Here’s Something You Might Find Interesting . . .

In the September 2008 issue of the Insider I wrote about using mitigation grant funds to floodproof nonresidential buildings. At the time, more than 10% of the properties on FEMA’s Repetitive Loss list were nonresidential properties – and collectively they had received nearly 25% of the claims dollars paid to all rep loss properties.

In this column I want to cover some aspects of floodproofing – whether the techniques are used (1) for new construction; (2) to achieve compliance when nonresidential buildings are substantially improved or substantially damaged; or (3) simply because owners of existing buildings elect to implement retrofit measures. Of course, when used to achieve compliance, floodproofing measures may be used only on nonresidential buildings that are located in special flood hazard areas that are designated as Zones A (including A, AE, A1-30, AO and AH). For easy reference as you read this column, I’ve copied certain pertinent NFIP regulations at the end of the column.

Building Codes & ASCE 24

Floodplain managers identify buildings as either residential or nonresidential. Building code officials think of buildings as residential (1- and 2-family homes and townhomes) and “commercial,” which refers to all other buildings (e.g., mercantile, industrial, educational, institutional, etc.). The building code that applies to nonresidential buildings is often called the “commercial” building code. Most states and communities that adopt a building code adopt one that is based on the International Building Code.

In my May 2010 column I explained that the flood provisions for nonresidential buildings are found in Section 1612 of building codes, and that they rely largely on reference to ASCE 24, Flood Resistant Design and Construction. A summary of ASCE 24 is available on ASFPM’s webpage at www.floods.org/PDF/ASCE24_Highlights_1008.pdf.

ASCE 24 has some specific requirements for floodproofing that are not spelled out in the NFIP regulations:

- Definitions for “dry floodproofing” and “substantially impermeable.”
- Dry floodproofing is allowed for nonresidential structures and nonresidential areas of mixed use structures located in A Zones, but is not allowed in coastal flood hazard areas where breaking waves are between 1.5 and 3 ft high (called Coastal A Zones).
- Dry floodproofing is allowed only where flood velocities are less than or equal to 5 ft per second, which should prompt designers to look for available information (e.g., floodway data tables) or to have an engineer develop velocity estimates.
- Limitations are imposed if the designer specifies measures that require human intervention (next section).
- Ingress and egress for emergency access is specified (also below).

Limits on Human Intervention

ASCE 24 specifies that dry floodproofing measures that require human intervention to activate or implement prior to or during a flood shall be permitted only when certain conditions are satisfied, including:

1. The flood warning time (to alert potential flood victims of pending floods) shall be a minimum of 12 hours, unless the community operates a flood warning system and implements an emergency plan to ensure safe evacuation of flood hazard areas, in which case human intervention is allowed only if the community can provide a minimum flood warning time equal to or longer than the cumulative:
   a) time to notify person(s) responsible for installation of floodproofing measures, plus
   b) time for responsible persons to travel to structure to be floodproofed, plus
   c) time to install, activate, or implement floodproofing measures, plus
   d) time to evacuate all occupants out of the flood hazard area.
2. All removable shields or covers for openings such as windows, doors and other openings in walls shall be designed to resist flood loads.
3. Where removable shields are to be used, a flood emergency plan shall be approved by the authority having jurisdiction and shall specify, at a minimum, the following information: storage location(s) of the shields; the method of installation; conditions activating installation; maintenance of shields and attachment devices; periodic practice of installing
shields; testing sump pumps and other drainage measures; and inspecting necessary material and equipment to activate or implement floodproofing. The flood emergency plan shall be permanently posted in at least two conspicuous locations within the structure.

Emergency Access
No one should ever imply that it is acceptable for people to remain in a building that is floodproofed. We have plenty of evidence that floodwaters rise higher than the predicted base flood elevation – and often even higher than the BFE plus 1 or 2 feet. Consider the consequences if floodwaters rise higher than floodproofing measures – walls may fail catastrophically or, at a minimum, water would rapidly fill up the building. This would be a very dangerous situation that could threaten the safety of anyone still inside.

To minimize that risk, ASCE 24 requires the designer to develop an emergency plan and also specifies that dry floodproofed buildings shall have at least one door satisfying code requirements for an exit door or primary means of escape, and the door must be situated above the elevation of the floodproofing and be capable of providing human ingress and egress during conditions of flooding.

One question that may come up is whether the door provided to satisfy this requirement has to meet the Americans with Disabilities Act. My answer is no, because this door is not intended to be used on a daily basis. Its primary use would be to evacuate personnel assigned to deploy floodproofing measures if they are unable to evacuate before the onset of flooding. Thus, having steps up to the door would not conflict with ADA requirements.

Certification of Floodproofing Designs
Both the NFIP regulations (§ 60.3(c)(4)) and the building code (Sec. 1612.5) require that designers certify that “designs and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions” that are specified. Neither the NFIP regulations nor the codes identify a specific form to be used for certification, but most design professionals probably use FEMA Form 81-65. If this form isn’t used, the community official should verify that a similar statement is included in the construction documents – and ensure that a copy is retained in the community’s permanent records. Note, however, that FEMA’s form must be used to obtain NFIP flood insurance (next section). FEMA Form 81-65 is available online at http://www.fema.gov/library/viewRecord.do?id=1600.

NFIP Flood Insurance and Floodproofing
A building that is floodproofed only to the BFE is compliant with the NFIP’s floodplain management regulations, but the protection measures will not be recognized by NFIP flood insurance policies. In order to be rated as protecting the building, floodproofing must extend to at least the BFE plus one foot. Buildings that are designed to comply with the building code and ASCE 24 will be recognized as floodproofed because of the requirement to floodproof to a minimum of BFE + one foot (or to BFE + 2 ft for essential and critical facilities).

Although a designer may certify the design of floodproofing without using FEMA Form 81-65, the form is required to obtain NFIP flood insurance.

Designing Floodproofed Buildings for Flood Loads – How High?
The design requirement in § 60.3(c)(3)(ii) specifies that “below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.” To meet the minimum, the designer only has to compute loads assuming the floodwaters rise to the BFE. Note however, that the building code refers to ASCE 24, which requires floodproofing to be at BFE plus one or two feet of freeboard, depending on the occupancy category of the building. The question then is this: what elevation does the designer use to compute the loads and develop the floodproofing measures? Is it the BFE, or the BFE plus freeboard?

A building that is floodproofed is one to which “floodproofing” has been applied or incorporated into the structural design. In order to be called floodproofed, the floodproofing measures must resist loads to the required height/elevation. If the requirement calls for floodproofing above the BFE (or if the owner/designer elects to extend floodproofing above the BFE), then the floodproofing design must account for loads associated with the elevation (or height) that will be certified by the registered design professional. Freeboard is a factor of safety and the only way to provide the intended additional level of protection is to design the floodproofing to resist water all the way up to the required elevation.

Materials Below the BFE – Inside Floodproofed Buildings?
This was one of the stranger questions I’ve been asked, but a close read of the NFIP regulations (and the building codes) reveals why a cautious designer would ask it. Section 60.3(a)(ii) requires new construction and substantial improvements to “be constructed with materials resistant to flood damage.” FEMA’s guidance, Technical Bulletin 3, clearly calls for flood damage-
resistant materials to be used below the base flood elevation. Obviously, all structural materials and finishes that are on the outside of a building and below the BFE will be exposed to floodwater and must meet the requirement.

But the question was this: what about materials used in areas below the BFE that are inside the floodproofed building? My answer was no – flood damage-resistant materials are not required to be used inside, even if below the BFE. I did note that FEMA’s Technical Bulletin #3 refers to U.S. Army Corps of Engineers’ guidance related to anticipated seepage. While dry floodproofed buildings should be designed such that the building will be water-tight, seepage may be anticipated under some conditions (such as long durations), in which case use of flood damage-resistant materials could be recommended. Download TB-3, Non-Residential Floodproofing – Requirements and Certification, at http://www.fema.gov/plan/prevent/floodplain/techbul.shtm.

Selected NFIP Regulations Pertinent to Floodproofing:

[Obtain Elevation] 60.3(c)(5) Where base flood elevation data are utilized, within Zone A on the community's FHB or FIRM: (ii) Obtain, if the structure has been floodproofed in accordance with paragraph (c)(3)(ii) of this section, the elevation (in relation to mean sea level) to which the structure was floodproofed,

[Design Requirement] 60.3(c)(3) Require that all new construction and substantial improvements of non-residential structures within Zones A1-30, AE and AH zones on the community's firm (i) have the lowest floor (including basement) elevated to or above the base flood level or, (ii) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;

[Design Certification] 60.3(c)(4) Provide that where a non-residential structure is intended to be made watertight below the base flood level, (i) a registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of paragraph (c)(3)(ii) or (c)(8)(ii) of this section, and (ii) a record of such certificates which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained with the official designated by the community under Sec. 59.22(a)(9)(iii);

Hectic Schedule Before 4th of July Recess

During the week leading up to the week-long 4th of July Congressional recess, the pace was hectic as both Houses of Congress tried to finish work on a number of pieces of legislation in the works. Efforts on some were successful; others were not and will require attention to finalize them when the Congress returns the week of July 12th. Further, Appropriations subcommittees in the House of Representatives finally began to mark-up their bills to fund the government for Fiscal Year 2011.

Among the items that did get completed was a further temporary extension of authority for the National Flood Insurance Program (NFIP) through September 30, 2010, retroactive to May 31st when the program most recently lapsed. The Congress also completed action on an extension of the tax credit for first-time home-buyers. Interestingly, the need to assure flood insurance availability for real estate closings in that 90 day tax credit extension window provided some incentive to pass the NFIP extension. Conversely, the need to pass flood insurance reauthorization had been seen as an incentive to pass the extension of unemployment insurance benefits, both of which were tied up in the larger tax extender bill and associated complexities concerning offsets to the costs of the tax extender measure. A short-term stand-alone bill (H.R. 5569) to extend the program had been introduced and quickly passed in the House the previous week. That measure was taken up on the Senate floor late on June 30th and passed by voice vote. The President signed it into law on Friday, July 2nd.

Legislation that did not get finalized was the supplemental appropriations bill to replenish the Disaster Relief Fund (DRF). Until that is passed, most disaster assistance and hazard mitigation programs are on “hold”. The DRF is precariously low as the hurricane season begins. The replenishment is caught up in many other political issues.