



Second-Story Conversion – Elevation Project Design Considerations for Hazard Mitigation Assistance Applicants

Purpose

Elevation is a common mitigation method for structures that are at risk of flooding, and is an eligible mitigation project under the Federal Emergency Management Agency’s (FEMA) Hazard Mitigation Assistance (HMA) Grant Programs. Structure elevation activities generally involve physically raising an existing structure in accordance with the 2015 HMA Guidance, or latest edition, and the American Society of Civil Engineers (ASCE) standard *Flood Resistant Design and Construction* (ASCE 24-14), or latest edition. ASCE 24-14 includes elevation to the Base Flood Elevation [BFE] plus freeboard, or higher when required by FEMA, local ordinance, or building code. Structure elevation may be achieved through a variety of methods, including elevating on continuous foundation walls; elevating on open foundations, such as piles, piers, posts, or columns; and elevating on fill. There are situations, such as structures with a slab-on-grade foundation, where physically raising the building is not feasible or cost-effective. FEMA conducted research to identify alternative flood mitigation methods to address these types of situations and published this information as recovery advisories. The purpose of this fact sheet is to identify project design considerations that should be taken into account when developing these types of HMA-funded elevation projects.

Background

FEMA’s *Hurricane Sandy Recovery Advisory 7 - Reducing Flood Risk and Flood Insurance Premiums for Existing Residential Buildings in Zone A (RA7)*¹ provides information on potential mitigation measures for residential buildings located in A Zones that did not incur Substantial Damage and are not undergoing Substantial Improvement. By using the measures described in this advisory, homeowners may reduce their risk of flood damage and may also lower their flood insurance premiums. FEMA’s *Iowa Floods of 2016 Recovery Advisory 2 - Elevating Residential Structures within Special Flood Hazard Areas (RA2)* provides similar information geared towards non-coastal areas.

One of the options allowable in Zone A, as provided in both recovery advisories, is the concept of raising a building’s lowest floor to or above the BFE by converting the usage of the ground floor to parking, storage, or building access and modifying or replacing the walls, filling below-grade areas and basements, or elevating the building as illustrated in Figure 1. This type of mitigation method is sometimes referred to as “lower-level abandonment,” “first-floor abandonment,” or “second-story conversion.” There are certain steps that need to be

¹ Recovery Advisories are issued to address specific issues identified after a disaster. The information in Recovery Advisories, however, is broadly applicable to all FEMA-funded mitigation projects, regardless of funding source (i.e., Hazard Mitigation Grant Program, Pre-Disaster Mitigation or Flood Mitigation Assistance).

followed in order for this type of mitigation method to qualify for a lower flood insurance premium.

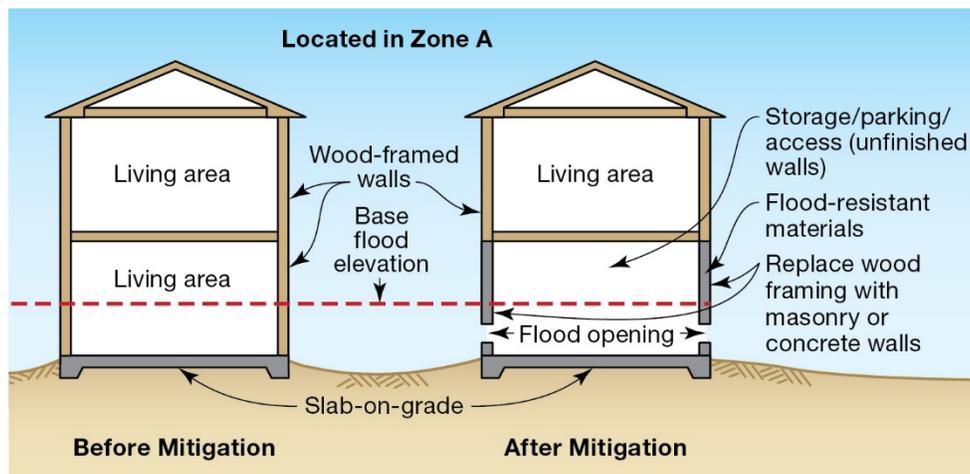


Figure 1. In Zone A, the floor below the BFE (left) can be modified to be compliant with NFIP criteria (right).

FEMA's Office of Flood Insurance Advocate, in its *2017 Annual Report*, identified customer frustration with a lack of premium reduction following conversion of a second floor or construction of an elevated floor as their new living space, and then abandoning the non-elevated floor of their living space.

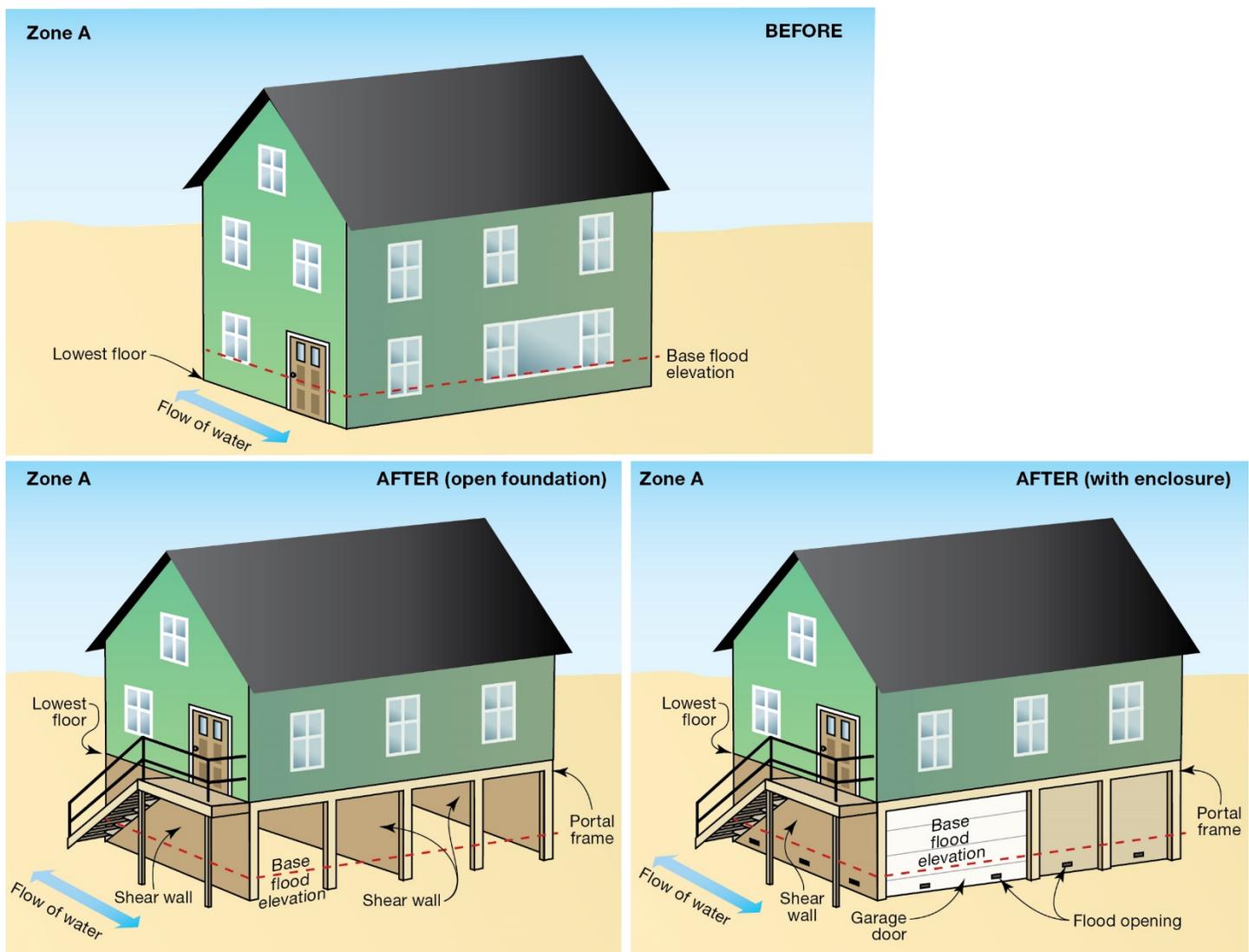
Explanation

FEMA HMA Guidance requires mitigation projects to be compliant with local building and floodplain management requirements. In addition, it requires projects to be not only feasible and effective in reducing risk, but also requires structure elevation projects to be designed in accordance with ASCE 24-14. However, even when these requirements are met, there are scenarios in which a project could qualify for an HMA grant but not result in flood insurance premium reduction.

To qualify for an insurance premium reduction, structures must meet the definition of an elevated building as explained in FEMA's Flood Insurance Manual.² The engineered options described in RA 2 and RA7 may allow a non-elevated building to be successfully converted to an elevated building by replacing or modifying the walls and repurposing ground-floor living space. To meet minimum floodplain management requirements and be eligible for elevated building without enclosure rating benefits in the A Zone, the building's previously habitable lowest floor must remain unfinished, have proper flood openings (e.g. venting), and may only be used for parking, storage, or building access. In addition, for conversion of a ground floor constructed with wood-framed walls to be considered an elevated building, walls must be converted into a combination of wood-framed shear walls and framed openings, and be designed with a continuous load path to resist all applicable loads (as shown in Figure 2). The community's local floodplain management regulations must also be amended

² An elevated building is one that has no basement and that has its lowest elevated floor raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns. Solid (perimeter) foundation walls are not an acceptable means of elevating buildings in V and VE Zones. A non-elevated building is one with a: slab-on-grade foundation with wood frame walls on the lowest level; or basement or below grade (subgrade) crawlspace foundation. (Flood Insurance Manual, October 2018).

to allow the community to define the work as a Substantial Improvement regardless of the cost of the work, because structures modified in this way may be considered ineligible for a lower insurance premium unless the modifications qualify as a Substantial Improvement. Recommended language for the local floodplain management provision is shown on page 9 of RA7 and page 8 of RA2. To ensure NFIP compliance, consultation with the local community's legal counsel, State NFIP Coordinating Office, and Regional FEMA Office prior to making the revisions is highly recommended. Homeowners should also be willing to sign a "non-conversion agreement" indicating that the space below the new lowest floor will not be converted to a use other than one for parking, storage, or building access.



Note: Drawing is not to scale. The number of flood openings shown is for illustration purposes only; the total number of openings depends on the square footage of the enclosure and the type and design of the opening.

Figure 2: In Zone A, the floor below the BFE (left) can be modified to be compliant with NFIP criteria (right)

An integral part of the mitigation process is certification by a registered design professional (e.g., an engineer or

architect) that the design and construction methods meet the specified provisions. A copy of this certification must be contained in the underwriting file for any building that has undergone this method of mitigation. A sample certification form is shown in Figure 3.

Foundation Wall Design Certification Statement

I certify that: (1) I have developed or reviewed the structural design, plans, and specifications for modification of _____ (building address) and (2) that the design and methods of construction specified are in accordance with accepted standards of practice for meeting the following provisions:

- The foundation and structure attached thereto are anchored to resist flotation, collapse, and lateral movement due to the effects of base floodwater loads acting on building components below the Base Flood Elevation and wind, seismic, or other loads imposed on the structure.
- The potential for scour and erosion at the foundation has been anticipated for conditions associated with the base flood, including wave action.
- The enclosure below the Base Flood Elevation is designed only for parking of vehicles, building access, and storage.
- The walls below the Base Flood Elevation and supporting the structure are constructed using flood damage-resistant materials.
- The walls of the enclosed space below the Base Flood Elevation contain flood openings that will allow the automatic entry and exit of floodwater.
- The building has no basement and its lowest elevated floor is raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns.
- The foundation **does** / **does not** employ wood-frame shear walls (circle one).

Certification and Seal

This certification is to be signed and sealed by a registered professional engineer or architect authorized by law to certify structural designs. I certify the Foundation Wall Design Certification Statement.

Certifier's Name _____ License Number _____
 Title _____ Company Name _____
 Address _____
 City _____ State _____ Zip Code _____
 Signature _____ Date _____ Telephone _____

Figure 3. Sample foundation wall design certification statement

Structure owners are urged to consult with their flood insurance agent prior to undertaking work to ensure that the work they have planned is consistent with the guidance in RA7 and/or RA2 and will qualify for an insurance premium reduction consistent with a properly elevated first floor.

Summary Compliance Checklist

In order for owners to meet the minimum floodplain management and HMA/ASCE 24, while also achieving a reduction in flood insurance premiums, the second-story conversion project should meet the following criteria:

- The building is not in a Zone VE or other areas shown on maps as Areas of Moderate Wave Action (e.g., Coastal A Zone).
- Building has no basement (or below-grade crawlspace).
- Elevation of the top of the lowest floor is above the BFE plus freeboard specified in ASCE 24.
- Enclosure below the lowest floor is unfinished and designed only for parking of vehicles, building access, and storage.
 - In determining whether an enclosure is finished, drywall that is mudded, taped, and painted is considered a finished wall. Drywall that is only painted is not considered to be finished. Drywall that is mudded and taped but not painted or textured is also not considered to be finished. Block walls are not considered to be finished even if they are painted. Typically, a block (or concrete) wall is part of the foundation system. Painted plywood is considered to be finished.
- Foundation and structure are anchored to resist all loads taking into account the potential for scour and erosion.
- The foundation is one of the following:
 - Concrete or masonry foundation walls (reinforcement may be needed to achieve resistance to loads);
 - Posts, piers, pilings, or columns; or
 - Slabs-on-grade with concrete/masonry or wood-framed shear walls certified in accordance with RA7 and/or RA2 guidance.³
- Walls below the lowest floor are constructed of flood-damage resistant materials.
- Enclosure walls have proper flood openings.
- Utilities and equipment are elevated above the BFE plus freeboard specified in ASCE 24.
- A registered design professional has certified that the design and construction meets the specified provisions.
- The homeowner has signed a “non-conversion agreement” with the community to ensure long-term mitigation effectiveness and continued floodplain management compliance.

³ If wood-framed walls are converted to shear walls, the community must have adopted an expanded definition of Substantial Improvement.

Resources

FEMA, *Hurricane Sandy Recovery Advisory 7 - Reducing Flood Risk and Flood Insurance Premiums for Existing Residential Buildings in Zone A (RA7)*

<https://www.fema.gov/media-library/assets/documents/30966>

FEMA, *Iowa Floods of 2016 Recovery Advisory 2 - Elevating Residential Structures within Special Flood Hazard Areas (RA2)*

<https://www.fema.gov/media-library/assets/documents/130555>

FEMA, Office of Flood Insurance Advocate, *2017 Annual Report*

<https://www.fema.gov/media-library/assets/documents/115278>

FEMA, *Hazard Mitigation Assistance Guidance and Addendum* (February 27, 2015)

<https://www.fema.gov/media-library/assets/documents/103279>

FEMA, *Minimum Design Standards for Hazard Mitigation Assistance (HMA) Projects in Flood Hazard Areas* (Policy 203-074-1) <https://www.fema.gov/th/media-library/assets/documents/93727>

FEMA, *Memorandum For: Write Your Own (WYO) Principal Coordinators and the National Flood Insurance Program (NFIP) Servicing Agent re: Hurricane Sandy Recovery Advisory 7 – Reducing Flood Risk and Flood Insurance Premiums for Existing Residential Buildings* (W-14029) (June 5, 2014)

The information in this fact sheet supersedes guidance found in FEMA P-347, Above the Flood: Elevating Your Floodprone House (2000).

Information Requests and Questions

FEMA encourages communities to work with their State or Tribal Hazard Mitigation Office in identifying and developing flood mitigation projects. States and federally-recognized tribes should contact their FEMA Region Office with questions. Questions can also be submitted by email to FEMA-HMA-Grants-Policy@fema.dhs.gov.