U.S. DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
National Flood Insurance Program

ELEVATION CERTIFICATE

OMB No. 1660-0008
Expires March 31, 2012

Important: Read the instructions on pages 1-9.

SECTION A - PROPERTY INFORMATION

For Insurance Company Use:

A1. Building Owner's Name — Policy Number

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. — Company NAIC Number

City State ZIP Code

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) _____

A5. Latitude/Longitude: Lat. _____ Long. _____ Horizontal Datum: ☐ NAD 1927 ☐ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number _____

A8. For a building with a crawlspace or enclosure(s):
- a) Square footage of crawlspace or enclosure(s) _____ sq ft
- b) No. of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade _____
- c) Total net area of flood openings in A8.b _____ sq in
- d) Engineered flood openings? ☐ Yes ☐ No

A9. For a building with an attached garage:
- a) Square footage of attached garage _____ sq ft
- b) No. of permanent flood openings in the attached garage within 1.0 foot above adjacent grade _____
- c) Total net area of flood openings in A9.b _____ sq in
- d) Engineered flood openings? ☐ Yes ☐ No

SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number	B2. County Name	B3. State

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use base flood depth)

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9.
☐ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other (Describe) _____

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☐ NAVD 1988 ☐ Other (Describe) _____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☐ No
Designation Date _____ ☐ CBRS ☐ OPA

SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☐ Finished Construction
*A new Elevation Certificate will be required when construction of the building is complete.

C2. Elevations – Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO. Complete Items C2.a-h below according to the building diagram specified in Item A7. Use the same datum as the BFE.

Benchmark Utilized _____ Vertical Datum _____

Conversion/Comments _____

			Check the measurement used.	
a)	Top of bottom floor (including basement, crawlspace, or enclosure floor)	_____._____	☐ feet	☐ meters (Puerto Rico only)
b)	Top of the next higher floor	_____._____	☐ feet	☐ meters (Puerto Rico only)
c)	Bottom of the lowest horizontal structural member (V Zones only)	_____._____	☐ feet	☐ meters (Puerto Rico only)
d)	Attached garage (top of slab)	_____._____	☐ feet	☐ meters (Puerto Rico only)
e)	Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)	_____._____	☐ feet	☐ meters (Puerto Rico only)
f)	Lowest adjacent (finished) grade next to building (LAG)	_____._____	☐ feet	☐ meters (Puerto Rico only)
g)	Highest adjacent (finished) grade next to building (HAG)	_____._____	☐ feet	☐ meters (Puerto Rico only)
h)	Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	_____._____	☐ feet	☐ meters (Puerto Rico only)

SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. *I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.* ☐

Check here if comments are provided on back of form. Were latitude and longitude in Section A provided by a licensed land surveyor? ☐ Yes ☐ No

PLACE SEAL HERE

Certifier's Name License Number

Title Company Name

Address City State ZIP Code

Signature Date Telephone

IMPORTANT: In these spaces, copy the corresponding information from Section A.	For Insurance Company Use:
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.	Policy Number
City State ZIP Code	Company NAIC Number

SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION (CONTINUED)

Copy both sides of this Elevation Certificate for (1) community official, (2) insurance agent/company, and (3) building owner.

Comments

Signature Date

☐ Check here if attachments

SECTION E - BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED) FOR ZONE AO AND ZONE A (WITHOUT BFE)

For Zones AO and A (without BFE), complete Items E1-E5. If the Certificate is intended to support a LOMA or LOMR-F request, complete Sections A, B, and C. For Items E1-E4, use natural grade, if available. Check the measurement used. In Puerto Rico only, enter meters.

E1. Provide elevation information for the following and check the appropriate boxes to show whether the elevation is above or below the highest adjacent grade (HAG) and the lowest adjacent grade (LAG).
a) Top of bottom floor (including basement, crawlspace, or enclosure) is _____._____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.
b) Top of bottom floor (including basement, crawlspace, or enclosure) is _____._____ ☐ feet ☐ meters ☐ above or ☐ below the LAG.

E2. For Building Diagrams 6-9 with permanent flood openings provided in Section A Items 8 and/or 9 (see pages 8-9 of Instructions), the next higher floor (elevation C2.b in the diagrams) of the building is _____._____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

E3. Attached garage (top of slab) is _____._____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

E4. Top of platform of machinery and/or equipment servicing the building is _____._____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

E5. Zone AO only: If no flood depth number is available, is the top of the bottom floor elevated in accordance with the community's floodplain management ordinance? ☐ Yes ☐ No ☐ Unknown. The local official must certify this information in Section G.

SECTION F - PROPERTY OWNER (OR OWNER'S REPRESENTATIVE) CERTIFICATION

The property owner or owner's authorized representative who completes Sections A, B, and E for Zone A (without a FEMA-issued or community-issued BFE) or Zone AO must sign here. *The statements in Sections A, B, and E are correct to the best of my knowledge.*

Property Owner's or Owner's Authorized Representative's Name

Address City State ZIP Code

Signature Date Telephone

Comments

☐ Check here if attachments

SECTION G - COMMUNITY INFORMATION (OPTIONAL)

The local official who is authorized by law or ordinance to administer the community's floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. Complete the applicable item(s) and sign below. Check the measurement used in Items G8 and G9.

G1. ☐ The information in Section C was taken from other documentation that has been signed and sealed by a licensed surveyor, engineer, or architect who is authorized by law to certify elevation information. (Indicate the source and date of the elevation data in the Comments area below.)

G2. ☐ A community official completed Section E for a building located in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.

G3. ☐ The following information (Items G4-G9) is provided for community floodplain management purposes.

G4. Permit Number	G5. Date Permit Issued	G6. Date Certificate Of Compliance/Occupancy Issued

G7. This permit has been issued for: ☐ New Construction ☐ Substantial Improvement

G8. Elevation of as-built lowest floor (including basement) of the building: _____._____ ☐ feet ☐ meters (PR) Datum _____

G9. BFE or (in Zone AO) depth of flooding at the building site: _____._____ ☐ feet ☐ meters (PR) Datum _____

G10. Community's design flood elevation _____._____ ☐ feet ☐ meters (PR) Datum _____

Local Official's Name Title

Community Name Telephone

Signature Date

Comments

☐ Check here if attachments

Building Photographs

See Instructions for Item A6.

	For Insurance Company Use:
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.	Policy Number
City State ZIP Code	Company NAIC Number

If using the Elevation Certificate to obtain NFIP flood insurance, affix at least two building photographs below according to the instructions for Item A6. Identify all photographs with: date taken; “Front View” and “Rear View”; and, if required, “Right Side View” and “Left Side View.” If submitting more photographs than will fit on this page, use the Continuation Page, following.

Building Photographs

Continuation Page

	For Insurance Company Use:
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.	Policy Number
City State ZIP Code	Company NAIC Number

If submitting more photographs than will fit on the preceding page, affix the additional photographs below. Identify all photographs with: date taken; “Front View” and “Rear View”; and, if required, “Right Side View” and “Left Side View.”

O.M.B. NO. 3067-0077
Expires July 31, 2002

FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM

FLOODPROOFING CERTIFICATE

FOR NON-RESIDENTIAL STRUCTURES

The floodproofing of non-residential buildings may be permitted as an alternative to elevating to or above the Base Flood Elevation; however, a floodproofing design certification is required. This form is to be used for that certification. Floodproofing of a residential building does not alter a community's floodplain management elevation requirements or affect the insurance rating unless the community has been issued an exception by FEMA to allow floodproofed residential basements. The permitting of a floodproofed residential basement requires a separate certification specifying that the design complies with the local floodplain management ordinance.

BUILDING OWNER'S NAME

STREET ADDRESS (Including Apt., Unit, Suite, and/or Bldg. Number) OR P.O. ROUTE AND BOX NUMBER

OTHER DESCRIPTION (Lot and Block Numbers, etc.)

FOR INSURANCE COMPANY USE
POLICY NUMBER
COMPANY NAIC NUMBER

CITY STATE ZIP CODE

SECTION I FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

Provide the following from the proper FIRM:

COMMUNITY NUMBER	PANEL NUMBER	SUFFIX	DATE OF FIRM INDEX	FIRM ZONE	BASE FLOOD ELEVATION (In AO Zones, Use Depth)

SECTION II FLOODPROOFING INFORMATION (By a Registered Professional Engineer or Architect)

Floodproofing Design Elevation Information:

Building is floodproofed to an elevation of ..... feet NGVD. (Elevation datum used must be the same as that on the FIRM.)

Height of floodproofing on the building above the lowest adjacent grade is ..... feet.

(NOTE: for insurance rating purposes, the building's floodproofed design elevation must be at least one foot above the Base Flood Elevation to receive rating credit. If the building is floodproofed only to the Base Flood Elevation, then the building's insurance rating will result in a higher premium.)

SECTION III CERTIFICATION (By Registered Professional Engineer or Architect)

Non-Residential Floodproofed Construction Certification:

I certify that, based upon development and/or review of structural design, specifications, and plans for construction, the design and methods of construction are in accordance with accepted standards of practice for meeting the following provisions:

The structure, together with attendant utilities and sanitary facilities, is watertight to the floodproofed design elevation indicated above, with walls that are substantially impermeable to the passage of water.

All structural components are capable of resisting hydrostatic and hydrodynamic flood forces, including the effects of buoyancy, and anticipated debris impact forces.

I certify that the information on this certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.

CERTIFIER'S NAME LICENSE NUMBER (or Affix Seal)

TITLE COMPANY NAME

ADDRESS CITY STATE ZIP CODE

SIGNATURE DATE PHONE

Copies should be made of this Certificate for: 1) community official, 2) Insurance agent/company, and 3) building owner.

PAPERWORK BURDEN DISCLOSURE NOTICE

GENERAL–This information is provided pursuant to Public Law 96-511, (The Paper Reduction Act of 1980, as amended), dated December 11, 1980, to allow the public to participate more fully and meaningfully in the Federal paperwork review process.

AUTHORITY–Public Law 96-511, amended; 44 U.S.C. 3507; and 5 CFR 1320

PAPERWORK REDUCTION ACT NOTICE–Public reporting burden for Floodproofing Certificate is estimated to average 3.25 hours per response. Burden means the time, effort, or financial resources expended by persons to generate, maintain, disclose, or provide information to the Federal Emergency Management Agency . You are not required to respond to this collection of information unless a valid OMB control number is displayed in the upper right corner of each form. You may send comments regarding the accuracy of the burden estimate and any suggestions for reducing the burden to: Information Collection Management, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20427, Paperwork Reduction Project (3067-0077). To ensure timely receipt and processing of the completed forms, return them to the address provided in the instructions to the forms. Do not send form(s) to the above address. Your response to this collection of information is required to obtain or retain benefits under the National Flood Insurance Program.

* U.S. Government Printing Office: 1997 – 517-742/83821

Date Received:_____ Received By:_____

Project/Permit Number:_____

Fee:_____

(To be Completed by Administrator)

FLOOD HAZARD PERMIT APPLICATION

(Please fill out application completely; Indicate NA if necessary.

PART I – APPLICANT INFORMATION

APPLICANT**:** _____

MAILING ADDRESS: _____

CITY:_____ STATE:_____ ZIP: _____

PHONE:_____ FAX: _____ EMAIL:_____

OWNER (If Different): _____

MAILING ADDRESS: _____

CITY:_____ STATE:_____ ZIP: _____

PHONE:_____ FAX: _____ EMAIL:_____

PART II - LOCATION OF PROPOSED PROJECT

TAX PARCEL ID(s): _____

SUBDIVISION: _____

LOT(s): _____ BLOCK: _____

ADDRESS/OTHER LOCATION INFORMATION: _____

_____

PART III – PROJECT DESCRIPTION:

PROPOSED WORK – CHECK ALL THAT APPLY

☐ STRUCTURE
- ☐ RESIDENTIAL
- ☐ COMMERCIAL
- ☐ NEW CONSTRUCTION
- ☐ ALTERATION
- ☐ ADDITION

☐ MOBILE HOME
- ☐ PRIVATE LOT
- ☐ MOBILE HOME PARK

☐ GRADE/EXCAVATION/FILL

☐ ROAD CONSTRUCTION

☐ NEW SUBDIVISION

☐ WATERCOURSE ALTERATION

☐ BRIDGE/CULVERT (Please Circle)

☐ UTILITY
- ☐ MAINLINE
- ☐ SERVICE CONNECT

☐ OTHER _____

EXISTING STRUCTURES

DETAILED PROJECT NARRATIVE (*Attach additional documentation if necessary*)

_____

_____

_____

_____

_____

_____

_____

_____

_____

PART IV – SUBMITTAL REQUIREMENTS

Check box to indicate information has been provided. ***All applications require the submittal of a site plan.***

☐ SITE PLAN SHOWING THE NATURE, **LOCATION, DIMENSIONS, AND ELEVATION** (MLLW) OF THE PROPERTY LOCATED WITHIN THE FLOODPLAIN, EXISTING OR PROPOSED STRUCTURES, LOCATION OF PROPOSED FILL, LOCATION OF STORAGE OF MATERIALS INCLUDING FUEL, AND LOCATION OF DRAINAGE FACILITIES.

☐ PROPOSED ELEVATION (===) OF THE **LOWEST FLOOR, INCLUDING BASEMENTS**/CRAWLSPACES OF ALL STRUCTURES.

☐ PROPOSED ELEVATION (MLLW) **OF ALL MACHINERY SERVING THE STRUCTURE INCLUDING FURNACES, HOTWATER HEATERS, AIR CONDITIONING, DUCTWORK, AND UTILITY METERS**

☐ FOR NON-RESIDENTIAL CONSTRUCTION ONLY: ELEVATION AND CERTIFICATION BY A REGISTERED ENGINEER OR ARCHITECT THAT FLOOD-PROOFING METHODS FOR ANY NON-RESIDENTIAL STRUCTURES MEET THE FLOOD-PROOFING CRITERIA OF THE MUNICIPAL FLOOD ORDINANCE.

☐ BASE FLOOD ELEVATIONS FOR NEW SUBDIVISONS OR DEVELOPMENT

☐ WRITTEN DESCRIPTION, IF APPLICABLE, DESCRIBING THE EXTENT WHICH A WATERCOURSE WILL BE ALTERED OR RELOCATED AS A RESULT OF THE PROPOSED DEVELOPMENT

☐ NO-RISE CERTIFICATION PREPARED BY A REGISTERED PROFESSIONAL ENGINEER FOR ALL PROJECTS LOCATED IN THE FLOODWAY, AND FOR ALL HYDRAULIC STRUCTURES, DRAINAGE FACILITIES, AND FILL IN FLOOD AREAS WITH BASE FLOOD ELEVATIONS WHERE NO FLOODWAYS HAVE BEEN IDENTIFIED. (Refer to Appendix C)

ASSOCIATED PERMITS

STATE AND FEDERAL PERMITS (Attach Documentation)	STATUS
☐ ARMY CORPS OF ENGINEERS 404 WETLAND PERMIT	_____
☐ FISH HABITAT PERMIT	_____
☐ COASTAL PROJECT REVIEW	_____

☐ OTHER _____ _____

ADDITIONAL REQUIREMENTS

IF A PERMIT CAN BE ISSUED FOR A PROPOSED STRUCTURE, IT WILL BE THE RESPONSIBILITY OF THE APPLICANT TO PROVIDE A FINAL AS-BUILT DRAWING AND ELEVATION CERTIFICATE PREPARED BY A REGISTERED PROFESSIONAL LAND SURVEYOR. A FINAL CERTIFICATE OF OCCUPANCY WILL NOT BE ISSUED UNTIL THESE DOCUMENTS HAVE BEEN SUBMITTED.

In signing this application, the landowner(s) or agent hereby grants the City of Dillingham the right to enter the above described location to inspect the work proposed, in progress, or work completed.

I hereby affirm and certify that I am one of the owners or am under contract with the owners, and I believe that the above information and/or statements are true in all respects to the best of my knowledge.

_____ _____

SIGNATURE (*Check One)* ☐ *Owner* ☐ *Applicant* *Date Signed*

FLOOD HAZARD PERMIT FEES

NOTICE: All fees are payable at time of application.

If issuance of a permit for one of these types of developments is, after review, refused by the City of Dillingham, one half of the permit fee deposited will be returned to the applicant.

PROJECT TYPE	FEE
Structure Addition Alteration New residential New commercial	
Watercourse Alteration or Obstruction	
Utility mainline	
Utility service connect	
New subdivision (Plus $ ____ per lot within the floodplain)	
Mobile Home Private Lot Mobile home park (Plus $ _____ per mobile home space within the floodplain)	
Street/Road Construction	
Bank/Slope Restoration (No in-channel work)	
Other	

FOR Administration USE ONLY

FEE CALCULATION	FEE
Structure	_____
Watercourse Alteration	_____
Utility	_____
Subdivision	_____
Mobile Home	_____
Street/Road Construction	_____
Bank/Slope Restoration	_____
Other:_____	_____
TOTAL	_____

APPENDIX A – SITE PLAN REQUIREMENTS

A SITE PLAN IS AN ACCURATE AND DETAILED MAP OF YOUR PROPERTY:

It shows the size, shape, and special features of your property; and the size and location of any buildings or other improvements to the property. Site plans show what currently exists on your property, and any changes or improvements you are proposing to make.

A SITE PLAN MUST CONTAIN THE FOLLOWING INFORMATION:

1. Legal description of parcel, north arrow, and scale
2. All property lines, easements and their dimensions
3. Names of adjacent roads, location of driveways
4. Location of streams, or lakes with setbacks indicated
5. Location, size, and shape of all buildings, existing and proposed, with elevation of lowest floor indicated
6. Location and dimensions of existing or proposed sewage systems
7. Location of all propane tanks, fuel tanks, and generators
8. Dimensions and depth of any fill on site
9. A survey showing the existing ground elevations at 4 corners of the building
10. Proposed ground elevations at 4 corners of the building, if applicable
11. Location of any proposed temporary construction fencing, buildings, fuel storage, and erosion control structures

ELEVATION NOTE: The City of Dillingham requires all VERTICAL datum to be based on MLLW Vertical datum. Assumed datum will not be accepted unless the property is located in areas where the datum has not been established.

For structures proposed in the flood plain, the lowest floor elevation must be at the base flood elevation. **Crawlspace grade is also considered "floor elevation" for the purpose of this requirement.**

For those areas where 1929 NGVD datum does not exist, a plot plan with contours, lot corner elevations using assumed datum, high-water mark and existing water levels of creeks, lakes, or streams, and proposed lowest living floor elevations, is required.

APPENDIX B- FLOODPLAIN CONSTRUCTION STANDARDS

USE OF FLOOD RESISTANT MATERIALS

The Federal Emergency Management Agency (FEMA) guidelines for flood resistant materials are contained in Technical Bulletin 2-93. This publication is available for review or reproduction upon request. This publication is also available on the Web.

Portions of buildings below the base flood elevation (BFE) are often constructed entirely out of concrete, which is considered a flood resistant material. It is also a common building practice to frame up from a concrete stem wall with wood construction to create a garage/storage space below the elevated first floor. Since garage spaces typically utilize sheetrock to achieve the necessary fire separation, construction of this type results in the use of materials subject to flood damage.

In order to comply with FEMA's guidelines for flood resistant materials as listed in Technical Bulletin 2-93, the use of untreated wood and sheetrock to cover wall members below the BFE is prohibited. The preferred design alternative (other than concrete walls) will be the use of pressure treated heavy timber construction (6"x10" horizontal, 8"x8" vertical) and pressure treated frame members. The ceiling can be protected with sheetrock if the first floor above the protected ceiling is one foot above the BFE and the sheetrock is less than one foot below that elevation. Cement board may be used as a substitute for sheetrock. Siding below the BFE shall utilize the acceptable materials listed in Technical Bulletin 2-93.

The area of a building below the BFE may only used for building access, parking and storage. No living space is permitted below the BFE.

REQUIRED ELEVATION

All construction below the BFE is susceptible to flooding and must consist of flood-resistant materials. The BFE will be established by this department and conveyed to the applicant for incorporation into the building plans. In order to adequately determine if flood-resistant materials are required, applicants proposing construction in flood prone areas shall provide a survey of existing ground elevations of the four corners of the proposed development and the proposed ground elevations of the proposed development.

The BFE shall be shown on the elevation drawings for the proposed structure. The BFE will be established by this department and conveyed to the applicant for incorporation into the building plans.

BASEMENTS

The City of Dillingham Floodplain Ordinance (DMC Title 15.04) requires that the lowest floor, including basement, be elevated at the BFE. The National Flood Insurance Program defines a basement as "any area of the building having its floor subgrade (below ground level) on all sides."

Applicants proposing construction in flood prone areas will need to be aware of final interior and exterior grade levels of the proposed structure. Subgrade basements and crawlspaces can incur significant flood insurance penalties.

OPENINGS TO EQUALIZE HYDROSTATIC FLOOD FORCES

The City of Dillingham Floodplain Ordinance requires that all fully enclosed areas below the lowest floor that are usable solely for parking, building access, or storage in an area other than a basement or crawl space shall have a minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area according to FEMA specifications. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

The vents should be placed on opposing walls to allow the entry and exit of floodwaters. Detailed information about FEMA's flood venting requirement may be found in Technical Bulletin 1. This publication is available for review or reproduction upon request. This publication is also available on the Web.

ELECTRICAL GEAR AND EQUIPMENT

All electrical, heating (**including fuel tank**), ventilation, plumbing and air conditioning equipment that is permanently affixed to a structure and which may be subject to floodwater damage shall be elevated at the BFE or higher unless otherwise constructed to prohibit the entry of flood waters. FEMA has published a document titled *Protecting Building Utilities from Flood Damage* that gives specific guidance on proper construction technique. This publication is available for review or reproduction upon request. This publication is also available on the Web.

FILL/ENCROACHMENT GUIDELINES

Proposed developments cumulatively may not increase base flood heights more that one-foot anywhere in the identified floodplain. (Applies only to floodplains with BFEs but without identified floodways.)

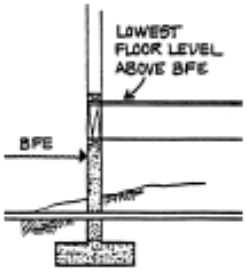
All watercourse alterations or modifications must not reduce the carrying capacity of the stream or increase BFEs. Watercourse alterations or modifications must not reduce the carrying capacity of the stream or increase BFEs. The applicant must submit an analysis that compares existing channel capacity with proposed capacity. Alteration or modification must maintain carrying capacity of the watercourse. Floodway regulations apply for alterations within a designated floodway (Appendix C).

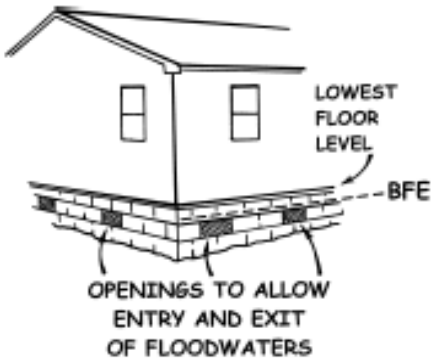
If fill is to be placed within the floodplain areas the applicant must include with the application the volume, height, and sideslope of the fill perimeter within the floodplain. The applicant must also indicate the method used to protect the fill from erosion. The placement must not interfere with any existing utilities or easements. Fill must not unreasonably obstruct or divert the flow of surface water to the detriment of adjacent or hydraulically affected property owners.

SPECIFIC FLOODPLAIN CONSTRUCTION STANDARDS

Residential Structures:

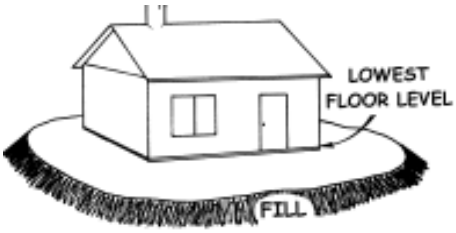
Residential structures must have the lowest floor including basement elevated at least to or above the BFE. This elevation requirement can be accomplished by any of the following three (3) methods:





1. Foundation Stem Walls:
The crawlspace must not be below grade. It must have as a minimum two permanent openings no more than one foot above grade. The total area of the openings must be no less than 1 square inch for every square foot of enclosed space. This helps to relieve hydrostatic pressure on the foundation during a flood. Any covers placed over the openings must be able to open automatically during flood flows without human intervention. Screens are acceptable if they permit entry and exit of floodwater.

2. Fill:
A poured slab placed over compacted fill can also be used to elevate the lowest floor of a structure to one foot above the BFE. Please note that when a building site is filled, it is still in the floodplain and no basements are permitted.



3. Piers, Piles and Posts:
This method is commonly used to avoid large fills and when flood heights are extreme. The supporting members must be designed to resist hydrostatic and hydrodynamic forces. Fully enclosed areas below the BFE can only be used for parking, access and limited storage. In addition, the following conditions must be met for any enclosed area below the BFE:

a) Service equipment (e.g., furnaces, water heaters, washers/dryers, etc.) are NOT

permitted below the BFE.

b) All walls, floors, and ceiling materials located below the BFE must be unfinished and constructed of materials resistant to flood damage.

c) The walls of any enclosed area below the BFE must be designed by a registered professional engineer or architect in a manner to prevent lateral movement, collapse or flotation of the structure. There must be at least two openings on each wall and the bottom of all openings must be no higher than one foot above grade.

Non-residential Structures

Must have the lowest floor including basement elevated to or above the BFE, or floodproofed at least one foot above BFE. If floodproofed, structures must be dry-floodproofed, which means keeping the water out. Non-residential (commercial) structures, together with attendant utility and sanitary facilities, are designed so that the structure is watertight below the base flood level. The walls are impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. Additionally, the structure must be designed to:

- prevent seepage, collapse or cracking of basement walls
- prevent buckling of basement floors
- prevent back-up of water from sewer lines
- have all openings located one foot above BFE
- all protective features must operate automatically without human intervention

Note: Dry floodproofing measures must be certified by a licensed engineer and only apply to non-residential structures.

APPENDIX C – “NO-RISE” ANAYLSIS PROCEDURES

Section 60.3(d)(3) of the National Flood Insurance Program (NFIP) requires that the City prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the city during the occurrence of the base (100-year) flood discharge.

In most cases, the “No-Rise Certificate” must be supported by technical data based upon the standard step-backwater computer model utilized to develop the 100-year floodway shown on the City of Dillingham effective Flood Insurance Rate Map (FIRM) or Flood Boundary and Floodway Map (FBFM) and the results tabulated on the Flood Insurance Study (FIS) for the City of Dillingham.

The analysis procedure is outlined in the attached document from the Federal Emergency Management Agency. While the attached guidelines specifically address floodway development the same procedure can be used to determine the impact of projects in flood zones without BFEs has that have the potential to increase flood elevations.

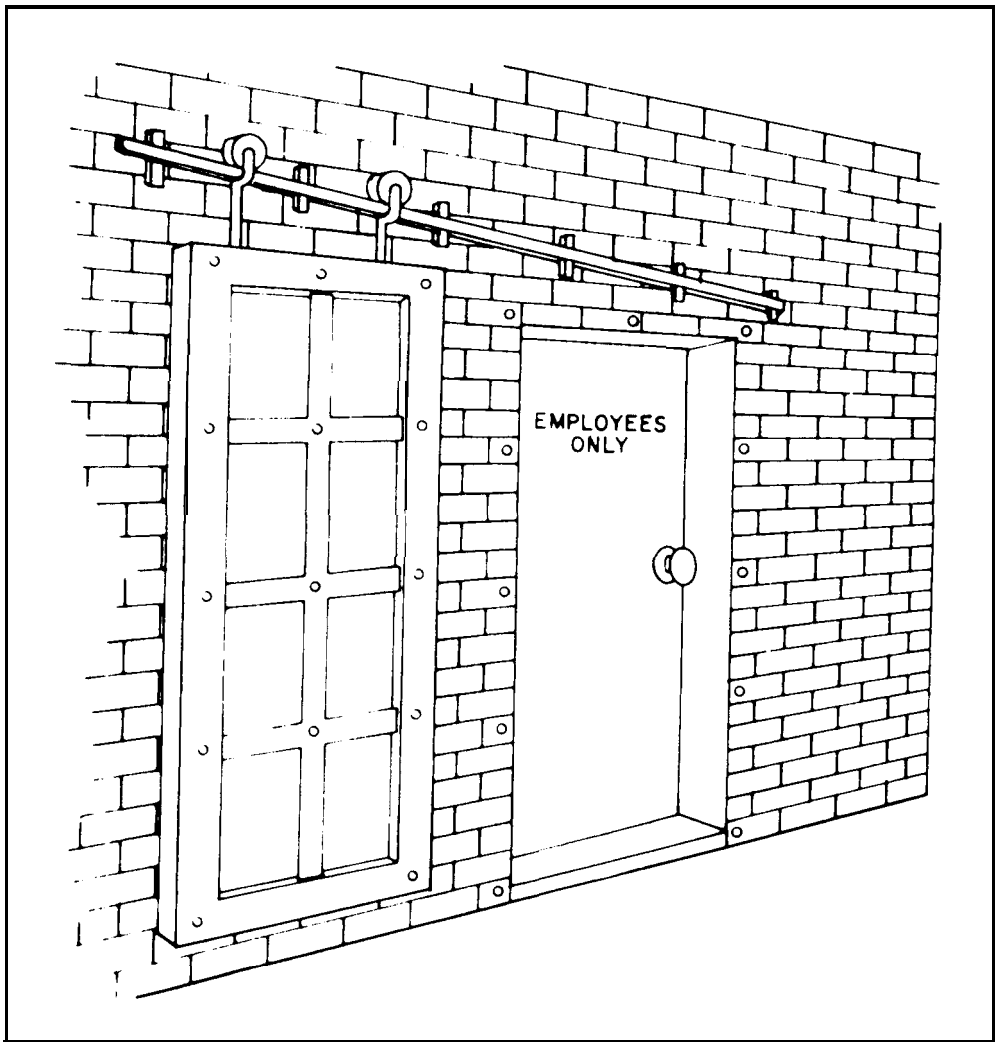
Technical Bulletin 3-93

Non-Residential Floodproofing — Requirements and Certification

for Buildings Located in Special Flood Hazard Areas

in accordance with the

National Flood Insurance Program



FEDERAL EMERGENCY MANAGEMENT AGENCY
FEDERAL INSURANCE ADMINISRTATION

FIA-TB-3
4/93

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.

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

Technical Bulletin 3-93 replaces Technical Bulletin 90-3 (draft) "Non-Residential Floodproofing Certification Requirements. "

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

TECHNICAL BULLETIN 3-93

Non-Residential Floodproofing — Requirements and Certification for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program

Introduction

This bulletin describes design, construction, and planning requirements for the floodproofing of non-residential buildings under the 'National Flood Insurance Program (NFIP) regulations and how to correctly complete the NFIP's Floodproofing Certificate for Non-Residential Structures form. For the purposes of this bulletin, floodproofing means making a building watertight, substantially impermeable to floodwaters.

Before a floodproofed building is designed, numerous planning considerations, including flood warning time, uses of the building, mode of entry to and exit from the building and the site in general, floodwater velocities, flood depths, debris impact potential, and flood frequency, must be addressed to ensure that dry floodproofing will be a viable floodplain management tool. These critical considerations are discussed within this bulletin.

In the FEMA publication "Floodproofing of Non-Residential Structures," floodproofing is described as a combination of adjustments and/or additions of features to buildings that eliminate or reduce the potential for flood damage. Examples of such adjustments and additions include anchoring of the building to resist flotation, collapse, and lateral movement; installation of watertight closures for doors and windows; reinforcement of walls to withstand floodwater pressures and impact forces generated by floating debris; use of membranes and other sealants to reduce seepage of floodwater through walls and wall penetrations; installation of pumps to control interior water levels; installation of check valves to prevent the entrance of floodwater or sewage flows through utilities; and the location of electrical, mechanical, utility, and other valuable damageable equipment and contents above the expected flood level.

Floodproofing components for an individual building may also include floodwalls, small localized levees, or berms around buildings. However, such components, because they are not part of the building itself, are generally not credited for the flood insurance rating of a building under the NFIP and are therefore not detailed within this bulletin.

The NFIP allows a new or substantially improved non-residential building in an A zone (Zone A, AE, A 1-A30, AR, AO, or AH) to have a lowest floor below the base flood elevation (BFE), provided that the building has been designed, constructed, and certified to be floodproofed and to meet established criteria. Floodproofing of areas below the BFE in residential buildings is not permitted under the NFIP. In a Coastal High Hazard Area (Zone V, VE, or V 1 -V30), construction or substantial improvement of a building with a lowest floor elevation below the BFE is not allowed, regardless of any floodproofing techniques employed.

A Floodproofing Certificate for Non-Residential Structures (FEMA Form 81 -65) has been developed by FEMA for use in the certification of non-residential floodproofing designs. Because of the increased potential for significant building damage due to the failure of the floodproofing system, the NFIP requires a design certification for all floodproofed buildings. In

accordance with Section 60.3(c)(4), communities shall require a correctly completed certificate (or its equivalent) for every floodproofed building within a Special Flood Hazard Area (SFHA) and shall maintain the completed certificates on file.

A Floodproofing Certificate for Non-Residential Structures is required for the following types of buildings (in A zones only):

- Floodproofed non-residential buildings (no residential uses).
- Floodproofed mixed-use buildings that are professionally designed with all residential uses located above the floodproofing design elevation.

NFIP Regulations

The NFIP regulations that specifically apply to the design of floodproofing for non-residential buildings are within Section 60.3(c)(3), which states that the community shall:

> ***"Require that all new construction and substantial improvements of non-residential structures within Zones A1 -A30, AE, and AH 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. "***

Section 60.3(c)(8) further states that the community shall:

> ***"Require within any AO zone on the community's FIRM that all new construction or substantial improvements of non-residential structures (i) have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified), or (ii) together with attendant utility and sanitary facilities, be completely floodproofed to that (base flood) level to meet the floodproofing standard specified in paragraph 60.3(c)(3)(ii)."***

Additionally, Section 60.3(c)(4) requires that any floodproofing design be certified in the following manner:

> ***"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 the accepted standards of practice for meeting the applicable provisions of paragraphs (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... "***

It should be noted that Technical Bulletins provide guidance on the minimum requirements of the NFIP regulations. Community or State requirements that exceed those of the NFIP take precedence. Design professionals should contact the community to determine whether more restrictive local or State regulations apply to the building or site in question. All applicable standards of the State or local building code must also be met for any building in a flood hazard area.

Planning Considerations

A review of the following factors for the site in question will assist the design professional in determining whether floodproofing is appropriate. For example, if a site will be surrounded by rapidly rising, high-velocity floodwaters during a flood, and the available warning time is short, then the site is unsuitable for a floodproofed building.

Warning Time

The rate-of-rise of floodwaters for the site in question, the established flood warning system (if any), the flood warning time available, and the reliability of the flood warning must be reviewed to determine appropriate floodproof design elements. The rate-of-rise or the flood warning time available through an existing reliable (community-based or regionally based) flood warning system must be adequate to provide sufficient lead time to evacuate a floodprone building when flooding threatens. In addition, sufficient warning time must exist to successfully place floodproofing components, such as removable flood shields or gates, if such components are to be included in the floodproofing design. Other examples of floodproofing techniques that can require human intervention are operating sump pumps and closing valves. The amount of time necessary to put human intervention floodproofing components in place will depend upon the number of components, their complexity, and the availability of personnel to place them. Floodproofed buildings are not appropriate for any site in a flash flood area, because of the potentially short warning time.

Safety and Access

Safe access to a floodproofed building is a critical factor in the determination of whether floodproofing is an appropriate design alternative. In 1987, Colorado State University conducted a study of human stability in flood flow conditions based on the product number of depth of flow multiplied by the floodwater velocity. Results of this study indicated that any floodplain location with a product number of 4 or greater represents a significant hazard to individuals. Floodplain sites with a base flood product number number of 4 or greater (depth in feet multiplied by velocity in feet per second) will create a hazard for anyone attempting to escape from or gain access to the site. Such sites are not generally acceptable for floodproofed buildings, unless modifications are made to the site to reduce the flood hazard.

For any floodproofed building, all roads to be used as evacuation routes must remain passable as the floodwaters rise. In addition, all roads that provide access to buildings whose dry-floodproofing components require human intervention must remain passable long enough for the

floodproofing components to be installed and for all personnel to safely evacuate the site. For sites with an acceptably low hazard (product number less than 4) that are contiguous to land above the BFE, evacuation and access during times of flooding are generally not critical considerations.

Flood Velocities, Flood Depths, and Debris

For sites with flood velocities in excess of 5 feet per second or base flood depths in excess of 3 feet, the cost of dry-floodproofed construction may be prohibitive. Part 3 of the section of this bulletin titled "Minimum Engineering Considerations" describes the flood forces that a floodproofed building must be able to resist. Flood-borne debris can generate impact forces that may make a dry-floodproofed design technically infeasible and therefore inappropriate. A level of safety above the BFE, referred to as freeboard, is recommended, as discussed under "Minimum Engineering Considerations. "

> Note: While buildings need only be protected to the BFE for floodplain management purposes, freeboard is considered for flood insurance rating purposes. Because of the additional risk associated with any floodproofed building, 1 foot is subtracted from the elevation to which a building has been floodproofed, for insurance rating (if the building is floodproofed at least to the BFE). Therefore, to receive an insurance rating based on 100-year flood protection, the building must be floodproofed to an elevation at least 1 foot above the BFE. Insurance premiums will be lower if floodproofing exceeds this requirement.

Flood Frequency

A site that has been flooded frequently may not be appropriate for a dry-floodproofed building. The cumulative wear-and-tear on a building's external components as a result of recurring inundation may render a dry floodproofing strategy infeasible. The cost of repeated business interruption and of frequent cleanup activities, as well as the effects of having to repeatedly implement a flood emergency plan, must be assessed.

If the evaluation of each of the aforementioned factors indicates that dry floodproofing is a viable floodplain management alternative, then a floodproofing design is developed. For all floodproofed buildings, the design professional must then produce both a Flood Emergency Operation Plan and an Inspection and Maintenance Plan for the building.

Flood Emergency Operation Plan

A Flood Emergency Operation Plan is an integral part of any building's floodproofing design and is critical when the floodproofing requires human intervention such as the installation of flood gates or flood shields. A Flood Emergency Operation Plan is necessary for any floodproofed building to ensure that the floodproofing components will operate properly under all conditions, including power failures. A continuous source of electricity to operate any necessary floodproofing components, such as pumps, will be needed for any floodproofing design that

includes such components. The design professional must produce the plan. An adequate plan must include the following:

1. An established chain of command and responsibility with leadership responsibilities clearly defined for all aspects of the plan.

2. A procedure for notification of necessary parties when flooding threatens and flood warnings are issued. Personnel required to be at the building should have a planned and safe means of ingress and should have no other emergency response duties during a flood event. Alternates should be assigned in the event that the primary persons responsible are unable to complete their assigned duties under the plan.

3. A list of specific duties assigned to ensure that all responsibilities are addressed expeditiously. The locations of materials necessary to properly install all floodproofing components must be included in the list.

4. An evacuation plan for all personnel—those without duties for the flood emergency as well as those with duties for implementing the plan. All possible ingress and egress routes must be identified.

5. A periodic training and exercise program to keep personnel aware of their duties and responsibilities. Training drills should be held at least once a year and should be coordinated with community officials. Flood safety precautions should be repeated during each training drill.

Inspection and Maintenance Plan

Every floodproofing design requires some degree of periodic maintenance and inspection to ensure that all components will operate properly under flood conditions. The necessary inspection and maintenance activities, including inspection intervals and repair requirements, must be described in the Inspection and Maintenance Plan. Components that should be inspected as part of an annual (as a minimum) maintenance and inspection program include the following:

1. Mechanical equipment such as sump pumps and generators.

2. Flood shields and closures, to ensure that they fit properly and that the gaskets and seals are in good working order, properly labeled, and stored as indicated in the Flood Emergency Operation Plan.

3. Walls and wall penetrations, for cracks and potential leaks.

4. Levees and berms, for excessive vegetative growth, cracks, or leaks.

Both the Flood Emergency Operation Plan and the Inspection and Maintenance Plan are necessary at the time that the Non-Residential Floodproofing Certificate is submitted to the community. Before issuing a building permit, the community should require that the property owner sign an agreement stating that the plan will be adhered to. The community should also be assured that the inspection and maintenance activities required by the plan will continue regardless of changes in the ownership of the floodproofed building. This assurance should be accomplished by appropriate deed restrictions. Any lease agreement should also contain clear language stating the leaseholder's responsibilities for the floodproofed building.

Minimum Engineering Considerations

The design professional, a registered professional engineer or architect, must certify that the following requirements have been met by the building's design, specifications, and plans:

1. The building must be watertight (i.e., floodwaters must not enter the building envelope):

    a. The building must be watertight to the floodproof design elevation, which is further defined as being at least the BFE. As previously noted, floodproofing to any elevation less than 1 foot above the BFE will have a serious negative impact on the flood insurance rating for the building. Generally a minimum of 1 foot of freeboard is recommended. Additional freeboard is warranted for sites where predicted flood depths may be inaccurate, such as sites within large drainage areas and rapidly urbanizing areas.

    b. The building's walls must be "substantially impermeable to the passage of water." FEMA has adopted the U.S. Army Corps of Engineers (COE) definition of substantially impermeable from the COE publication "Flood Proofing Regulations." This document states that a substantially impermeable wall "shall not permit the accumulation of more than 4 inches of water depth during a 24-hour period if there were no devices provided for its removal. However, sump pumps shall be required to control this seepage." Flood-resistant materials, described in Technical Bulletin 2, "Flood-Resistant Materials Requirements," must be used in all areas where such seepage is likely to occur.

2. The building's utilities and sanitary facilities, including heating, air conditioning, electrical, water supply, and sanitary sewage services, must be located above the BFE, completely enclosed within the building's watertight walls, or made watertight and capable of resisting damage during flood conditions.

3. All of the building's structural components must be capable of resisting specific flood-related forces. These are the forces that would be exerted upon the building as a result of floodwaters reaching the BFE (at a minimum) or floodproofing design level, and include the following:

    a. Hydrostatic Flood Force—This is the force that water at rest exerts on any submerged object. For a floodproofed building design, the calculations of hydrostatic flood forces must include saturated soil pressure on any portion of the building that is below grade (see Figure 1). Guidelines for determining hydrostatic pressure are provided on the following page.

HYDROSTATIC PRESSURES BY WATER DEPTH	
HEIGHT (H) (WATER DEPTH]	Ph (LBS/SQ.FT.)
1	62.4
2	124.8
3	187.2
4	249.6
5	312.0
6	374.4
7	436.8
8	499.2
9	561.6
10	624.0

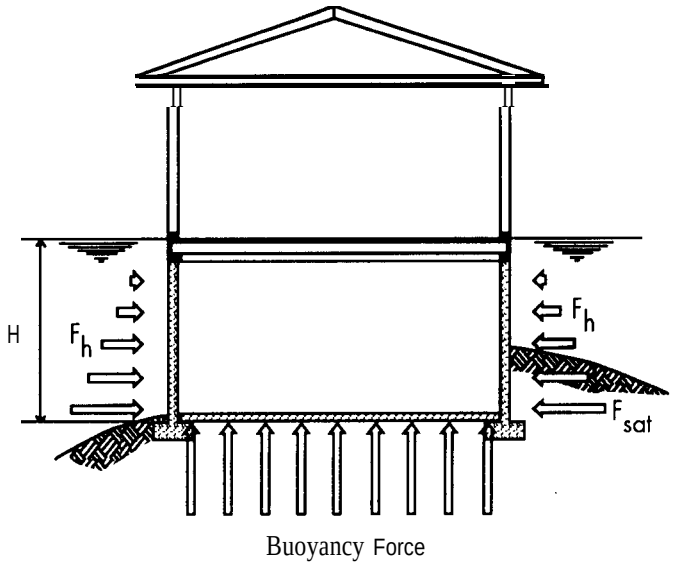


Figure 1. Hydrostatic Pressure Diagram

Resultant Lateral Force Due to Hydrostatic Pressure from Freestanding Water:

$F_h = \frac{1}{2}wH^2$

where: F_h is the lateral force from freestanding water (in pounds per linear foot of surface)

w is the specific weight of water (62.4 pounds per cubic foot)

H is the height of the standing water (to the floodproof design level)

If any portion of the building is below grade, then calculate the Resultant Cumulative Lateral Force Due to Hydrostatic Pressure from Saturated Soil:

$F_{sat} = \frac{1}{2}SD^2 + F_h$

where: F_{sat} is the lateral force from saturated soil

S is the equivalent fluid weight of saturated soil (in pounds per cubic foot)

D is the depth of saturated soil (in feet)

F_h is the lateral force from freestanding water

Note: See Appendix C of the FEMA "Design Manual for Retrofitting Flood-Prone Residential Structures" for further information.

b. Buoyancy-This is the vertical force associated with the building's tendency to float when inundated or surrounded by floodwaters. This force can be calculated as shown below.

Buoyancy Force:

$F_b = wAH$

where: F_b is the force due to buoyancy

w is the specific weight of water (62.4 pounds per cubic foot)

A is the area of horizontal surface (floor or slab) being acted upon (in square feet)

H is the depth of building below the floodproofing design level (in feet)

Note: See Appendix C of the FEMA "Design Manual for Retrofitting Ftood-Prone Residential Structures" for further information.

c. Hydrodynamic Force—This is the force exerted on vertical surfaces exposed to moving floodwaters. The determination of hydrodynamic force is based on the expected velocity of the floodwaters with depths to the floodproofing design level (BFE or higher). The projected average base flood velocity within the floodway may be obtained using FEMA Flood Insurance Studies (FISS) where a floodway has been identified. It should be noted that velocities in the flood fringe will generally be less than the floodway velocities presented in the FIS. Where no FIS velocity data exist, velocities should be determined using Manning's equation, as found in most hydraulic reference and text books.

Hydrodynamic Force:

$F_d = C_d m ½ (V)^2 A$

where: F_d is the lateral force due to hydrodynamic pressure

C_d is the drag coefficient

m is the mass density of water (1.94 slugs per cubic foot)

V is the velocity of the water (in feet per second)

A is the area of the wall affected (in square feet)

Note: See Appendix C of the FEMA "Design Manual for Retrofitting Ftood-Prone Residential Structures" for further information.

d. Debris Impact Force—This is the force associated with flood-borne debris striking the side of a building. This force presents the greatest unknown to the designer, but a value must be estimated to develop an effective floodproofing design. Unless more detailed information is available, such as historical debris flow data, the formula shown below should be used. This formula assumes a 1-second duration of impact. The weight of the object is generally estimated at 1,000 pounds but can be reduced to 500 pounds for areas subject to minor debris flow potential. Any areas subject to severe debris (such as mountainous regions or areas subject to ice floes) are not appropriate sites for floodproofed buildings unless the designer takes these forces into account in designing and armouring the building. Armouring often results in designs that are not cost-effective.

Debris Impact Force:

$$F_i = \frac{WV}{gt}$$

where:

- F_i is the Impact Force
- w is the weight of the object (in pounds)
- v is the velocity of the object (in feet per second)
- g is the acceleration due to gravity (32.2 feet per second^2)
- t is the duration of impact (in seconds)

Note: See Appendix C of the FEMA "Design Manual for Retrofitting Flood-Prone Residential Structures" for further information.

4. Like all construction that falls under the NFIP regulations, the building must meet the requirements of all applicable portions of local and State building codes, including the provisions of the Americans with Disabilities Act; life-safety codes for ingress, egress, and clearing; and venting and combustion air requirements.

Preparation of the Floodproofing Certificate for Non-Residential Buildings

The Floodproofing Certificate is required for all non-residential buildings to be floodproofed and is to be completed by the design professional. The first part of the Certificate contains information concerning the location and ownership of the building.

FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM

O.M.B. No. 3067-007

FLOODPROOFING CERTIFICATE

FOR NON-RESIDENTIAL STRUCTURES

The floodproofing of non-residential buildings maybe permitted as an alternative to elevating to or above the Base Flood Elevation; however, a floodproofing design certification is required. This form is to be used for that certification. Floodproofing of a residential building does not alter a cummunity's floodplain management elevation requirements or affect the insurance rating unless the community has been issued an exception by FEMA to allow floodproofed residential basements. The permitting of a floodproofed residential basement requires a separate certification specifying that the design complies with the local floodplain management ordinance.

	FOR INSURANCE COMPANY USE
BUILDING OWNER'S NAME	POLICY NUMBER
STREET ADDRESS (including Apt., Unit, Suite and/or Bldg. Number) OR P.O ROUTE AND BOX NUMBER	COMPANY NAIC NUMBER
OTHER DESCRIPTION (Lot and Block Numbers, etc.)	
CITY	STATE ZIP CODE

Building location and Ownership information

Section I of the Certificate is the Flood Insurance Rate Map (FIRM) information, including the BFE used in designing the floodproofing system. Copies of the FIRM should be available through the community's floodplain administrator.

SECTION I FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

Provide the following from the proper FIRM:

COMMUNITY NUMBER	PANEL NUMBER	SUFFIX	DATE OF FIRM INDEX	FIRM ZONE	BASE FLOOD ELEVATION (in AO Zones use depth)

Section I

Section II requests information regarding the floodproofing design. The first item is the elevation, referenced to the datum of the FIRM (generally the National Geodetic Vertical Datum of 1929), to which the building is floodproofed. This elevation must be equal to or greater than the BFE. It is important to note that for insurance rating purposes, the floodproofing design must provide protection to 1 foot above the BFE to receive rating credit. If the building is floodproofed only to the BFE, then the building's insurance rating will result in a higher premium. Before a decision is made to floodproof to less than 1 foot above the BFE, insurance implications should be carefully considered.

The second item is the height of the floodproofing above the lowest adjacent grade. This information is intended to be used by community building officials, FEMA, and NFIP insurance underwriters to analyze the level of safety that the floodproofing design will provide. Since floodwaters exert greater pressure on the floodproofed building as the height of the flooding increases (see Figure 1), floodproofing that exceeds 3 feet in height represents a greater risk and may result in insurance rates that reflect this increased risk.

SECTION II FLOODPROOFING INFORMATION (By a Registered Professional Engineer or Architect)

Floodproofing Design Elevation Information:

Building is floodproofed to an elevation of __.__ feet NGVD. (Elevation datum used must be the same as that on the FIRM.)

Height of floodproofing on the building above the lowest adjacent grade is feet.

(NOTE: for insurance rating purposes, the building's floodproofed design elevation must be at least one foot above the Base Flood Elevation to receive rating credit. If the building is floodproofed only to *the Base Flood Elevation, then the building's insurance rating will result in a higher premium.)*

Section II

Section III is the actual certification of the floodproofing design as required in Section 60.3(c)(4) of the NFIP regulations. It is important to note that design professionals signing this form are certifying that they have developed and/or reviewed the design plans and specifications and find them in compliance with accepted standards of practice for dry floodproofing. This certification is based on the floodproofing design, not the as-built condition of the building. The person signing this form must be a registered professional engineer or architect within the state or territory where the building will be constructed or substantially improved.

SECTION III CERTIFICATION (By a Registered Professional Engineer or Architect)

Non-Residential Floodproofed Construction Certification:

I certify that based upon development and/or review of structural design, specifications, and plans for construction that the design and methods of construction are in accordance with accepted standards of practice for meeting the following provisions:

The structure, together with attendant utilities and sanitary facilities, is watertight to the floodproofed design elevation indicated above, with walls that are substantially impermeable to the passage of water.

All structural components are capable of resisting hydrostatic and hydrodynamic flood forces, including the effects of buoyancy, and anticipated debris impact forces.

I *certify that the information on this certificate represents my best effort to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.*

CERTIFIER'S NAME	LICENSE NUMBER (or Affix Seal)		
TITLE	COMPANY NAME		
ADDRESS	CITY	STATE	ZIP
SIGNATURE	DATE	PHONE	

Copies should be made of this certificate for: 1) community official, 2) insurance agent/company, 3) building owner.

FEMA Form 81-65

Section III

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 being floodprone. FEMA, through the Federal Insurance Administration (FIA), makes flood insurance available to the residents of a participating community provided that the community adopts and enforces adequate floodplain management regulations that meet the minimum NFIP requirements. The NFIP encourages communities to adopt floodplain management ordinances that exceed the minimum NFIP criteria. Included in the NFIP requirements, found under Title 44 of the U.S. Code of Federal Regulations, are minimum building design and

construction standards for buildings located in SFHAs. Through their floodplain management ordinances, communities adopt the NFIP design performance standards for new and substantially improved buildings located in floodprone areas identified on FIA's FIRMs.

Technical Bulletins

This is one of a series of Technical Bulletins FEMA has produced to provide guidance concerning the building performance standards of the NFIP. These standards are contained in Title 44 of the U.S. Code of Federal Regulations at Section 60.3. The bulletins are intended for use primarily by State and local officials responsible for interpreting and enforcing NFIP regulations and by members of the development community, such as design professionals and builders. New bulletins, as well as updates of existing bulletins, are issued periodically, as necessary. The bulletins do not create regulations; rather they provide specific guidance for complying with the minimum requirements of existing NFIP regulations. Users of the Technical Bulletins who need additional guidance concerning NFIP regulatory requirements should contact the Natural Hazards Branch of the appropriate FEMA regional office. The "User's Guide to Technical Bulletins" lists the bulletins issued to date and provides a key word/subject index for the entire series.

Ordering Information

Copies of the Technical Bulletins can be obtained from the appropriate FEMA regional office. Technical Bulletins can also be ordered from the FEMA publications warehouse. Use of FEMA Form 60-8 will result in a more timely delivery from the warehouse — the form can be obtained from FEMA regional offices and your state's Office of Emergency Management. Send publication requests to FEMA Publications, P.O. Box 70274, Washington, D.C. 20024.

Further Information

The following publications provide further information concerning non-residential floodproofing:

1. "Answers to Questions About Substantially Damaged Buildings," FEMA, May 1991, FEMA-213.
2. "Block and Brick Wall Integrity Against Water Heights and Systems and Materials to Prevent Flood Waters From Entering Buildings," Carl E. Pace, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi, 1984.
3. "Commercial-Industrial Flood Audit," New England District, U.S. Army Corps of Engineers, n.d.
4. "Cooperative Flood Loss Reduction, A Technical Manual for Communities and Industries," Flood Loss Reduction Associates, 1981.
5. "Design Manual for Retrofitting Flood-Prone Residential Structures," FEMA, September 1986, FEMA-1 14.
6. "Floodproofing Non-Residential Structures," FEMA, May 1986, FEMA- 102.

7. “Flood Proofing Regulations,” U.S. Army Corps of Engineers, March 1992, EP 1165-2-314.

8. “Human Stability in a High Flood Hazard Zone,” S.R. Abt, R.J. Whittlen, A. Taylor, and D.J. Love, Water Resource Bulletin, August 1989.

9. “Sealants, Part 1,“ John P. Cook, Progressive Architecture, December 1974.

10. “Sealants, Part 2,” John P. Cook, Progressive Architecture, February 1975.

11. “Systems and Materials to Prevent Flood Waters from Entering Buildings,” U.S. Army Corps of Engineers, 1984.

12. “Tests of Brick-Veneer Walls and Enclosures for Resistance to Flood Waters,” Carl E. Pace, U.S. Army Corps of Engineers, Lower Mississippi Division, Vicksburg, Mississippi, 1978.

Glossary

Base flood — The flood that has a 1-percent probability of being equaled or exceeded in any given year (also referred to as the 100-year flood).

Base Flood Elevation (BFE) — The height of the base flood, usually in feet, in relation to the National Geodetic Vertical Datum of 1929 or other datum as specified.

Basement — Any area of a building having its floor subgrade (below ground level) on all sides.

Coastal High Hazard Area — An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high-velocity wave action from storms or seismic sources.

Federal Emergency Management Agency (FEMA) — The independent federal agency that, in addition to carrying out other activities, oversees the administration of the National Flood Insurance Program.

Federal Insurance Administration (FIA) — The component of FEMA directly responsible for administering the National Flood Insurance Program.

Flood Insurance Rate Map (FIRM) — The insurance and floodplain management map issued by FEMA that identifies, on the basis of detailed or approximate analyses, areas of 100-year flood hazard in a community.

Floodprone area — Any land area susceptible to being inundated by floodwater from any source.

Lowest floor — The lowest floor of the lowest enclosed area of a building, including a basement. Any NFIP-compliant unfinished or flood-resistant enclosure useable solely for parking of vehicles, building access, or storage (in an area other than a basement) is @ considered a building’s lowest floor.

Special Flood Hazard Area (SFHA) — Area delineated on a Flood Insurance Rate Map as being subject to inundation by the base flood and designated as Zone A, AE, A1-A30, AR, AO, AH, V, VE, or V1-V30.

Substantial damage — Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial improvement — Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed.

V-Zone Design and Construction Certification

FEMA

Purpose: To explain the certification requirements for structural design and construction in V zones.

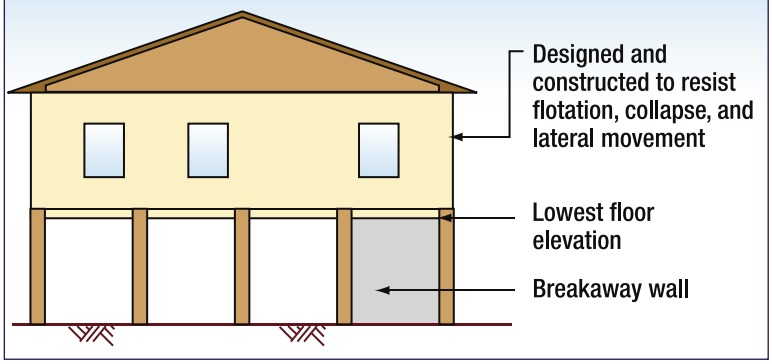
Structural Design and Methods of Construction Certification

As part of the agreement for making flood insurance available in a community, the National Flood Insurance Program (NFIP) requires the community to adopt a floodplain management ordinance that specifies minimum design and construction requirements. Those requirements include a ***certification of the structural design and the methods of construction.***

Specifically, NFIP regulations and local floodplain management ordinances require that:

1. a ***registered professional engineer or architect*** shall ***develop or review*** the ***structural design, specifications, and plans*** for the construction, and
2. a ***registered professional engineer or architect*** shall ***certify that the design and methods of construction*** to be used are in accordance with accepted standards of practice for meeting the following criteria:
   - the ***bottom of the lowest horizontal structural member of the lowest floor*** (excluding the pilings or columns) is elevated to or above the Base Flood Elevation (BFE); and
   - the pile or column foundation and structure attached thereto is ***anchored to resist flotation, collapse, and lateral movement due to the effects of wind and water loads acting simultaneously*** on all building components. Water loading values used shall be those associated with the Base Flood. Wind loading values used shall be those required by applicable state or local building standards.

Required Certifications in V Zones



The community, through its inspection procedures, will verify that the building is built in accordance with the certified design.

Completing the V-Zone Certification

There is no single V-zone certificate used on a nationwide basis. Instead, local communities and/or states have developed their own certification procedures and documents.

Registered engineers and architects involved in V-zone construction projects should ***check with the authority having jurisdiction regarding the exact nature and timing of required certifications***.

Page 2 shows a sample certification form developed by one state. It is intended to show one of many possible ways by which a jurisdiction may require that the certification and supporting information be provided. In this instance, three certifications are included on the form (Lowest Floor Elevation, Design and Methods of Construction, Breakaway Wall Collapse).

Other Certifications Required in V Zones

- Lowest Floor Elevation, by a surveyor, engineer, or architect (see Fact Sheet No. 4)
- Breakaway Wall Collapse, by a registered professional engineer or architect (see Fact Sheet No. 27)

The Design and Methods of Construction certification should take into consideration the NFIP Free-of-Obstruction requirement for V zones: *the space below the lowest floor must be free of obstructions (e.g., free of any building element, equipment, or other fixed objects that can transfer flood loads to the foundation, or that can cause floodwaters or waves to be deflected into the building), or must be constructed with non-supporting breakaway walls, open lattice, or insect screening.* **(See NFIP Technical Bulletin 5-93 and Fact Sheet No. 27.)**