FLOODPROOFING

Nonresidential buildings must be elevated or floodproofed. If they are elevated, they must meet the same standards as for residential buildings that were just reviewed. Elevation is the preferred method of flood protection because it is more dependable. Elevated commercial and industrial buildings can often be designed so that they can continue to operate during a flood reducing or eliminating business disruptions. Also, it will generally prove to be less expensive to elevate a non-residential building than to floodproof it. However, there will be situations where floodproofing may be the only feasible alternative for protecting a nonresidential building.

> ***44 CFR 59.1.*** *Definitions: "Flood proofing" means any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.*
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> ***44 CFR 60.3(c)(3)*** *[Communities must] 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;*
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> ***44 CFR 60.3(c)(4)*** *[Communities must] 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 §59.22(a)(9)(iii);*

For the purposes of regulating new construction, floodproofing is defined measures incorporated in the design of the building so that below the BFE:

- Walls are watertight (substantially impermeable to the passage of water),
- Structural components can resist hydrostatic and hydrodynamic loads and effects of buoyancy, and
- Utilities are protected from flood damage.

Most floodproofing is appropriate only where floodwaters are less than three feet deep, since walls and floors may collapse under higher water levels.

A registered professional engineer or architect must prepare the building plans and certify the floodproofing measures, preferably using the FEMA Floodproofing Certificate form. This is discussed in more detail in Unit 7, Section G.

Floodproofing techniques that require human intervention are allowed but should be discouraged. Human intervention means that a person has to take some action before the floodwater arrives, such as turn a valve, close an opening or switch on a pump. There are many potential causes of failure for these techniques, including inadequate warning time, no person on duty when the warning is issued, the responsible person can't find the right parts or tools, the person is too excited or too weak to install things correctly, and/or the electricity fails.

Before you approve plans for a building that relies on human intervention to be floodproofed, you should make sure that there are plans and precautions to keep such problems from occurring. Techniques that rely on human intervention should only be allowed in areas with adequate warning time and in situations where there will be someone present who is capable of implementing or installing the required measures.

More information on floodproofing can be found in FEMA's Technical Bulletin 3-93, *Non-Residential Floodproofing Requirements and Certification for Buildings Located in Special Flood Hazard Areas* (FIA-TB-3. 1993)

How high?

The minimum NFIP requirement is to floodproof a building *to the BFE*. However, when it is rated for flood insurance, one foot is subtracted from the floodproofed elevation. Therefore, a building has to be floodproofed *to one foot above the BFE* to receive the same favorable insurance rates as a building elevated to the BFE. Unit 9, Section B, discusses this in more detail.