Mayor Onderko,

Thank you for your inquiry to the FEMA Building Science Helpline regarding whether existing residential sub-grade basements need to be filled in to grade after the home is elevated to comply with National Flood Insurance Program (NFIP) and Community Rating System (CRS) regulations. This response is based on published FEMA Building Science guidance. Links to download all referenced publications are provided at the end of this email.

Please note that State and local jurisdictions may have requirements that are more stringent than FEMA's guidance and recommendations. As with all design and construction matters, please work with all other authorities having jurisdiction to ensure that ALL State and local requirements are being met, even when using FEMA publication and guidance recommendations. You may also wish to discuss this question with your State NFIP Coordinators, listed below.

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It is important to begin the discussion by defining the word basement as it is listed in Title 44 of the Code of Federal Regulations Section 59.1 as "any area of the building having its floor subgrade (below ground level) on all sides." This differs from other common terms such as a "walkout basement" where one side of a building constructed usually on sloped land has one wall that is above grade and the remaining walls either partially or completely below grade.

During the process of elevating a home an evaluation of the elevation project costs must be done by the local building official. The evaluation will determine whether the project is a Substantial Improvement, if the costs indicate that it meets the definition of a Substantial Improvement, then basements are not allowed and the basement must be eliminated. Additionally, the area below the elevated floor must be made into a complaint enclosure. Eliminating the basement does not need to be made explicit in your ordinance for Substantial Improvement/Substantial Damage because it is implicit in the minimum NFIP requirements which your ordinance must be based on. Under the NFIP and model building codes, new buildings and Substantially Improved buildings must meet all minimum requirements for flood hazard areas, including have their lowest floors (including basements) elevated to or above the BFE (or lowest floor elevation requirement, if higher than BFE). If a local official determines that work constitutes Substantial Improvement of any building that has a basement, the building must be brought into compliance, which includes eliminating the below-grade area. While your question was specifically related to homes/residential buildings, note that non-residential buildings may have dry-floodproofed basements below the BFE. The CRS credit for freeboard above the BFE applies only to new construction and buildings that are Substantially Improved and/or reconstructed due to Substantial Damage.

If the intent is to require elimination of the basement for all elevation projects in the special flood hazard area, regardless of Substantial Improvement/Substantial Damage determination, then that would need to be made explicit in the ordinance since it would be a higher standard. To accomplish this, you should speak with your State NFIP Coordinator.

If FEMA Hazard Mitigation Assistance (HMA) funding is used for the elevation project, then the project must meet ASCE 24, Flood Resistant Design and Construction, requirements, regardless of Substantial Improvement/Substantial Damage determination. Included in ASCE 24 is the requirement to have the lowest floor including basement elevated to or above the BFE + freeboard, which means the basement must be eliminated unless allowed to be dry floodproofed.

In regards to flood insurance, it is correct that owners will not achieve the premium discounts of elevating the lowest floor if the basement remains in place. For buildings that are rated at Post-FIRM, basements will be rated as the lowest floor for NFIP flood insurance rating purposes. If owners are using Increased Cost of Compliance (ICC) insurance coverage to help cover the costs of the elevation project, eliminating the basement would be required. ICC coverage is only available for Substantial

Improvement/Substantial Damage and repetitive loss structures. When revising floodplain management ordinances or building code provisions local officials should work with their State NFIP Coordinator in order to make sure that the regulations are worded properly in order to meet ICC coverage requirements.

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. For more guidance on filling in basements, see Hurricane Sandy Recovery Advisory #7, Reducing Flood Risk and Flood Insurance Premiums for Existing Residential Buildings in Zone A, Section "Converting the Ground Floor and Filling Below-Grade Areas and Basements" starting on page 5.
- Floodproof below-grade areas (A zone, non-residential only). The NFIP regulations allow nonresidential buildings in A zones to dry floodproof areas that are below-grade on all sides (basements) in order to meet compliance requirements. Careful evaluation of the structural integrity of a building must be undertaken to determine if dry floodproofing measures are feasible. For guidance, see FEMA P-936, Floodproofing Non-Residential Buildings.
- Walkout basements can be converted into compliant enclosures. Section 6.3.1 of FEMA P-758, Substantial Improvement/Substantial Damage Desk Reference, describes how a walkout basement can be modified to become a compliant enclosure (A zone only).

Regardless of requirements, eliminating basements should be encouraged, since buildings with basements are susceptible to structural damage if floodwater or subsurface water enters the basement.

FEMA Building Science has many publications for homeowners, design professionals, and builders that illustrate important concepts and best practices in accordance with building codes and standards for constructing and retrofitting stronger, safer buildings. The publications are downloadable for free on FEMA's Web site and are organized by hazard: http://www.fema.gov/building-science-publications

- Hurricane Sandy Recovery Advisory #7, Reducing Flood Risk and Flood Insurance Premiums for Existing Residential Buildings in Zone A (2013), https://www.fema.gov/media-library/assets/documents/30966. The mitigation measures described in this advisory are intended to be applied to buildings that did not incur Substantial Damage during Hurricane Sandy and are not undergoing Substantial Improvement, though the information may also be useful for owners of homes that incurred Substantial Damage or are undergoing Substantial Improvements.
- FEMA P-758, Substantial Improvement/Substantial Damage Desk Reference (2010), http://www.fema.gov/media-library/assets/documents/18562, provides practical guidance and suggested procedures to implement the NFIP requirements for Substantial Improvement/Substantial Damage.
- FEMA P-936, Floodproofing Non-Residential Buildings (2013), https://www.fema.gov/media-library/assets/documents/34270, provides information about regulatory requirements, design considerations, and descriptions of floodproofing methods and equipment.

Free hard copies of FEMA Building Science's current publications may also be ordered by calling the FEMA Publication Warehouse at 1-800-480-2520, Monday through Friday between 8:00 AM and 5:00 PM (EST), by fax at 1-240-699-0525, or by emailing your request to FEMA-Publications-Warehouse@fema.dhs.gov. Please provide the title, publication number, and quantity of each publication, along with your name, address, zip code, and daytime telephone number.

If you have additional questions pertaining to FEMA Building Science publications, please feel free to contact us again at FEMA-Buildingsciencehelp@fema.dhs.gov.

Thank you,

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