

Floodplain Management Bulletin

Elevation Certificate

May 2004



FEMA

National Flood Insurance Program

Floodplain Management Bulletin Elevation Certificate

This Floodplain Management Bulletin addresses frequently asked questions about the National Flood Insurance Program (NFIP) Elevation Certificate. The bulletin addresses the following questions:

Introduction	2
Frequently Asked Questions:	
1) Are communities required to use the Elevation Certificate to verify compliance?.....	2
2) Can the Elevation Certificate be used to determine the “as built” lowest floor of a structure?.....	3
3) What is the community’s responsibility for ensuring the Elevation Certificate is accurately completed?	6
4) Is it important for the datum used for the elevations obtained in section C of the Elevation Certificate to be the same as the datum used for the Base Flood Elevation in section B.9?	7
5) Why is it necessary to obtain the elevation of a crawlspace floor?.....	8
6) How can the elevation of a crawlspace floor be measured when the area is inaccessible?.....	8
7) How should the total area of permanent openings for section C3.i) be calculated if the openings include some type of cover?	9
8) Why is elevation information needed for certain types of machinery and equipment in section C3.e) of the Elevation Certificate?	10
9) Why is it important for communities to ensure that all machinery and equipment servicing the building is protected?	11
10) What requirements apply to ductwork?	12
11) Can the community use the Elevation Certificate to document compliance for all machinery and equipment servicing the building?	13
12) Why does the Elevation Certificate request the elevation for “Highest Adjacent Grade” and “Lowest Adjacent Grade”? Why doesn’t the Elevation Certificate also request the elevation for “Natural Grade”?	14
13) Is a survey required for Zone AO in order to complete the Elevation Certificate?	15
14) Is it necessary to capture the elevation of a sunken room on the Elevation Certificate?	16
15) If the elevation of the slab foundation or other foundation was surveyed at the time it was poured and no other changes have been made to the structure, is a final elevation certification required after construction is completed?	16
16) Which diagram should be used for manufactured homes that have vinyl or aluminum skirting?.....	18
17) Are Elevation Certificates required for accessory structures, such as a detached garage or a storage shed?	18
18) If an Elevation Certificate is prepared as part of a request for a Letter of Map Amendment (LOMA) or Letter of Map Revision based on fill (LOMR-F), but a Base Flood Elevation is not available in a Zone A, how can a Base Flood Elevation be obtained?.....	19
Further Information, Comments, and Ordering Information	20

Introduction

The **Elevation Certificate** (FEMA Form 81-31) is an important administrative tool of the NFIP. It is used to determine the proper flood insurance premium rate; it can be used to document elevation information necessary to ensure compliance with community floodplain management regulations; and it may be used to support a request for a Letter of Map Amendment (LOMA) or Letter of Map Revision based on fill (LOMR-F). This Floodplain Management Bulletin addresses frequently asked questions about completing and using the Elevation Certificate.

This bulletin is primarily intended to assist local floodplain management officials with responsibility for administering the community's floodplain management ordinance and to assist land surveyors, architects, and engineers who are authorized by law to certify elevation information on the Elevation Certificate. Insurance professionals who use the Elevation Certificate for insurance rating purposes may also find this bulletin useful. The information contained in this Floodplain Management Bulletin is not intended to replace the Instructions section of the Elevation Certificate, but to supplement them.

Because a FEMA Elevation Certificate is needed before most flood insurance policies can be issued under the NFIP, communities are encouraged to obtain and maintain Elevation Certificates so that residents and businesses can easily obtain flood insurance. In order to participate in the NFIP Community Rating System (CRS), communities must require and maintain the Elevation Certificate for all new and substantially improved structures.

References are made throughout this bulletin to various sections in the Elevation Certificate. You can obtain a copy of the Certificate through the Federal Emergency Management Agency (FEMA) Distribution Center or obtain a copy of the Certificate at the website <http://training.nfipstat.com/ecsurveyor/>. This is also the website for the Elevation Certificate tutorial.

Frequently Asked Questions

1) Are communities required to use the FEMA Elevation Certificate to verify compliance?

The NFIP regulations do not mandate that a community participating in the NFIP use a specific form for keeping building elevation records. Under the NFIP, communities are required to obtain the elevation of the lowest floor (including basement) of all new and substantially improved structures and maintain a record of all such information [44 CFR 60.3(b)(5)]. The community's permit files need an official record that documents to what height new buildings and substantial improvements in the Special Flood Hazard Area were elevated. This record is needed to show that buildings constructed in the floodplain are compliant with the community's floodplain management ordinance. While communities can create their own forms for documenting elevation information, communities are encouraged to use the FEMA Elevation Certificate for documenting the elevation of various building elements (section C of the Elevation Certificate) and for documenting building compliance including the lowest floor determination (section G of the Elevation Certificate which is the Community Information section). The advantage of using the Elevation Certificate is that it will help the property owner in obtaining flood insurance since this form is used in determining a flood insurance rate.

In order to participate in the CRS, communities are required to obtain and maintain completed FEMA Elevation Certificates for all buildings constructed or substantially improved in the Special Flood Hazard Area after the community's initial date of application for the CRS. Credit is provided to CRS communities that maintain Certificates for all new and substantially improved buildings. A software

program has been developed to enter Elevation Certificate data into an electronic database using a personal computer. Additional credit is available to CRS communities that maintain Elevation Certificates in a computerized format and provide a disk of the Elevation Certificate data to FEMA each year. You can obtain the software by writing or emailing your request to:

The National Flood Insurance Program
Community Rating System (NFIP/CRS)
P.O. Box 501016
Indianapolis, IN 46250-1016

E-mail: NFIPCRS@ISO.COM

2) Can the Elevation Certificate be used to determine the “as built” lowest floor of a structure?

The local official can use the guidance in Figure 1 on the following pages to help determine which level, based on the elevation information provided in section C of the Elevation Certificate, is the lowest floor. However, the local official should not rely solely on the Elevation Certificate for determining the lowest floor without inspecting the building site and without discussions with the permit applicant. Although section C of the Elevation Certificate records the elevation of the various building floors and components, this section does not specifically identify the “as built” lowest floor of the building or indicate whether the building, as constructed, complies with the community’s floodplain management regulations. The determination of the “as built” lowest floor for compliance with the community’s floodplain management ordinance is the responsibility of the local floodplain management official. The most effective way to ensure compliance is to inspect the site frequently during construction. This is particularly important in the early phases of work on a building because that is when errors in the elevation of the lowest floor can be found and most easily corrected.

The “Diagram Description” in the left hand column below refers to the eight Diagrams included in the Instructions for the Elevation Certificate. The “As Built Lowest Floor Determination” in the right hand column refers to the location that should be the lowest floor based on the type of building for which an “as built” determination is being made. The local official can document the “as built” lowest floor in item G8. of the Elevation Certificate (section G) or can document the “as built” elevation information on other community permit forms. Communities should also conduct the appropriate inspections to verify the elevation information and other information on the Elevation Certificate and to determine the building’s lowest floor to ensure that the building complies with the community’s floodplain management regulations (See Question 15).

Figure 1. “As Built” Lowest Floor Guide

Diagram Description:

“As Built” Lowest Floor Determination

Diagram 1: Slab-on-grade buildings.

A Zones: C3.a, top of bottom floor.

V Zones: See Note 1.

Diagram 2: Buildings with basements.

A Zones: C3.a, top of bottom floor (including basement).

V Zones: See Note 1.

Diagram 3: Split-level slab-on-grade buildings.

A Zones: C3.a, top of bottom floor.

V Zones: See Note 1.

Diagram 4: Split-level buildings other than slab-on-grade.

A Zones: C3.a, top of bottom floor (including basement).

V Zones: See Note 1.

Diagram 5: Buildings elevated on piers posts, piles, columns, or parallel shear walls (no obstructions, but open lattice and/or screening is permissible.)

A Zones: C3.a, top of elevated floor.

V Zones: C3.c, bottom of lowest horizontal structural member.

Diagram 6: Buildings elevated on piers, posts, piles, columns, or parallel shear walls with full or partial enclosure.

A Zones: If the enclosure has proper openings AND is used solely for parking, building access, or storage (see Note 2): C3.b, top of elevated floor.

If the enclosure does NOT have proper openings OR is used for something other than parking, access, or storage: C3.a, top of floor of enclosure.

V Zones: If the enclosure’s walls are break away AND the enclosure is used solely for parking, building access, or storage (see Note 3): C3.c, bottom of lowest horizontal structural member of the elevated floor.

If the enclosure’s walls are NOT breakaway OR the enclosure is used for something other than parking, access or storage: C3.a, floor of enclosure.

Continued on next page

Figure 1. "As Built" Lowest Floor Guide

Diagram Description:

Diagram 7: Buildings elevated on full-story foundation walls with partial or full enclosure.

Diagram 8: Buildings elevated on crawlspace. (See Note 4 on differentiating between a crawlspace and a basement.)

Attached Garage (when garage floor is below the Base Flood Elevation):

Equipment: Under the NFIP, buildings must be constructed with electrical, heating, ventilation, plumbing, and air-conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding. Generally, this is done by elevating equipment above the Base Flood Elevation, but there are ways to floodproof equipment to keep water out.

"As Built" Lowest Floor Determination

A Zones: If the walkout level (enclosure) has the proper openings AND is used solely for parking, building access, or storage (see Note 2): C3.b, top of next higher floor.

If the walkout level (enclosure) does NOT have the proper openings OR is used for something other than parking, access, or storage: C3.a, top of floor of walkout level.

V Zones: See Note 1.

A Zones: If the crawlspace enclosure has the proper openings (see Note 2): C3.b, top of next higher floor.

If the crawl space enclosure does NOT have the proper openings: C3.a, top of floor of crawlspace.

V Zones: See Note 1.

If the garage has the proper openings (see Note 2), then the garage floor (C3.d) is not the "lowest floor" for purposes of determining the as-built lowest floor of the building in item G8 of the Elevation Certificate.

If the building has an attached garage that does NOT have the proper openings, then the garage floor (C3.d) is the "lowest floor" that should be identified in G8.

Even though the building may be properly elevated based on the "as built" lowest floor, it is not a compliant building unless the equipment is properly elevated or floodproofed.

See also *Protecting Building Utilities From Flood Damage*, FEMA 348, 2000.

Continued on next page

Figure 1. "As Built" Lowest Floor Guide

Note 1. V Zone buildings that are constructed similar to Diagrams 1-4, 7 and 8, are violations under the NFIP. For buildings in V Zones the lowest floor is measured at the bottom of the lowest horizontal structural member, which will be the bottom of the slab or a footing.

Note 2. Enclosures and Openings in A Zones (Diagrams 6, 7, and 8). The NFIP Floodplain Management Regulations permit limited uses of enclosures below the lowest floor. The enclosed area below an elevated building cannot be used for other than parking of vehicles, building access, or storage. The enclosure must be built with flood resistant materials. The enclosed areas below an elevated building must contain openings. An opening is defined as: *A permanent opening in a wall that allows for the free passage of water automatically in both directions without human intervention.* Openings are explained on the last page of the Elevation Certificate Instructions and in Technical Bulletin 1-93 on *Openings in Foundation Walls for Buildings Located in Special Flood Hazard Areas* (FIA-TB-1). The number and total area of openings are provided in C3.h and i. The floor area measurement should be on the permit plans.

Note 3. In V Zones, an enclosure (as shown in Diagram 6) must be constructed with non-supporting, non-load bearing breakaway walls, which meet applicable NFIP criteria. The enclosure can only be used for parking of vehicles, building access and storage. The enclosure must be built with flood resistant materials. Flood insurance rates increase significantly when the area of the enclosure is 300 square feet or more.

Note 4. Crawlspace Construction (Diagram 8): If the floor of the crawlspace is below the Base Flood Elevation, NFIP requirements can be met by ensuring that the interior floor of the crawlspace is at or above the lowest adjacent grade to the building and the crawlspace contains openings. If the floor of the crawlspace is below the Base Flood Elevation and the interior floor of the crawlspace is below the adjacent exterior grade on all sides of the building, Diagram 2 or 4 must be used. Additional guidance on crawlspace construction can be found in Technical Bulletin 11-01, *Crawlspace Construction for Buildings Located in Special Flood Hazard Areas*, (FIA-TB-11).

3) What is the community's responsibility for ensuring the Elevation Certificate is accurately completed?

If the community maintains Elevation Certificates on file, it is the community's responsibility to ensure that the Certificate is completed correctly. Communities should do this as a general practice for any elevation certifications even if elevations are provided on the community's own forms or plans. The community should proofread the Elevation Certificate provided by surveyors for any errors or omissions, such as a wrong Flood Insurance Rate Map Index or Panel date or diagram number or for missing information in section C. If there are Certificates that have some of the items omitted or incorrectly filled out, the community has the following options.

- 1) For any inaccurate or incomplete information in items C3.a)-d), f), or g), the local official should request a new Elevation Certificate. If the local official uses elevation information taken

from other documentation that has been signed and embossed by a licensed surveyor, engineer, or architect who is authorized by state or local law to certify elevation information to complete section C, the local official needs to ensure the certified elevations are accurate and complete before entering them in section C. If not, the local official should request new certified elevations. Note: If the community uses elevation information taken from documentation other than the FEMA Elevation Certificate, the local official should check the box in G1. on the Elevation Certificate and indicate in the comment section the source of the elevation data.

- 2) The local official can do the following if incomplete or inaccurate information is found in sections A, B, or C1, C2, and C3.e), h) and i). **Note: The local official should not mark up the form with the correct information because the information in sections A, B and C is certified by a land surveyor, engineer, or architect who is authorized by law to certify elevation information.**
 - a) The forms may be returned to the surveyor with instructions on what needs to be changed or corrected;
 - b) The local official can prepare a separate memo with the correct information and attach the memo to the form. When the Certificate is provided to an inquirer, the memo must be included with it; or
 - c) The local official can note the changes or corrections in section G of the Elevation Certificate under Comments.
- 3) If the community uses Elevation Certificate software or maintains the elevation information in a database, the community can correct sections A and B, and subsection C1, C2, and C3.e), h), and i) when the data from the Certificate is entered into the Elevation Certificate software or database. It must be noted in section G what changes were made to the original paper copy. The local official should check item G1 when data are entered into database or elevation certificate software. The community will still need to keep the original Certificate, but can hand out copies printed from the corrected electronic version.

It should be noted that the community assumes responsibility for the accuracy of the changes it makes. Therefore, data entry for electronic versions should be double-checked.

One way communities can ensure that Elevation Certificates are accurately filled out is to complete sections A and B at the time of the permit application. The partially completed form can then be given to the surveyor who can then focus on completing the surveyed information in section C. If a community does complete section A and B, the surveyor should note in the comment section that the surveyor's certification is limited to section C.

4) Is it important for the datum used for the elevations obtained in section C of the Elevation Certificate to be the same as the datum used for the Base Flood Elevation in section B.9?

Yes. If the datum for the elevations in items C3.a)-g) are not properly converted when necessary, it could result in an inaccurate determination of compliance by the local floodplain management official or it could result in an inaccurate flood insurance rate. In item B1. of the Elevation Certificate, the elevation datum (either NGVD 1929 or NAVD 1988) to which the Base Flood Elevations on the applicable FIRM are referenced should be indicated. All elevations in section C must be referenced to the datum on which the Base Flood Elevation is based. If a datum conversion

is necessary, show the field measurements and datum conversion calculation in section C or in the Comments of section D or G, as appropriate.

5) Why is it necessary to obtain the elevation of a crawlspace floor?

It is very important that the elevation of the crawlspace floor be obtained so that, in the case of new or substantially improved construction, the community can determine compliance of the building with the community's floodplain management ordinance and the insurance agent can properly rate the structure for flood insurance.

If the floor of the crawlspace is below grade on all sides or the crawlspace foundation walls do not have proper openings in accordance with 44 CFR 60.3(c)(5) of the NFIP regulations that allow for the automatic entry and exit of floodwaters into the crawlspace area there is an increased risk of flood damages to the building due to hydrostatic pressure. The crawlspace foundation could be damaged or fail completely. It doesn't matter whether the crawlspace floor is a dirt floor or a finished floor.

The flood insurance rates for structures with crawlspaces up to 2 feet below-grade on all sides are higher than those for buildings that have the interior grade of the crawlspace at or above the lowest adjacent grade, since the risk of flood damage is greater for this type of construction. For structures that have their crawlspace floors greater than 2 feet below-grade, a full basement rate will be charged. These rates are higher still due to the increased risk of flood damage to the building.

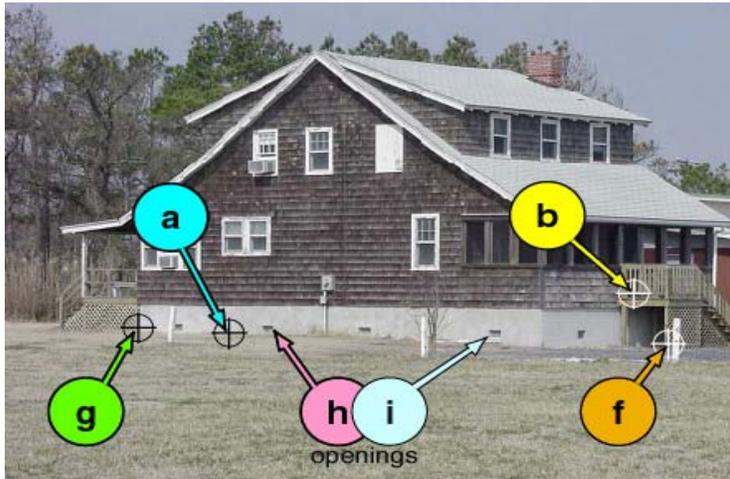
Additional guidance on crawlspace construction can be found in Technical Bulletin 11-01, *Crawlspace Construction for Buildings Located in Special Flood Hazard Areas*, (FIA-TB-11).

6) How can the elevation of a crawlspace floor be measured when the area is inaccessible?

It is recognized that surveyors may not have access to some crawlspaces in buildings due to height restrictions or lack of an access door and may not be able to shoot an elevation of the interior floor of the crawlspace.

If the surveyor has limited access to the crawlspace, such as in the case of the building in Figure 2, and is unable to shoot an elevation of the floor of the crawlspace [C3.a)], the surveyor can do the following:

- a. Use a yardstick or tape measure to check the floor height to the next highest floor, and then subtract the crawlspace height from the elevation of the "next higher floor" [C3.b)]. Provide the elevation in the comment section only and provide a brief description of how the elevation was obtained.
- b. Contact the local floodplain administrator for the community that the building is located in. The community may have documentation of the elevation of the crawlspace floor as a part of the permit process for the building. Provide the elevation in the comment section and provide a brief description of how the elevation was obtained.
- c. If the property owner has documentation or knows the height of the crawlspace floor to the next higher floor, try to verify this by looking inside the crawlspace through any openings or vents. If information appears to be reliable, provide the elevation in the comment section and provide a brief description of how the elevation was obtained.

Figure 2. Limited Access to Crawl Space

Letters equate to items in Section C3. of the Elevation Certificate:

- a) Top of bottom floor
- b) Top of next higher floor
- f) Lowest adjacent grade
- g) Highest adjacent grade
- h) No. of permanent openings
- i) Total area of all permanent openings in square inches.

NOTE: For all three suggestions above, under subsection C3.a) Top of bottom floor (including basement or enclosure) of the Elevation Certificate, the surveyor should indicate the following: “See comments section.”

7) How should the total area of permanent openings for section C3.i) be calculated if the openings include some type of cover?

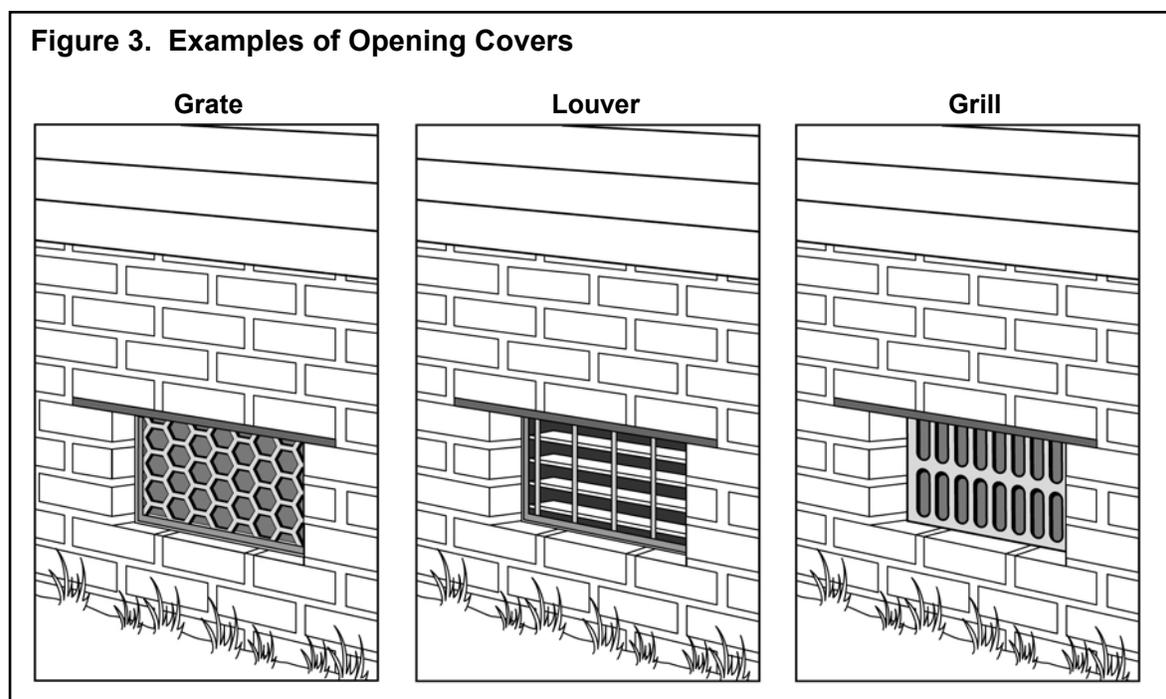
Buildings constructed on extended foundation walls or that have other enclosures below the Base Flood Elevation in A Zones are subject to flood forces that include hydrostatic pressure of floodwaters against the foundation or enclosure walls. If the walls are not designed to withstand hydrostatic pressure, they can be weakened or can fail causing damages to the building. The NFIP Regulations at 44 CFR 60.3(c)(5) require that foundation and enclosure walls of buildings constructed in A Zones contain openings (flood vents) that will permit the automatic entry and exit of floodwaters. These openings allow floodwaters to reach equal levels on both sides of the walls and thereby lessen the potential for damage from hydrostatic pressure. Under the NFIP, the following requirements must be met for all new or substantially improved A Zone buildings that have enclosed areas below the Base Flood Elevation:

- There must be a minimum of two openings and the openings should be on different sides of each enclosed area. If a building has more than one enclosed area, each area must have openings on exterior walls to allow floodwater to directly enter.
- The total net area of all openings must be at least 1 square inch for each 1 square foot of enclosed area.
- The bottom of each opening can be no more than 1 foot above the adjacent grade.

In situations where it is not feasible or desirable to meet the openings criteria stated above, a design professional (registered architect or engineer) may design and certify the openings. See Technical Bulletin 1-93 on *Openings in Foundation Walls for Buildings Located in Special Flood Hazard Areas* (FIA-TB-1) for additional guidance on the openings requirement. In all cases, any grates, louvers, grills, bars, or other opening covers must not block or impede the automatic flow of floodwaters into and out of the enclosed area.

Item C3.h) of the Elevation Certificate asks for the number of permanent openings in the walls supporting the building that are no higher than 1 foot above the adjacent grade and item C3.i) asks for the total area of all such openings in square inches. If there are no permanent openings within 1 foot above the adjacent grade, “0” (zero) should be entered in items C3.h) and i). Also, the surveyor should note in the Comments section whether the openings are in the foundation walls of the building and/or in the walls of any attached garage.

When there are grates, louvers, grills, or other opening covers as indicated in Figure 3, the surveyor can estimate the net open area in the flood vent (total area of all permanent openings in square inches). If the size of the openings, excluding any grates, louvers, grills, or other covers, cannot be estimated, the surveyor can measure the size of the opening, without consideration to the existence of any covers, and indicate in the comment section the type of opening cover that exists. It is the community’s responsibility and not the surveyor’s to determine whether the size, number, and location of the openings meet the requirements of the community’s floodplain management ordinance.



8) Why is elevation information needed for certain types of machinery and equipment in section C3.e) of the Elevation Certificate?

Because the area below the lowest elevated floor of an elevated building is exposed to floodwaters, there is limited flood insurance coverage in this area for Post-FIRM (Flood Insurance Rate Map) buildings located in zones A1-A30, AE, AH, AR, AR/A, AR/AE, AR/AH, AR/A1-A30, V1-V30, or VE. Flood insurance is provided for foundation elements that support the building, access stairs, and certain machinery and equipment items that are considered essential building elements located in enclosed areas below the lowest elevated floor of elevated buildings. The machinery and equipment items include a furnace, water heater, heat pump, air conditioner, and elevator. No coverage is provided for enclosures and only limited coverage is available for personal property contained therein.

For flood insurance purposes, the underwriter needs to know the lowest elevation of at least one covered machinery and equipment item in order to determine if a rate loading or surcharge is necessary.

Thus, the Elevation Certificate requires that the surveyor provide the elevation of the one machinery and equipment item if it is a furnace, hot water heater, heat pump, air conditioner, or elevator in C3.e) that has the lowest elevation and indicate the type of machinery and equipment surveyed in section D. An insurance rate loading is determined based on the elevation of the machinery and equipment item that is below the Base Flood Elevation. Additional information about other machinery and equipment is obtained on Part II of the Flood Insurance Application.

Note that the lowest elevation of machinery and equipment is needed whether the machinery and equipment is located inside or outside of the footprint of the building. For example, if the slab for an air conditioning condenser unit is the lowest elevation of covered machinery, then that is the elevation that should be documented in C3.e). However, the local floodplain management official is required to ensure that all machinery and equipment servicing the building are protected from flooding (See Questions 9 and 10). While the Elevation Certificate requires the elevation of only one machinery and equipment item, Question 11 addresses how community officials can ensure that all machinery and equipment is protected in accordance with the community's floodplain management ordinance and how compliance of these items can be documented.

9) Why is it important for communities to ensure that all machinery and equipment servicing the building is protected?

Protecting a building from flood damage means more than elevating the lowest floor to or above the Base Flood Elevation. Sections 60.3a(3)(ii) and (iv) of the NFIP regulations require that buildings ***“(ii) be constructed with materials resistant to flood damage”*** and ***“(iv) be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.”***

Flood insurance claims as well as post-disaster assessments have shown that significant damage to the machinery and equipment servicing the building (e.g., furnaces, hot water heaters, air conditioners, fuel systems, electrical receptacles, ductwork, and insulation) can occur due to improper design and location of these systems below the Base Flood Elevation. Floodwater often contains dissolved chemicals, silt, suspended solids, and floating debris. Moving floodwater exerts pressure on everything in its path, and causes erosion of soil and scour around solid objects.

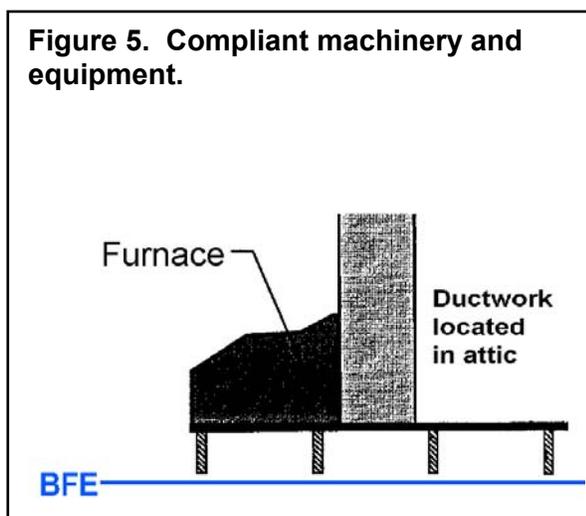
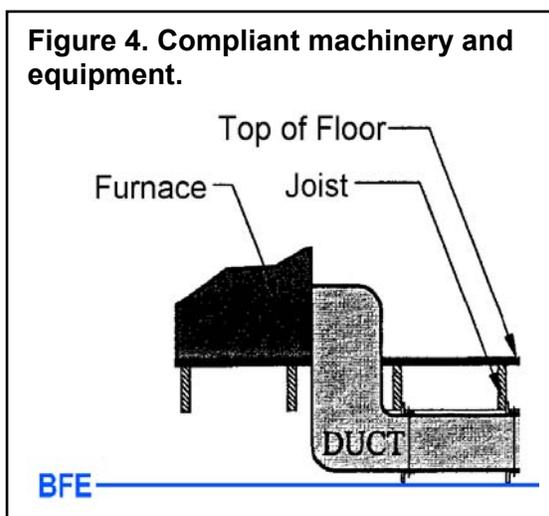
With such destructive characteristics, floodwaters present many hazards to the often-fragile components of building support utility systems including corrosion, contamination, flotation, dislocation, and other physical damages. Improperly designed or located machinery and equipment below the Base Flood Elevation that become dislodged can also increase damages to the structure itself even though the building's lowest floor was high enough. In addition, mold, mildew and fungus accumulating in flood damaged air passageways, such as ductwork, often can lead to serious health issues for residents or occupants of the structure. As a result, improperly designed and located machinery and equipment can result in increased costs and potentially extensive repairs. If the machinery and equipment servicing the building is damaged or destroyed, the building may be unusable for days or even longer.

In A Zones, utilities and equipment must be either elevated to or above the Base Flood Elevation or made watertight to the Base Flood Elevation so that the components are protected from flood damages. In V Zones, utilities and equipment must be elevated to or above the Base Flood Elevation. If not, then the building is not in compliance with the NFIP floodplain management regulations.

10) What requirements apply to ductwork?

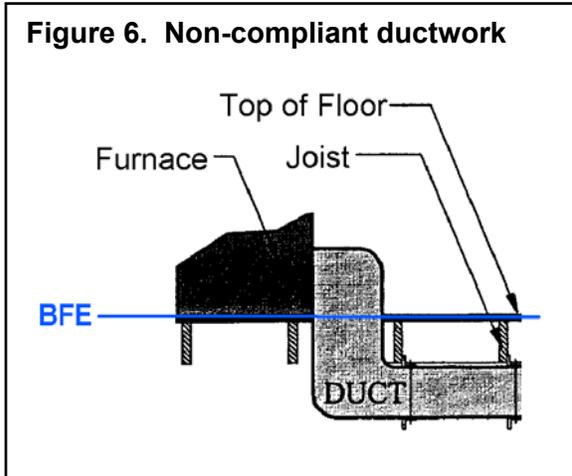
One question that gets frequently raised is related to the requirements that apply to ductwork. Ductwork must be either elevated above the Base Flood Elevation or if ductwork is located below the Base Flood Elevation, it must be made watertight to prevent water from entering or accumulating within the system components when inundated by floodwaters.

Equipment and the supporting distribution system should be elevated such as in Figure 4 or, as an alternative, property owners and builders should consider locating ductwork in the attic as indicated in Figure 5.



Ductwork may only be located below the Base Flood Elevation in new or substantially improved structures in a Special Flood Hazard Area as shown in Figure 6 if it is made watertight. This technique (making ductwork watertight) is only allowed in A Zones. Although it is possible to design and construct ductwork so that it is watertight to keep floodwater from entering the system components, this technique is not commonly used. In V Zones, ductwork must be elevated to or above the Base Flood Elevation.

Ductwork that is not elevated to or above the Base Flood Elevation or is not made sufficiently watertight to keep floodwater from entering the system components is considered non-compliant as shown in Figure 6.



For additional guidance on protecting utilities and other equipment servicing the building from flood damage, see FEMA manual, *Protecting Building Utilities from Flood Damage*, FEMA 348. This document reviews principles and practices for the design and construction of flood resistant building utility systems including ductwork and other equipment from flood damage.

11) Can the community use the Elevation Certificate to document compliance for all machinery and equipment servicing the building?

The community can use the Elevation Certificate to document compliance of all utilities, ductwork, machinery, and equipment or the community can use its own forms to document compliance. The following steps are recommended to communities to ensure that all machinery and equipment are in full compliance with the NFIP.

- Review your community's floodplain management ordinance and verify that it clearly requires elevation and protection of utilities, ductwork, machinery, and equipment to or above the Base Flood Elevation. If not, the floodplain management ordinance should be revised to include these requirements. If in doubt, ask your community's legal counsel whether the ordinance can be interpreted as providing this protection or check with the FEMA Regional Office or the State Coordinator for the NFIP.
- Review your permit application and inspection procedures to determine the best way to ensure that the requirement is being met. This may necessitate procedural changes such as additional information on the permit application form, additional plans provided by the permit applicant, an addition to a field inspection checklist, and/or a photograph for the record at the time of the final inspection.
- Discuss the matter with local builders and architects as necessary. Refer them to FEMA's manual, *Protecting Building Utilities from Flood Damage*, FEMA 348.
- Make sure the building plans clearly indicate that the building's utilities, ductwork, machinery, and equipment, such as furnaces, water heaters, heat pumps, air conditioners, and elevators and their associated equipment, will be properly elevated or that the components located below the Base Flood Elevation will be protected such that floodwater is prevented from entering or accumulating within the system components (watertight) (allowed in A zones only) before issuing the permit.
- Inspect the location of all utilities, ductwork, machinery, and equipment during the course of construction and make a final inspection after construction is completed to ensure that these items comply with the community's floodplain management regulations.

- Make sure that the community records show that utilities, ductwork, machinery, and equipment have been properly elevated or made watertight (A zones only) once construction has been completed. Elevation of these items can be documented in the following ways:
 - The community can document elevation of utilities, ductwork, machinery, and equipment on the community inspection records. The final inspection records can note that the bottom of the items, such as ductwork, are “X” feet above or below the lowest floor or the actual elevation can be used;
 - The community can document compliance of utilities, ductwork, machinery, and equipment in the Comments area of section G of the Elevation Certificate. The community can note in section G that the bottom of these items, such as ductwork, is “X” feet above or below the lowest floor or the actual elevation of these items can be used; or
 - The Elevation Certificate for finished construction requires the surveyor to enter the lowest elevation of one machinery or equipment item – a furnace, water heater, heat pump, air conditioner, or elevator – located in an attached garage or enclosure or on an open utility platform that provides utility services for the building in C3.e). If there is more than one machinery and/or equipment item, the community can require the surveyor to document the elevation of all machinery and equipment and list the type of machinery and equipment in the Comments area of section D when the Elevation Certificate is being used to document compliance. However, the community must still verify through inspections that all machinery and equipment comply with the community’s floodplain management regulations.

NOTE: Ductwork is not included in machinery and equipment that the surveyor must capture in C3.e) of the Elevation Certificate. However, the community can ask the surveyor to document the elevation of the bottom of the ductwork in section D of the Elevation Certificate or a community can document the elevation of ductwork in the community’s inspection records or in section G of the Elevation Certificate.

Where component protection is used for utilities, ductwork, and other machinery and equipment, the community should require documentation on the plans and indicate in the inspection records that these items have been designed and constructed so as to prevent floodwaters from entering or accumulating within the components during conditions of flooding (watertight).

12) Why does the Elevation Certificate request the elevation for “Highest Adjacent Grade” and “Lowest Adjacent Grade”? Why doesn’t the Elevation Certificate also request the elevation for “Natural Grade”?

Both the highest adjacent grade and the lowest adjacent grade are included in section C3. because it provides a clearer picture of how the building is constructed relative to the terrain. It also helps to verify that the diagram number chosen for the building is most similar to the building surveyed. This is particularly important for insurance rating since the underwriter at the insurance company will likely never see the building.

In Zones A1-30, AE, AH, AO, A (with a Base Flood Elevation), VE, V1-30, V (with a Base Flood Elevation) AR, AR/A, AR/AE, AR/A1-30, AR/AH, and AR/AO, natural grade information should be obtained by the community as part of the floodplain development permit application. The natural grade information should be obtained at this stage before any permit is issued in order to determine the

relationship between the natural ground and the Base Flood Elevation. This information is necessary in order to determine how high the building ultimately needs to be elevated. This information can be obtained from topographic information or from spot elevations obtained as part of site plans or drainage plans.

The community should document the natural grade information on the permit application or in section G of the Elevation Certificate. If the Elevation Certificate is used as part of the permit application and the building elevation is based on construction drawings, then the “Construction Drawings” box should be checked under item C1. of the Elevation Certificate.

13) Is a survey required for Zone AO in order to complete the Elevation Certificate?

No. Section C, which must be completed and certified by a surveyor, is not required for Zone AO. Only sections E and F are required to be completed. The information in section E is all that is needed in order to rate the structure for insurance purposes provided that sections A and B are also completed. However, if the elevations are intended for use in supporting a LOMA or LOMR-F, section C must be completed with certified elevations.

Although a survey is not required for Zone AO to complete the Elevation Certificate, the local floodplain management official must take appropriate actions to ensure that the structure is built in compliance. In Zone AO, all new and substantially improved buildings must have the lowest floor (including basement) 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) [44 CFR 60.3(c)(7)]. Under the NFIP, highest adjacent grade means ***“the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.”*** (44 CFR 59.1).

In order to ensure that a building in Zone AO is properly elevated, the community will have to determine that the lowest floor (including basement) is above the highest adjacent grade at least as high as the AO Zone depth. This may include reviewing grading plans and looking at topographic information before the building is constructed, and conducting inspections during the course of construction and before the building is occupied.

As part of the administration of the community’s subdivision ordinance, a community may already be requiring grading plans and other site information in which the elevation of the ground is provided as part of the subdivision review. The local floodplain management official should check the ground elevation information as part of the permit process in an AO Zone so that it can be used later to determine whether the lowest floor is above the highest adjacent grade at least as high as the AO Zone depth. The community should document the ground elevation information in the floodplain development permit file or in section G of the Elevation Certificate.

If the community does not require a site plan or grading plan, the community could require a survey of the ground elevation, check topographical information, if it is available and is sufficiently detailed, or require the builder to place a reference mark on the site so that the local official can determine that the building is elevated on fill to or above the required number of feet above natural grade.

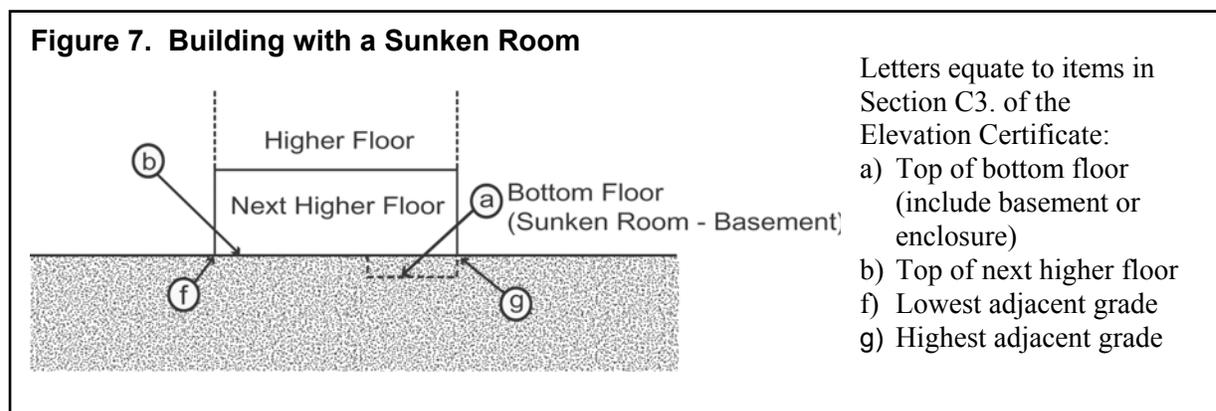
Communities shall not base their lowest floor determination on the completion of section E by the property owner or his or her agent. Under the NFIP, it is the community’s responsibility to ensure that the building is built according to the permit application. The local floodplain management

official should conduct a sufficient number of inspections to ensure that the building is built in compliance.

14) Is it necessary to capture the elevation of a sunken room on the Elevation Certificate?

Yes. The elevation of a sunken room or a sunken area within a room should be captured on the Elevation Certificate in item C3. of the Elevation Certificate at either C3.a) “Top of the bottom floor” or C3.b) “Top of next higher floor” depending on its location above or below other floors such as a basement. The floor of the sunken room could be considered the “lowest floor” under the community’s floodplain management ordinance depending on its location relative to other floors. The sunken room could also be considered the “lowest floor” for insurance rating purposes.

If the sunken room is below grade on all four sides as illustrated in Figure 7, it is considered a basement and Diagram 2 should be selected for item C2. of the Elevation Certificate.



15) If the elevation of the slab foundation or other foundation was surveyed at the time it was poured and no other changes have been made to the structure, is a final elevation certification required after construction is completed?

Yes. Once construction of the building is completed, the community must obtain "as built" elevation information on the building to determine whether the building is compliant in accordance with 44 CFR 60.3(b)(5)(i). As indicated in question 1, there is no mandated form – the community can use its own form or the Elevation Certificate to document the “as built” elevation information. These elevations need to be surveyed by a surveyor, engineer, or architect who is authorized by law to certify such elevation information. Use of a tape measure is not sufficient for determining “as built” elevation information and cannot be used for completing section C of the Elevation Certificate for the various floor elevations of the building required on the Certificate.

The “as built” elevation information must be obtained before an occupancy permit is issued. While construction is underway and changes can be more easily made to bring the building into compliance, the community should still verify that the building is elevated to the proper elevation and that other building elements will be protected from flood damages. Community floodplain management officials should not assume that construction and development will proceed as spelled out in the approved permit. The most effective way to ensure compliance is to inspect the building

site frequently during construction. A series of at least three inspections is recommended for any project that involves construction of a building in the floodplain.

The first inspection should be done before the ground is broken to determine that the site as identified on the permit application and proposed plans are consistent with actual ground conditions. This provides the local official an opportunity to check the floodplain/floodway boundaries, any setback lines, channel banks, etc.

A second inspection is recommended just before installation of the lowest floor to ensure that this floor will be built at the elevation stipulated in the permit application, and the foundation is the type specified in the plans. The type of foundation may dictate the schedule for this inspection. For example, if the building has a slab foundation, the inspection is best done when the forms are placed. If the forms for the slab are high enough, the local official can approve pouring the slab. In another example, if the building has an elevated foundation, (e.g., crawlspace), the inspection is best done when the foundation is completed. If the top of the foundation of the crawlspace is high enough, the local official can approve placement of the floor.

Making sure the lowest floor is properly elevated is the key to the entire floodplain construction process. The floor elevation can be checked during the second inspection in a couple of ways. The local official can require the builder to obtain a certification of the floor elevation or alternatively, the local official can use a hand level to determine whether the lowest floor will be as high as the reference mark established by the builder's surveyor before construction began. This reference mark could be located on a nearby stationary object such as a telephone or light pole or the surveyor could establish the reference mark on a stake. Use of a hand level will give the local official a rough estimate that the building will be constructed to the correct elevation. However, it is not as accurate an elevation as a survey.

During the second and later inspections the local official should also begin checking other building elements against the permit and the plans, such as whether the fill meets necessary compaction, slope, and protection requirements; the location of utilities are being properly protected; and if any openings are required, they are of the appropriate number and size and are located at the appropriate height above grade.

The local official should conduct a final inspection and obtain the "as-built" elevation certification to determine if the lowest floor is at the proper elevation. This inspection should be done as the project nears completion and before the certificate of occupancy or certificate of compliance is issued. The "as built" certification can be documented on the Elevation Certificate or on the community's own forms or on the plans. During this final inspection, all building elements (such as enclosures, openings, utilities, ductwork, machinery and equipment, breakaway walls, and anchoring) need to be thoroughly inspected to ensure that they comply with the community's floodplain management regulations.

For insurance purposes, for a building under construction, the survey should include only the elevations surveyed in items C3.a)-g). The remaining elevations, if applicable, should be obtained from the construction plans or drawings and entered as Comments in section D. Buildings in the course of construction are rated the same as completed construction. A renewal application and a new Elevation Certificate are required at renewal time once the building has been completed. The new Elevation Certificate should then be based on "Finished Construction" in item C1.

16) Which diagram should be used for manufactured homes that have vinyl or aluminum skirting?

If the vinyl or aluminum skirting is purely for decorative purposes, the skirting can be disregarded and Diagram 5 can be used in both A and V Zones. However, if the area below the manufactured home's lowest floor is enclosed by something other than vinyl or aluminum skirting, it may be an enclosure in which case Diagrams 6 or 8 may be more appropriate. The surveyor can note in the Comments section whether the manufactured home includes vinyl or aluminum skirting. Openings are not required if vinyl or aluminum skirting is used.

The local official should document on the permit whether skirting will be used or whether the area below the manufactured home's lowest floor will be an enclosure before issuing a permit. If an enclosure is created below the manufactured home's lowest floor, the enclosure can only be used for parking, access, or storage. If the manufactured home is located in an A Zone, the enclosed area must include openings [44 CFR 60.3(c)(5)]. If it is located in a V Zone, the area below the lowest horizontal structural member of the lowest floor must be either free of obstruction or constructed with non-supporting breakaway walls, open-wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the manufactured home or supporting foundation system [44 CFR 60.3(e)(5)].

17) Are Elevation Certificates required for accessory structures, such as a detached garage or a storage shed?

If a community requires that an accessory structure must be elevated to or above a specified elevation, then an Elevation Certificate or similar documentation will be needed to ensure that the accessory structure was built in compliance. Communities may allow accessory structures that are not elevated or dry floodproofed (made watertight) provided that they represent a minimal investment and are designed to have a low damage potential with respect to the structure and contents. These structures could include a two-car detached garage or smaller or a small shed. Generally, a community should allow wet floodproofed accessory structures only through its variance process unless it has established specific criteria in its floodplain management regulations. If the community allows wet floodproofed accessory structures, a certification of the elevation of the lowest floor to which the accessory structure is built is not required.

The Dwelling Form of the Standard Flood Insurance Policy written to cover a 1-4 family residence also covers a detached garage on the lot, but the coverage is limited to no more than 10 percent of the limit of the liability on the dwelling. Use of this insurance coverage is at the policyholder's option but reduces the building limit of liability on the main building. In this case, an Elevation Certificate is not required for the detached garage to be covered under the Dwelling Form.

If the property owner chooses to separately insure the detached garage under the Standard Flood Insurance Policy, then an Elevation Certificate will be required. Also, an Elevation Certificate is required if the property owner chooses to individually insure other accessory structures under the Standard Flood Insurance Policy.

18) If an Elevation Certificate is prepared as part of a request for a Letter of Map Amendment (LOMA) or Letter of Map Revision based on fill (LOMR-F), but a Base Flood Elevation is not available in a Zone A, how can a Base Flood Elevation be obtained?

Zone A identifies a Special Flood Hazard Area, studied by approximate methods, for which no Base Flood Elevations have been developed or provided as part of the Flood Insurance Study. Because an Elevation Certificate may be used to obtain a LOMA or LOMR-F, a surveyor may need to obtain a Base Flood Elevation at a building site in order to complete the Elevation Certificate. In some cases, Base Flood Elevations may already exist in the approximate Zone A area for which the Certificate is needed. There are several sources that a surveyor can check in order to obtain a Base Flood Elevation. The following list highlights three major sources for potential Base Flood Elevation data:

- 1) State and local agencies: Check with the community floodplain management official. A Base Flood Elevation may have been developed as part of the floodplain development permit process before the building was constructed. Other local sources include the local public works department or the local transportation department, which may have developed flood data in designing sewer and storm drainage systems or local roads. Also, check with state agencies, such as Department of Natural Resources or a Geological Survey, which may have conducted flood studies using state funds, or the Department of Transportation.
- 2) Other Federal Agencies: Information regarding Base Flood Elevations may be obtained from other Federal agencies involved in floodplain management. Some of the sources of Base Flood Elevation data may include the U.S. Army Corps of Engineers, U.S. Geological Survey, or the Department of Agriculture, Natural Resources Conservation Service.
- 3) FEMA may have detailed flood information that has not yet been incorporated into the community's Flood Insurance Study. Data requests should be directed to the FEMA Map Assistance Center at 1-877-FEMA MAP. In some circumstances FEMA can calculate a Base Flood Elevation if the data to develop the Base Flood Elevation is available in the back-up data to the Flood Insurance Study.

In some cases, a Base Flood Elevation may have to be developed for the building site by a qualified engineer. A list of additional sources for existing data as well as guidance in developing Base Flood Elevations can be found in the publication, *Managing Floodplain Development in Approximate Zone A Areas, A Guide for Obtaining and Developing Base (100-year) Flood Elevations*, FEMA 265/July 1995

NOTE: If the Elevation Certificate is to be used to support a LOMA or LOMR-F request, the Certificate must be submitted along with the application, supporting data, signatures, and FEMA review fees (only for LOMR-Fs), as appropriate, before the LOMA or LOMR-F can be processed.

Further Information

The Elevation Certificate and the Surveyor's Guide to the Elevation Certificate can be found at <http://training.nfipstat.com/ecsurveyor/>. The Elevation Certificate can be downloaded at this site.

Managing Floodplain Development in Approximate Zone A Areas, A Guide For Obtaining and Developing Base (100-year) Flood Elevations, FEMA 265, July 1995. Additional guidance pertaining to obtaining and developing Base Flood Elevations in Zone A can be found in this publication.

Openings in Foundation Walls for Buildings Local in Special Flood Hazard Areas in accordance with the National Flood Insurance Program, Technical Bulletin 1-93, FIA-TB-1 (4/93).

Protecting Building Utilities From Flood Damage, Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems, FEMA 348, November 1999.

To obtain a copy of these publications, see the section on Ordering Information below. They are also available to view and download from <http://www.fema.gov/library/prepandprev.shtm/mit>.

Comments

Any comments on the Floodplain Management Bulletin should be directed to:

FEMA
Mitigation Division
500 C St., SW
Washington, D.C. 20472

Ordering Information

- Copies of the Elevation Certificate and Instructions (FEMA Form 81-31) and the above listed publications are available from:

FEMA Distribution Facility
P.O. Box 2012, Jessup, MD
20794-2012.

FEMA's Distribution Facility also accepts telephone requests (1-800-480-2520) and facsimile requests (301-362-5335).

- Copies of the Floodplain Management Bulletins can also be obtained from the appropriate FEMA regional office.