Protecting Building Utilities and Ductwork from Flood Damage

Background: A community must be fully compliant with the National Flood Insurance Program's regulations in order to obtain or keep its Community Rating System (CRS) classification. Sections 60.3b(4) and 60.3c(2) of the NFIP regulations (44 *CFR* Part 60) require communities to ensure that the lowest floor of any new residential building is elevated above the base flood elevation. These regulations can be found at: http://www.access.gpo.gov/nara/cfr/waisidx_00/44cfr60_00.html

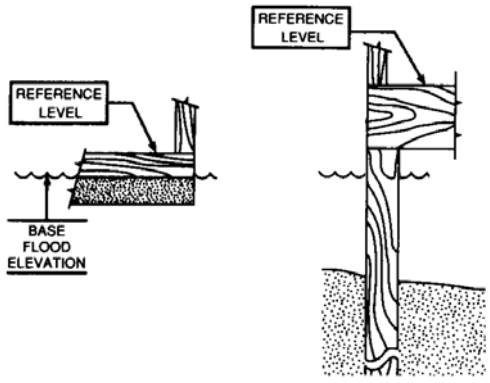
The freeboard element (FRB) in Activity 430 (Higher Regulatory Standards) of the CRS provides up to 300 points for requiring buildings to be protected to a level higher than the base flood elevation. Many model ordinances and many locally adopted ordinances have freeboard provisions. These are usually found in the ordinance as a "regulatory flood elevation," a "flood protection elevation," or a "base flood elevation plus (1) foot." It is called the "design flood elevation" in this paper.

A problem arises when local regulatory officials focus only on the lowest floor, and neglect other parts of their ordinances where there are additional provisions required by the NFIP regulations. Sections 60.3a(3)(ii) and (iv) of the NFIP regulations require that buildings "(ii) be constructed with materials resistant to flood damage" and " 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."

In short, protecting a building from flood damage means more than elevating the lowest floor above the regulatory flood elevation. Flood insurance claims have shown that the Federal Emergency Management Agency (FEMA) has paid a lot of money for damage to air conditioners, furnaces, ductwork and insulation that were flooded, even though the building's lowest floor was high enough. In addition, mold, mildew and fungus accumulating in flood damaged air passageways often can lead to serious health issues for residents.

This is primarily a concern for buildings on crawlspaces. Buildings on slab foundations, on pilings, and in V Zones normally have the utility facilities waterproofed or elevated high enough.

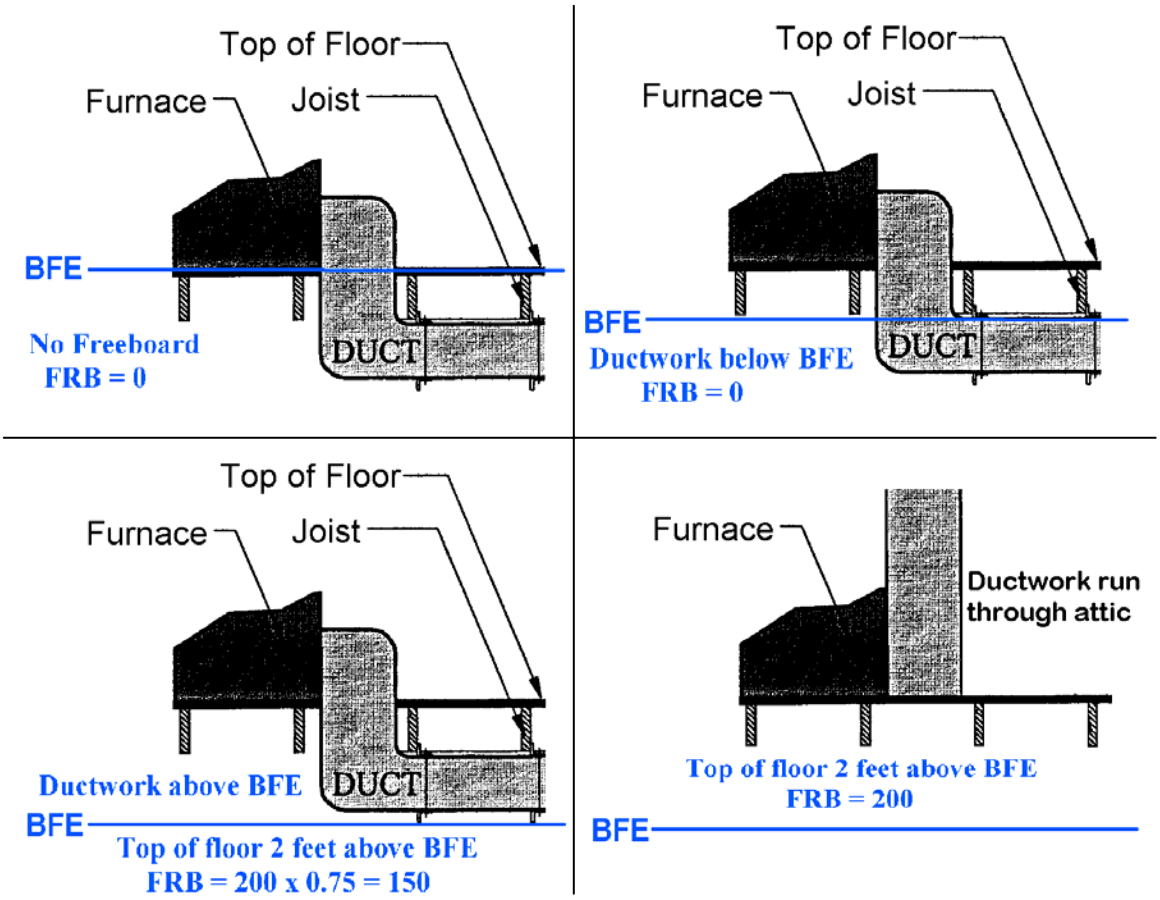
The new FEMA Elevation Certificate highlights this problem. When properly completed, the surveyor must record the elevation of the "top of the bottom floor," "attached garage," and "lowest elevation of machinery and/or equipment servicing the building," among other things. If the attached garage, machinery, and equipment are not above the base flood elevation or are not otherwise protected from flood damage, then the building is not in compliance with the NFIP regulations.



Focusing on elevating only the lowest floor misses other items subject to flood damage.

What's required: To receive full CRS credit for Freeboard (FRB), electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork) must be elevated or waterproofed to the base flood elevation plus freeboard. To be fully compliant with the minimum requirements of the NFIP, this equipment and service facilities (including ductwork) must be elevated or waterproofed to the base flood elevation.

A community can receive 75% of the appropriate FRB credit if it requires the utility facilities (including ductwork) to be elevated (or appropriately waterproofed) to or above the base flood elevation, but not necessarily to the freeboard level. If the utilities and ductwork are not elevated, floodproofed, or otherwise protected to the base flood elevation, there is no credit for FRB. Four scoring scenarios are shown below. In the top two, if the ductwork is not watertight and made of flood-resistant material, the building is not compliant with the NFIP regulations.



FEMA Guidance: *Protecting Building Utilities from Flood Damage*, FEMA 348, reviews ways to protect utilities and ductwork. This is the text from page 3.1-14 on alternatives to elevating ductwork. It can be found on FEMA's website at http://www.fema.gov/library/pbuffd.htm.

"Component Protection

"The NFIP does not recommend locating duct work below the DFE [design flood elevation, i.e., the base flood elevation plus freeboard] in any new or substantially improved structure located in an SFHA [Special Flood Hazard Area]. There is no known cost-effective technique for designing air ducts to keep floodwater from entering or accumulating within the system components during inundation by floodwaters.

"If duct work must be installed below the DFE, it should be minimized as much as possible. The material used for the ducts must be impermeable and watertight, such as welded seamless ductwork or large diameter PVC pipe. Such material is very expensive but practical for cases where a short length of duct work descends below the DFE.

"The water and fuel piping associated with HVAC systems must be properly protected from damage during flooding. PVC piping generally requires special consideration when used in flood-prone areas. This type of pipe is more susceptible to impact breakage. In addition, the nature of the material sometimes fractures or shatters when exposed to the heaving and settling that a structure experiences when withstanding floodwaters. If the lines are ruptured, it may result in contamination, leaking, or even fire. In general, copper and galvanized metal piping is better suited for use in flood-prone areas.

"Note: Component protection for duct work refers to continuous duct segments below the DFE which are watertight and terminate above the DFE. Duct segments with openings below the DFE or that terminate below the DFE are not permitted under the NFIP."

What the community should do: The following steps are recommended to ensure that your community is fully compliant with the NFIP and receives the appropriate freeboard credit under the CRS:

1. Review your ordinance and verify that you have clear legal authority to require elevation of ductwork and other utilities to or at the freeboard level. If in doubt, ask your community's legal counsel for a letter stating how the ordinance is to be interpreted.

2. Review your permit application and inspection procedures to determine the best way to ensure that the requirement is being met. This may necessitate procedural changes such as additional information on the permit application form, additional plans provided by the applicant, an addition to a field inspection checklist, and/or a photograph for the record at the time of the final inspection.

3. Discuss the matter with local builders and architects as necessary. Feel free to use excerpts from this handout.

4. Make sure your permit records show that the building's ductwork has been properly elevated. Here are some ways that this can be done:

    a. If the ductwork is located above the first floor, it should be clearly shown in the building plans.
    b. The final inspection records could note that the ductwork is above the first floor or "X" feet below the first floor. This measurement can be made by the inspector.
    c. The final inspection records could include the actual elevation of the bottom of the ductwork.
    d. The finished construction elevation certificate could include the actual elevation of the bottom of the ductwork in the comments part of Sections D or G.

5. Advise your ISO/CRS Specialist what your community will do. Will you need to change procedures to verify compliance? Will you prefer to forego CRS credit and not require ductwork to be elevated above the freeboard level? What will the ISO/CRS Specialist need from you at your annual recertification?