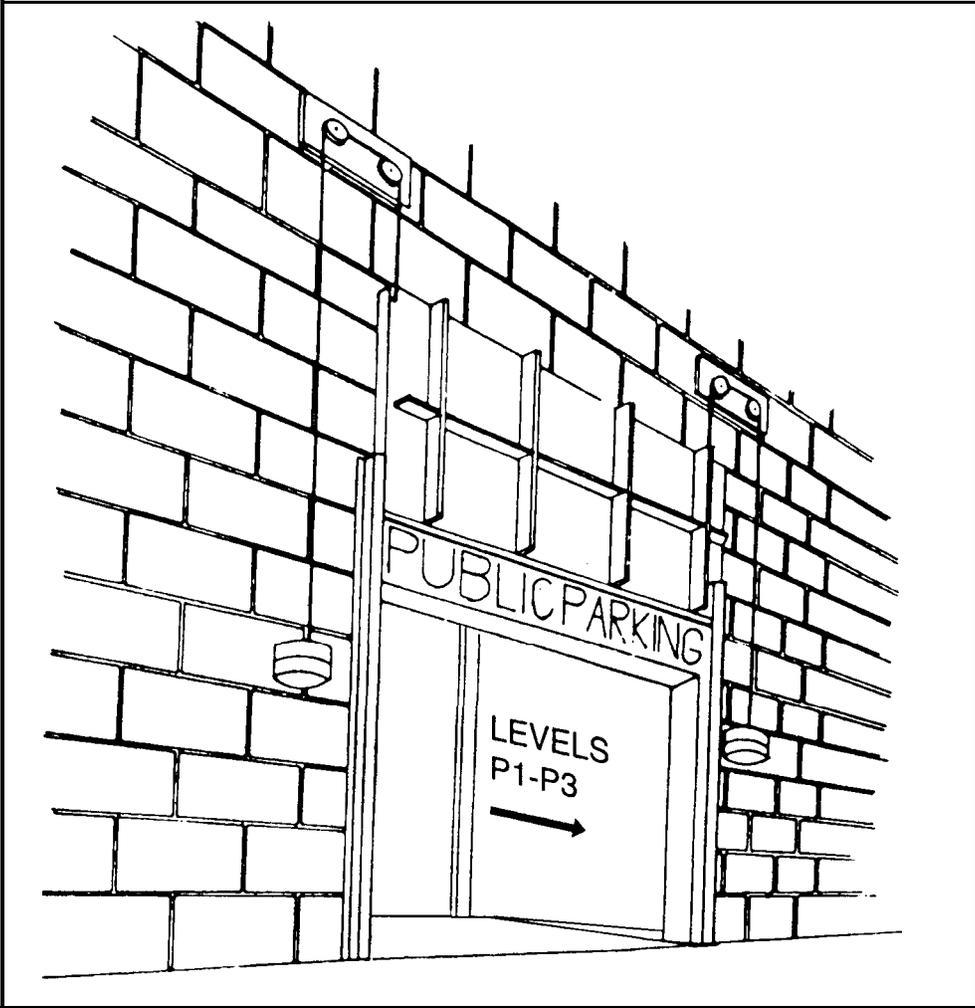


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**Below-Grade Parking Requirements**  
**for Buildings Located in Special Flood Hazard Areas**  
in accordance with the  
**National Flood Insurance Program**

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## Key Word/Subject Index:

This index allows the user to quickly locate key words and subjects in this Technical Bulletin. The Technical Bulletin User's Guide (printed separately) provides references to key words and subjects throughout the Technical Bulletins. For definitions of selected terms, refer to the Glossary at the end of this bulletin.

Key Word/Subject	Page
Below-grade parking garage, considered a basement	1
Below-grade parking garage, defined	1
Below-grade parking in A and V zones, when allowed, requirements for	2
Floodproofing, below-grade parking beneath non-residential buildings, design requirements for	4
Floodproofing, recognition of for insurance rating purposes	4

Any comments on the Technical Bulletins should be directed to:

FEMA/FIA  
Office of Loss Reduction  
Technical Standards Division  
500 C St., SW, Room 417  
Washington, D.C. 20472

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Graphic design based on the Japanese print *The Great Wave Off Kamigawa*, by Katsushika Hokusai (1760-1849), Asiatic collection, Museum of Fine Arts, Boston.

## TECHNICAL BULLETIN 6-93

### **Below-Grade Parking Requirements for Buildings Located In Special Flood Hazard Areas in accordance with the National Flood Insurance Program**

#### **Introduction**

The purpose of this bulletin is to provide technical guidance on the National Flood Insurance Program (NFIP) floodplain management requirements for below-grade parking garages for non-residential buildings in Special Flood Hazard Areas (SFHAs) shown on Flood Insurance Rate Maps (FIRMs).

Below-grade parking garages are commonly found in large engineered commercial buildings and are used for parking and access to the above-grade floors of the building. Flooding of these enclosed areas may result in significant damage to the building and any mechanical, electrical, or other utility equipment located there, such as ventilation equipment, lighting, elevator equipment, and drainage pumps. The garage walls, which often are major structural components of the building's foundation, are also susceptible to flood damage. The potential for injury to anyone in the garage, the potential for damage to parked cars, and the safety issue of removing parked cars when flooding threatens are important design considerations.

Note: Users of this bulletin are advised that it provides guidance that must be used in conjunction with Technical Bulletin 3, "Non-Residential Floodproofing — Requirements and Certification." The conditions and requirements set forth in both bulletins must be met for any below-grade parking garage to be in compliance with the minimum requirements of the NFIP regulations. A Floodproofing Certificate for Non-Residential Structures must be completed for any building in an SFHA with below-grade parking.

#### NFIP Regulations

The NFIP regulations provide direction concerning whether or not below-grade parking is permitted in SFHAs, both coastal and riverine. For the purposes of the NFIP, below-grade parking is considered a basement. A basement is defined as any area of a building having its floor subgrade (below ground level) on all sides. The following subsections provide applicable excerpts from the NFIP regulations.

#### Below-Grade Parking Garages in Residential Buildings in A Zones

Section 60.3(c)(2) of the NFIP regulations states that a community shall:

***“Require that all new construction and substantial improvements of residential structures within Zones A1-A30, AE and AH on the community’s FIRM have the lowest floor (including basement) elevated to or above the base flood level...”***





building. FEMA’s Technical Bulletin 3, “Non-Residential Floodproofing — Requirements and Certification,” must be consulted for necessary guidance on floodproofing designs for below-grade parking garages.

Note: While the NFIP regulations require that non-residential buildings be floodproofed only to the BFE, flood insurance rating procedures include a freeboard, or level of safety criterion. When a floodproofed building is rated for flood insurance, the level of flood protection is assumed at 1 foot below the top elevation of the floodproofing. For rating purposes, the NFIP requires that non-residential buildings be floodproofed to 1 foot above the BFE in order to receive rating credit for the floodproofing design.

A critical element in any floodproofing design for a below-grade parking garage is the point where the garage entrance ramp meets the street grade. The best method of protecting a dry-floodproofed garage from floodwaters is to design the garage entry to be above BFE. The entry can also be brought up and over a ramp of fill dirt placed above the BFE. In some cases, however, the garage entry must meet street grade at an elevation below the BFE. Such a design requires that a high-strength flood shield that can withstand the high hydrostatic pressure be installed so that floodwaters will not enter the dry-floodproofed garage.

Any portions of a floodproofing design that entail human intervention (such as placing a flood shield) greatly increase the potential for loss of life and property damage during a flood. A sufficient number of emergency exits must be available so that anyone in the garage will not be trapped by rising floodwaters, and a warning and evacuation plan must be developed and tested so that it can be readily implemented when a flood threatens. Such a plan is necessary for all below-grade garages as stated in Technical Bulletin 3, which provides guidance on warning and evacuation plans.

### Below-Grade parking for Mixed-Use Buildings

While the NFIP regulations state that dry floodproofing of below-grade parking garages is allowed only for non-residential buildings in A zones, professionally designed buildings that have both commercial (non-residential) and residential uses may be designed with floodproofed below-grade parking garages. All residential-use areas of the building must be above the BFE. An insurance agent experienced in the NFIP should be consulted during the design phase concerning the cost of insurance for a mixed-use building.

### The NFIP

The NFIP was created by Congress in 1968 to provide federally backed flood insurance coverage, because flood insurance was generally unavailable from private insurance companies. The NFIP is also intended to reduce future flood losses by identifying floodprone areas and ensuring that new development in these areas is adequately protected from flood damage. The NFIP is based on an agreement between the federal government and participating communities that have been identified as floodprone. FEMA, through the Federal Insurance Administration (FIA), makes flood insurance available to the residents of a participating community provided that the



