing in flood hazard areas.*

Summary:

- I. *FEMA, Manufactured Housing, and the NFIP*
- II. *State NFIP Coordinator and Local Floodplain Administrator Roles*
- III. *Design Standards for Manufactured Housing in Flood Hazard Areas To Meet NFIP Requirements*
- IV. *Installation Practices for Manufactured Housing in SFHAs*

Resources:

- 1) FEMA P-85: Protecting Manufactured Homes from Floods and Other Hazards - A Multi-Hazard Foundation and Installation Guide (2009)
- 2) Housing and Urban Development Website:
(http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/rmra/mhs)

I. FEMA, Manufactured Housing, and the NFIP

Manufactured Housing in US

Purpose of Manufactured Housing: They fill a demand for affordable housing in many rural areas

- ❑ *95,700 manufactured homes in US with average price of \$64,500*
- ❑ *Single-section homes had average price of \$35,200*
- ❑ *Double-section homes had an average price of \$73,100*
- ❑ *74% of new manufactured homes are located on private properties (remainder in manufactured home parks)*
- ❑ *Average floor size is approximately 1,600 sq. ft.*
- ❑ *31% of MH are located in four states (FL, CA, LA, and TX)*

Source: 2007 U.S. Census

In Alabama

- ❑ *14.3 % of total housing units are mobile homes (4th highest rank in US behind SC, NM, MS)*

Source: 2008 U.S. Census

Federal Emergency Management Agency (FEMA)

FEMA administers the National Flood Insurance Program (NFIP). Its responsibilities include:

- ❑ *Identifying communities with SFHAs;*
- ❑ *Issuing flood-boundary and flood-rate maps for flood-prone areas;*
- ❑ *Making flood insurance available through the NFIP “Write Your Own” program*
 - Enables the public to purchase NFIP coverage from private companies that have entered into agreements with the Federal Insurance Administration.
 - Licensed property and casualty insurance agents and brokers provide the primary connection between the NFIP and the insured party.
 - Licensed agents sell flood insurance policies and process the claims for any damages.
- ❑ *Assisting communities in adopting and enforcing floodplain management regulations;*
- ❑ *Providing technical assistance for NFIP compliance and flood mapping interpretation; and*
- ❑ *Administering the insurance program (development of program policies, setting insurance rates, paying*

FEMA & National Flood Insurance Program

NFIP regulates Manufactured Homes in SFHA

- ❑ *Since 1976, the NFIP has regulated the installation of manufactured homes in floodplains.*
- ❑ *NFIP has strengthened the regulations by defining existing and new manufactured home parks as separate entities.*
- ❑ *Different standards apply for new and existing parks.*
- ❑ *The standards governing manufactured homes continue to improve.*

FEMA Provides Technical Guidance

- ❑ *FEMA P-85: Protecting Manufactured Homes from Floods and Other Hazards - A Multi-Hazard Foundation and Installation Guide*

Industry Guidance on Manufactured Housing Design & Installation

- ❑ *Manufactured Housing Institute's Overview of Manufactured Home Installation*
- ❑ *Guide to Foundation and Support Systems for Manufactured Homes (Manufactured Housing Research Alliance, 2002)*
- ❑ *Sectional Manufactured Housing Installation Manual (Friendship Homes of Minnesota, 2009)*

FEMA & National Flood Insurance Program (cont'd)

NFIP Definitions Related to Manufactured Homes (regulations from 44 CFR 59.1)

- ❑ *“Manufactured home” means a structure, transportable in one or more sections built on a chassis and designed for use with/without a permanent foundation when attached to utilities.*
- ❑ *“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.*
- ❑ *“Existing manufactured home park or subdivision” means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by the community.*

FEMA & National Flood Insurance Program (cont'd)

Definitions (cont'd):

- ❑ **“New manufactured home park or subdivision”** means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of the 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).

General NFIP Requirements for Manufactured Homes

Participating communities are required to regulate **all** development in special flood hazard areas (SFHAs)

- ❑ *“**Development**” is defined in the NFIP regulations as:
Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.*
- ❑ *A permit must be obtained from the community.*
- ❑ *The community is responsible for reviewing all permit applications to determine whether development complies with the community’s floodplain management regulations.*
- ❑ *Communities are also required to review proposed development in SFHAs to ensure that all necessary permits have been received from those government agencies from which approval is required by Federal or State law.*

General NFIP Requirements for Manufactured Homes (cont'd)

- ❑ *44 CFR 60.3 (a) - “Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall*
 - i. be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,*
 - ii. be constructed with materials resistant to flood damage,*
 - iii. be constructed by methods and practices that minimize flood damages, and*
 - iv. be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.”*¹⁰

General NFIP Requirements for Manufactured Homes (cont'd)

- ❑ *44 CFR 60.3 (a)(4) - "Review subdivision proposals and other proposed new development, including manufactured home parks or subdivisions, to determine whether such proposal will be reasonably safe from flooding. If a subdivision proposal or other proposed development is in a flood-prone area, any such proposals shall be reviewed to assure that:
 - i. all such proposals are consistent with the need to minimize flood damages within the flood-prone area,
 - ii. all public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage, and
 - iii. adequate drainage is provided to reduce exposure to flood hazards."*

General NFIP Requirements for Manufactured Homes (cont'd)

Approximate Zone A Areas:

- ❑ *When a manufactured home is proposed in an Approximate A Zone site, the community must make every effort to obtain any BFE data and floodway data in order to achieve a reasonable measure of flood protection. [44 CFR 60.3(b)(4)]*
- ❑ *These are available from several sources:*
 - Variety of State and Federal sources for local hydrologic and hydraulic studies,
 - Approximate models available from OWR for flood studies done since 2008,
 - If BFE or floodway data cannot be obtained from these sources, the community should consider conducting, or requiring the applicant to conduct, a site-specific engineering analysis to determine a BFE (either simplified methods or engineering study).

General NFIP Requirements for Manufactured Homes (cont'd)

Approximate Zone A Areas (cont'd):

- ❑ *44 CFR 60.3 (b)(3) - “Require that all new subdivision proposals and other proposed development (including proposals for manufactured home parks and subdivisions) greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals base flood elevation data.”*
 - Community can perform a study to determine these elevations or require the developer to fund or complete the study.
 - When 50-lot, 5-acre threshold is surpassed for a development that includes one or more lots that are at least partially within the floodplain, BFE data must be developed through detailed study methodologies.
 - If the developer completes the study, it is subject to approval by the community.
 - CLOMR should be required if proposed development includes revisions to channel, floodway, or base flood elevations. LOMR submission required also after

General NFIP Requirements for Manufactured Homes (cont'd)

Approximate Zone A Areas (cont'd):

- ❑ *44 CFR 60.3 (b)(8) - "...all manufactured homes to be placed within Zone A on a community FHBM or FIRM shall be installed using methods and practices which minimize flood damage. For the purpose of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, the use of over-the-top frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces."*
- ❑ *Where elevation data is not available, FEMA advises communities to require manufactured homes to be elevated at a minimum of 3 feet or higher from the highest adjacent grade to minimize flood damages. In addition:*
 - Areas below the 3-foot elevation must be constructed with flood-resistant materials and utilities,
 - Mechanical equipment must be elevated to the 3-foot elevation,
 - Any utility and mechanical components that must be below the BFE must be made watertight to the 3-foot elevation.

General NFIP Requirements for Manufactured Homes (cont'd)

- ❑ *44 CFR 60.3 (c)(6) – “Require that manufactured homes that are placed or substantially improved within Zones A1-30, AH, and AE on the community's FIRM on sites*
 - i. Outside of a manufactured home park or subdivision,*
 - ii. In a new manufactured home park or subdivision,*
 - iii. In an expansion to an existing manufactured home park or subdivision, or*
 - iv. In an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as the result of a flood,*

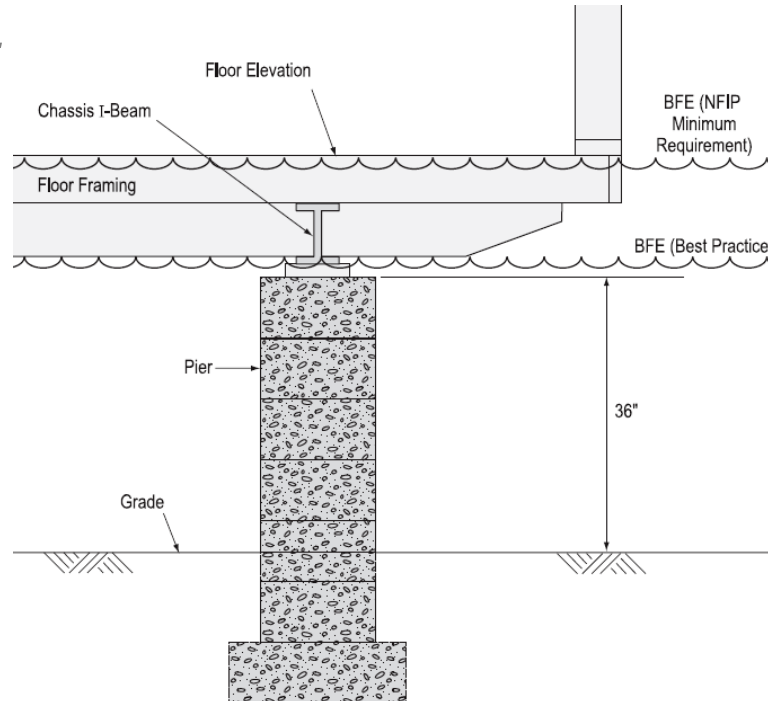
be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement.”
- ❑ *An exception has been made for the placement of manufactured homes in existing manufactured home parks or subdivisions, **however:***
 - *Once a manufactured home in an existing manufactured home park or subdivision is substantially damaged by flood, from that point on all manufactured homes placed on that lot must be elevated to or above the BFE.*

General NFIP Requirements for Manufactured Homes (cont'd)

- ❑ *44 CFR 60.3 (c)(12) - Require that manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A-1-30, AH, and AE on the community's FIRM that are not subject to the provisions of paragraph (c)(6) of this section be elevated so that either:*
 - i. The lowest floor of the manufactured home is at or above the base flood elevation, or
 - ii. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.

General NFIP Requirements for Manufactured Homes (cont'd)

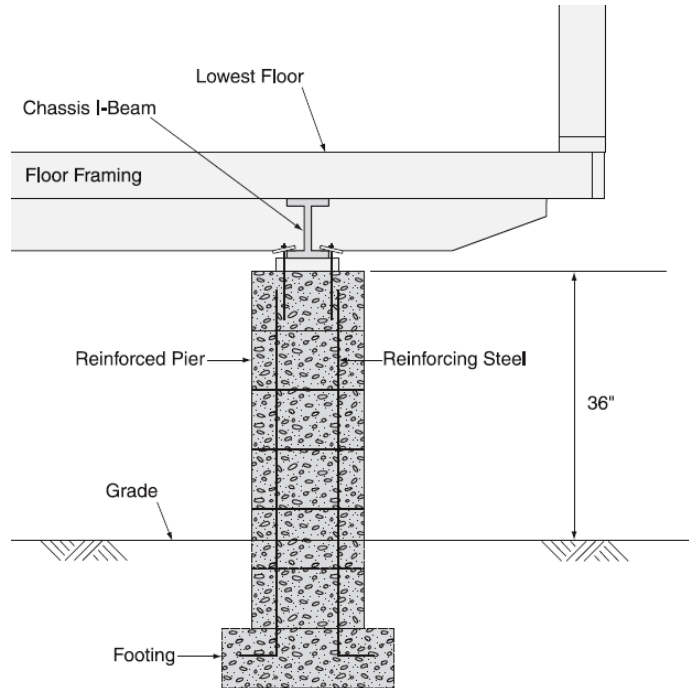
- ❑ *FEMA guidance recommends for A zones the best practice of placing the bottom of the manufactured home's steel frame at the BFE and not the lowest floor of the manufactured home in order to prevent flood damage to the floor and other interior finishes and contents.*



General NFIP Requirements for Manufactured Homes (cont'd)

- ❑ *Those elevation requirements [from 44 CFR 60.3 (c)(12)] apply in existing manufactured home parks or subdivisions established before the date of the community's initial floodplain management regulations when:*
 - 1) A manufactured home is being placed or replaced with a new model in an existing community or subdivision, or
 - 2) A manufactured home is being replaced in an existing manufactured home park or subdivision when the previous home had sustained substantial damage due to reasons other than a flood.
- ❑ *The 36-inch pier does not apply to the repair or replacement of a manufactured home on a site in an existing manufactured home park where a manufactured home has been substantially damaged by flood.*

General NFIP Requirements for Manufactured Homes (cont'd)



- ❑ *Typical example of a foundation used on manufactured housing per the 36-inch pier foundation. The pier, footing, and connection between the pier and the home must be designed to resist:*
 - flotation,
 - collapse, or
 - lateral movement

II. State NFIP Coordinator & Local Floodplain Administrator Roles

State NFIP Coordinator

Alabama's Office of Water Resources – Floodplain Management Unit's State NFIP Coordinator' Role:

- ❑ *Provides technical assistance for permitting, NFIP compliance, flood insurance, elevation certificates, and LOMAs.*
- ❑ *Provides training, outreach materials, and presentations at conferences and workshops.*
- ❑ *Can provide assistance in the field to review site development (limited basis).*
- ❑ *Reviews local floodplain management ordinances and programs for compliance and addressing programmatic issues/concerns.*

Local Floodplain Administrator

Alabama's Local Floodplain Administrator's Role:

- ❑ *Performs permitting for **all** development in the community's regulated flood hazard areas and any community designated flood hazard areas.*
- ❑ *Maintains necessary documentation (including ECs) of floodplain development for future review by State and Federal agencies.*
- ❑ *Provides technical assistance to local developers, builders, engineers, surveyors, and residents for development in and adjacent to flood hazard areas.*
- ❑ *Maintains technical knowledge of floodplain management concepts to the greatest extent possible by attending continuing education, reading technical guidance documents, and coordination with the State NFIP Coordinator or FEMA.*
- ❑ *Keeps FEMA and State NFIP Coordinator informed of any compliance issues that have been identified and are unresolved.*
- ❑ *Require CLOMRs and LOMRs be prepared, when applicable, for projects that modify the regulatory flood hazard areas channel, floodway, or base flood*

III. Design Standards for Manufactured Housing in Flood Hazard Areas To Meet NFIP Requirements

Design Standards for Manufactured Housing in SFHAs

Background for MH Design Standards: Developed as a result of FEMA's Mitigation Assistance Team (MAT) [formerly Building Performance Assessment Team (BPAT)] that are dispatched to report on the performance of structures in impacted areas following a disaster.

- ❑ *In 1992, Hurricane Andrew struck Dade County, Florida, destroying 97 percent of the manufactured homes in its path.*
- ❑ *In 1994, in response to the devastating damage from Hurricane Andrew, HUD adopted more stringent wind design criteria for manufactured homes installed in HUD Wind Zones II and III.*
- ❑ *In 1998, Hurricane Georges caused damage throughout Monroe County (the Florida Keys), Florida.*
 - BPAT dispatched to report on the performance of manufactured housing in impacted areas.
 - Most of the damage observed occurred to homes installed before Monroe County had adopted the NEIP regulations and the revised HUD standards

Design Standards for Manufactured Housing in SFHAs (cont'd)

Most of the flood damage caused by Hurricane Georges was the result of:

- lack of adequate elevation,*
- the use of unreinforced piers (dry-stacked blocks) in areas exposed to moving floodwaters,*
- inadequate anchoring,*
- failure of attached site-built additions, and*
- anchoring failures:*
 - poorly attached anchors;
 - lack of corrosion-resistant materials;
 - homes not fastened to their support piers; and
 - improperly attached tie-down straps.

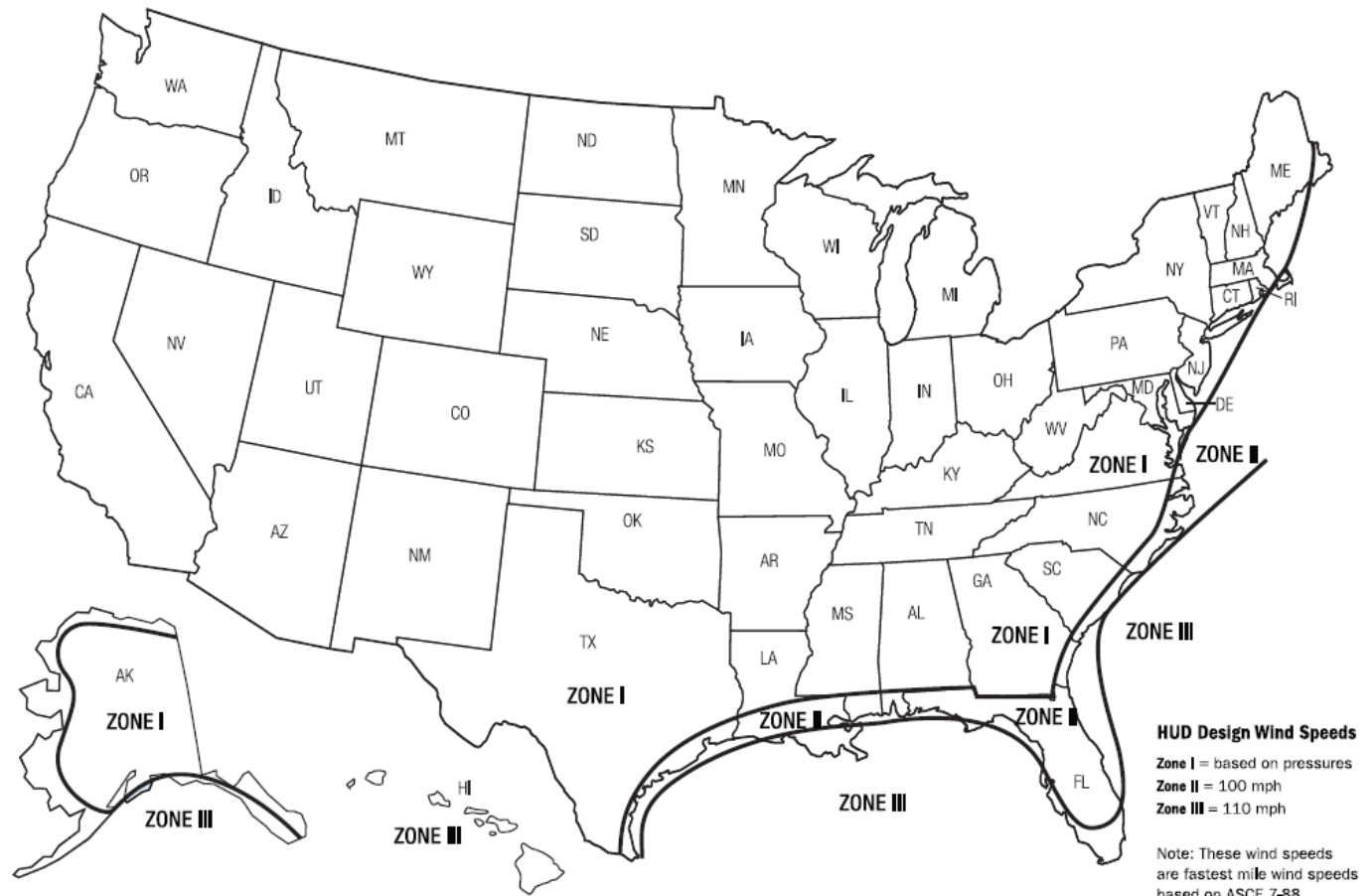
Standards for Manufactured Housing

Development of the Dept. of Housing and Urban Development's Manufactured Home Construction and Safety Standards (MCHSS)

- ❑ *Prior to 1975, there were no Federal mandatory regulations or standards governing the design and construction of manufactured homes.*
- ❑ *Since 1976, HUD's MCHSS, or "HUD codes," have regulated the design and construction of factory-built manufactured housing.*
- ❑ *After Hurricane Andrew in 1992, the HUD codes underwent many improvements regarding design and construction of manufactured homes.*
- ❑ *The HUD codes were revised in 1994 to include three wind zones (Figure on next page).*
 - Zone I homes are designed to resist specified lateral and uplift wind pressures. Design wind speed for Zone I are not specified.
 - Zone II homes are designed to resist a 100-mph (feet per mile) wind speed.

Standards for Manufactured Housing (cont'd)

HUD Wind Zone Map for Manufactured Housing



Standards for Manufactured Housing (cont'd)

- ❑ *All manufactured homes built on or after June 15, 1976 are subject to HUD requirements.*
- ❑ *Building codes are typically regulated at a local level.*
 - Exception is made with manufactured housing, which has federal manufacturing and building requirements, because it is most often built outside of the locality where it is eventually sited for use.
- ❑ *Manufacturers who build manufactured homes for sale in the U.S. are required to follow HUD-mandated design and construction standards.*
 - The standards are enforced either through HUD or approved Primary Inspection Agencies (either private firms or State administrative agencies).
 - HUD and agencies perform reviews of manufacturers' designs and inspect the homes during construction to ensure compliance with the standards.

Standards for Manufactured Housing (cont'd)

Siting and installation requirements for manufactured homes are generally a State or local regulatory responsibility, where such authority exists.

- ❑ *Some State and local regulations require licensed or registered installers, and/or require permits to be obtained prior to installation.*
- ❑ *Manufactured Housing Improvement Act of 2000 required that HUD establish minimum National Model Installation Standards (October 2007).*
- ❑ *States must meet certain requirements in order to continue to regulate manufactured home installation in their State.*
 - To be eligible, States must meet certain requirements as indicated in HUD's Installation Program published in June 2008, including a requirement that State Standards meet or exceed HUD's Model Installation Standards.
 - Manufacturers' installation instructions must be approved by the  Approval Primary Inspection

Standards for Manufactured Housing (cont'd)

- ❑ *Alabama has an approved Manufactured Home Installation Program. State Administrative Agency contacts:*
 - Elwyn Thomas, Administrator
Alabama Manufactured Housing Commission
350 South Decatur Street
Montgomery, AL 36104-4306
PH: (334) 242-4036 ext. 25
 - Tommy Colley, Program Manager
Manufactured Home Installation Program
Alabama Manufactured Housing Commission
PH: (334) 242-4036 ext. 22
- ❑ *Some Independent Third-Party Approval and Inspection Agencies that operate in Alabama:*
 - T.R. Arnold & Associates, Inc. (Elkhart, Indiana)
 - River Birch Homes, Inc. (Hackleburg, Alabama)

Standards for Manufactured Housing (cont'd)

Model Building Code Requirements based, in part, on NFIP Regulations

- ❑ *International Residential Code (IRC)*
 - Appendix E, Section 502 – Requirements for Foundation Systems
 - ✓ *Extend below the frost line*
 - ✓ *Be constructed of materials specified by the code, including masonry and concrete*
 - ✓ *Be made of solid material (concrete and masonry footings)*
 - ✓ *Be elevated to the DFE for new and replacement manufactured homes*
 - Appendix E, Section AE604.1 – Anchorage Installation Requirements
 - Appendix E, Section AE605 – Performance Requirements for Ties, Materials, and Installation
- ❑ *NFPA 5000's, "Building Construction and Safety Code", Chapter 39, Flood-Resistant Design and Construction*
 - References to ASCE 7, "Minimum Design Loads for Buildings and Other Structures" and ASCE 24, "Flood Resistant Design and Construction"
- ❑ *NFPA 501, "Standard on Manufactured Housing", addresses the design, manufacture and transportation of*

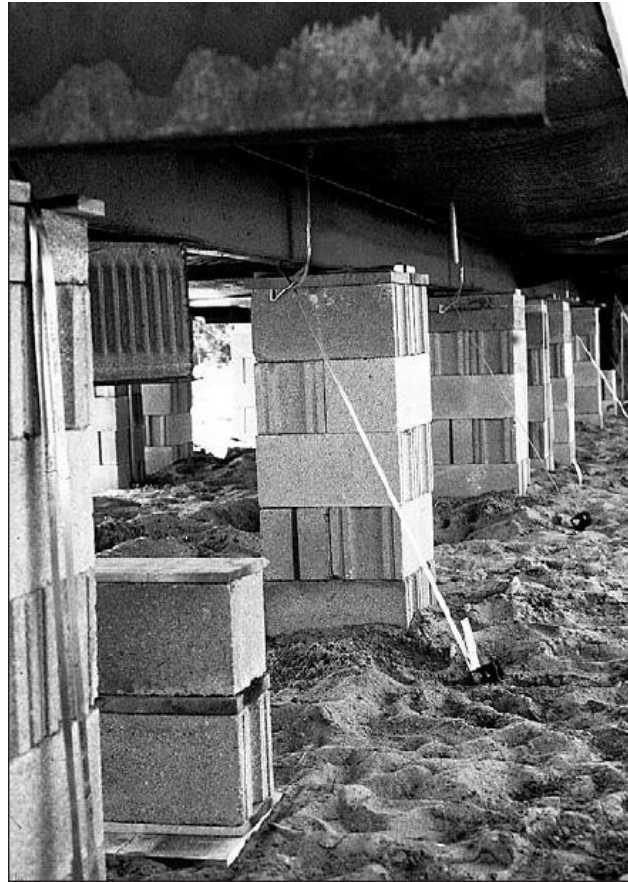
IV. Installation Practices for Manufactured Housing in SFHAs

Manufactured Homes in SFHA

Foundation Construction

- ❑ *Typical manufactured home foundations consist of a system of piers and ground anchors.*
 - Piers are typically placed beneath the two steel beams (spacing of 8 - 10 feet along the length of the manufactured home) – gravity load support.
 - Frame ties are connected to the steel chassis or perimeter beams, and run to ground anchors – lateral and uplift resistance.
- ❑ *Typical MH foundations and installation methods often address wind events with little consideration to the forces associated with flooding.*
 - Generally not designed for flood effects such as hydrodynamic and hydrostatic forces, buoyancy, erosion, and scour.
 - Potential failure modes observed in a typical installation include:
 - ✓ *Buoyancy, particularly during rapidly rising flood waters*
 - ✓ *Lateral movement, particularly when exposed to moving flood waters that extend above the home's*

Typical MH Foundation



Typical installation of a manufactured home on masonry block piers (dry-stacked) with tie-down straps.

- Adapts easily to the site conditions,
- Does not require much dimensional precision,
- Is installed very quickly, and
- Is economical to install.

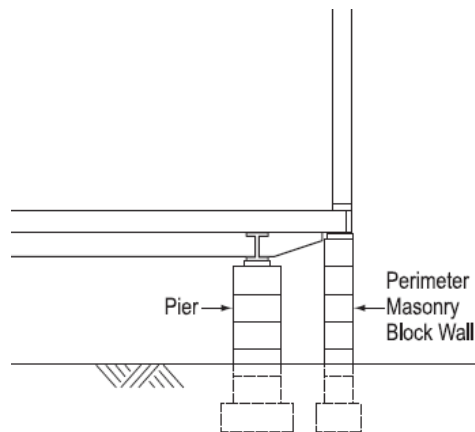
Perimeter Wall Foundations for MH

Perimeter foundations used with a manufactured home constructed with chassis beams

- ❑ chassis beams provide support for gravity loads, and
- ❑ the perimeter walls resist uplift and lateral loads.

Perimeter foundations with an integral floor framing system

- ❑ Perimeter walls resist uplift, lateral, and gravity loads;
 - ❑ With chassis systems, interior piers support the chassis, points along the marriage wall, and other areas of concentrated loads.
 - ❑ Perimeter walls can be constructed with typical building materials (e.g., cast-in-place concrete, masonry, or preservative-treated wood);
 - ❑ Footings are generally cast-in-place concrete.



Perimeter Wall Foundations for MH (cont'd)



Examples of
perimeter walls for
manufactured
homes.



Utilities & Mechanical Equipment

Care needs to be taken in the placement of utilities (such as water, sewer, and gas services) and mechanical systems

- ❑ *Location (from grade through floor) makes them susceptible to being inundated by floodwaters and damaged by floating debris.*
- ❑ *Separating these systems to protect them is important.*
- ❑ *To minimize damage to utility lines resulting from flooding:*
 - Place them in waterproof risers adjacent to the elevated foundation member;
 - Locate them on downstream side of the expected (or anticipated) flood flow;
 - Waterproofing of all connections with specific waterproof materials;
 - Utilize backflow preventers on water and sewage service;
 - For overhead electrical and telephone service, connection to the manufactured home must be

Utilities & Mechanical Equipment (cont'd)



Fuel oil tank without proper foundation or bracing.

Utilities & Mechanical Equipment (cont'd)

- ❑ *Consideration for effects of wind:*
 - Some flexibility must be provided in the utility lines and their connections to accommodate for any potential movements.
- ❑ *Components of heating and air-conditioning located below the floor remain vulnerable to flood damage.*
 - Exterior heating and air conditioning compressors elevated by placing them on platforms at or above the BFE;
 - Crossover ducts require entire home to be elevated 1 to 2 feet above the BFE.

Other Considerations for Installation

- ❑ *Flood Hazard Site Selection Considerations for Manufactured Housing*
 - Accessibility – Due to higher buoyancy potential, inhabitants of manufactured homes in flood-prone areas should prepare to evacuate an area should a flood watch be issued and not wait for flood conditions to develop.
 - What are the flood risks for manufactured home installation at the site?
 - ✓ *Frequency – How often does it flood (5-, 10-, 25-year)?*
 - ✓ *Duration – Is the site in a low-lying area that has ponding?*
 - ✓ *Rate – How quickly do the flood waters rise in the area?*
 - ✓ *Velocity – Is the velocity more than the foundation system is designed for?*
 - Can structural fill be placed to elevate the site? If fill is placed, will it withstand forces from velocity flows?

Other Considerations for Installation (cont'd)

- ❑ *Flood Hazard Site Selection Considerations for Manufactured Housing (cont'd)*
 - Are there any significant sources of debris upstream that could impact my site if it floods?
 - If long-duration flooding is an issue at the site, can the foundation be designed and constructed to resist long-duration flood waters?
 - Can the foundation be designed and constructed to withstand the expected design velocity flows?
 - Can adequate storm drainage be provided?
 - Is the site in a dam failure inundation zone?

CONTACT INFORMATION:

Corey Garyotis

Alabama Office of Water Resources | Floodplain Management Unit

Alabama NFIP State Coordinator

Email: corey.garyotis@adeca.alabama.gov

Phone: (334) 353-0853

QUESTIONS???

